

American Motors Muscle Car Cylinder Heads

The AMC engine family of 304, 343, 390 and 401 cubic inch V8 engines

BY **TONY PONTILLO**

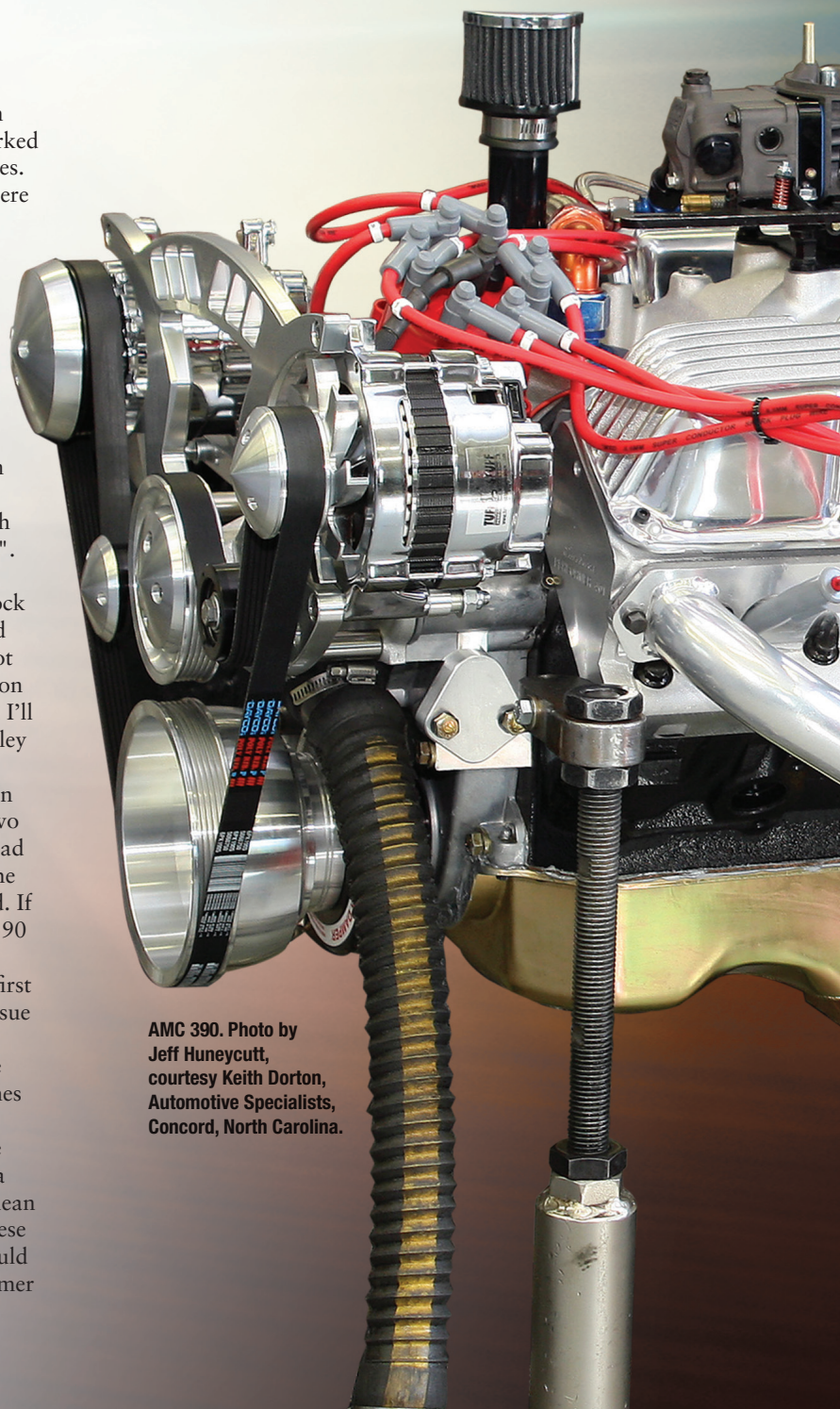
Being located in Kenosha, Wisconsin, the home of American Motors where almost everyone's father and grandfather worked at the factory, our town has a huge following of these vehicles. The engines used are all from the same design family but, there are some key differences.

Let's break down some of the main differences. The AMC 327 engine is from a completely different design. Basically, there are two different design cylinder heads — before and beginning of 1970 and up. Cylinder heads produced from 1970 have a dog leg exhaust port while 1968-69 cylinder heads have a rectangular exhaust port. Also, the later heads have 1/2 head bolts and the earlier heads have 7/16 head bolts. It is very common to bolt the new style cylinder heads on the older blocks for this you can use the Edelbrock 9693 head bolt bushing kit.

The cylinder block deck heights are slightly different with the early block measuring 9.175" and the later one is 9.208". There are also two different intake manifolds with different bolt spacing, the two-center bolt holes are different. Edelbrock has both intake manifolds available. Years ago, when we did not have the Edelbrock intakes to choose from we would slot the two center bolt holes to allow you to bolt up the intake on the early heads. The deck height difference is only .033" and I'll explain more about that later and pros/cons of using the valley pan over normal intake gaskets.

They made a 1969 390 cu/in engine and a 1970 390 cu/in engine and yes, the deck heights are different between the two years as well as the head bolt sizes are different. They also had both designs of the exhaust ports. Those differences make the 1970 390 engine the rarest and is starting to get hard to find. If you are doing a proper number matching build for a 1970 390 engine you have only one year to choose an engine from.

Let's get on to the rebuilding of the cylinder heads. The first item we look at is all these cylinder heads have a cracking issue on the outside of the head by the lower head bolt holes (see picture) When these heads were flycut to allow room for the head bolt the two outside corners are very thin and sometimes if not cracked already will crack when the cylinder head is installed and torqued down. For this reason, we only torque the two outside lower head bolts to 65lbs. Before spending a lot of time on the heads we just clean this area with brake clean and magnaflux it to see if they are cracked. We have seen these heads crack all the way around the corner of the head. I would say about 60% of the heads we see are cracked. If the customer is not trying to build a numbers matching car we would



AMC 390. Photo by Jeff Huneycutt, courtesy Keith Dorton, Automotive Specialists, Concord, North Carolina.



Looking at the location of the crack in this photo might lead one to believe it was really the result of a manufacturing flaw, but it was never modified.

recommend Edelbrock heads at this point. We believe this is the best option anyway because 98% of the AMC engines we build now are hydraulic roller engines.

But, if it's a numbers matching engine, we must repair the cracks and use the customers cracked heads. If the heads are cracked all the way around the corner, we will find different castings. If they are just cracked in the flycut groove usually about one inch long or so, we'll drill both ends of the crack then machine out the crack and Braze the crack.

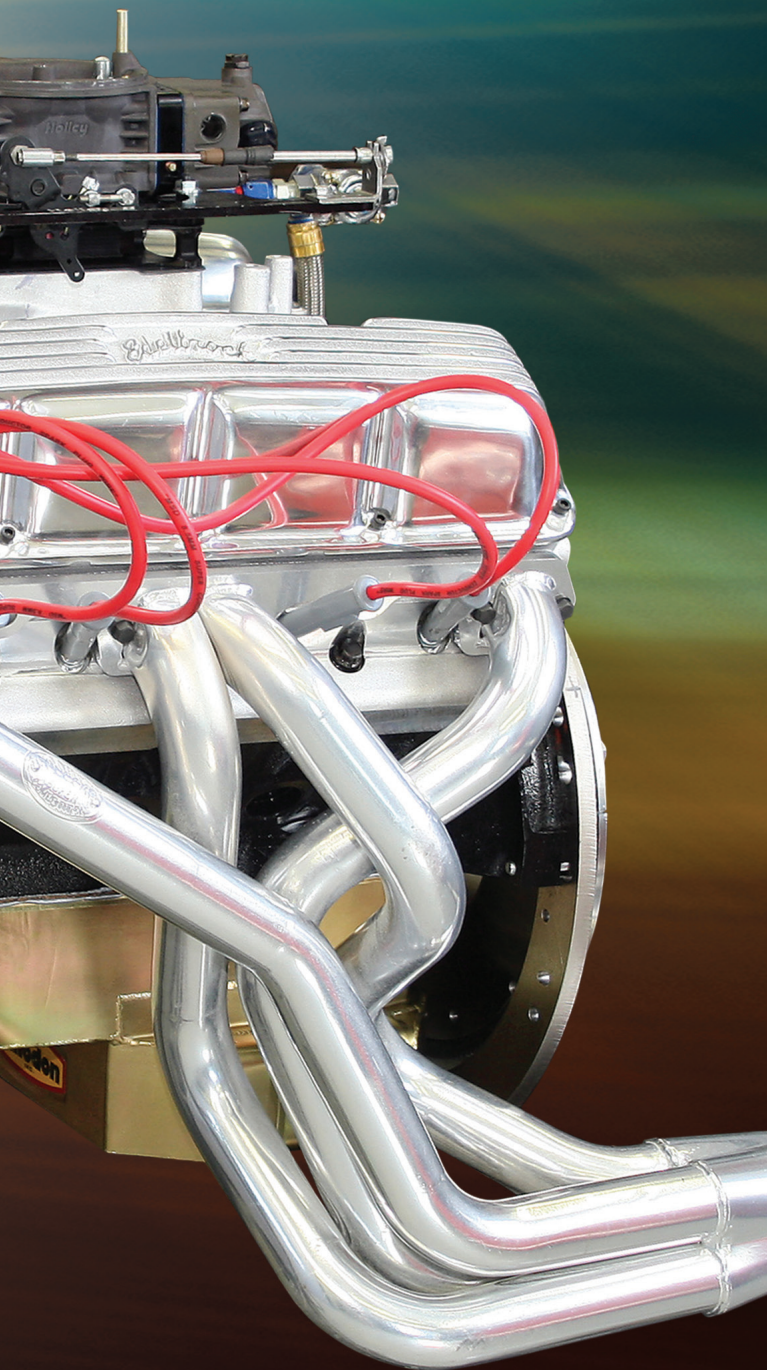
After machining we pressure test to make sure we have no leaks. Very seldom do we ever see these heads crack anywhere else. Looking at the location of the crack in the above photo might lead one to believe it was really the result of a manufacturing flaw, but it was never modified.

As I describe rebuilding these heads most of this information will be for a performance street car with a hydraulic roller camshaft. If you are building more performance or a race engine you will know what to do from here. All AMC heads came with 30° intake valves with a 3/8 valve stem. There was a company making special AMC valves with 11/32 stems and 45° seat angles that some shops used, we don't use those valves, we made the decision to install the small block Chevy valves. For the hard-core AMC guys we may not tell them we install SBC valves, as they seem to take that personally.

There are many different valve sizes in these heads but the 401 cu/in engine is stock with a 2.025" intake and a 1.680 exhaust valve. We will usually use a 2.050" or a 2.080" valve and when checking the installed valve height, we find using a .100-.200" longer valve works nicely. With this change we install new 11/32" by 1/2" OD guides, either Cast or Bronze. We also machine the valve guide down to accept a positive valve stem seal and eliminating the original large plastic seal that tends to always break apart. Let's talk about harden valve seats for unleaded fuel. Years ago, we used to install harden seats in all AMC heads to accept the unleaded fuel. It didn't take very long before we realized that the cast iron was so hard on the AMC heads that the seats were not sunken in, like in other engines. We never see a sunken valve seat on these heads and we rebuild about 30-40 AMC engines a year.

These heads use two different types of rocker studs/bridges, both are non-adjustable. The heads with non-adjustable rocker studs you can simply remove the stud. We do mill the base down usually just a clean up cut though. We have broken thru to water on the center pads. Indy cylinder head does sell a guide plate with the correct centers for the AMC we install the guide plate with screw in studs. On a full roller rocker arm we prefer to use the ones from Harland Sharp. On the heads with rocker arm bridges that have 5/16" threaded holes we machine those out to a 7/16" threaded hole. On these heads we do not mill the rocker base down for guide plates. We just install them. On some heads the pushrod hole is open and for these applications you will have to either run a self aligning rocker arm or install guide plates. Depending on the valve spring we are using we cut the spring pocket accordingly.

For Intake manifold choices Edelbrock has a couple numbers available with and without EGR. The early manifold 1968-1969 is for the short deck height and the two center bolt holes are



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different. The other intake is for 1970-up. This manifold can be bolted on the short deck blocks. Using Mr. Gasket Part #5844 or 800G these gaskets have the center two bolt holes slotted and you can use it as a template to slot the intake. The deck height difference is minimal and with a little fly-cutting, the manifold will bolt right up.

The original engines came from the factory with a valley pan under the intake. On stock engines we will use the valley pan, but when we do a performance build we install an internal oil line in the valley that would interfere with the valley pan.



So, we use the aftermarket intakes without the baffle pan on the bottom. They do have the rivet holes in the intake, so you can remove the pan from your original intake and install it if you would like to use it. We usually install a freeze plug in the rear of these intakes to plug the hole used for a PCV valve. If we're doing a completely

stock rebuild we do use the PCV valve, but, you must install a baffle under the intake. This is especially important if you are not using the valley pan, as it will suck oil thru the PCV without a baffle.

Most aftermarket valve covers do not come with any breather holes in them. If you are not using the PCV system and the engine is a performance build the front oil fill tube breather is not enough to vent this engine. So we will usually install a breather in each valve cover, or on our race engines we will us AN line and install a Puke tank to vent. ■



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