

BEAT THE HEAT

CHEMICALLY COOL THE AIR FROM YOUR HEAT-SOAKED BOOST MAKER WITH METHANOL INJECTION

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PHOTOS BY THE AUTHOR



➤ **The so-called** glory run—making dyno pulls on a chassis dyno or engine dyno with the moneymaker full cooled down and only warmed up enough to operating temperature—is all too common. Most of us chase that bigger number for bragging rights, so we don't think twice about it. Heat-soak is a serious matter and most of the time it leads to a reduction in power and performance. The 2010-present Camaro is like most other modern muscle cars—the ECM tracks the inlet air temperatures and once it hits a threshold (inputted by the tuner), the ignition timing is reduced to stave off detonation. That removal of timing certainly attempts to keep detonation at bay, which then leads to a significant drop in power. This will slow the car down in those chance meetings while cruising around town or when you are competing in a class like the popular NMCA True Street category. That is where the competitors are required to make a 30-mile drive and run three consecutive runs without the ability to pop the hood and cool the engine.

This month we ventured to Schenectady, NY for a visit with Redline Motorsports where Howard Tanner and his staff were

ready with a test car. Our goal was to get the company's HTR-850R Camaro heat-soaked and then make some dyno runs. The first couple of pulls were sans meth injection and Tanner logged the engine's parameters with the EFI Live software. A short break was taken and the Camaro was then flogged using the same heat-soak technique, but a full load of 50/50 methanol/water mix would be sprayed into the potent LS3 to offset the heat. We verified that the two tests were similar by comparing the readings from the inlet air temperature (IAT) sensor and water temperature sensor before going WOT and activating the dyno logging software.

Backing up for a moment, selection of our test vehicle was extremely important. The repertoire of vehicles we had to select from in the Redline stable was huge. We settled on the HTR 850 Camaro for a few reasons after numerous talks with Tanner and Rodney Michels of Alcohol Injection Systems (AIS). The special edition Camaro features a twin-screw supercharger from the fine folks at Kenne Bell. It is a 3.6L blower that benefits from an air-to-water intercooler and liquid cooled housing. Heat-soak is a reality despite the combined

efforts of the Kenne Bell systems. Nothing can overcome the heat produced from a few quick whacks of the throttle and cruising around town. Let's be realistic here, twin-screw blowers are known to create quite a bit of heat after considerable time prowling the streets, so we knew this ride was perfect to test the meth's cooling capabilities in this situation. The massively huge cubic inches were also a checkmark in the challenge column.

The engine itself is a beast as it is a Redline 427ci with CNC-ported LS3 heads and a custom camshaft. These HTR vehicles are sold through a dealership, so an even idle is required and moderate compression ratio (9.3:1) is a necessity thanks to the 93-octane pump gas. The dealership backs these cars with a warranty, further handcuffing Tanner to keeping the LS3 package tame. In cool and ideal testing conditions this car pounds 820 rwhp and 780 lb-ft of torque on the Land and Sea chassis dyno and through a factory six-speed manual transmission. Boost from the Kenne Bell blower is an aggressive 17 psi, which ramps in really quickly giving a broad curve to the car's average torque and rwhp results. Tanner could have added more boost by swapping pulleys, but we didn't want to stray from the pump gas. We bet the supercharger would easily make 25 or more psi of boost with the proper crank/blower pulley combination.

The kit Michels recommended was a trunk-mounted Stage 2 system as it holds more volume and has twin nozzles due to the twin-screw blower and large cubic inches. Installation is very straight forward as the cell is mounted in the trunk, the feed line is run to the engine compartment, and two nozzles are drilled and tapped into the blower inlet. The pump is wired up and controlled by a Hobbs switch for boost pressure activation. It was shipped pre-set to 3 psi, but Tanner upped the threshold to 10 so the meth wasn't kicked on so frequently. Twin-screw blowers

make boost quickly and even at the slightest roll into the throttle can send the engine to zero vacuum and into boost. The 10 psi setting ensures it is reserved for those special occasions. The Stage 2 kit comes standard with nylon tubing, but Tanner upgraded the two nozzles and feed line to all steel-braided lines, adding \$179.98 extra to the bill. Speaking of the cost, the kit retails for \$549.99—bringing the total with the steel-braided line upgrade to \$729.97. The Stage 1 trunk-mounted system retails for \$419.99 and also has upgrades available. If you don't want a truck mounted meth injection system then AIS has fender/firewall mounted systems that start at \$259.99.

Our lunch break was spent in the Camaro as Tanner jumped on the throttle and cruised the glamorous streets of upstate New York—all in the name of heating up the engine. Once back in the shop the car was strapped to the dyno and the fun began. Tanner hooked up his Dell laptop to the Camaro's ECM via a work cable and fired up the EFI Live software. One quick look at the IAT sensor readings revealed our baseline IAT was holding steady at 158 degrees. Tanner released the dyno drum's brake and began a steady state pull as he scanned the virtual dashboard on his laptop. Once all systems were cleared for go, the throttle was shoved wide-open and the Kenne Bell blower screamed in pleasure. The run produced a solid 658 rwhp and 694 lb-ft of torque under the heat-soak conditions. The IAT temps crept from 158 degrees to an unacceptable 187 degrees as the engine revved through the RPM range. A jump of 29 degrees might sound mild from those sitting on the sidelines, but the whole story reveals that the ECM calibration removed timing once the IAT readings hit 140 degrees. The run started with ignition timing at 12 and by the end of the pull it was reduced down to just 9. The ECM has the engine running a peak of 13.5 degrees when the engine IAT is below 140.

A short and brief cool down was in order as our goal was to test the output in similar conditions showing the benefits of the AIS spraying a

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Our choice for a test vehicle is the 2011 Camaro that has the full HTR-850R treatment.

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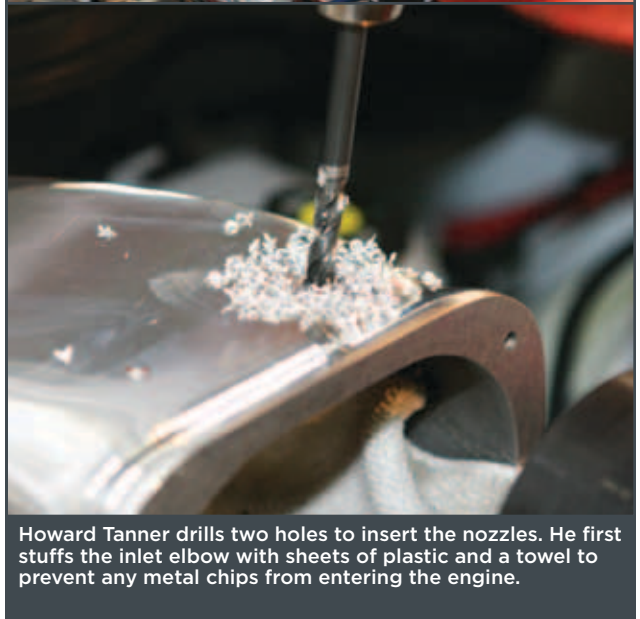


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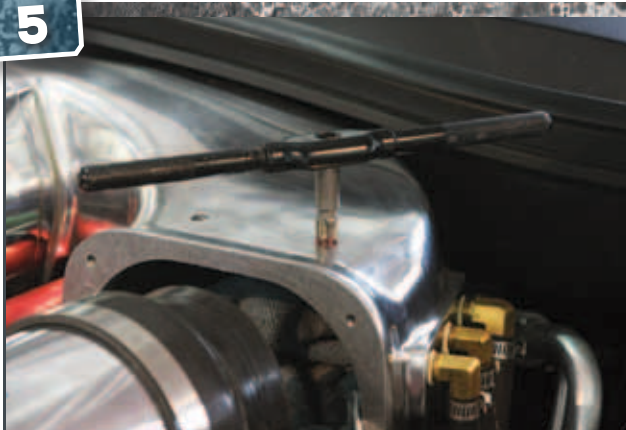
First order of business was to unbolt the inlet tube and throttle body.

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Howard Tanner drills two holes to insert the nozzles. He first stuffs the inlet elbow with sheets of plastic and a towel to prevent any metal chips from entering the engine.

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Tanner deviated from the instructions and went with a 21/64 drill bit since that is what the tap kit calls for when drilling/tapping for a 1/8-inch NPT hole. The AIS instructions call for a smaller drill bit because the nozzles are usually inserted in the inlet tube that has thinner material. The AIS nozzle will grab the tube better with the smaller hole. The blower elbow has a thicker housing so Tanner went with the tap kit's instructions.



A 427ci LS3 features CNC-ported heads, custom Redline camshaft, and a Kenne Bell 3.6L supercharger. In ideal testing conditions it produces 820 rwhp at 17 psi of boost, but those numbers fall after a cruise around town.

50/50 mix of methanol (windshield wiper fluid) and water. A quick scan of the EFI Live dashboard showed the IAT was at 157 degrees, close enough for our test. The pin was pulled and Tanner unleashed the fury of 427ci power in one quick sweep of the gas pedal as he shoved it to the floor. The car rocketed out 750 rwhp and 750 lb-ft of torque as meth mixes with 17 psi of boost. The data logger revealed IAT drops from 157 degree starting point to just 138 degrees—the ECM set the timing at 13.5 degrees thanks to the cooler air temperature. The general rule of thumb dictates that about 1 degree of timing on a car of this caliber is worth 20 or so rwhp. Given that rough bench-racing estimate, it holds true in this situation since the peak numbers were different by 92 rwhp before and after the meth injection.

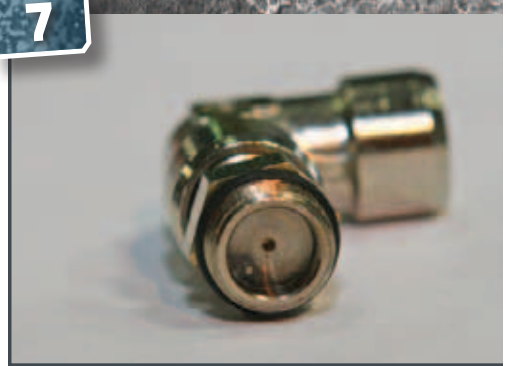
Heat-soak is a reality and meth injection is an easy way to combat it. There are other benefits like the octane increases that allows for more ignition timing and boost while gulping pump gas. This test was merely done to show the reduction in inlet air temperature and prevent the ECM from pulling timing under boost. Next time you have an impromptu meeting with an enemy of the state and your engine is roasty, just arm the methanol injection system and let it rip. You'll have all your horses ready for action by time the green light drops. ●

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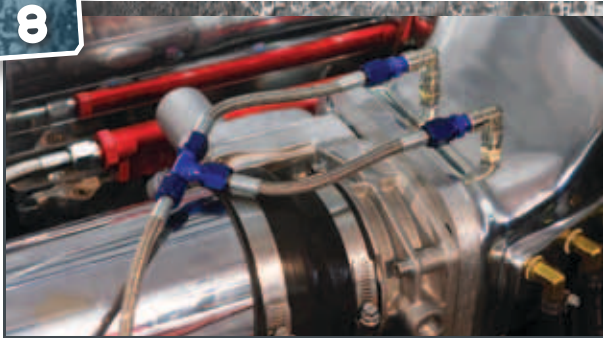


Here are the nozzles installed and its filter screens can be seen.

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The steel braided nozzle lines and the one running from the trunk-mounted cell are optional and increase the cost by almost \$180.

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A large cell gets bolted in the trunk and passes the strict NHRA guidelines for proper mounting. It holds three gallons of fluid.

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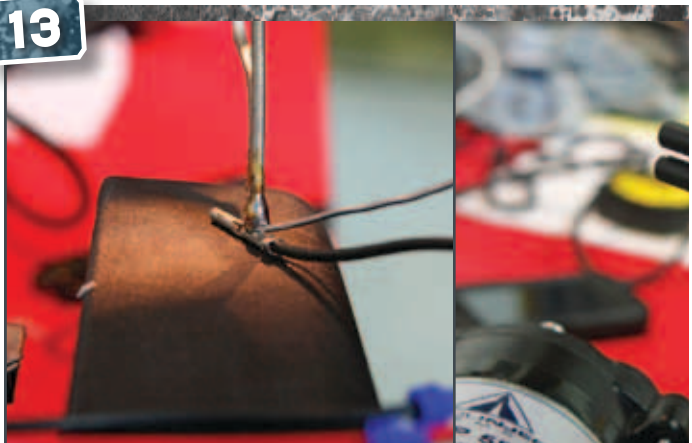


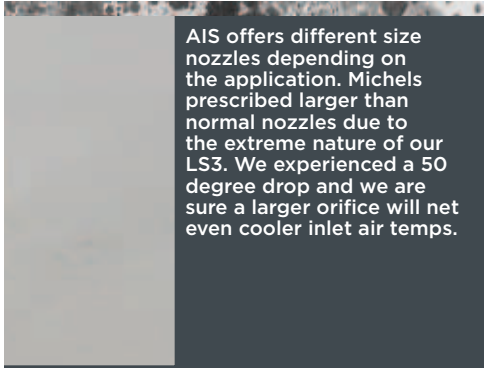
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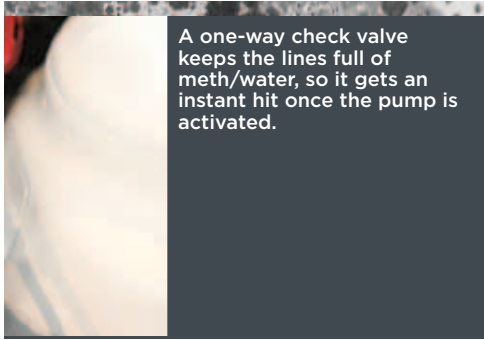
Tanner drills a hole in the floor of the trunk in order to run the steel-braided line and wires from the trunk to under the car and ultimately inside the engine compartment. A rubber grommet is also installed to prevent chaffing of the line and wires.

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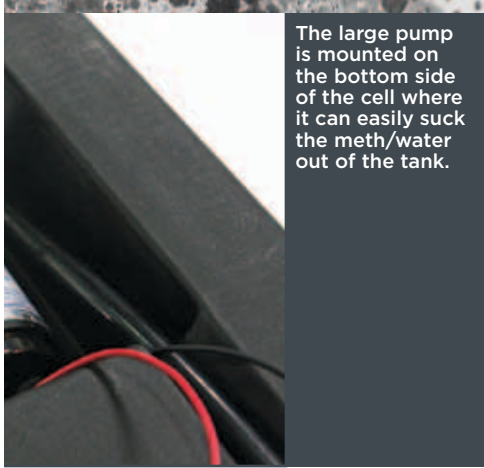




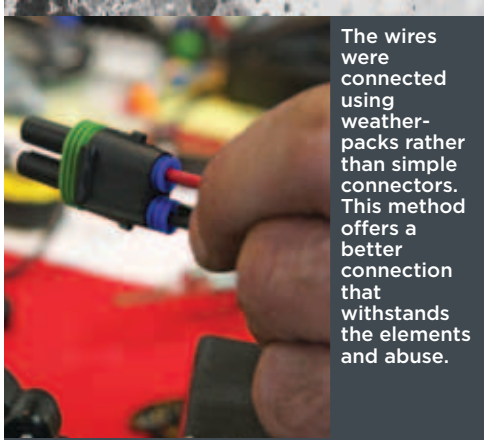
AIS offers different size nozzles depending on the application. Michels prescribed larger than normal nozzles due to the extreme nature of our LS3. We experienced a 50 degree drop and we are sure a larger orifice will net even cooler inlet air temps.



A one-way check valve keeps the lines full of meth/water, so it gets an instant hit once the pump is activated.



The large pump is mounted on the bottom side of the cell where it can easily suck the meth/water out of the tank.



The wires were connected using weather-packs rather than simple connectors. This method offers a better connection that withstands the elements and abuse.

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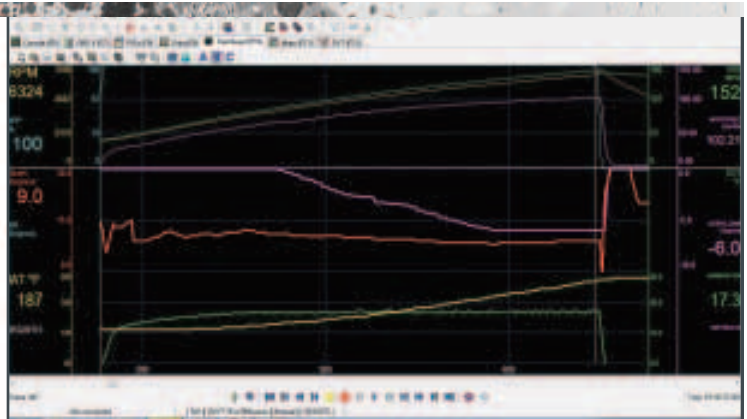
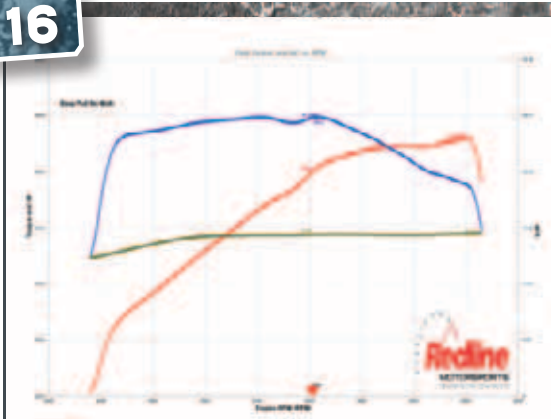


A vacuum hose is plumbed into the Hobbs switch while the pump is wired in. The switch is adjustable and came preset at 3 psi of boost. One turn of the knob enables the switch to activate the pump at 10 psi or whatever you desire for boost activation.

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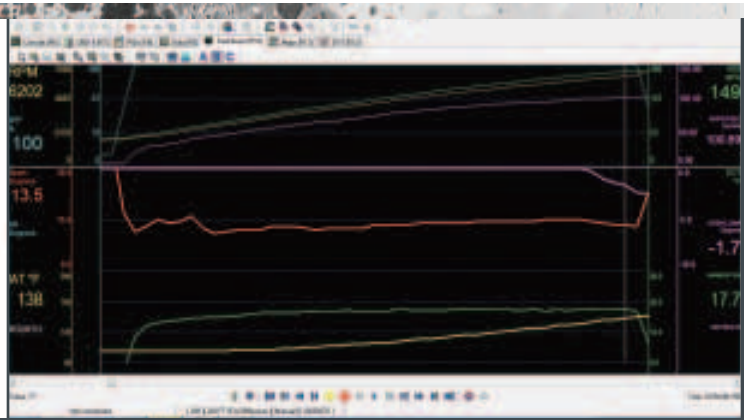
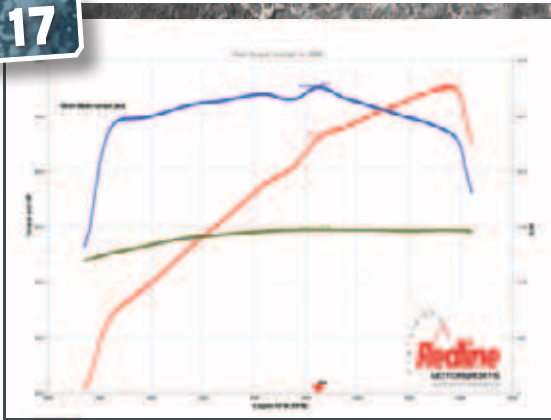


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The heat-soaked engine soared from 158 degrees to 187 degrees by redline at 6,000 rpm. It caused the ignition timing to drop from 13.5 degrees down to a scant 9. Peak output was just 658-rwhp under those conditions.

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Tanner activated the AIS methanol injection and the results were immediately realized—750-rwhp, some 92-rwhp better than the non-meth results. The reason for the gains was the drop from 157 degree IAT reading down to 138 degrees. The lower air temp kept timing at 13.5 degrees and the power gains show the difference.

SOURCES

Alcohol Injection Systems
1/801-447-2559
www.alcoholinjectionsystems.com

Redline Motorsports
518/355-8460
www.redline-motorsports.net