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COURSE 23/55

CLASS 2.

1/ What is the function of the Ballast?

The Ballast Resistance is inserted in the Coil Ignition System for the purpose of protecting the coil should the system be left in the "switched on" position with the engine dead.

When the engine is running the current flowing through the resistance and the coil is intermittent but when stationary the battery supplies a constant current, which (when switched on), which is detrimental to the coil. Under these circumstances the ballast resistance rises in temperature thereby increasing its resisting qualities.

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2/

(a) A faulty condenser will weaken the spark and cause misfiring.

(b) A weak permanent magnet will lessen the strength of the induced current thereby decreasing the intensity of the plug spark and causing misfiring\*  
\* debatable ?

(C) A dirty or oily pick up slip-ring or carbon brush  
~~to rotate as the contact is made~~  
may cause misfiring.  
~~to rotate as the contact is made~~  
~~to rotate as the contact is made~~

(D) The <sup>earthing</sup> wire from the contact breaker to the 'on and  
off' switch may have faulty insulation, which,  
when <sup>by</sup> vibration, is in contact with any metal part  
of the engine, will cause short-circuiting and  
misfiring. 8

3/

In the Polar Inductor type of magnet the  
armature is stationary. As there are no centrifugal  
stresses due to centrifugal action to contend with  
the coils may be of more simple construction.

Again, ~~due to the non-rotatory nature of the~~  
~~armature~~ the condenser may of the stationary type  
which renders it much more accessible and less  
liable to stress.

The greatest advantage of the P.I. type is  
its ability to supply many more sparks per  
revolution of the magnets than the rotating  
armature type. In multi-cylinder engines this  
allows the magnets to be driven at a  
reasonable speed. For example for a 12 cyl. engine



If a ~~was~~ rotating armature magnets were fitted, (2 sparks per rev.) the magnets would have to be driven at 3 times engine speed & in a P.I. magnets giving 4 sparks per rev. it need only be driven at  $1\frac{1}{2}$  times engine speed.

In an engine of 24 cylinders it is obvious that ~~the~~ it is not practicable to use a rotating armature magnets and the P.I. type <sup>(or rotating magnet type)</sup> must be used.

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The Ford V8 ignition unit has two big advantages ~~of~~ over the normal system.

(a) Its double contact breaker system allows <sup>for</sup> a longer period of make and a shorter period of break which is progressive as the engine speed rises, and thereby nullifies to a great extent, the one big disadvantage of coil ignition system i.e., the falling off in induced voltage as the speed of the building and collapsing of the magnetic field increases.

(b) By its system of automatic advance and retard, which is operated by centrifugal force in co-operation with a vacuum brake, it is

able to give the correct ignition timing at all speeds and under all conditions of engine load.

Another advantage is its compactness and ease of fitting which does not allow of any mistake when re-timing the engine

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To test the armature of a magneto it is necessary to have a battery, (say 6 volts) and copper, (or similar) wire. One side of the battery is connected to the shaft at the contact break end and ~~the~~ another wire is from the other side is touched against the opposite end of the shaft. If the primary circuit is in order a spark should occur when the loose wire is alternatively touched and brought away from the shaft.

Another wire is wound around the slip-ring and bent over to make a gap between ~~the~~ itself and the ends of the armature end pieces. When the primary circuit is broken by drawing away the wire from the shaft a spark should jump the gap from the slip ring to the end piece thereby indicating



that a current has been induced into the secondary winding.

The above applies to a rotating armature.

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6)

The "internal points of timing" in a magneto apply to the need for relating the ~~speed~~ position ~~of the~~ or state of the magnetic field and the resultant induced current to that of the rotor arm in the distributor. It is necessary to conduct the maximum voltage to the sparking plug.

It is also necessary to time the breaking of the primary circuit (by means of the C.B.), to ensure that advantage is taken of the maximum flux density of the magnetic field.

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8)

The voltage in the secondary circuit of a magneto is determined by three factors.

(a) The strength of the permanent magnet or (in the case of coil ignition) the voltage supplied to create the magnetic field in the primary circuit

(b) The rate at which the magnetic field is built up and collapsed, ~~this implies that the~~

and into the coils of the secondary coil.

and (c) the ratio of the number of turns of wire in the primary and secondary windings - the greater the number of secondary turns compared to the primary the greater the induced voltage.

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(a) The purpose of the Booster coil is to "boost" up the intensity of the spark in a magneto system of ignition at <sup>very</sup> low engine speeds upon starting the engine.

(b) The disadvantage of the magneto system is that at low speeds the current induced (see (b) of 8 above), is of a comparatively low voltage and results in a poor spark on the occasion when a <sup>good</sup> spark is needed, i.e. starting up the engine. To ~~overcome~~ ~~this the Booster coil is fitted and comes into operation~~ These circumstances do not apply to a coil ignition system as the primary voltage is supplied by a battery and is therefore constant.

(c) The Booster coil works on the electro magnetic principle. A pivoted contact alternately makes and breaks a circuit from the battery to a primary coil



wound around a soft iron core, (thus, the electro magnet),  
and the higher voltage is induced in the normal  
manner via a secondary coil. This is lead to  
the distributor and to a rotor arm fixed so  
that a late <sup>or retarded</sup> spark is supplied.

The Booster coil is <sup>sometimes</sup> usually fitted to the  
starter motor circuit so that it is in operation  
only for a few seconds whilst the engine is being  
turned over by the starter.

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