



*Lotus Cars*

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## **Limited Edition Lotus Sport Exige 240R**

### **Highest Performing, Limited Edition Exige:**

Lotus Sport, the performance division of Lotus Cars Ltd., has developed the Lotus Sport Exige 240R, a limited edition high performance sports car with total global build volumes kept strictly to 50 cars.

Lotus Sport will build the Lotus Sport Exige 240R within its facilities at the Group Lotus Headquarters in Hethel, Norfolk. This facility, located in the centre of the famous Hethel Test Track, has a great history of producing bespoke versions of Lotus products and can list the Lotus Sport Exige 400 hp racecar and over 100 Elise and Exige racing cars in its portfolio.

With a supercharged and intercooled high revving engine producing over 240 hp and over 170 lbft of torque, the Lotus Sport Exige 240R reaches 60 mph in less than 4 seconds and 100 mph (160 km/h) in less than 10 seconds before topping out at 155 mph (249 km/h). At this top speed the advanced aerodynamics produce 113 kg of downforce increasing grip, stability and safety.

The 50 versions of the Lotus Sport Exige 240R will be built as post registration official factory conversions of new Lotus Exiges. Up to 40 of these cars will be sold in the EU and the balance is intended to be predominantly sold in Japan. The suffix of 240R indicates the approximate horsepower of the engine, conservatively rounded down from the actual figure of 243 hp (181 kW, 247 PS). The total unladen weight is approximately 930 kg and the power to weight is approximately 261 hp / tonne (195 kW / tonne, 266 PS / tonne).

All 50 cars will be built to order and to further identify and maintain the exclusivity of the Lotus Sport Exige 240R, they will only be available in Sport Yellow or Sport Black – both unique and exclusive colours specifically blended to denote the brand colour scheme of Lotus Sport.

The Lotus Sport Exige 240R will be sold at a Recommended Retail Price of £43,995 (62,000 Euros).

The Lotus Sport Exige 240R also has a unique interior trim in black with Lotus Sport Yellow highlights in leather. A unique numbered Lotus Sport build plate is fitted to the aluminium chassis member on the passenger side. The interior also includes sports seats, driver and passenger four-point harnesses which are fitted to a cross bar that is part of the motorsport specification T45 roll bar.

New lightweight five spoke forged alloy wheels are of a slightly wider section to the standard Exige wheel to accommodate the optional extra track only specification slick tyres as well as the Yokohama A048 tyres, which come as standard. These wheels are painted in "Satin Black" for the Sport Yellow painted version of the Lotus Sport Exige 240R and "High Power Silver" for the Sport Black painted version.

In addition to the powerful four-cylinder engine, the Lotus Sport Exige 240R also includes specially developed Lotus Sport parts including upgraded brakes, stiffer springs and 2-way adjustable Ohlins dampers with ride height adjustment, an adjustable front anti-roll bar, twin oil coolers and an Accusump.





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Clive Dopson, Managing Director of Lotus Cars Ltd. is very enthusiastic about the new Lotus Sport Exige 240R: "The Lotus Sport Exige 240R is a classic example of Lotus' focused attitude to performance through lightweight. We believe that this car, even though it will be built in small volumes, is a very significant addition to the Lotus product portfolio and will go down in history as such. I am sure that the fortunate fifty customers of the car will agree."

Chris Arnold, General Manager for Lotus Sport comments: "The Lotus Sport brand has been around for a number of years, and in that time has developed a number of performance upgrades for customers. The Lotus Sport Exige 240R is probably the most complete in-house Lotus Sport product that has been developed. It is a testament to the capability of the Elise platform and the competence of the standard Exige that we haven't had to make any structural changes to the car to accommodate the power of a 3 litre engine, albeit in the guise of a 1.8 litre engine."

Chris Arnold continues: "These fifty cars are unique, both in appearance and in equipment levels. After we have made these fifty cars, we will not be building any more to this complete specification. Lotus Sport has the Lotus product experience to be able to chose the right components for the Lotus Sport Exige 240R so if customers want the ultimate road going Exige, I recommend that they do not delay and contact their nearest Lotus dealer as soon as possible!"

### **The Lotus Sport Exige 240R in More Detail**

The Lotus Exige, unveiled to the world in the spring of 2004 is a phenomenal sports car. However in the quest to continuously improve performance of the Exige, Lotus Sport needed to either reduce the weight of the whole vehicle or increase the power of the engine.

The Exige is, of course, built to the lightest specification possible without resorting to expensive and rare materials normally found in the rarified environment of Formula One or Aerospace Industries where weight reduction is often considered more important than cost. The performance improvements had to be made through increasing the power of the engine without significantly increasing the weight of the engine and therefore the overall weight of the car.

The standard Exige uses a 189 hp (141 kW, 192 PS) 2ZZ-GE 1.8 litre VVTL-i (Variable Valve Timing with Lift – intelligent) engine supplied by Toyota. This high revving engine is governed to a maximum engine speed of 8500 rpm with a change between two cams (a high speed cam and a low speed cam) at between 5800 rpm and 6200 rpm depending upon the operating conditions of the car.

The supercharged engine in the Lotus Sport Exige 240R has a maximum power output of 243 hp (181 kW, 246.8 PS) at 8000 rpm and a torque figure of 174 lbft (236 Nm, 24 kgm) at 7000 rpm. This vast amount of extra power and torque now available means that the cam change between the low-speed cam and the high-speed cam now takes place at around 4000 rpm giving a smooth and linear surge of power from 4000 rpm all the way to the maximum 8500 rpm.

The equivalent power output of a standard 3.0 litre engine was the target when the initial research and feasibility study got underway in the Autumn of 2004. Working closely with Lotus Engineering's world leading Powertrain Research Team, the advanced 1.8 litre VVTL-i 2ZZ-GE engine was fitted with a supercharger and intercooler system

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#### **Engine Down-Sizing is the Key**

One of the key demands of the automotive industry is to produce engines with not only low emissions and high fuel economy but also extremely good performance. These two demands for performance and economy are not normally compatible unless there is a significant change in the engine development strategy.

Lotus Sport required more horsepower and torque for the Lotus Sport Exige 240R and therefore approached Lotus Engineering's Powertrain Team, who had been conducting extensive research into "engine downsizing". Engine downsizing is the concept of using advanced technologies to enable a small engine to produce the power and torque of a much larger engine, with the obvious reduction in fuel consumption and emissions.

Lotus is one of the first organisations to not only recognise the changing market and legislative demands but also to actually develop a solution to the problem – supercharging a high compression ratio and high speed engine.

Lotus Sport and Lotus Engineering had to ensure that there were minimal changes to the base 2ZZ-GE engine, which arrives fully dressed from Toyota for the Exige and the Elise 111R. The lightweight 2ZZ-GE engine, with a compact metal matrix composite alloy cylinder block, is a perfect unit on which to conduct the necessary research, as it runs to a high 8500 rpm, with a very high compression ratio of 11.5:1. The only changes needed to be made to the engine were the addition of a low pressure Eaton M62 Supercharger (and the longer drive belt that this requires), the intercooler and a new intake manifold, plenum and induction system.

The Roots-type Eaton M62 supercharger (with a sealed-for-life internal mechanism meaning that it does not require the use of the engine's oil) is run from the crankshaft, and has an integral bypass valve for part load operation.

Charge air (air under pressure from the supercharger) is cooled through a Lotus Sport Air to Air intercooler (the cooling air enters via the roof scoop) before being fed into the engine itself

All charge air ducting has been kept as short as possible with large diameter pipes making sure that the bends in these ducts are not too tight, to the benefit of throttle response and efficiency.

#### **Extra Functions for the Lotus T4 Engine Management System.**

The Lotus T4 Engine Management system was developed for the Elise 111R and the Exige and is used again in the Lotus Sport Exige 240R. This engine management system has been reprogrammed to optimise the supercharged engine with two additional functions of controlling a fifth injector (located downstream of the intercooler to add additional fuel flow under hard acceleration or high speed driving) and to control the bypass valve.

The lightweight C64 six-speed gearbox (with an aluminium casing) is fitted with the closest ratios and gearset afforded by the transmission, the gearbox offers a fast, precise and light gearshift, ensuring drivers have total control and flexibility to apply the power exactly as and when required.





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Jamie Turner, Chief Engineer of Powertrain Research for Lotus Engineering explains more about the engine being a significant development for Lotus: "The basic architecture of the 2ZZ-GE engine is perfect for Lotus Engineering to put its research into engine downsizing into practice as it is a very high revving engine with a very high compression ratio. With a 1.8 litre engine we have produced the horsepower and effective torque of a standard 3 litre engine which gives us the benefits of light weight and reductions in fuel consumption and emissions. The automotive industry is having to downsize its engines and I think that it would be fair to say that Lotus is one of the first high performance vehicle manufacturers to successfully act upon these strategic demands."

#### **Performance**

The Lotus Sport Exige 240R has been tested extensively both at Lotus' Headquarters in Hethel, Norfolk as well as at test facilities around Europe. With a 0-60 mph (0-96 km/h) time of 3.9 seconds and a 0-100 mph (0-160 km/h) time of 9.9 seconds, the latest addition to the Exige stable has become one of the quickest accelerating production cars in the world. But of course straight line speed is not what a Lotus is all about. An impressive top speed of 155 mph (249 km/h) disguises the capability of the Lotus to lap circuits or cover great distances quickly.

So with a 22% increase in power and a 23% increase in torque with just a 1.5 % (approximate) increase in weight, the Lotus Sport Exige 240R has a power to weight ratio of 261 hp / tonne (195 kW / tonne, 266 PS / tonne) so sticking rigidly to the Lotus core philosophy of Performance Through Light Weight.

#### **Exterior**

All fifty examples of the Lotus Sport Exige 240R will be painted in a high metallic content paint in either in Sport Yellow or Sport Black – both unique and exclusive colours specifically blended to denote the brand colour scheme of Lotus Sport.

The Lotus Sport Exige 240R uses Lotus specific Yokohama A048 tyres (rated W and annotated with "LTS") to maximise grip and achieve the ride and handling targets set by Lotus.

New lightweight Lotus Sport five spoke forged alloy wheels have a slightly wider section, when compared to the standard Exige wheel, to accommodate the optional extra track use only specification slick tyres. These wheels, with Lotus Sport etched on one spoke of each wheel, are painted in "Satin Black" for the Sport Yellow painted car and "High Power Silver" for the Sport Black painted car.

The brake system has been upgraded with sport brake pads, high grade silicon brake fluid, metal braided brake hoses and Sport Yellow painted brake calipers (AP Racing on the front and Brembo on the rear) are all linked to the proven Lotus track tuned servo-assisted four-channel ABS system that enhances braking performance and minimising stopping distance without taking over from the skill of the driver.

To suite their own driving style and road conditions, drivers will now be able to tune the near perfect Exige suspension with the Ohlins two-way adjustable dampers (which have 22





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compression and 60 rebound settings) and ride height adjustment to reduce the ride height from 130 mm to 120 mm and an adjustable front anti-roll bar.

An oil "Accusump" is included in the Lotus Sport Exige 240R package as an oil reservoir backup for extreme track use. Cornering speeds and the lateral forces generated within the car when driven on the track are far higher than what can be experienced safely on the road and the "Accusump" ensures that, under these extreme conditions, the engine oil pressure remains constant.

A "Stage One" sports exhaust is fitted with the bifurcated exhaust pipes exiting from the centre of the anodised-finish 3-piece rear diffuser. Front driving lamps, twin oil coolers, central door locking, alarm (with immobiliser) and air conditioning (weighing in at a minimal 15 kg, 33 lbs) completes the equipment package for the Lotus Sport Exige 240R.

#### **Aerodynamics**

The Lotus Sport Exige 240R uses the same aerodynamic package as the standard Exige. Of course like all Lotus cars, the Lotus Sport Exige 240R isn't all about straight-line performance. The Lotus Sport Exige 240R is one of the quickest cars from A to B and around a circuit. Key to this incredible performance is the aerodynamic package, which creates 113 kg of downforce (53 kg front and 60 kg rear) at the maximum speed of 250 km/h (155 mph). At 100 mph (160 km/h) the downforce is the same as the standard Exige being 41.2 kg (90.64 lbs) at 100mph (19.3 kg, 42.46 lbs front and 21.9 kg, 48.18 lbs rear). This downforce ratio between front (47%) and rear (53%) is, of course, balanced and remains constant at the speeds of which the Exige is capable. This class leading aerodynamic package is provided through the aid of the following:

- Completely flat underside of the car – provided by the elegantly simple strong yet light weight extruded and bonded aluminium tub
- Anodised rear diffuser which helps promote the "Venturi effect" underneath the car
- Deep front splitter which sits just 98 mm (minimum) and 108 mm (maximum) from the ground (giving just enough ramp angle clearance) whilst still maintaining the aerodynamic properties and of course the aggressive stance.
- Fixed rear wing that is set at the optimum 11.5 degree angle for the best compromise between downforce and drag.

#### **The legendary chassis and body**

Of course, the Lotus Sport Exige 240R is built around the revolutionary and award winning extruded and bonded aluminium tub, with a light weight steel rear subframe, as used in the Elise 111R. The chassis tub itself weighs just 68 kg (150 lbs) and has a stiffness of 10,500 Nm per degree.

The body of the Lotus Sport Exige 240R remains unchanged from the Exige as it is already a winning formula that is both effective and stunning to look at.





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#### Interior

Each Lotus Sport Exige 240R is individually numbered. The individual numbers, 1 to 50, will be stamped on unique numbered Lotus Sport build plates. The build plate is clearly visible on the aluminium chassis member on the passenger side of the cockpit.

The unique interior trim takes the black and the yellow theme of the exterior paint colours by using predominantly black trim with Lotus Sport Yellow highlights on certain components including the gearstick gaiter, the handbrake gaiter, and padded leather door inserts. The black sports seats also use the Sport Yellow theme with padded highlights and bespoke woven Exige branding on the headrests.

The lightweight but strong composite sports seats hold the driver of the Lotus Sport Exige 240R under the high g-forces that will be experienced under cornering, acceleration and braking on the track. As part of the post-registration process, four-point harnesses are fitted for both driver and passenger – attached to the chassis and to the cross bar (part of the T45 roll-bar).

The small 320 mm offset steering wheel is perfectly suited to coaxing and guiding the Lotus Sport Exige 240R along some of the finest roads and around the most challenging of circuits. The lightweight extruded aluminium pedals are perfectly positioned for efficient heel and toeing – a technique that many drivers will wish to perfect to be able to exploit the performance of the car and drive it how it was meant to be driven.

Twin instrumentation dials show road speed and engine speed (up to 10,000 rpm) with the graphics and orange back lighting showing the key information clearly and effectively.

A four speaker Blaupunkt stereo system with CD player is provided as standard along with a radio receiver wiring loom including a dipole aerial kit located in the front of the Lotus Sport Exige 240R.

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#### **Summary of Equipment on Lotus Sport Exige 240R (in addition to the standard equipment on the Lotus Exige):**

- Limited edition of 50 examples supplied in either Sport Yellow or Sport Black.
- Individually numbered, 1 to 50, stamped on unique numbered Lotus Sport build plates
- Lotus Sport Yellow gearstick gaiter
- Lotus Sport Yellow handbrake gaiter
- Lotus Sport Yellow padded leather door inserts
- Black sports seats with Lotus Sport Yellow padded highlights and bespoke woven Exige branding on the headrests.
- Lightweight but strong composite sports seats with four-point harnesses
- Roots-type Eaton M62 supercharger (with a sealed-for-life internal mechanism) and integral bypass valve for part load operation.
- Lotus Sport Air to Air Intercooler
- Lotus specific Yokohama A048 tyres (rated W and annotated with "LTS")
- Wider section lightweight Lotus Sport 5-spoke alloy wheels (Optional extra track use only specification slick tyres) painted in "Satin Black" for the Sport Yellow painted car and "High Power Silver" for the Sport Black painted car.
- Upgraded brake system with Sport brake pads, high grade silicon brake fluid, metal braided brake hoses and Sport Yellow painted brake calipers (AP Racing on the front and Brembo on the rear).
- Ohlins two-way adjustable dampers with ride height adjustment
- Adjustable front anti-roll bar
- "Accusump" oil reservoir backup
- Sports exhaust – "Stage One"
- Anodised-finish 3-piece rear diffuser
- Front driving lamps
- Twin oil coolers
- Air conditioning
- Lotus Sport Exige 240R exterior decal

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#### **Notes:**

High-resolution pictures of the Lotus Sport Exige 240R can be downloaded from the media centre of the official Group Lotus website at <http://www.grouplotus.com/mediactr>. The image library is for registered users only. Members of the press may register for the media centre.

The full reference to the Paper about the Supercharging of the 2ZZ-GE engine is as follows:

"The Performance of a High Compression Ratio, High Speed Supercharged Engine", presented by Lotus Engineering at the Global Powertrain Congress, September 2004, in Dearborn, Michigan. Authors: Jamie Turner, Richard Pearson and Andrew Parrott, Lotus Engineering.

#### **About Group Lotus plc:**

The main operating subsidiary of Group Lotus plc is Lotus Cars Ltd., which has two operating divisions - Lotus Cars and Lotus Engineering:

Lotus Cars builds and commercialises Lotus sports cars, Elise and Exige; builds sportscars for General Motors and manufactures the advanced composite front and rear crash structures for Aston Martin V12 Vanquish.

Lotus Engineering provides comprehensive and versatile consultancy services to many of the world's OEMs and Tier 1 suppliers, offering a full engineering service from initial concept and project design through development to full production prototype build.

#### **Lotus Sport**

Lotus Sport is the performance arm of Lotus Cars Ltd and is located at the Norfolk Head Office next to the famous Hethel test track. The department designs and builds modified versions of the standard Lotus road cars with special emphasis on upgraded performance, improved ride and handling packages and race specific safety equipment.

Individual performance parts to customise or upgrade a vehicle are available via Lotus Sport and its workshops can service, repair, restore or upgrade a standard road or competition Lotus.

In addition, Lotus Sport provides a range of driving packages using the renowned Hethel test circuit, including driver training and corporate days, as well as offering enthusiasts a guided tour of the Lotus factory.

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