

Tuning the Uber Motor



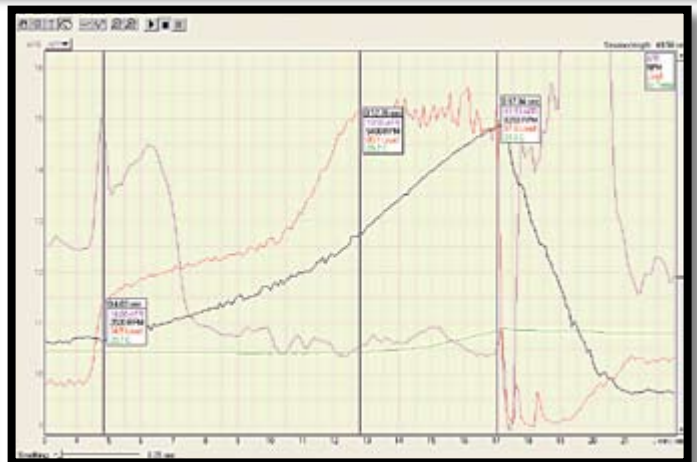
Story By RYAN SCOTT
Photos By RYAN SCOTT

MAKING POWER ON PAPER AND MAKING POWER TO THE WHEELS are two entirely separate things. Last month we showed you what it takes to build a motor capable of producing well over 500 horsepower. We built it, but will the horsepower come? To realize that goal encompasses a myriad of factors, fortunately Gary's '94 RX-7 was extremely well prepped, and ready to take on the dyno rollers. The final piece of the puzzle, and undoubtedly the most important part when dealing with these power levels, is tuning.

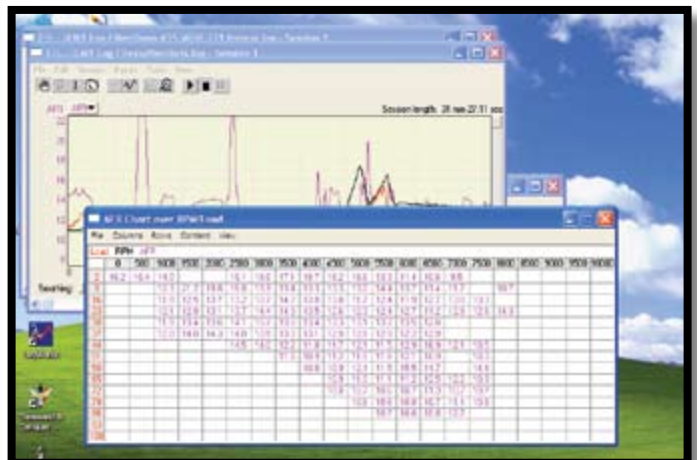
To handle tuning duties, we called in long-time tuner and Wolf EMS North America distributor, Chris Green. Gary and myself both being Wolf v4 owners have known Chris for sometime, and after guarantees of fame and fortune from magazine exposure, we managed to drag his ass to St Louis.

The Wolf Version 4 truly is a powerful piece of engine management hardware, and a huge step up from the previous Version 3. Upgrades include greatly increased resolution, a faster processor, boost and idle control, and many more auxiliary inputs/outputs. In addition to all these features is a robust Windows software package. Of course, something this powerful can also be quite a challenge to operate. Over the years, Gary and I have worked with the Wolf and had some pretty good success, but we never got things just right. By getting Chris in town to tune the car, we take the loose nut behind the wheel out of the equation.

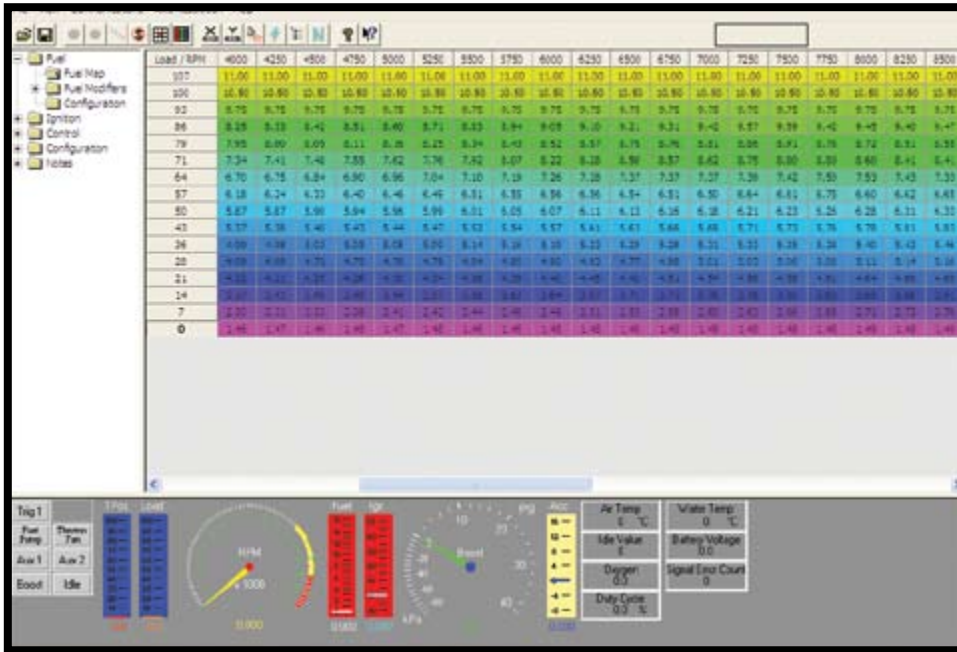
Once again generously donating dyno time was Lightspeed Motorsports. Coming in on a typical Sunday off work, John and crew were very generous with their time. To make the most out of the day we invited other STL rotary owners over for a full-on dyno day, featuring Chris and his skills. But the star of the show was Gary and his White '94.



LM-1 logging trace during 435RWHP run



LM-1 logging alternate view—displaying over 30 minutes of data



Wolf 3D fuel map display used on Gary's car

A stand-alone engine management system is not enough to tune a car. True there may be those who can tune by ear, feel how a car responds and smells on the street. Those tuners are a rare breed, and the results are not typically as reliable as what you can achieve with proper tuning and logging tools. So what are the 'proper' tools? To start, you need a wide-band air/fuel (AFR) meter and the ability to log the information. Providing that function was the Innovate Motorsports LM-1, another powerful piece of hardware with fantastic Windows software. The LM-1 comes with an accurate (self calibrating) Bosch wide-band AFR, Windows software, and a logging box which samples data 12 times per second and can record up to 44 minutes of data.

Chris had highly recommended that we get a LM-1 on Gary's car in advance, and start doing some logging. And after use, it's hard to imagine being without it, the LM-1 became an integral part of the tuning process. Further adding to the LM-1's usefulness is the ability to tailor the log display to match that of the Wolf v4 fuel map grid. And the owner of any engine management system could do the same, Power FC, Haltech, you name it. At around \$400 street, the LM-1 is something every rotary owner should have in their arsenal.

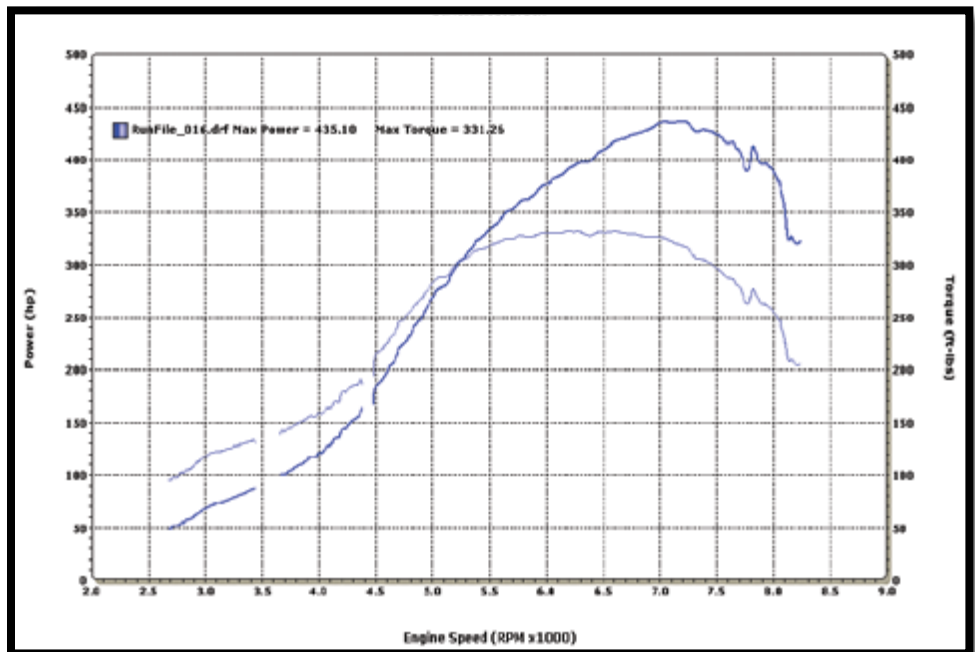
To try and get some results before the heat of a St Louis summer kicked in, Gary and Chris hit the dyno around 10am. After a few runs to establish a baseline and gather logs, Chris started making changes to the fuel maps. Quickly the car hit a new personal best, 386 rear wheel horsepower at 13psi, but we all knew there was more left. However a leaking exhaust manifold cut Gary's day short. In fact, the manifold was leaking bad enough that accurate AFR measurements were not possible. We decided to cut the day short and use Monday to fix the issues before returning to the dyno Monday evening.

Gary's turbo setup was a custom job done by DaVinci Motorworks in Belleville, IL consisting of a Garret TO4-R 1.0 A/R, .7 front side, and a

67mm compressor wheel. By no means is this a huge turbo, but very capable of around 500 hp at the wheels. As mentioned earlier, the v-band flange DaVinci welded on was leaking enough that it had to be fixed before continuing, which they did Monday afternoon. After that it was back to the dyno for round two. Chris and Gary were feeling the pressure, it was do or die, Chris had to get back on a plane first thing in the morning Tuesday.

Back on the dyno Monday evening, things again started rather inauspiciously. The exhaust leak was fixed, but a new problem had arisen. Now we were seeing some rather dramatic fluctuations in boost pressure, enough in fact that it would produce at 20-30 hp swing on the dyno. And trying to up boost pressure to 15psi had no effect, it would not go above 1bar. Even cursing and prolonged head scratching had no effect.

Finding the problem was a bit of luck actually, as one of the Lightspeed guys noticed what sounded like air venting from the intercooler piping at the exact moment the boost would drop. It turned out that the custom IC plumbing was welded improperly, and had numerous pin sized holes throughout the welded areas. With our faces inches away from the piping we could actually see little steam geysers all over the pip-



ing while under boost. Ugh, at least it's an easy fix ... and at least we found it! Duct tape to the rescue, certified to 100mph and now certified to 15psi, we wrapped the plumbing and gave it another run.

Bam! Just like that 2 days of work culminated with resounding success – 435 rear wheel horsepower at only 15 – 15.5psi! Yea, you read that right! The RX-7 Specialties Uber Motor certainly can flow, and Chris certainly can tune. The combination came together perfectly with resounding success. And not only does Gary's car now make awesome power, it runs clean. No more watery eye inducing exhaust

scent, in fact the car only produces a faint smell. And it literally runs so clean that the exhaust tips look like the tip of a used spark plug, no black soot, only a light grey chalk like coating. Impressive, and while Gary can't stay out of it long enough to really know what kind of mileage the car is getting, I'd guess 20+ mpg. It's totally driveable around town, no missing or hesitations, just smooth and strong.

Gary is so happy he's already planning his next upgrades. At 15psi he's hitting close to 90% injector duty cycle, a sure sign that more fuel is needed. So he'll be upgrading his stock 550cc primary injectors with a set of 850cc replacements. At the same time he'll be swapping in some -6AN fuel line and standard fittings wherever necessary.

On race gas and 20psi we have no doubt the car will produce over 500 rwhp.

In the future we'll talk about the specifics of tuning in depth, and all the tools used such as the Innovate Motorsports LM-1, Wolf 3D Engine Management System, and the Apexi Power FC. Huge thanks to Chris and the guys at Lightspeed! **RX**



"I can't believe that shit worked!"

Credits:

- Wolf Engine Management Systems, Chris Green – Wolf USA
- Lightspeed Motorsports: University City, MO (314) 432-5221
- Innovate Motorsports <http://www.tuneyouengine.com>
- DaVinci Motorsports Belleville, IL (618) 222-1201
- RX7 Specialties www.rotaryengine.com (403) 246-6980