

# Diagnosing & Repair

Late model vehicles (*OBD II*) can be checked with the scan tool for the following problems:

- Crankshaft Position Sensor
- Crankshaft Speed Sensor
- Knock Sensor
- Ignition coil primary circuit
- Ignition coil secondary circuit
- Timing reference signal
- Other devices



# Diagnosing & Repair



## Spark Test

- Spark test is usually performed when an engine cranks but won't start

## Procedure

- Remove one of the secondary wire from the spark plug.
- Insert the spark tester into the wire.
- Ground the tester into the engine.
- Start or crank the engine and observe the spark at the tester's air gap.



# Diagnosing & Repair

## Spark Test Results.

- Strong spark = Good Ignition voltage
- Strong spark with no start = Fouled plugs, Fuel system, Engine
- Weak spark on all wires = Ignition coil, Rotor, Coil wire.
- No spark = Early Models > Coil Supply voltage  
Late Models > Crankshaft Sensor



# Diagnosing & Repair

**DEAD CYLINDER** is a cylinder that is not burning fuel on power stroke.

**Indication** – Rough idle, stumbling under load (*up hill*), or puffing noise in the engine exhaust.

**To Check** pull off one plug wire at a time (*engine running*)

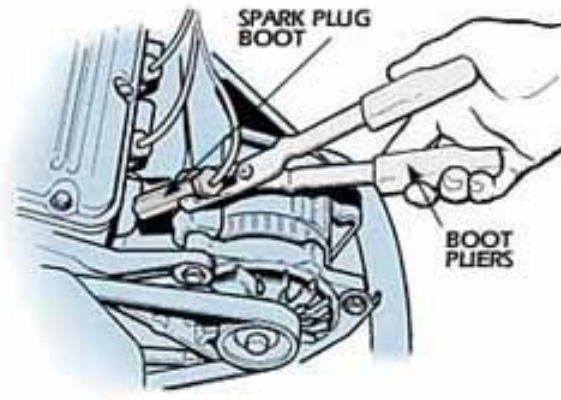
- On a live or firing cylinder the RPM will drop when the wire is disconnected.
- On the dead cylinder the idle smoothness and RPM will not change.

After locating the dead cylinder, check for spark and spark plug.

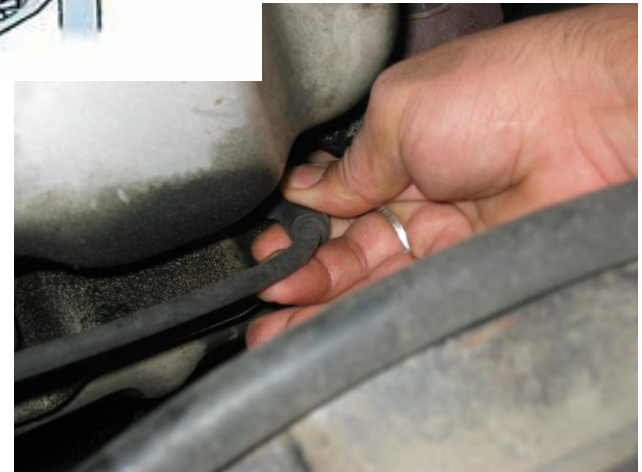
# Diagnosing & Repair

**Plug Service** Bad plug can cause misfire, lack of power, poor fuel economy, hard starting, and high emissions(HC)

- When removing the sparkplug wire, number them and **never** pull on the wire.



- Always hold the boot, twist, and then pull.



Remove the plugs when engine is cooler (*Aluminum Head*) with the proper sparkplug socket.

# Analyzing Sparkplugs



Normal used plug.

Engine and ignition system in good condition.



Oil fouled Plug **Caused by excessive oil entering the combustion chamber.**

- Worn rings
- Scored cylinder walls
- Leaking valves

# Analyzing Sparkplugs



Ash fouled plug.

- Poor fuel quality
- Some oil entering cylinder



Carbon fouled plug (*Dry black appearance*).

- Slow speed driving (local driving).
- Plug heat range too cold.
- Weak ignition.
- Rich mixture.

# Analyzing Sparkplugs



*Pre-ignition (melting of the center electrode)*

- Timing too far advance.
- Low-octane fuel.
- Plug heat range too high.



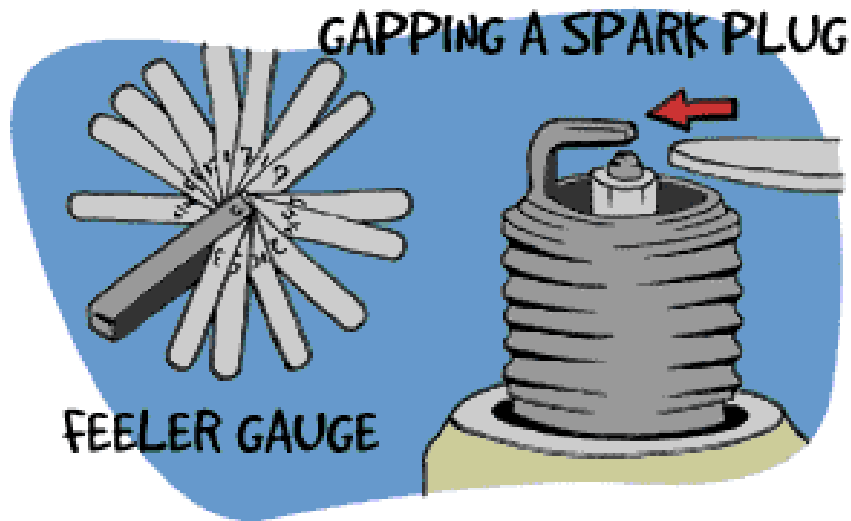
*Worn (normal electrode erosion)*

- Old plug with prolonged use.



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## Gapping the sparkplug



- Always gap the sparkplugs before installing.
- Sparkplug electrode gap is normally 0.030" – 0.080"

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## Sparkplug wire

- Burned or broken conductor.

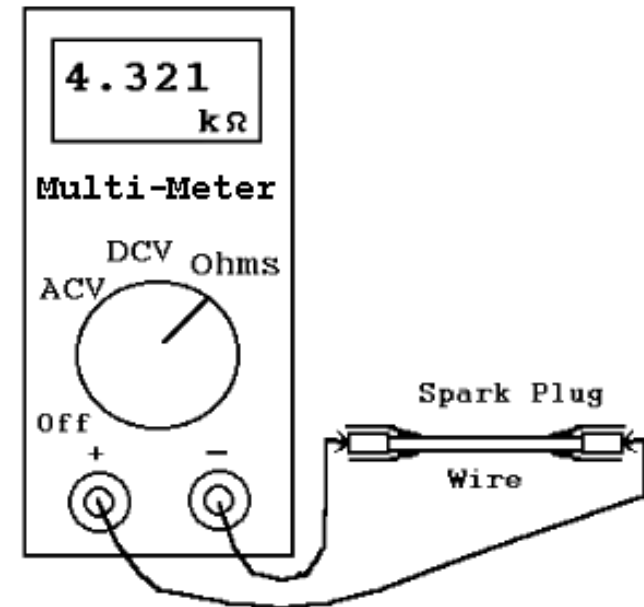
Check resistance (*Ohmmeter*)

**Good** = No more than  $12,000\Omega/\text{foot}$

- Damaged insulation (*Spark arcing*).

Cannot be checked with ohmmeter.

Spray water on the wires and run the engine (**listen and look for arcing**)



# Diagnosing Pickup Coil

Bad pickup coil can cause stalling, missing, no-start troubles and loss of power at specific speeds.

## Pickup coil test

- Connect ohmmeter or AC voltmeter across the pickup coil output.
- Ohmmeter reading will be between 250-1500 ohms.
- Engine cranking, the AC voltage should be between 3-8volts.

Use non-magnetic feeler gauge to adjust the pickup oil air gap.



# Diagnosing & Repair

## IGNITION TIMING

If ignition timing is advance or retard, it will result loss of power, pinging under load and poor fuel economy.

Base timing is the timing without computer control or vacuum advance.

When using timing light it will make the timing marks on the rotating part to stand still.

Marks located on dampener pulley or flywheel.

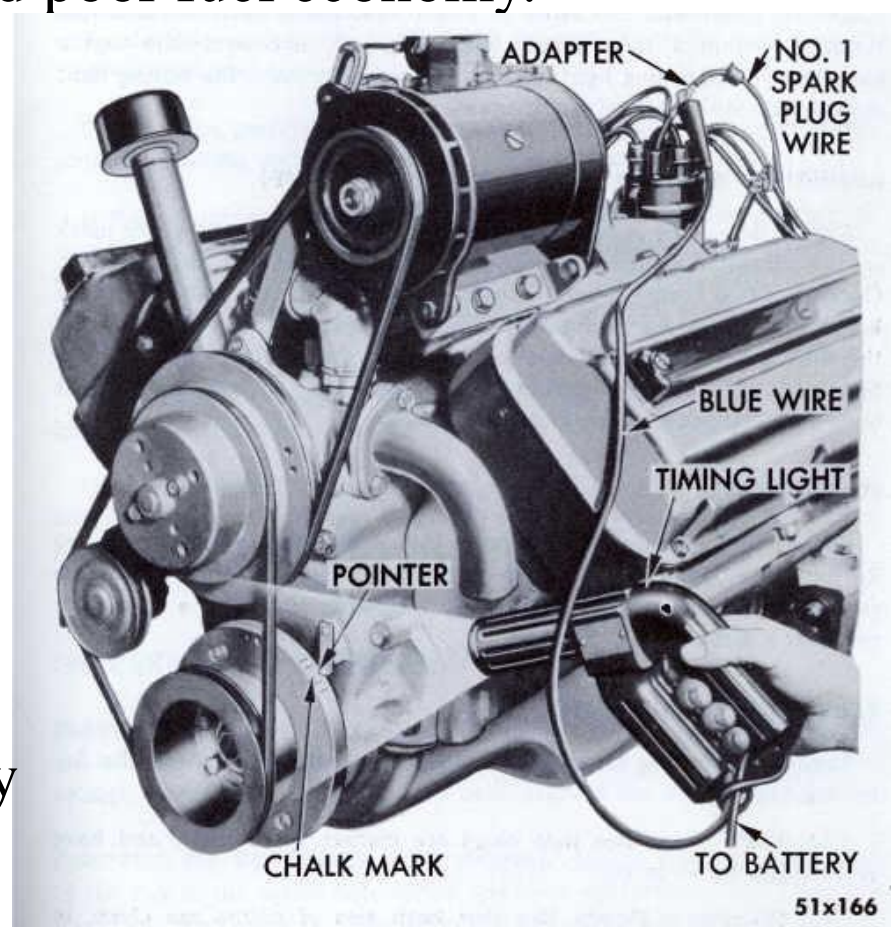


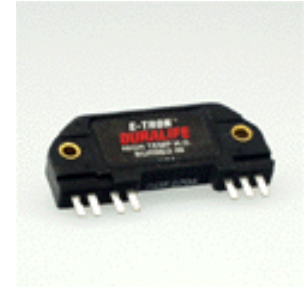
Fig. 23—Timing Distributor With Timing Light

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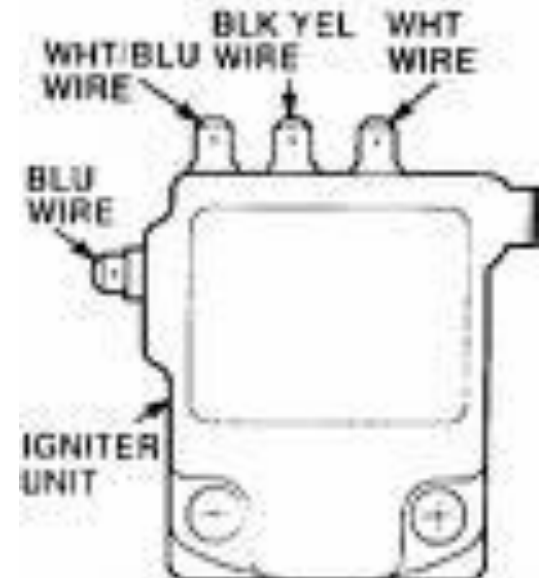
## IGNITION CONTROL MODULE

### Problems:

- Engine stalling when hot.
- Engine cranks w/o starting.
- Engine misses at high/low speeds.



On imports, ignition module is called *Igniter*.



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