

Definition: **ignition system** from *Dictionary of Energy*

Transportation. a collective term for the components of an internal combustion engine that produce the spark to ignite the mixture of fuel and air; i.e., the battery, ignition coil, spark plugs, distributor, and associated switches and wiring.

Summary Article: **ignition**

From *The Columbia Encyclopedia*

apparatus for igniting a combustible mixture. The German engineer Nikolaus A. Otto, in his first gas engine, used flame ignition; another method was heating a metal tube to incandescence. Ignition systems in modern automobiles use an electric spark to ignite the compressed mixture of air and gasoline in the cylinders.

Battery Ignition Systems

A battery ignition system has a 6- or 12-volt battery charged by an engine-driven generator to supply electricity, an ignition coil to increase the voltage, a device to interrupt current from the coil, a distributor to direct current to the correct cylinder, and a spark plug projecting into each cylinder. Current goes from the battery through the primary winding of the coil, through the interrupting device, and back to the battery.

Interrupting the Current

In older automobiles, the interruption of the primary current was created by “breaker points,” a switch with tungsten contacts to retard erosion. Driven at half engine speed, a breaker cam, a rotating object with a lobed surface (one lobe for each cylinder), opened and closed the points. When the breaker points were closed, current flowed through the primary winding of the ignition coil. In electronic ignition systems, introduced in the early 1960s, the interrupting device is a reductor, a magnetic pulse distributor that produces timed electric signals that are amplified to control the current to the primary winding of the ignition coil. Such systems generally reduce ignition maintenance and increase engine efficiency.

The Ignition Coil and Distributor

The primary winding consists of wire coiled around an iron core. Over this is a secondary winding of many more turns of finer wire attached to the distributor. Current flowing through the primary winding creates a magnetic field. When the breaker cam opens the breaker points or the reductor delivers its signal, the circuit is broken and current stops. The magnetic field collapses, inducing in the secondary winding a much higher voltage that is led to the distributor. Inside the distributor a moving finger rotates at half engine speed. As it rotates it touches contacts, each of which runs to a different cylinder. Rotation is timed so that when the finger is touching the contact for a particular cylinder, a high voltage has just been induced in the secondary winding of the ignition coil and the piston has almost reached the top of the compression stroke. Thus a high voltage is impressed across the spark plug gap.

The Spark Plug

The spark plug consists of a center electrode imbedded in insulating ceramic. Around the outside is a threaded metal shell that screws into a hole in the top of the cylinder. A ground electrode extends from

the shell over the end of the center electrode. Between the two electrodes there is a small gap of .015–.040 in. (.038–.102 cm). At about 8,000 volts a spark jumps the gap and ignites the air-gasoline mixture. A centrifugal advance makes the spark fire earlier at high engine speeds; a vacuum advance makes it fire earlier at small throttle openings above idle.

Magneto and Diesel Ignition Systems

A magneto ignition system is essentially the same as a battery system except that a permanent magnet generator supplies current directly. Where compactness is an advantage or where there are no other accessories that require a battery, a magneto system may be preferred. Aircraft, motorcycles, and farm equipment often have magnetos.

In a diesel engine the fuel ignites as soon as it is injected into the hot, highly compressed air in the cylinder. Diesel engines frequently utilize an electric heating element, called a glow plug, inside the cylinder to preheat the air to facilitate starting and running until the engine has reached its operating temperature.

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