

'03-'04 COBRA TECH & TUNING TIPS

BLOWZILLA 2400 2.4L

It's no secret the Kenne Bell Billet 2.2L and 2.4L BLOWZILLA's are clearly the ultimate Cobra power adders and the class act of Twin Screw supercharging (see Kenne Bell/Autorotor vs. Lysholm Feature Comparison). Over the years, both have established a stellar and proven record for performance and reliability on Mustangs.

2.2L or 2.4L

It should first be understood that the Kenne Bell 2.2L BLOWZILLA makes gobs of HP and torque and is capable of producing boost levels to 24 psi. The 2.4L is for those who simply want the most from their '03-'04 Cobra. The 2.2L and 2.4L share the exact same 6x4 rotor lobes and profiles, big bearings, shafts, gears and billet case, but the 2.4L utilizes 1" longer rotors housed in a 1" longer billet case. This is responsible for the relatively higher air flow/boost and lower air charge temp. To summarize, the 2.4L enjoys some air charge temp and parasitic loss advantages over it's companion 2.2L and the Lysholm 2.3L, particularly at the higher boost levels. If running 9-24 psi boost, the 2.2L is recommended. For 12-28 psi, the 2.4L is the better choice. There is no big advantage to the larger 2.4 if your plans are to run under 24 psi.

BOOST POTENTIAL

The 2.4L develops 3-4 psi more boost than a 2.2L with the same pulley/ratio. Maximum supercharger rpm is 18,500. Example: A 2.2L produces 24 psi with a 9.25" x 3.25" pulley combination (2.84 ratio x 6500 engine rpm = 18460 rpm). The 2.4L makes up to 28 psi with the same pulleys. The additional boost accounts for approx. 13HP per psi, depending on inlet restriction.

RECOMMENDED ENGINE & SUPERCHARGER RPM

Note: At these elevated boost levels with the ultra flat torque curves of the Twin Screw, we do not recommend revving the Cobra 4V beyond 6000. Let the supercharger work for you as it was designed. Why overrev and overstress the engine and supercharger? An extra 1000 rpm (7000 vs 6000) results in a whopping 66% higher inertial load on the rods, crank, pistons etc. Think hard about that analogy. However, if for some reason you choose not to heed our advice and insist on overrevving the engine beyond 6000, then divide our maximum recommended supercharger rpm 18,500 by 7000 engine rpm to arrive at the maximum pulley ratio/boost (2.6 ratio).

APPROXIMATE BOOST WITH 9.25" CRANK PULLEY*

SUPERCHARGER PULLEY	RATIO	BOOST		SUPERCHARGER RPM @ ENGINE RPM	
		2.4L	2.2L	6000	6500
4"	2.31	20	16	13860	15015
3-3/4"	2.46	23	19	14760	15990
3-1/2"	2.64	26	22	15840	17160
3-1/4"	2.84	28	24	17040	18460

*"0" inlet restriction with Kenne Bell Cobra Cool Air Kit, Big Oval Throttle Body, Exhaust and 90mm Meter.

2.4L BELTS & PULLEYS

Tests conducted on our dyno indicated the HP was very close for the 2.2L and 2.4L at the same boost up to 24 psi. A big advantage of a 2.4L is it's pulley can be 1/2" larger and make the same boost, thereby providing 16% more belt contact area. By comparison, the 10 rib system contact area is only 25% greater (10 ribs vs 8 ribs = +25%). Yes, an 8 rib system appears to be adequate up to 28 psi. Our prototype 2.4L on Earl's car made numerous 1/4 passes at 28 psi with the 8 rib system. The K080810 belt with an auxiliary tensioner, 4 larger 100mm idlers and an otherwise stock serpentine system seems to work quite well. A new system that removes the alternator from this loop and drives its "double" pulley off the other belt has also proven to work very well with shorter and more stable 61-3/4" 8 rib belt. Note: USE ONLY KENNE BELL SUPERCHARGER PULLEYS OR THE WARRANTY IS VOID.

SPARK PLUGS

Our tests indicate that the Denso T20EPR-U groove or NGK TR6 at .025 gap will fire to 30 psi. The Denso Iridium plugs do not fire as well at high boost levels in the Cobra 4V engine. The Kenne Bell BOOST-A-SPARK™ is the most powerful - easy to install - Ford ignition system on the planet. Highly recommended after 15 psi boost.

MASS AIR METER

After 600HP, switch to the SCT mass air meter, as the stock 90mm pegs/maxes out. That means it CAN NO LONGER SUPPLY MORE FUEL BASED ON AIR FLOW. We've made the 90mm work at 700+HP, but only with some complex and sophisticated Kenne Bell chip tuning. A far better approach is the Kenne Bell/SCT/BOOST-A-PUMP™/60 lb tune. The ultimate set up is to replace the small 90mm (3.55") with a larger 5" meter. A 3.55" (90mm) meter in a 4" or 5" inlet system is obviously restrictive at some HP level. We've seen a 25HP gain with our 5" meter.

FUEL SYSTEM

Kenne Bell was the first to make 700HP with a twin screw Cobra. At 700HP, the fuel pressure loss through the stock fuel line is 7 psi. This is not a problem if using the Kenne Bell BOOST-A-PUMP™. Replace it with a 3/8" or 1/2" line for even more fuel flow and reduce the 7 psi loss to only 1 psi. The stock lines will unquestionably support 700HP. The stock fuel rails are also OK. Only a 3 psi loss from front to rear. We've said it before many times . . . FORGET THOSE FOCUS PUMPS. The amp draw is excessive and

overloads the FPDM and shuts off all of the fuel. Our inlet manifold is notched for larger aftermarket fuel rails which will reduce the 3 psi loss to 2 psi. Retain the stock Cobra pumps with the Kenne Bell BOOST-A-PUMP™. It's plenty of fuel for 750HP and 60lb injectors. "If it ain't broke, don't fix it." There have been many Cobra engines damaged by those who believe they had a better solution than the Kenne Bell BOOST-A-PUMP™ and Chip combo. The BOOST-A-PUMP™ is the key to supplying the correct AF ratio from 366 stock HP to 700+ HP. At around 700HP, plan on installing another FPDM in parallel to handle the additional amp load of the pumps.

TUNING

If tuning with the stock 90mm meter and not using the Kenne Bell factory tune, find a reputable tuner who has done this successfully before and "pressure tune it" from 600-700HP - or go with the latest Kenne Bell 5" meter/60 lb chip combo.

NEW OIL "VENT BOLT" DESIGN DRIVE

Like any hi-revving oil lubricated device, venting to relieve pressure build up is mandatory. The excessive pressure build up from the swirling lubricant in the Kenne Bell 2.2L BLOWZILLA must be vented. Normally, the vent in the drive or the front cover is adequate. Under certain conditions, as with the high boost/high rpm Cobra engine, some oil is discharged with the air. In the past, Kenne Bell kits were shipped with an Oil Recovery System consisting of a small tube which vents into a transparent plastic "catch" bottle. The overwhelming majority of our '03-'04 Cobra customers do not use the Oil Recovery System. Some objected to the Oil Recovery System, so as of 8/'04 all new Cobra 2.2L and 2.4L BLOWZILLAS will utilize a new drive with the same Kenne Bell 12mm "vent bolt" design as our Lightning and 4.6 Mustang GT drives. Earl's Automotive has tested this new drive design at 30 psi and 708HP. To quote Earl "after an entire month of dyno and drag strip testing, I haven't lost a drop of oil." The 10mm pulley and coupler bolts used in the early drives are upgraded to bulletproof 12mm bolts. The shafts and bearings are considerably larger than our competition - and all drives are serviceable. The 12mm "vent bolt" does require a corresponding new 12mm pulley. Again, early Cobra '03 drives used a 10mm pulley and bolts. The new 12mm pulleys are available in 4", 3-3/4", 3-1/2", 3-1/4", 3" and 2-3/4" sizes. Note: Only these 12mm pulleys fit the new "vent bolt" drives. Note: The early 2.2/2.4 10mm drives cannot be upgraded to the late 12mm "vent bolt" design. Replacing the early drive with the late "vent bolt" design requires the supercharger be sent to us, as the rotors must be re-timed/re-phased to accept the new drive. This can only be done at Kenne Bell. Sorry, but the old 10mm drive cannot be upgraded.

2.4L vs 2.2L KIT

None of the basic 2.4L kit parts interchange with the 2.2L, so upgrading is not feasible. The 2.4L's 1" longer billet case also requires a new lower front coolant crossover tube, drive, inlet manifold (Big Oval only), discharge manifold, brackets, etc. All emissions components are retained so the kit is perfectly streetable.

As is the case with all Kenne Bell Cobra and GT kits, the time, tested and proven BOOST-A-PUMP™ and a custom calibrated Kenne Bell Chip are highly recommended with each kit. We engineer, test and tune our own kits in-house. We have 13 years of experience in the calibration of Fords, so we know how to tune our kits better than anyone. If you decide to have the kit tuned by others, please check with our Tech Department for a recommendation on competent experienced tuners.

OVERVIEW

Here's a quick overview of what's required to support 700RWHP in a Cobra 2.2 or 2.4 Kenne Bell Supercharger Kit - a good chip, dual FPDM's, 60 lb injectors, Kenne Bell BOOST-A-PUMP™ with stock Cobra pumps and a new 3/8" or 1/2" fuel line, 5" Mass Air Meter, 5" Cool Air Kit with "open" fenderwell (NO UNDERHOOD "HOT AIR" EXPOSED FILTERS), Kenne Bell BOOST-A-SPARK™ and NGK or Denso plugs, Metco 8 Rib Pulley Kit (use only Kenne Bell Supercharger Pulleys) and Centerforce Clutch. Crower Stage 2 Cams are good for 25HP. Headers are expensive, a nightmare to install and make very little HP, tend to leak and create driveability problems. Bassani X Pipe and dual exhaust seems to work best.