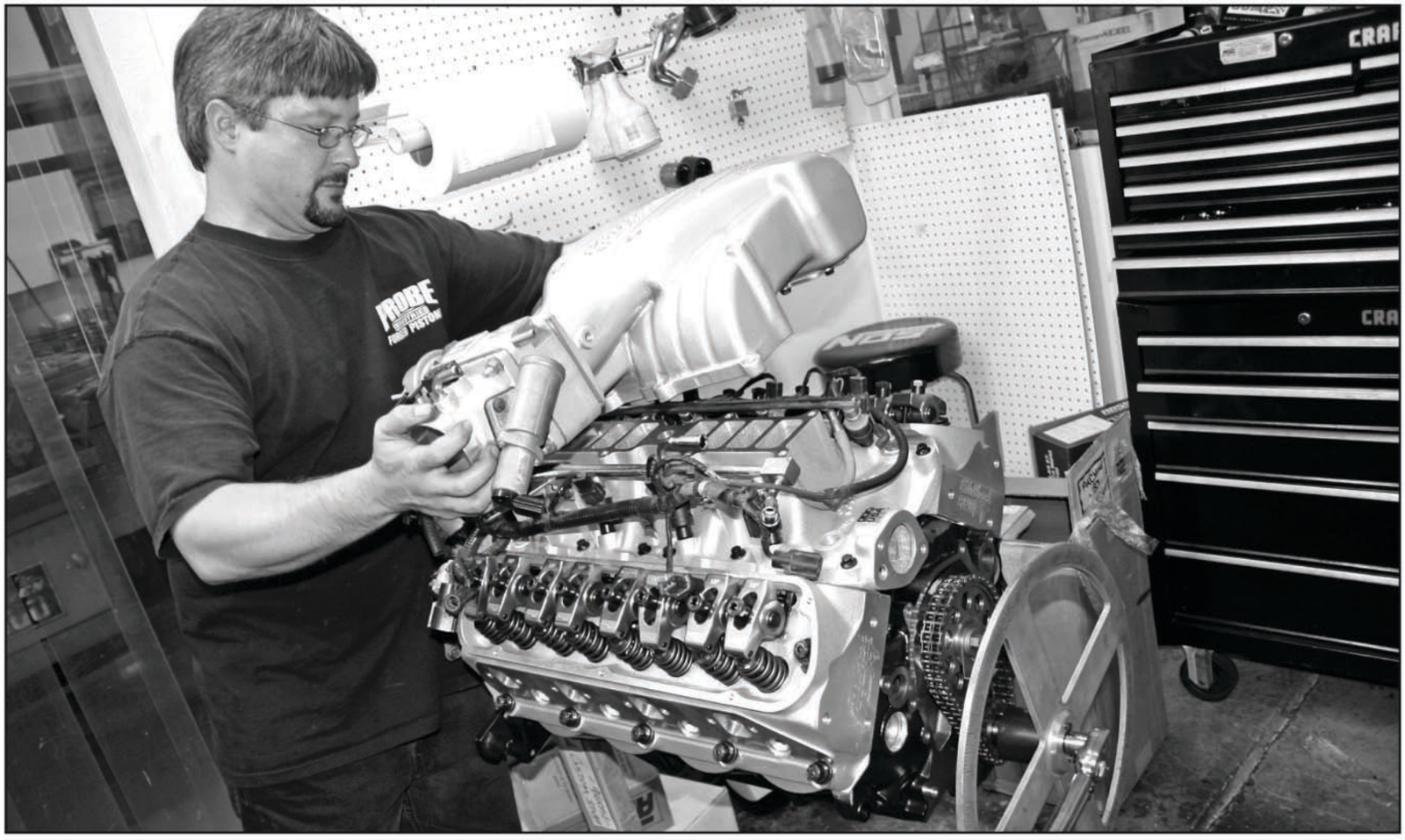
screaming eagle, part II

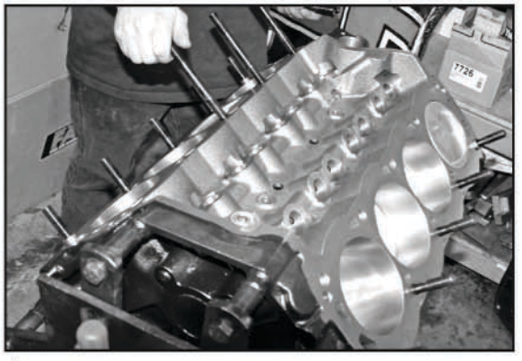
WE TOP OFF OUR SHORTBLOCK WITH GOODNESS FROM EDELBROCK, COMP, SCE AND ARP



Two months ago, you read about our Coast High Performance Pro Street 363-cube shortblock being put together by the good folks over at CHP. This month, we head back over to their assembly room and follow along as they assemble the top half of the engine using some really nice parts from Edelbrock, Comp, SCE and ARP. Our goal with this motor isn't about building a class-killer or a high-dollar custom bullet that will make great dyno sheets, and then eat itself at the track. Rather, this motor is being put together with parts commonly available on the shelves of your local speed shop, and will make solid, reliable power with good street manners.

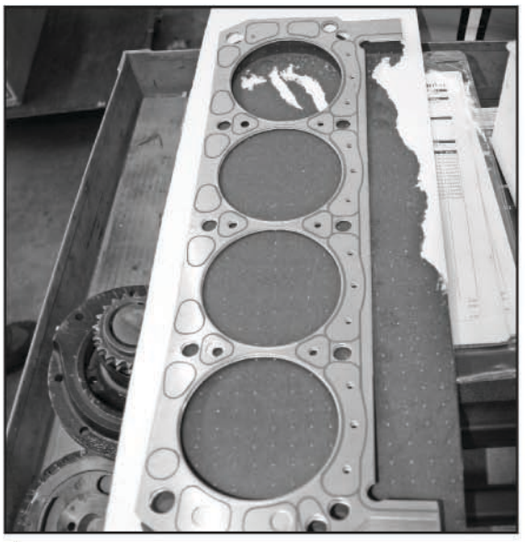
HEADING UP THE LIST

Arguably, the most crucial part in the top end is the cylinder head. For our project, we turned to one of the largest names in aluminum cylinder heads, who also happens to be in our backyard – Edelbrock. When we told them what we were doing, they suggested one of their newest designs for



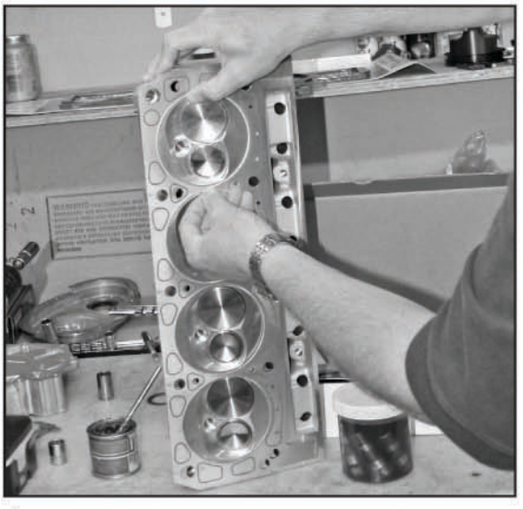
^ The first step in assembling the top end was to screw the head studs into the block. While there is reason to debate going with head bolts versus head studs, we don't plan on ever taking the heads off the block while it's in the car and we had the luxury of assembling the motor on an engine stand, making the choice for studs an easy one.

^ On the recommendation from Shawn at Coast High Performance, we ordered our head studs undercut. The process, which is only done to the shorter studs, allows both the longer and shorter studs to stretch evenly when tightened, providing a much more even clamp load across the deck.



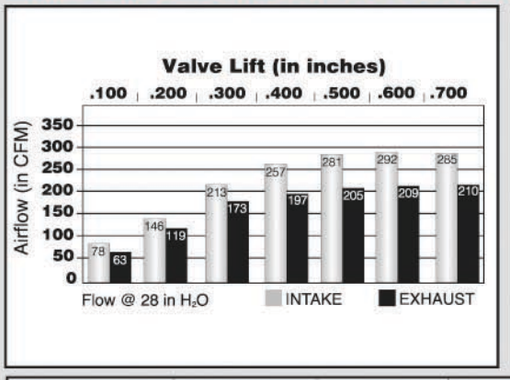
While a copper head gasket is usually not the ideal choice for a street-driven motor, the Titan ICS features a bead around all the water passages that creates a leak-proof seal without the need for additional sealants.

the small-block Ford; the RPM Extreme. Cast and machined entirely in Southern California, the RPM Extreme is known informally as the "RPM XT" or simply the "XT," and features a unique design. By using a combination of as-cast design, and CNC-porting, the XT heads offer the maximum blend of performance and affordability. They feature CNC-porting to crucial areas such as the entry of the intake ports, the exit of the exhaust ports, and the intake and exhaust bowls. The XT's combustion chambers are fully CNC'd and measure out to 59cc. The CNC-profiled intake ports feature a volume of 185cc and the flow sheet shows 292 cfm of flow at .600-inch lift. The exhaust ports, which are CNC-profiled similarly to the intake ports, measure out at 75cc and flow 209 cfm at .600-



With the Titan ICS' internal combustion seal – the stainless o-ring in the gasket – one key area was pointed out by Ryan Hunter of SCE. A lot of people order their gaskets based off of bore size, but fail to check to make sure that the gasket will completely surround the combustion chamber, which is critical with an ICS gasket.

Edelbrock RPM XT Flow Sheet



Valve Lift	.100"	.200"	.300"	.400"	.500"	.600"	.700"
Intake	78	146	213	257	281	292	285
Exhaust	63	119	173	197	205	209	210

Flow Tested @ 28 inches H_2O

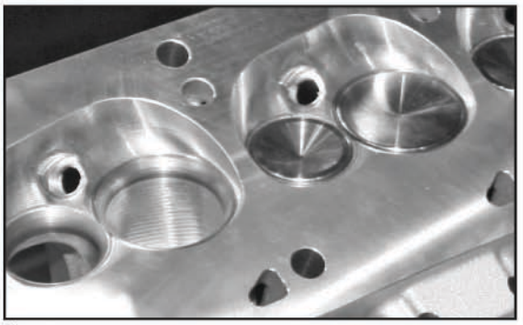
It's not often that you get the support of a president of a company directly in a project. Not only did Ryan Hunter come down to Coast and hand-deliver the gaskets, he even installed them for us. That's customer service!

inch of valve lift. The RPM Extreme comes assembled with stainless steel valves that measure out to 2.02-inch intake and 1.57-inch exhaust – with 8mm stems, which have a traditional 18-degree angle. Conical valve springs are utilized for valvetrain stability and will handle up to a .600-inch lift camshaft profile. The heads also come with 7/16-inch rocker studs, and hardened steel guide plates. The heads have been designed with a 5/8-inch deck thickness and 1/2-inch head bolt bosses. Normally, that would require the use of a head stud bushing with the stock 7/16-inch head bolt holes, but since our Dart block has 1/2-inch head stud holes, it all works together without the use of any bushings.

MANNING THE GATES

A great flowing head is nothing if the supporting gear isn't there to properly open and close the valves, and for those components we looked no further than the supplier of our camshaft – Comp Cams. Their Ultra-Gold Series of stud-mount rocker arms are designed specifically for high-performance street and race engines. Precision machined out of aluminum, the Ultra-Gold arms feature modern design features that reduce their weight and increase their ratio accuracy. Even with their lighter weight, their strength has been maintained and they are able to withstand extremely aggressive spring pressure and valve lift, and the rockers have a lifetime warranty from Comp.

Here, Shawn lowers the first head onto the short-block. ARP wasn't kidding when they said in the catalog that the head would "glide" onto the block with their studs.

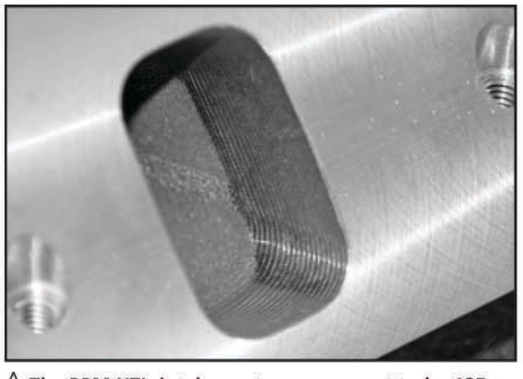


^ The Edelbrock RPM XT features a fully-CNC'd combustion chamber that specs out at 59cc. With the reverse-dome pistons we're running, we should have somewhere in the neighborhood of a 9.15:1 static compression ratio, which should be optimum for our blower.

For lifters, we went with Comp's OE-style High Energy hydraulic roller lifters. Designed to be a direct replacement for the stock lifters, the lifters work well with either a stock cam or, as in our case, one of Comp's hi-po hydraulic roller camshafts. We also sourced a set of Comp's Hi-Tech pushrods to sit atop the lifters and actuate the rockers. They are a one-piece design made from .080-inch wall seamless chromoly tubing for maximum strength and durability. The design uses precision-formed and reinforced 5/16-inch ball ends, which are then heat-treated. To finish them off, the pushrods are black-oxide finished and laser etched with part numbers and lengths.

CONTAINING THE POWER

When it comes to head gaskets and street cars, copper gaskets really don't pop up on the radar. However, after talking to Ryan Hunter at SCE Gaskets about the project, they convinced us that their Titan ICS gasket would hold anything we could throw at it as far as cylinder pressure, and that the gasket's unique built-in coolant seals not only wouldn't require any additional sealants, but would work for our application. The sealing of the water passages is achieved by patented bead seals which are bonded directly onto the gasket surface itself, forming a waterproof seal between the both the head and gasket, and the block and gasket.

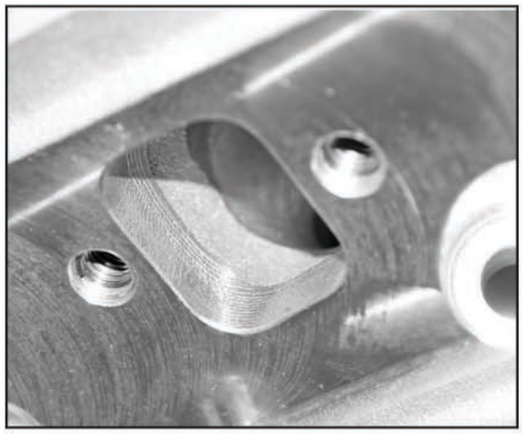


^ The RPM XT's intake port measures out to be 185cc and is CNC-profiled on the entrance to the port, allowing it to flow 292 cfm at .600-inches of lift with the included stainless steel, 8mm-stem 2.02-inch intake valves.

Top End Spec Sheet

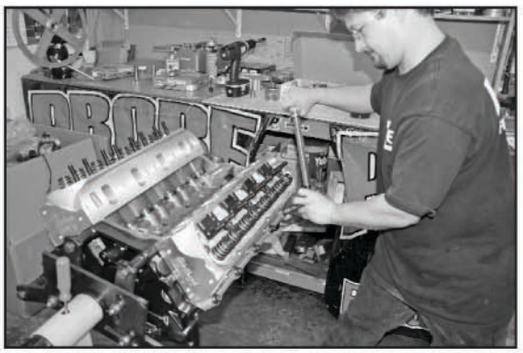
Cylinder Heads	Edelbrock RPM XT, complete (P/N 51259)
Rocker Arms	Comp Ultra-Gold, 1.6 (P/N 19044-16)
Pushrods	Comp Hi-Tech (P/N 7929-16)
Lifters	Comp High-Energy (P/N 851-16)
Head Gasket	SCE Titan ICS (P/N S36154)
Fasteners	ARP Undercut Head Studs (P/N 254-4703) ARP Engine and Accessory Kit (P/N 554-9701)
Intake Manifold	Edelbrock Performer RPM II (P/N 7123)
Throttle Body	Edelbrock 70mm w/ EGR Plate (P/N 3825 & 3828)

With our coolant concerns assuaged, we took a more in-depth look at what makes the Titan ICS so strong. The Internal Combustion Seal (ICS) actually takes the place of the O-ringing of the head and block, and consists of a stainless steel O-ring that is inserted into the body of the gasket. It seals by he same theory as a normal O-ring, but without the need to machine the head and block to accept the wire. Additionally, should cylinder pressures get high enough to cause a head to lift; the upper and lower seal flanges act as a secondary barrier that expands as the head lifts. However, we don't expect that to ever be an issue with this motor, but it's nice to know that the gasket will handle whatever we throw at it down the line.



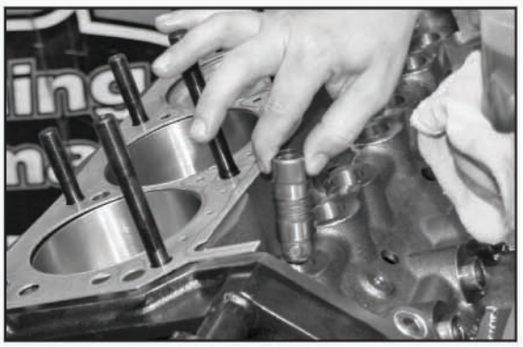
^ The exhaust port of the XT heads is also CNC-profiled, and measures out to 75cc. They are good for 209 cfm of flow at .600-inch lift with the 1.57-inch exhaust valves which feature the same stainless steel construction and 8mm stems as the intake valves.

The next part of the sealing puzzle is clamping the head onto the block, and to help us with that, we turned to our friends at Automotive Racing Products. When it comes to engine fasteners, ARP is the industry leader in fastener technology. While there is a debate between head bolts and studs in a street car, since we were assembling the motor on an engine stand, and don't plan on ever taking the heads off while the motor is in the engine bay, it made the choice to go with studs and easy one. Starting with an 8740 alloy, each

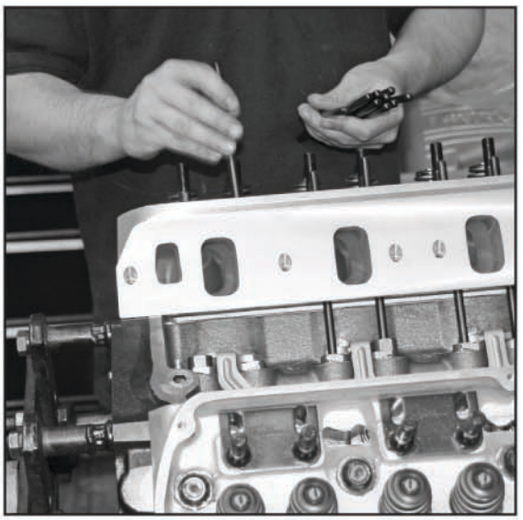


^ Following ARP's recommendations for torque, and Shawn's personal experience, we used Moly assembly lube and torqued everything to 105 ft. lbs. across the board. ARP provides a separate torque spec for both moly assembly lube and 30-weight oil.

ARP head stud is precisely heat treated. They are then put through a centerless grinding process to make them as concentric as possible before cutting the threads. By cutting the threads after heat treating, the fatigue strength is increased ten-fold over fasteners with threads cut prior to heat treating. We also opted for the undercut studs. This is a procedure, done only to the shorter of the head studs which equalizes the "stretch" of both the long and short fasteners, providing a more consistent clamp load across the deck surface.

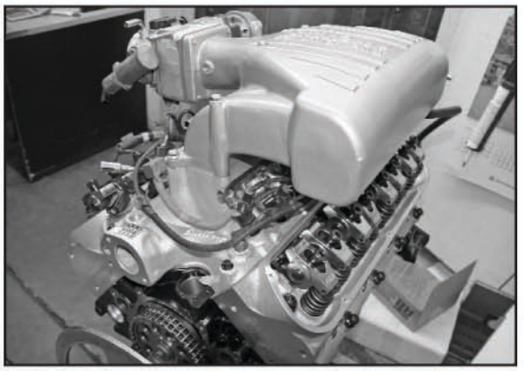


^ When it came to the lifters, we went with Comp Cams High Energy lifters. Designed to be a performance upgrade from stock, the High Energy hydraulic roller lifters work well with a stock cam or with a more aggressive high performance profile.



For pushrods, we went with Comp's line of Hi-Tech pushrods. They are a one-piece design made from seamless chromoly, and have precision-formed 5/16-inch ball ends. They are heat-treated and then given a black oxide coating before being laser engraved with the length and part number.

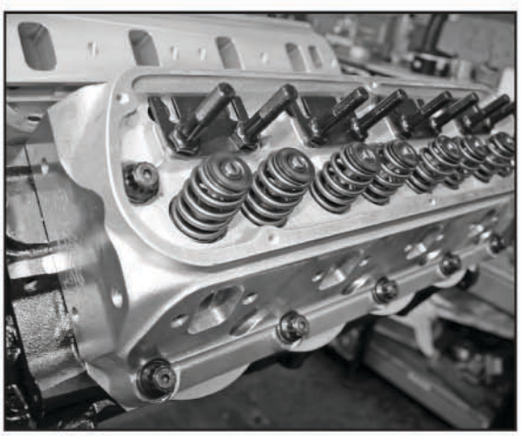
Comp's Ultra-gold rockers are their first Aluminum roller rocker design. Precision CNC-machined, the stud-mount 1.6 ratio rockers have modern design features to reduce weight while maintaining their strength and ability to live in an extremely strenuous environment.



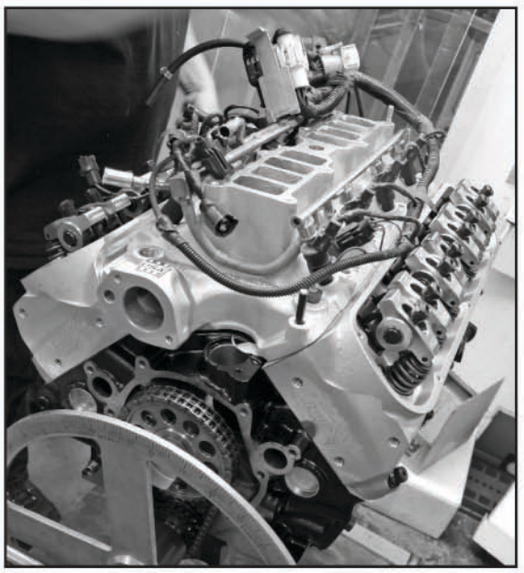
With everything bolted up, all that's left is to put on the vintage Edelbrock valve covers, bolt up the oil pan (which is currently in the final steps of production, check out the tech review next month) and our bullet is ready to drop in between the frame rails.

FEEDING THE BEAST

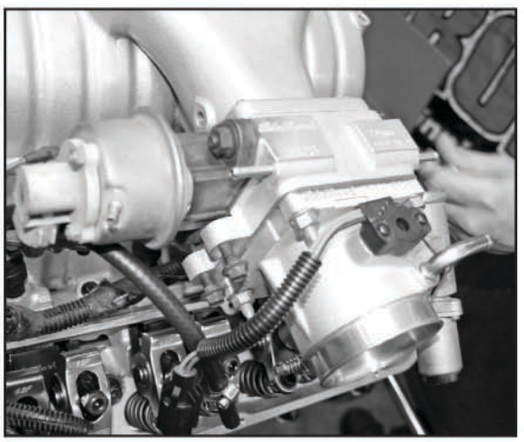
To top off our combo, we again looked in the Edelbrock catalogue to see what would match what the guys who know what they are talking about say our powerband will be, and sure enough, the Edelbrock Performer RPM II fit the bill perfectly with an advertised powerband of 1500-6500 rpm. Edelbrock says that it's ideally suited for a street/strip car, which is good, since the car will be driving to and from the track, but we also know they are capable performers at the track, as we've seen them under the hood of several Renegade cars. Granted, those particular pieces have been worked over with a die grinder as much as the rules will allow, but still, it speaks to the design. The inlet on the Performer RPM II is sized to exactly mate up to a 70mm throttle body, and since we aren't currently planning on porting the manifold at all, we opted for an Edelbrock 70mm throttle body with matching EGR spacer. Since we don't need to wring every last ounce of power from this motor to achieve our ET goals, we think that the 70mm opening when combined with a blower will be more than capable. With the engine now good to go, it's just a matter putting the new Tremec TKO 600 under the car and then we're ready to drop in our new bullet. Stay tuned. ■



The RPM XT heads come fully assembled with conical (beehive) valve springs. They will handle camshaft profiles with up to .600-inches of lift at the valve with fairly aggressive profiles. Thankfully, our camshaft falls within those specs.



We had previously transferred over the fuel rails and associated wiring to save time when we drop the motor into the car. Once we got all the rockers mounted, we bolted up the lower half of the Edelbrock Performer RPM II. With an advertised powerband of 1500-6500 rpm, it is a perfect fit for our combo.



Since the opening of the upper plenum of the Performer RPM II is 70mm and we didn't really want to port the intake yet, we went with Edelbrock's 70mm throttle body and EGR plate, which mates up perfectly to the RPM II in stock form. The combo should be plenty for our ET goal, with room to grow.

source

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