



ROVER-K-SERIES SUPERCHARGER KIT – FREQUENTLY ASKED QUESTIONS

Background

The Hangar 111 K-Series Supercharger kit transforms a standard or modified Lotus Elise S1, S2, 111S, Exige S1 or 340R into a smooth, drivable high performance road or track day car without upsetting the cars dynamics. Cylinder head, engine and exhaust system changes will normally be required to get the best performance from the supercharger kit which is capable of delivering between 190bhp and 260bhp+.

Q: Is this a re-launch of the Turbo Technics Supersport TT190, TT215 or TT230 Kits?

A: No. This is a new kit developed by Hangar 111 that features 3 components that we purchased outright from Turbo Technics in 2009. These components have been redesigned and will be produced by Hangar 111 during 2012.

Q: How much does the kit cost?

A: There are a number of options including a complete turn-key solution – the “K260” and a separate standalone supercharger kit for those who would like to build their own engine and cylinder head. Prices can be found on our website at the link below:

<http://www.hangar111.com/rover-k-series-supercharger-kit.htm>

Q: What is included?

A: The “K260” is our complete ‘turn-key’ solution and gives appx 260bhp and 190lbft of torque at 6750rpm. The standalone supercharger kit will allow between 190bhp and 260bhp+ to be achieved depending on the engine and cylinder head setup used.

The “K260” Kit is full installed and setup and includes the following:

- Ported & Polished Cylinder Head (converted to big valves if head is standard).
- Fully Balanced Engine Block with low-compression Pistons, matched con-rods, bearings and liners.
- Supercharger Kit with all brackets, fuel injectors, fuel pump, silicone hoses, alloy pipes and plenum and air filter
- Chargecooler Kit with all silicone hoses, brackets, pump and pre-cooler.
- All fasteners, wiring, relays and small components.
- All coolants, lubricants, gaskets and sealants.
- 4-2-1 Exhaust Manifold and Sports Catalyst.
- Emerald K6 Engine Management & Mapping.

The “Standalone SC Kit” features over 200 components and includes the following:

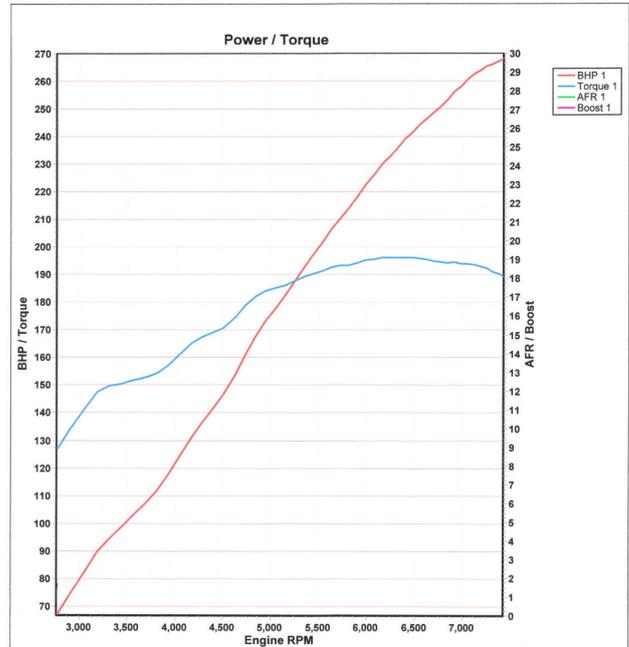
- Supercharger Kit with all brackets, fuel injectors, fuel pump, silicone hoses, alloy pipes and plenum.
- Chargecooler Kit with all silicone hoses, brackets, pump and pre-cooler.
- All fasteners, wiring, relays and small components.
- Air Filter Kit

The Standalone kit does not include: - Installation; ECU & Mapping; Exhaust Manifold, Catalyst); Engine & Cylinder head modifications; Air filter kit; Coolants.

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PLOT 1 FILE: D:\at_w88h111s6.r01 DATE: 29/11/2011 TIME: 15:40:37
Hangar 111 Supercharged Elise S1 +2
258.2 BHP / 742.9 l/min (118 mph) 196.3 lbft / 6396 l/min





Q: Can the kit be fitted to cars with air-conditioning?

A: Yes, but the air conditioning system must be removed to make space for the supercharger, therefore cars fitted with air conditioning will lose their air conditioning. The normal heater system will be unaffected.

Q: How long will it take to install the kit?

A: This depends on the specification. For example if you have the K260 full install, we will require your car for a minimum of 10 working days to install the engine, the supercharger and setup the kit.



Q: Does the K260 kit re-use my engine or do you supply a new one?

A: The engine block and cylinder heads are on an exchange basis. Each block and head are fully tested.

Q: Do you supply fitting instructions?

A: Yes – to an extent. With so many differences between cars, we are unable to cover all eventualities but we do provide documentation for the basic kit installation.



Q: Which type of supercharger does the kit use?

A: We use a specially modified Rotrex C30 unit that is custom built only for Hangar 111.

Q: I already have a Turbo Technics TT190, TT215, TT230 kit installed but my Supercharger is broken. Can I use your supercharger kit and how much will it cost?

A: Yes. We have designed the kit to be compatible with Turbo Technics supercharger kits. The original boost will be matched to the original TT kit specifications and the car must then be remapped (with an Emerald ECU). The cost depends on which parts of the original kit you would like to keep. For example, we can re-use the original TT chargecooler however it is not as efficient as our own design Chargecooler system as it is appx ¼ of the size with a much lower coolant flow rate.

Q: Can I buy the kit on it's own?

A: Yes – there is a standalone kit available that includes everything apart from Exhaust components, ECU, Engine and Cylinder head. You will need to rebuild your engine and head to a low-compression configuration for the kit to perform reliably and achieve high power output.

Q: Will the kit work with my polished and ported cylinder head?

A: Yes – but the final power output will depend on how much work has been carried out on the head and what it is capable of flowing. We can convert standard Rover K heads into a 'Big Valve' head that will match the flow of a VVC cylinder head.

Q: Can I supply my own engine for the build?

A: Yes – but we are unable to guarantee any parts that we do not supply.

Q: Can I re-use my exhaust, induction kit and sports catalyst.

A: Yes. We can recommend what might need to be changed to get best performance, but generally existing components can be re-used. If any restriction is present then we will let you know when we are testing the vehicle.

Q: Can I add camshafts to the kit.



A: Yes. Because we map the car when the build is completed any additional parts that are fitted will be optimised if they are suitable. We can advise you on the best components for this purpose.

Q: Can you send a kit to the USA/Europe/Australia?

A: Yes. We can provide a shipping cost to send the kit to world-wide destinations

Q: How much weight does the kit add to the car?

A: Appx 18kg's with all fluids on board.

Q: Does the kit upset the cars weight distribution?

A: No. The balance of the car was checked after the kit was completed and the car maintains a 39.5/60.5 weight distribution. The development car weighed appx 788kg's with a full tank of fuel.

Q: How was the kit conceived?

A: That's a not a quick question to answer! We're very proud to have opened up a new avenue for the K-Series engine so here's a brief summary!

During 2011 we developed an Elise Series 1 111S (VVC Engine) with our supercharger kit to produce 268bhp and 196lb/ft of torque. The engine work was carried out by the customer to a specification that was pre-agreed, using internal components supplied by Hangar 111.

The K260 Project Car was developed with the following objectives in mind:

- Torque – To deliver a 'bend the seats back' level of torque – giving the impression of a much larger engine
- Durability – This was to be a road and track-based car – not a competition car (but this is also possible)
- Driveability – To ensure that the car was round-town drivable and not a headache on the open road

There was a rough budget set for the development which would include the design, drawing and fabrication of around 50 brand new parts and the incorporation of three components for which we had purchased casting molds for. There were five key elements to the overall design:

Engine Block

To ensure maximum durability and the ability to consume boost, the original K-Series VVC engine was stripped, rebuilt and setup with low-compression (8.5:1) pistons and matched rods. The complete bottom end was then balanced as a single unit - crank, crank pulley, rods, pistons, flywheel and clutch cover. Cylinder Liners were replaced and the block was "decked" to ensure correct liner height was achieved.

Cylinder Head Rework

The VVC Cylinder head already has the large inlet and exhaust valves needed for a job like this, therefore the head was ported and polished and a small amount of material removed from the chambers (around the valves) to further reduce the compression ratio. A replacement BP270 exhaust camshaft from Piper Cams was installed when the engine was rebuilt.

Supercharger Kit

The supercharger kit design was the longest part of the project. While the engine and head were all built in line with traditional methods, the supercharger kit would be a new design complete with all the associated challenges that would bring. Creating something that was cool running, easy to maintain and reliable in operation was the main aim. From the brackets to the pipes, hoses and fasteners – everything was carefully engineered to ensure that the kit would be durable. The Rotrex C30 charger unit that we chose is of a small footprint, features it's own separate oil system (with reservoir) and is smooth and quiet in operation. Boost is restricted not by a pulley, but by a carefully designed restrictor collet that we install into the charger inlet.

Chargecooler

Our experiences with the design and implementation of chargecooler systems for our Elise 111R and Exige S supercharger kits and upgrades gave us the basis for the chargecooler here. The design of a chargecooler has a number of subtle elements that must be balanced out to give the best possible unrestricted flow and volume while maintaining a cold environment to cool the boost from the charger. Our chargecooler maintained a cool 37°C inlet temperatures during extensive testing under load. This significantly reduces thermal stresses to the cylinder head while at the same time giving better fuel mixture performance and allowing full ignition advance – thus enabling more torque delivery.



Exhaust System

Boost is all well and good, but at the other side of things gas flow is critical. The exhaust is probably one of the most restricting factors in a forced induction system. It is also layered with subtle design considerations that can influence choice when a manifold, catalyst or rear silencer is sought for such an engine setup. Our experience developing torque while tuning the K-Series for normally aspirated applications came in here. A traditional 4-2-1 manifold design has always worked well with the normally aspirated K-Series engine – providing the correct primary tube diameters aren't too large that the whole system causes a loss of back-pressure. So we have selected a large bore 4-2-1 exhaust manifold with a 200 cell sports catalyst (for MOT and noise purposes) along with one our own Signature Sports Exhaust systems (an optional extra) – specially designed for low-noise and best possible gas flow.

Other Items

Fuel injectors and fuel pump were all installed on this vehicle. Injectors were sized according to power targets and what we had learned through our years of supercharging the Toyota 2ZZ engines.

If you would like further technical information regarding the Rover K-Series Supercharger Kit please do not hesitate to contact us:

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Alternatively email us at technical@hangar111.com and we will respond as soon as possible. You can visit our website at www.hangar111.com for more information.