Galileo Research, Inc. Initial Prototype Free-Piston Engine-Generator Testing.

Test To Study The Effects Of Advancing Spark Ignition.

Conditions:

- **Full Throttle.**
- **2 Stroke Gas/Oil Mix.**
- **Start Engine at 28 Hz.**
- **Fixed 12.9 Ohm Resistive Load.**
- **Advancing Ignition Timing.**

Jim Hodges suggested:
Spark in relation to Piston Reversal
and is accomplished by
subtracting "Spark Ignition Distance From Center"
from ½ the Stroke.

Results:

Data Points from Data Acquisition Record *(seconds)*	Operating Frequency *(Hz)*	Max Stroke *(Inches)*	Spark Ignition *Distance From Center (Inches)*	Spark Ignition *Distance from Piston Reversal (Inches)*	Average Cylinder Pressure *(PSI)*	Current Output *(Amps)*	Voltage Output (*Peak to Peak) (V)*	Voltage Output (RMS) *(V)*	Power Output (Watts)	Voltage *"Dead Zone"* [1] *over 1" Stroke (Inches)*	Voltage *"Dead Zone"*[1] *over 1" Stroke (seconds)*
1.0 to 1.1	26.0	1.251	0.500	0.1255	425	3.25	154	49.7	161.53	0.251	0.0050
20.0 to 20.1	25.5	1.185	0.449	0.1435	350	3.13	143	47.1	147.42	0.185	0.0038
30.6 to 30.7	25.0	1.157	0.407	0.1715	300	3.00	140	46.0	138.00	0.157	0.0035
46.9 to 47.0	24.5	1.043	0.321	0.2005	180	2.87	125	42.5	121.98	0.043	0.0005

[1] **Alternator designed for 1" stroke is being over stroked by as much as 0.27" (0.135" in either direction).**

Observations:

- **Advancing timing resulted in a change in ignition timing relative to "Center" and in "Piston Reversal" position.**
- **Advancing timing resulted in reduced Stroke, Cylinder Pressure, Power Output and Operating Frequency.**