Secondary Ignition Tech Session
V8 Meet—Springdale, AR 2024 Max Fulton & Tim Duhamel




**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.

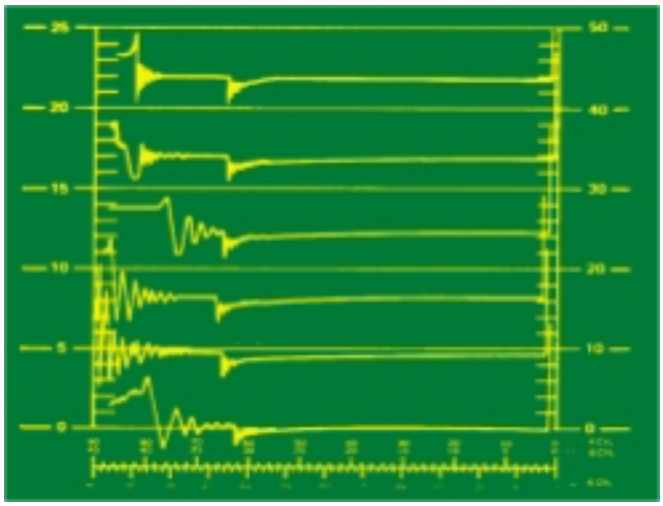
**Ignition Timing:** very late or very early causes a reduction in effective compression, and lower peak voltage.

**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/