



XF / XJ

ALL- WHEEL DRIVE

MEDIA INFORMATION PACK



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ALL-WHEEL DRIVE JAGUAR XF AND XJ OFFER OPTIMISED ABILITY IN ALL GRIP CONDITIONS

AT-A-GLANCE

■ Jaguar is introducing a new All-Wheel Drive (AWD) system to selected 2013 Model Year XF and XJ saloon cars for left-hand drive markets*.

■ The AWD system is powered exclusively by Jaguar's new 3.0-litre V6 supercharged petrol engine in 340PS form driving through an eight-speed automatic transmission and featuring Stop/Start technology.

■ Jaguar AWD operates 'intelligently', continuously monitoring grip levels and driver inputs to both pre-empt and react to wheel-slip, enabling maximum traction in all conditions.

■ Feed-forward torque distribution allows the system to actively anticipate wheel slippage and prevent it occurring, therefore providing greater driver confidence and vehicle stability in low-grip scenarios. Torque split can be up to 50:50 front/rear.

■ At speed in normal grip conditions the AWD system delivers drive predominantly to the rear wheels, thus providing the dynamic driving experience all Jaguars are renowned for, while maximising powertrain efficiency.

■ Suspension and steering systems have also been reengineered in order for the AWD XF and XJ to match their rear-wheel drive counterparts' acclaimed driving dynamics.

*For full market availability details, please contact your local PR representative.



INTRODUCTION

“THE SYSTEM DELIVERS ALL THE TRACTION BENEFITS YOU WOULD EXPECT, BUT THE AWD XF AND XJ ARE STILL VERY REWARDING CARS TO DRIVE - WHICH WAS EXACTLY OUR INTENTION”

A new All-Wheel Drive (AWD) system has been developed by Jaguar for its XF sports saloon and XJ flagship, specifically to increase their capability and versatility in weather conditions in which grip may be compromised. The system has been created in response to customer demands for Jaguar models with all the driver involvement and feedback for which the marque is renowned but with the added layer of confidence that AWD provides in low-grip conditions.

The system, developed using Jaguar Land Rover expertise in AWD, is based around the new 340PS 3.0-litre V6 supercharged petrol engine, allied to the acclaimed ZF eight-speed automatic gearbox and Jaguar Intelligent Stop/Start. The new engine is the perfect partner to the AWD system thanks to its high specific output that provides unruffled refinement and smooth, safe power and torque delivery whatever the conditions underfoot.

In order to maintain the essential Jaguar driver appeal the system is rear-wheel drive-biased and

has undergone 18 months of extensive cold weather and all-surface testing to ensure that steering integrity and suspension refinement are unaffected. The longitudinal engine installation means Jaguar's engineers were able to retain the rear axle as the primary drive path, with a multiplate clutch within the transfer case apportioning torque to the front axle as dictated by grip conditions and driver inputs.

The primary benefit of this system is that both the AWD XF and XJ remain every bit as agile and communicative as their rear-wheel drive counterparts with no dilution of steering feel or feedback during spirited driving. In dry road conditions the system will deliver drive predominantly to the rear axle while constantly monitoring grip levels, steering and throttle inputs, allowing it to intervene unobtrusively and almost instantaneously should it detect the possibility of wheel-slip, delivering torque to the front axle as appropriate to maximise traction.

The AWD dovetails with Jaguar Drive Control to add yet another layer of security and confidence by allowing the driver to select Winter mode

which pre-warns the system that traction may be compromised and causes it to allocate a greater proportion of drive torque to the front axle. Integration with the Dynamic Stability Control and anti-lock braking systems allows each wheel to be braked individually and torque apportioned from side-to-side across each axle to further enhance security.

Offered in appropriate left-hand drive markets only, the sole external differentiation between these and rear-wheel drive XF and XJ models is the addition of '3.0 AWD' badging on the bootlid. The AWD system is available with both standard and long-wheelbase derivatives of the XJ.

As Ian Hoban, Vehicle Line Director, Jaguar Cars explains: "What we are most proud of is the fact that our All-Wheel Drive system preserves all the dynamic qualities of our rear-wheel drive Jaguar saloons in terms of handling, steering quality and ride refinement while adding a new depth of ability in low-grip conditions. The system delivers all the traction benefits you would expect, but the AWD XF and XJ are still very rewarding cars to drive - which was exactly our intention."



3.0-LITRE V6 SUPERCHARGED PETROL ENGINE

Providing the power for the All-Wheel Drive system is Jaguar's new all-aluminium 3.0 V6 S/C 340 petrol engine, which features new combinations of cutting-edge technology allowing it to deliver a smooth, refined and thrilling 340PS at 6500rpm. Most importantly for the AWD application is a muscular 450Nm peak torque output produced from 3500-5000rpm, with 400Nm available from just over 2000rpm for superb low-down pulling power.

The 3.0 V6 S/C 340 utilises dual independent variable cam timing (DIVCT) and spray-guided direct injection (SGDI), allied to new spark plug orientation that aligns the electrode precisely within the combustion chamber for enhanced

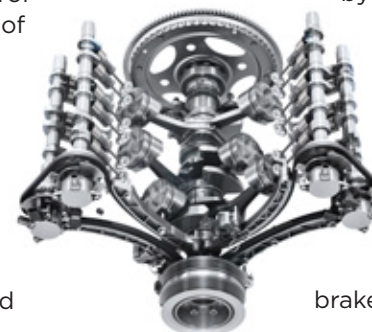
efficiency. These features, along with a compression ratio of 10.5:1, optimise power, torque and economy throughout the rev range.

The latest twin-vortex Roots-type supercharger is mounted in the 'V' of the engine and features electronically managed boost control which offers operating efficiencies of up to 20 per cent. An innovative system of counter-rotating front and rear balancer weights devised by Jaguar's engineers ensure the V6's refinement matches that of the marque's acclaimed 5.0-litre petrol V8s.

The 3.0 V6 S/C 340 is complemented by the Jaguar-tuned

eight-speed automatic transmission from ZF. This transmission's large spread of ratios allows the engine's prodigious power and torque to be fully exploited by the AWD system while optimising economy and emissions. Manual control is offered by steering-wheel-mounted paddles.

Efficiency is also boosted by Jaguar's Intelligent Stop/Start system which improves fuel consumption by up to five per cent on the EU combined cycle. Utilising a twin solenoid starter, the system is able to restart the engine in less time than it takes for the driver's foot to move from the brake to the accelerator.



ALL-WHEEL DRIVE HARDWARE

The All-Wheel Drive system utilises the eight-speed automatic gearbox, standard on all XF and XJ models for the 2013 Model Year, but modified to accept the fitment of a transfer case with an active coupling which directs torque to a new front propshaft, front differential and halfshafts as required.

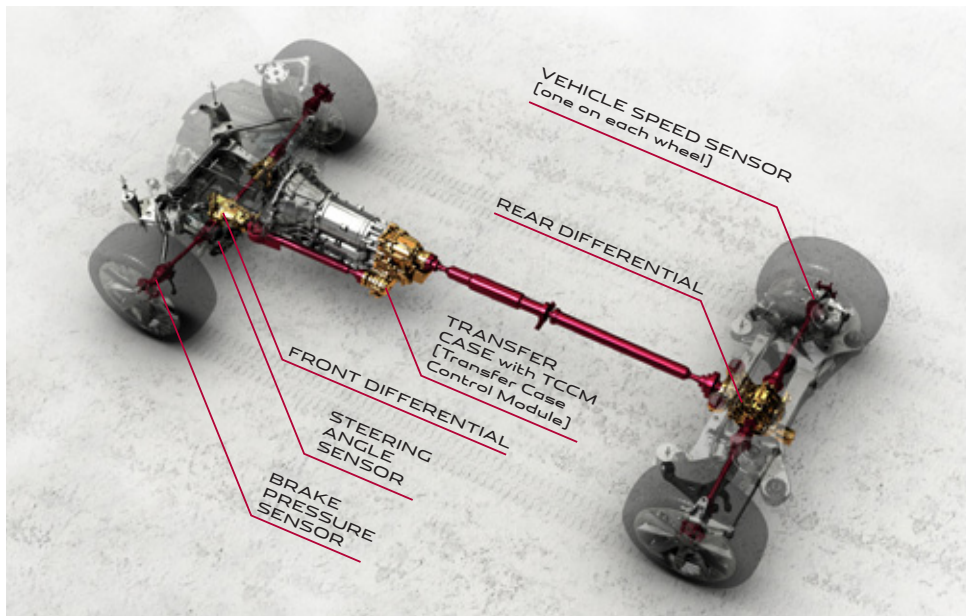
The multiplate wet clutch coupling directs torque through the front propshaft as dictated by the Transfer Case Control Module (TCCM), which monitors grip levels and driver inputs, apportioning the torque front and rear as appropriate.

In order to accommodate this All-Wheel Drive hardware in both the XF and XJ, a new front subframe, cross member, engine mounts and exhaust system have been engineered. The system has been optimally packaged with the front driveshafts running through the engine sump for a lower centre of gravity. The engine itself receives a recalibrated ECU to allow it to communicate with the active transfer case while under-bonnet modifications have been carried out to the fuel lines, hoses, air intake and exhaust to accept the new systems. A new engine undertray and heatshield incorporates a transmission tunnel acoustic pack to ensure refinement is identical to the rear-wheel drive models.

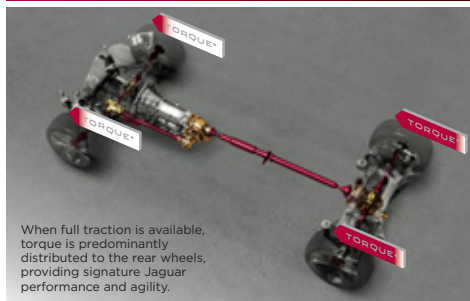
A number of other key components were reengineered in order to preserve the essential Jaguar dynamic qualities of the XF and XJ. High-pressure power steering hoses and a new front knuckle design allow the directionality and feedback of the steering systems to replicate the rear-wheel drive cars. Front suspension systems are substantially upgraded, receiving new springs, dampers and anti-roll bars. Rear suspension springs and dampers are modified while the XJ is additionally fitted with a new anti-roll bar. Both models receive a recalibration of the software controlling the Adaptive Dynamics suspension system (standard on the XJ AWD, optional on the XF).

HOW THE AWD SYSTEM WORKS

OVERVIEW

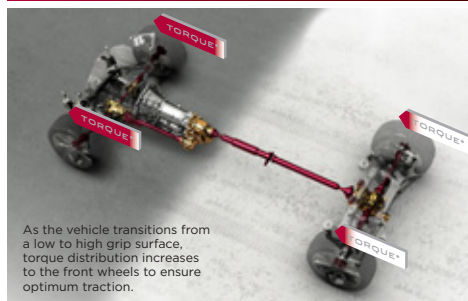


DRY ROAD CONSTANT SPEED



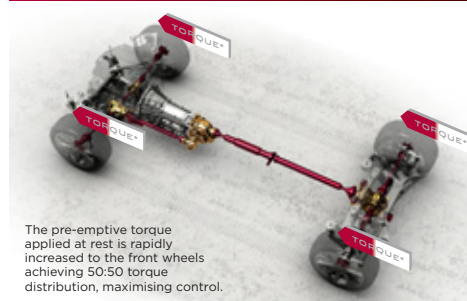
When full traction is available, torque is predominantly distributed to the rear wheels, providing signature Jaguar performance and agility.

LOW TO HIGH GRIP TRANSITION



As the vehicle transitions from a low to high grip surface, torque distribution increases to the front wheels to ensure optimum traction.

FULL THROTTLE, LOW GRIP SURFACE



The pre-emptive torque applied at rest is rapidly increased to the front wheels achieving 50:50 torque distribution, maximising control.

*Applied torque to the wheels represented by red sections

UNOBTRUSIVE OPERATION

A guiding principle throughout the development of the AWD system was that whatever the conditions there should be no penalty in terms of ride quality, agility or driver enjoyment and that both XF and XJ AWD models should offer the same involving handling as their rear-wheel drive counterparts.

In order to achieve this Jaguar's engineers spent 18 months testing the system in a variety of conditions including the frozen lakes and split-grip surfaces of the Jaguar Land Rover development facility in Sweden.

The All-Wheel Drive system was carefully integrated with the existing electronic dynamic and safety programmes to enhance the functionality of each one and create a surefooted overall package governed by the TCCM.

In dry road conditions, the All-Wheel Drive system operates in such a manner that all the dynamic qualities of the rear-wheel drive models are preserved by prioritising torque delivery to the rear axle. The exception to this is on pull-away from rest when a pre-load torque is always applied to the front wheels to ensure smooth, fuss-free and consistent initial acceleration.

This is governed by the feed-forward element of the control algorithms, whereby situations in which wheel-slip might occur are predicted and accounted for by delivering torque to the front wheels as a pre-emptive measure to eliminate the possibility of a loss of grip. Because it is an active, rather than passive, torque delivery method, feed-forward allows the car to offer all-wheel drive security entirely unobtrusively while retaining the dynamic rear-wheel drive handling characteristics expected of a Jaguar.

The system constantly monitors road conditions, throttle and steering inputs and should any slip be detected between the front and rear axles the TCCM will automatically apply reactive feed-back torque to negate any difference in front and rear wheel speeds. The maximum torque split is 50:50 front to rear.

When operating in Winter mode – selected by using the Jaguar Drive Control buttons – the feed-forward function is strengthened to pre-empt the possibility of wheel-spin. In addition, the Dynamic Stability Control system constantly monitors wheel-slip across each axle and uses the anti-lock braking system to selectively brake each of the four wheels as necessary to prevent wheel-spin.

Jaguar Drive Control also offers the enthusiastic driver the option of Dynamic mode in which throttle response is sharpened and the gearbox is instructed to upshift more quickly and at higher revs. Dynamic mode also firms up the damper settings in vehicles equipped with Adaptive Dynamics to deliver more precise, controlled body movements to enhance handling. In Dynamic mode, the All-Wheel Drive system operates in the same manner as in Normal mode.





WINTER TESTING

In order to thoroughly develop and test the All-Wheel Drive systems in the XF and XJ, the engineering team used a dedicated Jaguar Land Rover proving facility on the edge of the Arctic circle. The testing complex, near the town of Arjeplog in Northern Sweden, experiences average winter temperatures that never rise above freezing, making it the ideal location to test at the extreme end of any vehicle's operating conditions.

The proving ground is centred around a frozen lake, which, with ice up to half a metre thick, provides a consistent and safe surface for on-the-limit testing of the All-Wheel Drive system. In addition, specially constructed stretches of heated tarmac allow the engineers to assess and fine tune the behaviour of the cars when they encounter a split-grip surface with, for instance, the wheels on one side of the car on tarmac and the other side on snow or ice.

The cars are constantly monitored, even during something as mundane as a trip to the local shops. Testing takes place over several months to cover a range of conditions from deep midwinter snow to spring thaw.

TECHNICAL SPECIFICATION*

Jaguar XJ 3.0 V6 S/C AWD

Engine	3.0-litre V6 Supercharged petrol
Capacity (cc)	2995
Bore/Stroke (mm)	84.5/89
Peak Power (PS@rpm)	340@6500
Peak Power (kW@rpm)	250@6500
Peak Torque (lb/ft @rpm)	332@3500-5000
Peak Torque (Nm@rpm)	450@3500-5000
Transmission	Eight-speed automatic, all-wheel drive
Intelligent Stop/Start	Yes
Final Drive Ratio	2.56:1
0-60mph (secs)	6.1
0-100km/h (secs)	6.4
Top Speed (mph km/h)	155 250 (limited)**
Combined Economy (l/100km US mpg)	9.8 19
CO ₂ Emissions (g/km)	234



Jaguar XF 3.0 V6 S/C AWD

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*Manufacturer's estimates

**When fitted with summer tyres. North American cars fitted with All-Weather tyres will be limited to 121mph/195km/h as dictated by the speed rating of the tyres.





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