

Some Ignition Problems and Their Solution



Ford Motor Company
Detroit, U. S. A.

Ford Model T

You see them wherever you go
And they go wherever you see them

Some Ignition Problems and Their Solution

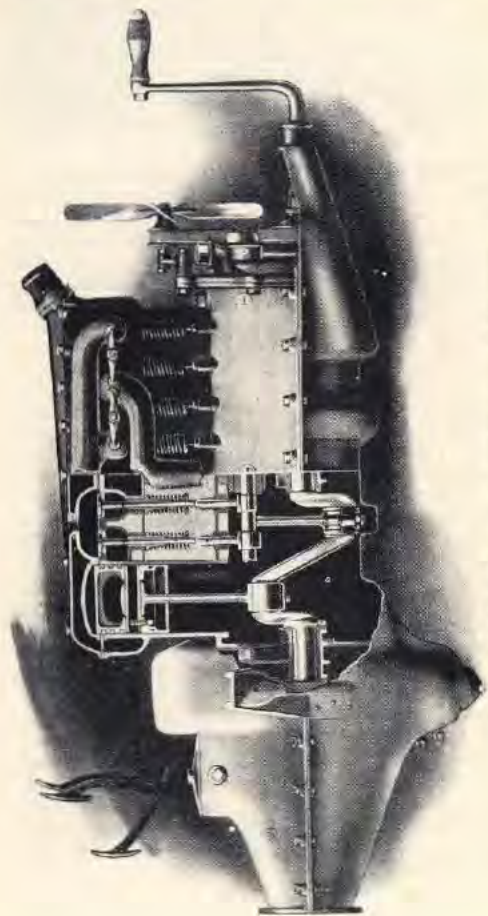
FORTUNATELY most of our troubles are imaginary. As it's darkest just before the dawn so we worry most keenly and our load of trouble is heaviest just before the inevitable calamity overtakes us—and then at the last moment, it dissolves in thin air. If we would only stop worrying over impending difficulties and devote our time to their solution, we would—yes, we certainly would, but we don't. However, here's the point we are trying to emphasize:

We may as well admit first as last that most of our motor car troubles are due to our own neglect or mistreatment, and it's obvious, therefore, that they may be practically eliminated by intelligent care and attention.

Likewise, automobile as well as human ailments must be accurately diagnosed before a cure is effected and we shall devote this little booklet to a brief discussion of some ignition problems which may arise, and their solution, and a description of the features which have made the Ford Ignition System one of the most notable inventions in automobile history.

First, know your car intimately, thoroughly. Devote the first week, or longer if need be, to a careful, painstaking study of its entire mechanism. It is not enough to be able to start it, stop it and back it. Learn the purpose of each part and its relation to the others and if you keep them all properly cleaned, oiled and adjusted (a quick, simple job if done regularly), you will have prevented the possibility of 99% of *breakdowns*.

The mechanism of a modern automobile is in reality decidedly simple, but there are compara-



Ford Model T Engine—four-cylinder—twenty horsepower

tive degrees of simplicity and the Ford Model T can only be adequately described as the antithesis of complexity. The Ford is the acme of simplicity—and mechanical simplicity is the fundamental safeguard against trouble.

The engine of course is the most important unit, but it is, of itself, powerless without the perfect co-operation of its ignition device, just as the trolley car is entirely dependent upon current from the power plant. In all cars using magnetos except the Ford, the engine and the magneto are separate, distinct units, and as the street car stops if the trolley wire breaks, so the engine stalls if a connection to the magneto or batteries short-circuits, breaks or grounds.

The magneto of the Ford is an integral part of the engine, consisting of only two sections, one attached to and rotating with the fly wheel, and the other fastened to the cylinder casing; another striking example of the Ford way of preventing trouble by completely eliminating the cause. This exclusive Ford feature is described in detail on a later page.

Once more before we take up the details of our subject "Ignition Problems," let us drive home the all-important fact that motor car troubles are few or many in direct ratio to the simplicity or complexity of a car's construction—therefore the extreme simplicity of the Ford Model T is perhaps the basic reason for its world-wide popularity. Give your Ford the care it deserves, drive it intelligently and it will afford you uninterrupted pleasure and satisfaction for a long term of years.

To enable you to understand clearly our reference to any part, we include several illustrations.

The uneven sputter and bang of the exhaust means that one or more cylinders are exploding irregularly or not at all, and the trouble should be promptly located and overcome. Misfiring if allowed to continue will in time injure the en-

gine and the entire mechanism, and if you would be known as a good driver you will be satisfied only with a soft, steady purr from the exhaust. If anything goes wrong, stop and fix it if possible, don't wait until you get home.

It is our purpose to explain here the quickest and surest way to determine the cause of misfiring and how to correct it effectively.

First ascertain which cylinder is not exploding properly. This is done by operating the vibrators on the spark coils. Open the throttle until the engine is running at a good speed and hold down the two outside vibrators No. 1 and No. 4 with the fingers so they cannot buzz; this cuts out the two corresponding cylinders, No. 1 and No. 4, leaving only No. 2 and No. 3 running.

If they explode regularly it's obvious the trouble is in either No. 1 or No. 4. Relieve No. 1 and No. 4 vibrators and hold down No. 2 and No. 3 and also No. 1; if No. 4 cylinder explodes evenly it is evident the misfiring is in No. 1.

Therefore, we will assume that No. 1 cylinder is the one out of order, and the cause must be located. The first place to look is No. 1's spark plug, perhaps fouled with oil or short-circuited with carbon. Remove and clean thoroughly and see that the point is 1-32 inch from the core. Replace it and be sure the connection to binding post is screwed tight. If the missing continues and a new plug doesn't help matters, it's apparent the trouble is elsewhere.

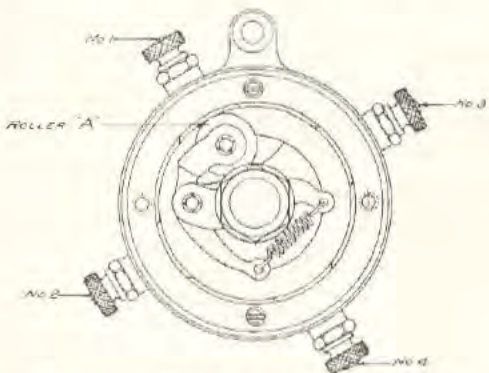
Now, test No. 1 spark coil; disconnect the spark plug end of the cable leading from No. 1 coil and touch it lightly to some part of the engine; if a good spark is produced the coil is all right. If you don't get a spark, inspect the platinum points on vibrator and adjust with thumb screw until a strong, steady buzz results.

If the spark plug and coil are all right, the trouble may be due to a leak in the cylinder head gasket. This is easily determined by lifting the

starting crank slowly the length of the stroke for each cylinder in turn, a strong or weak compression being easily detected. Once in a lifetime an exhaust valve may become warped from an overheated engine; if this happens the seat must be reground, or a new valve substituted.

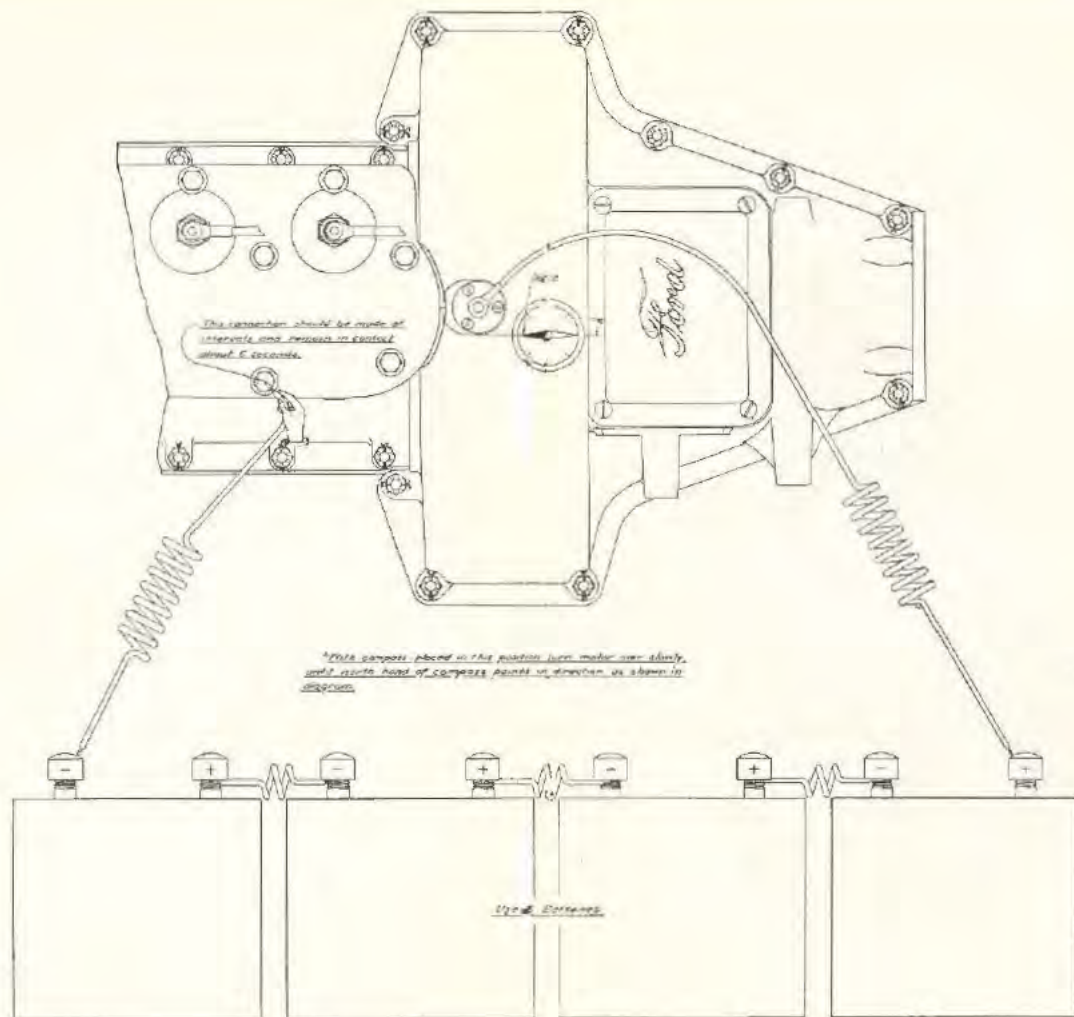
If misfiring occurs only when running at high speed, inspect the commutator. The surface of the circle around which roller "A" travels should be clean and smooth so that the roller makes a perfect contact at all points. If the roller fails to make a good contact on any one of the four contact points, its corresponding cylinder will not fire.

In advancing the spark lever you will find one certain notch on the quadrant at which the motor does not increase in speed. It is advisable to mark this "dead" notch on the quadrant and avoid placing the spark lever in it when driving or cranking.



Roller "A" should be on Contact Post No. 1 when
Cylinder No. 1 is ready to fire

Diagram showing Ford Model T Commutator



WATSON
 DIAGRAM FOR RECHARGING MAGNETS

MAGNETO

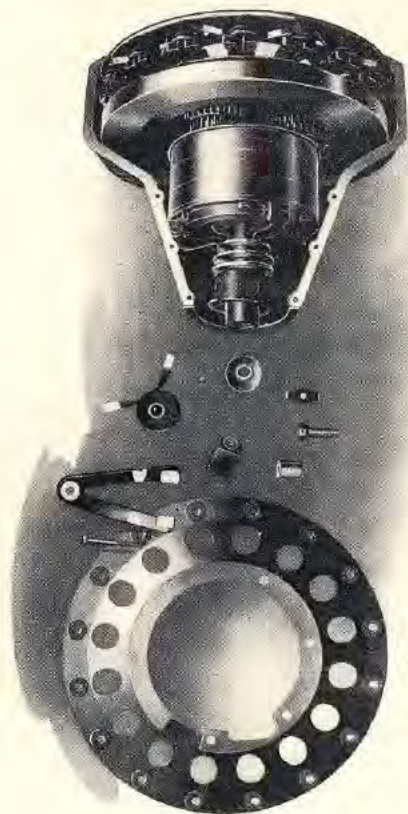
The Ford Magneto is a striking illustration of three Ford characteristics—originality, simplicity and superiority. The Ford igniting system is absolutely different and immeasurably simpler and better than any other.

It is safe to say that a large majority of all the trouble experienced with other cars is due to faulty ignition in some form. The basic principle in the construction of the Ford Magneto absolutely eliminates all superfluous and complicated parts. The expense and annoyance of batteries are avoided in the Ford. It has no brushes, no commutator, no moving wires to work loose at their binding posts, no complicated connections from motor to magneto.

The Ford magneto is a part of the engine, consisting of only two members—one attached to and rotating with the fly wheel and the other fastened to the cylinder casting. The revolving magnets on the fly wheel generate an induced current in coils, so mounted as to face the magnets and cut the lines of force. In short, the Ford magneto is a most ingenious adaptation of the principle found in the alternating current direct connected dynamo used in lighting all up-to-date cities.

As the magnets move, with the fly wheel, through a large circle, a slight movement of the starting crank instantly produces a powerful current assuring a perfect spark at all times. Your Ford is always ready to start when you are.

The following fourteen "Dont's," written by one of the well known magneto manufacturers and clipped from a recent issue of a local newspaper, show the many difficulties that are likely to happen with the regular type of magneto. The extreme simplicity of the Ford specially designed magneto eliminates all these difficulties, such as unnecessary wires and other intricate parts. It is unnecessary to caution a Ford owner. There are no "Dont's" such as



Model T Magneto

the following in connection with the Model T magneto.

Don't test your magneto unless you have it completely assembled, i. e., breaker box in place and distributor cover with wires attached.

Don't think it necessary when washing the car to flood the magneto with water. All high tension instruments work better when not flooded with water. This will be thoroughly appreciated by those who have driven with the old type coil ignition.

Don't open up the spark plug gaps nor permit them to burn themselves open more than 1-32 of an inch.

Don't flood the breaker box when oiling the little roller on the breaker bar. The oil should be applied with a tooth pick about once a month.

Don't expect your magneto to operate if you permit the frayed ends of your wires to come in contact with each other or the little parts of the instrument.

Don't dissect the instrument to see what makes the wheels go around, unless you are an expert. We put the right number of wheels inside when we make it.

Don't drive the motor with the spark retarded, but as far advanced as possible.

Don't leave your switch turned to battery over night.

Don't try to improve the adjustment of the platinum points in the breaker box until they stop breaking.

Don't disconnect the wires leading from the magneto to the coil, unless you are careful to get them back according to their respective letters.

Don't pull out the carbon brushes in the distributor because you think there is not enough tension on the springs.

Don't fail to put back your wire gauze brushes in the breaker box when putting the breaker box back on the magneto.

Don't pull the wire spring which is under the hexagon nut on the plate between the magnets.

Don't pull out your switch plug until after you have placed your switch on the off-point.

Only a severe accident can prevent the perfect operation of the Ford magneto. If one occurs, demagnetizing the magnets, perhaps by a short circuit in the coil switch or in the wires in the bottom of the coil box, have your dealer re-charge them. On pages 8 and 9 we tell you how to do it, but our famous Ford service, reaching to every corner of the globe and including thousands of dealers, is maintained to supply prompt and effective attention for just such emergencies.

CARBURETOR

Trouble in the carburetor causes misfiring or loss of power in the engine, and we will describe some possible carburetor difficulties and their causes.

Dirt or water in the carburetor, obstructed feed pipe, clogged spraying nozzle, bent or grooved adjusting needle, a too lean mixture (too much air for the gasoline), or a too rich mixture, a fuel soaked float, or a poor grade of gasoline, will cause misfiring.

A rich mixture will not only quickly foul up the cylinders, pistons and valves with soot, but will tend to over-heat the cylinders, and is likewise wasteful of the fuel. It will often choke the engine and cause misfiring at slow speeds, although at high speeds the machine will run perfectly. The mixture should be kept as lean as possible and at the same time obtain the full power of the motor.

A too weak mixture will often result in back-firing through the carburetor, for the reason that the gas burns slowly in the cylinder, and is still burning when the inlet valve opens again, which causes the gas in the intake pipe to ignite.

The usual method of regulating the carburetor is to start the motor, advancing the throttle lever to about the sixth notch with the spark retarded. The flow of gasoline should now be

cut off by screwing down the needle valve until the engine begins to misfire; then gradually increase the gasoline feed by opening the needle valve until the motor picks up and reaches its highest speed, and until no trace of back smoke comes from the exhaust. Having determined the point where the motor runs at its maximum speed, the needle valve binding screw should be tightened to prevent the adjustment being disturbed.

If the cork float has become fuel-soaked it should be removed and thoroughly dried out, and then given a couple of coats of shellac varnish to make it waterproof. If the float is adjusted too low, starting will be difficult, if too high it will cause the carburetor to flood or leak.

The spraying nozzle having a very small opening, a minute particle of grit or other foreign matter may clog up the orifice, particularly if the motor is running at considerable speed, and cause misfiring. The reason for this is because at high speeds the increased suction will draw particles of dirt, etc., into the nozzle, whereas at slow speed the suction is not enough to raise this sediment. In any case if the valve seat is rough, it should be ground by applying a little pumice or fine emery and oil to the seat and rotating the needle valve until both are smooth and bright. A needle valve which has been grooved by a rough valve seat may be smoothed off with a fine file.

The presence of water in the carburetor or in the gasoline tank, even in small amounts, will cause the motor to misfire and stop. As water is heavier than gasoline it settles at the bottom of the tank and into the sediment bulb along with other foreign matter. It is therefore a good plan to occasionally drain the tank by opening the pet cock at the bottom of the sediment bulb. This will prevent the possibility of an over-accumulation of waste matter which might otherwise work down into the carburetor. The careful driver will strain the gasoline through chamois skin when filling the tank. The Ford carburetor is the best money will buy.

GENERAL SPECIFICATIONS

BRAKES—Two sets: (a) Service band brake operates on the transmission and is controlled by a foot pedal; (b) Emergency brake is controlled by hand lever at side of car acting on the drums of rear wheels.

CLUTCH—Multiple steel discs, operating in oil.

CONTROL—Three foot pedals. By pressing the first pedal "C" the slow speed is applied; by releasing, it is in the high speed. The center pedal "R" is for reversing the car. The third pedal "B" is the brake. The Ford Model T can be entirely manipulated either by use of the pedals or by the controlling lever at the side of the car.

COOLING—Thermo-syphon and fan.

CRANK CASE—Upper half integral with cylinder casting. Lower half of pressed steel and extended to form lower housing for magneto and transmission.

EQUIPMENT—The Touring Car, Torpedo Runabout, Open Runabout and Roadster include at the fully equipped prices, a top, automatic brass windshield, speedometer, two gas lamps, generator, three oil lamps, tubular horn and a kit of tools. The Town Car and Coupe equipment includes three oil lamps, tubular horn and tools only.

FINAL DRIVE—By cardon shaft with single universal joint to bevel drive gears in live rear axle. Ford three-point system (patented in all countries) with all moving parts enclosed in dust proof casings, running in oil. Vanadium steel throughout.

FRONT AXLE—One piece drop forging in I-beam section, specially heat treated Vanadium steel.

IGNITION—Alternating current magneto, but with no moving parts. Entirely enclosed as an integral part of the engine and running in oil. The Ford magneto always insures a powerful spark. No batteries or dry cells are required.

LUBRICATION—Combination splash and gravity system—simple and effective.

MOTOR—Four cylinders, four-cycle, 20 h. p., 3 $\frac{3}{4}$ -inch bore, 4-inch stroke.

SHAFTS—Crank and cam, non-welded, drop-forged, heat-treated Ford Vanadium steel, with all surfaces ground to absolute accuracy.

SPRINGS—Front and rear, semi-elliptical transverse, all Vanadium.

STEERING—By Ford reduction gear system.

TIRES—Pneumatic; front 30x3 inches, rear 30x3 $\frac{1}{2}$ inches. Standard makes. Best quality. Larger tires than ordinarily used for weight of the car, which means longest service and greatest comfort.

TRANSMISSION—New design Ford spur planetary, bathed in oil. All gears are of Vanadium steel, silent and smooth running in action.

VALVES—Extra large, all on the right side and offset.

WHEEL BASE—100 inches; tread 56 inches; 60-inch tread for Southern trade when ordered.

All prices are f. o. b. Detroit

Ford Motor Company

General Offices and Main Factory

Detroit, U. S. A.

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