

INTRODUCTION

When introducing a new kit, we make every attempt to supply our customers with as much pertinent information as possible about both the Kenne Bell kit and the related products and issues. There is also more tech info and dyno tests on the Kenne Bell 2.1L Supercharged GT's that should prove informative.

DYNO TESTS

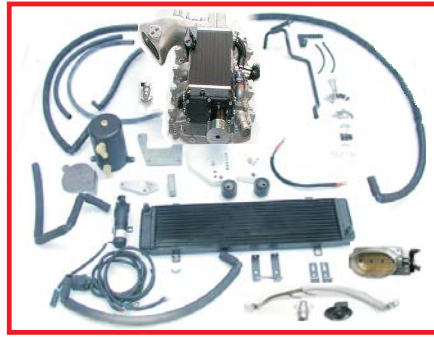
There are many variables, but this is a summary of our tests that can serve as a guide for what to expect from our 2.1L (replaced the 1.7L) and 2.6L (replaced the 2.2L) kits and 4.6 mods.

RWHP		CHANGE	TEST DESCRIPTION
AUTO	MANUAL		
217	245		Stock '99-'04 GT manual trans.
	431*	+186	Kenne Bell 2.1L 9 psi kit with 90mm Meter, 75mm TB, 75mm Big Tube, CAK. Note: *431HP/507EHP is a LOT of power and torque. 450HP/529EHP is the maximum recommended power for the stock 4.6 motor. At this point, upgrade to a built forged rod and 8-8.5 piston motor.
476	507	+76	Install 15 psi pulley on 2.1L for comparison only. Not recommended because inlet losses are high (4.75" Hg vs. 2" Hg). 75mm now too small. 2.1L supercharger is not in it's ideal efficiency range as it was at 431HP and 9 psi boost with only 2" Hg loss.
530	564	+57	Install Kenne Bell BIG BORE 2.6L kit. 15 psi boost with a 5" Cool Air Kit. Gains are from lower inlet losses and higher efficiency 2.6L.
508	541	-23	Change to 8.1 low compression pistons. 15 psi boost. All else the same.
579	616	+75	Add cams, ported PI heads, headers, x pipe, 15 psi boost.
642	682	+66	Raise boost to 20 psi, Meziere (phone#760-746-3273) electric water pump and underdrive alternator pulley.

NOTES:

- All 2.6L BIG BORE Tests were conducted with an automatic trans and locked converter. Manual trans numbers reflect the 6% parasitic loss in an automatic. The unlocked torque converter lost 46HP vs. a lock up converter. (Precision Industries Phone # 901-466-0267).
- Keep engine rpm to 6000 max so not to exceed the 18,000 rpm supercharger limit.
- All boost measurements taken after intercooler. Boost is 1-2.7 psi higher into intercooler.

INCLUDED COMPONENTS



BASE RACE KIT BIG BORE 2.6L GT COMPETITION KIT Part# TS1000-99-BK

This is basically the same supercharger and Big Oval inlet manifold used in our '03-'04 Cobra Kits except it is mounted on the Kenne Bell GT intake manifold/intercooler. All major components are pre-assembled and tested. This kit includes all intercooler components and hardware, Big Oval Throttle Body, 30 amp BOOST-A-PUMP™ and the necessary emissions components (Cobra EGR valve and tube, IAC valve and hoses).

MAJOR KENNE BELL BASE RACE KIT COMPONENTS INCLUDED

- Billet Twin Screw 2.6L Supercharger
- Cobra Hi-Flow Inlet Manifold
- Billet Bypass Valve Assembly
- Bar and Plate Intercooler
- HD Heat Exchanger
- Intercooler Pump
- Water Fill Reservoir
- BOOST-A-PUMP™ (30 amp)
- Fuel Rails ('00 up)
- 160° Calibrated Thermostat
- Single Blade Oval Throttle Body

Note: All necessary hardware, lines, fittings, gaskets etc. included.

OPTIONAL COMPONENTS

Note: The Base Race Kit does not include the following Kenne Bell parts:

- 90mm mass air meter & adaptors
- Injectors
- Belt
- 8 rib pulley system
- Chip/calibration
- Cold air system (use '03 Cobra)

The tuner or builder is responsible for the above components and tuning of the kit, but may wish to select some of the following Kenne Bell options.

8 RIB BELT SYSTEM UPGRADE (Highly recommended for boost levels above 10 psi)

The 8 rib system helps eliminate any belt slippage associated with 6 rib systems and high boost. 33% more belt contact surface area. OK to 20 psi. 8 rib kit is complete with all engine accessory pulleys, 6.5" machined face crank pulley (7.5" and 8.5" can be bolted to this pulley, but the 8.5" requires 3 bolt style tensioner), spacers and brackets. Belt included. Note: 8.5" requires Meziere electric water pump and alternator underdrive pulley and 3 bolt style tensioner. Supercharger pulleys are available in 1/4" / 2 psi increments.



8 RIB KIT COMPONENTS

- Crank Pulley (6.5")
- Water Pump Pulley (5.0")
- Tensioner (3 bolt style only)
- Tensioner Bracket
- Alternator Pulley
- Alternator Spacer and Brace
- Flat Idler Pulley
- Flat Idler Spacer
- Power Steering Pulley
- AC Pulley

Note: 3 bolt tensioner uses KO81177 belt. 1 bolt tensioner uses KO81145 belt. Check number of bolts in tensioner before ordering. There is a "1 bolt" and "3 bolt" tensioner on the GT's.

**Part# F2600-1 (for 1 bolt tensioner)
F2600-3 (for 3 bolt tensioner)**

Note: Kit components not sold separately

8 RIB 7.5" CRANK OVER PULLEY KIT

Increases boost 3 psi over 6.5" pulley. Includes 7.5" crank pulley, belt and hardware. Pulley bolts to special Kenne Bell machined face 6.5" 8 rib crank pulley allowing use of either 6.5" or 7.5". Works with all stock accessories. *Note: 3 bolt tensioner uses KO81177 belt. 1 bolt tensioner uses KO81145 belt.*



**Part# F2601-1 (for 1 bolt tensioner)
F2601-3 (for 3 bolt tensioner)**

8 RIB 8.5" CRANK OVER PULLEY KIT (works with 3 bolt style tensioner only)

Increase boost 3 psi over 7.5" and 6 psi over 6.5". Includes 8.5" crank pulley and hardware. Pulley bolts to special machined face 6.5" 8 rib crank pulley which accepts either the 7.5" or 8.5". Includes tensioner idler pulley. Must use Meziere (phone#760-746-3273) electric water pump and underdrive alternator pulley. Using a smaller 4" water pump pulley to obtain clearance for the big 8.5" will reduce power by 26HP. Customer must determine belt size based on pulley combination used. Use K081145 for 20 psi.

Pulley Notes: DO NOT attempt to bolt the Kenne Bell 7.5" and 8.5" pulleys to the stock 4.6 GT pulley or other cast face pulley. Must use Kenne Bell machined 6-1/2" pulley.

Note: If using 8.5" with a 1 bolt style tensioner, the 4.6 GT front cover must be switched to a 3 bolt style tensioner cover.



Part# F2602-3 (for 3 bolt tensioner)

Note: 8.5" not available for 1" bolt tensioner. Must replace front engine cover.

5" HI FLOW INLET SYSTEM

Completes the inlet system. Connects to the Big Oval Throttle Body. Includes billet adaptor, 5" filter, 5" hose, '03 Cobra molded inlet tube and all hardware. Recommended for power levels above 560HP with 100-125mm meters.



Part# F1019-5

**2400 KG MASS AIR METER
Part# F8001**



(Not Included with Inlet System)

PULLEY SIZE / BOOST / PULLEY RATIO

Supercharger Pulley	6.5" Crank		7.5" Crank		8.5" Crank*	
	Boost	Ratio	Boost	Ratio	Boost	Ratio
3-1/2"	13	1.85	17	2.14	20	2.42
3-1/4"	15	2.00	19	2.30	22	2.61
3"	17	2.16	21	2.50	24	2.83
2-3/4"	19	2.36	21	2.72	26	3.10

**Requires electric water pump*

The BIG BORE 2.6L kit has a lot of flexibility built into the overall design. The extensive crank and supercharger pulley selection allows for a wide range (9-20 psi) of boost adjustment for any fuel octane or combination. Maximum recommended supercharger rpm is 18000.

$\frac{\text{Crankshaft Pulley}}{\text{Supercharger Pulley}} = \text{Ratio}$. $\text{Ratio} \times \text{engine rpm} = \text{Supercharger rpm}$. Maximum rpm for racing is 18,000 rpm.

Example: Max rpm = 6000 engine x 2.83 ratio = 16980 Supercharger rpm.

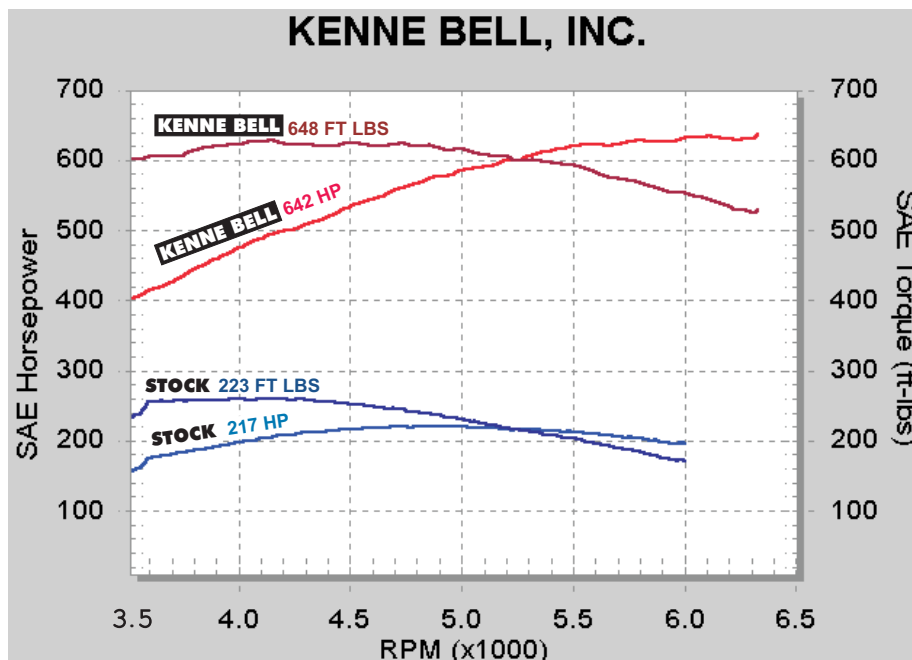
Note: Supercharger engines do not need to be revved as high as naturally aspirated engines. Keep engine rpm to 6000 max.

4.6 2V SUPERCHARGER SIZE

There is no one supercharger size that is ideal for all applications. An engine that produces more power flows more air and can reach a point where the supercharger air flow rating/boost capability becomes overtaxed. Simply stated, the supercharger becomes too small to supply sufficient air volume to the engine it is feeding. However, the twin screw is unique in that, being a positive displacement supercharger it will continue to pump enough air if you "overspin" it. Unfortunately, this tactic of overrevving results in excess power consumption/parasitic HP loss and a reduction in supercharger reliability.

RODS & PISTONS

When exceeding 450RWHP, we recommend replacing the stock cast pistons and powdered metal rods with forged H beam rods and forged 8.0-8.5 pistons which should allow the engine to run another 3-5 psi (12-15 psi) depending on pump fuel octane. Remember this. Power is all about cylinder pressure and it is easier and far less expensive to change supercharger boost than pistons and compression ratio. Reducing the compression ratio from the stock 9.5 to 8.5 or 8.0 will lower power by approx. 3%-4% respectively (see "HP vs. Compression Ratio"), but the lower compression will permit the engine to run 3-5 psi (40-65HP) of additional boost which will more than offset the relatively small power loss from CR.



REAR WHEEL HP & TQ COMPARISON 2.6L KIT vs. STOCK (both auto trans)

KENNE BELL 2.6L 20 PSI, AUTOMATIC TRANS, PORTED HEADS, CAMS, HEADERS

(Divide by .79 for engine HP and Torque with automatic trans and .85 for manual trans)

Auto trans is 6% less efficient than manual trans.

We recognize that many of our customers will choose to race or street drive their 2.6L kit cars with an automatic trans, so we ran the tests with the 4R70W Mustang trans (locked converter). The automatic numbers can be easily converted to manual trans HP by dividing by .94. Example: 642HP ÷ .94 = 682. These were actual tests on the same Kenne Bell '99 GT test car. An incredible gain of 412HP and 423 ft. lbs. over stock with the Kenne Bell 2.6L kit on a built 8.1 CR motor. How's that for a big block feel. You won't get hungry or sleepy waiting for the boost with these kits. Note the most desirable feature of Kenne Bell Twin Screw Kits - a fat, flat, pavement shredding average torque curve of 600 ft. lbs. from a mere 2500-5500 rpm and still 550 ft. lbs. at 6000.

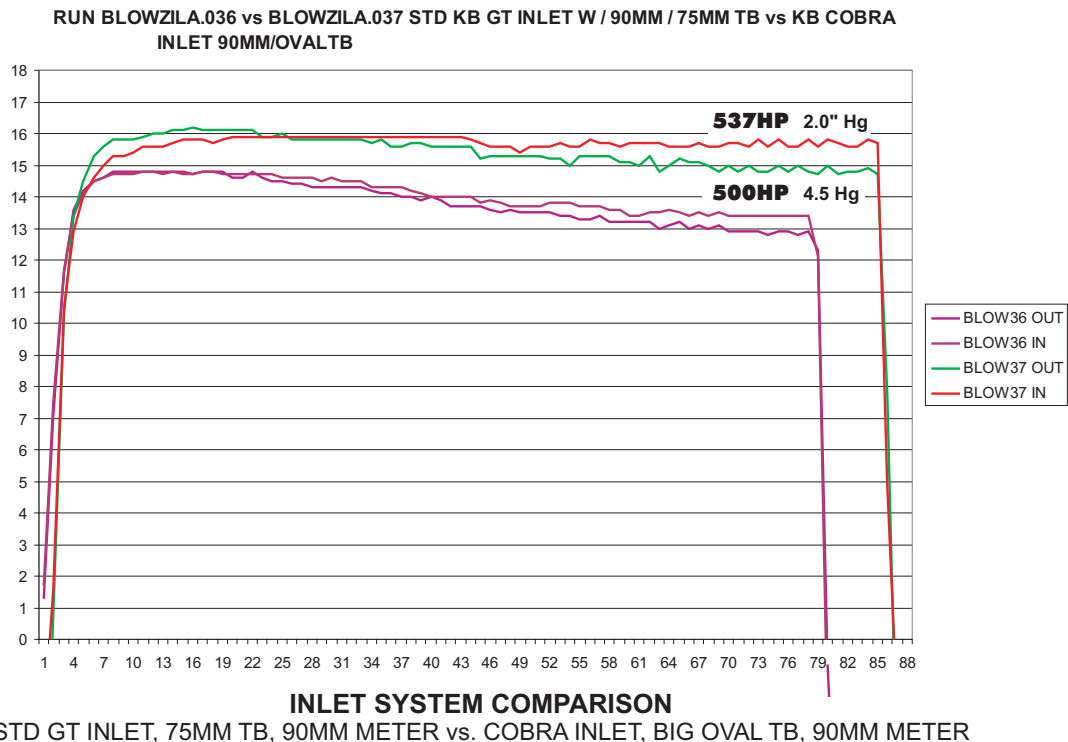
THE TEST CAR

Here's what it is. The old Kenne Bell '99 GT has been our 4.6 GT kit test mule since 1999. It's been the recipient of thousands of dyno tests. It produced an amazing 642HP with an automatic and 682 with the manual trans, both at 20 psi boost. These power levels are 30HP above our comparably equipped Cobras. The little 4.6 2V motor with a Kenne Bell supercharger is one pissed off 2V.

- Kenne Bell 2.6L Kit
- Kenne Bell BOOST-A-PUMP™
- Kenne Bell Cool Air Kit (5")
- Kenne Bell Switch Chip® (Note: Not available. Prototype only. Kit must be custom tuned)
- Kenne Bell Big Oval Throttle Body
- Kenne Bell 8 Rib System / 7.5" Crank Pulley / 5" Water Pump or 8.5" / Electric Water Pump
- Sean Hyland 8.1 Forged 4.6 2V (Phone#519-421-2589)
- Renegade Racing Ported P1 Heads (Phone#248-684-8366)
- Comp Cams XE274HR and Springs
- Precision Industries Lock Up Torque Converter 2400 stall (Phone#901-466-0267)
- Jerry Wroblewski 4R70W Trans
- Ford Cobra R Hood
- Ford '03 Cobra Tank & Pumps (Dual Cobra or Dual Focus pumps)
- 1/4" Auxiliary Fuel Line and Filter with Stock Fuel Rails
- 60lb Injectors
- Hooker Long Tube Headers
- Bassani Exhaust and X Pipe (No Cats)
- Denso T20EPRU or NGK TR6 (Gapped at .025")
- MT Slicks
- Colorado Yuma Billet Wheels
- 90mm or new Ford GT Mass Air Meter
- Modified 700HP+ Pump Driver and Wiring Assembly

INLET SYSTEM RESTRICTION

As an engine makes more HP, it inhales more air. To reduce or eliminate these inlet restrictions, the filter, mass air meter, throttle body and inlet manifold may have to be enlarged to cope with the increased air flow. Note: That does not imply that ALL inlet systems benefit from larger components. Typically, modern OEM stock components are large enough and therefore upgrading is a total waste of money. Such is the case with the Kenne Bell 4.6 GT 2V "standard" 5 and 9 psi kits. This inlet tract design with the 90mm Meter, 75mm Throttle Body, Big Tube Kit and Cool Air Kit is OPTIMIZED. There is no gains to be had at these power levels i.e. up to 430RWHP/500EHP, the max HP recommended for the stock block 4.6 2V. That is a lot of HP from an engine that made 245RWHP stock. So if your plans are to do a forged built 4.6 to hold together under the elevated power levels from higher boost, heads and cam, then yes, the larger Kenne Bell 2.6L Supercharger, inlet manifold and Big Oval Throttle Body will make more power (see Dyno Tests). For example: If the inlet restriction increases from 2" Hg (431HP) to 4.75" (507HP), the supercharger is being starved for air thereby forcing it to work harder and consume more engine HP. The boost drops from 15.8 psi to 13.5 which is, of course, accompanied by a corresponding total power loss of 37HP. All because of a mere 2.75" Hg pressure loss in the inlet system. Yes, as we well know from our years of experience, positive displacement superchargers are extremely sensitive to inlet restrictions. That is why we recommend the larger higher flow capacity Kenne Bell '03-'04 Cobra inlet manifold and Big Oval Throttle Body in combination with the big 2.6L Supercharger for the 500+HP 4.6 GT 2V applications. Again, please note that the larger Cobra throttle body and inlet manifold are not necessary at the 9 psi 431HP level. Raise the boost to 14 psi and 500HP and the loss is now 37HP. So now all you 9 psi kit owners want to know how much power the Cobra inlet with the Big Oval Throttle Body would make on your 431HP combo. Answer - a mere 3HP. Definitely not worth the expense.



THROTTLE BODY HP GAIN COMPARISON

65MM vs. 75MM KENNE BELL SUPERCHARGED 4.6 GT

65MM	75MM	HP GAIN
245	245	0
361	365	+4
418	431	+13
432	449	+17

The tests were conducted on our Kenne Bell Supercharged '99 GT with the 75mm Throttle Body and Big Tube Kit. This should help you to better understand air flow vs. restriction. Also look at "Inlet System Restriction." Note how a 65mm "loses" 4HP on a 361HP 6 psi kit, but the loss quadruples to 17HP on a 432HP 9 psi kit. Finally, there's no gain whatsoever on the stock 245HP engine. There will always be a way to make more HP. Sometimes it is easy and relatively inexpensive. At some point, it may not be practical or cost effective. It's all about the "losses" and not the psycho babble. What we at Kenne Bell strive to make our customers aware of is - when to buy a product. For example: Why purchase a 75 or 70mm - or 90mm throttle body for a 245HP stock engine. The throttle body is not a restriction and therefore cannot increase power. Look for the restriction. The same is true for filters, cool air kits and meters. If in doubt, check out our dyno tests. No loss - no gain.

MASS AIR METERS

The stock meter is pegged at 400HP and the 90mm at approx. 475. Replace with a 100mm-125mm meter. A 90mm meter, regardless of manufacturer, is TOO SMALL for high HP.

HOOD

The Cobra inlet and top mounted IAC valve arrangement requires the Cobra R hood for clearance with the 2.6L. Use hood pins. The '94 up mustang hood latch is marginal, as are some of the fiberglass aftermarket hoods we've seen.

PULLEYS & WATER PUMP HP LOSSES

We designed a 7.5" and 8.5" crank pulley to cover any racing need. They bolt to a Ford F150 5.4 8 rib 6.5" crank pulley, which has a machined face that accept our pulleys. Kenne Bell offers a complete 8 rib system with a 7.5" crank and 5" water pump. As compared to the stock 6.5" crank, the 7.5" requires only 1 more HP to drive the WP, PS and ALT (1.5 vs. 1.34 ratio). The larger 8.5" is good for another 3 psi, but must use a smaller 4" water pump (2.12 ratio) for clearance. Don't use this combo. According to our dyno tests, the 4" pump eats up another 26HP when spun 41% faster at the 2.12 ratio vs. a 1.5 ratio with the 7.5" crank. In summary, the water pump parasitic HP loss is OK with the 6.5" or 7.5" crank, but cavitates and surges with the 8.5". And yes, a 5.5" "undersize" crank pulley can result in some small power gains (2HP), but we always like the larger crank pulley for 2 reasons; 1. belt wrap and 2. boost/ratio. So, lose that 5.5" underdrive crank pulley. To run the 8.5" crank pulley for higher boost, switch to an electric water pump. FYI, total accessory losses are approx. 2% on the GT, so throwing all the accessories in the trunk saves 8HP on a 400HP engine - unless, of course, you are overspinning the water pump. Avoid hitting the rev limiter. There is no belt that likes to be left trying to stop a high speed supercharger when the engine abruptly shuts down at 6000 rpm. Note: An underdrive alternator pulley is good for 5HP and recommended with the 8.5" crank pulley.

FUEL SYSTEM

We used 60lb injectors with a baffled Cobra tank #2R32-9002-AA, Cobra dual pumps #2R32-94307-AB and driver #XR3Z-9D372-AC. The stock GT fuel system with Kenne Bell 36lb injectors and the Kenne Bell BOOST-A-PUMP™ is adequate to 475HP max. You can stick in an SVT Focus pump with larger 50-60lb injectors and make up to 525. Figure 650 max with Cobra pumps and 700+ with dual Focus pumps, 40 amp external fuse and upgraded pump driver (FPDM module). Note: The driver must be modified as it "pulses" the pump and is current limited. The Cobra tank and high pressure pumps with the BOOST-A-PUMP™ is highly recommended for 1/4 mile and road racing as the tank is baffled. The GT is not. Focus pumps are lower pressure and require a 40 amp external fuse with the BOOST-A-PUMP™ (see website for pump flow tests).

FUEL LINES - PRESSURE LOSSES

At 700RWHP, there is the same 7 psi pressure loss as in the Cobra between the tank and fuel rails. The fuel rails are adequate. We ran another new AN line from the tank to the driver's side fuel rail into a special Kenne Bell rail fitting which "loops" the system and negates the rail crossover line pressure loss. Now the system has plenty of capacity as the tank to rail loss is only 1 psi. You may wish to read "Fuel Pump Figuring" and "Theory of Operation Explained" on our website. Pay particular attention to the fuel line loss data. At even 700RWHP, 25 psi boost and 60lb injectors with 80 psi fuel pressure, we measured the loss at only 7 psi in 13 feet, the length of a GT or Cobra fuel line. Again, this isn't theory or bench racing babble, but instead a factual accurate pressure and flow measurement with calibrated Kenne Bell pressure sensors. You only need larger or dual lines if the 7 psi loss is a problem. With lower HP, smaller injectors, less boost etc., the stock lines are perfectly adequate. However, if you choose to disregard the facts and instead spend big money on fuel lines and rails that aren't necessary, that is your choice to make.

RETURN vs. RETURNLESS SYSTEMS

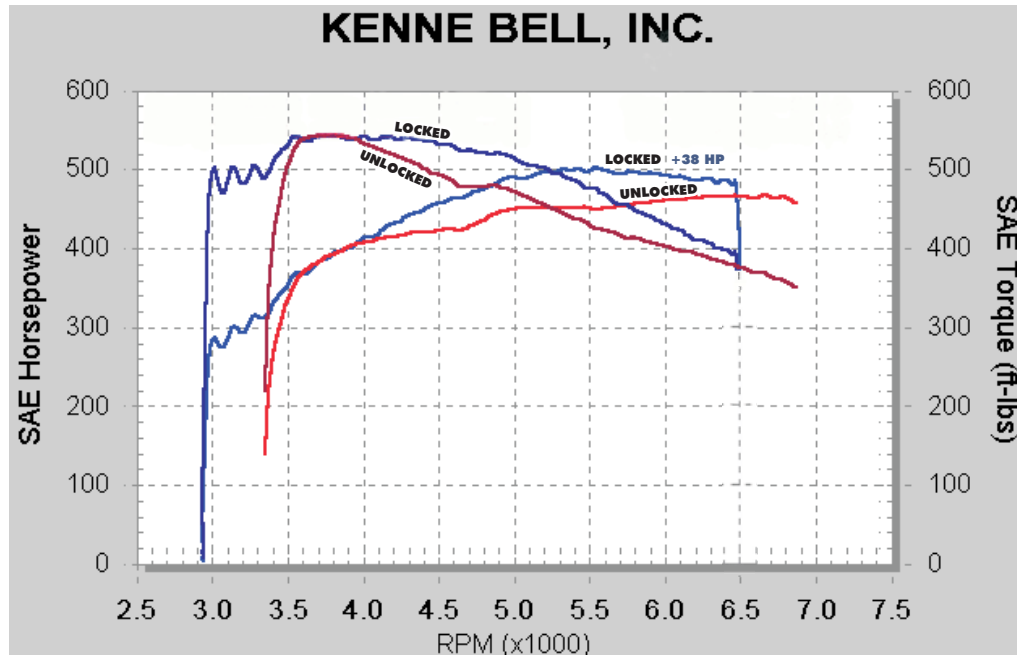
There are those who do not understand the principle of operation of the returnless system or just want to sell you an expensive return system. Remember that the '99 up fuel system is returnless as is the EEC calibration. Therefore, losing your return system requires a new EEC, the accompanying wiring mods etc. or a completely new stand alone system. Kenne Bell has done extensive testing and product development on the returnless system. We make it perform very well to 700HP and beyond. Run another 1/4" line with a new Ford filter to the fuel rail from the tank. One pump per line. The trick is to tie into both fuel rails to equalize the rail pressure. Don't overlook this. With this set up, the stock rails are adequate. The second 1/4" line will lower the 7 psi pressure drop at 700HP to 1 psi, well within acceptable levels. See "Fuel Pump Figuring" and "Theory of Operation Explained" for a better understanding of fuel flow dynamics.

700 HP COBRA / GT FUEL SYSTEM

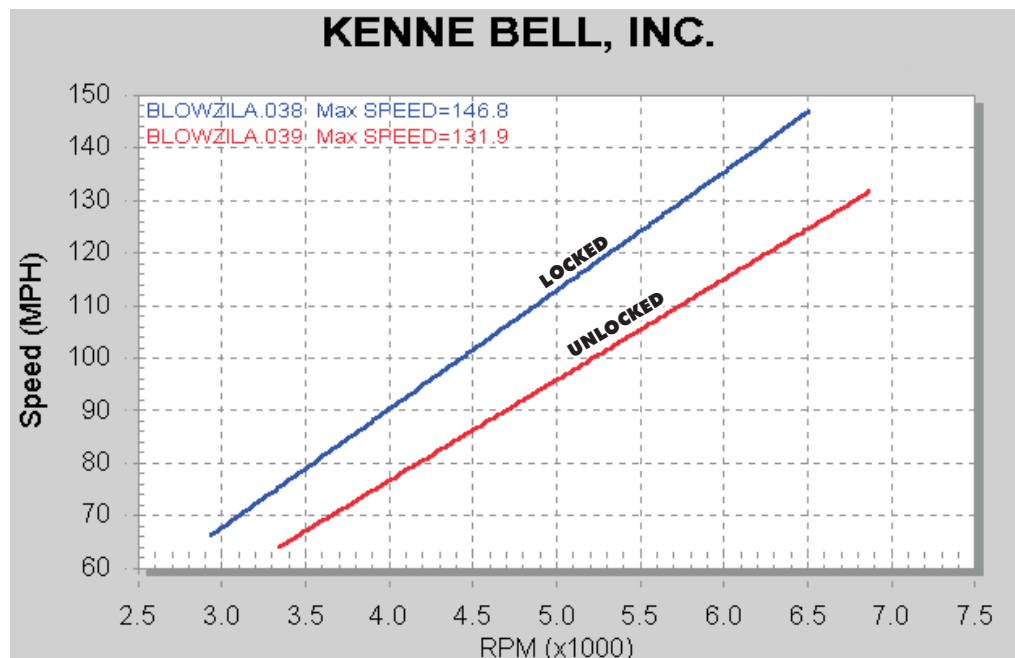
After months of testing on our fuel flow bench and dyno, we developed a 700HP returnless fuel system for the '03-'04 Cobra's and '99-'04 GT. This 700HP Cobra/GT Fuel System is now available exclusively thru Earl's Automotive (phone 818-838-7154). It utilizes either Cobra or Focus pumps, Kenne Bell 30 amp BOOST-A-PUMP™, auxiliary second fuel line with rail connection, individual heavy duty FPDM (module), wiring, connectors and installation instructions.

TORQUE CONVERTERS 4.6 AUTOMATIC vs. MANUAL TRANS

According to Ford Engineering, the "locked up" 4R70W automatic trans is at least 6% less efficient than a manual trans. Even though the torque converter is locked up, the engine is still burdened with operating the transmissions hydraulic pump (6%). The Kenne Bell test car produced 652 at 22 psi with an automatic and 692 with the manual trans at 22 psi with the 2.6L kit. An "unlocked" torque converter is not the way to go, contrary to what you might have heard. Slippage or inefficiency is never good. Kenne Bell has been a huge proponent of locked converters since our Buick days in the '80's. We designed and sold thousands of these converters to Buick, Cyclone/Typhoon and Ford E40D customers. Look for another 10% loss in power if the converter is a non lock up or run in the unlocked mode. As is always the case at Kenne Bell, we speak from experience and not theory or heresy. The feedback we receive tells us that our customers appreciate accurate unbiased testing accompanied by good tech data. Here's a back to back test at the 500HP level on our test car (507 locked vs. 469 unlocked). Do you know anyone else who goes to the expense of running these tests for their customers? Note: It's 11% at 600HP because the slippage increases proportionately to torque and HP. Stated another way, the higher the engine HP, the more the converter slips and the greater the power loss. Now look at the speed of your car vs. the engine rpm. This relationship applies to any vehicle, GT or Cobra. And look at all that available launch torque, even at a mere 3000 rpm. If tire spin is a problem, just launch it at 2500, 2000, 1500 or even idle. Launching an automatic is far easier on the drive train than a manual trans. That is a fact. Now would you really rather have a centrifugal supercharger that likes to be launched at a drive train shocking 5000 rpm or higher? Yes, the centrifugal or turbo is clearly at a disadvantage. Of course, you could always neutral start it by revving to 5000-6000 and then dropping it in gear. Get the picture? Compare any point on the graphs and you then tell us why anyone would prefer a non lock up.



LOCKED vs. UNLOCKED TORQUE CONVERTER 4R70W with PRECISION IND. CONVERTER
REAR WHEEL HP & TORQUE



LOCKED vs. UNLOCKED TORQUE CONVERTER 4R70W with PRECISION IND. CONVERTER
VEHICLE SPEED COMPARISON AT ENGINE RPM