

## DIS Troubleshooting

When a customer complaint involves either a No-Start or Driveability condition, the ignition system becomes a prime suspect. Many customers and technicians have fallen into the trap of replacing the ignition module first in hopes of curing the symptom. This can result in returned parts by your customers, a costly situation for us all. In order to prevent unnecessary returns a comprehensive diagnostic test should be performed. The pinpoint tests listed below should aid you in helping your customers solve their DIS ignition problems.

### No Start Condition

#### Test For Spark

- Disconnect tachometer wire (if equipped) A shorted tachometer can prevent the vehicle from starting.
- Disconnect camshaft position sensor (if equipped).
- Attempt to start the engine. If it starts your problem is with the sensor or tachometer.
- Using a spark tester, check for adequate spark.
- Install tester on plug wires #1, #3, and #5 (V6) one at a time. Leave the matching plug wire attached while testing for spark.



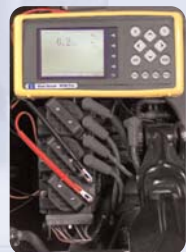
#### Test Coil Power & Ground Source

- Turn ignition on.
- Check for battery voltage at ignition positive circuit to the ignition control module.
- No voltage present - Check for blown ignition fuse or open circuit between fuse and module.
- Test ground circuit for resistance to negative battery post (0 ohms).
- High resistance-repair open or bad connection in ground circuit.



#### Test Ignition Coil Resistance

- Disconnect ignition coil wires.
- Using an ohmmeter, check each coil's resistance. Secondary resistance should be between 5,000 - 8,000 ohms.
- Resistance out of spec. - replace coil.



#### Test RPM Signal

- Connect a scan tool to the vehicle's diagnostic connector (under dash). Crank the engine and observe RPM signal.
- Without a scan tool, use a DVOM and check for a fluctuating voltage signal by back-probing the RPM high reference circuit.
- No RPM signal present - Check for AC voltage signal from the crankshaft sensor.
- Crank signal present - Replace ignition module.



## Total Engine Management Coverage



Standard is your complete supplier for all your Engine Management requirements. In addition to ignition system products, we carry a comprehensive line of emissions control, fuel system, electrical accessories, switches, and relays for almost every vehicle made. We are also your source for ignition wire and cable products. You can rely on Standard to provide you with the most complete source of OE quality and reliability products.

## Selling With The Ignition Catalogs



**Engine Management Guide** The Engine Management Application Guide is the Counterperson's most important tool when it comes to selling ignition parts for cars and light trucks. It provides essential information on all the products in the line of ignition parts.



**Older Car & Truck Guides** The Older Car & Truck Guides are your keys to ignition parts for vehicle model years 1990 and earlier.



**Illustrated Guide** The Ignition Illustrated Parts Guide is a useful companion to the Application Guide. It contains illustrations of specific parts under each category of components. The guide includes a cap-rotor chart, relay application chart and relay schematics.



**Marine Guide** The Marine Application & Parts Guide contains listings for replacement ignition parts for inboard, outboard, and stern driven marine engines. It also contains an illustrated parts guide and marine accessory listing.



**Industrial Guide** The Industrial Guide & Parts Guide contains the ignition parts application guide for tractors, farm and industrial equipment, plus small engines and motorcycles. The listings are alphabetic by manufacturer.

## Summary

**Standard provides outstanding coverage for domestic and import cars, light trucks, tractors, and marine and industrial ignition systems. Coverage for model years dating as far back as the 1920's in some cases, makes Standard your complete ignition parts source. Our quality always meets or exceeds original equipment specifications.**

**Standard is committed to helping you get your share of the ignition parts market. Clear, comprehensive catalogs and our team of ignition experts help you provide the right replacement parts to meet your customer's needs. Standard also provides award winning technical training support to assist your customers take the guess work out of diagnosing these complex systems. Visit [www.smp-training.com](http://www.smp-training.com) for more detailed information about our ignition and engine management products. You can also enroll in our CounterPerson Certification Program and receive a premium plus a certificate upon completion. "That's why we say, "When OE Fails... Trust Standard."**

# STANDARD

# IGNITION SYSTEMS

## A Counterperson's Guide



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# Ignition System Knowledge

As a Counterperson, it's important for you to understand the basics of ignition system theory. This knowledge will allow you to help your customers troubleshoot and solve their ignition problems. Remember that the main function of any ignition system is to produce the electrical energy necessary to jump the gap at each spark plug at a precise time.

## Ignition System Overview

Ignition systems use two circuits, the primary circuit (low voltage) and the secondary circuit (high voltage). The primary circuit, in a conventional system, consists of the battery, the ignition switch, a ballast resistor, primary switch (points or ignition module), and the primary winding in the ignition coil. The secondary circuit consists of the coil secondary winding, the distributor cap, rotor, spark plug wires, and the spark plugs.

## High Secondary Voltage

A very high voltage (8,000 to 25,000 volts) is necessary to arc across the spark plug gap. The ignition coil acts like a step-up transformer. It boosts the battery's low voltage DC power to high voltage power through the principal of magnetic induction. As power flows through the primary winding, a magnetic field builds up just like in an electromagnet. When the power flow is abruptly turned off, the magnetic field collapses. This induces a pulse of high voltage in the secondary winding of the coil. How and when the primary circuit power is turned on and off varies depending on the type of ignition system. As the high voltage flows from the secondary winding of the coil, it enters the distributor cap through the central coil tower. The power then flows through the rotor and is distributed to each of the spark wires.

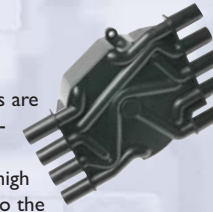
## Breaker Points and Condensers

Points and condensers were used to control the primary current flow in the ignition system for over 75 years. The condenser acts like an electronic shock absorber. When the points open, the power from the coil is absorbed in the condenser. When the points close again, the condenser discharges that power back into the circuit. This reduces point arcing and prevents the contacts from burning.



## Caps & Rotors

Distributor caps and rotors are key components in the ignition system. Their primary function is to transfer the high voltage output of the coil to the spark plugs. They are made of insulating plastics that can withstand high voltages. The significance of these components is often overlooked in the quest for engine performance. Using high quality materials increases the cost of these parts but gives added value in terms of improved conductivity, performance, and an extended life cycle.



## Control Modules

Ignition Control Modules are solid state devices. They perform the primary circuit switching duties that were handled by breaker points in conventional systems. On electronic systems, the control module is triggered by signals from a pick-up assembly. On computerized systems the ignition module controls timing during start-up, but once the engine is running, the computer takes command of the ignition module telling it when to switch the coil primary on and off. Control modules make extremely accurate ignition timing control possible.



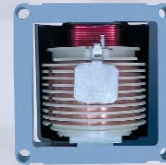
## DIS Modules

Standard Motor Products offers comprehensive coverage for the latest Distributorless Ignition Systems. These sophisticated thick-film microcircuits incorporate multiple power transistors and multiple integrated circuits of improved design. They are the largest and most complex hybrids ever undertaken by an aftermarket supplier. In order to ensure OE performance we use the same Original Equipment IC chips that GM uses. Our GM replacement modules perform exactly like the OE modules.



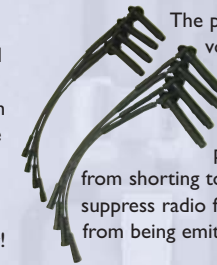
## Coils

There are numerous styles of ignition coils. Some are oil filled while others are filled with an epoxy resin to dissipate heat build-up. Coils perform the vital function of transforming low voltage from the battery to high secondary voltage. DIS coils are able to transform 12 volts into as much as 100,000 volts. The air/fuel mixture has no trouble igniting with that kind of power!



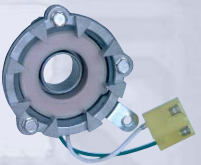
## Secondary Wire

The plug wires carry the high voltage necessary to jump the gap at the spark plugs. Only high quality silicone jackets and boots can prevent high DIS voltages from shorting to ground. The wire must also suppress radio frequency interference (RFI) from being emitted to the atmosphere.



## Ignition Input Devices

Pick-ups, cam sensors, and crank sensors are devices that send signals to the ignition control modules or the PCM in order to establish proper ignition timing. They come in three basic types: magnetic, Hall Effect, and photo-optical.



# The Evolution Of Ignition Systems

### Conventional Systems

A conventional system controls the power interruption to the coil primary winding with a set of breaker points and a condenser. The points work like a switch, turning the coil primary circuit on and off as a rubbing block rides on the rotating distributor cam lobes.



### Electronic Systems

Electronic ignition control was developed to solve the wear and adjustment problems associated with conventional breaker point systems. Electronic systems use an ignition module, which is triggered by a pick-up device to switch the primary circuit on and off. Electric modules are able to maintain ignition dwell and timing settings regardless of mileage and driving conditions.



### Computerized Systems

Computerized systems use sensors that inform the ECM (Electronic Control Module) about engine speed, piston position, engine temperature, and load. The computer processes the sensor signals to calculate ignition timing. A command signal is sent to the ignition module, which opens and closes the primary circuit. These systems provide more efficient engine performance leading to improved fuel economy, increased engine power, and cleaner emissions.



### Distributorless Ignition Systems

DIS takes computerized engine control one step further, eliminating yet another weak link in the old ignition chain, the mechanical distributor. Instead of routing the coil's power through the distributor cap and rotor these systems send the coil's voltage directly to the spark plug through the spark plug wires.



### Direct Ignition

Direct Ignition (DI) takes distributorless ignition Systems one step further. It uses the PCM (powertrain control module) to directly control the switching of the coil. This type of system commonly uses a single coil mounted directly to the spark plug. Note: some later model Asian imports utilize one coil for two cylinders.

