



## 2) Capacitor Discharge Ignition

### a. General

The Capacitor (or Condenser) Discharge Ignition, the CDI, is different in several respects from the contact-type ignition. With the contact breaker ignition, the ignition spark is produced from the high voltage induced in the secondary winding of ignition coil when primary winding current is suddenly interrupted. With the CDI a thyristor is used in place of the contact breaker points. When the thyristor is gated with a signal sent from the signal generator rotor, the thyristor suddenly conducts and sends a pulse to the primary circuit. From then on action is similar to the mechanical ignition in that a high voltage is induced in the coil secondary winding and the ignition spark results.

It can be seen then, that there will be no trouble with fouled or worn points, and no way for ignition timing to become maladjusted. In this manner misfiring, low spark voltage, etc. are avoided, and stable ignition can be achieved. Furthermore, since the primary winding current is cut in and out electrically, the rise time is faster and a stronger voltage and better ignition is provided by the secondary winding.

To send the ignition spark to a different cylinder each time, a distributor is located between the secondary coil and the spark plugs. The rotor distributor is turned through gear and shaft connection to the crankshaft, so that every time a spark is produced and sent to the rotor, the rotor is pointing to the appropriate spark plug wire connection in the distributor cap.

### b. Construction and Operation

Figure 410 is a diagram of the Capacitor Discharge Ignition circuit. It can be roughly divided into the timing detection circuit, capacitor charge circuit, and the actual ignition spark producing circuit.

#### (1) Ignition timing detection

Ignition timing is determined by a voltage signal produced by the signal generator. When the magnet projections on the signal generator rotor pass the pickup coil as they rotate, each magnetic field cuts through the coil windings and induces a voltage in them. This voltage is sent to the A Unit, amplified, the waveform shaped by the trigger amplifier, and the resultant sent to trigger, or gate, the thyristor.

#### (2) Capacitor Charge Circuit

To charge the capacitor, the 12 VDC from the battery is changed to 400VDC in the DC-DC Converter. To accomplish this, the 12 volts direct current is first changed to AC by a two-transistor oscillator, the AC is stepped up to 400 volts by a transformer, changed back to DC by a full wave rectifier, and the 400VDC resultant is used to charge the capacitor. The charged capacitor is then ready to discharge when the thyristor conducts.

The capacitor charging current path is from the transformer through a diode to ground, up through the primary winding of the ignition coil to one side of the capacitor; and the return path is from the other side of the capacitor through another diode back to the opposite side of the transformer.

#### (3) Ignition

When the thyristor is triggered, i.e. receives a gating pulse, it conducts and acts as a short circuit across the charged capacitor. Consequently, the capacitor suddenly discharges through the ignition coil primary winding. The fast rate of discharge in conjunction with the high turns ratio of the coil windings, produces a 30KV ignition spark across the spark plug gap. The capacitor discharge current path is from the coil side of the capacitor, through the primary winding to ground, and up through the thyristor back to the other side of the capacitor.