Instructions No. 2850D
Supersedes Instructions No.2850C and 2888B

FAIRBANKS-MORSE

TYPES FM-J1 AND FM-JE1 MAGNETOS



Fig. 1. Type FM-J1 Magneto and Mountings.

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 ignition spark even under the most difficult operating conditions. Although field adjustments are simple, they are rarely necessary and should be made only in accordance with the following instructions.

APPLICATION

Types FM-J1 and FM-JE1 magnetos are intended for use on single cylinder engines requiring a 360° ignition spark interval. Available for either clockwise or counterclockwise rotation, these magnetos are built for both base and flange mounting, with the base-mounting units made suitable for both the 35- and 45-mm. shaft heights through the use of base adapter plates. On the magnetos with the 35-mm. shaft height the Type UC impulse coupling is standard equipment, while the 45-mm. unit is equipped with the Type UA2 coupling. Type FM-J1A magnetos are also furnished without impulse couplings. A two-pole magnetic rotor, together with a single lobe breaker cam, provides a single ignition spark per revolution. Magnetos on one cylinder engines usually operate at crankshaft speed.

SERVICE PROCEDURE

The table below gives a very logical procedure to follow when an engine fails to start, is hard to start, or misses in operation. Since the use of this table locates the trouble in many cases before the magneto is reached, it prevents all-too-common maladjustment of parts in good condition. Type FM-J magnetos are built in sealed housings which should be opened only when it is certain that the ignition spark produced is unsatisfactory. This condition may be determined through ignition spark tests which are easily made in the field.

TESTING THE IGNITION SPARK

With a properly adjusted spark plug 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 by holding the end of the ignition cable not more than 1/16 in. away from the spark plug terminal. The engine should not miss fire when this is done. Ignition tests made while any part of the system is wet are useless.

TESTING THE MAGNETO SPARK

Remove the ignition cable from the end cover socket and insert a short piece of stiff wire. Bend this wire to within 1/8 in. of the engine block. Turn the engine over slowly and watch carefully for the spark which should occur at the instant the impulse coupling re-

TROUBLE	POSSIBLE CAUSE	SUGGESTED REMEDY
A. Flooding	Hot or cold engine; over-rich fuel mixture.	Dry out cylinder; crank engine slowly with fuel shut off; or let engine stand idle for short interval.
B. Insufficient fuel or air	Empty fuel tank; clogged fuel supply line; clogged air intake.	Replenish fuel supply; clean fuel system and check carbureter; clean air intake system.
C. Ignition connections	Loose or corroded terminals; broken cable; short-circuited switch.	Clean or replace cable terminals; inspect soldered or clamped joints; test and replace cable; check ignition switch.
D. Spark plug	Corroded, worn, or damaged points; cracked or carbonized insulator.	New plug; clean points and insulator; adjust point gap to recommended opening; never attempt to adjust center electrode.
E. Magneto	Points, impulse coupling.	See instructions beginning "TESTING THE IGNITION SPARK".

leases. If a strong spark is observed, it is highly recommended that the magneto be eliminated as the source of difficulty and that the cable, terminals, and spark plug be thoroughly inspected.

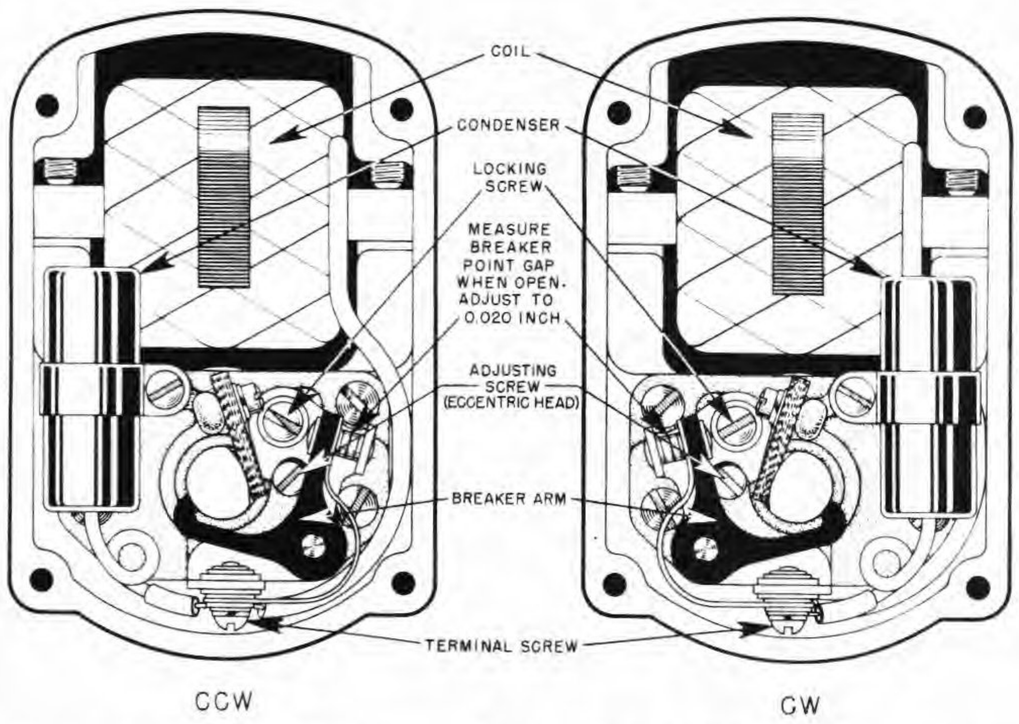


Fig. 2. End Views of Type FM-J1 Magneto.

SERVICE OF BREAKER POINTS

Remove the magneto end cover and compare the arrangement of parts with the drawings of Fig. 2. 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. Complete replacement, when necessary, can easily be made by removing the locking screw of the contact support bracket and the terminal screw, which frees the breaker arm. 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 locking screw, turning the eccentric head adjusting screw until the proper gap is obtained, and then retightening the locking screw. The cam felt wick, if dry or hard, should be replaced by a new factory-impregnated wick.

LUBRICATION AND BEARINGS

Lubrication of Type FM-J magnetos in the field is unnecessary and inadvisable. When a complete overhaul of the magneto is made by a Factory-Authorized Magneto Service Station, the lubricants will be renewed. Long, continued use of the magneto will eventually necessitate replacement of the sleeve bearing in the breaker plate, at which time its oil reservoir should be refilled. The grease-packed ball bearing of the drive end controls rotor thrust, and as the rotor is locked in this bearing, no attempt must ever be made to remove the rotor from the housing without specific, detailed instructions. Such work should always be done by trained service men.

REASSEMBLY AND SEALING

Type FM-J1 magnetos are sealed at the factory against the entry of dust and moisture through the use of a varnish-coated gasket joint. Opening the magneto for breaker point adjustment or other service necessitates resealing the magneto upon reassembly. The surfaces between the magneto frame and the end cap should be cleaned thoroughly, a new gasket should be provided, and the joint should be sealed with a coating of Special FMC02 Gasket Varnish.

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.

MAGNETO-TO-ENGINE TIMING

If the magneto has been removed from the engine, replacement necessitates accurate retiming. Directions given by the engine manufacturer should be followed closely, with careful attention being given to flywheel and gear markings. The retiming operation consists of rotating the magneto to the position at which the impulse spark occurs, turning the engine over until the piston reaches top dead center, and coupling the magneto to the engine without disturbing the setting of either. In applications in which the engine flywheel is marked for advance spark firing position, the magneto may also be turned to the advance spark position and coupled to the engine. The advance spark position may be ascertained for a single cylinder magneto by removing the end cap and turning the magneto rotor in the direction opposite to that of normal operation until the breaker points are just about to close. This method of finding the advance spark position eliminates the possibility of interference from the action of the impulse coupling.

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 shown in Fig. 3 may be loosened to permit movement of the drive collar in relation to the drive shaft collar. The drive collar may then be turned until the slots of the float disc become aligned with the impulse coupling lugs, after which the nut should be tightened securely and the locking lugs of the washer turned up to hold the nut in position.

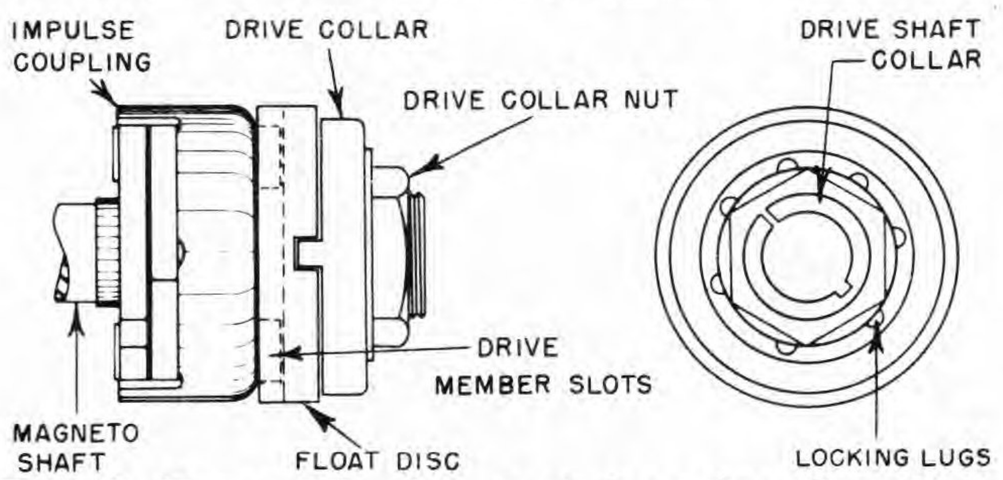


Fig. 3. Drive Member and Impulse Coupling Assembly for Base Mounting Magnetos.

RADIO-SHIELDED MAGNETOS

When conditions require complete radio shielding of the ignition system, a Type FM-JE magneto should be used. These units are similar in construction to standard models except that the plastic end cap is replaced by an all-metal cover through which the high tension lead is conducted by means of a special insulated socket so arranged as to permit simple connection of the shielded high-tension cable.

MAGNETO SERVICE FACILITIES

Factory-Authorized Magneto Service Stations, located throughout the United States and foreign countries, have been carefully selected by Fairbanks, Morse & Co. in order to assure highly efficient inspection and 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 a directory of Factory-Authorized Magneto Service Sta-

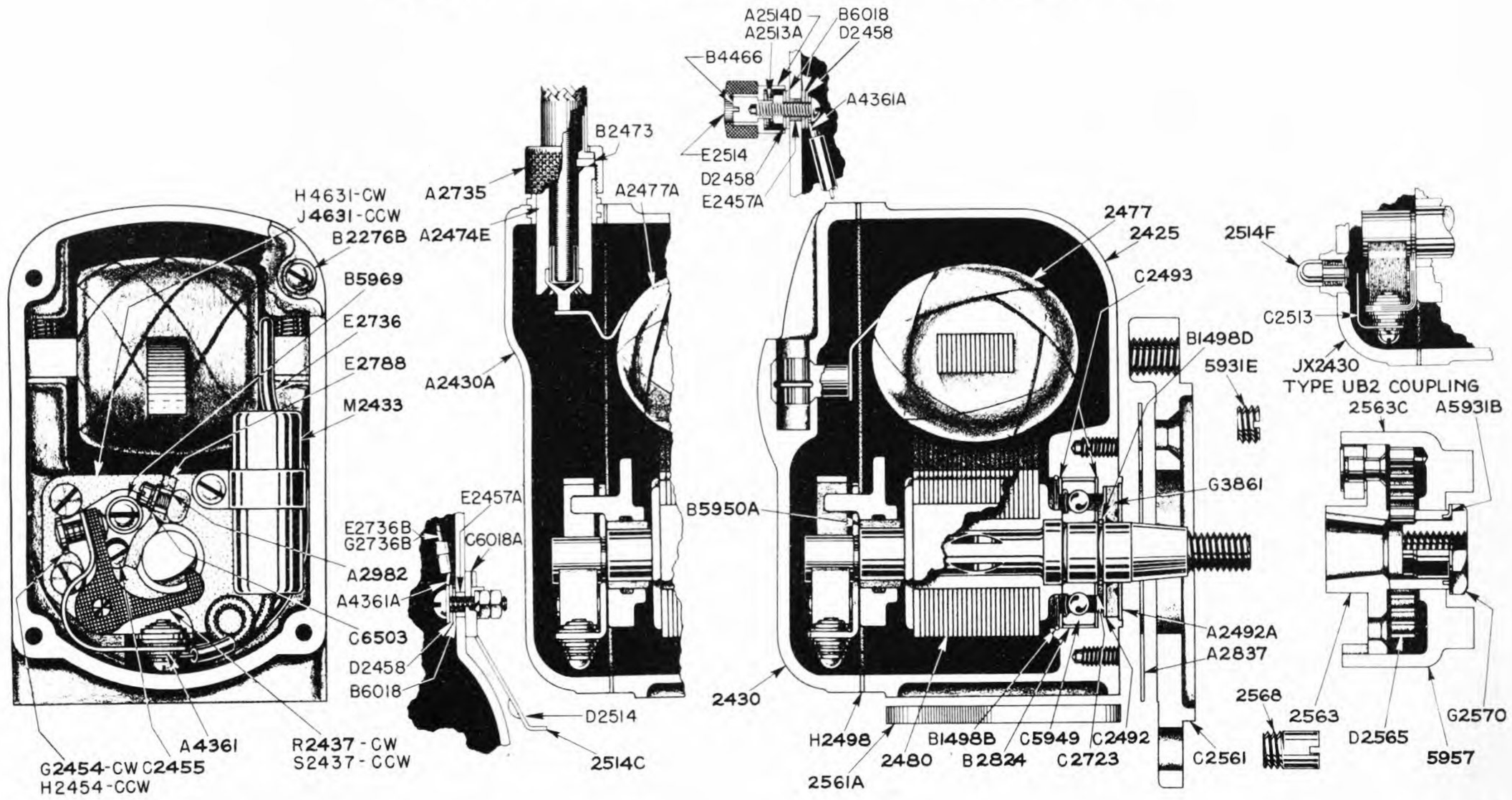
tions.

GENUINE REPLACEMENT PARTS

Genuine Fairbanks-Morse magneto replacement parts are stocked by all Factory-Authorized Magneto Service Stations and should always be insisted upon for repairs. The use of spurious parts usually proves less satisfactory and less economical than the use of the manufacturer's replacements in addition to voiding the magneto guarantee.

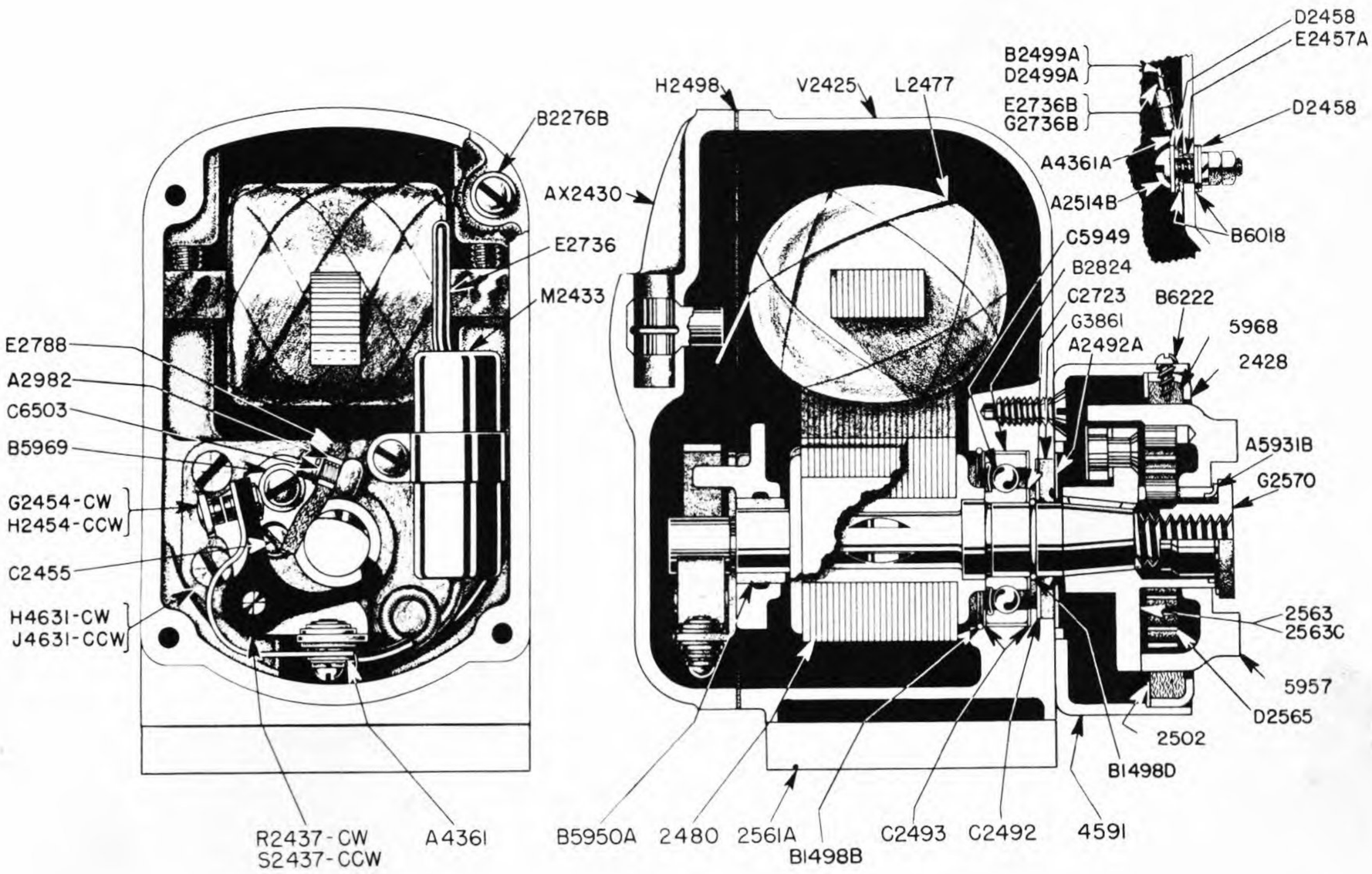
REPAIR CHARTS

Types FM-J1 & FM-JE1 Magnetos



LDC6

S. A. E. Base Mounting Units - 35 mm. & 45 mm. Shaft Heights



FAIRBANKS-MORSE TYPES FM-J1 AND FM-JE1 MAGNETOS

Identification Number	Order By Part Number	Name of Part. Unless otherwise specified, part is for both CW and CCW magnetos.	No. Used FM-J1A	FM-J1B	FM-JE1A	FM-JE1B
1498B	B1498B	Rotor Bearing Snap Ring	1	1	1	1
1498D	B1498D	Rotor Shaft Snap Ring	1	1	1	1
2276B	B2276B	End Cap Screw Flat Washer	4	4	4	4
2425	V2425	Frame - 35 mm. SAE Base. Use 2561A Adapter Plate	1		1	
	CX2425	Frame - Basic Flange. Use 2561 Adapter Plate		1		1
2428	D2428	Coupling Housing Cupped Washer. Use with Type UA2 Coupling	1		1	
	E2428	Coupling Housing Cupped Washer. Use with Type UC Coupling	1	1	1	1
2430	AX2430	End Cap - Standard	1	1		
	JX2430	End Cap - FM-J1A15/B15 JX2430 inc. A2514F Switch	1	1		
2430A	A2430A	End Cap - Radio Shielded			1	1
2433	M2433	Condenser. Inc. A4361	1	1	1	1
2437	R2437	Breaker Point Set - CW. R2437 inc. G2454, E2788	1	1	1	1
	S2437	Breaker Point Set - CCW. S2437 inc. H2454, E2788	1	1	1	1
2454	G2454	Stationary Bracket and Point - CW	1	1	1	1
	H2454	Stationary Bracket and Point - CCW.	1	1	1	1
2455	C2455	Breaker Point Adjustment Screw	1	1	1	1
2457A	E2457A	Primary Ground Insulating Bushing. Use with A2514B, A2514C, A2514D.	1	1	1	1
2458	D2458	Primary Ground Flat Washer. 2 used with A2514B & A2514D	No. Dep. on Grd. Switch			
		1 used with A2514C				
2473	B2473	Cable Socket Rubber Seal			1	1
2474E	A2474E	Cable Outlet - Radio Shielded			1	1
2477	L2477	Coil - Standard. Inc.E2736, A4361.	1	1		
2477A	A2477A	Coil - Radio Shielded. A2477A inc. E2736, A4361			1	1
2480	AX2480	Magnetic Rotor - Standard	1	1	1	1
2480	DX2480	Magnetic Rotor - Z Engines	1	1	1	1
2492	C2492	Inner Retaining Washer	1	1	1	1
2492A	A2492A	Outer Retaining Washer	1	1	1	1
2493	C2493	Bearing Insulating Washer	2	2	2	2
2498	H2498	End Cap to Frame Gasket	1	1	1	1
2499A	B2499A	Primary Ground Wire - 7" Long. B2499A inc. E2736B,A4361,A4361A.	1	1	1	1
	D2499A	Primary Ground Wire - 5" Long. D2499A inc. G2736B,A4361,A4361A.	1	1	1	1
2502	D2502	Coupling Housing Flat Washer. Use with Type UA2 Coupling	1		1	
	E2502	Coupling Housing Flat Washer. Use with Type UC Coupling	1	1	1	1
2513	C2513	Ground Switch Contact Spring. Use with A2514F	1	1	1	1
2513A	A2513A	Primary Ground Button Spring. Use with A2514D	1	1	1	1
2514	D2514	Ground Switch Lever. Use with A2514C	1	1	1	1
	E2514	Primary Ground Push Button. Use with A2514D	1	1	1	1
2514B	A2514B	Primary Ground Terminal Group. Inc. E2457A,D2458,A4361A,B6018	1	1	1	1
2514C	A2514C	Spring Lever Ground Switch Group. Inc. E2457A,D2458,D2514,A4361A, B6018, C6018A	1	1	1	1
2514D	A2514D	Push Button Ground Switch Group. Inc. E2457A,A2513A,E2514,D2458, A4361A,B4466,B6018	1	1	1	1
2514F	A2514F	End Cap Push Button Switch Group. A2514F inc. C2513	1	1	1	1
2561	C2561	Flange Adapter Plate - ZC Engines.		1		1
2561A	A2561A	Standard SAE Detachable Base Plate	1		1	
	B2561A	Base Adapter Plate - Z Engines	1		1	
	D2561A	Base Adapter Plate - FM-J1A15	1			
2563	V2563	*Cplg. Hub Assembly - Type UC - CW	1	1	1	1
	W2563	*Cplg. Hub Assembly - Type UC - CCW.	1	1	1	1
	AX2563	*Cplg. Hub Assembly - Type UA2 - CCW.	1		1	
	AX2563	*Cplg. Hub Assembly - Type UB2 - CCW.		1		1
	BX2563	*Cplg. Hub Assembly - Type UA2 - CW	1		1	
	BX2563	*Cplg. Hub Assembly - Type UB2 - CW		1		1
2563C	V2563C	*Coupling Complete - Type UC - CW Inc.V2563,D2565,A5931B,R5957	1	1	1	1
	W2563C	*Coupling Complete - Type UC - CCW Inc.W2563,D2565,A5931B,R5957	1	1	1	1
	AX2563C	*Coupling Complete - Type UB2 - CCW Inc.AX2563,D2565,A5931B,M5957		1		1
	BX2563C	*Coupling Complete - Type UB2 - CW Inc.BX2563,D2565,A5931B,N5957		1		1
	KX2563C	*Coupling Complete - Type UA2 - CW Inc.BX2563,D2565,A5931B,N5947	1		1	
	LX2563C	*Coupling Complete - Type UA2 - CCW Inc.AX2563,D2565,A5931B,M5957	1		1	
2565	D2565	Coupling Drive Spring - Series U	1	1	1	1
2568	H2568	Cplg. Pawl Stop Pin - Type UB2 - CW.		1		1
	J2568	Cplg. Pawl Stop Pin - Type UB2-CCW.		1		1
2570	G2570	Coupling Nut - Series U	1	1	1	1
2723	C2723	Thrust Bearing Shim	2	2	2	2
2735	A2735	Cable Outlet Nut			1	1
2736	E2736	Primary Lead Wire Tube	1	1	1	1
2736B	E2736B	Primary Ground Wire Tube - 7"Long	1	1	1	1
	G2736B	Primary Ground Wire Tube - 5"Long	1	1	1	1
2788	E2788	Cam Felt Wick	1	1	1	1
2824	B2824	Rotor Bearing Insulating Strip	1	1	1	1
2837	A2837	Flange Plate Gasket		1		1
2982	A2982	Cam Felt Wick Spacer	1	1	1	1
3861	G3861	Bearing Seal Rubber Washer	1	1	1	1
4361	A4361	Lead Wire Terminal (#8)	3	3	3	3
4361A	A4361A	Lead Wire Terminal (#6)	1	1	1	1
4466	B4466	Ground Screw End Nut. Use with A2514D	1	1	1	1
4591	B4591	Coupling Housing Assembly - CCW. Use with Type UA2 Imp. Cplg.	1		1	
	C4591	Coupling Housing Assembly - CW. Use with Type UA2 Imp. Cplg.	1		1	
	F4591	Coupling Housing Assembly. Use with Type UC Imp. Cplg.	1	1	1	1
4631	H4631	Bearing Plate Assembly - CW. Inc. E2788,A2982,B5950A,C6503	1	1	1	1
	J4631	Bearing Plate Assembly - CCW. Inc. E2788,A2982,B5950A,C6503	1	1	1	1
5931B	A5931B	Coupling Nut Lockwasher	1	1	1	1
5931E	A5931E	Flange Plate Setscrew - CW		1		1
	B5931E	Flange Plate Setscrew - CCW		1		1
5949	C5949	Rotor Ball Bearing	1	1	1	1
5950A	B5950A	Rotor Sleeve Bearing	1	1	1	1
5957	M5957	Coupling Shell - CCW. Use with Type UB2 Imp. Cplg.		1		1
	N5957	Coupling Shell - CW. Use with Type UB2 Imp. Cplg.		1		1
	P5957	Coupling Shell - CCW. Use with Type UA2 Imp. Cplg.	1		1	
	Q5957	Coupling Shell - CW. Use with Type UA2 Imp. Cplg.	1		1	
	R5957	Coupling Shell - CW & CCW. Use with Type UC Imp. Cplg.	1	1	1	1
5968	C5968	Coupling Housing Felt Washer. Use with Type UA2 Imp. Cplg.	1		1	
	D5968	Coupling Housing Felt Washer. Use with Type UC Imp. Cplg.	1	1	1	1
5969	B5969	Stationary Contact Flat Washer	1	1	1	1
6018	B6018	Primary Ground Insulating Washer. 2 used with A2514B and A2514D.	No. Dep. on Grd. Switch			
		1 used with A2514C				
6018A	C6018A	Primary Ground Insulating Washer. Use with A2514C	1	1	1	1
6222	B6222	Cplg. Housing Cupped Washer Screw.	2		2	
6503	C6503	Cam Felt Wick Holding Washer	1	1	1	1
	GK16	Gasket Kit. GK16 inc. A2492A, H2498, G3861	1	1	1	1

* Specify lag angle desired.

FAIRBANKS, MORSE & CO.

Manufacturers

Executive Offices:
Chicago, Illinois

526093-064815M-BDN

Magneto Sales & Factory:
Beloit, Wisconsin

Printed in U.S.A.