2000 SVT Mustang Cobra R Overview

SVT MUSTANG COBRA R SETS PERFORMANCE BENCHMARK The Ford Special Vehicle Team's 2000 SVT Mustang Cobra R is the pony car icon taken to the extreme of pure performance. Developed specifically for racing, 300 of these vehicles will be built at Ford's Dearborn Assembly Plant in March, 2000, and shipped to selected SVT certified dealers. "This is the fastest, the best-handling Mustang ever. It will set a performance benchmark for the competition," says John Coletti, Ford Special Vehicle Engineering manager. "Cobra R combines high-performance hardware and engineering that go a long way toward making it the best of the breed." Tom Scarpello, specialty vehicle marketing manager at Ford, says the 2000 Cobra R is both a race car and a modern icon. "Three hundred people will be able to have a lot of fun in this car, and be very competitive racing it," Scarpello says. "That's what Mustang, and Cobra R in particular, is all about. This car elevates the whole *idea* of Mustang - without changing what it's been for more than 35 years." Cobra R equipment includes a 385-horsepower (estimated) 5.4-liter 4-valve DOHC V8 engine from Ford's modular family, a McLeod aluminum flywheel, a Tremec six-speed manual transmission, 18 x 9.5-inch wheels and tires, Brembo 4-piston aluminum front brake calipers, Eibach racing springs, and a 21-gallon Fuel Safe fuel cell. A rear wing and front splitter provide high-speed aerodynamic stability. The car's top speed is more than 170 mph. Winning on a road course is all about transitions in and out of corners, and handling those corners is the 2000 Cobra R's forte. With lateral acceleration higher than 1.0g on the 100-foot skidpad, Cobra R sets a new benchmark for road-holding in its class. "Everything we've done on this car is a notch, or several notches, above anything we've done before," Coletti says. "This 2000 Cobra R pushes the performance envelope far beyond the capabilities of any previous Mustang." **Engine and Drivetrain**
Producing 385 bhp and 385 lb.-ft. of torque, the Cobra R's engine shows the performance capabilities of Ford's overhead-cam modular family, says Coletti. "One of our goals is to make the Ford modular engine family the performance benchmark of the industry. This application demonstrates its real potential. This engine is street-legal, EPA certified, and very driveable for its high power output." For the Cobra R, SVE developed high-flow aluminum cylinder heads, with dual overhead camshafts and four valves per cylinder. At the bottom, a Canton Racing Products oil pan provides extra oil capacity, reduced windage losses and improved oil control under racing conditions. To cool the synthetic oil used in the Cobra R's engine, an air-to-oil cooler system is mounted behind the front fascia. The exhaust system consists of short-tube headers leading into a Bassani X-pipe system with catalytic converters, which was chosen to achieve emissions compliance and improved sound quality. Borla produces the Cobra R's unique mufflers and side-exit pipes. The side-exit routing is used to provide more clearance at the rear for the 20-gallon fuel cell. To handle the engine's power, it was necessary to upgrade several components in the drivetrain that were designed for the standard Cobra's 320 horsepower and 317 lb.-ft. torque output. The engine is mated to a Tremec T-56 six-speed manual transmission, the first time any Mustang has been equipped with a six-speed gearbox. The transmission provides closer ratios for racing, as well as the robustness necessary for the engine's torque. It is fitted with a special mounting bracket and reinforcement system for extra strength and stiffness. The clutch is the 11-inch single plate unit used in the Cobra, which in durability testing proved capable of handling the horsepower and torque of the Cobra R engine. Visteon supplies the Cobra R's hydro-mechanical differential with speed and torque sensitivity. For racing demands, it provides predictable performance and greatly improved torque transfer capability. Speed sensitivity is achieved with a gerotor pump, which is activated when the half shafts rotate at different speeds. When this happens, the pump applies hydraulic pressure through a piston to compress the clutch pack, transferring torque to the other wheel. The differential's torque sensitivity provides immediate torque transfer, which is very helpful in maintaining grip during straight-line acceleration. When one wheel spins relative to the other, the differential's beveled helical gears produce an axial force that tries to separate them and, like the

gerotor pump's action, compresses the clutch pack to transfer torque. The final drive ratio is 3.55:1, compared with the Cobra's 3.27:1. The rear axle half-shafts are unique to Cobra R. These are induction-hardened GKN units with the strength to perform reliably under the 5.4-liter engine's higher torque loads. Shaft diameter is unchanged from the Cobra, but the inner splines have 31 teeth instead of 28, the inner tulips are a tripod design, and the right-side shaft is shorter to accommodate the larger differential. **Suspension and Steering**

To complete the performance equation, the SVE team has engineered the Cobra R's suspension to provide handling that matches its high power output. The Cobra R's suspension follows the SVT tuning philosophy for road cars - compliant and subtle - but at a much higher level, with a strong emphasis on race-track handling. The engineers optimized tuning to balance center-of-gravity height, aerodynamic downforce, ride height, overall grip on bumpy roads, along with driving fun and driving ease at the limit. The result is a car that achieves a remarkable lateral acceleration measurement over 1.0g on the 100-foot skidpad. This compares with 0.89g for the '99 Cobra, and it also exceeds the numbers posted by Cobra R's best-handling competitors. The 2000 Cobra R is equipped with Eibach coil springs, which lower the car 1.5 inches in front and 1.0 inches at the rear, and make a major contribution to its handling capabilities. The front spring rate is 800 lb./in., while the rear rate is 750 lb./in. This compares with 500 lb./in. front and 470 lb./in. rear on Cobra. These spring rates make the Cobra R 30 to 40 percent stiffer than the production '99 Cobra, and capable of carrying a significant amount of aerodynamic downforce. Bilstein shock absorbers with digressive valving provide the wheel control for Cobra R's racing application. The front shocks are gas-charged monotube while the rears are gas-charged twin-tube. Testing proved that Cobra's front and rear stabilizer bars provided the handling characteristics that the chassis engineers required for the Cobra R. Compared with Cobra, all the Cobra R's suspension control arm and rear subframe bushings are made of stiffer material, which improves handling by reducing compliance-steer under the higher cornering, acceleration and braking forces generated in racing. In addition, the outer pivot of the upper control arm has been relocated to provide increased camber. Cobra R is equipped with fundamentally the same steering package as Cobra - a rack-and-pinion system with 15:1 ratio and 2.5 turns lock-to-lock. For Cobra R, the boost curve has been revised to give more precise overall feel, and the T-bar is stiffer to give on-center feel and feedback more suitable for racing. The rack stops are revised to accommodate the larger wheels and tires as well as the lowered ride height. The tie rod ends have been lowered 4mm to decrease bump steer with the car's lowered ride height, and their boots have been upgraded for more heat resistance. For the extremes of racing conditions, Cobra R's power steering fluid is cooled by an air-to-oil cooler behind the front fascia, and also by a water-to-oil cooler integrated with the engine radiator. **Brakes, Wheels, Tires**

To provide the kind of ultra-competitive braking capability the SVE team required, the Cobra's Brembo 13-inch vented front rotors have been fitted with Brembo four-piston aluminum calipers on the Cobra R. Air inlets designed into the Cobra fog light bezels are used to provide extra cooling for the Cobra R's front brakes. Air ducts run from these inlets to special carbon-fiber heat shields fitted around the inside of the brakes to intercool the rotors. These heat shields are race-proven through development and use by Multimatic Motorsports, racing 1999 Cobras in the Motorola Cup series. The rear brake rotors and calipers are not changed from the Cobra, but special racing pads have been specified, which are 1mm thicker. These pads provide increased temperature stability, longer life and also help to decrease stopping distance. The 2000 Cobra R is equipped with 18 x 9.5-inch, five-spoke aluminum alloy wheels with the Cobra R emblem on their center caps. These wheels provide the extra clearance required for the larger front brake calipers and, fitted with specially manufactured 265/40ZR18 BFGoodrich g-Force KD tires, help give the elevated level of handling the SVE team demanded for this new Cobra R. **Chassis and Bodywork**

Cobra R's basic body structure is the same as any other Mustang. In fact, one of the team's objectives was to use as much existing componentry as possible, both for tooling cost management and to keep the manufacturing and assembly process as close as possible to the standard Mustang. Items deleted to reduce weight and enhance performance include all chassis sound damping material, trunk trim

and spare tire cover, the rear seat and rear trim. Even the 21-gallon fuel cell, produced by Fuel Safe for the Cobra R, uses the same mounting points as the stock tank, as well as the current production filler neck and evaporative system. The Cobra R's rear deck and rear fascia are the same as used on the Mustang V6 model. The Cobra rear fascia incorporates exhaust-pipe cutouts, which are not needed on the Cobra R due to its unique side-exit system. Unique Cobra R body parts include a specially designed rear wing and front splitter (*see* *Special Features*) which, along with the lowered ride height, reduce front lift and increase rear downforce. The splitter itself virtually eliminates front-end lift above 100 mph. The splitter/wing combination dramatically increases the car's aerodynamic stability, and the effects are especially noticeable approaching the car's top speed of more than 170 mph. The "power dome" hood, also unique to the Cobra R, provides the extra clearance necessary for the engine's intake system. **Interior**

Cobra R's interior reflects the car's high-performance capability. Recaro seats provide the firm lateral support that is essential for drivers subjected to the high g-forces of racing. Cobra R's B&M Ripper shifter gives drivers the advantages of short throws and positive stops, and also provides added durability for the rigors of racing. The shift lever is topped by a leather-wrapped knob embossed with the six-speed shift pattern. In the instrument cluster, the speedometer has been changed to an 180-mph read-out. In the rear, the seat has been replaced with a closure panel that covers the floor pan. The area is covered by carpet that extends up the back and is held in place with velcro.

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