Written by Derek Putnam
Photography Courtesy of BES, Induction Solutions, and the Manufacturers

THE SILVER MULLET

INDUCTION SOLUTIONS AND BES TEAM UP TO CONSTRUCT A 588CI BULLET FOR NITROUS

As much as we often hear of turbo this and supercharger that, nitrous oxide injection is still just as popular as ever—the NMCA even has a class dedicated to just that power adder in ARP Nitrous Pro Street. When we caught wind of Induction Solutions' Steve Johnson and his plan to put together a research/development/fun machine, we rang up the nitrous guru to following along on the upcoming engine build for the Third-gen Camaro. We also will check back in as the F-body is used to develop new products for the company as well.

While many have come to know Johnson as a nitrous tuner and manufacturer, many years ago he could be found behind the steering wheel and forging what would be the foundation for his business. Johnson got his first bit of name recognition in 1992 at Hot Rod Magazine's Fastest Street Car Shootout, where he piloted a 1981 Trans Am to mid 8-second times at over 160 mph. A stint in Pro Mod cars followed just a few months after that legendary street car event, but Johnson stepped away from it all in 1996.

"I was competitive in Pro Mod on a limited budget, but when the five-inch-bore-center combination came out, I knew I'd be at a disadvantage," said Johnson. "Plus the writing was on the wall that I needed to spend more time with family, so it was just the right time to step away."

But even as Johnson stepped away from driving, his career in the nitrous oxide market accelerated. He went to work for Mike Thermos at Nitrous Oxide Systems. "It was a natural fit," said Johnson, who traveled to numerous races and provided tune-up and on-track advice to customers over the next six years. He then traded blue for red by accepting an offer from Edelbrock to be the company's Director of Motorsports.

"I helped them refine quite a few things, and get the name into the racing world more," said Johnson. Working for the two companies helped Johnson become a recognizable name, and that led to requests for plumbing intakes for nitrous—something Steve did on the side at first, but eventually took off

Nick Bacalis and Tony Bischoff are in charge of ordering parts for the builds at BES, and the cast of items that BES assembled for this 588 cubic-inch, big-block is impressive.

on its own. Recognizing the need for a hands-on approach, and with Edelbrock pushing more requests his way, Johnson formed Induction Solutions in 2006. Twenty years after his last stint behind the wheel and with a successful company now running full steam, Johnson was ready to jump back behind the wheel.

"We wanted something as an R & D project," said Johnson. "We're very tech oriented, and we will carry that into the car. But it might also make appearances in class racing too." After locating a rolling chassis, Johnson dialed up Tony Bischoff at BES Racing Engines for a brand new bullet.

"We've worked with [Tony] Bischoff on several nitrous combos," said Johnson. "He has a great reputation on engines." FSC spoke with Nick Bacalis of BES Racing Engines for all the details on Johnson's engine, which Johnson subtly describes as a "class engine build with some different stuff. But with a dyno sheet showing the 588ci engine within 30 horsepower of a current nitrous X275 frontrunner, it should be fun to make laps in."

Said dyno sheet was impressive, with the big-block churning out 1,085 horsepower naturally aspirated. With a set of .037 nitrous jets in the Induction Solutions X 275 nitrous-oxide system, power output jumped to 1,504 horsepower, with pulls being made from 6,400 to 8,000 rpm. **FSC**

BUILDING BLOCK

When building an engine with 4-digit power figures, a strong foundation is required. To meet that requirement and save some weight, BES employed a Brodix 8B 2000 aluminum block. US-made from A-356 virgin aluminum, the block features stronger main webbing and additional head bolt lugs in the deck area, and includes steel billet main caps and splayed center caps. Steve Johnson specified a 10.2-inch deck with a raised cam location. BES bored the lifter holes to .903-inch, the camshaft tunnel for a 55mm roller, finish-bored the cylinders to 4.560-inch and honed the block. "You can get these things done by Brodix, but BES prefers to do it in house," said Nick Bacalis of BES.

After the block is prepared, the first part to be installed is the camshaft. A Comp Cams solid roller was custom ground to BES specifications, and although we couldn't coax exact specifications from BES, "it has around an inch of lift," according to Johnson.

A Lunati Signature Series crankshaft with 4.5 inches of stroke is next to find a home in the block. A set of Clevite bearings (coated by Calico) are used with ARP studs and caps supplied by Brodix.

With the camshaft and crankshaft in place, a Jesel belt drive gets bolted in place next. "We recommend a belt drive for most higher end builds," said Bacalis. "A chain will work, but a belt drive provides better harmonics, you can degree the cam exactly where you want it, and you get more precise timing, especially at higher rpm."

SLUG IT OUT

The piston takes a lot of abuse in a nitrous engine. BES made the call to Diamond for a set of nitrous-specific pistons, but used a unique method on the design. "We made a dome mold of the Brodix cylinder head combustion chamber and sent it to Diamond," said Nick Bacalis. "They made the pistons from that mold, and using this method provides better compression and valve clearance." The pistons are designed to run bigger wrist pins, measuring .990-inch in diameter and 2.930-inch in length. BES wouldn't give us specifics when we asked about a final compression ratio, but said it was north of 13:1.

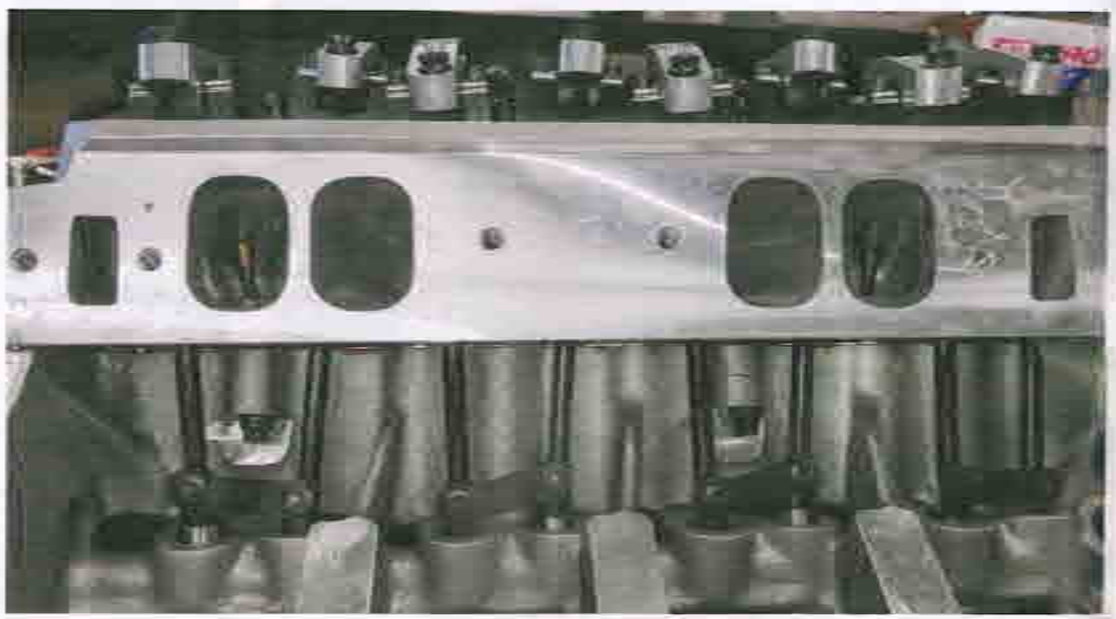
ATI's Super Damper takes its place on the front of the crankshaft. Bacalis noted BES has a good history with ATI, so it was a natural choice for this build.

A set of Oliver Racing Parts forged steel I-beam connecting rods with the ARP bolt upgrade will mate with the Diamond pistons to complete the rotating assembly.

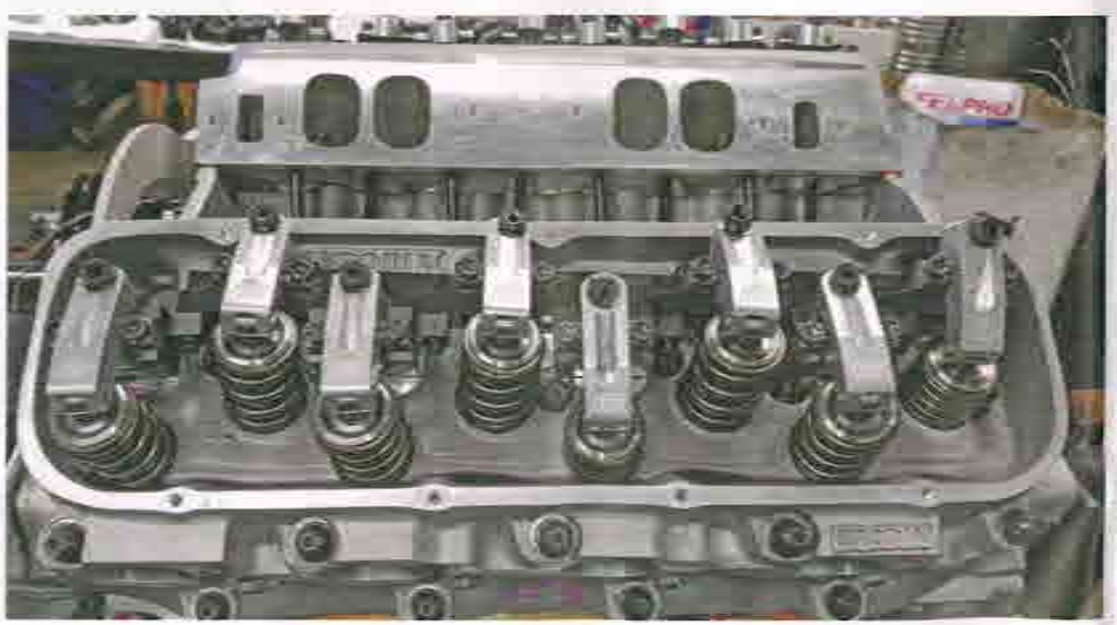
BES selected a custom Total Seal ring package for this build. The top ring is an .043-inch thick TNT top ring that uses Total Seal's hybrid ductile iron technology designed for the rigors of a nitrous-oxide application. The second ring is a ductile iron Napier ring measuring .043-inch, and in between you'll find a 3-piece oil ring combination. End gap specs are a shop secret, but it's typical to open up the end gap more with a nitrous build over a naturally-aspirated build.

Breaking from a traditional build, Johnson selected a unique cylinder head from Brodix. "We've done some research and development with Brodix in the past," said Steve Johnson. "So they wanted to try this new cylinder head on the build. It is a crossover between a BB-3 XTRA and a Head Hunter series, and features a smaller intake port than most builds of this nature." The heads were CNC finished by BME and BES softened the chambers.

Before the Diamond pistons and rods are assembled, the pistons are bead blasted to "reflect the heat around all the edges," according to Bacalis.



The rotating assembly is complete, so the focus turns towards bolting the cylinder heads in place. Cometic head gaskets are sandwiched between the block and heads, while Trend Performance pushrods in a 7/16 inch diameter are used with Isky Red Zone roller lifters.



A T&D Machine Products shaft rocker assembly tops the cylinder heads with a 1.8:1 ratio working the Victory titanium intake valves and a 1.7:1 ratio addressing the exhaust side.

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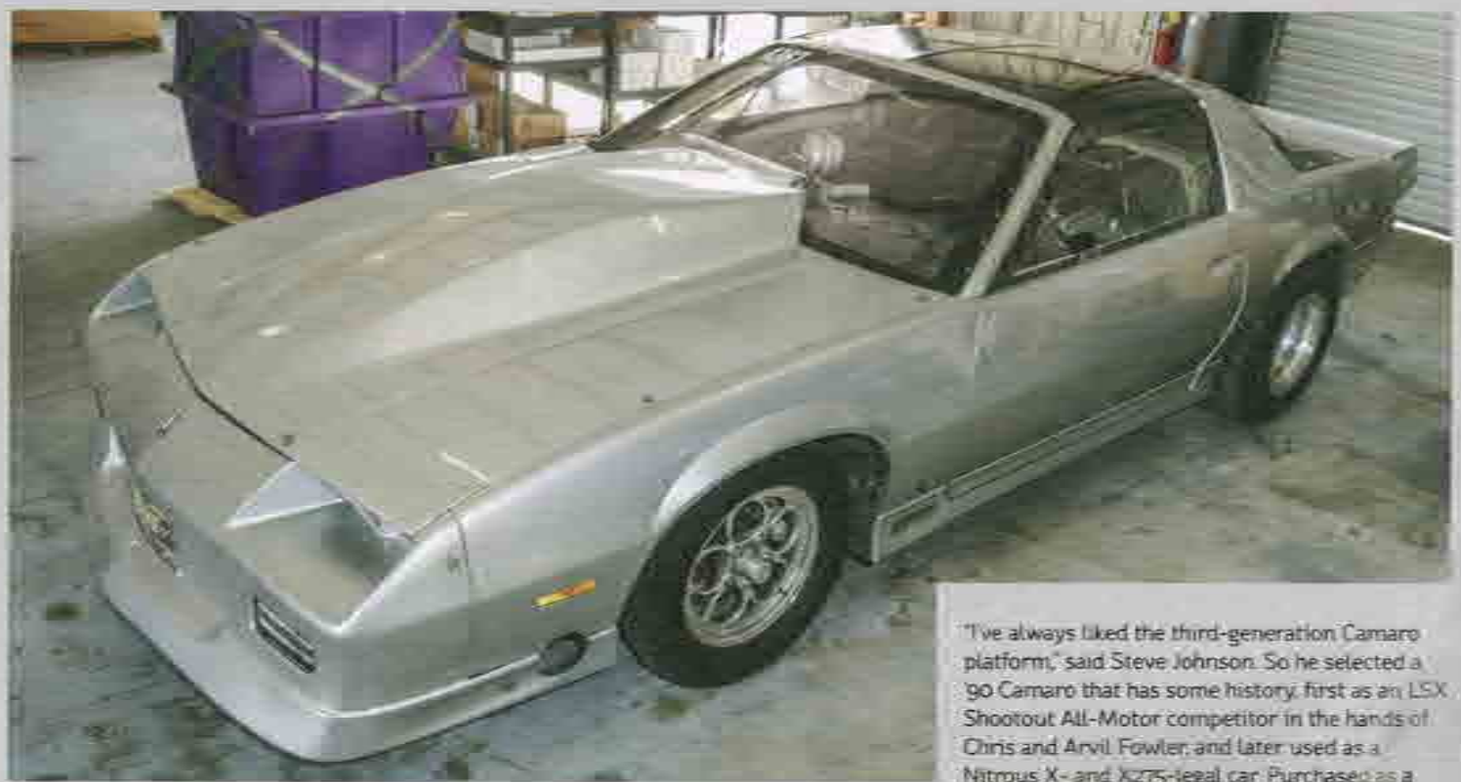

"I've always liked the third-generation Camaro platform," said Steve Johnson. So he selected a '90 Camaro that has some history, first as an LSX Shootout All-Motor competitor in the hands of Chris and Arvil Fowler, and later used as a Nitrous X- and X275-legal car. Purchased as a rolling chassis, Johnson has a list of things to change before it starts making runs. "It will go to Ron Rhodes to do some updates to the chassis, fit the engine, make headers and fit a 1-piece front clip," said Johnson. "Plus we have to plumb it, wire it, and put a data logger in it when it returns." Johnson hopes to start making laps in it in the fall of 2017, sharing the driving duties with his son, Matt.

A wet-sump oiling system is based around a Moroso billet oil pump and a trick 2-piece oil pan that allows easy access to the mains while hanging within the Third-Gen Camaro chassis while holding eight quarts of lube.

Moving back up top, the engine receives the Edelbrock Super Victor intake with Induction Solutions' direct-port nitrous oxide system and Mist A Fire water injection system in place. A set of BES-personalized Moroso fabricated aluminum valve covers is also in place.

A DIRECT SHOT

Although the engine will be used primarily research and development, Steve Johnson wanted a healthy shot of sauce on top. "I put the direct-port on it for the dyno primarily, and we also did the direct-port, water injection system," said Johnson. "It's what we wanted to start with for testing." The X275 class-specific, single-stage nitrous system uses upgraded solenoids with a .125-inch orifice over a standard direct-port kit, and also uses black insulated nitrous and fuel lines. The Mist A Fire water injection system was introduced by Induction Solutions three years ago--"A lot more people are taking interest in it now," said Johnson. "It helps cool the combustion chamber and the top of the piston by drawing heat out of it. The extra water grains also slow down the flame, which allows tuners to add more timing back into the tuneup." Induction Solutions welded bungs into the 2897 Edelbrock Super Victor intake for the nitrous and water injection systems, plumbed it, and then shipped it to BES.

Metering the fuel and air mixture falls to a Holley 1250cfm Gen 3 Ultra Dominator carburetor. Featuring a refined main body and 20 percent larger capacity fuel bowls, the carburetor comes in at nearly four pounds lighter than previous Dominator models. Jon Bitler of IRD Racing Carburetors put his tweaks to it before it came to rest on top of the 588.

The final touches include bolting the carburetor and motor plate in place, as well as adding the MSD crank trigger, a Moroso vacuum pump and fittings, and a Meziere water pump.

//SOURCES

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