

**The Effects of Increased Ignition Energy on Cold Start  
Hydrocarbon Emissions**

by

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## **(Abstract)**

A study on the effects of increased ignition energy on cold start hydrocarbon emissions was conducted. The tests were conducted on a single cylinder ASTM-CFR engine. The engine was outfitted with EFI, exhaust analyzers, and temperature probes. The engine was also modified to produce cold start conditions rapidly after each run. For the experiment the engine was started from 18° C using three increasing ignition energy levels. The first level of ignition energy was the ignition energy produced by the stock CFR engine's ignition system. The second and third increased ignition energy levels were obtained by adding 0.387 joules and 1.187 joules to the stock output through a supplementary ignition system. Startup emissions and the number of cycles until the first successful fire were measured.

The results of the tests show a 14% decrease in the average peak hydrocarbon (HC) concentration levels at the highest ignition energy. Overall reduction in HC was less. The variance in the peak HC levels was reduced at the highest ignition energy setting. CO production was increased in response to the increase in HC consumption. The spread in measured number of cycles until first fire was decreased at the highest ignition energy level.

Although positive results were obtained, the test apparatus had some problem areas that may have reduced the effectiveness of the high energy ignition system. Based on what was learned recommendations on apparatus refinements and further tests were included.

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