

Any engine with a 12volt point ignition can be converted to electronic ignition using a Ford gray remote-mount TFI module.

-It is both cheap and easy.

Point ignition is simple. When the points open the current is interrupted on the primary side of the coil. The magnetic field collapses which induces a high voltage in both the primary and secondary coil windings. The high voltage in the secondary produces a spark at the plug gap. The coil current is switched off and on by the points opening and closing. Switching a coil on and off is where the heat is generated and that is what causes the points to burn out. If a capacitor (condenser) is not wired in parallel to the points to quench the high voltage arc from the primary they would burn out quickly.

In a regular point ignition the points are a current switching device. The idea here is to change the points from a high current switching device to a low voltage and current triggering device and use the TFI module to do the heavy current switching. Using the points for triggering only will prevent wear on the point electrical contact. The rubbing block in contact with the cam will still wear slowly over time altering timing. Proper lubrication will help slow the wear.

Of all the digital ignition modules used in automotive applications the Ford TFI is the only common module that fires on the negative to positive transition of the trigger waveform. Since point ignition systems 'fire' at the same time they can be a good triggering device for the TFI ignition module. Just visit the local auto salvage yard and get several gray REMOTE mount Ford TFI modules along with the heat sink, and plug-in. Cut off as much of the harness as possible with the plug to the module. It is important to get a remote-mount TFI module and heat sink pair like the one pictured. The earlier TFI model mounted directly to the distributor was subject to damage by engine heat. Though it will work it is more difficult to mount requiring fabrication of a heat sink, and may be damaged.

To connect a Ford gray remote-mount TFI unit, looking directly at the module as shown. Pin #1 is connected to ground. Pin #2 connects to the negative side of the coil. Pins #3&6 are tied together and hooked to the positive side of the coil. That should be keyed ignition power. Pin #4 is grounded. Pin #5 is connected to the points. Disconnect or remove the condenser from the distributor. Insulate and tie off the lead as required. You MUST make sure there is no condenser hooked to the points. The points need only to close and open. The gap determines engine timing. It is a good opportunity to replace and align the points and set the gap. Make sure the 12V keyed electrical power does not

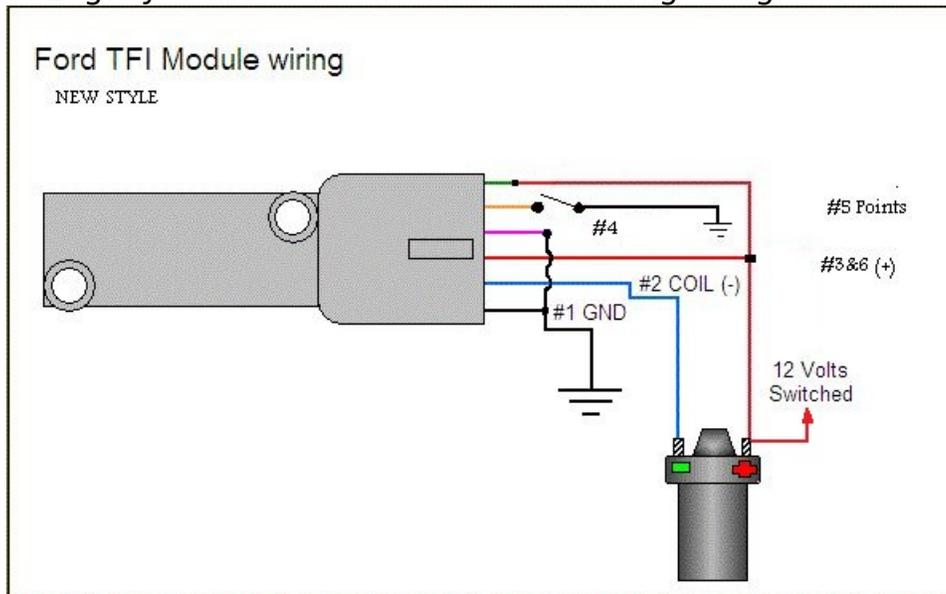
run through a ballast resistor or wire. Bypass any resistance unit to provide full 12V key ON power to the coil and module.

If you set up a battery on a bench and hook up all the wires as shown you can check the spark by toggling the point lead (#5) to ground. You will see a nice hot spark out of the secondary. The circuit is quite simple and works well on older motorcycles and engines with points. Single and twins will work fine on one module, but fours need two. Rule of thumb is one set of points one module, two points two modules. There are exceptions of course. Older dual-point performance distributors will only require one set of points for triggering the single module.

Module wires as they are called originally, from the bottom:

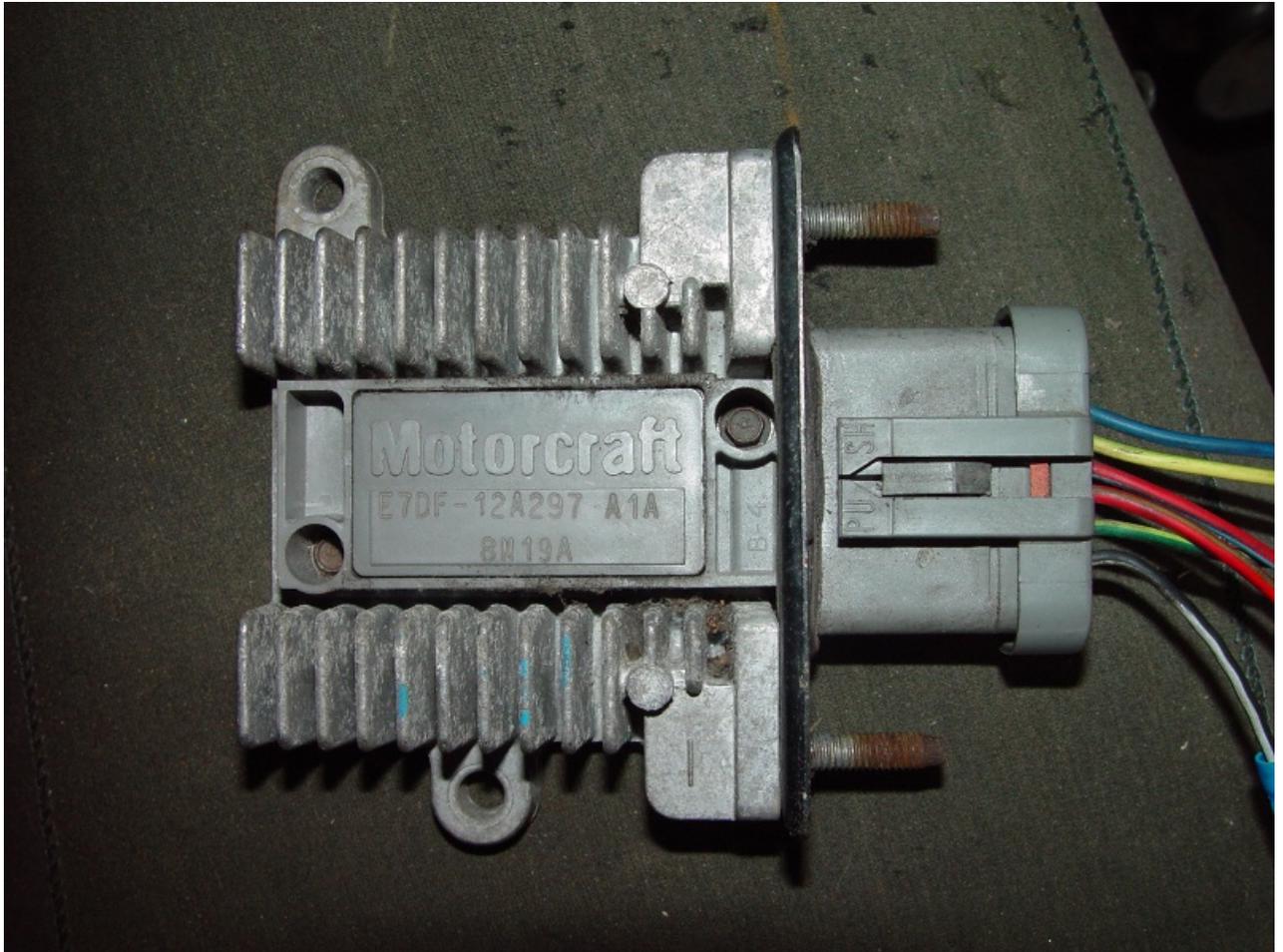
1. IGNITION GROUND -connects to a good ground point.
2. COIL NEGATIVE -connects to the negative side of coil.
3. RUN POWER -to key-ON 12V, connect to pin 6, + side of coil
4. START on the gray module. Not used, -connect to ground.**
5. SPOUT -connect to the points to provide the trigger signal.
6. PIP -12V signal from the hall effect sensor that is used by the PCM to control engine timing via the SPOUT signal.

Ford TFI gray remote-mount module wiring diagram:



Note: The TFI module will fire the coil on the rising edge of either the SPOUT or PIP signal depending on the voltage at the START pin. 12V applied to the START pin will cause the TFI module to ignore the SPOUT signal and fire on the

rising edge of PIP during engine cranking. Most conversion diagrams show the points connected to the SPOUT pin which must mean it is pulled up to 12V internally with a resistor. It is unknown if the coil current regulation mode operates from both the PIP and SPOUT signals. The SPOUT signal is used during normal PCM engine operation at all RPM's to fire the ignition and regulates dwell time and coil current on the gray module.
**To avoid any stray noise impairing ignition operation ground the START pin #4.



BTW, the module illustrated above is used on a lot of 88-95 vehicles so look for those years at the scrap yards.

Generally try not to replace coils on older applications because sometimes the hotter spark will cause older distributor caps to arc and they can be difficult to find.

The TFI ignition module will fire most coils. Coil current power limiting is performed by the gray TFI module so no external resistor is required. Coils that use an internal resistor are probably contraindicated.

Models with gray remote "Push Start": Standard Ignition part number LX-226 for cross reference:

| | |
|---------------------|----------------------|
| Ford Taurus 88-90 | Ford F-series 88-97 |
| Ford T-Bird 88-90 | Lincoln Cont 88-90 |
| Ford Bronco 90-96 | Mercury Cougar 88-90 |
| Ford E-series 88-96 | Mercury Sable 88-90 |

NOTE- DO NOT USE BLACK MODULE. The computer controls the coil charging 'dwell' time on the black module. The connections are similar but external coil current regulation would be required.

=====
==

Another well written article explaining the Ford TFI module operation written by David Sill, IDENTIFIX Ford Team Leader. Dave is a certified Ford EEC, Advanced Engine Performance Specialist, ASE Master and L1. He is a graduate of Ford's ASSET Program and has 14 years of diagnostic repair experience.

Ford TFI modules: Gray or Black?

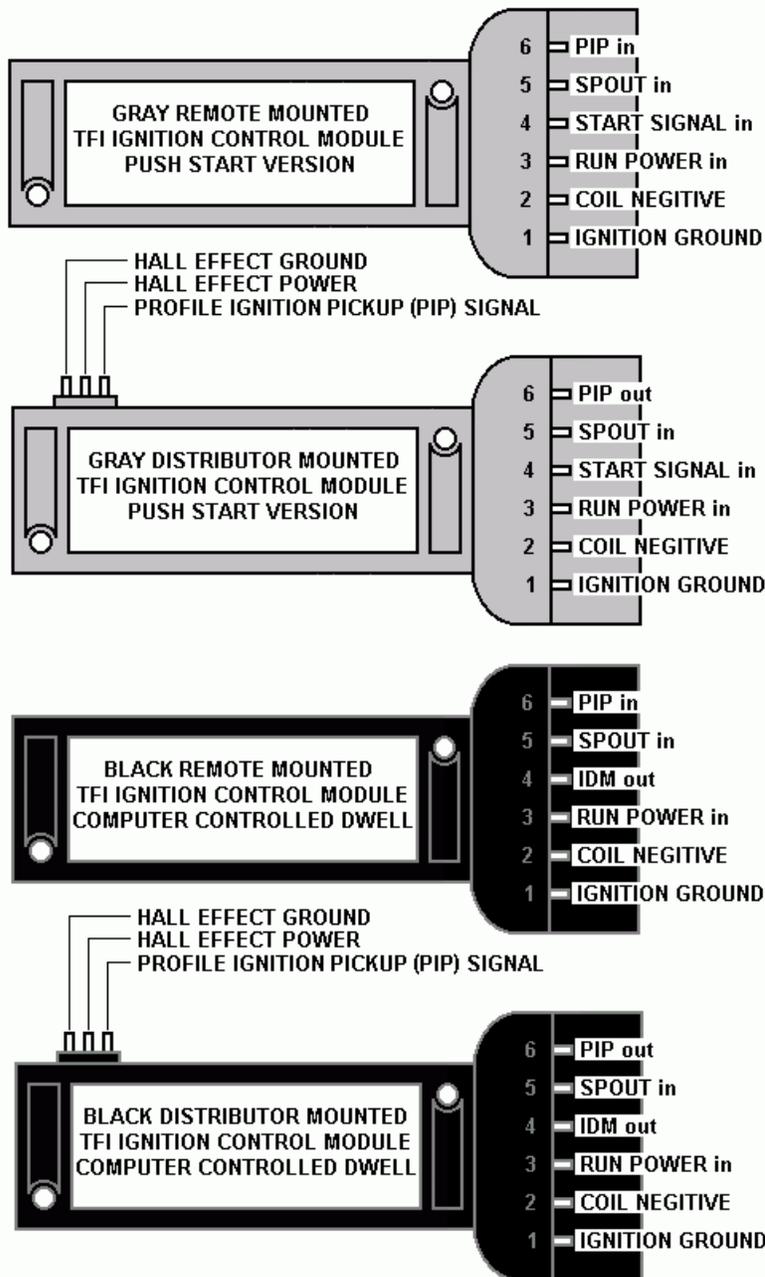
http://www.myo-p.com/Ford-EEC/EEC%20Help%20files/Files/TFI_grey_or_black.html

Most technicians who deal with Ford driveability and no-start problems have become very familiar with the Thick Film Ignition (TFI) system. Ford started using the six-pin TFI module with the EEC-IV computer system in 1983, and for years it remained basically unchanged.

The early TFI system, which Ford calls the "Push Start" TFI system, uses a gray TFI module. Originally, the module was mounted on the distributor. In the late '80s Ford began to relocate it away from the distributor on some vehicles to provide better protection from the effects of engine heat, but system operation remained the same. It uses a Hall effect pickup (stator) in the distributor, which generates a battery voltage, 50% duty cycle square wave, called the PIP signal, to the EEC-U PCM and the TFI module. The PCM processes this signal and sends out another battery voltage, 50% duty cycle square wave, called the SPOUT signal, to the TFI module. As long as the TFI module is receiving a SPOUT signal, it will fire the coil at the rising edge of that signal (except during engine cranking, when SPOUT is ignored) and the vehicle will run with the amount of timing advance commanded by the computer. If the TFI module does not receive the SPOUT signal, it will fire the coil at the rising edge of the PIP signal, and the vehicle will run at base timing. This is true on all TFI systems.

Ignition dwell with the Push Start (gray module) system is

controlled by the TFI module alone, and increases with engine rpm. The Ignition Diagnostic Monitor (IDM) signal on a Push Start TFI system comes from the coil negative circuit and is filtered through a 22k ohm resistor to pin #4 on the EEC-IV computer. The computer monitors this circuit to verify a coil firing for each PIP signal, and sets codes if it sees missing or erratic signals. Another feature that is unique to the Push Start TFI system is the start input on pin #4 of the module connector. This is wired into the starter relay trigger circuit, and signals the TFI module that the engine is cranking. When the module sees battery voltage on this circuit, the SPOUT signal is ignored.



Copyright 2004 RJM Injection Technologies
www.fordfuelinjection.com

In the early '90s, Ford began using a different TFI system on certain vehicles--the Computer Controlled Dwell (CCD) TFI system. **The TFI module on CCD TFI is always black in color.** There are a few major differences between the two systems. As the name implies, with the CCD system, the computer controls primary dwell. The CCD TFI module still ungrounds (fires) the coil at the rising edge of the SPOUT

signal, but now the falling edge of the SPOUT signal (which had no meaning to the Push Start TFI module) is used by the CCD TFI module to ground the coil. The PIP signal remains the same 50% duty cycle square wave, but SPOUT signal duty cycle varies according to how much dwell is desired by the computer.

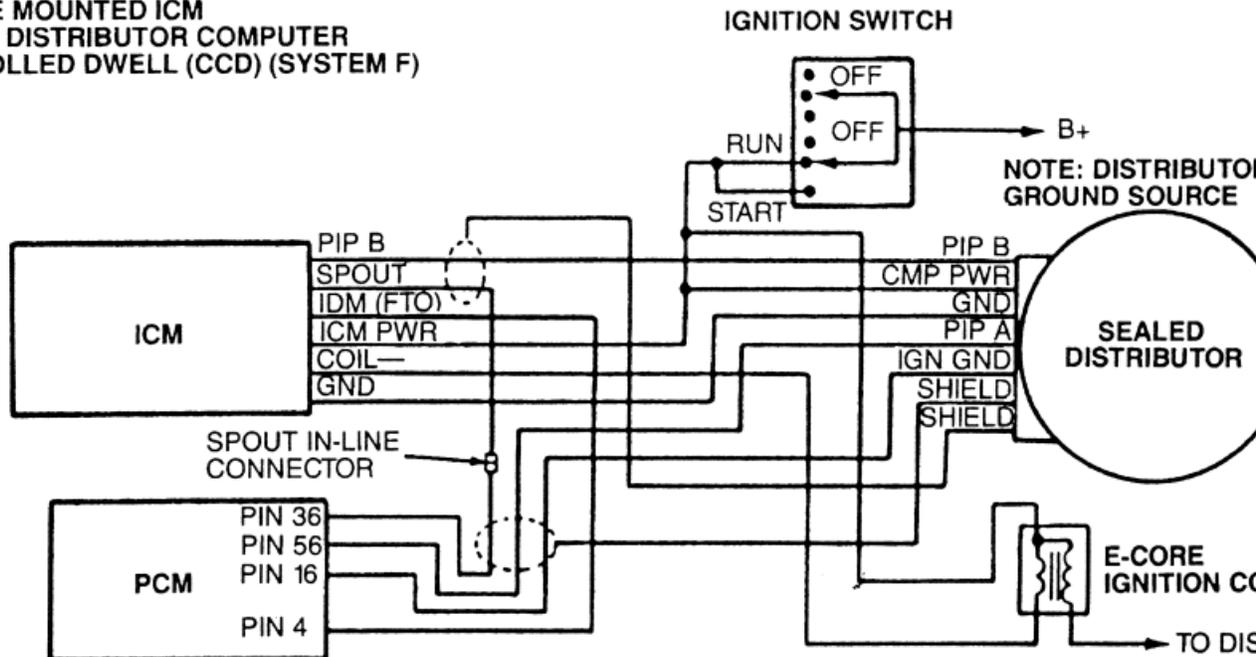
Another major difference between the two systems is the IDM circuit. Pin #4 on the CCD TFI module, which was the start circuit input on the Push Start TFI module, is now the IDM signal, sent directly from the TFL module to pin #4 on the EEC-IV computer. This signal is still a filtered (low voltage) version of the ignition primary waveform, but is filtered internally in the TFI module rather than through an external resistor. There isn't any start circuit input to the CCD TFI module; the module infers engine cranking from a low rpm input from the PIP signal.

Since these two TFI systems are so significantly different, yet so similar in appearance, parts application problems will inevitably occur. A gray Push Start TFI module will plug right into a CCD system, and vice versa. To make matters worse, parts books are often incorrect on TFI module applications! With the incorrect TFI module installed, the vehicle will run, but driveability and MIL (Malfunction Indicator Lamp) problems will result. For instance, if a gray Push Start TFI module is installed in a CCD system, the computer will not be able to control ignition dwell, and the MIL will illuminate with memory codes for the IDM circuit set, as the gray TFL module is incapable of generating an IDM signal to the computer. If a black CCD TFI module is installed in a Push Start system, dwell will remain fixed, since the SPOUT signal duty cycle never changes. If in doubt about which TFI module belongs on a particular vehicle, consult the ignition system wiring diagram for the vehicle. If the wire going to pin #4 on the EEC-IV computer comes directly from pin #4 of the TFI module, it is a CCD system. If not, it is a Push Start system.

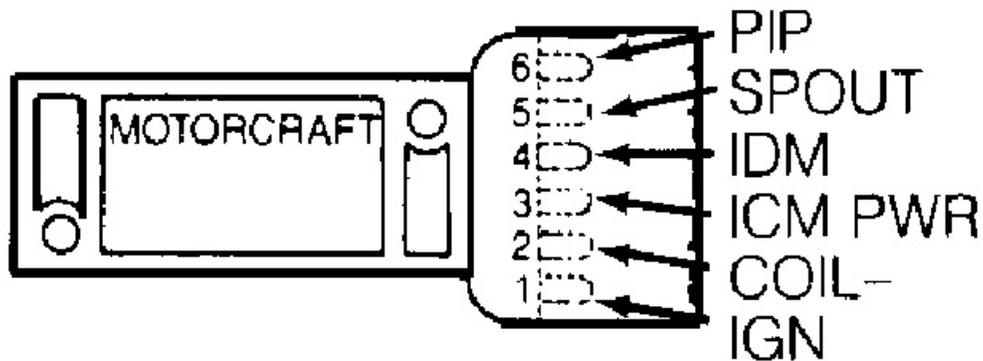
A final note: As with every other rule, there is an exception. Some 1.9L Central Fuel (throttle body) Injected Escorts and Tracers were built with black TFI modules that are not CCD modules. If you encounter one of these, check the engineering number on the module. A CCD TFI module engineering number always starts with E9 or higher.

REF: Black CCD TFI module schematic for reference only.

REMOTE MOUNTED ICM
SEALED DISTRIBUTOR COMPUTER
CONTROLLED DWELL (CCD) (SYSTEM F)



Remote Mounted TFI Module Pinout Diagram



REF: Black TFI CCD module pinout for reference only.