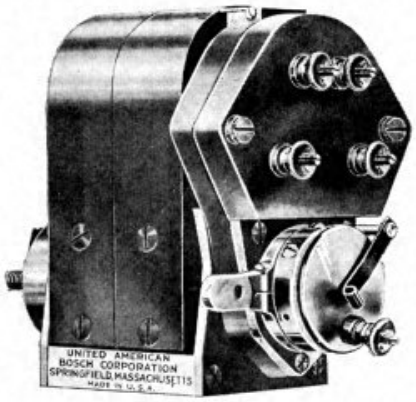
AMERICAN BOSCH
PRODUCTS

REPAIR INSTRUCTIONS FOR AMERICAN BOSCH HIGH TENSION MAGNETO TYPE DU

TRADE MARK AMERICAN BOSCH

The Types DU4/2, DU4 and DU6 Magnetos are of the high tension series, and are used respectively on two, four and six-cylinder engines of the automobile type, in motor car, marine, tractor and stationary service.



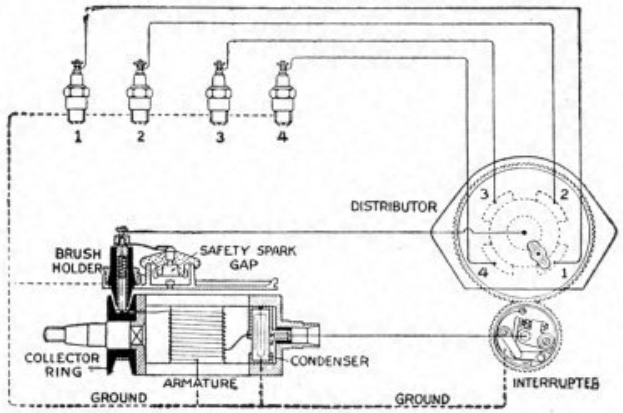
The Type DU magnetos are usually employed as sole ignition on an engine, or, in some cases, in connection with a battery system operating on a separate set of spark plugs. The DU magnetos, without alteration, are also employed to provide battery and magneto ignition on one set of spark plugs, this being accomplished by means of the American Bosch Vibrating Duplex Ignition System, a separate booklet describing which may be had on request. The American Bosch Independent Magnetos, DU type, are those described in this booklet.

Generation of Current

Like other American Bosch High Tension Magnetos, the type DU generate their own high tension current directly in the magneto armature (the rotating member of the magneto), without the aid of a separate step-up coil, and have their timer and distributor integral.

The armature winding is composed of two sizes of wire, one size comparatively heavy and the other very fine. The heavy wire is the primary or low tension circuit, and the very fine wire, the secondary or high tension circuit.

The rotation of the armature between the poles of strong permanent magnets creates or induces a current in the armature primary circuit, and this is further augmented at every 180° revolution of the armature shaft by the abrupt interruption of the primary circuit by means of the magneto interrupter. At the opening of the primary circuit, the resulting discharge of current from that circuit induces a current of high voltage in the armature secondary circuit. The high tension current thus created is collected by the collector ring on the armature and passed to the collector brush, then to the various magneto distributor terminals,



Circuit Diagram Type DU-4 Magneto

Note: Spark plugs must be connected in accordance with firing order of engine.

each of which is connected by cable to the spark plug in its respective cylinder.

Safety Spark Gap

In order to protect the armature and other current carrying parts, a safety spark gap is provided.

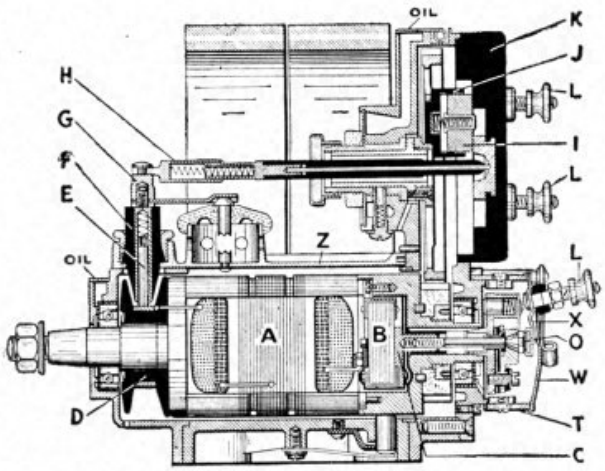
The safety spark gap is arranged on the dust cover over the armature, and consists of two short pointed electrodes supported a short distance from each other; one electrode is set on the dust cover itself and inclosed by a metal and wire gauze housing, while the other, an insulated electrode, is set in the center of the steatite cover of the safety spark gap housing and connected into the secondary circuit of the magneto.

Under ordinary conditions, the current will follow its normal path to the spark plug, but if for any reason the electrical resistance in the secondary circuit is increased to a high point, as when a cable becomes disconnected or a spark plug gap too wide, the high tension current will discharge across the safety gap.

The current should never be allowed to pass across the safety spark gap for any length of time, and if the engine is operated on a second or auxiliary ignition system, the magneto must be grounded in order to prevent the production of high tension current. The snapping sound by which the passage of the current across the safety gap may be noted should always lead to an immediate search for the cause of the difficulty.

Timing Range

The magneto interrupter housing is arranged so that it may be rotated through an angle of about 20° to 35° with respect to the armature shaft. The movement of this housing in one direction or the other causes the interrupter lever to strike the steel cams earlier or later in the revolution of the arma-



Vertical Section of DU4 Magneto

A Armature.
B Condenser.
C Condenser connection plate of armature primary circuit.
D Collector ring.
E Collector brush.
F Collector brush-holder.
G Collector brush-holder cap nut.
H Conducting rod.
I Distributor brush.
J Distributor brush-holder.
K Distributor plate.
L Terminal nut.
M Interrupter disc.
N Contact block.
O Interrupter fastening screw.
P Contact screw—long.
Q Contact screw—short.
R Interrupter lever.
S Interrupter operating spring.
T Interrupter housing.
U Interrupter housing control arm.
V Interrupter cam.
W End cap.
X End cap contact spring with brush.
Y Holding post spring.
Z Dust cover.

ture, the spark occurring correspondingly earlier or later in the stroke of the piston.

The spark can be advanced by moving the interrupter housing, by means of the timing control arm, in the direction opposite the rotation of the armature, and can be retarded by moving the interrupter housing in the same direction as the rotation of the armature. The armature rotation is indicated by the arrow on the oil well cover at the driving shaft end of the magneto.

Cutting Out the Ignition

An insulated grounding terminal is provided on the end cap, with its inner end consisting of a spring with carbon contact, pressing against the head of the interrupter fastening screw. The outer end of the grounding terminal is connected by low tension cable to one side of the switch, and the other side of the switch is grounded by connecting another cable between it and the engine or chassis.

When the switch is open, the primary current follows its normal path across the platinum interrupter contacts and is interrupted at each separation of these contacts; however, when the switch is closed, the primary current passes from the head of the interrupter fastening screw to the carbon contact of the grounding terminal, thence through the switch to the engine and back to the magneto, and as the primary current remains uninterrupted when following this path, no ignition current is produced.

Care and Maintenance

Aside from keeping the magneto clean externally, practically the only care required is the oiling of the bearings; of these, there are two ball bearings supporting the armature, and a single plain bearing supporting the shaft of the distributor gear.

Any good, light engine oil may be used for this purpose, and each of the bearings should receive not more than two or three drops about every 500 miles, applied through the oil ducts under the covers marked "Oil" located at both ends of the magneto.

The interrupter is intended to operate without lubrication, and as oil on the platinum interrupter contact will prevent good contact, cause sparking and burning, as well as misfiring, care should be exercised to prevent the entrance of oil to these parts.

STARTING THE ENGINE: When cranking an engine equipped with a DU magneto as sole ignition, the spark lever may be safely advanced about one-third, or even one-half on starter equipped engines, and in this position will permit easier starting.

Trouble—Cause and Remedy

Ignition difficulties may be divided into two main classes, one due to spark plugs and cables, and the other due to the magneto. In case of defective ignition, therefore, it must first be determined whether the fault is in the magneto or elsewhere.

In general, when only one cylinder misfires, the fault is in the spark plug, the most common plug difficulties being as follows:

PLUG GAP TOO WIDE: The distance between the electrodes of the spark plugs varies according to the individuality of the engine, but normally this distance should not be less than 1/50th inch. On the other hand, too wide a gap increases the electrical resistance, and interferes with the proper generation of current at low speed.

PLUG SHORT CIRCUITED: This is usually caused by a cracked or porous insulator, or by fouling of the electrodes or insulator. Any of these conditions will cause misfiring by permitting the current to stray from its intended path.

Other Faults

CABLES: Misfiring of one cylinder, either continuous or intermittent, may be due also to a chafed or broken cable or a loose cable connection. The cables should be carefully examined, special attention being paid to the insulation. The metal terminals of the cable must not come into contact with any part of the magneto except the terminals on the distributor plate and end cap or any metal parts of the engine except those designated as being correct according to the instructions given.

IGNITION FAILS SUDDENLY: A sudden failure of ignition may indicate a short circuit in the low tension cable, due to a defect in the cable, to a faulty connection at the switch or to the presence of dirt or moisture. A test for trouble in the switch or low tension cable can be made by removing the cable from the grounding terminal on the end cap and endeavoring to start the engine on the magneto. If the engine runs with this wire disconnected, but stops when the wire is connected, it is evident the magneto is in good order and that the trouble is due to some fault in the switch or grounding wire permitting the low tension current to escape to ground.

IRREGULAR FIRING: If the cables and plugs are in good condition, and yet the ignition is irregular, the trouble is probably with the magneto, and the interrupter should be carefully examined. It should be seen that the interrupter lever moves freely on its pivot, that the hexagon headed fastening screw in the center of the interrupter is properly tightened, and also that the two platinum interrupter contacts are properly secured in position.

If the interrupter lever does not move freely on its pivot, which is sometimes possible, particularly with new magnetos, the hole in the fibre bushing in which the lever pivots, may be slightly enlarged by means of a reamer or

small round file; this work, however, should be carefully done as very little reaming accomplishes the desired result.

PLATINUM INTERRUPTER CONTACTS: The platinum interrupter contacts should be examined for the correctness of their adjustment, and they should be so set that they are separated by a distance of 0.4 of a millimeter (about 1/64th inch) when the interrupter lever is resting on either of the segments in the interrupter housing. The strip of steel attached to the magneto adjusting wrench, which is furnished with each magneto, is to be used as a gauge for this distance. The adjustment of the platinum interrupter contacts may be made by loosening the lock-nut of the long contact screw, which passes through the interrupter contact block, and turning the hexagon head of the screw itself with magneto adjusting wrench. When the adjustment is made, care should be taken to tighten the lock-nut firmly. The platinum contacts of the interrupter should be clean and in proper alignment. If any oil, grease or dirt is deposited on them it can be removed by drawing a piece of cloth or paper between them while they are together or, if they are pitted too much, a cloth dampened with gasoline may be used. If the latter method is used care must be taken that the points are absolutely dry before attempting to operate the magneto. If the points are uneven or in bad condition (but only then) they may be smoothed by means of a fine, flat jeweler's file.

The interrupter may be taken out as a unit by removing the interrupter housing and removing the hexagon headed fastening screw in the center of the interrupter with the magneto adjusting wrench.

INSULATING PARTS: As it sometimes happens, brush holders and other insulating parts of the magneto are damaged through accident or carelessness. These parts should also be carefully examined for possible disarrangement or damage of the insulation which might permit leakage of current. In order to prevent leakage by the brush holders, distributor plate or other insulating parts, it is necessary to clean them occasionally with a soft cloth saturated with gasoline. After cleaning these parts the magneto should not be operated until it is thoroughly dry.

Installation of Magneto

DRIVING METHOD — DRIVING SPEED

Since the magneto produces an ignition spark only at certain definite points in the rotation of its armature, it must be connected to the engine in such a manner that the spark is available always at the instant when required in the cylinder, i. e., about top dead center of the compression stroke. The magneto, therefore, must be positively driven from the engine by a method of drive that will eliminate slippage; coupling drive is preferable but gear drive can be used. Belt or friction drive cannot be used.

The Type DU6 magneto, producing two sparks per revolution of its armature shaft, must be driven at one and one-half times engine speed for six-cylinder, four-cycle engines, and at three times engine speed for six-cylinder, two-cycle engines. The Type DU4 must be driven at engine speed (crank shaft speed) for four-cylinder, four-cycle engines, and at twice engine speed for four-cylinder, two-cycle engines.

The Type DU4/2, 360°, is intended to be operated at engine speed on two-cylinder, four-cycle engines, the cylinders of which fire alternately every 360° revolution of the crank shaft; for two-cylinder, two-cycle engines, this type must be driven at twice engine speed. The type DU4/2, 180°, for two-cylinder, four-cycle engines, the cylinders of which fire at intervals of 180° and 540°, must be operated at engine speed.

DIRECTION OF ROTATION: The Type DU magnetos are designed to run in two directions, that is, clockwise or anticlockwise, as viewed from the shaft end of the magneto. The direction in which each magneto is designed to run is indicated by an arrow on the oil hole cover at the shaft end of the magneto.

Timing the Magneto

With the average four or two-cycle engine, the proper operating results are obtained by timing the magneto as follows:

The crank shaft is rotated to bring the piston of No. 1 cylinder (in automobile practice this is the cylinder nearest the radiator) exactly on top dead center of the compression stroke, and the piston is to be maintained in that position. The magneto is then to be secured to the bracket or bed on the engine, and the control arm on the interrupter housing placed in the fully retarded position.

With that done, distributor plate should be removed by withdrawing the two holding screws, or releasing the two catch springs, as the case may be, thus exposing the distributor gear and brush. The cover of the magneto interrupter housing is also to be removed to permit observation of the interrupter.

The armature should then be rotated by means of the exposed distributor gear in the direction in which it is to be driven, until the platinum interrupter contacts are just about to separate, which occurs when the interrupter lever begins to bear against one of the steel interrupter cams.

The armature should be held in that position while the magneto drive is connected to the engine, due care being taken that the piston of No. 1 cylinder is still exactly on top dead center of the compression stroke. The installation is completed by replacing the interrupter housing cover and distributor plate, and connecting the cables between the magneto and spark plugs.

EXACT MAGNETO TIMING: The foregoing will establish the desired relationship between the magneto armature and the engine crank shaft. It should be noted, however, that while these instructions covers the average engine, the exact magneto timing for individual engines is best determined by trial. Where specific instructions for magneto timing are given by the engine manufacturers, it is recommended that they be followed in preference to those herein given.

AMERICAN-BOSCH PRODUCTS
Made by UNITED AMERICAN BOSCH CORPORATION, SPRINGFIELD, MASS., U.S.A.

CONVERSION PARTS

for making

2- and 3-CYLINDER MJ MAGNETO TYPES

from 4- and 6-cylinder types in Type Builders.

MJA 4/2 (180°)B—All Variations

Same as 4-cyl. types except: Use Distributor Plate..... **DP5217**

MJA 4/2 (360°)B—All Variations

Same as 4-cyl. types except: Use Distributor Plate..... **DP5212**
Use Magnet Rotor Cam..... **CA528**

MJA 6/2 (360°)B—All Variations

Same as 6-cyl. types except: Use Distributor Plate..... **DP5214**
Use Magnet Rotor Cam..... **CA528**

NOTE: The Conversion Parts for making all 2- and 3-cyl. MJA types, as shown above, are supplied in—
"A-2 & 3 cyl. Conversion Kit"—see Manual p. 5h

MJB 4/2 (180°)A—All Variations

Same as 4-cyl. types except: Use Distributor Plate..... **DP5242**

MJB 4/2 (360°)A—All Variations

Same as 4-cyl. types except: Use Distributor Plate..... **DP5213**
Use Magnet Rotor Cam..... **CA524**

MJB 6/2 (360°)A—All Variations

Same as 6-cyl. types except: Use Distributor Plate..... **DP5241**
Use Magnet Rotor Cam..... **CA524**

NOTE: The Conversion Parts for making all 2-cyl. (only) MJB types, as shown above, are supplied in—
"B-2 cyl. Conversion Kit"—see Manual p. 5h

		MJC 4/2 (180°)A Same as 4-cyl. types except:	**MJC 4/2 (360°)A** Same as 4-cyl. types except:		**MJC 6/2 (360°)A** Same as 6-cyl. types except:	
ROTATION	TIMING RANGE	DISTRIBUTOR PLATE	DISTRIBUTOR PLATE	MAGNET ROTOR	DISTRIBUTOR PLATE	MAGNET ROTOR
Aclw.	Fixed	DP5265	DP5259	RT5238	DP5262	RT5238
Clw.	Fixed	DP5265	DP5259	RT5239	DP5262	RT5240
Aclw.	20°	DP5264	DP5261	RT5238	DP5263	RT5238
Clw.	20°	DP5264	DP5261	RT5239	DP5263	RT5240

NOTE: The Conversion Parts for making all 2-cyl. (only) MJC types, as shown above, are supplied in—
"C-2 cyl. Conversion Kit"—see Manual p. 5h