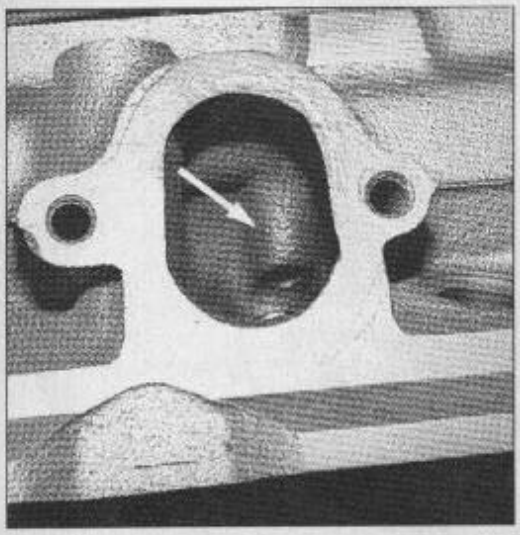
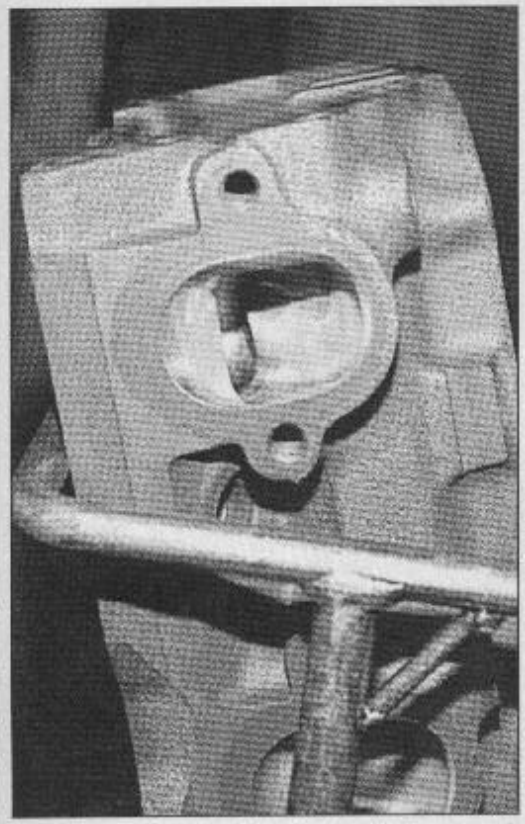




Instead of laying down the extra cash for a set of aluminum heads, consider porting the existing heads to increase the flow. Stock 460 heads have a large lobe (*arrow*) in all the exhaust ports that significantly hinder flow and rob the engine of horsepower. In the second photo, the lobe has been removed and the entire port has been smoothed and polished.

Power Porter

By Cole Quinnell

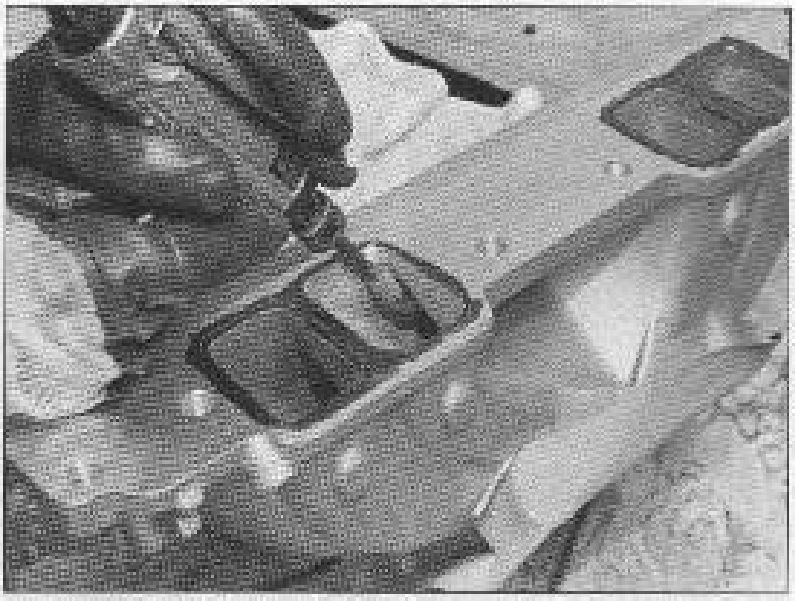
You Can Perform Basic Porting

Porting and polishing are perhaps regarded as the ultimate in professional cylinder-head preparation. These two terms immediately add an air of respect to an engine buildup, and at least $500 to the bill. Yet you probably own the tools required to do this work and you may be surprised to find that you can perform basic porting work yourself.

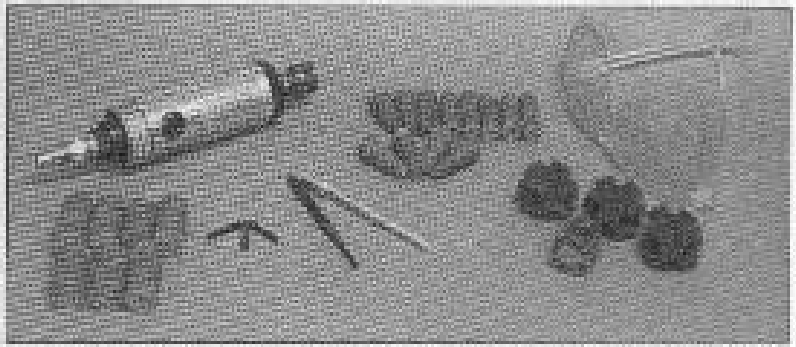
There are certain types of porting that we would dissuade you from attempting, especially for your first project. One is reshaping cylinder-head intake and exhaust ports and combustion chambers. These areas are as complicated as they sound and are best left to professionals of good reputation. However, cleaning up casting lines and matching your intake manifold to the cylinder heads are easy tasks that nearly anyone can do. If you own a die grinder, abrasive porting attachments are affordable and the only other investment needed is your time. A high-speed Dremel tool won't work as it turns in excess of 40,000 rpm.

One word of warning: Not every intake and cylinder head deserves porting. As you'll learn, porting is time intensive and you don't want to invest 20 hours or more into a project that won't have any real benefits. In general, modified engines and those having a mismatch between the intake manifold and cylinder head ports will reward your efforts. An example might be a Chevrolet 350 engine built up enough to produce 340 hp. Another one is an FE Ford with an aftermarket intake that has ¾-inch larger ports than the original FE heads. This mismatch creates considerable turbulence instead of simply being a smooth pathway for the air/fuel mixture.

There's also a big difference between porting aluminum and iron parts: Iron takes considerably longer. Whatever material you're porting, make sure you're working in a well-lit area, and that you're standing or sitting comfortably because you'll be there for quite some time. Other than these general tips, and the other information presented in this article, all you need are a few tools and a part to port.



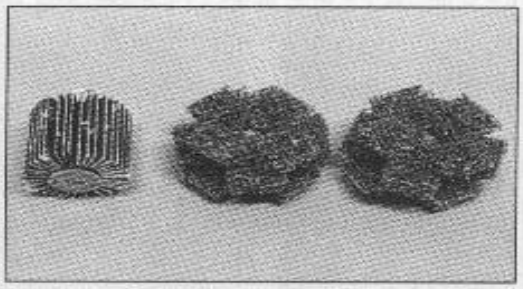
1 Which Standard Abrasives kit you need depends on the components and the frequency of jobs you'll be doing. Each of the kits shown is relatively inexpensive and comes with the mandrels and accessories you'll need to attach the abrasive rolls to your die grinder.



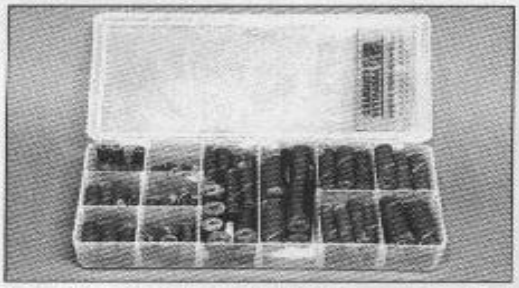
2 The Standard kit is a minimal kit that will probably detail an engine block or finish an intake manifold on a V-8. You'll need to wear safety glasses, gloves, a paper air mask, a long sleeve shirt, and long pants.

PHOTOGRAPHY COLE QUINNELL

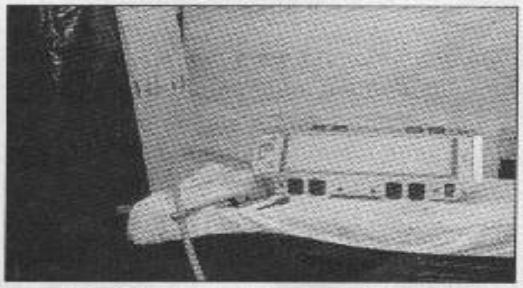
3 The Deluxe kit gives you a better selection and a greater quantity of the basic rolls. This is a better starting kit for most beginners because the abrasive rolls tear easily when pushed against the sharp corners of the parts you're porting. With practice, you'll become better at avoiding this.



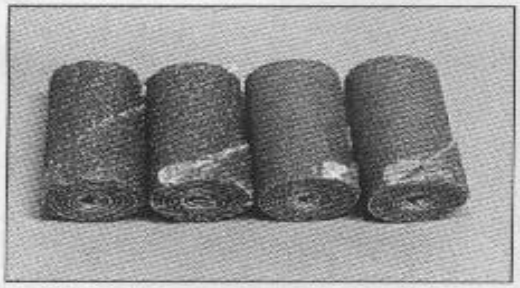
6 Then use the 120-grit flapper wheel (*left*) to prepare the surfaces for the final finish with the Cross Buffs (*right*). The Cross Buffs will leave the finish very smooth and shiny. Some professional porters prefer to leave intake manifolds and intake ports in the cylinder heads with an 80- or 120-grit finish to aid atomization and tumbling, but most agree that the exhaust should be as smooth as possible.



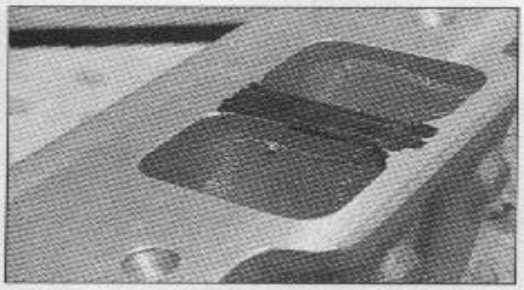
4 The Cartridge Roll kit comes with plenty of 60- to 120-grit rolls. This is a good supplemental or refill kit for the other porting kits. The rolls are smaller (¼- to ½-inch diameter) than those provided in the Standard kit. The smaller size is also easier to use in certain areas of an engine.



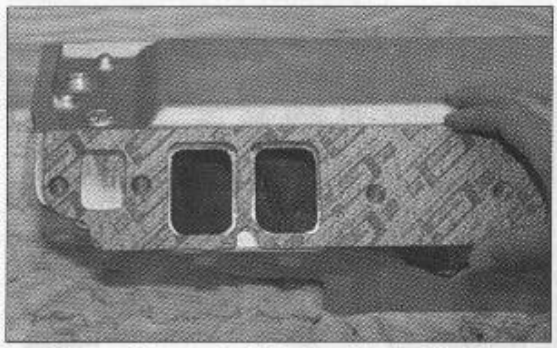
7 The first step in porting is to set up the work area. Metal dust will go *everywhere* so we covered areas that we wanted to keep clean with sheet plastic. Then we laid a discardable towel on the work bench to set the intake manifold on. Run an air hose to the workbench, and leave plenty of slack to move around. You'll also need a good light over the work area.



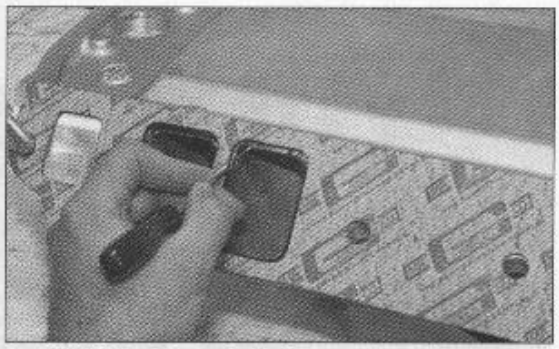
5 The lower the grit number, the more aggressive the sandpaper. The 40-grit rolls (*the two on the left*) should be used first to remove larger amounts of metal. Follow this with an 80-grit roll (*right*). These are used to create the basic shape. Tapered versions in both grits are included in the kits in addition to the straight ones shown to ease porting in tight areas.



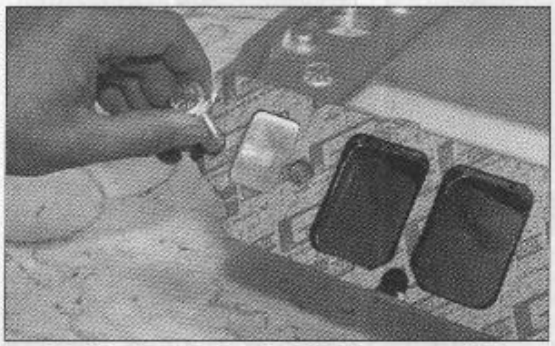
8 These are some of the big items you can clean up in the ports. Our goal with this intake wasn't to drastically alter the shape of the ports. Instead, we wanted to match the port-outlet size to the gasket (the cylinder heads were matched to the same gasket by a professional porter), and remove any obvious hindrance to flow.



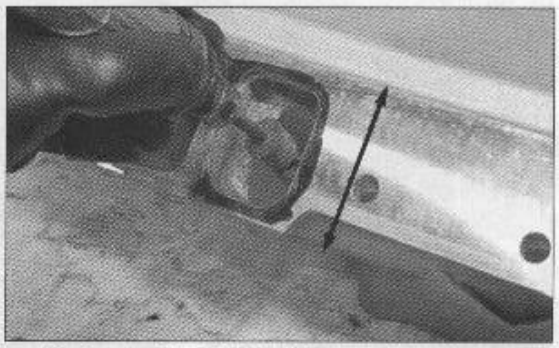
9 You must have a plan before breaking out the die grinder. Intake-port matching is one of the easier porting jobs to tackle, so that's what we did for this article. Select an intake gasket with intake-port openings that are the same size as the ports in the cylinder heads.



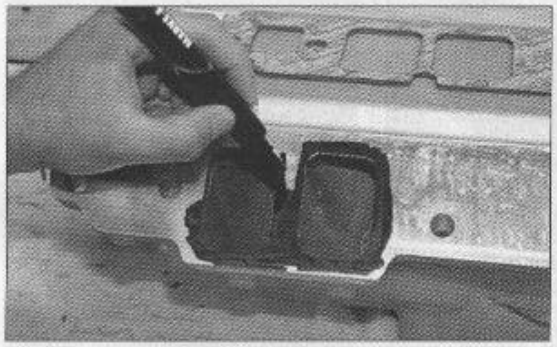
12 With the intake gasket in the correct position, use a scribe to scratch a line around each of the ports. This will be your guide or outline for your work. The scribe we used was from Harbor Freight and cost about $1—they're available from most tool stores.



10 Position the gasket on the intake in a manner that you can repeat on both sides. We found that ⅞-inch bolts fit perfectly in this Mr. Gasket big-block Chevrolet intake gasket (PN 110) and Edelbrock Victor 454-R intake (PN 2907). This is a very important step since matching the intake ports is worthless unless you can line up the heads, gaskets, and intake manifold once you're finished porting.



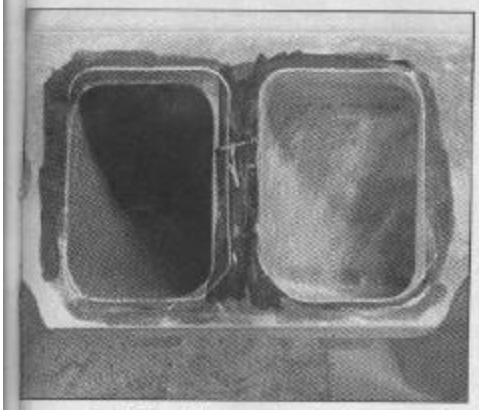
13 We began with a 40-grit roll in an area that needed a lot of material removed because proper control and finesse will take awhile to achieve. Keep the roll moving steadily (*arrow*) to avoid creating a dip. You want to remove material uniformly. At first, be only concerned with the end of the port (at the gasket): The rest will be blended in later.



11 Then use a marking dye on the intake. A product called Dykem is used by professionals for this, and you can order it from most mail-order houses when you purchase a Standard Abrasives porting kit. We're cheap so we used a wide-tip felt-tip pen instead.

14 The corners can be a little difficult to shape with the large roll. We switched to a tapered 40-grit roll to rough in these areas. Try to keep the end of the mandrel and the chuck portion of the grinder from hitting the port as this will create a rough area you'll need to fix.

21 We found that positioning a bright flashlight at the other end of the port we were working on helped us clearly see what we were doing. Also, use compressed air to frequently blow metal dust from the work area. Find a way to stand or sit comfortably: We spent 20 hours porting this intake manifold.



22 The difference in the two ports is very noticeable both to the eye and to the touch. The finished port (*right*) has a 120-grit finish that should provide a smooth flow, but still retain a little texture to help the air and fuel mix. The proper sizing of the intake-manifold ports to the cylinder-head ports can make a big difference in power and in how smoothly a modified engine runs. *4x4*

SOURCES

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