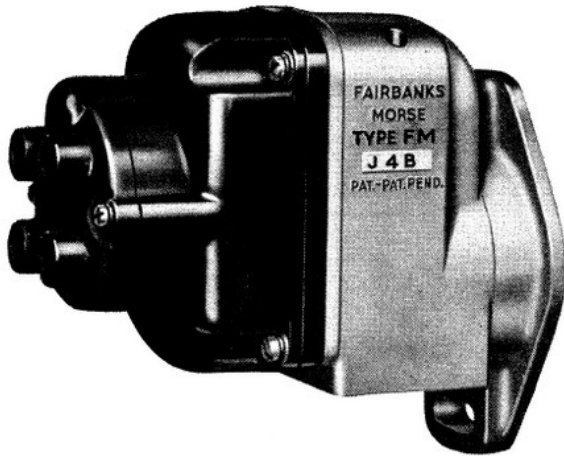
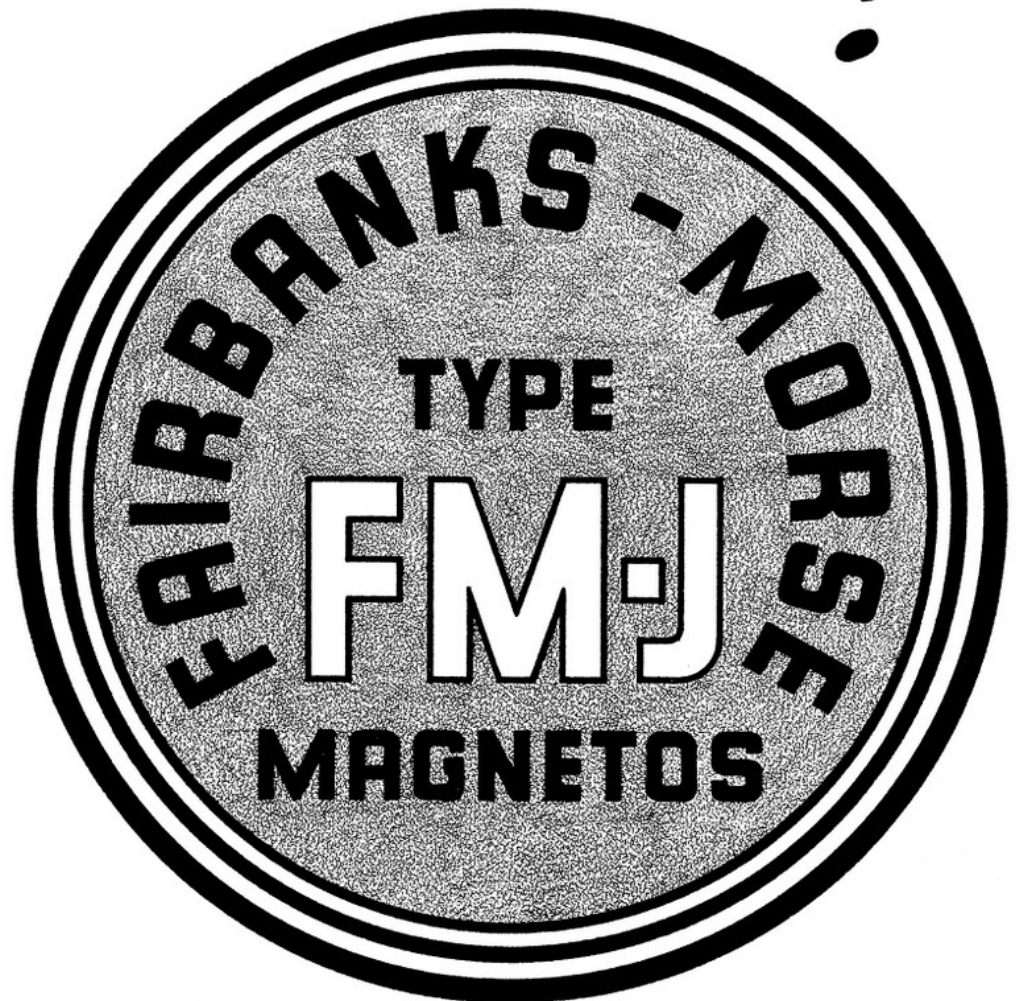


MAGNETO INSTRUCTIONS

NO. 2846A

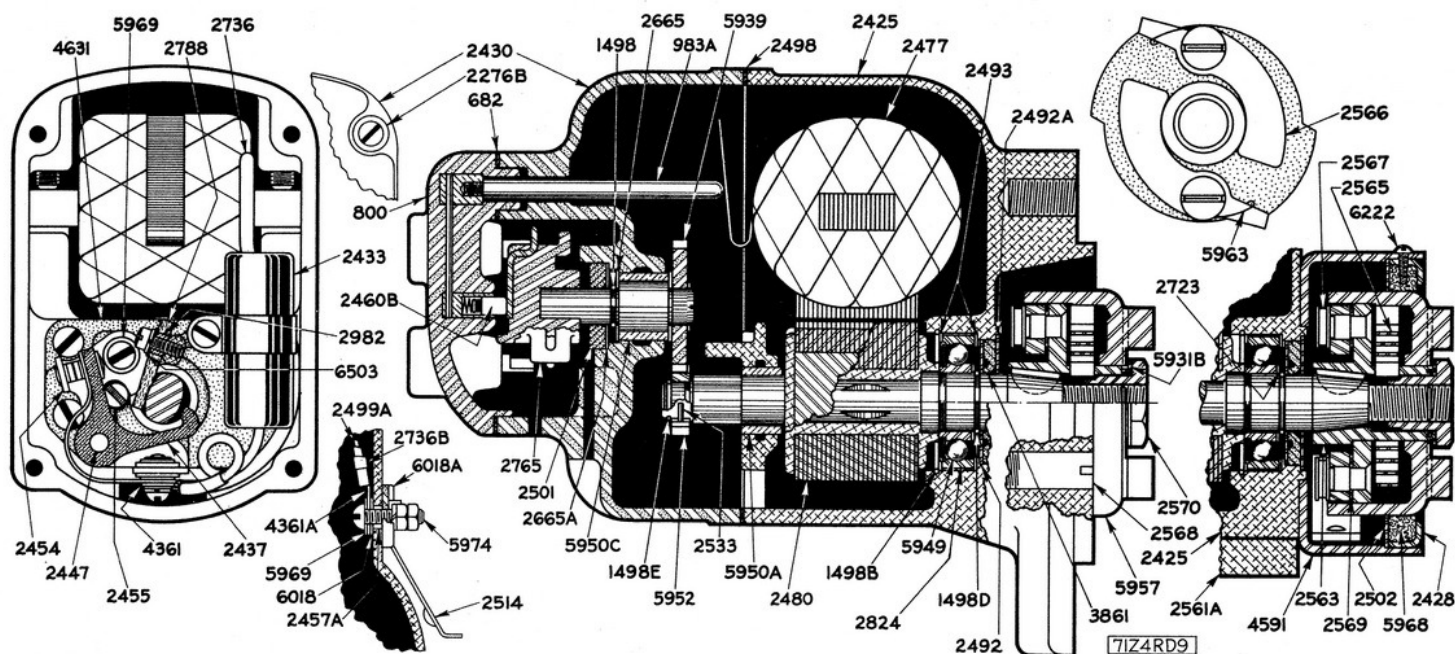


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FIRST EDITION
SEPT. 1940

REPAIR CHART & LIST - TYPES FM-J4A & FM-J4B MAGNETOS



Identification	Order By Part No.	Name of Part - Unless otherwise specified, part is for flange or base, CW or CCW magnetos.	No. Used	Symbols for factory use only	Identification	Order By Part No.	Name of Part - Unless otherwise specified, part is for flange or base, CW or CCW magnetos.	No. Used	Symbols for factory use only
682	B682	Distributor Cover Gasket.....	1	Z4RD682A	2563C	U2563C	Coupling-Complete-UA-CCW-Base.....	1
800	C800	Distributor Compartment Cover...	1	Z4RD800A6			(U2563C inc. R2563, D2565, A5931B, P5957)		
983A	A983A	Distributor High Tension Lead...	1	Z4RD983B1	2565	D2565	Coupling Drive Spring-Series U...	1	Z4RD6012A
1498	D1498	Distributor Shaft Snap Ring.....	1	Z4RD1498D	2566	G2566	Coupling Pawl - Series U.....	2	Z4RD2566B2
1498B	B1498B	Rotor Bearing Snap Ring.....	1	ZRD5955A1	2567	E2567	Coupling Pawl Rivet - Series U...	2	Z4RD2567A2
1498D	B1498D	Rotor Shaft Snap Ring.....	1	Z4RBL498A1	2567	F2567	Coupling Pawl Rivet - Type UB1...	2	Z4RD2567B2
1498E	A1498E	Rotor Shaft Pinion Snap Ring....	1	Z4RD1498D	2568	C2568	Coupling Stop Pin - CW - Flange...	1	Z2RB2568B2
2276B	B2276B	Dist. End Cap Screw Washer.....	1	ZRB2276A1	2568	D2568	Coupling Stop Pin-CCW - Flange...	1	Z2RB2568A3
2425	V2425	Frame - Std. without Mounting...	1	Z2RD2425D4	2569	B2569	Coupling Pawl Washer - Series U...	2	Z4RD2569A1
2425	AX2425	Frame - Std. Flange (One Piece)..	1	Z4RD2425J1	2570	G2570	Coupling Nut - Series U.....	1	Z4RD2570A2
2428	CX2428	Coupling Hsg. Cupped Wshr.-Base.	1	Z4RD2428F8	2665	B2665	Dist. Shaft Flat Washer.....	1	Z4RD2665D2
2430	D2430	Dist. End Cap (Inc. B5950C).....	1	Z4RD2430F8	2665A	A2665A	Dist. Bearing Seal Flat Washer....	1	Z4RD2665E
2433	M2433	Condenser (Inc. Lead, A4361)....	1	Z433Z4RD2	2723	H2723	Shaft Thrust Bearing Shim.....	1	Z4RD2723A
2437	R2437	Breaker Point Set-CW(Inc.G2454)..	1	Z437Z4RD4	2736	E2736	Primary Lead Wire Tube.....	1	Z4RD2736A
2437	S2437	Breaker Point Set-CCW(Inc.H2454).	1	Z437Z4RD4	2736B	G2736B	Ground Lead Wire Tube.....	1	Z4RD2736B1
2447	G2447	Breaker Arm Fulcrum Pin.....	1	Z4RD2447C	2765	M2765	Distributor Rotor.....	1	Z4RD2765E3
2454	G2454	Sta.Support & Contact Point - CW	1	Z453Z4RD4	2788	E2788	Cam Felt Wick.....	1	Z4RD2788C2
2454	H2454	Sta. Support & Contact Point-CCW	1	Z453Z4RD3	2824	B2824	Rotor Bearing Insulating Strip....	1	Z4RD2824B
2455	C2455	Sta. Contact Adjustment Screw...	1	Z4RD2455A2	2982	A2982	Cam Felt Wick Spacer.....	1	Z4RD2982A
2457A	E2457A	Pri. Ground Screw Bushing.....	1	ZRD2457A1	3861	G3861	Bearing Seal Neoprene Washer.....	1	Z4RD3861D
2460B	E2460B	Coil Lead Brush with Spring.....	1	Z4RD2267A2	4361	A4361	Lead Wire Terminal (#8 Screw)....	3	ZRB4361A
2477	G2477	Coil (Inc. E2736, A4361).....	1	4051Z4RD11	4361A	A4361A	Lead Wire Terminal (#6 Screw)....	1	ZRD4361A
2480	CX2480	Magnetic Rotor - Complete.....	1	Z475Z4RD24	4591	B4591	Coupling Housing - CCW - Base....	1	4591Z4RD7
2492	C2492	Retaining Washer - Inner.....	1	Z4RD2492A1	4591	C4591	Coupling Housing - CW - Base.....	1	4591Z4RD6
2492A	A2492A	Retaining Washer - Outer.....	1	Z4RD2492B	4631	H4631	Bearing & Breaker Plate - CW.....	1	4631Z4RD7
2493	C2493	Bearing Insulating Washer.....	2	ZRB2493A	4631	J4631	Bearing & Breaker Plate - CCW....	1	4631Z4RD6
2498	H2498	End Cap Gasket.....	1	Z2RD2498B			(H4631 & J4631 inc. G2447, E2788, A2982, B5950A, C6503)		
2499A	D2499A	Grd.Lead Wire(Inc.G2736B,A4361)..	1	Z4RD2499B1	5931B	A5931B	Coupling Nut Lockwasher.....	1	Z4RD5931B
2501	E2501	Dist. Shaft Cork Washer.....	1	Z4RD2501B	5939	N5939	Distributor Shaft & Gear.....	1	5943Z4RD9
2502	D2502	Coupling Hsg. Flat Washer-Base..	1	Z4RD2502B1	5949	C5949	Drive End Ball Bearing.....	1	Z4RD5949A
2514	D2514	Ground Switch Lever.....	1	ZRD2514C1	5950A	B5950A	Rotor Sleeve Bearing - Oilite.....	1	Z2RD5950A2
2533	F2533	Rotor Pinion Pin.....	1	Z4RD2533C2	5950C	B5950C	Dist. Sleeve Bearing - Oilite.....	1	Z4RD2665B
2561A	A2561A	Standard SAE Base Plate.....	1	ZRD2561D3	5952	F5952	Rotor Pinion.....	1	Z4RD5952D2
2563	Q2563	Cplg. Hub Assembly-UA & UB-CCW..	1	Lag Angle must be specified when ordering	5957	M5957	Coupling Shell-UB-CCW-Flange.....	1	Z4RD5957H4
2563	S2563	Cplg. Hub Assembly-UB1 - CW...!	1		5957	N5957	Coupling Shell - UB-CW-Flange....	1	Z4RD5957G5
2563C	Q2563C	Coupling-Complete-UB-CW-Flange..	1	hub assemblies	5957	P5957	Coupling Shell - UA-CCW-Base.....	1	Z4RD5957P1
2563C	R2563C	Coupling-Complete-UB-CCW-Flange.	1	Lag Angle must be specified when ordering	5957	Q5957	Coupling Shell - UA-CW-Base.....	1	Z4RD5957N1
2563C	S2563C	Coupling-Complete-UB1-CW-Flange.	1		5963	B5963	Pawl Spring-UB1-Flange.....	2	Z4RD5963B1
2563C	T2563C	Coupling-Complete-UA-CW-Base....	1	ordering couplings	5968	C5968	Coupling Hsg. Felt Washer-Base...	1	Z4RD5968C
2563C	U2563C	Coupling-Complete-UA-CCW-Base....	1		5969	B5969	Stationary Support Washer.....	2	Z4RD5969A1
2563C	V2563C	Coupling-Complete-UA-CW-Base....	1		6018	B6018	Pri.Grđ. Insulating Wshr.-Inner...	1	ZRD6018B
2563C	W2563C	Coupling-Complete-UA-CCW-Base....	1		6018A	C6018A	Pri.Grđ. Insulator Block.....	1	ZRD1355A
2563C	X2563C	Coupling-Complete-UA-CCW-Base....	1		6222	B6222	Cplg. Hsg. Washer Screw-Base.....	2	Z4RD6222A
2563C	Y2563C	Coupling-Complete-UA-CCW-Base....	1		6503	C6503	Cam Felt Wick Holder.....	1	Z4R2458A

Instructions No. 2846A
FAIRBANKS-MORSE TYPES FM-J4A & FM-J4B MAGNETOS
 Field Service and Adjustment Information

1. **GENERAL DESCRIPTION** - Modern ignition systems are carefully engineered to provide quick, easy starting and maximum dependability of operation without adjustment or service. Fairbanks-Morse Type FM-J magnetos are outstanding for their advanced design and sturdy construction, making them field performance leaders. Especially compact in assembly, the powerful Alnico magnetic rotor assures an intensely hot ignition spark under the most difficult of operating conditions. While field adjustments are simple, although rarely necessary, the following directions should be carefully observed.

2. **SERVICE PROCEDURE** - A logically arranged service outline to be followed when tractor engines fail to start, start with difficulty, or miss in operation is tabulated below. Since the use of this chart locates engine trouble in many cases before the magneto is reached, it prevents too common misadjustment 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.

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.
B. Insufficient Fuel or Air	Empty fuel tank; clogged fuel supply lines; clogged air intake.	Replenish fuel; clean fuel supply system and check carburetor; clean air intake system.
C. Ignition Connections	Loose or corroded terminals; broken cables; short-circuited switch.	Clean or replace cable terminals; inspect soldered or clamped joints, test and replace cables; check ignition switch.
D. Spark Plugs	Corroded, worn or damaged points; cracked or carbonized insulators.	New plugs; clean points and insulators; adjust point gap to recommended opening: never attempt to adjust center electrode.
E. Magneto	Brush, points, impulse coupling.	See instructions beginning paragraph #3 (below).

3. **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 by holding the ignition cable end not more than 1/16" 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.

4. **TESTING THE MAGNETO SPARK** - Pull the ignition cables out of the end cap sockets and insert a short, stiff wire. Bend this wire to within 1/8" of the engine block. Turn the engine over slowly and watch carefully for the spark discharge which should occur at the instant the impulse coupling releases. The test should then be repeated for each of the remaining terminals. It is highly recommended that, when a strong ignition spark is observed, no dismantling of the magneto take place and that cables, terminals and spark plugs be thoroughly inspected. If no spark is observed, the ignition switch should first be carefully examined to be certain it has not become accidentally closed.

end of the stationary point bracket, then turning the eccentric head adjusting screw until the gap is obtained, and locking the assembly by tightening the round head screw.

7. **REASSEMBLY OF MAGNETO** - Do not oil or grease the bearings or cam of the Type FM-J magneto as the design eliminates the necessity of field lubrication. The cam felt wick should be replaced by a new factory-impregnated wick if dry or hard. Coil and condenser replacements, while simple, are not recommended unless test equipment is available. Under no circumstance should any attempt be made to remove the magnetic rotor from the housing as it is locked in a special drive end thrust bearing and specific instructions must be carefully followed in releasing the shaft. Reassembly of the distributor cap to the frame involves the proper meshing of the gear teeth, which is explained in the following paragraph.

8. **PROPER MESHING OF GEAR TEETH** - The rotation of the magneto must be correctly ascertained; this can be quickly determined with reference to Fig. 2. Rotation is clockwise when the condenser is mounted to the right of the pinion, and counter-clockwise when mounted to the left. The breaker point assembly also changes its location, but for simplification has been blackened out in the drawing. The gear teeth are marked to facilitate the correct meshing of the gears. For CW rotation the single marked tooth of the pinion must mesh between the two marked teeth of the distributor gear which are designated by the letter C. For CCW rotation, the marked tooth of the pinion must mesh between the two marked teeth of the distributor gear designated by the letter A.

(Continued on Page 4)

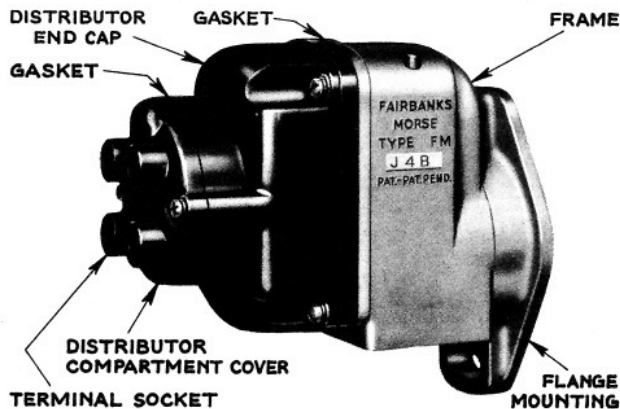


Figure 1 - Type FM-J4B Magneto

5. **DISTRIBUTOR COVER REMOVAL** - The distributor compartment cover (Fig. 1) should be removed, care being taken not to damage the gasket attached to the cover side of the joint. The distributor compartment should be thoroughly cleaned and the air inlet and outlet passages opened. Examine the high tension lead brush; replace if noticeably worn or damaged. This brush should move freely in its holder and should have a slight spring pressure.

6. **SERVICE OF BREAKER CONTACT POINTS** - Contact point adjustment necessitates the removal of the distributor cap which has a sealed gasket joint with the metal housing. The contact points should be examined for evidences of pitting or pyramiding. A small tungsten file or fine stone may be used to resurface the points. If points are worn or badly pitted, they should be replaced. Points are to be adjusted to have a .020 inch gap at full separation. Adjustment is made by loosening the round head locking screw at the upper

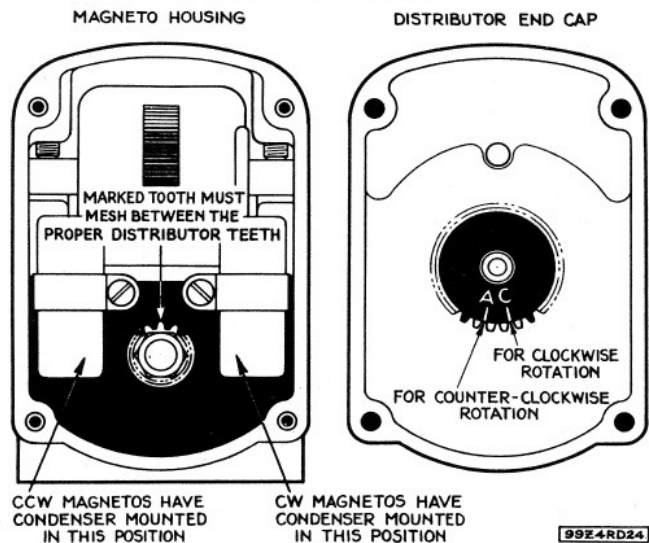


Figure 2 - Meshing Distributor Gear and Rotor Pinion

9. **SEALING THE MAGNETO** - Before the distributor cap is replaced the edges should be cleaned and a new gasket provided. The joint should be completely coated with the Special FMCO2 Sealing Varnish. Sealing the magneto properly prevents dust and moisture from entering the housing and reducing the efficiency of the mechanism.

10. **MAGNETO-ENGINE TIMING** - Proper timing of the magneto to the engine provides that the ignition spark be produced at the spark plug gap at the precise instant the fuel mixture in the cylinder should be ignited for best engine performance. This point is carefully determined by the engine designers, usually being designated as a certain number of degrees before top dead center. When starting the engine, however, it is advantageous to retard the ignition spark until it occurs late enough in the cycle to avoid the possibility of engine kickback. Impulse couplings furnished with modern magnetos automatically provide this spark-retard feature while the engine is being started.

The importance of correctly timing the magneto to the engine cannot be minimized and the steps described below should be followed carefully. Two methods are outlined: (I) the advance spark position method and (II) the impulse coupling trip method. In either case the breaker points must first be accurately adjusted to secure proper timing of the ignition spark.

(I) Advance Spark Position Method.

A. Magneto - To set the magneto for advance spark position (#1 cylinder), it is necessary first to remove the distributor compartment cover. Then locate along the inner wall of the compartment the timing boss pointed out in Fig. 3. Turn the rotor from the coupling end in the direction opposite to normal operation until the distributor contact lines up exactly with the timing boss as indicated by dotted lines in the diagram. The magneto is now timed for advance spark position (#1 cylinder) and it should be exactly in this position until it can be coupled to the engine.



Fig. 3 - Timing Diagram should be made to the engine instruction book for details concerning the timing marks of the particular engine. Turn the engine over until the timing marks coincide, indicating that it is in advance spark position (#1 cylinder).

(II) Impulse Coupling Trip Method.

A. Magneto - The magneto must first be set for the actual spark discharge to #1 terminal. This can be accomplished by replacing the ignition cable of #1 socket with a short, stiff wire, bent to within 1/8" of the magneto frame. Then turn the magnetic rotor from the impulse coupling end until a spark is observed between the wire and the frame. The coupling should be held in the position at which the trip occurs.

B. Engine - Remove the spark plug or otherwise determine

top dead center for the piston in #1 cylinder. Turn the engine over until this position is obtained (be certain that it is on the compression stroke).

11. **CONNECTING FLANGE MAGNETO TO ENGINE** - Without disturbing the setting of either magneto or engine as determined by method (I) or (II) of Paragraph 10, the magneto may now be coupled to the engine by simply engaging the drive lugs of the impulse coupling with the driving slots of the engine drive member. A slight movement of the flywheel may be necessary to secure accurate alignment.

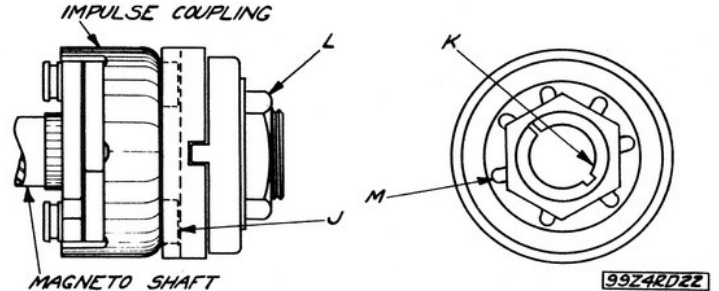


Figure 4 - Drive Member For Base Mounted Magnetos

12. **CONNECTING BASE MAGNETO TO ENGINE** - A separate drive member is used as shown in Fig. 4. Keep the engine and magneto in the positions determined under methods (I) or (II) of Paragraph 10. Assemble the drive member on the engine drive shaft by first loosening the drive collar nut (L), then slipping the collar (K) on the shaft, being certain that the shaft key is in place. The drive member slots should then be lined up with the impulse coupling lugs of the magneto and the locking nut (L) tightened. Bend up the locking lugs (M) around the nut to prevent the loss of the proper timing position through loosening of the nut.

13. **IMPULSE COUPLINGS** - The impulse coupling is used to facilitate starting of the engine and at the same time to automatically retard the ignition spark while starting. Through this device the rotor of the magneto is held back while the engine is turned over to its firing position, at which instant the rotor is snapped forward at high speed, thereby producing an intense, hot spark, automatically retarded to prevent backfiring. A characteristic snap as the impulse coupling releases usually indicates that it is functioning satisfactorily. The impulse feature disengages as soon as the engine has picked up speed, after which the coupling serves as a conventional drive member. Couplings may be cleaned in kerosene and lubricated with a medium engine oil, but if functioning improperly they should be taken, with the magneto, to an Authorized Fairbanks-Morse Magneto Service Station.

14. **MAGNETO SERVICE FACILITIES** - Authorized Magneto Service Stations, located throughout the U.S. and foreign countries, have been carefully selected by Fairbanks, Morse & Co. in order to assure highly efficient and complete repair and inspection service to owners of Fairbanks-Morse magnetos. These service stations are equipped with special tools and have had special training for magneto repair and, in addition, have the advantage of close contact with the factory service and engineering departments.

Genuine Fairbanks-Morse magneto replacement parts, which may be obtained from all Authorized Service Stations, should always be insisted upon for repairs. A complete list of the names and addresses of Authorized Fairbanks-Morse Magneto Service Stations is available upon request.

Fairbanks, Morse & Co.

Manufacturers
Executive Offices:
Chicago, Illinois



Magneto Division
BELOIT, WISCONSIN

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