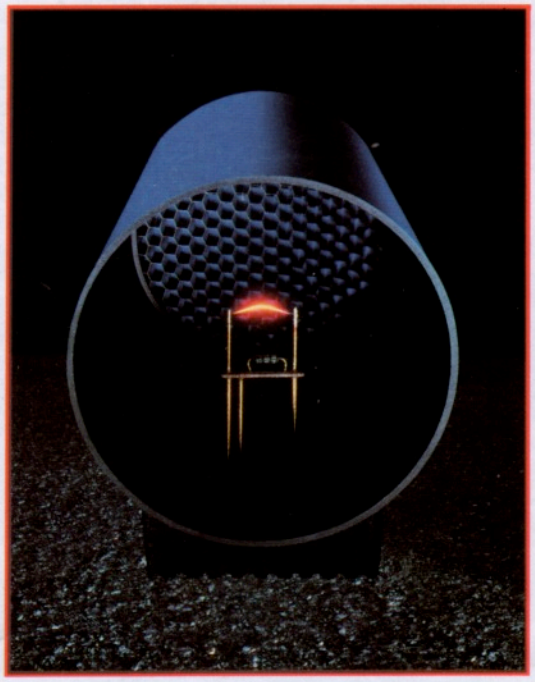
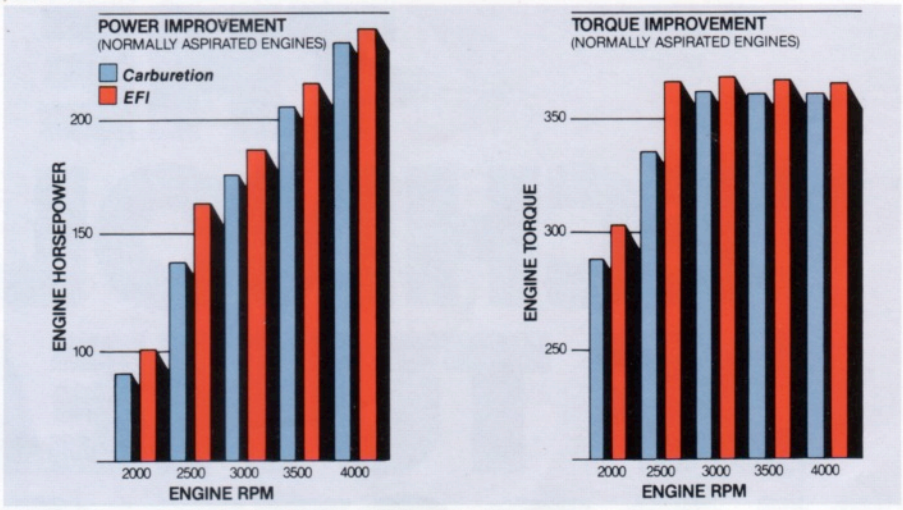
THE TECHNOLOGY OF TUNEABLE HORSEPOWER



FIRST™

FUEL INJECTION RESEARCH & SYSTEMS TECHNOLOGY

TAKE THE F.I.R.S.T.™ STEP TO HIGHER PERFORMANCE



Carburetion vs. EFI: "Bolt-on" horsepower and torque

Fuel Injection Research and Systems Technology by AirSensors™

Bolt-on horsepower — it's every auto enthusiast's dream. But ironically, just when automobiles are the most sophisticated in their history, it is now harder than ever before to custom-tune your engine for more horsepower and higher performance.

To meet the often conflicting demands of low emissions and high fuel efficiency, more and more of today's automobile engines are at the mercy of electronic "black boxes" and complex engine management computers. And while these factory-installed devices perform their jobs admirably well, they're pretty single-minded. In other words, they don't allow much tuning before they actually begin to *counteract* the performance improvements you thought you had made.

Until now, that is. With the introduction of the F.I.R.S.T.™ high performance fuel injection systems from AirSensors ™, you have the technology of *tuneable* horsepower at your fingertips.

Digital ECU can be dash-mounted for continuous monitoring/programming of engine performance

F.I.R.S.T. stands for Fuel Injection Research and Systems Technology and refers to a complete line-up of electronic fuel injection (EFI) systems designed to replace traditional carburetor systems or to upgrade the ever-increasing number of factory EFI installations. (In 1980, less than one percent of U.S.-built cars and trucks incorporated EFI; by 1982 that figure was up to 14 percent. Experts expect 85 percent of the vehicles built for the 1990 model year will use factory-equipped EFI systems.) Without a doubt, EFI is the wave of the future, and AirSensors is riding the crest of that wave with exclusive EFI technology that delivers more power, better mileage and fewer exhaust emissions than any normally-carbureted engine intake system.

The F.I.R.S.T. product line includes several different EFI systems, but at the heart of each one is our revolutionary, patented Air Mass Sensor that exploits the latest advances in "platinum hot wire" *electronic* anemometry for airflow readings that are vastly superior to the "speed-density" mechanical-type air meters used with every other fuel injection system.

Supplied with ultra-precise airflow readings from our Air Mass Sensor, combined with additional "feedback" from other engine-mounted sensors, the system's microprocessor-based Electronic Control Unit (ECU) determines *instantaneously* the optimum air/fuel mixture required for every firing of every cylinder at every revolution.

We're not just splitting hairs with microsecond overkill, either. The ECU in a F.I.R.S.T. fuel injection system supersedes the factory-installed "black box" and adapts the engine automatically and immediately to changing conditions of engine load, external temperature, humidity and altitude to guarantee maximum combustion efficiency and power. Furthermore, driveability is enhanced thanks to crisp throttle-response and smoother idling; gas mileage is improved; and exhaust emissions are lowered.

And that's where the *real* breakthrough — the F.I.R.S.T. breakthrough — occurs, because it doesn't matter whether AirSensors' ECU is responding to a cold engine or to your radical new camshaft in order to guarantee that your engine receives the precise fuel/air mixture required for good, clean power — good, clean, *tuneable* power. That means you can install any combination of intake pressurizer (either turbocharger or supercharger), modified camshaft, performance manifold and free-flowing exhaust system with no emissions price to pay and no engine-compatibility problems — despite some *very* remarkable power increases.

The revolutionary Air Mass Sensor — Heart of the AirSensor system

TUNED PORT INJECTION

By every stretch of the imagination, an EFI system from AirSensors — whether installed by itself or in combination with some other engine modification — delivers a quantum leap in performance. Now, the last word in high performance EFI technology is F.I.R.S.T. Available only from AirSensors.

Tuned Port Injection — The F.I.R.S.T. is the Ultimate

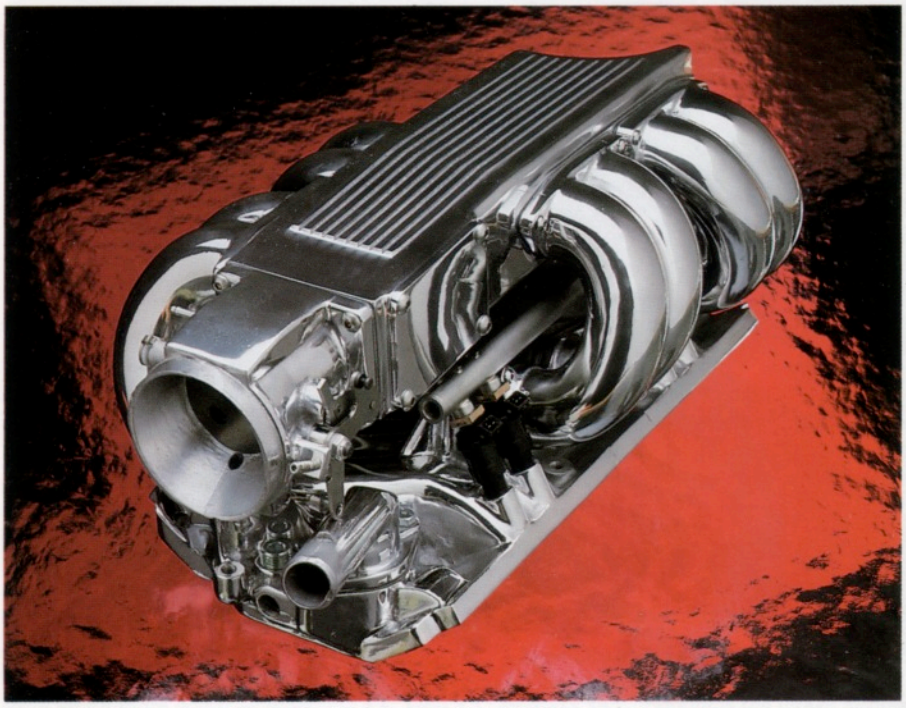
The flagship of the F.I.R.S.T. product line is its state-of-the-art Tuned Port Injection (TPI) system. Intended to replace carbureted intake systems as well as provide a "retro-fit" upgrade for engines with factory-equipped TPI, the F.I.R.S.T. TPI system can "breathe" efficiently up to 450 horsepower, making it ideal for engine builders as well.

The F.I.R.S.T. TPI system is AirSensors' most advanced fuel injection system. Because it *naturally* pressurizes the intake manifold and injects fuel almost directly into each cylinder, combustion is super-efficient. This means better mileage and emissions in addition to improved performance.

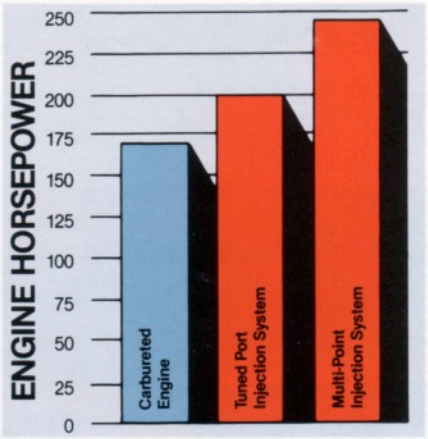
Best of all, the F.I.R.S.T. TPI system is perfectly compatible with additional engine modifications. Now for the first time, enthusiasts can easily modify late-model fuel-injected street machines without risking a "performance meltdown" caused by the confused reaction of factory-installed on-board computers.

In broad overview, the F.I.R.S.T. TPI system incorporates four distinct elements:

1. **Information-collecting sensors** (for monitoring engine operating conditions)
2. **Digital, microprocessor-based Electronic Control Unit** (that determines the optimum fuel/air ratio based on data from the sensors)
3. **Tuned port intake assembly with multi-point fuel injectors** (where the ECU-controlled fuel/air mixture is actually created and delivered to the engine)
4. **Pressurized fuel delivery system** (to ensure a consistent fuel supply to the injectors)



Tuned-Port Injection, by AirSensors



Pathway to power: Carbureted vs. TPI vs. Multi-Point horsepower performance on a Chevrolet 350 small block

The Components of the System

Sensors

- Air Mass Sensor, which incorporates cutting edge "platinum hot wire" technology to measure the actual *mass* of air entering the engine at every instant
- Engine Speed Sensor, which continuously monitors engine RPMs
- Engine Temperature Sensor, to monitor the changes in engine performance ranging from "cold start" to maximum operating temperature
- Spark plug Firing Sensor, for synchronizing fuel injection with each and every engine revolution

Digital ECU

- A sophisticated digital computer, incorporating a programmable microprocessor, that actually reads data provided by the sensors and continuously adjusts the air/fuel mixture delivered to the engine
- Provides optimum performance up to 450 horsepower
- Allows seven different function adjustments for precise fuel/air delivery to all engines under all operating conditions:
  1. Master, or "cruise," fuel/air mixture
  2. Idle mixture
  3. Cold start mixture
  4. Mixture under start of load
  5. Percentage mixture during load
  6. Mixture under start of acceleration
  7. Percentage mixture during acceleration
- Instantaneously resets to preset conditions at the push of a button

MULTI-POINT INJECTION

- Recalibrates easily for optimum performance with any additional engine modifications, such as turbo- or supercharging, modified camshaft, high performance manifold, improved exhaust system, etc.
- Features fuel pump shut-off switch to prevent fuel leakage and flooding in the event vehicle doesn't start
- Incorporates fail-safe "drive home" mode to allow vehicle operation even if system completely malfunctions

Tuned Port Intake Assembly with Multi-Point Fuel Injectors

- Actually bolts in place of factory-equipped TPI assembly or replaces carbureted intake system on earlier vehicle applications
- High-performance air door responds accurately to ECU commands for exact amount and timing of air intake
- Ram tubes precisely "tuned" for maximum throttle response over a 2500 to 4000 RPM range, with significantly improved low-end torque
- Computer-designed plenum and manifold ensure maximum ramming effect and minimum airflow restriction
- Injector-mounted fuel rails deliver precisely metered fuel to areas of high air velocity at the end of each cylinder's intake runner

Pressurized Fuel Delivery System

- Maintains constant 39 PSI for consistent fuel delivery to injectors
- Pressurized system eliminates vapor lock
- Fuel pressure regulator returns up to 90 percent of fuel to the tank for constant recirculation
- Features highest quality electric pump and fuel tank sending unit
- 2 in-line filters on either side of pump ensure maximum fuel purity for long injector life

The F.I.R.S.T. Tuned Port Injection system comes complete with wiring harness, connectors and step-by-step instructions. Little, if any, modification of stock parts is required.

When Power Comes F.I.R.S.T.

Traditionally, really tuneable racing performance has meant selecting the manifold-camshaft-exhaust combination that puts the power exactly where you want it, then bolting on a big enough carburetor to "feed" the system. The only problem, of course, has been that a carburetor that's just right for high revs is usually all wrong for low revs — and vice versa.

But now, for the F.I.R.S.T. time, there's a powerful alternative to the classic carburetor compromise. F.I.R.S.T. offers a Multi-Point injection system that delivers tuneable, flexible power for just about any serious high performance application under the sun.

The key to the system lies in its adaptability. The Multi-Point system shares three essential elements with *all* of the fuel injection systems from F.I.R.S.T.:

- F.I.R.S.T.'s exclusive Air Mass Sensor and additional engine monitors
- Programmable ECU
- Pressurized fuel delivery system

Multi-Point Fuel Injection, by AirSensors

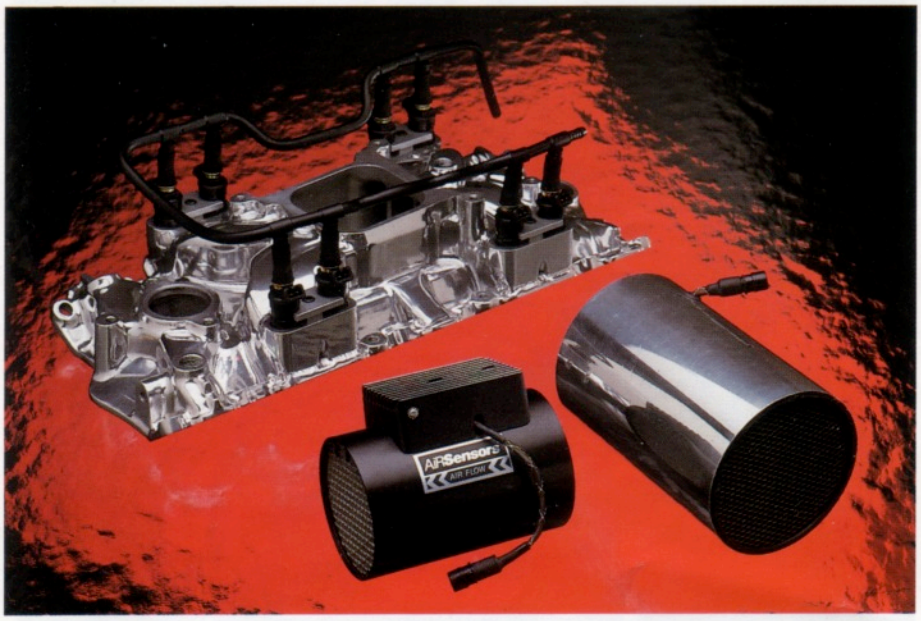
What makes the F.I.R.S.T. Multi-Point system unique, however, is the way the fuel/air mixture, that is determined by the ECU, is actually introduced into the engine. This is done by the combination of:

1. A four-barrel throttle body mounted to the manifold in place of a carburetor; and
2. One fuel injector per cylinder inserted directly into each of the manifold's intake runners through a specially drilled hole.

F.I.R.S.T. offers a high performance manifold to go with the system, and it incorporates a very special feature. The manifold, designed with excellent breathing characteristics for improved low- to mid-range torque and mid- to upper-range horsepower, is pre-drilled and otherwise modified to accept injector-mounted fuel rails; but it comes with these holes plugged. This means you can upgrade your engine in stages: First while retaining your carburetor, you can put together the proper manifold-camshaft-exhaust combination for the kind of performance you have in mind. Then, simply by unplugging the injector ports and removing the carburetor, you can install the remaining fuel injection components from F.I.R.S.T.:

Power parts: multi-point EFI components, including manifold, air mass sensor, injector-mounted fuel rail, digital ECU, pressurized fuel system

- Throttle-Body
- Injector-mounted fuel rails
- Air Mass Sensors and engine operation monitors
- Programmable digital ECU
- Pressurized fuel system



More air for more power — replacing a 4" with a 5" air mass sensor doubles the intake airflow

An additional advantage of this set-up is its compatibility with just about any other aluminum engine manifold. If your manifold is already part of a proven, high performance, *carbureted* system, you can improve overall performance with the Multi-Point injection system. All that's required is to replace the carburetor with F.I.R.S.T.'s throttle-body and to modify the aluminum manifold slightly to accept the system's injector-mounted fuel rails.

The beauty of the system is its startling capacity. On a properly equipped Chevy small block, F.I.R.S.T.'s Multi-Point set-up can turn out up to 750 horsepower — with a twin throttle-body set-up as much as 1,200 horsepower is possible. And because the fuel/air ratio is precisely and instantaneously metered according to engine speed and external conditions, flexibility over the entire operating range is remarkably enhanced for the sake of overall driveability. Puddling, the traditional bane of tunnel ram manifolds, is virtually eliminated as is the high-rev fuel starvation so characteristic of "street rat" torque manifolds. Now that's performance — performance *plus!* Only from F.I.R.S.T., the leader in fuel injection technology.

THROTTLE-BODY SINGLE-POINT INJECTION

The F.I.R.S.T.-Rate Carburetor Replacement

The F.I.R.S.T. Throttle-Body Single-Point injection system is intended as a direct, "bolt-on" replacement for a factory-equipped carburetor. Due to the precise metering of the fuel/air ratio for every combination of internal and external driving conditions, fuel injected engines run cleaner and more efficiently, produce more power and get better mileage.

The AirSensor difference: patented air mass sensor, digital ECU, pressurized fuel delivery system

But even beyond the remarkable advantages of fuel injection over carburetion, the Throttle-Body Single-Point fuel injection system from F.I.R.S.T. enjoys several unique attributes. Its revolutionary Air Mass Sensor is more accurate than any other anemometer — or air measurement device — available from any auto manufacturer or aftermarket source. This is because it uses a platinum "hot wire" whose electrical conductivity is actually altered by the mass of the air passing over it, and this produces the required air measurements much better and much faster than the mechanical "speed-density" meters used with other systems.

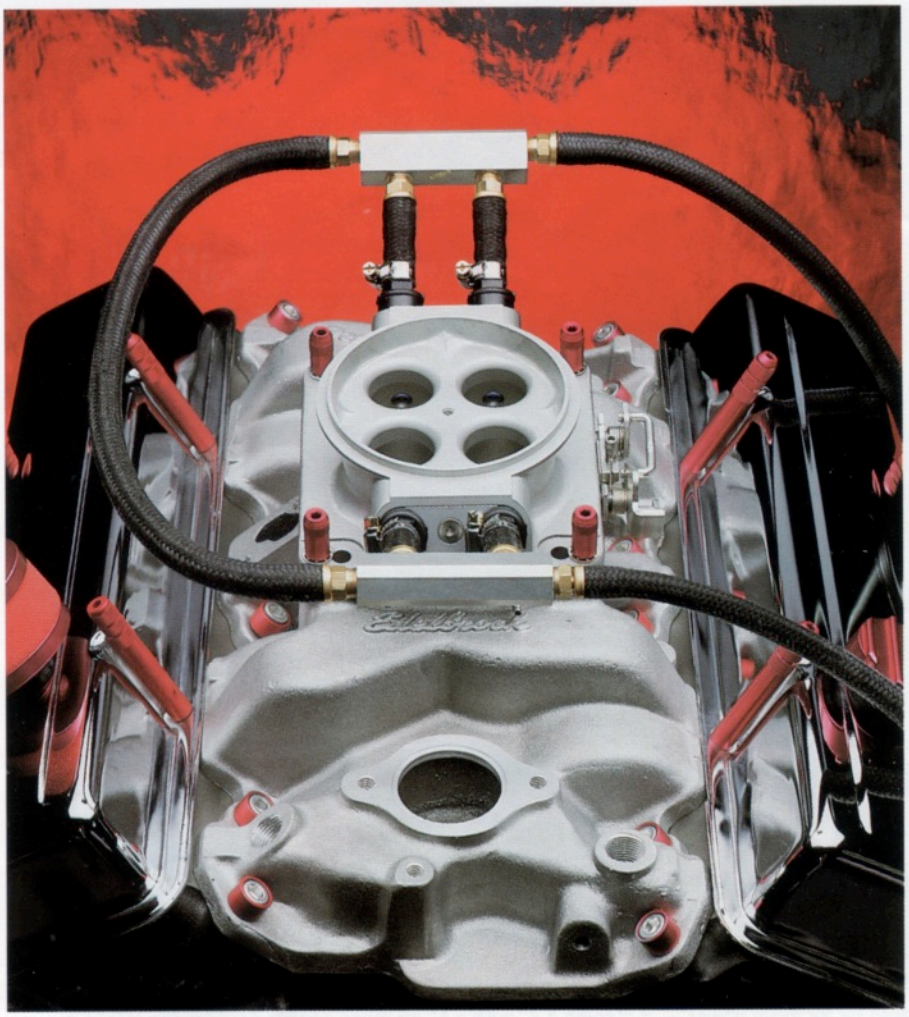
Thanks to F.I.R.S.T.'s digital ECU, however, an engine equipped with our Throttle-Body Single-Point system truly outclasses its carbureted counterpart. That's because microprocessor programmability opens the way for additional engine modifications — such as a pressurized intake, cam swaps, manifold changes, etc. — without sacrificing driveability, fuel economy or emissions certification. And the F.I.R.S.T. system is capable of sustaining up to 375 horsepower thanks to its aerodynamic capacity of 1000 cubic feet per minute.

The system components include:

- Exclusive Air Mass Sensor and other engine monitors
- Digital ECU
- Pressurized fuel delivery system
- Injector-mounted throttle-body

The throttle-body is almost identical to that included in our multi-point system, with the exception that four injectors are mounted directly within the high velocity passages of the throttle-barrels themselves. As for the system's sensors, ECU and fuel system, these are identical to those incorporated in F.I.R.S.T.'s remarkable TPI system.

In addition to the components listed above, the Throttle-Body Single-Point fuel injection system from F.I.R.S.T. includes a complete wiring harness, all necessary connectors and step-by-step installation instructions. Little or no modification of stock parts is required, although some vehicles may require slight change of the throttle linkage or minor relocation of plumbing. On certain older vehicles, a fuel return line must be installed to accommodate the pressurized fuel system.

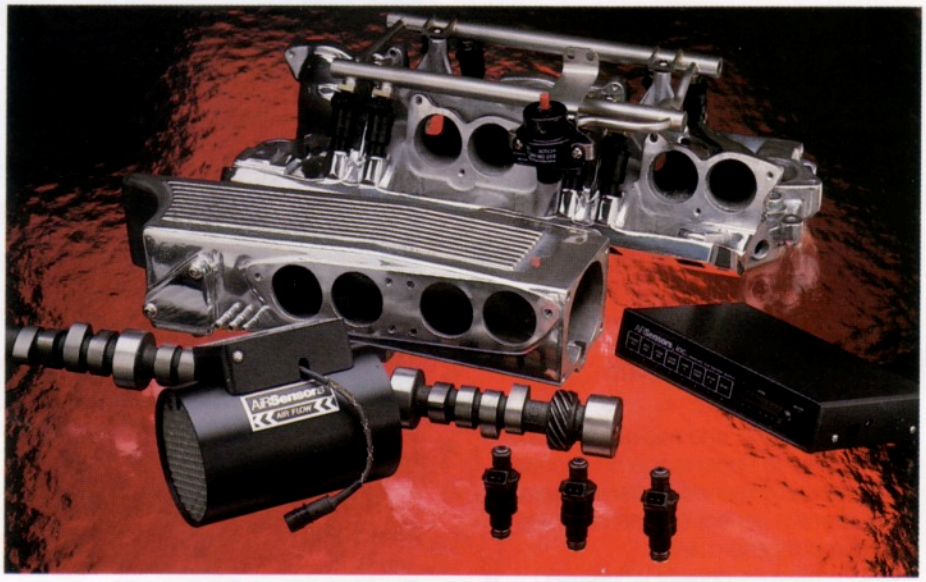


Throttle-Body Single-Point Fuel Injection, by AirSensors

TPI UPGRADE COMPONENTS

The F.I.R.S.T. to Improve On Factory Performance

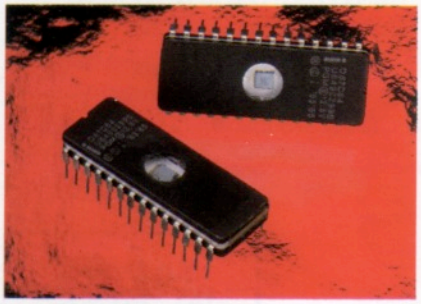
As described elsewhere in this brochure, F.I.R.S.T. manufactures a state-of-the-art TPI system that completely revolutionizes the already revolutionary factory TPI set-ups. But for enthusiasts interested in improving showroom stock performance without swapping out the whole system, F.I.R.S.T. also offers a number of upgrade components that allow *selective* improvements to your TPI performer.



Tuned-Port Injection Factory Upgrade Components manifold and plenum, fuel rails and injectors, air mass sensor, high performance camshaft, digital ECU

Replacement Computer Chip (EPROM) for Factory-Installed On-Board Computer —

- A simple, inexpensive performance booster
- Optimizes power output by modifying engine's factory settings for spark advance and fuel/air ratio
- Easy to install; just remove the factory EPROM and plug in the replacement
- Compatible with entire factory system; no other modifications necessary



Replacement EPROM computer chips for plug-in horsepower

Digital Electronic Control Unit (ECU)

- Replaces factory-installed engine management computer using non-programmable read only memory (ROM) with a digital, *programmable* microprocessor
- Dash mounted to provide instantaneous driver control of seven engine operation parameters; includes pushbutton reset
- Allows full-range of additional engine modifications without affecting emissions certification or causing incompatibility with factory-installed equipment
- Safety features include fail-safe "drive home" mode and automatic fuel pump shut-off if engine does not start

Air Mass Sensor

- Features the most accurate anemometer technology in the world
- Allows precise mixing of air and fuel for engine performance that is extremely sensitive to changing internal and external driving conditions
- Far superior to the mechanical "speed-density" anemometers used by every other fuel injection system manufacturer
- The ideal performance upgrade to accompany installation of a F.I.R.S.T. Digital ECU

High Performance Air Door

- Improves regulation and control of air intake with factory TPI
- A direct, "bolt-on" replacement
- Compatible with all other factory TPI components
- Increases airflow capacity to meet the demands of further changes in engine's volumetric performance (e.g. manifold, camshaft and/or exhaust changes)

Tuned Ram Tubes

- Computer-designed to provide maximum cylinder charging over a broad mid-range powerband (2400-4000 RPM)
- Actually pressurizes intake with a harmonic pulse that is carefully "tuned" to each cylinder's firing frequency
- Compatible with factory plenum and manifold
- Provides the enhanced intake capacity necessary for sustaining other engine performance improvements

High Performance Fuel Rails and Injectors

- Replaces factory components with high performance, high-capacity fuel injector assembly
- Designed to withstand the demands of aggressive driving conditions
- Increases fuel delivery capacity to meet the needs of additional modifications to engine's volumetric performance (e.g., manifold, camshaft and/or exhaust changes)

High Performance TPI Plenum and Manifold

- Boosts power output by 5 to 10 percent simply by improving engine's volumetric efficiency
- Especially compatible with F.I.R.S.T.

Digital ECU for both improved performance and safe emissions output
- The ideal accompaniment to a high performance camshaft and/or free-flowing exhaust system

High Performance Cam and Lifter Kit

- Improved low- and mid-range torque and mid- to upper-range horsepower
- Computer-matched hydraulic lifters guarantee perfect compatibility and optimum performance
- No emissions penalty when used with F.I.R.S.T.'s Digital ECU
- Includes Assembly Lube and complete instructions for easy installation
- The ideal accompaniment to a high performance TPI plenum-manifold and/or free-flowing exhaust system

Essential extras: portable air flow meter with digital readout; high pressure fuel gauge; gas additive fuel injector cleaner

Fuel Injection Accessories From F.I.R.S.T.

Fuel Injection System Cleaner

- Prolongs injector life when added to a tank of gas every 5,000 miles
- Scours injector nozzles to prevent build-up of debilitating obstructions
- Specially formulated by F.I.R.S.T. for use with all of our fuel injection systems — will not inhibit performance or combustion

Portable Airflow Meter

- Incorporates the F.I.R.S.T. Air Mass Sensor for the most accurate airflow readings available
- Completely portable — ideal for field testing and for setting performance benchmarks for consistent engine tuning anywhere
- Essential for diagnosing fuel injection system malfunctions
- Parallel circuitry allows comparative testing of factory-installed airflow meters
- Comes complete with inlet and exit adapters, control and readout unit, power cable and 12-volt adapter, and technical manual with engine performance specifications

High Performance Fuel Gauge

- Provides accurate readings for monitoring fuel system performance
- Specially designed for compatibility with F.I.R.S.T. high-pressure fuel system
- Essential for diagnosing system malfunctions due to pressure loss or blocked injectors

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