Six Shooter: How to Supercharge Your TR6

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Story and Photos By Carl Heideman

With Jaguar E-type and Big Healey prices setting records, many of the industry's speculators, waxers and poseurs have named the Triumph TR6 as the next six-cylinder British sports car to buy. They recommend jumping on these machines right now as their prices are bound to skyrocket. It turns out they've got it right, but for the wrong reason. From the way we see things, it's all about performance potential, not capital appreciation.

The minute Moss added a TR6 application to their growing line of superchargers for British cars, we knew that the time had come to add a TR6 to our fleet. And we've done it for the right reason—to drive the doors off of it, not to wait for its value to peak at auction.

So we ordered a Moss supercharger and then found a TR6—in that order. Our previous experience with MGB and Midget blowers told us we wouldn't be disappointed. Thanks to its torquey, but otherwise unimpressive, low-compression 2.5-liter inline-six, the TR6 would make an excellent candidate for supercharging.

Finding the right TR6 wasn't that hard, but we did look at about 10 examples before we found one to call ours. We ended up a with a New White 1976 model that had been parked for several years and needed some TLC.

With 100,000 miles on the clock its provenance was proved, but the car was a little rough around the edges. It had received some serious work in the mid-1980s—body work, paint and a rebuilt engine—but little had been done during the following 20 years and 20,000 miles.

Once we got it running again thanks to a fresh battery, brake work and coolant leak repair, our first test drive told us this TR6 wasn't propelled by a stock engine. The car was already peppy. We were worried that maybe this engine was souped up too much for the blower, but we found a tag on the firewall listing the engine specs. Our concerns were neutralized, as according to the tag the engine just had more cam; the compression ratio had not been raised. Perfect.

After some baseline zero-to-60 and dyno testing, we pulled off the bonnet and started the supercharger installation process. Supercharger installation is a bit more involved for the TR6 than for the MGB or Midget, but the project is certainly something that a somewhat experienced home mechanic can finish over a long weekend or two.

Blower Basics

There's an old analogy that says an engine is like a pump; the more you put in, the more it pumps out. The trouble is, a lot of people think that you need to pump in more fuel. It's easy to get fuel into an engine. Getting enough air in there is another story altogether.

Most classic cars make their best power when the ratio of air to fuel is about 12.5 parts air to 1 part fuel. So for every pound of fuel (about 1 pint) that's 121/2 pounds of air. At sea level, 121/2 pounds of air is about 170 cubic feet—that's a lot of air to cram through valves that are usually less than two inches in diameter.

Traditional power recipes for normally aspirated engines try to get more air into an engine in three ways:

• Making better or larger pathways into the engine by improving the flow characteristics. This can be done by porting the cylinder head, increasing carb sizes and increasing the port and valve sizes.

• Increasing valve lift, therefore increasing potential volume through the valve opening.

• Increasing valve opening duration, therefore giving the air more time to get into the engine.

The trouble with normally aspirated engines is that even though these methods work, the air still needs to be sucked through the intake tract and ports. It's a little like leading a horse to water and hoping that it takes a drink.

Superchargers take that horse to the water and force it to drink. By various means, superchargers pump or compress the air before it gets in the engine. The more air it gets, the more fuel it can burn, and the more power the engine makes.

Before you go and think supercharging is the best thing since sliced bread, realize there are downsides. First, consider the cost and complexity. Supercharger kits usually carry price tags of several thousand dollars and add multiple moving parts to an engine, increasing the potential for breakdown.

The second issue is the parasitic loss: It takes power to spin the supercharger. How much power depends on the supercharger in use, but it can range from single digits to hundreds of horsepower.

Finally, we have to mention the bane of supercharging: heat. Compressing the air so more of it can fit into the engine is going to heat it up. That heat is going to cost some power, but more important it's going to increase the likelihood of problems like detonation. Detonation not only kills power, it often kills engines.

Despite these shortcomings, it's clear that we're living in an age where supercharging is pretty close to being a silver bullet in many performance applications. While it's not inexpensive, the power gained per dollar spent is comparable to or better than many other power-adders.

Modern blowers have gotten more efficient, more compact, more reliable, and more cost-effective. They usually will work with stock or near-stock engines and allow for great performance and drivability throughout large rpm ranges. They also usually build power at much lower engine speeds than normally aspirated power-adders, making the power much more usable in street applications.

Superchargers and their cousins, turbochargers, have gotten fairly common in modern cars. Thanks to several aftermarket manufacturers, we're seeing more and more of them made for our classics. The next time you're looking for more power, you might look to a blower for that boost.

Complete Kit

There are several companies offering superchargers for British cars, and Moss isn't the first to offer one for the TR6. What separates Moss from most of the others is the thoroughness of the package. The Moss kit is totally complete, right down to the last nut, bolt and hose clamp.

The supercharger is also set up for a stock engine and is designed for a milder state of tune to provide a nice balance between performance, drivability and longevity. The heart of the kit is Eaton's MP62 supercharger, the same one used in many modern cars and throughout the aftermarket. The kit then adds a custom manifold setup, drive system, fuel delivery and all required sundries.

The drive system also converts the TR6's V-belt to a modern, multi-ribbed serpentine belt. To do so, the kit comes with a new water pump and pulley as well as a new pulley for the alternator. Several brackets, idlers and a spring-loaded auto-tensioner are also included.

For fuel delivery, Moss has moved away from the SU carbs they use for their other kits to something not often seen under the bonnet of a British beauty: an American Holley carb. Should they be needed, tune-up and rebuild parts for the supplied 350 cfm manual-choke, two-barrel Holley can often be found at just about any auto parts store.

To ensure enough fuel delivery to that carburetor, the kit also requires an electric fuel pump—yes, it's included. A block-off plate for the stock mechanical unit comes with the kit. Finally, a seemingly cheap chrome-topped, paper element air filter covers that carb. (In testing we found that it performed about as well as several much more expensive K&N units.)

The blower kit comes in two versions, one for the 1969-'71 TR6 (part No. 150-108), the other for 1972-'76 models (part No. 150-118). Either kit costs $3495. Moss also has a couple of options for the blower. For added boost, they sell a smaller pulley that provides an additional 2 psi of boost. (The part number is 150-112, and it costs $144). To keep heat down, they offer a heat shield kit (part No. 150-106 for $86) that goes between the blower and the manifolds. We ordered both options for our installation.

Maximizing Power With Some Tuning

Just bolting parts to an engine won't necessarily increase power. Once the dust has settled, it takes a good tuning session to maximize the parts' impact. Performance tuning is more than just setting the timing and carbs to the factory specs. In fact, the factory specs often simply don't apply to a performance tune.

A good performance tune will start by working on the ignition side of the engine—finding the right initial timing, the right advance curve and the right maximum timing. Once that's well-established, it's time to work on the carbs. Getting the jetting right throughout the entire power range (not just idle) can make the difference between a smoking exhaust and smoking tires—which would you rather have?

Case in point, our nicely tuned TR6 initially made 89 horsepower at the wheels and did zero to 60 in 10.3 seconds. Once we installed the supercharger the car ran well, but we could only muster 10.0-second zero-to-60 times—not great considering we'd just added a $3500 supercharger.

We didn't have to work with the ignition much, as we soon found that the supplied carb jetting was too rich. As we leaned out the carb, we continually improved our zero-to-60 times until they dropped to 8.3 seconds. A few hours and $20 worth of jets had made a big difference.

Knowing that our tune was now pretty close, we headed to the chassis dyno to get the last bit of power out of the car. Our initial run produced 108 horsepower at the wheels. As always, we first found our best timing setting. Advancing the total timing from 33 degrees to 37 degrees yielded another 5 horsepower—a great start.

We then looked at the air/fuel ratios and found we were still a little rich. We went two jet sizes leaner and picked up another 5 horsepower. That dyno session had yielded 10 additional horsepower, which further whittled down our zero-to-60 times.

The bottom line is that the supercharger alone didn't get us a lot of power. We got the biggest jolt and most fun out of our blown engine thanks to a carefully executed performance tune. We recommend you budget for a good tune—preferably with some dyno time—as you plan your power upgrade recipe.

Insert Tab A Into Slot B

Despite the imposing 46-page instruction manual and the number of parts included in the box, the installation is quite simple. First, the radiator, front chassis crossmember and pulley system need to be removed. The intake manifold and carbs are then pulled from the engine.

Now it’s time to start installing parts. The water pump and new pulleys are fitted, while the Eaton blower and its manifold simply replaces the stock setup. The chassis crossmember and radiator can go back in following some simple hose routing.

Then the mechanical fuel pump is removed from the engine block and its mounting hole is blocked off. The electric pump is installed, plumbed and wired. The bonnet is reinstalled, and the installation is finished.

While we think Moss has done a great job with the kit, we did take some liberty with a few of the installation details. First, we didn’t follow their lead with regards to the installation of the electric fuel pump. The book says to fit the pump to a chassis member behind the left-rear tire. While we didn’t feel like rerouting the wiring and fuel lines to accomplish that task, the real deal-breaker was the fact that the new setup would allow the fuel pump to be pelted with road spray.

We decided to mount the new pump under the hood, near its stock location. We attached the pump to the left-front inner fenderwell—out of harm’s way and about 8 inches from its original location on the engine block. This move allowed us to keep almost all of the original fuel lines in use and considerably shortened our wiring.

We also strayed from Moss’s recommendations when wiring the fuel pump. We didn’t use their included fuse as the stock wiring provided two fuses for us already, and we routed things a little more neatly. We used the purple circuit for a fused, main power source and the green circuit for a fused, switched source that turns the relay and pump on and off.

For our final act of rebellion, we improved upon the crankcase breathing offered in the kit. Like many aftermarket carb setups, the kit didn’t have a provision for positive crankcase ventilation. Instead, there was a provision to hook the crankcase breather on the valve cover to the air filter. While this does allow the crankcase to vent, it’s also traditionally a quick path to fumes and oily air filters. We remedied the situation by installing an inline PCV valve (NAPA Part No. 2-9209) and hooking it to a manifold vacuum port on the carb.

Steadily Building Performance

Before installing our blower, we needed to get some baseline measurements. These numbers would allow us to better evaluate the Moss kit, as we have found the butt dyno to sometimes be a little optimistic and erratic.

If you read the old reviews of the TR6, you'll see that the U.S.-spec cars could generally sprint from zero to 60 mph in 10 to 12 seconds. We usually get times in the 12- to 14-second range. Our car initially baselined at a very strong 10.3 seconds. (Before you get too excited, realize that a new Miata can accomplish that same feat in about 7.5 seconds.)

Now we could go visit the dyno shop. Depending on the year of manufacture, Triumph rated the American-market TR6s from 102 to 106 horsepower. Thanks to their Lucas fuel injection, the British cars did a little better, producing 150 horsepower at the crank.

We've never put a fuel-injected TR6 on the chassis dyno, but we have found stock American-market TR6s usually make between 72 to 74 horsepower at the wheels with a very flat torque curve that hovers around 100 lb.-ft. The difference between the factory numbers and the figures recorded at the dyno are partly due to driveline drag. By comparison, our hotted-up, still normally aspirated TR6 performed quite well, producing 89 horsepower and 111 lb.-ft. of torque at the wheels.

Once we had installed the blower, we could redo our testing. For the first batch of tests, we ran the car with the standard supercharger pulley that produced 5 psi of boost. After a little tuning, our zero-to-60 runs took just 7.4 seconds. A trip to the chassis dyno produced figures of 118 horsepower along with 134 lb.-ft. of torque.

We then went to the high-boost pulley, which bumped us to about 7 psi of boost. While the car was already awake with the 5 psi pulley, the 7 psi pulley woke it up like it had spent the whole morning at Starbucks. Our zero-to-60 times plummeted to 6.3 seconds, horsepower climbed to 131, torque leapt to 147 lb.-ft., and the smiles stayed on our faces for days.

Despite the increased performance, drivability of the car is excellent. It starts quickly and idles at 600 rpm. The engine also doesn't feel the slightest bit twitchy or peaky as tweaked engines often do. It just feels like a strong stock engine until the throttle is opened. Then it pulls like a freight train.

Our only complaint is that the accelerator pedal effort seems excessive. Maybe Moss designed it that way to keep drivers out of trouble, but we're going to do some work to make it easier to put the hammer down.

Blow Up Your Engine?

One of the most common urban legends is that superchargers blow up engines. We've worked with scores of supercharged cars over the years, ranging from 50-year-old classics with period-correct huffers to late-model cars fitted with state-of-the-art blowers.

Likewise, we've seen people put together great combinations that worked and bad combinations that didn't. As a result, we've seen a few engines blow up, but the supercharger was never the direct cause of these failures.

Almost every time, detonation holed a piston. In some cases, it was a matter of tuning. The owner didn't make sure the car was tuned right and either had too much timing advance or too lean a mixture at high rpm. The result of either situation is detonation and engine damage.

In other cases, it was a matter of putting a supercharger on an engine not optimized for forced induction. Usually, the engine had too high a static compression ratio to support the blower. Once again, catastrophic detonation was the result.

Another urban legend we hear is that blowers destroy rods, bearings and cranks. In street applications at boost levels below 12 psi, we just haven't seen any damage like this. Our feeling has always been that running an engine at high engine speeds for sustained periods of time is generally hard on the bottom end, regardless of induction system. With most superchargers, enough torque and power are produced at low engine speeds that sustained high speeds aren't necessary to move the vehicle along.

Is a supercharger going to blow up your engine? If your engine is suited for boost, properly tuned and kept below redline, then the answer most likely is no.

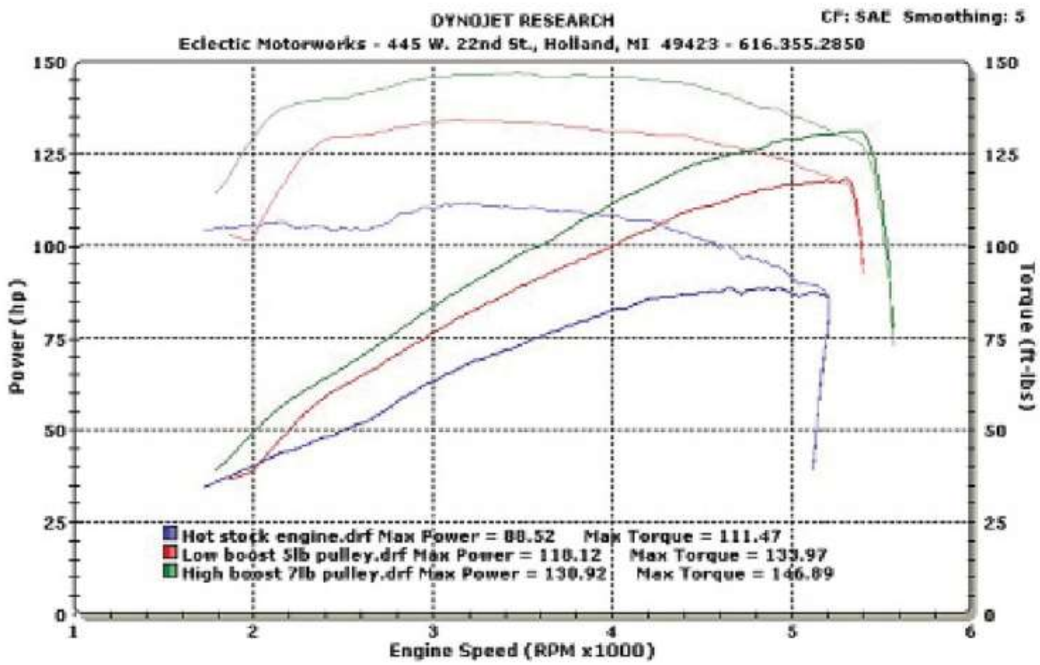
Results, and Other Power Options

Setup	HP at 3500 rpm	Peak horsepower	Peak Torque	0-60 time	Parts cost
Stock	62	74@4600 rpm	95@2800 rpm	13.5 sec.	$0
Mild camshaft	73	89@4800 rpm	111@3200 rpm	10.3 sec.	$350
Mild cam, ported head, increased compression ratio	75	100@5000 rpm	114@2800 rpm	8.4 sec.	$1350
Big cam, ported head, increased compression ratio, triple carbs	92	146@5700 rpm	144@4800 rpm	n/a	$7600
Supercharged, 5 psi boost, mild cam	89	118@5300 rpm	134@3100 rpm	7.4 sec.	$3950
Supercharged, 7 psi boost, mild cam	97	131@5300 rpm	147@3500 rpm	6.3 sec.	$4100

Note 1: Costs are approximate for parts and machine shop work only. Installation and tuning are not included. Note 2: All horsepower and torque figures are measured at the rear wheels on a chassis dyno.

Supercharging isn't the only way to make a Triumph TR6 go faster. For years, people have been waking up TR6s using some fairly straightforward formulas. We've put several hopped-up TR6s on the chassis dyno and can offer some comparative numbers. First, some generalizations: TR6s respond very well to cylinder head porting, increased compression ratios, cam upgrades plus induction and exhaust upgrades. Parts shouldn't be thrown at the cars randomly, however. Rather, they must be picked to support a planned performance objective and design. We've detailed some of this in past issues of Classic Motorsports—check out our January 2007 and September 2005 issues for some proven recipes. (We also have more TR6 engine editorial in the works.) The chart below shows some power comparisons for a few well-prepared cars.

Future Plans



You'll be seeing more of our TR6 in future issues of Classic Motorsports. We're not done trying to make more horsepower, as we also have an even higher-boost pulley to try. We think it will drop our zero-to-60 times to below six seconds, giving us Porsche Boxster-like acceleration.

We also need to address some cosmetic issues. We covered the underhood detailing in our last issue, but the car still needs some love regarding its 20-year-old paint work. The interior could also use a little attention, and we have a few other steps to take to transform this car into a great daily driver with a bit of attitude.