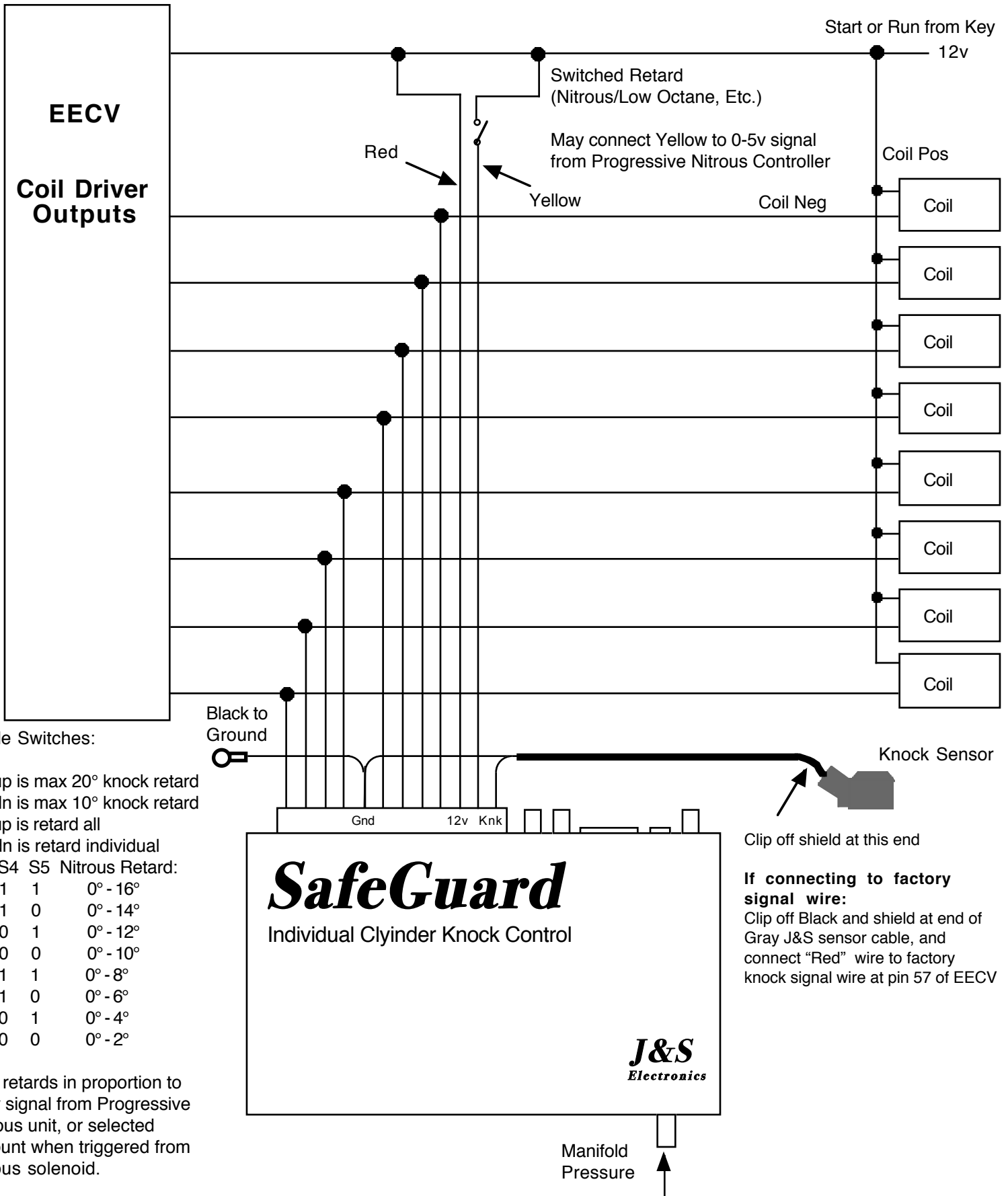


# J&S Electronics

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- Applications
- 4, 5, 6, or 8 cylinder operation.
  - Coil on plug or waste spark systems
  - Must have access to coil Neg.
  - Not for CDI. Must be inductive ignition.
- 

- Easy Installation
- Connect output wires to coils in any order (no wires to cut)
  - Tap factory knock signal or install Bosch sensor
  - Connect hose to manifold
  - Connect 12v and ground.
- 

- Operation
- Retards only the knocking cylinders
  - Retards with Boost
  - Retards with switch activation, such as nitrous or low octane, or proportionally, when connected to 0-5v signal from nitrous controller
  - Boost retard start point and rate are adjustable
- 

- Operating Principle
- Stock ignition is primary ignition. Unit retards by extending dwell, increasing spark energy as a side benefit.
  - Unit "knows" that knocking cylinder is the last one that fired, and will retard "that cylinder" two revolutions later.
  - Retards one, two, or three steps per knock event, depending on knock intensity and sensitivity setting.
  - Re-advances one step every twenty revolutions.
  - Step size is one or two degrees, depending on mode switch.
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- Warranty concerns
- Protects coils and factory wiring. Automatic disconnect if overcurrent is sensed.
  - To bypass, simply unplug unit from harness. Stock ignition is still connected and operational.

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## “Vampire” Installation for Ford COP

1) The unit must be installed in the passenger compartment.

If you have the plug and play option, refer to the last two pages.

2) Locate the eight coil drive signals on the EECV computer. Using Vampire taps provided in the kit, splice the J&S Control wires to the coil drive signals. Firing order is not important. Any J&S control channel can go to any coil drive signal.

**NOTE:** If you have the Knock-Finder option, wire the coils in order, 1-8. Then LED 1 will relate to cylinder 1, LED 2 will relate to cylinder 2, etc. This will make it easy to tell which cylinders are knocking.

NOTE: The Brown wire is a spare, or may be used for GM “one wire” knock sensors.

3) Connect the Red wire to switched 12 volts. Coil positive is ideal, since 12v is present during Cranking as well as Run.

4) Connect the Black wire to a good chassis ground (not sheet metal).

5) For systems with factory knock sensor, you may connect to pin 57 of the EECV. There are two wires and a shield in the small diameter J&S gray knock cable. Strip the jacket about two inches and cut off the black and the shield wires. Connect the other wire (could be Red or Clear, depending on availability) to the factory knock signal wire.

The ECU connector for the F150 Lightning and H.D. is in the engine bay, so you will need to run the cables through the firewall. Locate the factory knock signal wire in the large connector block near the firewall (connector C110, pin 38, Yellow wire with Red stripe).

For systems with no factory sensor, purchase our sensor kit and install as follows: Install the adapter bolt in the engine block. On '03-'04 Cobras, there is an unused hole just rear of the motor mount on the driver's side. Thread the adapter bolt in and mount the Bosch sensor on the end of the adapter. For blocks that do not have an unused hole, remove one of the motor mount bolts and replace it with the adapter bolt.

Run the gray knock sensor cable through the firewall. Crimp the connector pins onto the black and clear wires, then insert pins into the rear of the connector body. Polarity is not important. Plug the connector into the knock sensor.

6) Connect the unit to a source of manifold vacuum/pressure. The supplied brass “tee” compression fitting may be used to tap into the 1/8” nylon tube going to your boost gauge.

7) If you are using nitrous oxide, connect the J&S “Aux” wire to the nitrous switch. When you hit the nitrous switch, the unit will retard either 2° (S5 down) or 4° (S5 up). You could also wire pin 2 to a toggle switch, and use it to retard 2° or 4° when you fill up with low octane fuel.

7a) Extended version uses S3, S4, and S5 to select 2°-16° switched retard when “Aux” wire is connected to 12v. See table on sheet 1 (drawing).

Note: If you have a proportional nitrous controller with 0-5v output, connect it to the “Aux” wire for proportional nitrous retard. This feature is included in units produced after 12/15/09.

8) At power-up, the unit performs a self check. The “Status” LED (above the monitor jack) will flash ten times over a two second period. At the same time, it will exercise the optional knock retard bargraph monitor if plugged into the monitor connector. The test will be aborted when the key is moved to the start position.

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9) The "Status" LED pulses during cranking, and as the engine starts to run, the pulses get closer together, merging into a steady glow at idle. Above 980 RPM, the function of the LED changes to show the amount of knock retard. With no knock retard, the LED will be off. When knock retard occurs, the LED brightness will increase in proportion to the amount of knock retard.

10) Once you have the engine running on the J&S unit, you are ready to test the knock sensor. The unit will not detect knock unless the following conditions are met:

- a) Lightning version, RPM must be above 1250 RPM , Cobra version, above 1750 RPM
- b) Less than five inches of vacuum.

11) Temporarily unplug and cap off the source of manifold vacuum. The on board MAP sensor will now read 0 psi (at sea level), enabling knock detection. Also, temporarily set mode switches 1 and 2 up, making it easier to tell if the unit is retarding. Leave the hose disconnected from the unit until step 14 is completed.

12) Set the sensitivity control to max, and hold the engine above the minimum shown above. Tap rapidly on the knock sensor with a screwdriver, and you should be able to hear the engine slow down as the unit retards. You can also see the timing retard with your timing light, and the Monitor LED on the front panel will glow dimly, increasing in brightness with increasing knock retard. If you have the J&S Knock/Retard Bargraph display, you can also see the amount of retard. If you have the Knock-Finder option, all the LED's on the front panel should light. The brightness is proportional to the retard amount.

13) Once you have verified that the unit retards with knock, set mode select switch 1. This returns the unit to the individual cylinder retard mode. Reconnect the source of manifold pressure. Set the Sensitivity control to mid range.

14) Sensitivity Adjust: Now you are ready for your test drive. A common mistake is to set the sensitivity control to maximum. This may cause the unit to over-retard due to engine noise. We recommend setting the knob to mid-range and getting the vehicle up to highway cruising speed.

To ensure that the unit is armed, disconnect the vacuum hose from the back of the unit. Remember, the unit ignores the knock sensor if it senses more than five inches vacuum.

Increase the sensitivity until the unit just starts to retard due to engine noise, then back it off slightly.

**Note that some engines do not make enough random noise to set off the sensor.**

The Status LED will light up in proportion to the amount of retard. If you have the Knock/Retard bargraph gauge, it will show how much the unit is retarding. If you have the knock-finder option, it will light indicating the retarded cylinders.

After adjusting the sensitivity, check for false knock on decel. If no false knock, and you do not wish to use the boost retard function, you may leave the vacuum/boost line disconnected. If there is false knock on decel and you find it objectionable, connect the unit to a source of vacuum. Be sure to turn the "Rate" knob fully CCW if you do not wish to use boost retard.

After setting the sensitivity, connect the vacuum/boost line to the back of the unit.

15) Observe the Status LED when setting the boost retard. Adjust the boost retard so that knock retard is kept at a minimum.

16) Boost Retard Start: The Start knob sets at what boost pressure the boost retard begins. Fully CCW, the boost retard starts at zero psi. Fully CW, and boost retard starts at 10 psi.

17) Boost Retard Rate: The boost retard rate is adjustable, from zero (fully CCW), to two degrees per psi (fully CW).

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## Plug and play option:

Tools required: Volt Ohm Meter, screwdriver with 2.5mm (0.1") flat blade, wire strippers, wire cutters, x-acto knife, pliers, masking tape.

- 1) Key off.
- 2) Disconnect all the factory coil connectors.
- 3) Route the MSD harness to the coils.
- 4) Connect all eight of the MSD two pin male connectors to the factory coil connectors. Do not connect the coils at this time.
- 5) Key on.
- 6) Use a voltmeter to determine which of the MSD's eight pin connectors (Gray wires or Black wires) is getting 12v. A spare pin is provided to probe the connectors. Record your results.
- 7) Key off.
- 8) Connect the Vampire plug with the single Red wire to the MSD eight pin connector that had 12v.
- 9) Connect the Vampire plug with the eight colored wires to the other MSD eight pin connector.
- 10) Connect the Vampire plug with the Back and Yellow wires to the three pin MSD connector.
- 11) Connect the Black wire in the three pin MSD connector to a good ground.
- 12) If you are using nitrous, connect the Blue wire of the three pin MSD connector to the nitrous solenoid. 12v to this wire will activate nitrous retard.
- 13) If you intend to use the knock-finder option, you will need to buzz out the harness to determine which coil is connected to which Vampire wire. MSD installs the Black and Gray wires into the eight pin connectors in no particular order, as it is not required for their application.
- 14) Strip about two inches of the gray jacket from the Vampire cable, then strip about 1/4" insulation from all but the Brown wire (Brown is not used).
- 15) If not using the knock-finder, skip to step 17.
- 16) Use an ohm meter or "beeper" to determine to which coils the Vampire Green, White, Orange, Blue, Violet, Pink, Gray, and Tan wires are connected. Note that coil 1 is at the front of the engine, passenger's side. Driver's side front is coil 5. Measure between each colored Vampire wire and the MSD two pin female connectors. Do not insert a wire into these connectors, as it may spread the pin. You can reach the end of the pin with your voltmeter leads. Record your results. For example: Green goes to coil 3, etc.
- 17) Connect the MSD two pin female connectors to the coils.

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- 18) Wrap the free end of the Vampire cable and the two knock cable wires with masking tape, and feed them through the firewall, into the passenger compartment, then route them to the blue box.
- 19) Strip about 1/4" insulation from the "Clear" wire of the knock cable, and install into pin 1 of the 12 pin Vampire connector.
- 20) Strip about 1/4" insulation from the Black knock sensor wire and install it AND the Black wire of the Vampire cable into pin 8 of the 12 pin Vampire connector.
- 21) Install the Yellow wire into pin 2 of the 12 pin Vampire connector.
- 22) Install the Red wire into pin 3.
- 23) If you are not using the knock-finder, install the eight vampire wires into pins 4, 5, 6, 7, 9, 10, 11, and 12. Order is not important.
- 24) If you ARE using the knock-finder, refer to your notes from step 16. Install the coil 1 wire into pin 4, coil 2 to pin 5, coil 3 to pin 6, coil 4 to pin 7, coil 5 to pin 9, coil six to pin 10, coil 7 to pin 11, and coil 8 to pin 12.
- 25) In the engine compartment, connect the "Clear" wire of the knock cable to the factory knock signal wire, using the supplied wire tap. Use a dab of silicone jelly (included) to prevent corrosion.

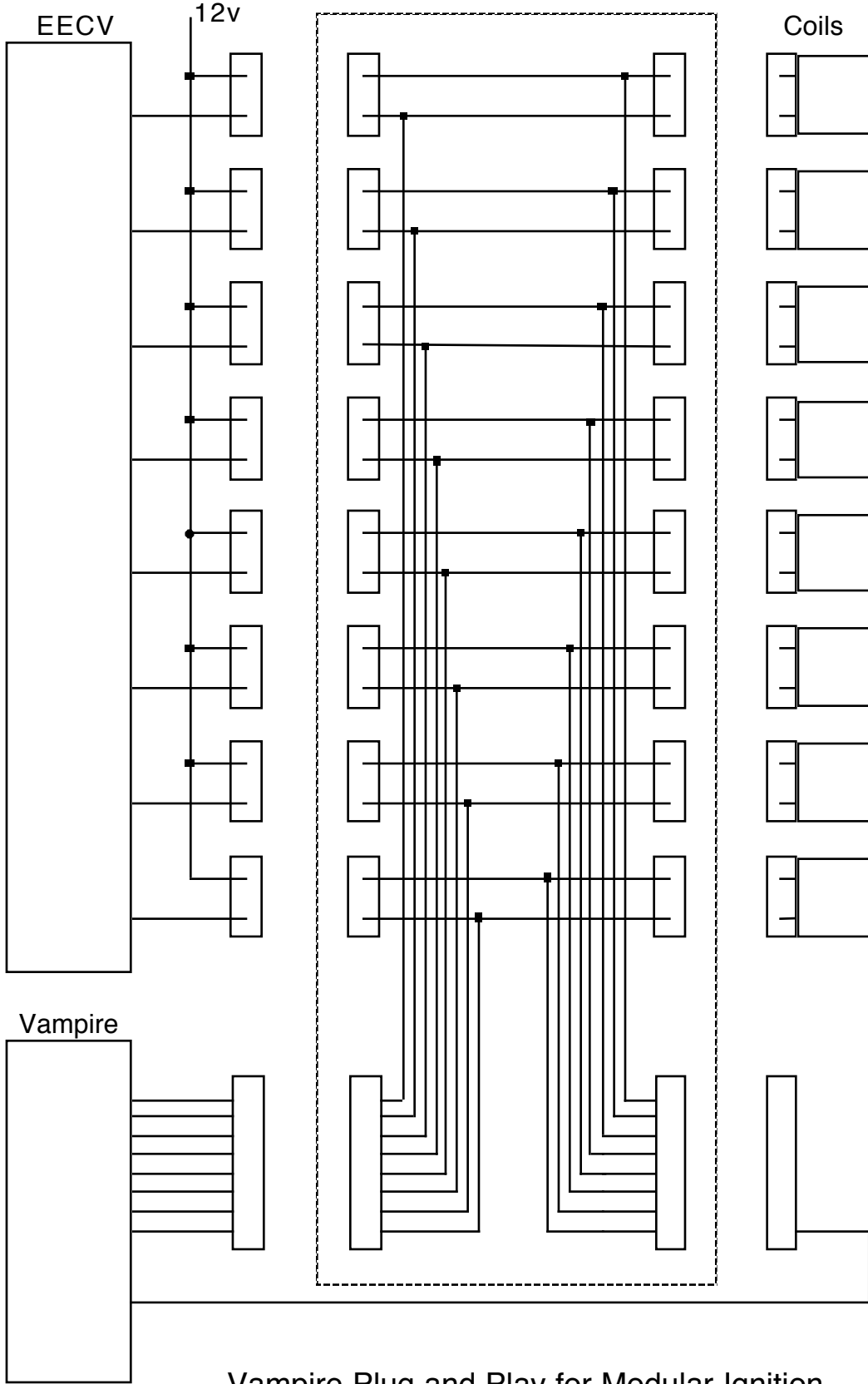
Ford documents show the knock signal wire is Yellow/Red. The factory wire terminates at pin 57 of the EECV, but can also be accessed at pin 38 of the 38 pin connector near the firewall, or at the knock sensor connector.

Note the other wire in the knock sensor connector is grounded. Clip off (do not use) the Black and shield wires of the J&S knock cable at the sensor end.

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## MSD 8734 Harness



Vampire Plug and Play for Modular Ignition