

Installing the Hot-Spark Electronic Ignition Conversion Kit in

Ford, FoMoCo, Motorcraft, Autolite

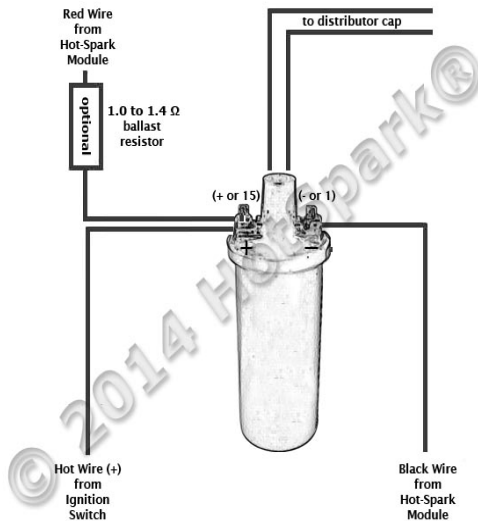
4-cylinder, 6-cylinder and 8-cylinder Vacuum-advance Distributors

Applies to red Hot-Spark 3-series ignition kits

Warning: Reversing the red and black ignition wires will destroy the ignition module. The Hot-Spark module's red wire connects to positive (+ or 15 on Bosch coil). The black wire connects to negative (- or 1 on Bosch coil). Remove the condenser and its wire from vehicle. Connect any other wires to the coil in their original positions. This module is designed for 12V negative ground applications only.

Test Maximum Charging System Voltage: If the charging system voltage, measured at the coil's positive terminal, is more than 14.0 volts at any RPM level, the voltage regulator likely needs replacing. Too much voltage can destroy the ignition module and other electronic components. A maximum charging system voltage of 13.0 volts or so is plenty. A quick fix is to wire a **1.4 Ohm external ballast resistor** between the coil's + terminal and the HotSpark ignition's red wire. Adding the ballast resistor is cheap insurance against voltage surges, etc.

Make sure that the ignition wires have plenty of slack inside the distributor and are not rubbing on any moving parts. It's best to use a small zip-tie, on the inside of the distributor, where the ignition wires exit, to keep the wires from being pulled into contact with moving parts. If you need to extend the length of the ignition wires, use 20-gauge (AWG) wire. Crimp tightly or solder all connections.



Remove points, condenser and condenser wire from distributor. Remove the condenser and its wire from the vehicle.

Important: Clean the distributor's breaker points plate thoroughly, so that the ignition module's base plate makes good thermal contact with the distributor.

Coil Required: Do not use a low-resistance coil that does not have the minimum primary resistance required by the ignition module, as stated in the instructions (minimum 3.0 ohms for 4- and 6-cyl or 1.5 ohms for 8-cyl, assuming a 12-Volt electrical system). The coil resistance regulates the current in the ignition module/coil circuit. Too little coil primary resistance results in too much amperage going to the ignition module, which can overheat the electronics. The failure may not

happen immediately, but the excess heat will shorten the life of the ignition module electronics. How long the electronics will last depends on how much heat is generated. It could be a matter of a couple of hours to a few hundred hours, depending on temperature.

To measure coil primary resistance: Label and remove all wires to coil (+ or -). Using a common digital multimeter in the 200 Ω mode, cross the red and black leads of the Ohmmeter. Allow 10 seconds or more for the reading to settle and write down the reading. Still in the 200 Ohm mode, measure between coil's + and - terminals. Allow a few seconds for the reading to settle, until it stabilizes. Subtract the previous reading, taken with the leads crossed, to compensate for Ohmmeter's inherent resistance. Do not use a low-resistance coil, such as the MSD or Accel coil; they don't have enough primary resistance for this application. For best performance, the coil should also have 7,000 Ohms or more secondary resistance (measured from coil's + or - terminal to center high tension terminal, in the 20K Ω mode of the Ohmmeter).

Ballast Resistor: If the coil's primary resistance is not quite enough or is borderline, you can wire an external ceramic ballast resistor (with 1.0 to 1.4 Ohms resistance) between the coil's + terminal and the red HotSpark ignition wire: www.Hot-Spark.com/1-HS14BR.htm . Adding the ballast resistor is cheap insurance against voltage surges, etc.

Test Battery Voltage to Coil: With ignition switch ON, engine not running, check voltage at coil's + terminal. The voltmeter should read somewhere around +11 to +13 volts. If voltage is too low or there's no reading, the battery's terminals or ground connection may be corroded and need cleaning or the battery may need charging. Some vehicles have a resistor wire running from the ignition switch to the coil's + terminal. If this resistor wire drops the voltage below 9 volts or so, you may need to run a non-resistor wire from the ignition switch to the coil's + terminal or run a +12V wire directly from the ignition switch to the red Hot-Spark ignition wire. Make sure that the ignition switch terminal to which you connect this wire has power only when the ignition switch is in the ON position. Or, you can, for temporary testing purposes only, run a wire directly from the battery's + terminal to the coil's + terminal, the Hot Spark ignition's red wire to the coil's + terminal and the black Hot-Spark wire to the coil's - terminal. Do not leave the wire from the battery connected to the coil's + terminal for more than a minute or so without the engine running.

Air Gap between Magnet Sleeve and Ignition Sensor: If you need to increase air gap slightly, hold ignition base plate away from distributor shaft while tightening set screw and/or loosen the two Allen head screws and retighten screws while lightly prying ignition module away from magnet sleeve. Do not over-torque these Allen screws. Black magnet sleeve should not rub against red ignition module, but exact gap is not critical. In rare instances, it may be necessary to gently pry red ignition module away from black magnet sleeve to keep them from rubbing together.

Ignition Timing: Set the ignition timing, engine running, with a stroboscopic light, to the distributor's factory specification. The difference in distributor position with points vs. electronic ignition can be as much as 30 degrees or so clockwise or counterclockwise, so you'll definitely have to reset the timing.



Left: 3FOR8U1 in Ford 8-cylinder Vacuum-advance Distributor

Right: 3FOR6U1 in Ford 6-cylinder Vacuum-advance Distributor



Above: 3FOR4V3 in 4-cylinder Motorcraft Vacuum-advance Distributor

1. Turn off the ignition switch and/or remove the ground strap from the battery. Though not absolutely necessary, it is probably easiest overall to remove the distributor from the car before installing the Hot-Spark module. If the contacts in the inside of the distributor cap are worn or damaged, replace the distributor cap. Replace the rotor if it's worn.
2. Remove distributor cap, leaving the plug wires in place, unless replacing the distributor cap as well.
3. Remove points, condenser and the condenser's wire from the vehicle. Because the Hot-Spark kit does not modify the distributor, the points and condenser can be reinstalled at a later time.
4. Clean any grease or dirt thoroughly from the distributor's points cam and the breaker points plate.
5. Insert the Hot-Spark module's wires, one at a time, from the inside of the distributor out, through the hole in the side of the distributor. Gently pull and rock, up-and-down and side-to-side, the rubber grommet, through the hole, until it seats.
6. Clean the breaker plate thoroughly to provide a solid electrical ground and good thermal transfer. You can apply a *very* thin coat of thermal transfer paste to the bottom of the ignition base plate. Place the Hot-Spark module's bottom plate onto the distributor's breaker plate. The screw holes used to secure the points should line up with the ignition module holes. The Hot-Spark module's base plate should lie flat and snug on the distributor's breaker plate. Insert the screws and tighten.

3FOR4V3 Ignition kit for 4-cylinder Ford/Mercury Motorcraft distributors with vacuum advance only. Not for centrifugal-advance-only distributors. Remove points, condenser and their wires.

3FOR6U1 Ignition kit for 6-cylinder Ford, FoMoCo, Motorcraft and Autolite distributors with vacuum advance only. Not for centrifugal-advance-only distributors. Remove points, condenser and their wires.

3FOR8U1 Ignition kit for 8-cylinder Ford, FoMoCo, Motorcraft and Autolite distributors with vacuum advance only. Not for centrifugal-advance-only distributors. Remove points, condenser and their wires.

7. Install magnet sleeve, with the larger opening down. Turn the magnet sleeve left and right, while pushing down firmly, until you can feel the distributor shaft cam lobes line up with the flat spots inside the magnet sleeve. Press down firmly until the magnet sleeve slides as far down as it will. Install the rotor on top of the magnet sleeve, making sure the rotor is aligned with the slot in the top of the distributor shaft. The rotor should slide all the way down and lock into place, so that it cannot turn independently of the distributor shaft. If you can still turn the rotor independently of the distributor shaft, the magnet sleeve and/or rotor is not seated all the way down.

Magnet sleeve positioned too high: Situation: The fit between the distributor shaft and the magnet sleeve is especially tight and you can't slide the magnet sleeve down onto the distributor shaft all the way. The rotor rides too high, causing the distributor cap to wobble when you rotate the distributor shaft. Fix: Rotate the magnet sleeve so that it lines up with the lobes of the distributor shaft cam and the magnet sleeve can slide down a bit. Install the rotor and tap, with a small hammer or a soft rubber mallet, *very gently*, on the center of the rotor, until the magnet sleeve seats firmly onto the distributor shaft, over

the distributor cam lobes. With the rotor and distributor cap installed, you should be able to rotate the distributor shaft without the distributor cap wobbling. If the distributor cap still wobbles, you may need to adjust the number or thickness of the distributor shaft shims or the placement of the distributor shaft gear.

Magnet sleeve fit too loose: If the fit between the distributor shaft lobes and the magnet sleeve is too loose, the distributor shaft may be worn down from years of the points block rubbing on the distributor cam lobes, with accumulated dirt and grit, and/or insufficient lubrication. If the fit is especially loose, the only solution, short of replacing the distributor, may be to clean the distributor cam lobes thoroughly with alcohol and wrap the lobes with a single wrap of high-quality electrical tape, before pressing the magnet sleeve down over the lobes. Too loose a fit between magnet sleeve and distributor cam lobes may result in erratic timing.

You can adjust the air gap by loosening the two ignition module screws and moving the module closer to or farther from the magnet sleeve. The air gap should be sufficient to keep the magnet sleeve from rubbing on the ignition module. An ideal gap

8. Check to see if the vacuum advance is working properly by sucking on or applying vacuum to the vacuum canister port. The breaker plate should move smoothly and freely.

9. Adjust the two Hot-Spark ignition wires, as in the above photo, so that they have plenty of slack inside the distributor and they're not rubbing on any moving parts.

10. Install the distributor cap.

11. Reinstall the distributor.

12. The Hot-Spark module's red wire connects to positive (+). The black wire connects to negative (-). DO NOT reverse the polarity of these wires or the ignition module will be destroyed.

13. Check all wire connections, including the two Hot-Spark wires and the spark plug and coil high-tension wires. If you need to extend the length of the wires, use 18- or 20-gauge wire. We recommend soldering all splices and connections, if you can, or crimp all connections tightly. Make doubly sure that all wires are connected to the proper terminals, etc. before reconnecting the battery or turning the ignition switch to the ON position. Make sure that all connectors are snug. Reconnect the battery and set the distributor timing statically. It's a good idea to secure the wires inside the distributor, next to where they exit, with a zip tie, to keep the wires from being pulled into contact with the spinning magnet sleeve or rotor.

14. You can set the timing statically to about 0° (TDC) at first, so that the engine will start. You may need to tweak the distributor, a little at a time, right or left, to enable the engine to start and remain running. Time the engine with a stroboscopic light, with the engine running, according to factory specifications.

Setting Timing: This will probably be the last time you have to set the timing for a long time, so it's worth it to spend the extra time and effort to set the timing absolutely spot-on accurately. An engine with its timing set to perfection will start with the slightest bump of the starter and purr like a kitten at idle – something to make you feel good every time you get in the car.

TDC = Top Dead Center, or 0° BTDC = Before Top Dead Center ATDC = After Top Dead Center

Distributor Cap and Rotor: Stock Ford rotors and distributor caps work fine with the Hot-Spark module. A worn, corroded or scored distributor cap and/or rotor is often the cause of the timing jumping around erratically at idle. With the Hot-Spark electronic ignition installed in place of points, several times as much voltage surges through the rotor to the distributor cap terminal contacts. While the rotor and distributor cap may have functioned alright with points, the increased strain of double the voltage may be too much for the old, worn rotor and distributor cap. We recommend installing a new distributor cap and rotor when converting from points to electronic ignition.

Spark Plug Gap: With the Hot-Spark ignition kit, the stock spark plug gap specification is fine. For racing purposes, you can increase the spark plug gap by about .005 inches, or .12 mm. Be aware that changing the spark plug gap can affect the timing - you should recheck the ignition timing if you change the spark plug gap.

Wiring Installation Basics:

1. Remove points, condenser and condenser wire from the vehicle.
2. Attach the red lead of a voltmeter to the coil's positive (+) terminal. Attach the voltmeter's black lead to engine ground. With the ignition switch on, engine not running, measure the voltage at the coil's positive (+) terminal. The reading should be somewhere around +11 to +13 volts. If voltage is too low or there's no reading, the battery's terminals or ground connection may be corroded and need cleaning. Some vehicles have a resistor wire running from the ignition switch to the coil's + terminal. If this resistor wire drops the voltage below 9 volts or so, you may need to run a non-resistor wire from the ignition switch to the coil's + terminal or run a +12V wire directly from the ignition switch to the red Hot-Spark ignition wire. Make sure that the ignition switch terminal to which you connect this wire has power only when the ignition switch is in the ON position.

To get the ignition running initially, only these wires should be attached to the coil's + and - terminals:

- A. +12 volts from the ignition switch to the coil's + terminal
- B. Red Hot-Spark wire to the coil's + terminal
- C. Black Hot-Spark wire to the coil's - terminal. **DO NOT connect any +12-volt wire to the coil's - terminal. Connect only the black Hot-Spark ignition wire to the coil's - terminal. Do not connect the coil's - terminal to ground.**
- D. The automatic choke and fuel shut-off valve may also need to be attached to the coil's + terminal.
- E. Generally, only the black Hot-Spark wire is attached to the coil's - terminal. If a tachometer wire is usually attached to the coil's - terminal, don't attach it until the timing has been set and engine is running properly. No other wires should be connected to the coil's + and - terminals at this time.
- F. Attach a stroboscopic timing light to the spark plug wire of Cylinder number 1. With engine rotated to TDC (0 degrees) on the firing stroke of Cylinder number 1, ignition switch ON, turn the distributor until the timing light flashes. You may need to turn the distributor left or right, a little at a time, until the engine will stay running, so that you can set the timing with the engine running, using a stroboscopic timing light, according to factory specifications.
- G. For testing purposes, no other wires should be attached to the coil terminals, except for the center high-tension lead to the distributor cap.

Static timing, using an ordinary 12-volt test lamp, will not work. Attach a stroboscopic timing light to the spark plug wire of Cylinder number 1. With engine rotated to TDC on the firing stroke of Cylinder number 1, ignition switch ON, slowly turn the distributor clockwise or counter-clockwise until the timing light flashes. Tighten the distributor clamp a little, so that you can still turn the distributor by hand, but the distributor won't turn on its own. The rotor should be pointing to number 1 cylinder's spark plug wire.

Start the engine. You may need to turn the distributor left or right a little, until the engine will stay running, so that you can set the timing with the engine running, using a stroboscopic timing light, according to factory specifications.

Using Hot-Spark Ignition with VDO Tachometer:

Connect a diode no. 1N4005 between the negative terminal (- or 1) of the coil and the wire that goes to the tachometer. The cathode end (silver band) should be nearest the tachometer side, not the coil side. You should be able to buy a diode no. 1N4005 at an electronic supply store.

Replacing Ford 8-Cylinder Breaker Plate

Ford 8-Cylinder Breaker Plates

From left to right: the original plate removed from an Autolite distributor, Car Quest PN FD8006, and Motorcraft PN D2PZ-12151-A



The Motorcraft PN D2PZ-12151-A, at right, has a spring that is too tall to allow the magnet sleeve to fit properly. If your distributor needs a new breaker plate, buy the Motorcraft breaker plate and borrow new parts from it for your distributor's original breaker plate.



Email from a Customer: Breaker Plate Spring Modification

I purchased one of these V8 Ford 3FOR8U1 kits from you. Had trouble getting right breaker plate from Carquest and Ford. They both came with the high spring on the plates. I ended up converting the original one by removing the clip carefully and cutting the spring down to 1/4" tall and carefully driving the retainer down on the shaft to hold it in place (I did not cut the shaft).

While I had it apart, I cleaned it and re-lubed the plates and moving parts with Syl-Glide from NAPA. Modified the vacuum advance lever with a grinder for clearance around the module and put it all back together with the Hot-Spark kit and it works great! Thought I would share the idea of trimming the spring in case you have a customer run into the same problem. Thanks again, DuWayne in West Columbia, SC.

Problems with Installation? See www.Hot-Spark.com/Troubleshooting.pdf

Latest On-Line Installation Instructions: www.Hot-Spark.com/Installing-Hot-Spark-Ford.pdf

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