



NITROUS Express

NX Maximizer

BY MARTIN MUSIAL (WWW.AUTOMOSPORTS.COM)

IT'S BEEN CALLED the spray, the juice, the shit, the giggle gas, the nawz and the list goes on. Of course, these terms all refer to one thing, nitrous oxide. Once feared by the import crowds it has grown in popularity and use, because when used properly the gains can be immense. Sure, some people frown upon it and say it's cheating, but with the fastest drag cars using it, who can argue? There are a few things that have made nitrous more appealing and safer to use in the last

few years. Wideband oxygen sensors have become very affordable and now almost anyone can make sure their tune is spot-on. Piggy-backs and standalone engine management units have also made nitrous safe and easy to use. Now with a few keystrokes we can take out four degrees of ignition timing and add five percent of fuel to be able to run that big nitrous shot. One warning on nitrous, it's an addiction. Drive a car with nitrous and you'll never want to go back!

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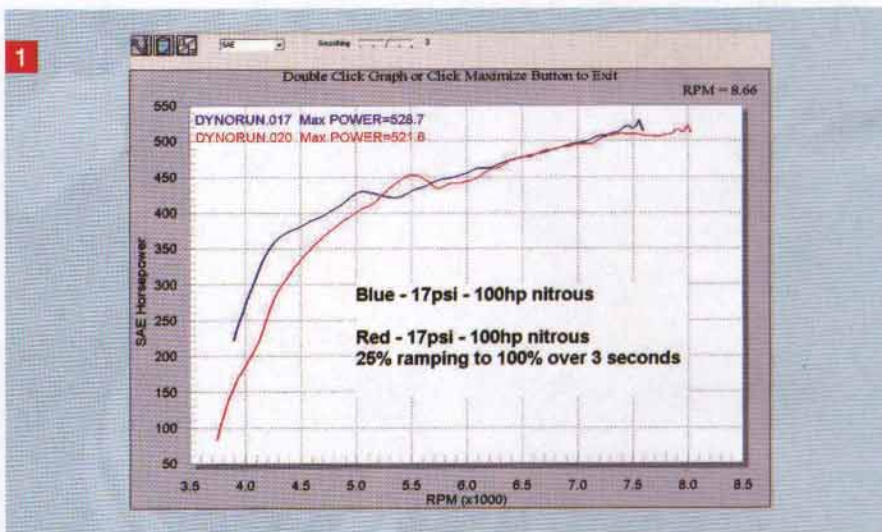
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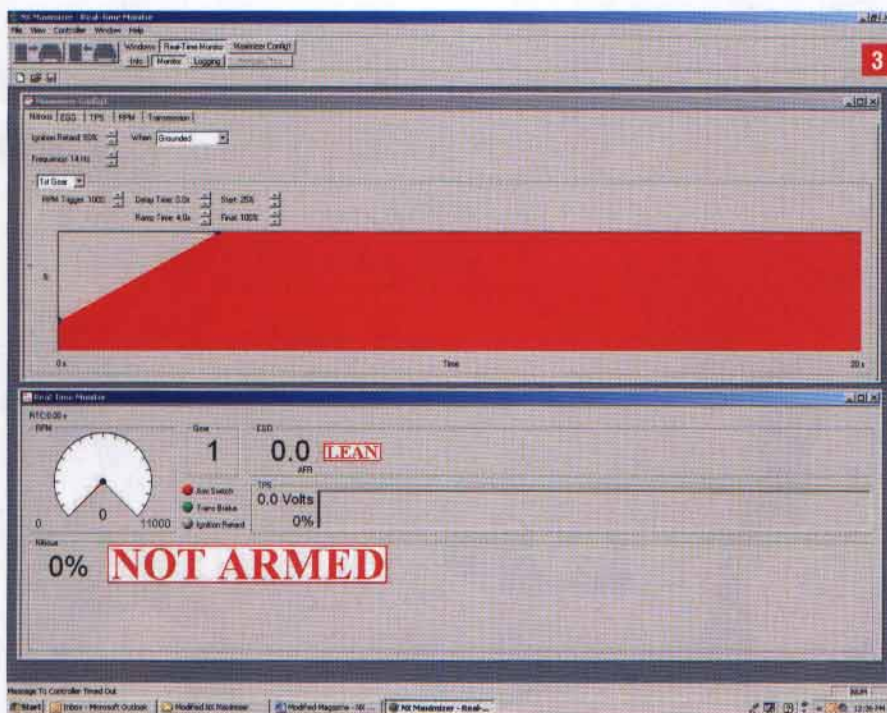


BASICS OF NITROUS AND NITROUS TUNING

Nitrous was first used in WWII. Fighter-planes used nitrous as a boost during emergency maneuvers or to compensate for less oxygen at higher altitudes. Nitrous was used in racing starting in the 50s but didn't gain popularity until the 70s. At that time, all the big time drag racers were using nitrous oxide injection. With the recent import performance explosion, manufacturers are making components that let the small displacement motors handle huge horsepower. Turbo guys love nitrous. It spools their turbo instantaneously, cools the intake charge down, and gives gobs of power. Nitrous adds power by releasing oxygen into the cylinder. Nitrous oxide consists of two parts nitrogen to one part oxygen. Under normal conditions nitrous oxide is a non-flammable gas that some of you may have experienced at a dentist's office, and hopefully not from a can of whipped cream. When nitrous oxide is injected

into the engine the heat from the compression stroke breaks down the gas and releases the oxygen. At a little over 550 degrees Fahrenheit the chemical bond breaks and that oxygen becomes available to burn. This extra oxygen is what gives the engine more power. Of course, more fuel is needed now that there is more oxygen and there are two types of nitrous systems for this. One is a wet kit that injects nitrous and the needed fuel. The other is a dry kit that only injects nitrous. With a dry kit there has to be some method of fuel enrichment, be it additional fuel pressure or remapping the ECU.

Tuning on nitrous requires some basic guidelines that must be followed. First of all, nitrous should only be injected under wide open throttle. If injected at low throttle opening there could be a nitrous backfire that can destroy intake manifolds, start fires and other nasty stuff. The air to fuel ratio also needs to be richer when running nitrous. On a naturally aspirated car, I would suggest a 12.0:1 ratio depending on

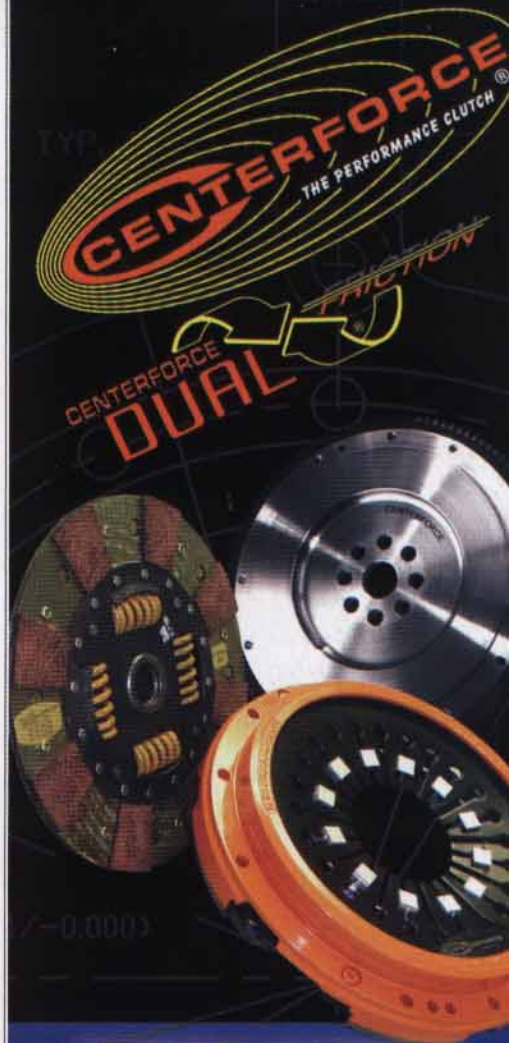


1. In this chart the NX Maximizer ramps up from 25-percent (25hp shot) to 100-percent (100hp shot) in a span of 3 seconds. You can see the peak hp is the same as without the use of the Maximizer but with it enabled, in the lower rpm the hp drops. This can be extremely useful when launching a vehicle because less driveline stress occurs which results in less breakage upon launch. 2. Here the Maximizer was pulsed to provide 50-percent of the shot and did extremely well in achieving it despite the added stress on the solenoids. 3. The NX Maximizer has included software that allows you to fully customize the way you want to have your nitrous setup. Welcome to the new world of controlling your nitrous system.

the size of the shot. On turbo applications the A/F ratio needs to be about 11.0:1. The richer mixture helps to avoid detonation and keeps things cooler in the combustion chamber. Fuel mixtures can be changed with fuel jets which are provided with the nitrous system. Always start rich and work your way back. Choose a higher octane fuel when using nitrous, because the added cylinder pressure and heat increase the chance of detonation. If your car is tuned for 93 octane, then a 75 shot of nitrous could require 100 octane to run safely. Ignition timing must also be reduced when running nitrous to avoid detonation. A rule of thumb: about 1 to 1.5 degrees of timing retard for every 50 horsepower of nitrous. This can be done through an aftermarket ignition retard box, through ECU tuning or reducing the base timing with the distributor. This is a very basic tuning guide and you should keep checking the plugs for signs of detonation or monitoring the engine's knock sensor to keep things safe.

DESCRIPTION AND BASIC INSTALLATION OF THE NX MAXIMIZER

The NX Maximizer will do to nitrous what piggyback systems did to ECU tuning. Hookup is very similar to the wiring and arming setup of a conventional nitrous system. In addition, the NX Maximizer needs a TPS signal, tach signal and optional wide-band sensor input. You can also output an ignition retard signal to an aftermarket ignition system capable of retarding timing. So what can this piece of hardware do? You want your nitrous to come on only after first gear, after 3,000rpm, 85 percent throttle, and then ramp your 100 shot gently starting from 0 to 100 percent over four seconds? No problem. With just a flick of the switch to arm the system the NX maximizer can take over from there and handle all of these conditions. The system can control what gear, RPM, and TPS to activate plus pulse the solenoids to give complete control of how much and how fast to bring in the nitrous.



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The NX Maximizer Progressive Solenoid Driver. This device sends signals to your solenoids and controls them to perform whatever function has been programmed via the PC or PDA software.

HOW THE NX MAXIMIZER WORKS AND SOME EXAMPLES

The NX Maximizer can be controlled via PC or PDA software. Some basic information has to be provided through the software to setup the Maximizer. To sense what gear the vehicle is in, parameters for how many gears, type of transmission, and so forth must be selected from drop down menus. Obviously smacking the rev-limiter on nitrous is a big no-no so the Maximizer can be configured to deactivate the nitrous after a certain RPM. After a brief TPS calibration, the Maximizer can determine what gear the car is in and at what throttle position to activate the nitrous. We're ready for the good stuff. Wouldn't it be nice if your nitrous could shut off if the car was running too lean? This would eliminate burnt valves, melted pistons, and ruined motors. Lucky

for us this feature is built into the Maximizer. Using an optional FJO wideband sensor and controller, it can be wired to the Maximizer and you can set the air fuel ratio point for turning off the nitrous. Another problem with nitrous is that it can hit pretty hard. Hit that button and you'll have 900-1,000psi of nitrous flowing instantaneously into the motor. A big nitrous shot can be violent and toast the tires and shock the engine or drivetrain. With the Maximizer we can ramp in the nitrous and control how much is injected. This can allow smooth nitrous delivery and also inject nitrous only when necessary. Each gear has independent settings, meaning you can go from zero to hero depending on what gear you are in. Unless you have an unusually large turbo you won't want to spray right off the line in first gear. Then in second gear you might want the nitrous to come in really soft so

the tires don't go up in smoke. Using a simple graph, we can click and drag our initial nitrous starting point and ramp it up to the final value. For example, we'll have the nitrous start at 25 percent and ramp up to 100 percent over a two second time span. That means our 100 shot will start out at about a 25 shot and progressively increase to the full 100 shot over a two second time period. This is great for cars with traction problems and can be tweaked at the track until the ultimate settings are reached. We all know that most of the ET at the track is made up in the first 330' of the track, so what's the point of spraying on the big end? Well, if you're really juicin' the motor with a 200 shot or bigger it might be a wise decision not to put the motor under prolonged load. Let it rip for the first three gears and then shut down the nitrous in fourth where the engine is held under load the longest. The MPH might drop a little but the ET won't change much and the engine will last longer.

TESTING

For testing purposes we outfitted our Lancer EVO 8 with the Nitrous Express Maximizer and a 100 shot single fogger nozzle. A base-line run was done at 17psi without nitrous. For the first test we ran the nitrous as it would be without the maximizer. From the graph you can see the power jumps and spikes very suddenly as the nitrous turns on. The next test was to gently ramp the nitrous in. The initial nitrous was at 25 percent ramping to 100 percent over three seconds. The dyno graph reveals no spike and a smooth power increase. For the next test we leaned on the controller and asked for only 50 percent nitrous. Although hard on the solenoids, we really wanted to see if this would work and it did. During the run the A/F was closely monitored for safety and I could feel the power was reduced from the decreased nitrous shot. The last graph reveals the results - a perfect run with steady air fuel ratios and our reduced nitrous shot. And for the giant turbo crowd that only wants to spool that thing up, we went with a 100 percent initial and ramped it down to 0 percent after 3 seconds. The turbo spooled up instantly and then the power tapered down to follow the boost-only power curve. These tests clearly show how well the progressive controller works and the different scenarios it could be used under. Whether you run at the track or spray it on the street, everyone can benefit from this advanced form of nitrous control. ■■■



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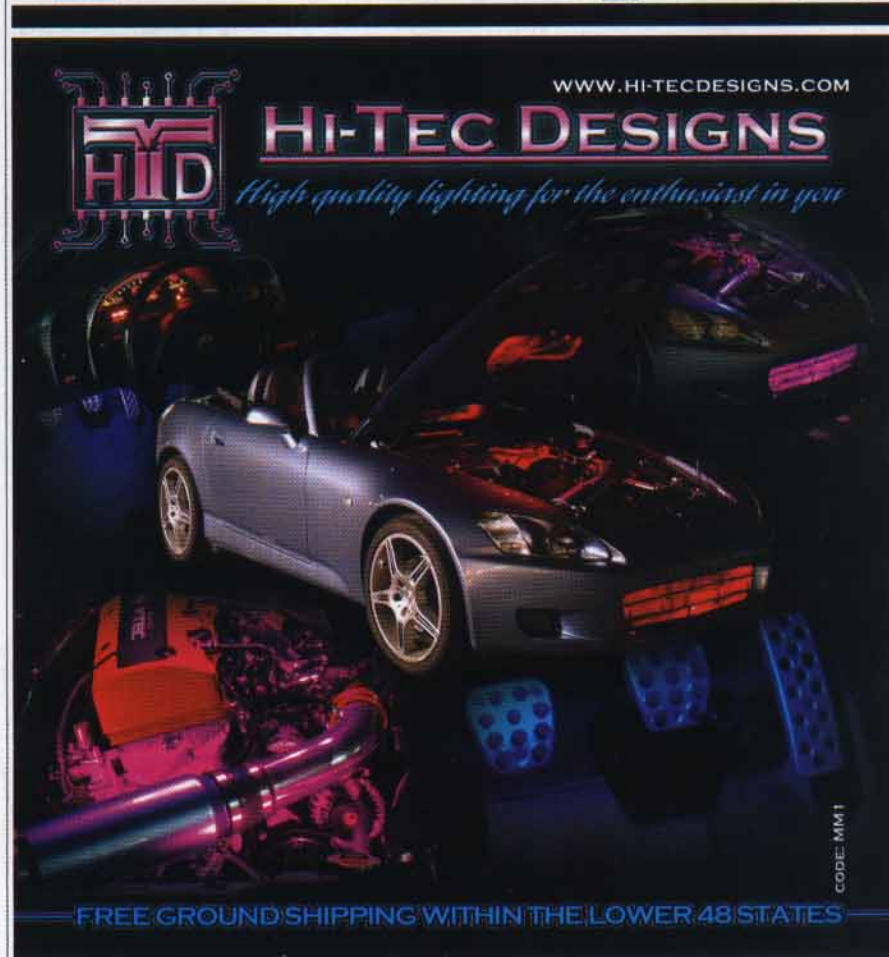
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