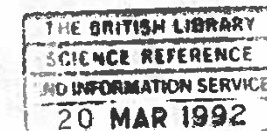


RESEARCH DISCLOSURE

March 1992 Number 335

*The International Journal for companies seeking an
alternative or supplement to obtaining patents*

March 1992 Number 335



Established 1960

RESEARCH DISCLOSURE

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Capacitor Discharge Ignition System

A capacitor discharge ignition system for a spark ignited internal combustion engine. The system has a power supply 10 for charging capacitor 12. Capacitor 12 is connected to a semiconductor switch 14 and when switch 14 is conductive, capacitor 12 discharges through the primary winding 16 of an ignition coil 18. The secondary winding 20 of ignition coil 18 is connected to a spark plug 22 of a spark ignited internal combustion engine. The system can be a distributorless system having a plurality of ignition coils and a plurality of switches like switch 14, one switch for each ignition coil.

The switch 14 is connected to a pulse control 24 which controls the switching of switch 14. The switching is controlled such that spark plug current flows for about 20 microseconds and can be controlled to provide spark plug currents having a duration in the range of 1 to 100 microseconds. Further, the number of current pulses that occur during an ignition event can vary in a range of 2 to 200. The resulting peak value of spark plug current may be 0.2 to 10 amps. The ignition coil primary 16 may have less than 20 turns and the secondary 20 may have less than 2000 turns.

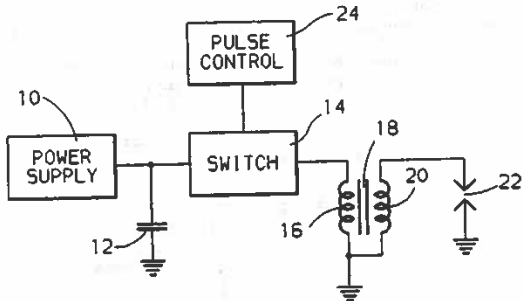
The pulse parameters yield two primary advantages. The relatively high plug current affords the ability to create igniting arcs across badly fouled plugs and the high peak power enhances the ability to ignite lean air/fuel mixtures and alternate fuels like alcohol.

Pulses produced by the system are more efficient in transferring energy into the gaseous air and fuel to be heated and ignited than are those with longer duration and shorter rise time.

The relatively short duration of this high peak current and power level allows the necessary transformers to be of a certain design. As a result they are small, light weight, highly reliable and capable of operating at high temperatures. They can then be mounted directly to the spark plug or can be combined with the spark plugs in an integral package.

In conventional capacitor discharge ignition systems, the approach is to stretch the arc duration of capacitor storage (capacitor discharge) systems as far as practical or to approximately 250 microseconds. Large, heavy, expensive, relatively unreliable, ignition coils are required to support

that pulse. These coils cannot be mounted directly on the plug because of their size and inability to withstand the temperatures encountered there. Multiple pulses are still required for each ignition event, even with 250 microsecond duration per pulse, to prevent drivability problems of surge and unstable idle. With multiple pulses, these pulse widths are not required and widths in the 20 microsecond range are adequate.



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