

The Aftermarket EFI buyer's guide, courtesy of www.efisupply.com

We often receive inquiries from customers asking which aftermarket electronic fuel injection system is the best one. Rather than steering our customers toward a particular system, we prefer to enable them to make an informed decision when selecting an aftermarket EFI system. While efisupply.com currently offers systems from ACCEL DFI, BigStuff3 and FAST, each offer features that make them well suited for a particular application. We sell many of each, finding that our customers are equally satisfied. Their satisfaction is the product of careful consideration of their needs before the purchase, matching the system to the functionality required by their application. It isn't a matter of whether a particular system is better for street or racing, but rather pairing carefully matched components with a proper calibration. We have created a spreadsheet, which provides a summary view of the features of each of the systems we sell. A copy is available for download at: www.efisupply.com/feature_listing.pdf. In addition to our brief feature listing spreadsheet, we have also developed this 11 page aftermarket EFI buyer's guide to better equip you to determine which system will best serve you and your application.

Many aftermarket EFI buyers initially find it difficult to determine what parts they need to perform a complete aftermarket EFI installation on their vehicle. Our aftermarket EFI systems are available as basic kits including only an ECU and wiring harnesses or as complete systems. If you're looking for a comprehensive, no-hassle solution, you will likely find the FAST XFI "Ready To Run" kits or the ACCEL DFI "Pro Ram" and "Engine Builder" systems are your best bet. These systems include an aftermarket EFI ECU, interface cable and software, wiring harnesses, sensors, intake manifold/fuel rail assembly, throttle body, fuel injectors, fuel pump, distributor ("Ready to Run" and "Engine builder" kits) and Ignition amplifier (included with "Engine Builder" kits). These systems also offer added value as our suppliers to offer a package discount, which we're able to pass along to our customers. In addition to the standard packages posted on our site, we're also sometimes able to substitute or upgrade package components to better meet the needs of a specific application. Common system customizations include fuel pump and/or fuel injector upgrades and MAP sensor upgrades for boosted applications.

While the complete systems referenced above are a common choice for those converting an older engine, many customers have engines that come originally equipped with electronic fuel injection. These vehicles often need only the electronics (ECU), interface harnesses and possibly a basic sensor kit (MAP, IAT, ECT). These customers may or may not opt to upgrade their manifold, throttle body or fuel injectors (all available from efisupply.com). These applications may employ any of our popular systems (ACCEL DFI, BigStuff3 or FAST XFI) in any of a number of configurations.

It can at times be confusing to figure out which parts you may need to perform a complete installation of an aftermarket EFI system. Each system is configured a bit differently. By referring to the following pages one will gain a better idea of what parts are required for your installation and which system will best enable you to meet your engine management objectives.

ACCEL Thruster EFI systems:

These systems are available in "Engine Builder" and "Pro Ram" kit form or as separate components. The 77062 module is included with Wideband O2 systems and may be used to convert

basic systems from a conventional narrow-band O2 to a Wide-band O2 sensor. The 77062 adds PC free data logging of over 20 minutes of data which may later be downloaded for review as well as provisions for a driveshaft speed sensor and auxiliary sensor channel.



Figure 1 - ACCEL Thruster EFI "Engine builder" system.

If you plan to build a system from separate components, we recommend the following:

- ECU/Harness kit (available with or without Wideband O2)
- Ignition adapter harness
- Sensor kit

Other popular components include:

- DFI dual sync distributor
- Fan/fuel pump control harnesses
- TCC lockup control harness
- Knock sensor
- ACCEL DFI digital ignition system
- Fuel Injectors
- Fuel pump
- Throttle body

For more information on the "Engine Builder" and "Pro Ram" kits, please visit our website at the following links:

www.efisupply.com/dfi.htm

www.efisupply.com/images/dfi/dfigen7proram.pdf

www.efisupply.com/accel_dfi_engine_builder.htm

ACCEL DFI Gen 7 systems:

These systems have been the "bread and butter" of the ACCEL DFI product offering for many years, and with the exception of a pair of application have recently evolved into the Thruster EFI system.



Figure 2 - ACCEL DFI Gen 7 77030E Aftermarket EFI retrofit for late model Ford Modular engines

Application facts:

- Aside from the 77030E and 77050 systems developed specifically for late model distributorless applications, the Gen 7 systems are now being sold as the Thruster EFI systems with the Stage II “Pro” ECU. Refer to the Thruster EFI component recommendations above for all applications other than the 77030E and 77050 late model distributorless systems.
- The 77030E is only compatible with early (96-98) coil pack applications and does not support the later model coil-on-plug engines.
- The 77062 module is required to upgrade either of the above systems from a conventional narrow-band O2 to a Wide-band O2 sensor. The 77062 also adds PC free data logging of over 20 minutes of data which may later be downloaded for review as well as provisions for a driveshaft speed sensor and auxiliary sensor channel.

BIG STUFF 3 systems:

These systems are sold only in the form of ECU/harness kits, but are available for a wide variety of applications. The base systems include an ECU, wiring harnesses, software, Wideband O2 sensor and communication cable. Many optional components are available, see our website at: www.efisupply.com/bs3.htm for a list of available features. We've also recently developed complete turnkey systems for those customers wanting a complete system solution with a Bigstuff3 ECU.



Figure 3 - Big Stuff 3 Gen 3 PRO SEFI ECU

Application facts:

- Systems for Ford “Mod Motor” applications do include LS-1 coils, however coil mounting brackets must be fabricated or purchased separately.
- Systems for GM LS-1 based engines do not include ignition coils.
- Systems for GM LS-1 engines may be adapted to other applications to provide coil on plug ignition. Doing so requires the use of a Bigstuff3 universal 24T input wheel/pickup assembly and a cam sensor (both GM and Ford offer OEM cam sync devices for use on V-8 engines originally equipped with a distributor).

Popular options include:

- Dual Wideband O2 control
- Traction control
- Integral (PC free) internal/external channel data logging
- 24 injector control
- RacePak digital dash

- XIM Ignition module
- TCU transmission controller and adapter harness
- Fuel Injectors
- Fuel pump
- Throttle body

Popular options include:

- Traction control
- PC free internal channel data logging
- PC free external channel data logging (Accelerometer, EGT, fuel pressure, oil pressure)
- Digital touch screen LCD dash

Application facts:

- With the addition of the appropriate XIM Ignition module kit, the XFI may be adapted to Ford Modular, GM LS-1, New HEMI and other coil on plug ignition applications.
- With the addition of the TCU (transmission control unit) the XFI may be utilized in conjunction with electronically controlled GM, Ford and Chrysler late model transmissions.
- FAST has recently added a self tuning function to the XFI to simplify the calibration/development of the VE table

For more information on the “Ready to Run” kits, please visit our website at:

www.efisupply.com/fast_xfi_ready_to_run.htm

For details regarding the new and improved functionality of the FAST XFI 2.0 please visit our website at: <http://www.efisupply.com/xfi2pt0.pdf>

For information on the full FAST XFI product offering, please refer to the following links:

www.efisupply.com/xfi.htm

www.efisupply.com/FAST/FASTcompleteCatalog12606.pdf

FAST EZ EFI systems:

These systems are sold in complete TBI (Throttle Body Injection) systems with or without fuel pump and filter and also as multiport retrofit kits and are adaptable to a wide variety of applications. The TBI system supports up to 600hp and includes a TBI unit with integrated fuel injectors and sensors, self tuning ECU, software, wideband O2 sensor and handheld programmer.

Application facts:

- These systems are self tuning and require no previous EFI tuning experience
- TBI systems are designed for easy carb to efi conversions
- These systems are only for non power-adder applications and do not provide ignition control



Figure 6 - FAST EZ EFI TBI system

For more information on the available EZ EFI kits, please visit our website at:
http://www.efisupply.com/fast_ez_efi.htm

For a pdf brochure on the EZ EFI TBI kits, please visit our website at:
<http://www.efisupply.com/FAST/ezefi.pdf>

In addition to selecting the appropriate electronics and associated hardware for your electronic fuel injection application, there are also other components which one must select in order to allow them to get the most from their chosen system. We have outlined the most popular components below.

Fuel injectors

Fuel injectors are a simple, but often misunderstood component of an EFI system. Reduced to its simplest form, a fuel injector is little more than a solenoid valve with an orifice sized to flow fuel at a given rate. The injectors most commonly used with aftermarket EFI systems are available in both high and low impedance form. High impedance injectors are comparable to units used in OEM applications while low impedance “peak and hold” type injectors require greater current to initiate flow. Low impedance injectors are typically required to achieve higher flow ratings than those provided by high impedance units. Low impedance injectors are not compatible with factory type. This being the case, high horsepower applications typically require the use of aftermarket ECU’s. When selecting fuel injectors the bottom line is properly matching the injectors to your anticipated power level. We have made this process an easy one, to determine which injectors you need for your application, simply download our injector sizing utility (requires Microsoft Excel) and enter your parameters. This spreadsheet may be downloaded from

our website [by clicking here](#). To view the injectors currently available from efisupply.com, please refer to the following link: www.efisupply.com/fuel_injectors.htm

Throttle Bodies

Selection is actually one of the simplest aspects of putting together an EFI system. While carburetors are better undersized than oversized, the same cannot be said for EFI throttle bodies. Using an undersized throttle body will unnecessarily restrict airflow. Care should be taken to going too large however as using too large a throttle body will result in a lack of throttle "resolution" or sensitivity and may negatively impact drivability. We have found that 1200 cfm 4150 flange units are well suited for naturally aspirated EFI applications from 400-600hp and the 1550 units to work well from 500-800hp. Applications making more naturally aspirated power are likely equipped with a 4500 series throttle flange and should employ a 2000 cfm unit. If you're running a wide-open application which requires little throttle sensitivity, you may opt to go with the big 2600cfm unit.



Figure 7 - 4-barrel throttle body for EFI applications

OEM fuel injected and forced induction applications are often equipped with monoblade (single barrel) style throttle bodies, as they are readily coupled with charge air tubing. Interfacing a monoblade style throttle body to a 4-barrel intake manifold is simple and requires the use of one of the aluminum elbows offered on our site. Elbows are available for both 4150 and 4500 flange manifolds. In addition to an adapter elbow, applications utilizing a monoblade style throttle body will require a GM idle air control motor adapter housing if the use of an IAC is desired (this provides superior idle control, but is often omitted on racing applications and those seeing limited amounts of street driving).

For more information on all of the aforementioned components, please refer to the following links:

www.efisupply.com/thrbod.htm

www.efisupply.com/images/wilson/wilson_catalog.pdf

Fuel pump/filter/regulator



Figure 8 - Magnafuel EFI pumps and filters

As with fuel injectors, a fuel pump must be appropriately size for a given power level. Fortunately, this is an easy task as our chosen fuel system providers have thoroughly outlined the capabilities of their products in their catalogs. Simply click the product descriptions found at: <http://www.efisupply.com/magnafuel.htm> and <http://www.efisupply.com/aeromotive.htm> to open catalog excerpts providing detailed information on each of the listed products.

Ignition components and ignition systems



Figure 9 - ACCEL DFI 75610 digital ignition system

Aside from the need to generate a cam sync signal for systems to be operated in sequential injection mode, ignition requirements for a fuel-injected engine are not unlike those of a carbureted engine. The simplest means of generating crank and cam signals for distributor-equipped engines is through the use of dual-sync distributors. These distributors are readily interfaced to aftermarket ECU's and are available for a wide variety of applications. While sequential fuel injection may provide the best performance, many users find that aftermarket EFI systems work sufficiently well in batch-fire (also known as bank-to-bank) mode. Operating an EFI system in batch fire mode also allows aftermarket EFI users to utilize less costly OEM (HEI and TFI) distributors. The third popular option for generating ignition pulses in distributor-equipped application is generally reserved for those to be operated in excess of 6500 RPM. This approach is to utilize a crank trigger to generate the crank signal and a modified distributor having which generates only one pulse per revolution (usually via a reluctor having 7 of 8 tabs removed) to generate the crank signal. Use of a crank trigger provides maximum signal integrity in excess of 9000rpm.

The next consideration regarding ignition for an electronically fuel injected applications is that of the choice of an ignition amplifier box. With the exception of systems developed to interface OEM distributorless ignition systems, aftermarket EFI systems do require the use of an ignition amplifier box such as the ACCEL 300+ and ACCEL DFI Digital 6 and Mallory HyFire series. While there are a number of user programmable ignition systems on the market, this functionality is redundant and often goes unused in an ignition system used with an aftermarket EFI system as the systems offered by [efisupply.com](http://www.efisupply.com) provide users with that same functionality.

Taking things a step further many users are now opting to equip their distributor equipped engines with distributorless, coil per plug ignition systems. This is commonly done either by fitting an engine with a cam sync and LS-1 type crank sensors and utilizing an LS-1 EFI system to drive LS1 style coils, or through the use of the ACCEL DFI 75610 digital ignition control module which is capable of driving 8 conventional coils.

To learn more about the various components listed above, please refer to our website at: <http://www.efisupply.com/ignition.htm>

Wideband O2 sensors

As any experienced tuner can tell you, a wideband O2 sensor is an extremely valuable tool when it comes to optimizing a fuel calibration. It is our position that the only engine which may be safely operated under heavy load, without a wideband O2 is one whose calibration has first been developed with the use of a wideband O2 sensor (as is the case with OEM and some crate motor applications, or an engine tuned on a dynamometer equipped with a wideband O2). Using an aftermarket fuel injection system equipped with a wideband O2 sensor, even novice tuners are quickly able to get VE (Volumetric Efficiency) and transient fueling fine tuned promptly, provided they have been equipped with a proper baseline calibration file to start with. The use of a wideband O2 sensor also provides a broad margin of safety as an engine may be operated in closed loop mode under full load. Unlike mass air based systems which add fuel based upon the amount of air presumed to be entering an engine and a fuel system free from any changes in flow, speed density systems equipped with wideband O2 sensors based meter fuel based on the amount of air actually entering the engine and accounting for any variance in the performance of the fuel system (fuel pump flow variance, pressure variance, injector flow variance, filter restrictions, etc.).

Software:

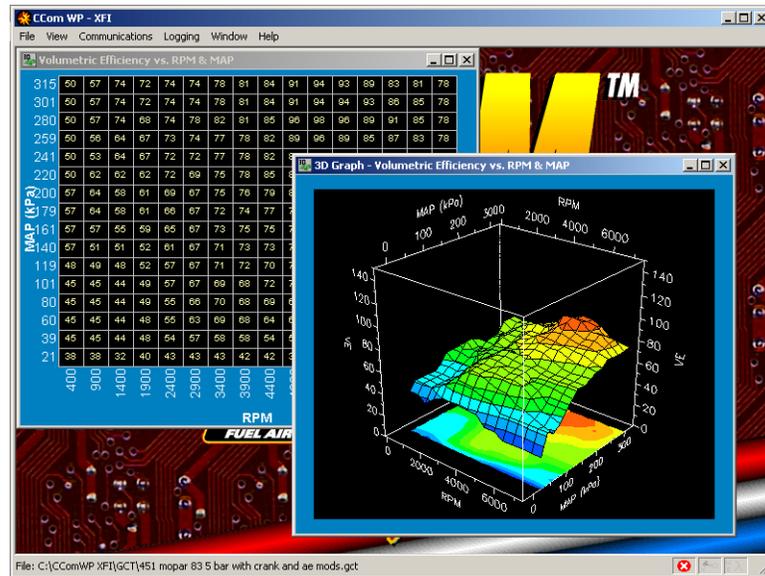


Figure 10 - Aftermarket EFI software interface

While selecting the right hardware is critical, the software interface is also something a prospective aftermarket EFI user should spend some time studying. We have a page posted on our site which provides links to the software download site where you may download and “test drive” the software for each of the aftermarket EFI systems we offer. This page is www.efisupply.com/software.htm.

This concludes our brief tour of the efisupply.com aftermarket EFI product offering. This document has been developed in response to your questions. As our schedule permits, we plan to develop more documents to assist you in unraveling the mystery of aftermarket EFI. Please feel free to distribute this document to any others whom you feel may benefit from its contents. If you have any additional questions or any feedback regarding this document, we encourage you to contact us at sales@efisupply.com.

Thanks for taking the time to read the efisupply.com Aftermarket EFI buyer’s guide, we look forward to assisting you with your future aftermarket EFI needs!

Aftermarket efi system feature guide - courtesy of efishupply.com

	FAST EZ EFI	FAST EZ EFI 2.0	FAST XFI 2.0	ACCEL Thruster EFI	ACCEL DFI Gen VII	BigStuff3	Holley Dominator EFI
4,6 and 8 cylinder compatible	yes	yes	yes	yes	yes	yes	yes
LS-1 system available	no	requires EZ-LS	requires XIM	no	optional	optional	optional
Ford 4.6/5.4 Modular system available	no	no	requires XIM	no	optional	optional	optional
New HEMI system available	no	no	requires XIM	no	no	no	no
single Wideband O2	standard	standard	standard	optional	optional	standard	standard
dual Wideband O2	no	no	no	optional	optional	optional	standard
closed loop control at WOT	yes	yes	yes	yes	yes	yes	yes
maximum number of injectors	8	8	16	16	16	24	24
ignition timing control	no	yes	yes	yes	yes	yes	yes
launch/2-step RPM limiter	no	no	yes	yes	yes	yes	yes
fuel pump control	yes	yes	yes	yes	yes	yes	yes
sequential injector control	no	no	requires cam sync	requires cam sync	requires cam sync	requires cam sync	requires cam sync
fueling algorithm/strategy	speed density	speed density	speed density	speed density	speed density	speed density	speed density
individual cylinder tuning	no	no	yes	yes	yes	yes	yes
fan control	yes	yes	yes	yes	yes	yes	yes
torque converter clutch control	no	no	yes	yes	yes	yes	yes
super/turbocharger compatible	no	no	yes	yes	yes	yes	yes
boost control	no	no	yes	no	yes	yes	yes
MAP sensor compatibility	1 BAR	1 BAR	1,2,3,5 BAR	1,2,3 BAR	1,2,3,4 BAR	1,2,3,4,5 BAR	1,2,3,5 BAR
Stages of N ₂ O/power adder control	none	1	4	1	3	3	4
dual sync distributor available	no	yes	yes	yes	yes	yes ²	no
maximum RPM limiter	no	yes	yes	yes	yes	yes	yes
GM Electronic trans control	no	no	optional	no	no	optional	optional
turbo anti-lag	no	no	yes ⁴	no	yes	no	yes
integral data logging	no	no	optional	optional	optional	optional	yes
driveshaft RPM input	no	no	optional	optional	optional	optional	no
traction control	no	no	optional	no	no	optional	no
LCD dashboard	no	yes	optional	no	no	optional	optional
EGT support	no	no	yes	no	no	no	no
accelerometer support	no	no	yes	no	no	no	no
fuel pressure input	no	yes	optional	no	no	optional	optional
knock sensor	no	no	optional	optional	optional	no	optional
"turnkey" system available	yes	yes	yes	yes	yes	yes	no
secondary injector control	no	no	optional	no	optional	optional	optional
auxiliary launch mode	no	no	yes ⁴	no	yes	yes ⁴	yes
programmable auxiliary output	no	no	yes	yes	yes	yes	yes
custom baseline calibration included	not req'd	not req'd	yes ³	yes ³	yes ³	yes ³	yes ³

footnotes:

1 fuel pressure input requires use of auxiliary 0-5V input channel on logger module.

2 System is compatible with MSD all in one dual sync distributor.

3 All systems purchased from efishupply.com include a custom baseline calibration developed for your application.

4 Auxiliary launch feature is configurable through Power adder control functions, antilag may be actuated but requires additional components.

for more information, contact our sales staff at sales@efishupply.com

8/22/2013