Time To TPI

The Who, What, Where, And Why Of TPI
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By Scott Crouse

During the mid-'80s, automobile manufacturers made the decision to jump into electronic fuel injection (EFI). Computer-controlled engines benefit from improved fuel mileage and crisp throttle response derived from accurate control of the fuel and spark curves.

In 1985, GM introduced its Tuned Port Injection (TPI) manifold on the Corvette and the Camaro line. The TPI system includes a manifold base, two sets of runners, a plenum, and a throttle-body.

The TPI manifold was originally designed for 305ci engines with 19 lb/hr fuel injectors operating at 36 psi, and employs a long and narrow runner to enhance bottom and midrange torque. The 350ci TPI-equipped engines use the same intake as the 305ci with larger 22 lb/hr injectors at 43.5 psi. The additional cubic inches broadened the power curve, but the long-runner intake limited rpm. The LT1 engine replaced the TPI in the Corvette in 1992, and in the Camaro in 1993.

Now that TPI intakes are both plentiful and inexpensive, it's tempting to snatch one up for your hot rod. Before hunting the wrecking yards, we dove into several books for some technical advice to make sure we bought the right stuff. TPI-equipped

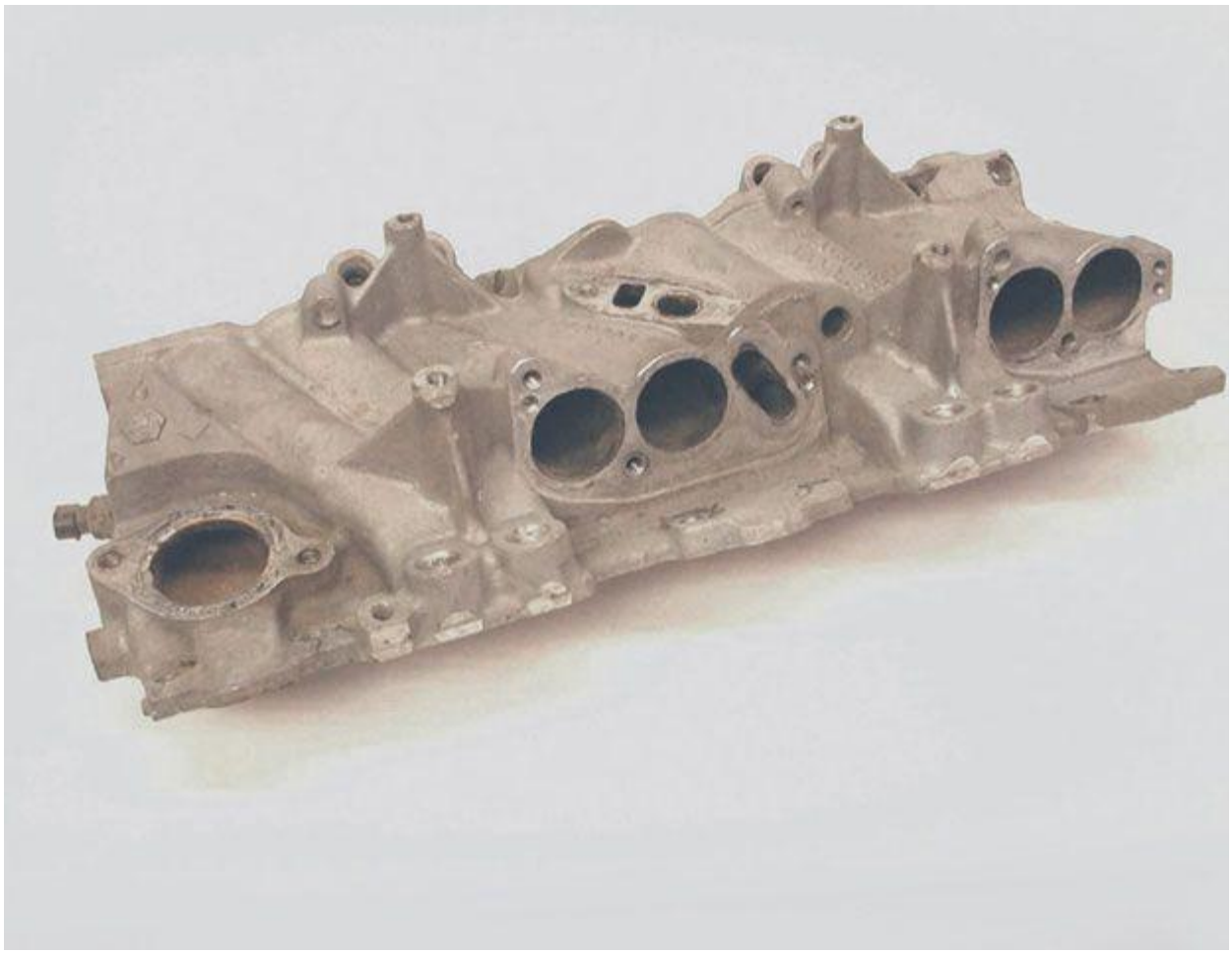
Corvettes and F-body cars rolled off the assembly line between 1985 and 1992, but mixing and matching parts from different engines can cause problems. The main rule to follow when TPI hunting is to obtain as many parts as possible from the same donor engine. The TPI design can be identified by the long arching runners that extend from the base manifold to the plenum. However, the basic TPI has experienced several revisions over the years.

In 1985, the Corvettes and Camaros used an iron small-block cylinder head. The following year, Corvettes were offered with two cylinder-head options. Corvettes with aluminum heads used an >> intake manifold that placed the ERG flange near the distributor, while the '86 iron-head Corvettes used the '85 design that placed the EGR valve in the middle of the manifold. Then, in 1987, all Corvettes came with aluminum heads using the '86 aluminum-head base-manifold design. Another major change to the TPI system came on the '87-'92 Camaro cylinder heads. These cast-iron heads feature revised center bolt-hole angles. These altered bolt-hole angles required a third base with matching center bosses.

GM revised the TPI plenums as well. All plenums feature an EGR passage, but the '85-'88 plenums are cast with an additional cold-start passage controlling a ninth fuel injector. The '85-'88 TPI plenums also feature a triangular idle-air control (IAC) port located between the two throttle-bore openings. This IAC port requires a compatible throttle-body, while '89-'92 plenums without an IAC port can use either throttle-body design.

Once you have all the right manifold parts, it's time to hunt down the proper electrical components. Obtaining the correct sensors, electronic control module (ECM), and wiring harness is crucial to completing the TPI swap (see "EFI Basics, Part I," Jan. '02). Using the factory wiring harness can be cumbersome due to many nonessential connectors. Several aftermarket companies including Painless Wiring and Howell Engine Developments offer easy-to-use TPI wiring harnesses that will make this swap much easier.

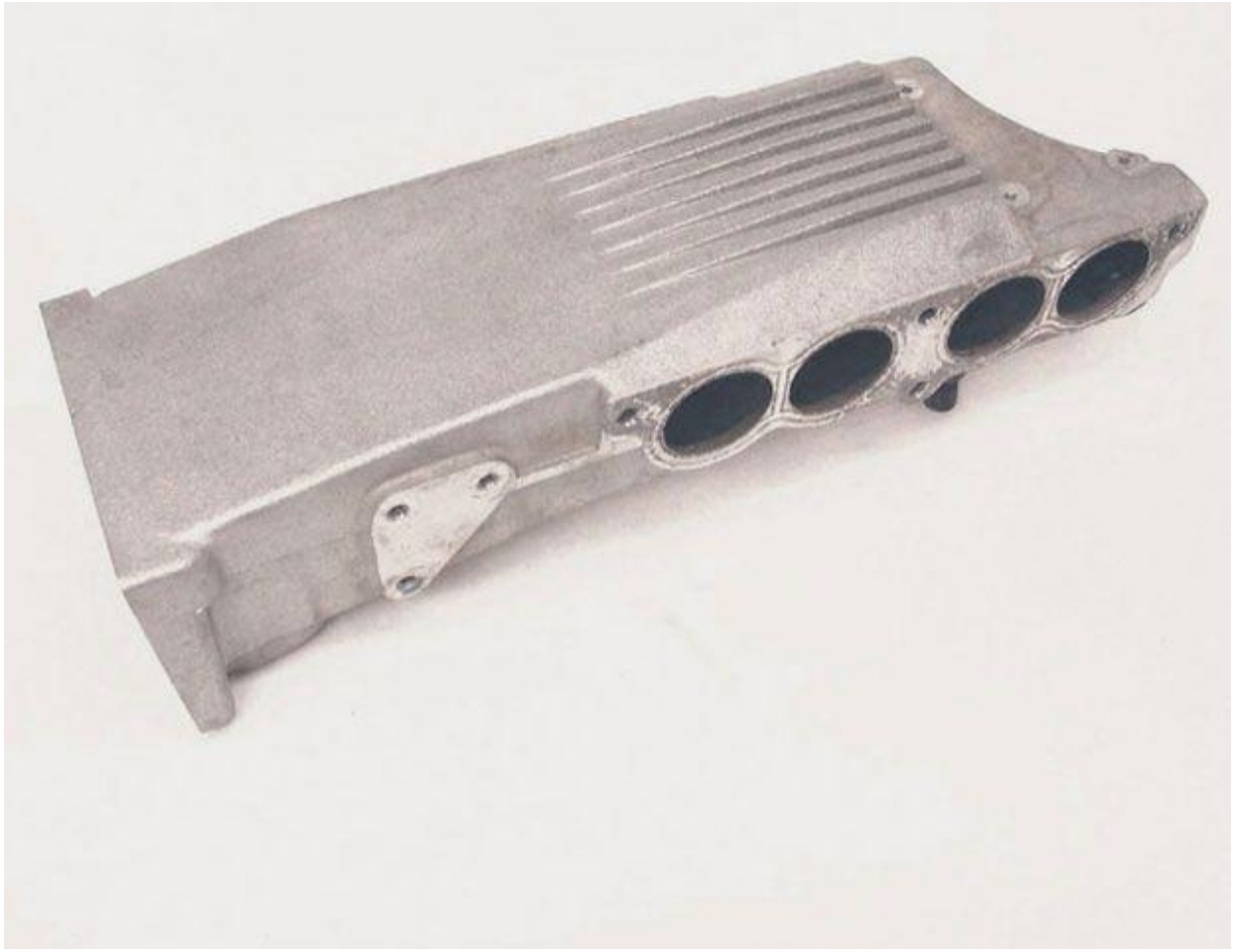
The key to going fast for less is doing the research and understanding what it takes to get your TPI combination right. With the proper aftermarket changes, your TPI-powered Chevy will be frying the tires and smoking the competition.



Between 1985 and 1992, GM produced several different versions of the TPI base manifold. All '87-'92 Camaro manifolds locate the EGR port in the center and feature a revised center bolt-hole boss.

The TPI runners are one of...

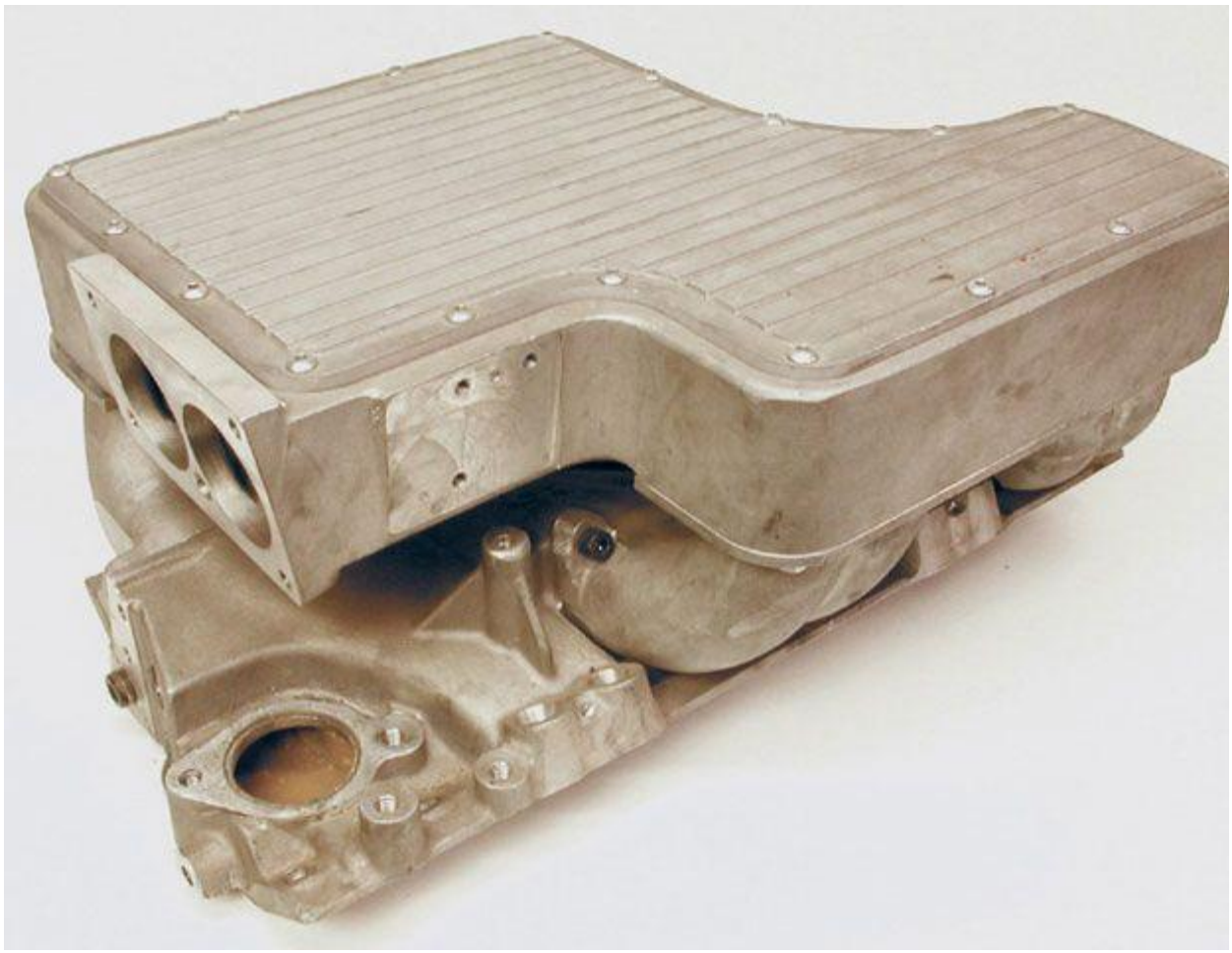
The TPI runners are one of the best places to begin looking for power. The small factory runner improves bottom-end torque while a shorter- and larger- diameter runner improves top-end horsepower. The key to the right TPI combination is obtaining the correct runners for your application.



The '89-'92 plenum has no...

The '89-'92 plenum has no triangular IAC port located between the throttle bores, which makes it easy to identify. A factory TPI plenum may not be a race piece, but with a little porting to match the larger runners, these plenums work well.

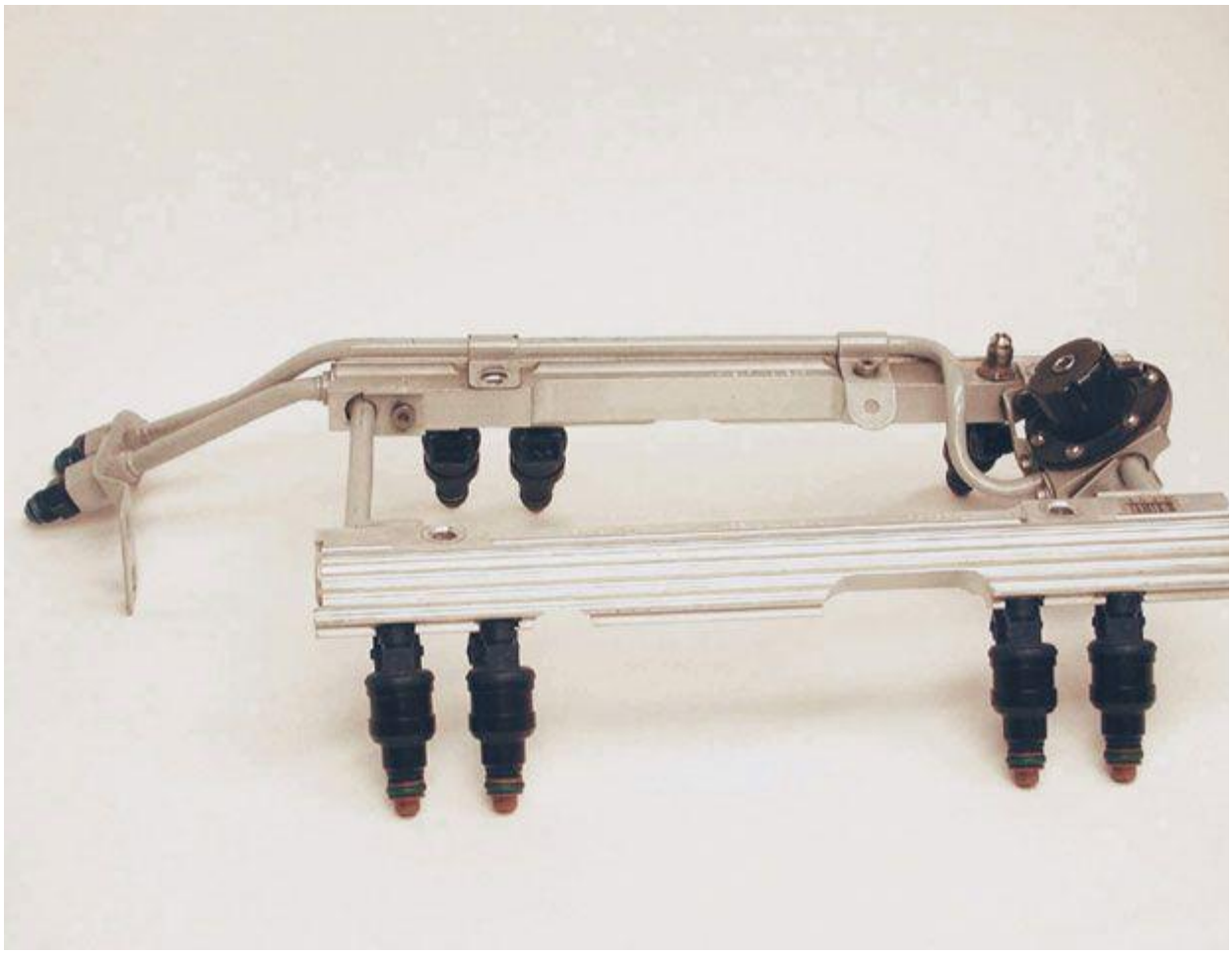
A throttle-body's main function is to control the amount of air the engine ingests. This is a 1,000-cfm ACCEL throttle-body.



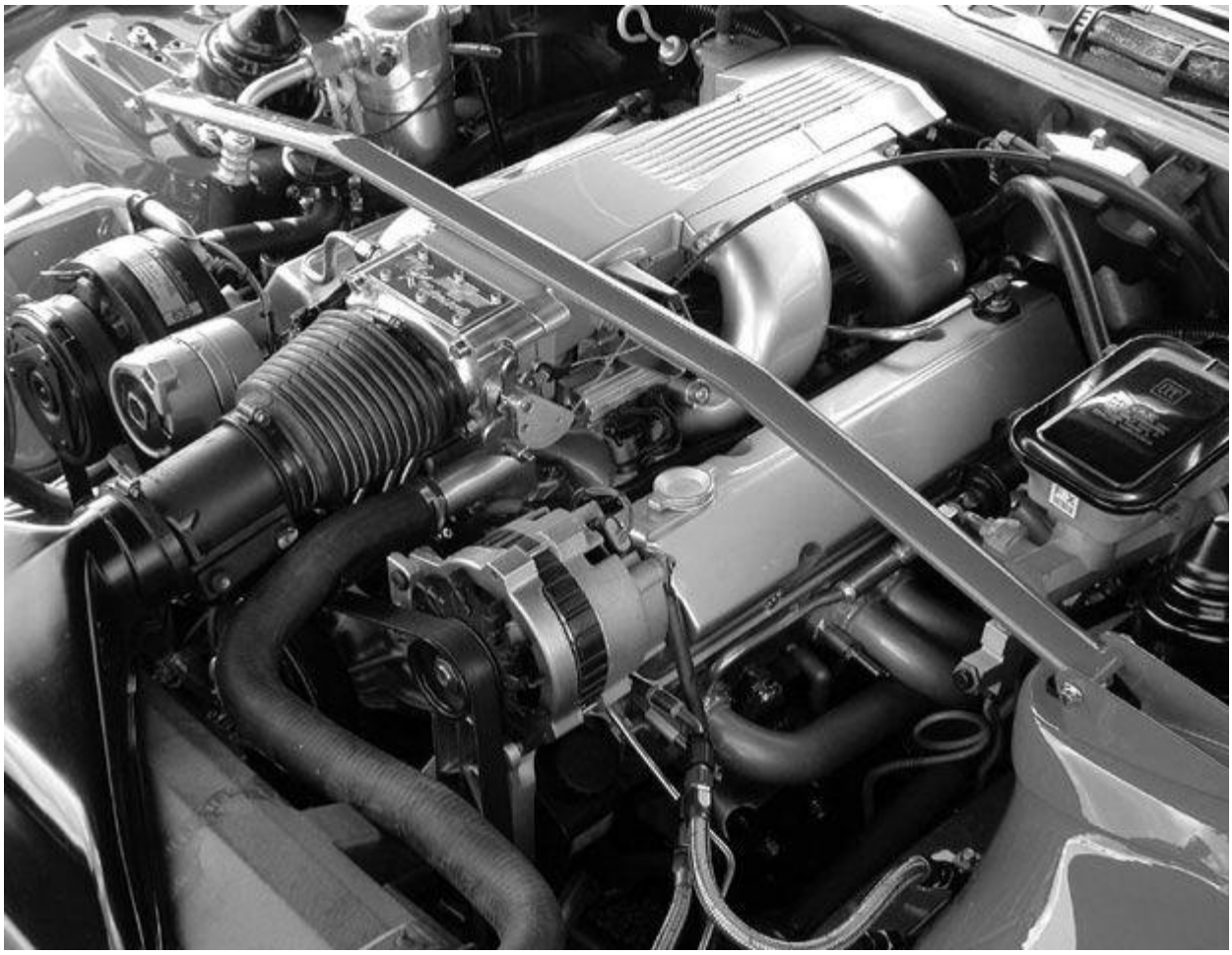
ACCEL's SuperRam intake manifold is an aftermarket performance version of GM's TPI design. The shortened runners provide outstanding top-end power while creating excellent torque.

Nitrous Oxide Systems is one of the few nitrous companies producing TPI nitrous-oxide systems. The plate design sandwiches the nitrous between the TPI plenum and the throttle-body. Be sure to use the correct nitrous plate to keep from blocking the IAC port.

As the power level of your engine increases, the capacity of your fuel injectors must increase as well. Though it's possible to manipulate a stock fuel injector's flow rate, it is hard on the internals and can cause them to fail.



A A commonly overlooked TPI item is the fuel rails. The factory fuel rails are more than adequate for over 500 hp and can be swapped from any '85-'92 TPI-equipped vehicle.



You can easily identify a factory TPI system by its long, arching runners. However, because of the many design changes made over the years, be sure to obtain all the pieces from the same donor car to ensure compatibility.

Before you begin your TPI upgrade/swap, it's best to gain as much knowledge as possible. Jaguars That Run, Tuned Port Induction Specialties (TPIS), Painless Wiring, and CarTech all offer literature with extensive TPI information.