



TRICK OR TREAT

We put the new cylinder head from Trick Flow to the test. Do they pass?

Story & Photos By Andy Finkbeiner

It wasn't all that long ago when your only choice for increasing flow numbers (and HP) meant shelling out big bucks for a well-used pair of Max Wedge heads, or laboriously porting some swap-meet 906s.

Then, a few decades ago, things began to change: Dave Koffel released his all-out B1 race heads, and Russ Flagle's Indy Cylinder Head introduced what has grown into virtually a full line of big-block heads, from mild to wild, with an equally wide array of manifolds. Fast forward another decade or so, and street heads were added from Edelbrock (who now offers two version) and 440 Source (who now offers a CNC-ported version). All of these heads (and several other lesser-known varieties) are aluminum alloy, reducing your Mopar's engine mass, right where it counts, up front, and up high, and are easily repaired. Everything was (finally) coming up roses for Mopar guys!

Into this crowded field, Summit Racing's Trick Flow division announced their all-new CNC ported big block heads back at the 2014 SEMA show, but the heads didn't start to ship until September of 2015. We had a feeling that these heads would be the next big deal for Mopar guys so we elbowed our way to the front of the line and grabbed one of the first set of heads that Trick Flow shipped.

As soon as we got

Our set of Trick Flow heads are mounted up and ready to run on the 470 inch B block stroker engine.



The 470 low-deck alive and on the dyno! We were able to get a handful of shake-down runs on the new engine before this article went to press and we're happy to say that we've seen 590 ft-lbs of torque and 660 hp. We expect those numbers to increase as we get the new combination tweaked and sorted out.

the heads in our hands we knew that Trick Flow was on to something special. The CNC porting work looked great, and the numbers from the flow bench backed up the good looks. Peak flow is right at 330 cfm on the intake side at 0.700 lift while the exhaust flow is 260 CFM or 79% of the intake flow. Those numbers

are good enough to support an easy 650 HP given the correct cam and that is a big enough number to put most any Mopar into the 10s at the local drag strip.

Trick Flow offers the heads with several different spring combinations but we wanted to build up a fairly serious bracket type engine so we went straight to the bottom of the page for the version with the solid-roller-capable springs. This version of the head is capable of handling 0.700 inches of valve lift right out of the box and has lightweight titanium retainers to reduce the odds of valve float.

Once we had the heads in hand we needed to build a short block that could handle the power capability of the heads. We settled on a classic 470 inch low deck stroker engine (400 block with a 3.91 stroke crankshaft) but decided to go with a pump gas combination so we could drive to the track and make passes without spending a



fortune on race fuel. The Trick Flow heads have a smaller-than-stock chamber at 78cc so the pistons require a small dish in order to work with pump gas. Fortunately, there are a lot of piston choices these days and we found a shelf-stock piston from Diamond Racing that fit the bill. Scat Crankshafts was super helpful in building us one of their fully machined Superlight 'shafts

as well as providing a set of lightweight I beam rods for the build. Our friends at Holley suggested using one of their brand new Ultra XP 850 carbs for this engine while the guys at Jesel talked us into one of their new front drive combinations with a belt driven camshaft and a belt driven distributor.

As we got into the engine build we

came to the conclusion that there was so much information to cover on the topic that we decided to split the project into multiple articles with the first article covering the heads and engine build, while the next article will follow up with more details on the camshaft and induction system as well as the dyno testing. Having said that, let's jump straight into the pictures of the



The combustion chamber in the Trick Flow heads is fully CNC machined with a finished volume of 78 cc. The intake valve is 2.19 inches while the exhaust is 1.76 inches.



The rocker shaft is relocated higher on the Trick Flow heads by roughly 5/8-inch in order to provide more room for longer valves and valve springs. We took a quick look at the resultant geometry with various rocker arms and came to the conclusion that the shorter rocker arms such as those from Crane (right) and Comp (l.) would be our first choice.



The ports on the Trick Flow head are fully CNC machined. This view of the exhaust port shows the fairly large step over that Trick Flow uses in their CNC machining. The spark plugs are angled similar to Edelbrock or Indy heads.

We began the engine build with a standard bore 1978 400 block. This block passed all of our inspection tests including checking for cracks and sonic checking the cylinder walls. The story that late-date B and RB engines have thinner walls is just that: A story.



The block was carefully cleaned and fully deburred. The oil pump pickup was drilled and tapped for the larger 1/2 NPT pickup size (do this with extreme caution, the boss is cast smaller than on Hemis). We called Hughes Engines and got a set of their chamfered main bearings for this engine.



SCAT has recently added a lot of new Mopar stroker kits to their catalog. SCAT didn't have a 3.91 inch stroke crankshaft in the catalog, but they were more than willing to whip one up for us. We went with the Superlight option for this crankshaft along with a set of 6.700 long SCAT I beam bushed rods and Diamond pistons with full-floating pins.



The SCAT Superlight crank is rough balanced but we needed to dial it in once we had all of the other parts. Finished bobweight for this rotating assembly is only 2222 grams - over a pound lighter than an OEM 440!



The SCAT Superlight crankshaft only weighs 54 lbs. so it is easy to drop in place. We used an ARP main stud kit to provide a little extra clamping force on the main caps.

Once the crankshaft is in place and everything is torqued to specification we measured the crank end play to make sure that the thrust bearings are correct.



ABOVE: A close up of the SCAT Superlight crankshaft shows the fully machined counterweights as well as the gun drilled mains and the hollow rod journals.



Once the crankshaft is fully secure the piston and rods can be knocked into place using a ring compressor and plenty of lube. Of course a bore-specific ring compressor, or even the wrinkle-band type, makes this job easier.

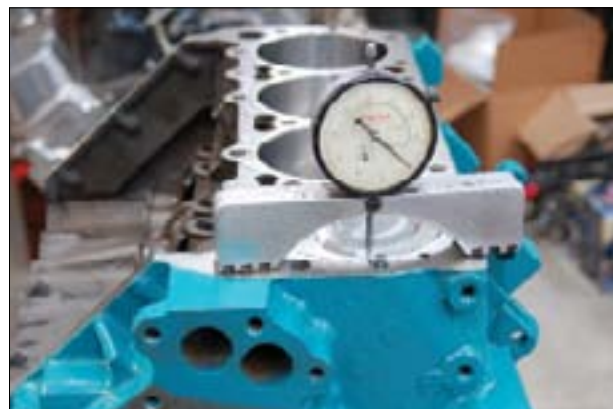
RIGHT: We have been using the billet rear main seal retainer from Mancini Racing for many years with excellent results. Installation is fairly simple and we haven't had one leak yet. Indy offers a similar setup, there's no reason today to use the crack-prone stock cast retainer.





Rod side clearance is double checked after all of the rods are in place. This engine has extra side clearance since it is using Chevy width rods on a Mopar width crankpin, this would result in increased oil consumption on a pure-street engine (which this isn't).

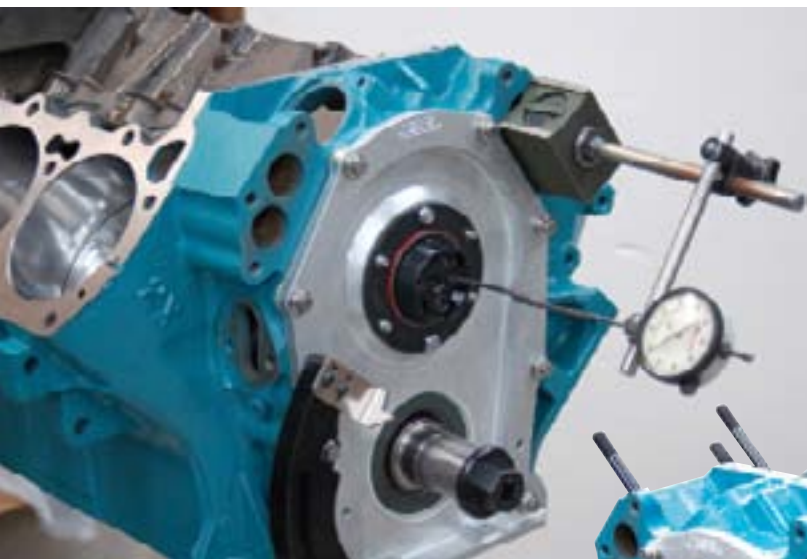
BELOW: The pistons are Diamond part number #52407 with a 12.5 cc dish. At zero deck with a 0.040 thick head gasket the compression ratio is pump gas friendly at 10.6 to one.



The block was decked 0.005 inches to provide a deck height of zero. (I.e., the tops of the pistons are flush with the deck surface)



LEFT: The Jesel belt drive front cover provides a double thrust bearing arrangement for controlling camshaft end play. The belt drive also provides an easy way to adjust the camshaft centerline. Also note the clever square-recess ARP crank-snout screw, this belongs on every Mopar buildup.



RIGHT: With the belt drive installed, the next step was to screw in the head studs and then double check the fit of the Cometic MLS head gaskets. The center row of head studs needs to be longer than with cast iron heads since these Trick Flow heads are taller than stock. We used a row of 5.0 inch long head studs for the center row.



Once the head was installed we were able to order the pushrods and then verify valve operation. Gross valve lift with our 0.460" lobe camshaft and the 1.50 rocker arms was just a little over 0.690 inches. Rocker arm geometry appeared to be just fine at this lift.

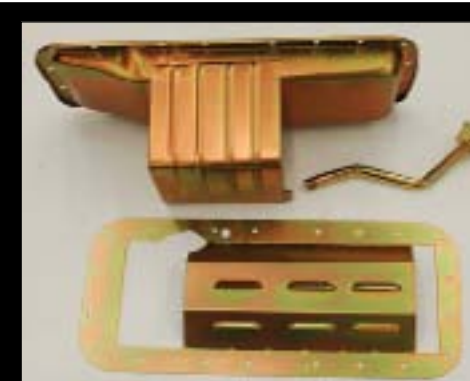


One additional advantage to using the Jesel belt drive is that a belt driven distributor can be added which is driven off the front of the cam. The belt drive distributor eliminates the friction, slop, and harmonics of the camshaft gear drive. Note Meziere electric water pump (another track-only part).



The ignition is triggered by a flying magnet wheel bolted to the vibration damper. This crank trigger type of ignition system was pioneered by the Mopar Missile crew back in the Direct Connection days (Think: Huntsville, Apollo 11, Chrysler Engineered)

The oiling system is all Milodon including the #31010 deep sump pan with matching pickup and windage tray. A standard windage tray fits just fine with a 3.91 stroke crank when using the Shivvy 2.200" rod journals.



The oiling system is completed with a Milodon #21814 billet pump and a System 1 screen type filter. The screen filter allows us to quickly examine the filter element between dyno pulls to see if the engine is generating any debris.



The induction system consists of a Holley 850 Ultra XP carburetor mounted on a proven Victor 383 intake manifold. (Remember, double-pumper carbs such as this are only for race use). We'll also be testing a Holley 950 carb as well as a Mopar Performance intake. Trick Flow has announced a new intake manifold but it isn't available yet. Once the Trick Flow intake is available we'll be the first to test it.



Sources:

DIAMOND RACING
Clinton Twp, MI, 877-552-2112
www.diamondracing.net

HOLLEY
Bowling Green, KY, 866-464-6553
www.holley.com

GRAY'S AUTOMOTIVE
McMinnville, OR, 503-620-4353
www.graysengines.com

JESEL
Lakewood, NJ, (732) 901-1800
www.jesel.com

MILODON
Simi Valley, CA, 805-577-5950
www.milodon.com

TRICK FLOW
Tallmadge, OH, 330-630-1555
www.trickflow.com

SCAT CRANKSHAFTS
Redondo Beach, CA, 310-370-5501
www.scaterprises.com