

Basic Components of Secondary Ignition waveform:

Dwell: time the points are closed, charging the ignition. Usually 2-4 ms. (variable).

Spike: (aka "Peak Voltage") The kV of the spark. "Normal" is ~ 7kV. (Another source said 12kV, but I've always seen 7kV in "old" cars with traditional ignitions). Higher indicates resistance or lean mixture. Lower often indicates rich mixture (easier to burn).

Burn time: Usually takes 1.5 to 1.75ms. If ascending, can indicate lean mixture or running problems. If descending: high resistance in wire or plug. Normal = level.

Remember: look for both individual anomalies (comparing cylinders) as well as systemic ones. (E.g, every cylinder has high kV ? Check coil wire, overall lean mixture).

Snap Throttle test: peak voltage should increase. (Effective compression increases)

OTHER Variables:

Compression: higher compression is higher resistance to igniting, so higher peak voltage.

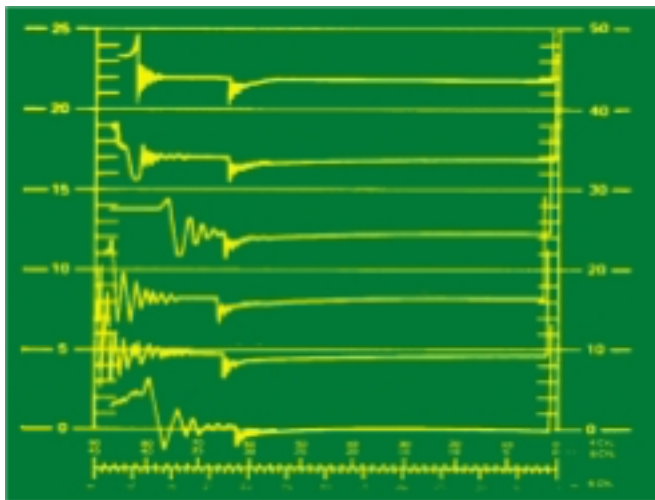
Ignition Timing: very late or very early causes a reduction in effective compression, and lower peak voltage.

Fuel Mixture: leaner makes for higher resistance (higher peak voltage); richer is lower.

“Nearly normal” waveforms can be caused by firing angle errors. (Different timing between cylinders). This can be worn shafts/bushings, trigger errors, etc.

Plug Gap, plug and wire resistance: larger plug gap starts a better burn—but adds in much higher resistance. (.040” is accepted for “standard” ignitions). Plug/wires not to exceed 7k Ohms. (NOTE: non-resistor plugs no longer available! So wires need to be of lower resistance.)

FIND your “normal”: all cylinders the same is correct, but actual values will be determined by the above variables. Determine your ‘in-line” resistance (plugs & wires).



Normal Spark Line

Falling spark line: high resistance

Long, low spark line: low resistance, fouled plug, cross-firing

High, Short spark line: High resistance, wide plug gap

Rising spark line: at what speed? Wide plug gap, sticking valve, or vac leak

No spark line: open plug lead

NOTE: ignition coil checks are done with primary ignition diagnostics.

SOURCES:

<https://www.tomorrowstechnician.com/diagnosing-secondary-ignition-problems/>

<https://www.motor.com/magazine-summary/mastering-basics-secondary-ignition-analysis-may-2001/>

<https://www.autosuccessonline.com/scoping-and-interpreting-secondary-ignition-wave-forms/>