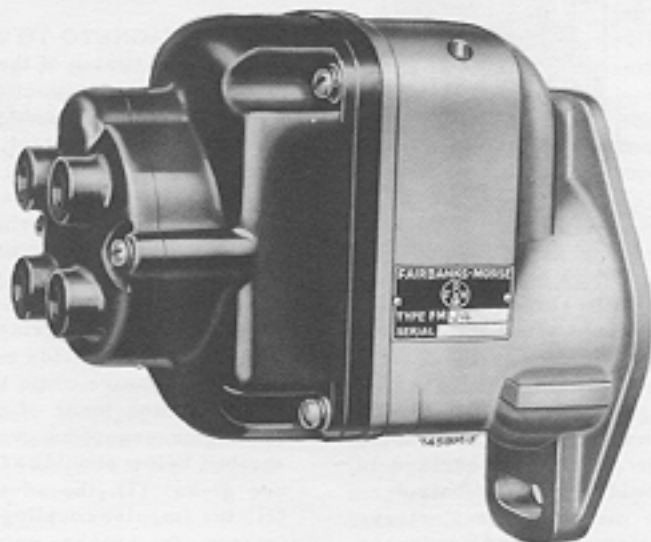


FAIRBANKS-MORSE**TYPES FM-J4A AND FM-J4B MAGNETOS****Field Service and Adjustment Information****GENERAL DESCRIPTION**

Modern ignition systems are carefully designed to provide quick, easy starting and maximum dependability of operation without adjustment or service. Through advanced engineering, together with sturdy construction, Fairbanks-Morse Type FM-J magnetos have become field performance leaders. Especially compact in assembly, the powerful Alnico rotor assures an intensely hot spark even under the most difficult operating conditions. Field adjustments are rarely necessary and, although very simple, they should be made only in accordance with the following instructions.

SERVICE PROCEDURE

Improper functioning of the magneto is often believed to be the cause of much engine trouble arising from other sources, such as a flooded carburetor, an obstructed air intake, defective ignition connections, or corroded spark plug points. Since a brief engine inspection will often locate the trouble before the magneto is reached, it prevents maladjustment of magneto parts in good condition. It is suggested that the magneto be opened only when it is certain that the ignition spark produced is unsatisfactory. This condition may be determined by simple tests which are easily made in the field.

TESTING THE IGNITION SPARK

With properly adjusted spark plugs in good condition, the ignition spark should be strong enough to bridge a short gap in addition to the actual spark plug discharge. This may be determined with the engine running by holding the end of the ignition cable not more than 1/16 in. away from the spark plug terminal, taking the usual precautions against electric shock. The engine should not misfire when this test is made. However, ignition tests made while any part of the system is wet are useless.

TESTING THE MAGNETO SPARK

Tag the ignition cables to insure their proper replacement in the end cap cover; then remove them from their respective sockets and insert a short, stiff wire in one of the sockets. Bend this wire to within 1/8 in. of

the engine block. Turn the engine over slowly two complete revolutions and watch carefully for the spark discharge which should occur once during the cycle at the instant the impulse coupling releases. Repeat this test with the wire in each of the other sockets. If a strong spark is observed with the wire in each socket, it is recommended that the magneto be eliminated as the source of difficulty and that the cables, terminals, and spark plugs be thoroughly inspected. If no spark occurs, the ignition switch should be examined to make certain it has not accidentally become closed.

END CAP COVER REMOVAL

If no spark is obtained from one or more of the magneto terminals, remove the end cap cover, taking care not to damage the gasket attached to the cover side of the joint. Remove the distributor rotor and clean the distributor compartment thoroughly, observing whether the air passages are open or clogged. It is very important that these air passages be kept free of dirt and other foreign matter. If these passages are obstructed for any appreciable length of time, corrosion of all metal parts within the end cap will result. Examine the high-tension lead brush and replace it if noticeably worn or damaged. This brush should move freely in its holder and should be under slight spring pressure.

SERVICE OF BREAKER POINTS

Before examining the breaker points, it is first necessary to remove the end cap, which is sealed to the metal frame by a gasket joint. The breaker points should then be inspected for evidence of pitting or pyramiding. A small tungsten file or fine stone may be used to resurface the points except in the case of badly worn or pitted points, which should be replaced. If it is necessary to resurface or replace the breaker points, it will also be necessary to readjust them to their proper clearance, which is 0.020 in. at full separation. This adjustment is made by loosening the round head locking screw at the upper end of the stationary point bracket, turning the eccentric head adjusting screw until the proper clearance is obtained, and locking the assembly in place.

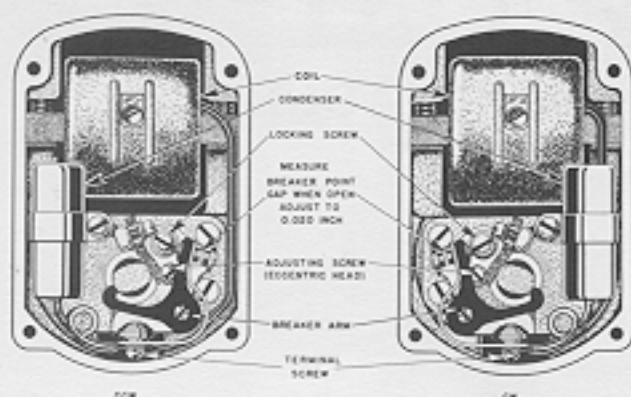


Fig. 1. End Views of Type FM-J4 Magneto.

by tightening the locking screw. A final measurement of the breaker point gap should be made after the locking screw is tightened. See Fig. 1.

The cam felt wick, if dry or hard, should be replaced by a new factory-impregnated wick. Other than this, Types FM-J4 magnetos do not require field lubrication and any attempt to oil or grease the bearings is inadvisable. The lubricants should be renewed only during a complete overhaul of the magneto by a Factory-Authorized Magneto Service Station. Coil and condenser replacements, while simple, are not recommended unless test equipment is available. Under no circumstances should any attempt be made to remove the magnetic rotor from the frame; it is locked in a special drive end thrust bearing and specific instructions must be carefully followed in releasing the shaft.

REASSEMBLY AND SEALING

Before mounting the end cap onto the frame, the rotation of the magneto must be determined; this can be quickly ascertained by referring to Fig. 2. Rotation is clockwise when the condenser is mounted to the right of the pinion, and counterclockwise when mounted to the left. The breaker point assembly also changes its location, but for simplicity, this detail has been blocked out in the drawing. The gear teeth are marked to facilitate the internal timing of the magneto. For clockwise rotation the single marked tooth of the pinion must mesh between the two marked teeth of the distributor gear designated by the letter C. For counterclockwise rotation, the marked tooth of the pinion must mesh between the two marked teeth of the distributor gear designated by the letter A.

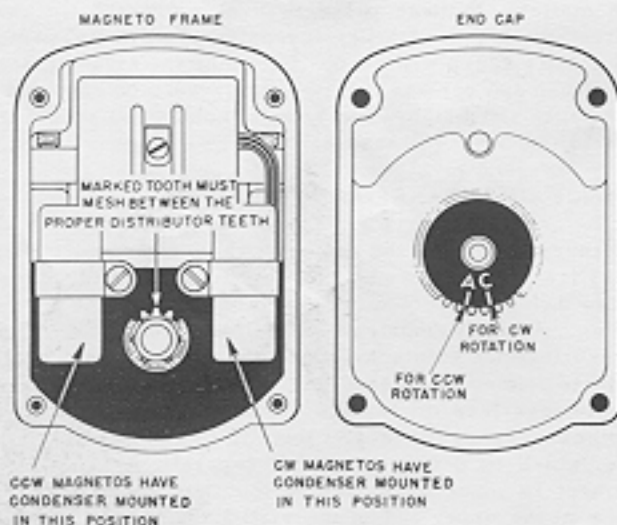


Fig. 2. Internal Timing.

Before replacing the end cap on the magneto frame, clean the contact surfaces between the cap and the frame. Then coat both contact surfaces completely with Fairbanks-Morse FMCO2 Gasket Varnish, place a new gasket in the joint, and mount the end cap on the frame, tightening the four screws securely.

TIMING MAGNETO TO ENGINE

Proper timing of the magneto to the engine produces an ignition spark in each cylinder at the exact instant that the fuel mixture should be ignited for best engine performance. This instant, which is accurately determined by the engine designers, is usually designated as a given number of degrees of angular travel of the crankshaft before the piston reaches its uppermost position in the cylinder during the compression stroke. When starting the engine, however, it is advisable to retard the ignition spark until it occurs late enough in the cycle to avoid the possibility of backfiring. Impulse couplings furnished with modern magnetos automatically provide this spark-retarding feature while the engine is being started.

The importance of correctly timing the magneto to the engine cannot be overemphasized, and the steps described below should be followed carefully. Two methods are given: (1), the advance spark position method and (2), the impulse coupling trip method. Whichever method is used, the breaker points must first be accurately adjusted to secure proper timing of the ignition spark.

(1) Advance Spark Position Method

A. Magneto

Set the magneto for advance spark position in the No. 1 cylinder. This is done by turning the rotor from the coupling end in the direction OPPOSITE to that of normal operation until the distributor contact lines up exactly with the timing boss as indicated by the dotted lines in the timing diagram shown in Fig. 3. The magneto is now timed for advance spark position in the No. 1 cylinder and should be held exactly in this position until it is coupled to the engine.



Fig. 3. Timing Diagram.

Refer to the engine instruction book for details concerning the timing marks of your particular engine. Then rotate the crankshaft until the timing marks coincide, indicating that the No. 1 cylinder is in advance-spark firing position. Be sure that the piston is on its compression stroke.

(2) Impulse Coupling Trip Method

A. Magneto

Remount the end cap cover on the end cap, following the same procedure used in sealing the joint between the end cap and the magneto frame. Next, set the magneto for spark discharge to the No. 1 terminal. This may be accomplished by use of a short, stiff length of wire placed in the No. 1 socket and bent to within 1/8 in. of the magneto frame. Then turn the magnetic rotor from the impulse coupling end in its normal direction of rotation until a spark is observed between the wire and the frame. Hold the coupling in the position in which the trip occurred.

B. Engine

Remove the spark plug, or otherwise determine top dead center for the piston in the No. 1 cylinder. Then turn the engine over until this position is reached, being certain that the piston is just at the end of its compression stroke.

COUPLING MAGNETO TO ENGINE

Without disturbing the setting of either magneto or engine as determined by method (1) or (2) above, couple the magneto to the engine in the following manner:

(1) Flange Mounting Magnetos

Engage the drive lugs of the impulse coupling with the driving slots of the engine drive member. A slight movement of the engine flywheel may be necessary to secure accurate alignment. Tighten capscrews and nuts securely.

(2) Base Mounting Magnetos

If no change has been made in the position of the drive member, it is necessary only to engage the drive lugs of the impulse coupling with the drive slots of the float disc. Be sure that the shaft assembly is aligned before securing the base mounting screws.

ADJUSTABLE DRIVE MEMBERS

Most engines using base mounting magnetos are equipped with adjustable drive members. Ordinarily the position of the drive member is not altered when removing the magneto, but when necessary, the drive collar nut L (See Fig. 4) can be loosened to permit relative movement of the engine drive shaft in collar K. The drive member slots J can then be turned for alignment

with the impulse coupling lugs, after which the nut L should be tightened. The locking lugs M of the washer should be turned up around the nut to prevent its becoming loose.

IMPULSE COUPLING

The impulse coupling is used to facilitate starting of the engine by automatically retarding the ignition spark during the starting operation and at the same time producing an intense, hot spark which would otherwise be impossible at very low engine speeds. By means of this device the rotor of the magneto is prevented from turning during the starting operation until the piston in the engine is approximately at top dead center, at which instant the rotor is snapped forward at very high speed, producing an intense spark which is automatically retarded to prevent backfiring. The impulse feature disengages as soon as the engine develops speed, after which the coupling serves as a conventional drive member. A characteristic snap as the impulse coupling releases usually indicates that it is functioning satisfactorily. Couplings may be cleaned in kerosene and lubricated with a medium engine oil, but if functioning improperly, they should be taken, together with the magneto, to an Authorized Fairbanks-Morse Magneto Service Station.

MAGNETO SERVICE FACILITIES

Authorized Fairbanks-Morse Magneto Service Stations, located throughout the United States and foreign countries, have been carefully selected by Fairbanks, Morse & Co. to insure highly efficient and complete repair service to owners of Fairbanks-Morse magnetos. These service stations, which are specially equipped for magneto repair and manned by highly-trained personnel, maintain close contact with the factory service and engineering departments. The station most convenient may be located by use of Bulletin FM18D, which is available upon request.

Genuine Fairbanks-Morse magneto replacement parts, which may be obtained from all Authorized Service Stations, should always be insisted upon for repairs. The use of spurious parts usually proves less satisfactory and economical, in addition to voiding the manufacturer's warranty.

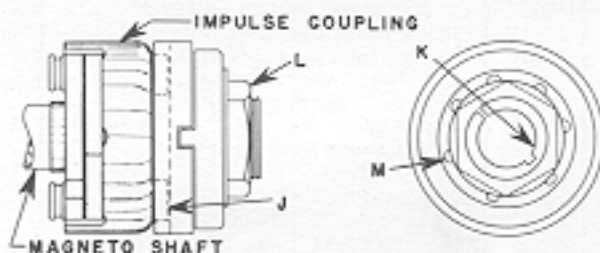
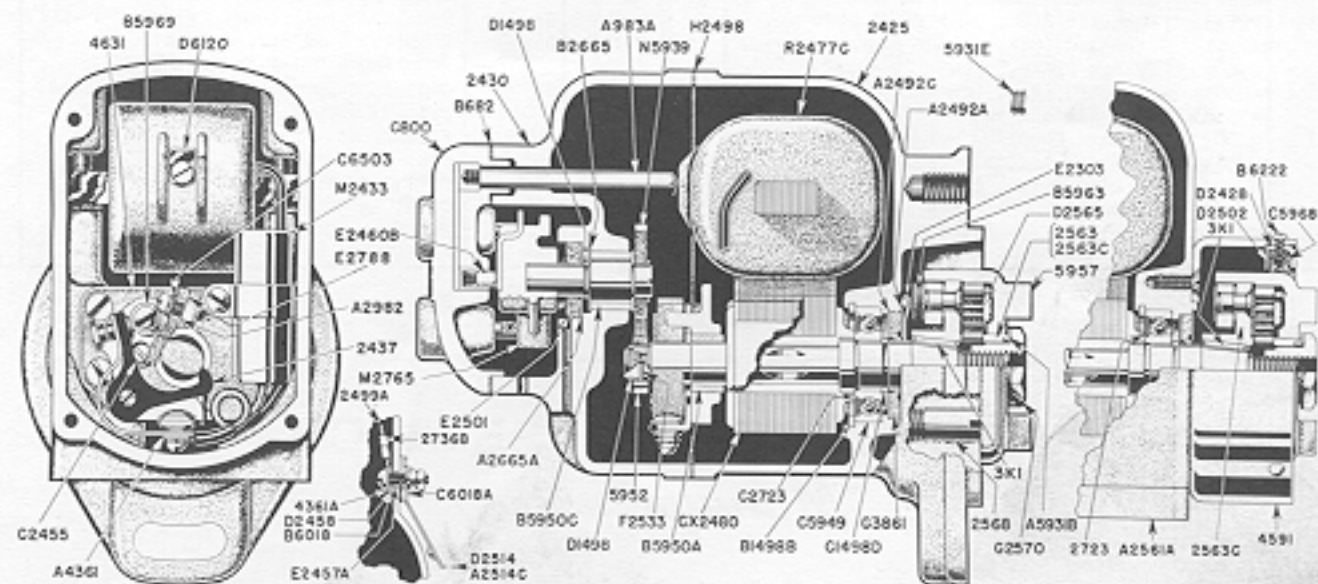


Fig. 4. Drive Member for Base Mounting Magnetos.

REPAIR CHART - TYPE FM-J4 MAGNETOS

Please turn the page.

| Identi- fication Number | Order by Part Number | Name of Part. Unless otherwise spec- ified, part is for both base and flange, CW and CCW magnetos. | No. Used | Identi- fication Number | Order by Part Number | Name of Part. Unless otherwise spec- ified, part is for both base and flange, CW and CCW magnetos. | No. Used |
|-------------------------------|---|--|-------------|-------------------------------|-----------------------------------|--|-------------|
| B582 | B582 | End Cap Cover Gasket | 1 | | S2563 | Impulse Coupling Hub (UBL, CW) . . . | 1 |
| C800 | C800 | End Cap Cover | 1 | | (S2563 inc. B5963) | | |
| | B593A | End Cap Cover Screw (#8-32x9/16") | 2 | | S2563C | Coupling Assembly (UBL, CW, Flange) . | 1 |
| A983A | A983A | Distributor High Tension Lead Rod . | 1 | | (S2563C inc. S2563, D2565, N5957) | | |
| B1498B | B1498B | Magnetic Rotor Bearing Snap Ring . . | 1 | | T2563C | Coupling Assembly (UA, CW, Base) . . | 1 |
| C1498B | C1498B | Rotor Drive End Shaft Snap Ring . . | 1 | | (T2563C inc. Q2563, D2565, Q5957) | | |
| D1498 | D1498 | Distributor Shaft Snap Ring | 1 | | U2563C | Coupling Assembly (UAL, CCW, Base) . | 1 |
| D1498 | D1498 | Magnetic Rotor Gear Snap Ring | 1 | | (U2563C inc. R2563, D2565, P5957) | | |
| E2303 | E2303 | Oil Slinger Disc (Integral Flange) . . | 1 | D2565 | D2565 | Impulse Coupling Drive Spring | 1 |
| 2425 | AX2425 | Frame (Standard Integral Flange) . . | 1 | 2568 | G2568 | Cplg. Pawl Stop Pin (Int. Flange, CW) | 1 |
| | PX2425 | Frame (FM-J4A14. Special Base) . . | 1 | | D2568 | Cplg. Pawl Stop Pin (Int. Flange, CCW) | 1 |
| | V2425 | Frame (Use A2561 or A2561A Plates) . | 1 | | N2568 | Cplg. Pawl Stop Pin (Dem. Flange, CW) | 1 |
| | VX2425 | Frame (FM-J4B16S & FM-J4B16C) . . | 1 | | P2568 | Cplg. Pawl Stop Pin (Dem. Flange, CCW) | 1 |
| D2428 | D2428 | Coupling Housing Cupped Washer (Base) | 1 | G2570 | G2570 | Impulse Coupling Nut (Series U) . . . | 1 |
| 2430 | EX2430 | End Cap | 1 | A2665A | A2665A | Distributor Bearing Seal Washer . . . | 1 |
| | QX2430 | End Cap (FM-J4B5A) | 1 | B2665 | B2665 | Distributor Shaft Bearing Washer . . | 1 |
| | 10814A | End Cap Screw (#10-24x3/8") | 4 | C2723 | C2723 | Magnetic Rotor Brg. Shim (as needed) | 1 |
| M2433 | M2433 | Condenser | 1 | 2736B | E2736B | Primary Terminal Wire Tube (7") . . . | 1 |
| | B85N | Condenser Mtg. Screw (#8-32x5/16") | 1 | | G2736B | Primary Terminal Wire Tube (5") . . . | 1 |
| | 8LW3 | Condenser Mtg. Screw Lockwasher (#8) | 1 | M2765 | M2765 | Distributor Rotor | 1 |
| 2437 | B2437 | Breaker Point Set (CW) | 1 | E2788 | E2788 | Cam Felt Wick | 1 |
| | B2437 | Breaker Point Set (CCW) | 1 | | 686A | Cam Felt Wick Screw (#6-32x3/8") | 1 |
| | B85N | Breaker Arm Term. Screw (#8-32x5/16") | 1 | | 6LW2 | Cam Felt Wick Screw Lockwasher (#6) | 1 |
| | 8LW5 | Brkr. Arm Term. Screw Lockwasher (#8) | 1 | B2824 | B2824 | Rotor Bearing Insulating Strip* . . . | 1 |
| | B85N | Cont. Sup. Lock Screw (#8-32x5/16") | 1 | A2837 | A2837 | Demountable Flange Gasket | 1 |
| | 8LW3 | Cont. Sup. Lock Screw Lockwasher (#8) | 1 | A2982 | A2982 | Cam Felt Wick Spacer | 1 |
| C2455 | C2455 | Contact Support Adjusting Screw . . . | 1 | G3861 | G3861 | Magnetic Rotor Bearing Seal Washer . | 1 |
| E2457A | E2457A | Ground Screw Insulating Bushing . . | 1 | A4361 | A4361 | Lead Wire Terminal (#8 Screw) . . . | 3 |
| D2458 | D2458 | Primary Ground Screw Washer | 1 | A4361A | A4361A | Lead Wire Terminal (#6 Screw) . . . | 1 |
| E2460B | E2460B | Brush and Spring Assembly | 1 | 4591 | B4591 | Coupling Outer Shell (Base, CCW) . . | 1 |
| R2477C | R2477C | Coil Assembly | 1 | | C4591 | Coupling Outer Shell (Base, CW) . . . | 1 |
| | (R2477C inc. D6120, 683W) | | | | 2586G | Coupling Outer Shell Screw (Base) . . | 4 |
| | 258812A | Coil Bridge Setscrew (1/2-20x1/2") | 2 | 4631 | B4631 | Bearing Support Assembly (CW) . . . | 1 |
| CX2480 | CX2480 | Magnetic Rotor Assembly | 1 | | J4631 | Bearing Support Assembly (CCW) . . . | 1 |
| A2492A | A2492A | Rotor Drive End Seal Outer Washer . . | 1 | | 886G | Bearing Support Screw (#8-32x3/8") | 4 |
| A2492C | A2492C | Rotor Drive End Seal Inner Washer . . | 1 | A5931B | A5931B | Impulse Coupling Nut Lockwasher . . | 1 |
| | C2493 | Rotor Bearing Insulating Washer* . . | 1 | 5931E | A5931E | Flange Plate Setscrew (CW) | 1 |
| H2498 | H2498 | End Cap to Frame Gasket | 1 | | B5931E | Flange Plate Setscrew (CCW) | 1 |
| 2499A | B2499A | Primary Terminal Wire Assembly (7") | 1 | N5939 | N5939 | Distributor Shaft and Gear Assembly . | 1 |
| | (B2499A inc. E2736B, A4361, A4361A) | | | C5949 | C5949 | Rotor Ball Bearing (Drive End) . . . | 1 |
| | D2499A | Primary Terminal Wire Assembly (5") | 1 | B5950A | B5950A | Rotor Sleeve Bearing (Opp. Drive End) | 1 |
| | (D2499A inc. G2736B, A4361, A4361A) | | | B5950C | B5950C | Distributor Sleeve Bearing | 1 |
| E2501 | E2501 | Distributor Shaft Seal Washer | 1 | F5952 | F5952 | Rotor Pinion | 1 |
| D2502 | D2502 | Coupling Housing Flat Washer (Base) | 1 | 9957 | FX5957 | Coupling Shell (UBL7, CW) | 1 |
| A2514C | A2514C | Spring Lever Ground Switch Group . . | 1 | | GX5957 | Coupling Shell (UBL17, CCW) | 1 |
| | (A2514C inc. E2457A, D2458, D2514, B6018, C6018A, 6810N, 6N1, 6LW1) | | | | N5957 | Coupling Shell (UBL, CCW) | 1 |
| | | | | | N5957 | Coupling Shell (UB, UBL, CW) | 1 |
| D2514 | D2514 | Ground Switch Spring Lever | 1 | | F5957 | Coupling Shell (UAL, CCW) | 1 |
| | 6810N | Ground Switch Screw (#6-32x3/8") . . | 1 | | Q5957 | Coupling Shell (UA, CW) | 1 |
| | 6N1 | Ground Switch Nut (#6-32) | 2 | | T5957 | Coupling Shell (UAL5, CCW) | 1 |
| | 6LW1 | Ground Nut Lockwasher (#6) | 1 | | U5957 | Coupling Shell (UA5, CW) | 1 |
| F2533 | F2533 | Magnetic Rotor Gear Pin | 1 | | W5957 | Coupling Shell (UB7, CW) | 1 |
| | A2561 | Standard (SAE) Flange Plate | 1 | B5963 | B5963 | Coupling Pawl Spring (UBL) | 2 |
| | 2588G | Flange Plate Screw (1/2-20x1/2") . . | 4 | C5968 | C5968 | Coupling Housing Felt Washer (Base) . | 1 |
| A2561A | A2561A | Standard (SAE) Demountable Base Plate | 1 | B5969 | B5969 | Contact Support Locking Screw Washer | 1 |
| | A5812C | Base Plate Screw (1/2-20x1/2") | 2 | B6018 | B6018 | Primary Ground Insulating Washer . . | 1 |
| 2563 | Q2563 | Impulse Coupling Hub (UA & UB, CW) | 1 | C6018A | C6018A | Primary Ground Insulating Block . . . | 1 |
| 2563C | Q2563C | Coupling Assembly (UB, CW, Flange) . | 1 | D6120 | D6120 | Coil Clip | 1 |
| | (Q2563C inc. Q2563, D2565, N5957) | | | | 683W | Coil Clip Screw (#6-32x3/16") . . . | 1 |
| | R2563 | Impulse Coupling Hub (UAL & UBL, CCW) | 1 | B6222 | B6222 | Coupling Housing Washer Screw (Base) | 2 |
| | R2563C | Coupling Assembly (UBL, CCW, Flange) | 1 | C6503 | C6503 | Cam Felt Wick Holding Washer | 1 |
| | (R2563C inc. R2563, D2565, N5957) | | | 3K1 | 3K1 | Key (Rotor Shaft to Impulse Coupling) | 1 |

*Not used in magnetos manufactured after 1951 (Approx.).

Service stations please refer to last paragraph of Bulletin FM284 of Sept. 15, 1951.

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