

Supercharged

Test Tech



The Vector Performance VP-6 supercharger kit can make any 3800 V6 think it's an LT1 for about \$3,200. OK, maybe not quite an LT1, but at least an L98.

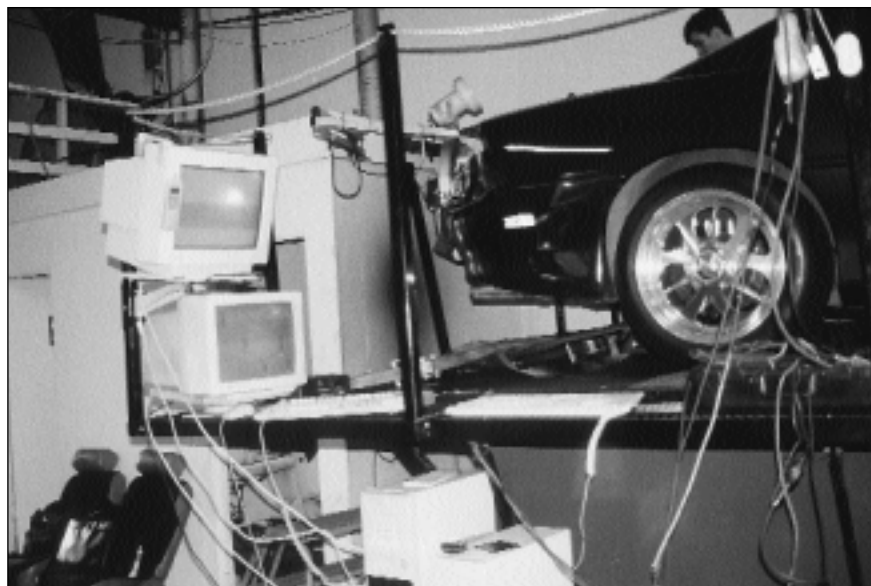
Vector Performance offers 3800-series engines the power of a V8 without a costly engine swap.

By Richard Holdener
Photography by the author

When it comes to coaxing serious amounts of horsepower out of an otherwise stock motor, it's hard to beat supercharging. And though superchargers abound for V8 ponycars, there are precious few offerings for the V6 F-body.

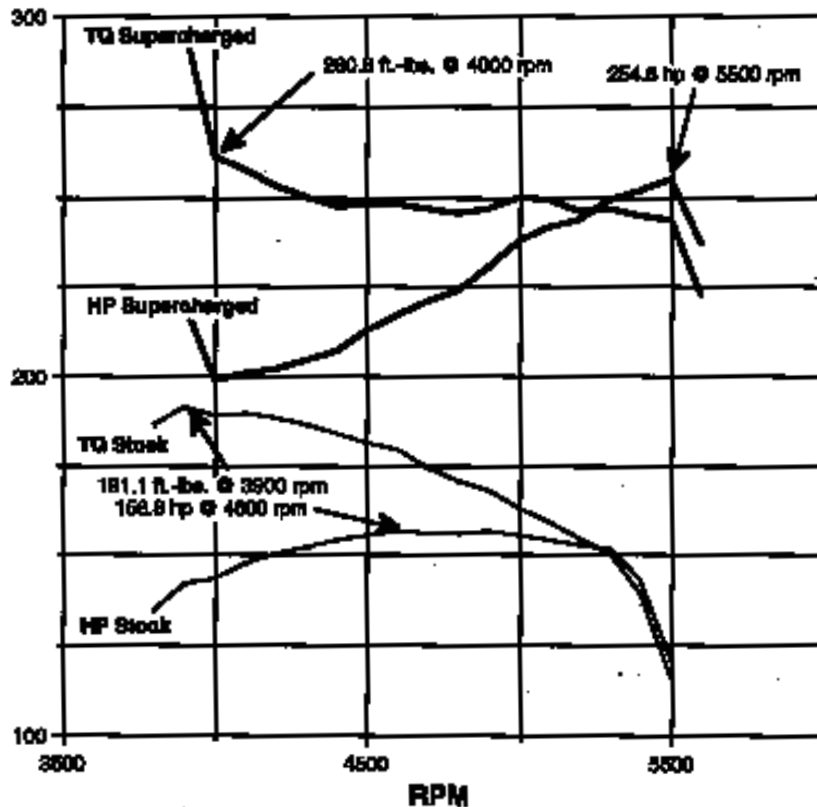
Vector Performance, in Huntington Beach, Calif., has come to the rescue of all 3800-series V6 Camaro and Firebird owners ('95^{1/2}-'98) who have been looking for a little more oomph for their trusty steeds. Knowing full well that air-flow is horsepower, Vector found a way to force-feed the little V6 enough air to make it think it's a V8.

The recipe was simple: If the 3800 could inhale as much air as a 5.7L V8, then it would put out a similar amount of power. The folks at Vector could have taken the ported head, cam and header

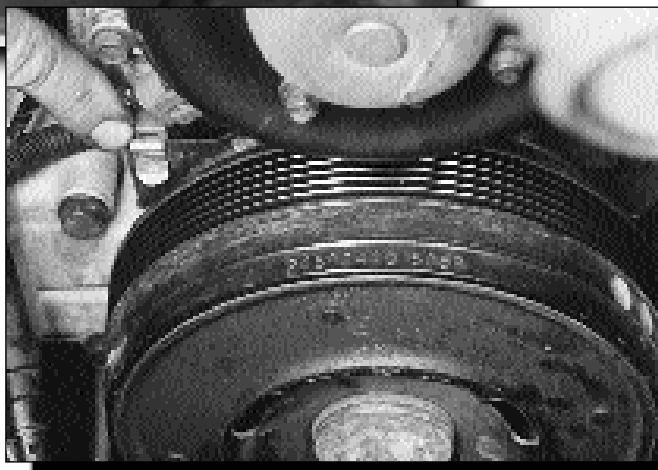


The Camaro was tested in stock configuration prior to installing the supercharger kit. The test procedure for the dyno runs was to mash the throttle down in low gear and have the motor run up to the shift points in First, Second and Third. Running it through three gears gave us a more accurate picture of the real power output. In stock form, the 200-hp V6 put down 158 hp to the wheels, about right for an automatic-equipped motor.

Vector Performance Supercharger Stock vs. Supercharged



After removing the factory air cleaner assembly and replacing it with the K&N cold air system, we unbolted the A/C canister and left it resting on the strut tower.



This shot shows the plastic cover behind the crankshaft pulley. It was necessary to remove 1 inch from the cover to allow clearance for the supercharger pulley. Some minor clearing of the retaining cover also was necessary.

route to better performance, but they knew those simple bolt-ons wouldn't give the little engine big-engine performance. These mods would help the air-flow into and out of the motor, and in doing so add horsepower, but James Bawkey of Vector Performance wasn't looking for just a good-running V6; he wanted the 3800 to run like a good V8. After watching the supercharged V6 roar on the Dynojet, we can safely say that he has met his goal.

Getting V8 power from the 3800 V6 took nothing short of a completely new supercharger system. Since the V6 was never going to ingest enough air on its own to make something on the order of 300 (flywheel) horsepower, it had to be forced to do so. Naturally a supercharger was the way to go, but which one?

After looking at all the options, James chose a Powerdyne supercharger for his kit. The key reason for the choice was the relatively silent operation compared to the competitors. In addition to the noise quality, the belt-driven Powerdyne blower required no external oil source or drainback. The Powerdyne eliminated cutting a hole in the oil pan, something required with other centrifugal superchargers.

With the blower choice taken care of, the next problem was where to fit it. Though only a V6, the full complement of accessories on the 3800 took up nearly all of the available mounting space. On most aftermarket supercharger applications, the blower is basically mounted as one of the accessories. On most Vortech, Paxton, Powerdyne and ATI kits for other applications, the supercharger sits next to one of the accessories and is either run off the stock serpentine system or driven directly off a dedicated crank pulley. Unfortunately for Vector Performance, there simply wasn't sufficient room for the blower to be mounted in this fashion. The A/C, smog pump, alternator and power steering took up all the available space next to the block. Some might have thrown their hands up at this point, but James took the lack of space in the engine compartment as a personal challenge.

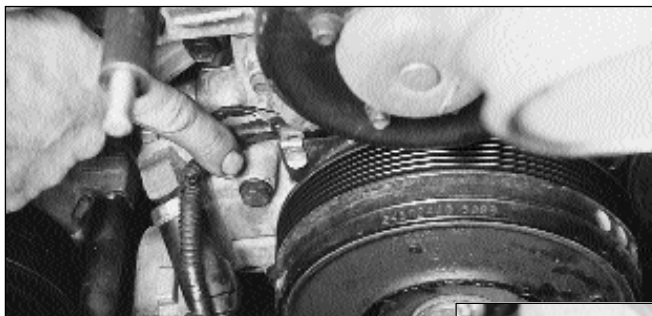
Though there wasn't a great deal of room on either side of the engine, there was plenty of it in front of the motor. Having a V6 in an engine compartment designed for a longer V8 left room between the front of the motor and the radiator. As it turned out, this gave James all the room he needed for his kit.

The trick to using the space between

the motor and the radiator was turning the supercharger around to face the motor. This presented somewhat of a problem, as the Powerdyne wasn't available in a reverse-rotation model, like the Vortech. The problem was spinning the blower in the proper direction in its reverse-mounted position. Vector solved this dilemma by spinning the supercharger pulley with the back side (flat) of the 6-rib serpentine belt. Using the reverse mounting position, a unique belt-tensioning system and a longer belt, Vector was able to drive the supercharger pulley with the same belt used for the rest of the accessories. About the only problem with using the flat-sided drive pulley was that the belt had to be pretty snug to keep tension on blower pulley. With the low-boost level kits (less than 10 psi) offered by Vector, this didn't prove to be much of a problem.

The remainder of the VP-6 kit includes chrome air tubing, a custom intake system, a K&N cold air system, a fuel management unit (FMU) to increase the fuel pressure to the injectors under boost, and a larger fuel pump (for the 9-psi kit). A Crane adjustable ignition retard is also supplied with either the 6- or 9-psi kit, allowing the user to dial in the necessary amount of ignition retard to suppress detonation. If good fuel is used, less retard may be used to bring up the power. This is a nice touch, as it allows many customers to increase the power output by dialing in more ignition timing when running octane booster or unleaded race fuel. At the track, full ignition advance can be safely dialed in with the larger fuel pump, FMU and good gas.

As we mentioned, the Vector Performance supercharger kit is available in two different boost levels, 6-psi (VP-6, \$3,200) and 9-psi (VP-9, \$3,650). The additional 3 psi in the VP-9 kit comes courtesy of a smaller supercharger pulley, which spins the impeller faster to produce more boost. The added boost is compensated by additional fuel pressure from the rising-rate fuel regulator and a larger fuel pump. Some additional timing retard may be necessary when running the higher boost level, especially if regular unleaded fuel is used. Vector Performance recommends always running premium unleaded fuel with any supercharged motor, regardless of the boost level. We made sure to fill our test car with premium unleaded before subjecting it to the full-boost



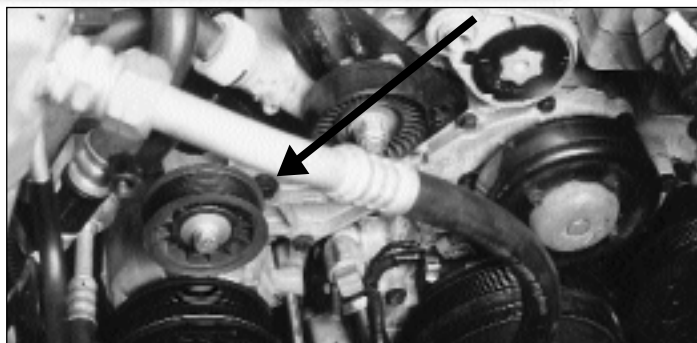
The oil-sending unit was removed and replaced with an angled brass fitting to reposition the sending unit out of harm's way. The wires also were tie-wrapped to the sending unit to keep them from rubbing on the serpentine belt and/or pulley.

The stock idler pulley was removed by unbolting the center retaining bolt. Ours came off without much fuss, but James assured us that some of them can be very tough to get, requiring a pulley-removal tool available from most auto parts stores.

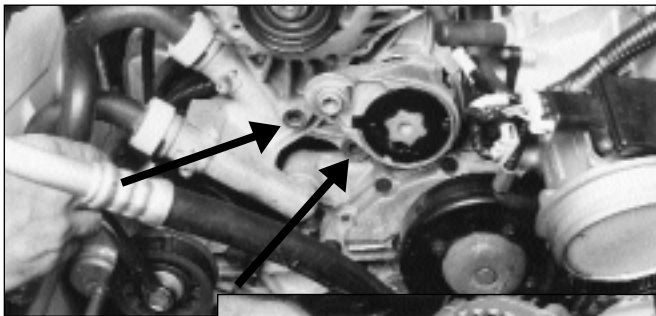


The factory serpentine tensioner was removed by backing out the lefthand threaded retaining bolt.

The 6-rib tensioner supplied with the kit was installed with the machined (flat) face toward the motor (arrow).



This 7 1/2-inch stud was installed in place of the top A/C retaining bolt.



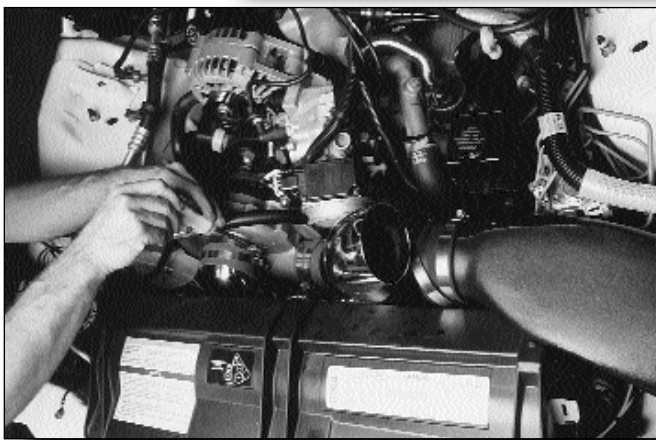
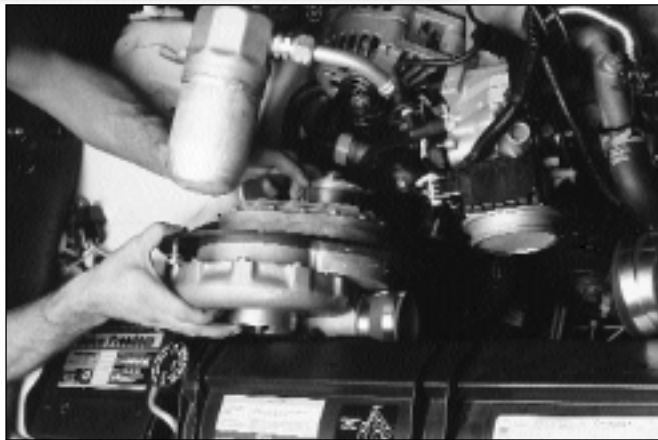
Bolts were removed (see arrows) from the alternator and water pump to make room for the tensioner bracket.

The new belt tensioner was installed using a 4-inch bolt and an 8 1/2-inch threaded stud. After the bracket was in place, the stock tensioner pulley was reinstalled.



Spacers were installed over the two threaded studs.

The supercharger assembly was installed by lifting the A/C canister out of the way. Before sliding the supercharger mounting base plate over the two threaded studs, James threaded the serpentine belt between the pulleys.



The chrome discharge and inlet tubes to the Powerdyne supercharger were connected using the supplied hoses and clamps. It was necessary to lengthen the charge air sensor wires due to its revised mounting position.

dyno runs, and we even added a can of 104-plus octane booster to make sure no detonation was present. It is always better to be safe than sorry when it comes to a supercharged motor. A little octane booster is cheap insurance against detonation ruining the whole adventure. Besides, we almost always run a mixture of some sort at the track.

Before installing the supercharger kit, we took the Camaro over to Fedor Auto Sport Tuning in Huntington Beach, Calif., to get a few baseline runs on the Dynojet. Its Dynojet facility is available to the general public for an affordable rate and includes a MOTEC air/fuel meter to measure the air/fuel mixture at wide open throttle. Care should be taken to optimize the air/fuel mixture on any supercharged motor. Trying to run too lean a mixture on a supercharged motor will only result in a quick lesson in the fine art of motor rebuilding. Too lean, too long—too bad!

One of the problems with testing an auto-trans car on the Dynojet is that it is difficult to get rear wheel horsepower data at low rpm. The reason is that the power numbers are much more accurate (and usually higher numerically) in the higher gears. Unfortunately, most automatic transmissions cannot be locked into a particular gear to run from 2000 rpm to 6000 rpm. All we could do was mash the pedal to the floor and see what happened in each gear. Because of the shift points in the transmission, we were able to gather power numbers only from 3900 rpm to 5700 rpm, but we could look at the dyno chart for all three gears to determine the power differences before and after the supercharger installation. The stock 3800, which is rated at 200 hp at the flywheel, made 158 hp and 193 lbs.-ft. of torque at the wheels, just about right for the 200 rated flywheel horsepower, given the losses through the automatic transmission.

With our baseline runs out of the way, we were ready for the supercharger. The car was taken back to Vector Performance for the install, which took the better part of the day. The straightforward installation is detailed in the accompanying photos and involves attaching the supercharger assembly to the front of the motor and installing the auxiliary fuel pump, the FMU and the ignition retard. Though the inline fuel pump is not needed on the 6-psi kit, the extra horsepower from the additional boost seemed to tax the stock pump. Since the FMU increased the fuel pressure under boost, supplying the needed volume of fuel at the higher

pressures makes a fuel pump's job much harder. The inline pump made sure the motor had plenty of fuel flow at the higher pressure.

The adjustable timing control allowed us to dial back the timing to control detonation. Like most boost-referenced ignition retard units, the Crane system takes a boost reading and dials back a certain number of degrees per pound of boost. For example, if the motor is seeing 6 psi and the timing control dial was set at 1, then the timing would be retarded a total of 6°.

Once the supercharger was installed and the belt tightened, we took the car for a quick ride around the block. The power was impressive. Though the stock 3.8L motors run pretty well, the Vector-charged motor felt mighty impressive, even more than the factory-supercharged 3800 motors. Power seemed to be better everywhere, right from the bottom, where care now had to be taken not to light the tires, all the way to the shift points. The 3.8L V6 ran like a good V8; maybe not quite as hard as an LT1, but pretty close. We were anxious to see if the dyno numbers confirmed our seat-of-the-pants impressions.

With a can of octane booster mixed with the premium unleaded fuel, the car was once again strapped down on the FAST Dynojet for testing. The MOTEK was hooked up so we could monitor the air/fuel mixture at wide open throttle while making the runs. With the 9-psi pulley, K&N cold air system and the timing control knob set at 0, we put the hammer down and waited for the numbers. The motor sounded good and the tranny shifted hard between gears. We lifted off the loud pedal at around 5500 rpm in third gear and waited for the hard numbers. We thought the motor really felt and sounded good, and apparently the dyno agreed with us. The power graphs were better everywhere, with the peak rear wheel horsepower now hovering a full 100 hp higher than in stock form. The Vector Performance-supercharged motor peaked at 256 hp at the wheels and 262 lbs.-ft.

During the runs, we monitored the boost pressure with the MOTEK and saw a peak reading of 8.65 psi. Imagine, a full 100 hp and 70 lbs.-ft. from only 8.65 psi. Who says the V8 boys get to have all the fun? With the right supercharger, you can turn your mild-mannered 3800 into a vicious Vector V6. Happy hunting.



A quick disconnect tool was used on the factory return line to install the FMU.

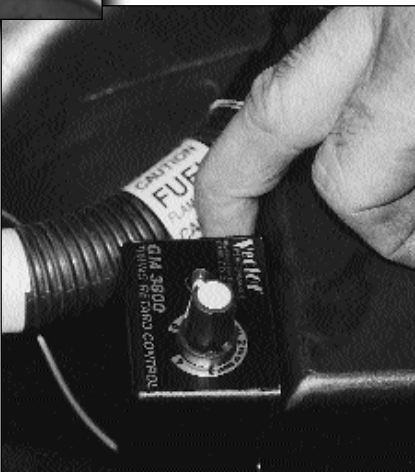


Additional fuel enrichment for the pressurized motor was supplied by a fuel management unit (FMU) that raised the fuel pressure when the motor is under boost. On the 9-psi kits, an additional fuel pump was supplied to ensure the motor never starved for fuel. A fuel pressure gauge is an excellent idea for either kit. The fuel pressure should go up to a fixed point (approximately 75 psi) and hold steady for the entire time the motor is at full throttle. If the pressure starts to drop at the top of the rpm range, the fuel pump is inadequate for your needs. With the extra fuel pump used on the 9-psi kits, the pressure never varied, even when making more than 250 hp at the wheels.



With everything tightened down and all the running clearances checked, the motor was started and allowed to idle while we double-checked everything. A quick trip around the block told us that good things were in store for us on the dyno.

The supercharger kit included this adjustable timing control, which retards the ignition timing in proportion to boost. Dialing in the timing retard helped reduce the chance of detonation. Obviously more timing will make more power, but not at the expense of damage to the motor. Our dyno tests were run with a can of octane booster thrown into the premium unleaded to further minimize the chance of detonation at the 8.5-psi level.



After playing with the boost level, timing and fuel, the Vector Performance supercharger kit managed to coax an additional 100 hp out of the otherwise stock 3.8L V6. At only 8.6 psi, the power output jumped from 158 hp at the wheels to 256 hp. Torque was up by a whopping 70 lbs.-ft., something that was really noticeable from the driver's seat.

Sources

FEDOR AUTO SPORT TUNING

15608 Graham St.
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714/894-8415
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VECTOR PERFORMANCE

17092 Palmdale St.
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V6 supercharger kit