

Remembering the Legendary Jim Wangers

Don Keefer's
**PONCHO
PERFECTION**



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The ONLY All-Pontiac Magazine

Last of the Hot Full-Sized Pontiacs: 1968 428 HO Four-Speed Catalina



**Engine Build: Nitemare Performance
Fuel-Injected 455 Race Engine**



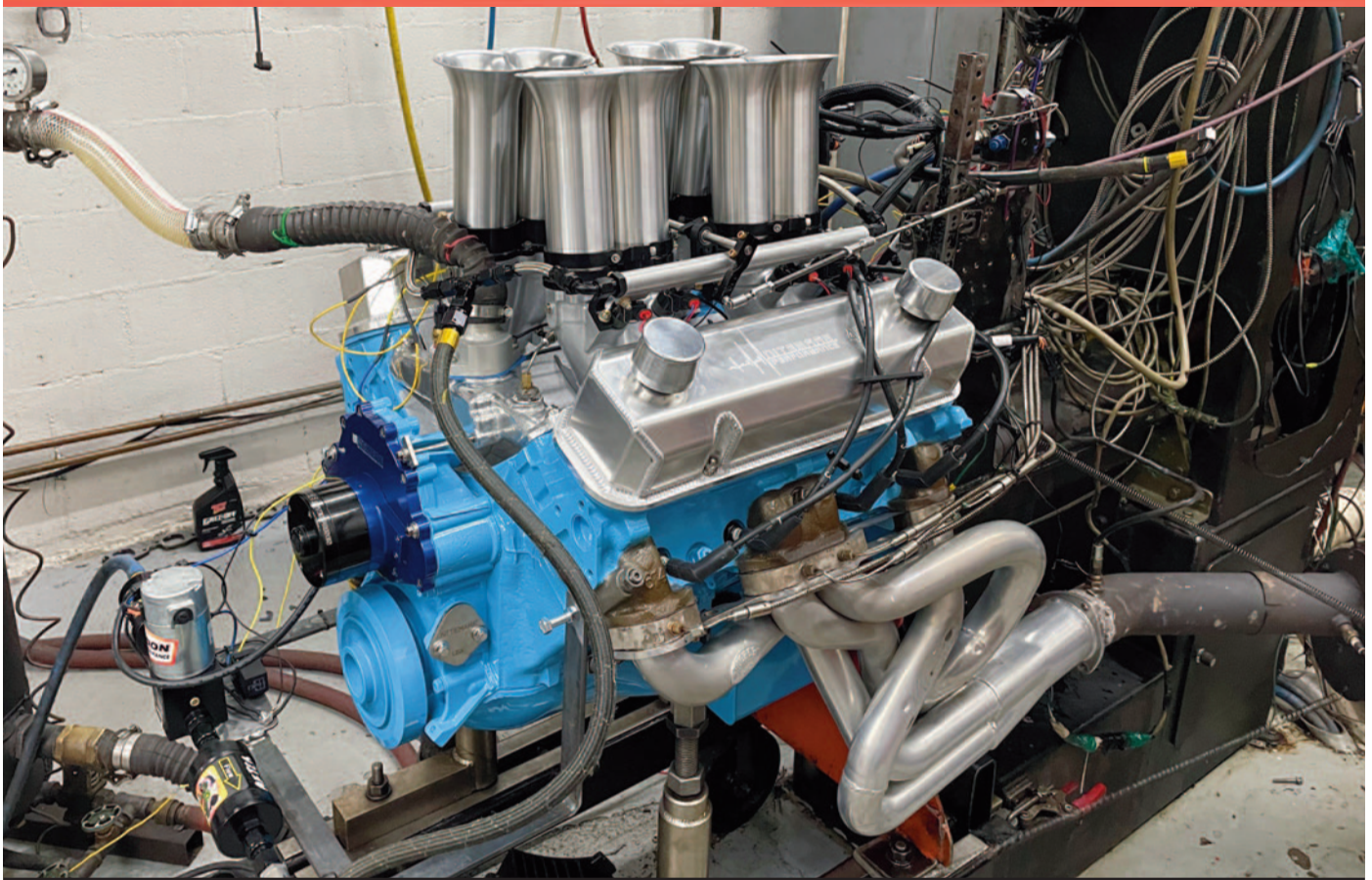
**Department X: Piranha
Mule Car**

**Short-Deck Pontiac
Engine Parts Update**



Super-“er” Duty

Nitemare Performance builds an old-school-looking Kinsler fuel-injected Pontiac for Nostalgia Super Stock competition.



Looking like it was yanked from a Factory Experimental drag car in the 1960s, Nitemare Performance put this Pontiac together with a bulletproof bottom end, a monster roller cam, heavily massaged Ram Air IV heads, and that gorgeous Kinsler EFI system. Spoiler alert: This is how you make 700 naturally-aspirated horsepower!

By Jason Scott
Photos by Darrin Magro

Chris and Jaynie Heuton had a problem: they'd found the perfect foundation for a Nostalgia Super Stock racecar — a clone of an A/FX '63 Super Duty Tempest — that was mostly mechanically-complete, except for one little thing: an engine.

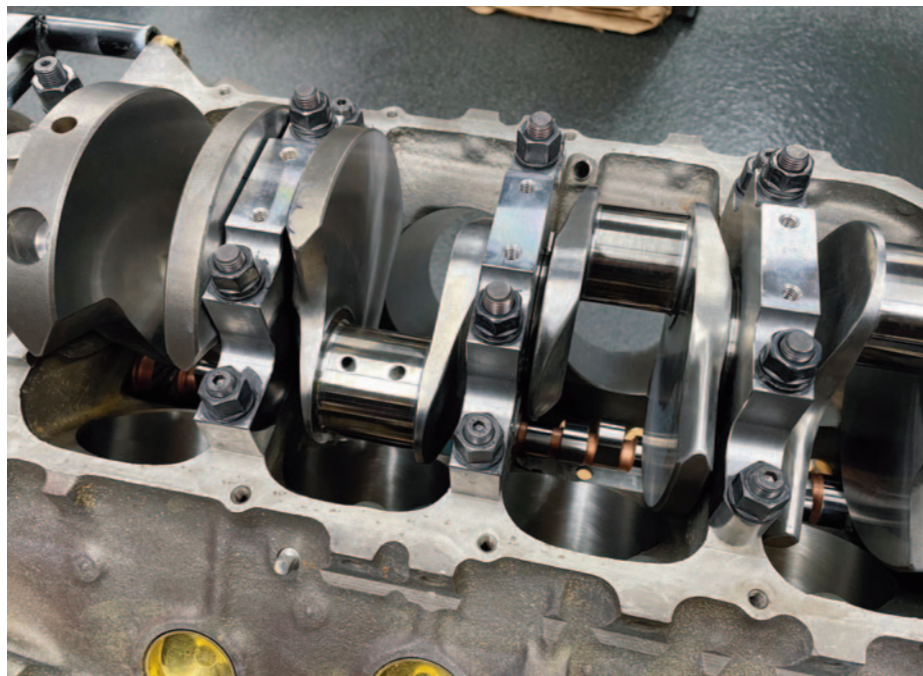
Since the Super Duty 421 that the original SD Tempests had come with were no-compromise engines, the Heutons knew that their Tempest needed something equally special. And they knew just where to get it.

Having restored a few Pontiacs before, the Heutons were no strangers to the particular predicament that they'd gotten themselves into ... again. In the past, they had turned to Nitemare Performance for engines for their resto projects and had been astounded by the meticulous preparation performed by Nitemare's Darin Magro on their engines. So, after a quick conversation with Magro to discuss their needs, work commenced.

Poncho Plans

Magro explained that the conversation with the Heutons was critical to developing the plan for their engine. Yes, they had a racecar, and, yes, they wanted it to be fast, but equally important, it had to be reliable; they were willing to sacrifice a little power for a lot of longevity, because they didn't want to have to rebuild the engine every year. They wanted weekends at the races to be fun events for them, not wrench-bending, thrash sessions to make the next round.

They also took a look at the rules for the Nostalgia Super Stock series' Factory Experimental class to see



The factory four-bolt, 400 block was fitted with Nitemare's billet steel main caps, ARP studs, and a 4.25-inch SCAT forged steel crank.

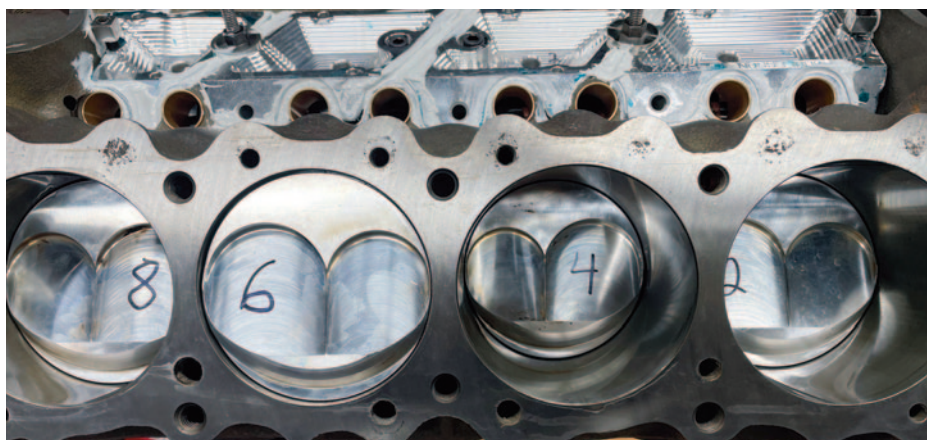
what kinds of restrictions they might be faced with. Fortunately, there weren't many ... except for one biggie: the induction system, which we'll cover in a bit.

With a plan coming together, Magro started gathering parts and getting them prepped.

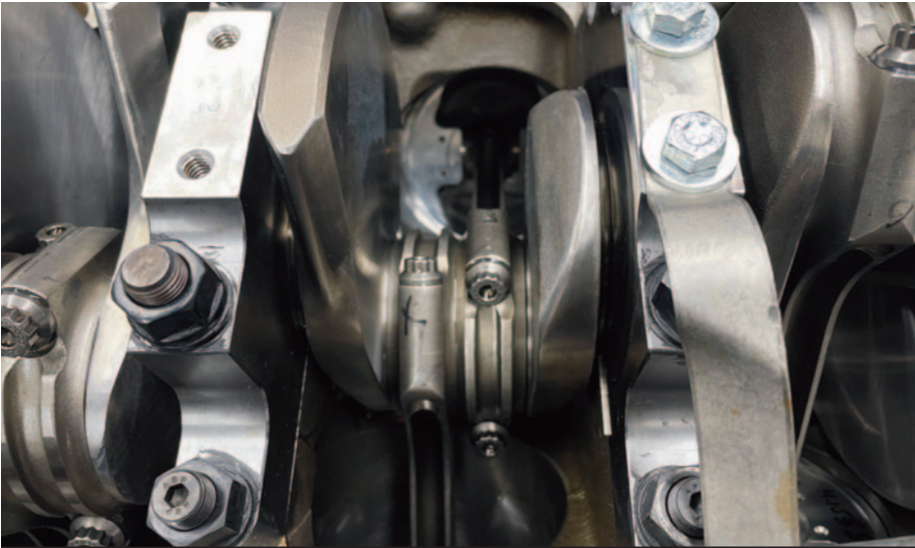
Building Blocks

Magro selected a seasoned, factory

400 block with four-bolt mains to serve as the foundation of the engine. The middle three factory main caps, however, were jettisoned in favor of Nitemare's billet steel caps for improved strength, and the factory locating dowels were ditched for Nitemare's slightly-oversized ones that prevent the caps from squirming around. An ARP stud kit was used to secure the caps.



These pistons are vintage Venolias—the last set available before the company evaporated. They're .040-inch over-sized, which puts displacement at 462 cubic inches. They also make for 13.5:1 compression ... pump gas need not apply.



Like the crank, the rods are forged units from SCAT. They're 6.800-inch long (a bit more than stock) and feature 2.200-inch big ends (a bit smaller than stock). And they're held together with ARP 2000 bolts to ensure they stay that way, even at high RPM.

Next, the block's lifter valley was fortified with a brace kit and the water passages were filled with rock-block to the bottom of the water pump holes to minimize block distortion. Once it was determined the block geometry wouldn't change, the

lifter bores were blueprinted with installation of bronze bushings to perfect alignment and dimensions, which Magro describes as vital for high-RPM race engines running a roller cam, as this engine has.

Typical for any good rebuild, the

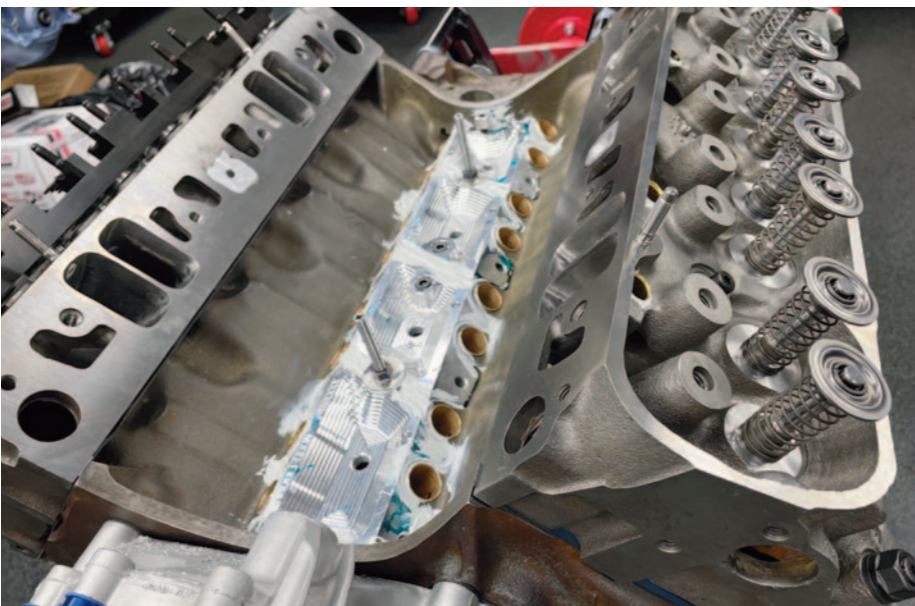
block was decked, squared, and the cylinders were bored and honed to size. Finally, every edge was deburred to minimize stress risers that could lead to cracking, and the block was thoroughly cleaned to remove any filings, and all machined surfaces were oiled to prevent rust.

Rotating Assembly

To ensure the bottom end was absolutely bulletproof, Magro specified a SCAT forged steel crankshaft with a 4.25-inch stroke—slightly longer than that of a factory 455's 4.21-inch dimension. The rod journals, however, were machined slightly smaller—at 2.200 inches—for the next item: The connecting rods Magro chose are SCAT's big-block Chevy-sized, forged steel, H-beam units that measure 6.8 inches long with 2.200-inch big ends. These dimensions make them slightly longer than stock Poncho 6.625-inch rods, but the big end is slightly smaller than the Pontiac 2.25-inch journals. For extra strength, the bolts were upgraded to ARP 2000 units, to better cope with high RPM.

Magro selected a set of Venolia forged aluminum pistons—which wound up being the last set available, before the company went out of business. Combined with the heads (more on those, later), compression worked out to approximately 13.5:1. Yes, race gas is required, but the Heutons were fine with that, because this is a race engine.

The pistons were fitted with Total Seal Advanced Profiling (AP) rings, consisting of a stainless steel top ring, ductile iron reverse-torsional tapered second ring—both coated to



Here's a glimpse of the trick lifter valley brace kit, as installed. It's CNC machined and fit really well, with only a few minor mods. Note the bronze-bushed lifter bores; according to Nitemare's Magro, high lift roller cams will run into all sorts of issues unless the lifter bores are perfectly located, first.

reduce cylinder wear and friction—along with a traditional three-ring oil control setup. Magro custom-prepped the rings to optimize gaps. Sealed Power and Clevite bearings were used throughout the engine, and, of course, clearances were checked carefully and adjusted as needed to ensure an ideal oil cushion.

Lastly, a BOP one-piece rear main seal was used to help minimize unsightly and perhaps problematic oil leaks.

Oil System

Race engines don't do well if they run starved for oil, so Magro made sure the Super Duty's engine would have what it needs to stay well-lubricated while rocketing down the track.

The upgrades started with one of Nitemare Performance's blueprinted Pro oil pumps with its 1/4-inch thick Pro oil pump cover plate with machined-in grooves that help prevent gear-to-cover contact during high-RPM operation. One of Nitemare's hardened and sleeved oil pump driveshafts turns the pump, while a Nitemare custom copper oil pump-to-block gasket prevents pressure losses at this critical junction.

One of Nitemare's specially-baffled "Road Race" oil pans keeps the matching oil pickup submerged in oil, even during high-G launches.

The engine was tested with Nitemare's Pro Series remote oil filtration system to guarantee a steady supply of clean, cool oil. The system is comprised of a billet, O-ringed oil filter housing adapter, braided lines, billet filter adapter, and oversized oil filter.

Cam, Lifters, Etc.

One area that Magro considers the "secret sauce" of his engines is the camshaft, so specs are intentionally a bit vague, here, but he did confess that the Comp Cams solid roller cam has about 0.775-inch lift and roughly 285 degrees of duration for the intake valves "and maybe a bit more on the exhaust side." He also pointed out that he's learned through experience with R&D engines that big roller cams require precise lifter locations in Pontiacs, which is why this block's lifter bores were blueprinted and sleeved with bronze bushings to make sure each lifter was exactly where it was supposed to be.

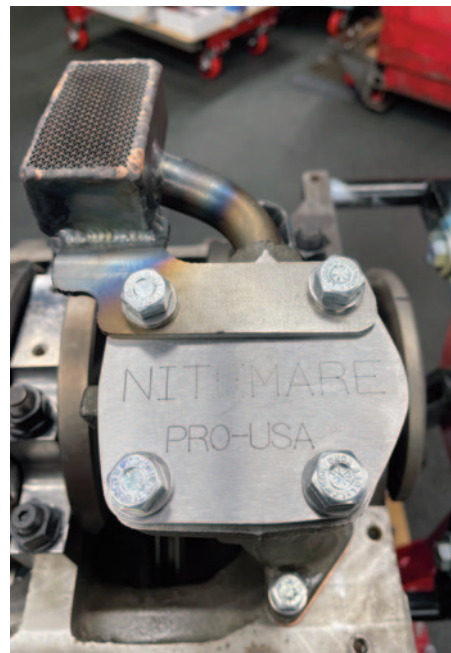
Connecting the cam to the crank is one of Nitemare's .005-inch short, adjustable timing sets with a billet cam gear and bronze thrust washer to keep the cam from walking rearwards.

Riding the cam's lobes are Crower solid roller lifters pushing on 3/8-inch chromoly Trend Performance pushrods.

Cylinder Heads

To meet the Heuton's power goals for the engine, Magro specified a set of heavily-ported factory Ram Air IV heads. He started by blueprinting a set of unmolested heads to get them dimensionally perfect, then applied a Stage IV porting job that resulted in phenomenal flow of 308 cfm through the intake ports and 245 through the exhausts, as measured by his Super-Flow flow bench.

Stainless steel competition valves from Ferrea were custom machined with high-flow back cuts and precision resurfaced on Nitemare's Rottler



Oil is the engine's blood and without it, it wouldn't last long, so Magro equipped this one with one of Nitemare's blueprinted Pro Series pumps. It features a 1/4-inch thick cover plate with precision-machined grooves to improve the oil cushion between the gears and cover. The pump's bolted to the block with a custom copper gasket to minimize pressure loss, and it's driven by one of Nitemare's sleeved and hardened oil pump driveshafts. The pickup is to match the oil pan.

milling machinery to optimize the widths and margins of each cut.

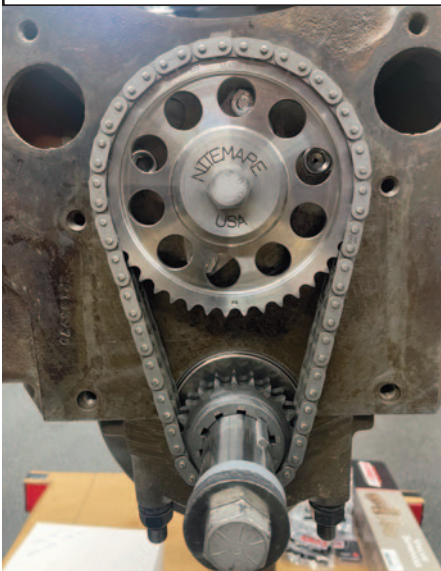
Comp Cams springs, retainers, and locks keep the Ferrea valves in place, while Viton seals minimize oil seepage into the cylinders.

T&D steel, shaft-mounted, roller-tip, 1.55:1 rocker arm assemblies actuate the valves with minimal deflection, to ensure accurate valve events.

Nitemare Performance fabricated



The most secretive aspect of the build is a Comp Cams solid roller cam with “about .775-inch lift” and “roughly 285 degrees” duration, according to Magro. It opens the valves quickly and far, and keeps them there a long time, which lets lots of air flow in and out of the engine as needed to make big power.



The cam is turned by one of Nitemare Performance's .005-inch-short, double-row, adjustable timing sets to help ensure accurate valve events.

aluminum valve covers close-up the heads, while a Nitemare-engineered valley pan hides the cam and lifters.

Induction Systems

For break-in and initial dyno baselining, Magro temporarily installed a heavily-modified Street Dominator intake with a 950-cfm Quick Fuel Black Diamond carb. For most customers, that would be more than sufficient ... especially since the engine produced 675.6 horsepower and 573.7 pounds-feet of torque with that configuration.

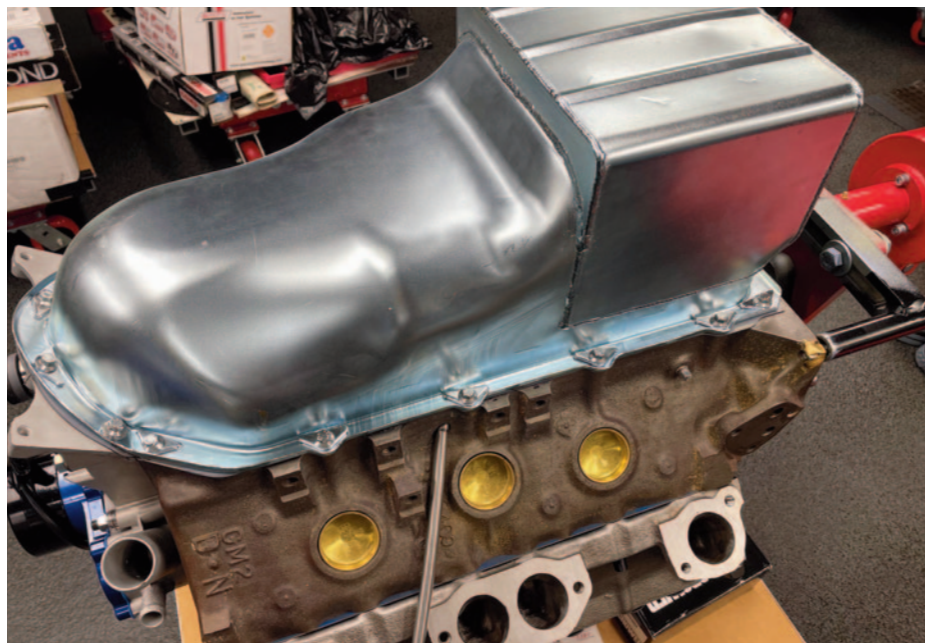
But here's where those class rules came into play ... and made things just a bit more unusual.

At the time, the Nostalgia Super Stock Factory Experimental class required an old-school-looking fuel injection system with an individual stack for each cylinder. In case you haven't been shopping for such a system ... they're hard to come by ... and a bit tricky to set up ... as Magro

learned, shortly after embarking on the project.

After some research and searching, Magro learned that Kinsler Fuel Injection in Troy, Michigan was the only company that could make Pontiac intakes with an EFI system. Kinsler's folks were eager to work on the project, so Magro and the Kinsler people collaborated for weeks to get everything “just right” so the intake, ram tubes, sensors, and all the assorted bits and pieces that were needed to make the EFI system work were included and would bolt together without issues. Magro said that aside from having to fabricate or modify a couple brackets to fine-tune the fit, the Kinsler system went on with minimal drama.

Once installed, the challenge of tuning the Kinsler system was left to Andy Starr of Starr Performance. Starr hooked up the wiring, fine-tuned the fuel map, then spent about an hour syncing the eight butterflies and ad-



A baffled Nitemare Performance “Road Race” oil pan keeps the oil pump pickup submerged in oil, even under extreme acceleration, so that the pump doesn't suck air and starve the bearings for oil.

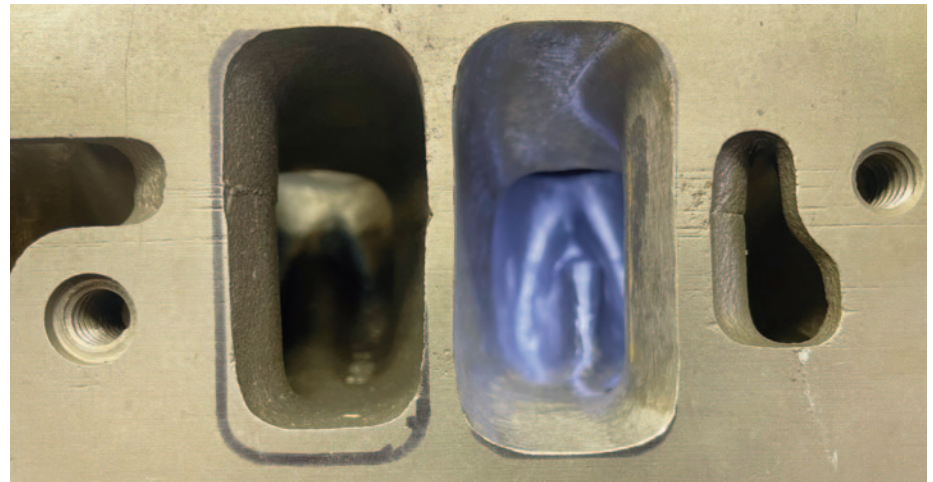
justing the throttle stops. "Andy was impressive," according to Magro. "He got everything fully dialed-in within four pulls!"

"Dialed-in" is an understatement: the engine produced 694.1 horsepower and 599.6 pounds-feet of torque with the Kinsler EFI system on it! That's nearly 20 more horsepower and 25 pounds-feet better than with the carb!

And best of all, the engine starts and runs crisp and clean — no need to muss or fuss with jetting or power valves or different boosters. Heuton can do data captures at the track, email them to Starr who can then revise the "tune", then email that back to Heuton to load into the system, then he's off to the races!

Miscellaneous

The engine was completed with a myriad assortment of parts. For the cooling system, a Mezier electric water pump draws no power from the engine but keeps the engine's operating temp in-check. It bolts to a Nitemare-blueprinted factory tim-



The heads are factory Ram Air IV castings that Magro treats to a Stage IV porting job. Here, you can see how much material gets removed from the stock port (left) to make the modified port (right). According to the Superflow flow bench, they flow 308 cfm per intake port! A hefty improvement over stock ports that flow about 246 cfm.

ing cover. A bit higher up, a Nitemare Pro Series billet aluminum water neck is bolted to the intake.

The reciprocating assembly is, of course, balanced, but a Nitemare Performance BHJ balancer helps dampen any stray harmonics, while a TCI flexplate is bolted to the back of the crank. A PowerMaster "upside down" gear-reduction mini starter gets things cranking at start-up.

To ignite the fuel and air, a Holley Dual Sync distributor ties in with the Kinsler injection controls, while and MSD coil and Moroso Ultra 40 wires carry the spark energy to AC plugs.

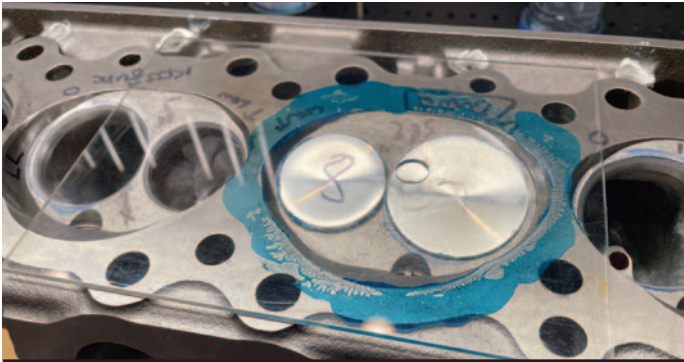
On the dyno, coated Hooker headers were used to expel exhaust gases from the engine, however, the Heutons will have different headers bolted to the engine to facilitate its installation in their '63 Tempest.



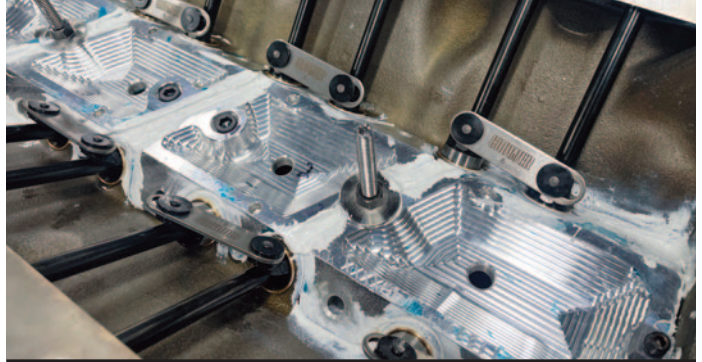
The roof of the ports were raised so much that on some ports, the valve cover retainer bolt holes were exposed. The fix was easy, however, with studs and some carefully-applied JB weld to seal them in.



As for the exhaust side of the heads, factory IV castings flow well — obviously. But Nitemare's ported ones flow sooooo much better: 245 cfm, to be specific — as well as factory intake port flow! — and far better than factory ports at about 180 cfm.



Here, the chambers were being checked to ensure they were consistently sized. The valves are Ferrea stainless steel units treated to precision machining on Nitemare's Rottler equipment.



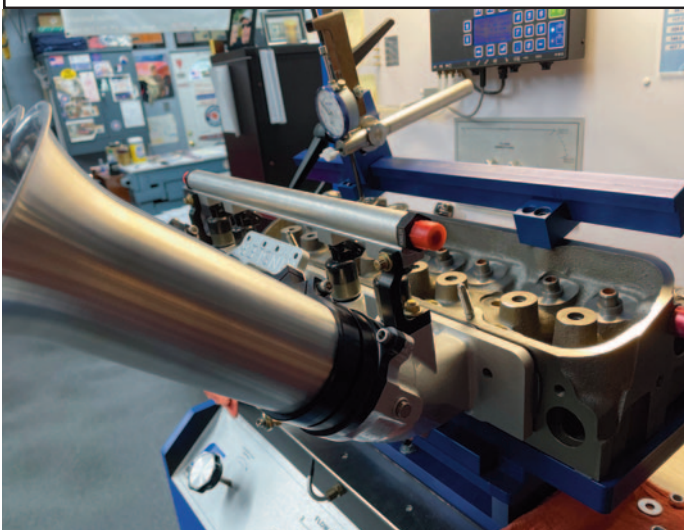
Here, you can see the Crower roller lifters and their link bars that connect them and keep them facing the proper direction on the lobes. The 3/8-inch chromoly pushrods are from Trend Performance.



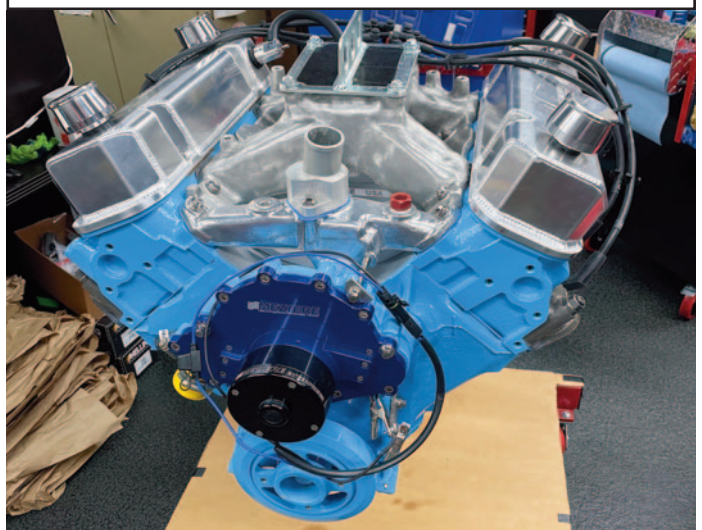
Since this is a race engine, the heat passages were filled to help keep the intake cooler. The heads were also treated to a full complement of machining steps to true up the intake and exhaust gasket surfaces and blueprint the valve spring pocket depths, among other processes.



Another somewhat tricky aspect of this engine is the use of T&D rocker shafts, equipped with Comp Cams 1.55:1 rockers. The shafts keep the rockers stable and minimize any erroneous movement.



Here, the Kinsler intake and ram tubes are being flow-tested on the Superflow bench, to benchmark their efficiency and port-match the intakes to the heads.



For simplicity, Nitemare installed a four-barrel intake and carb for break-in purposes. Note the Meziere electric water pump that eliminates parasitic draw from the engine while keep the engine nice and cool. The harmonic dampener is one of Nitemare's custom BHJ units, painted to be stealthy.



Here's the Kinsler setup being test-fit to the engine, along with some temporary bracketry to hold the fuel filters and pump when the engine goes to the dyno.



At the back of the engine fuel flows from the rails to a common pressure regulator that then allows fuel to return to the tank. This helps prevent fuel percolation since fuel doesn't dwell in the rails absorbing heat, and obviously the pressure regulator ensures the injectors get the pressure they need to produce an effective spray pattern. The MSD distributor was used for mock-up purposes and break in with the carb setup; a Holley dual-sync unit is more compatible with the engine's control unit and was used for dyno testing.

Nightmare Performance Injected 462 Pontiac Corrected Dyno Data

Engine RPM	Corrected Torque	Corrected Horsepower
3,500	523.8	349.0
3,600	526.8	361.1
3,700	529.4	373.0
3,800	532.6	385.4
3,900	535.3	397.5
4,000	541.1	412.1
4,100	551.8	430.7
4,200	566.9	453.3
4,300	583.6	477.8
4,400	596.5	499.8
4,500	597.4	511.8
4,600	587.4	514.5
4,700	579.5	518.6
4,800	572.4	523.1
4,900	568.9	530.7
5,000	567.4	540.1
5,100	571.2	554.7
5,200	579.2	573.4
5,300	587.1	592.4
5,400	594.1	610.8
5,500	599.2	627.5
5,600	598.1	637.7
5,700	599.6	650.8
5,800	598.3	660.7
5,900	595.6	669.1
6,000	593.9	678.4
6,100	589.3	684.5
6,200	584.5	690.0
6,300	576.6	691.7
6,400	567.6	691.7
6,500	560.8	694.0
6,600	552.3	694.1
6,700	542.9	692.6
6,800	528.6	684.4
6,900	512.1	672.8

The Bottom Line

Magro explained that much of the Heuton's engine isn't all that different from one of his traditional high-performance street crate engines. It's just carefully selected components and meticulous preparation and assembly.

The one aspect in which the Heuton's engine differs is that glorious Kinsler fuel injection system. And with just shy of 700 horsepower and 600 pounds-feet of torque, this nat-

urally-aspirated Poncho is impressive, to say the least. It easily out-gunned the tried-and-true four-barrel — an ability that Magro attributes to the Kinsler system's better-optimized air/fuel distribution, cylinder to cylinder, and to Starr's masterful tuning.

As an added plus, the Kinsler-equipped engine starts and runs better than the carb. It's a more efficient system for both racing (where allowed by rules) and on the street.

This would normally be the part



Here's a good look at the Kinsler system's ram tubes. Each cylinder has its own tube and its own fuel injector, which helps optimize the air/fuel mixture for balanced performance. This is one of the reasons the system is able to out-perform a basic carb setup.

where we advise you to grab your credit card and order one for yourself ... but before you do, we feel it's our civic duty to warn you that there is a drawback to the Kinsler injection system: its price. This system is not for the faint of heart or the thin-of-wallet. As the saying goes: "If you have

to ask, you probably can't afford it." On the other hand ... ohmygod! it's amazing! And if you're into racing and you actually want to win, sometimes you have to bite the bullet and pay the piper. If you do, you can have a Super-er Duty engine for your Pontiac, too.

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The fuel system plumbing is much like that for a modern EFI car: the supply line features a T that feeds a rail for each bank, which, in turn, connect to the injectors themselves.



And here the engine is on the dyno after being tuned by Andy Starr of Starr Performance. Owners Chris and Jaynie Heuton were willing to sacrifice a few horses to ensure the engine was rock-solid reliable, but even so, the engine put out 694.1 horsepower and 599.6 pounds-feet of torque. And that's with only a brief break-in and five dyno pulls on it. With a bit more running, it oughta loosen up just enough to make an honest 700 horses and 600 pounds-feet!