

POWER!



BIG POWER **FINALLY!** FOUR-POPPER

Turbocharged 2.5L Wrangler

By Pete Trasborg

**We've said it for years:
If you want your four-cylinder-powered Jeep to have**

power, sell it and get a six-cylinder-powered Jeep or swap in a V-8. The other thing we've been harping on for years is that some company needs to step up and bring to market an affordable bolt-on turbocharger kit. The Jeep 2.5L four-cylinder isn't a bad engine, it's actually downright bulletproof by today's engine standards; it just needs a shot of power that most bolt-on modifications can't provide.

Enter 505 Performance. The company started selling high-performance Jeep

engines in 2001 and has been building high-performance engines with and without turbos and superchargers for longer than that. So when the company introduced a turbo system for a Jeep 4.0L four years ago it ended up on our radar and we figured it was only a matter of time until the trickle-down theory kicked in and a four-cylinder kit emerged.

While we didn't put an intercooler on ours (they are available) or trick it out with powdercoated parts (also available), we did pick the mind behind the turbo kit for information about how these systems work and came away with a much better understanding of the parts needed and why they are needed. Oh, and a Jeep that picks up its skirt and goes when you punch it.

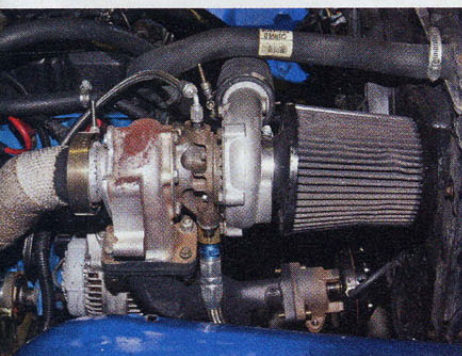
After all was said and done, we ended up with a four-cylinder that pulls like a six-cylinder. In all our years and miles of driving Jeeps we've never been happier to be behind the wheel with a bunch of squirrels under the hood.



The base \$2,999 kit includes (from left to right, top to bottom) the turbo, a K&N air filter, a turbo wastegate, a Split Second fuel management computer, the downpipe from the turbo to your stock exhaust, the turbo and wastegate mount, an oil return line, oil fittings, Accel injectors, silicone hoses and high-end clamps for the intake, band-style exhaust clamps, vacuum hose, intake tube (from turbo to throttle body), clamps for exhaust tubing to turbo and turbo-mount pipe, and the pipe that bolts to your existing header. It is a very complete kit, and also included (but not shown) is the blow-off valve.



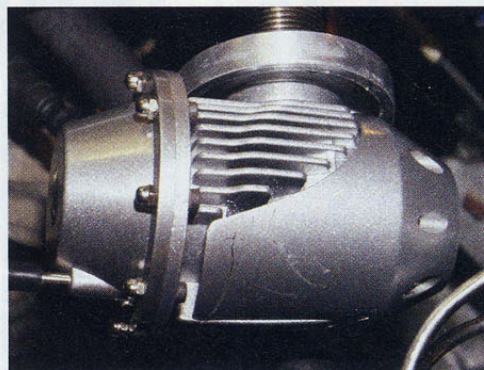
We cut the old exhaust off and pulled the oil pan. A 1-inch hole will need to be drilled in the oil pan for the $\frac{1}{8}$ -inch (AN-10) oil return line from the turbo. We opted to weld the AN-10 fitting in, but you can simply bolt it through the oil pan. Either way, unless you want metal shavings in your oil, pulling the pan is needed. Since we had RTV'd the old oil pan gasket on, we replaced the gasket with a Fel-Pro part (PN OS 34007 R). Most can do without this, as the oil pan gasket is often reusable.



Turbos are pretty simple, but often misunderstood. They are basically a low-pressure air compressor that uses the engine exhaust to power the compressor wheel. Exhaust gas goes in one end of the turbo, spins the compressor blades, and then exits the turbo heading towards the tailpipe. On the other side, it needs an air input, and then an outlet to the engine after the air is compressed. Also, it shares oil with the engine, so it needs an oil input (from the oil pressure sending unit) and an oil outlet (going back to the oil pan).



The turbo wastegate controls how much boost your turbo makes. Left unchecked, the turbo will create exponentially higher boost numbers as the engine RPM goes up. The wastegate has a vacuum port that attaches to manifold vacuum and it opens at a set point. This unit limits our turbo to about 7 pounds of boost. The kits that carry the one-year warranty will be sold with a pre-set 6 pounds of boost. If that isn't enough for you, you can get optional springs to increase boost, but you void 505's warranty.



After you let off the gas, and the butterfly closes on the throttle body, the pressure built up between the turbo and the throttle body could actually bend the butterfly. So, the blow-off valve is attached to engine vacuum on both sides of the throttle body, and can sense drastic pressure differences. When it senses a difference that might damage things, it dumps whatever pressure is left between the turbo and the throttle body.

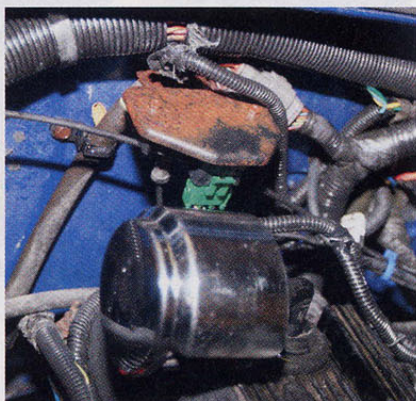


For most people, the hardest part of this install is going to be removing the oil pressure sending unit to put in the T-fitting that goes to the turbo oil line. Of course, for us, with our welded-in custom aftermarket exhaust system with a modified header, we had a bit more work to do. The company ended up making us a custom tube from the header to the turbo pipe to fit our application. However even if you have an aftermarket header, as long as it bolts to your stock exhaust, you'll be fine.

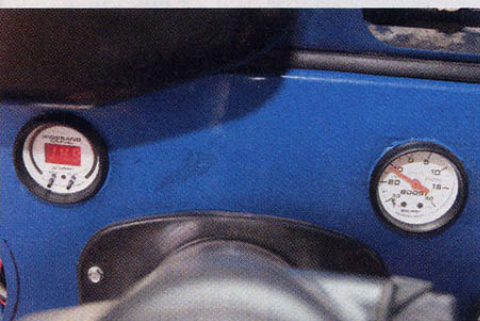


The secret to keeping the "check-engine" demon at bay is this fuel/timing calibrator from Split Second (FTC1-019B). It is included in the kit, and 505 loads it with a fuel map that will get 99.9% of us going right off the bat. Even our YJ, with a bored-out TJ throttle body, custom $2\frac{1}{2}$ -inch exhaust, high-flow cat, and worn-out cap and rotor ran like a champ with the off-the shelf fuel map. Of course, with the included software, you can go in and change the fuel map as you see fit, but be careful about leaning it out or richening it up too much as you could damage the engine.

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The stock MAP sensor is left on the firewall and a wire from the fuel/timing calibrator is tapped into it to feed a MAP signal to the stock computer. The stock MAP sensor is a 1-bar sensor, which means it can only read vacuum. A 2-bar sensor is needed to read boost, but the stock computer isn't set up for those readings. So, a vacuum line is run to the Split Second calibrator, the 2-bar sensor in the unit analyzes manifold pressure and then feeds the stock Jeep computer a reading it can use. In this manner, the Jeep computer still runs the engine using the stock O₂ and other sensors.



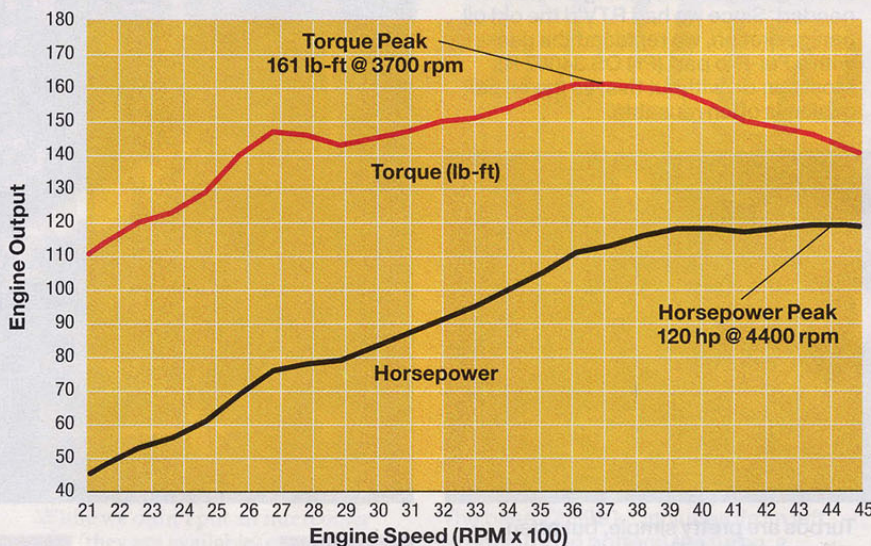
We fully plan on tuning the kit to tighter tolerances in the future, and we just wanted to see what was going on with our new parts, so we added an Auto Meter wideband O₂ gauge (PN 5778) and an Auto Meter boost gauge (PN 5701). With the boost gauge, we can monitor how much boost we get (about 7 pounds) at what point in the RPM (all in by about 2300 RPM). And by watching the wideband gauge we can make sure we aren't running too lean at any point to avoid burning pistons or otherwise damaging the engine.



After we hooked everything up and took it for a drive, we were left with oil puking out the crankcase vent hole. With 20,000-30,000 miles on our rebuilt engine, we thought it was in great shape. However, 505 tells us that the amount of oil we were losing was more in line with an engine that had 100,000-150,000 miles on it. The solution is a band-aid, but for now it's working: we added a Moroso Breather Tank that we got from Summit Racing (PN MOR-85470) to the system to keep the oil spewage under control.



As it turns out when you take a Jeep with over 400,000 miles on it, some things which were fine give it up with the addition of almost 50hp and about 75lb-ft of power. We noticed the Jeep heating up more than before, but by putting our swapped-in electric fan on "high" we are able to keep it under control. We couldn't control the slipping of the oil-soaked parts-store clutch so we swapped in a Centerforce Dual Friction clutch to fix the problem. The actual problem was leakage at the back of the valve cover dripping down the back of the engine. We fixed that long ago, but our clutch was still toasted. With the Centerforce, we should be good to go for a long time to come.



Once we had the spewage under control, we took the Jeep down to AEM to run it on the dyno. We ran this Jeep on AEM's dyno before, so it only made sense to return there for this round. While we lost the dyno sheet we had, we did find an email laugh-

ing at the 83 hp this Jeep put to the rear wheels last time. This time we hit 120hp/161lb-ft at the rear wheels. That puts us at 104hp before and 150hp/201 lb-ft at the crank after installing the turbo, putting us near stock six-cylinder output, assuming a 25-percent correction factor for parasitic drivetrain loss. For comparison, stock-rated power for this Jeep is 120hp/139lb-ft at the crank.

Sources

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Auto Meter, 866/899-0800, autometer.com

Federal-Mogul (Fel-Pro), 248/354-7700, federal-mogul.com

Midway Industries (Centerforce), 928/771-8422, centerforce.com

Split Second, 949/863-1363, splitsec.com

Summit Racing, 800/230-3030, summitracing.com