

## **WORLD FAMOUS EISEMANN MAGNETOS FOR LIGHT AIRCRAFT**

Through the years since 1904, Eiseman Magnetos have been recognized as top-quality ignition equipment for industrial, marine and aircraft engines. The vast experience in design and construction gained during those years, has culminated in the fine aircraft magnetos covered by this manual.

These rotating magnet, high-tension type magnetos are specifically designed for four- and six-cylinder, four-cycle aircraft engines. Although LA and AM models do not look alike, they are essentially the same--the principle difference being that LA models are shielded to prevent radio interference. Both series embody the following construction and design features:

- Platinum contact points for hotter spark and positive action.

- Permanent lubrication except for repacking the ball bearing during major overhaul.

- Highest quality materials throughout.

- All parts precision machined to exact measurements.

- Versatile, light-weight and efficient.

- Equipped with impulse starters for positive easier starting.

Eisemann service facilities, among the most complete in the industry, extend from coast-to-coast and throughout the world.

This combination of design and construction features, plus the extensive service facilities, make these Eisemann magnetos ideally suited for today's light aircraft engines.

## BRIEF CONSTRUCTION FACTS

### HOUSING

Strong, lightweight and durable die-casting of high-quality aluminum alloy, with laminated electric steel cores.

### COIL

Coil core ends, conical and taper machined to a high finish, mate with the housing taper to insure excellent continuity in the magnetic circuit. Protected and insulated so effectively by a new plastic molding compound that power leakage and coil deterioration are practically eliminated.

### MAGNET ROTOR

High output Alnico magnet, centered on two grease-packed ball bearings, functions smoothly for extended period of abnormally rough usage.

### BREAKER

High speed, spring type to permit adjustment without changing the parallel relationship of the contact points. Connected to the condenser and coil by a flexible lead.

### CONDENSER

Rolled-section type, metal-cased and hermetically sealed. Thoroughly impregnated with protective compound to strongly resist high heat and vibration.

### DISTRIBUTOR ROTOR

Special, high dielectric strength plastic material. Driven by a long-wearing linen bakelite gear.

### ADAPTER AND END COVER (LA MODELS)

High quality aluminum alloy die-castings which "metal jacket" the magneto to obtain the proper radio shielding features.

### IMPULSE STARTER

The impulse starter is an auxiliary device that serves a two-fold purpose: It automatically retards the timing of the ignition spark to prevent engine backfiring, and it intensifies the spark at low speeds to insure easier starting.

Eisemann impulse starters are available in numerous variations to meet requirements of any special installations.

### ROTOR SHAFTS

Eisemann flange mounted magnetos are offered with different types of rotor shafts. A standard shaft for use where the magneto drive unit is carried on the engine shaft, and extended shafts for use where the magneto drive unit is carried by the magneto shaft.

## OPERATION

### MAGNETO

The LA-4 magneto is driven at crankshaft speeds on four-cycle, four-cylinder engines, while the LA-6 unit is driven at one and one-half times crankshaft speed on four cycle, six-cylinder engines. The AM-4 magneto is driven at engine speed on four-cycle, four-cylinder engines, while model AM-6 is driven at one and one-half times crankshaft speed on four-cycle, six-cylinder engines.

(See figure 3) The magnet rotor assembly (permanent magnet (8) and two laminated poles), rotating in the housing tunnel, sets up a magnetic flux. The housing pole shoes, bridged at their upper ends by the laminated coil core (13), completes the magnetic flux circuit. The direction of the magnetic flux through the coil is reversed twice for each revolution of the magnet rotor. Reversal of the flux generates a current in the primary winding (12) of the coil. This current represents energy which is stored in the magnetic circuit due to changing the magnitude and direction of the flux. Opening the breaker contacts (19) actuated by the breaker cam, interrupts the

low voltage primary circuit. The stored energy is immediately released and causes the flux to collapse rapidly. The rapid collapse of the flux induces a high voltage surge in the coil's secondary winding (11). This surge passes along the high tension outlet (10) of the coil and through the coil contactor (9) to the distributor rotor assembly. The distributor rotor is timed to the magnet rotor so that the rotating electrode is aligned with each consecutive distributor plate electrode (5) at the instant the secondary voltage attains maximum value. The distributor plate electrodes (one per cylinder) are connected to the spark plugs according to firing order. At the instant of contact, the surge travels along the high tension cable (1) to the spark plug, thus firing the proper cylinder at the proper time.

### IMPULSE STARTERS

In most aircraft installations, it is desirable to have one of the magnetos equipped with an impulse starter to prevent engine "backfiring" and intensify



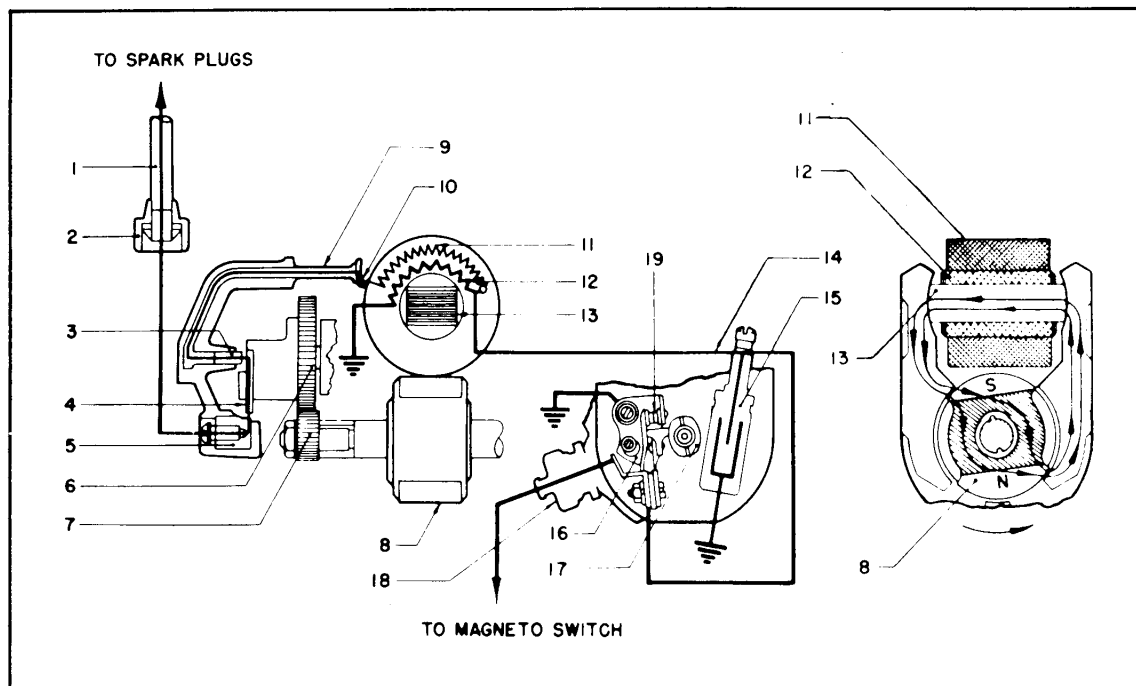


Figure 3. Schematic Diagram, Electric and Magnetic Circuits

- |                                |                              |                            |
|--------------------------------|------------------------------|----------------------------|
| 1. High Tension Cable          | 7. Pinion Gear               | 14. Breaker Condenser Lead |
| 2. Cable Plate Ferrule         | 8. Magnet Rotor              | 15. Condenser              |
| 3. Carbon Brush and Spring     | 9. Coil Contactor            | 16. Breaker Assembly       |
| 4. Distributor Rotor Electrode | 10. High Tension Terminal    | 17. Breaker Cam            |
| 5. Distributor Plate Electrode | 11. Coil - Secondary Winding | 18. Ground Terminal        |
| 6. Distributor Gear            | 12. Coil - Primary Winding   | 19. Contact Points         |
|                                | 13. Coil - Core              |                            |

the spark to insure easy starting. The impulse starter is made up of three component parts; the drive cup, compression spring, and flange assembly. The drive cup engages with a corresponding drive member on the engine, while the flange assembly is keyed directly to the magneto rotor shaft. The two parts are connected by the compression spring. Pawls, mounted on the flange are pivoted and actuated by gravity so that, at starting speeds, the end of each pawl engages in sequence, a catch pin secured in the housing. During starting, this catch pin temporarily locks the rotor during each revolution. The drive cup continues to turn with the engine and winds up the connecting spring and at the proper instant, the cup releases the pawl from the catch pin. The spring then unwinds rapidly and drives the rotor to produce a high intensity spark for starting the engine. When the engine is running, centrifugal force swings the pawls into a non-engaging position and the impulse starter ceases to operate, automatically advancing the spark for proper timing in the running position.

On some installations it is necessary to consider the angle of the driving lugs. While the number of parts in the impulse starter are relatively few, the variations required for specific installations are

quite numerous. Combinations of different drive cups with a variety of flanges provide the required "lug" and "lag" angle for specific applications. (See fig. 4.)

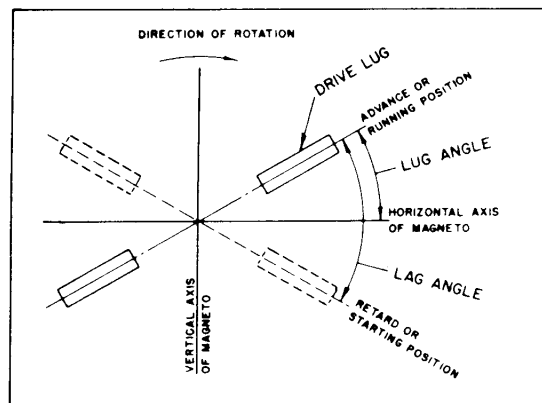
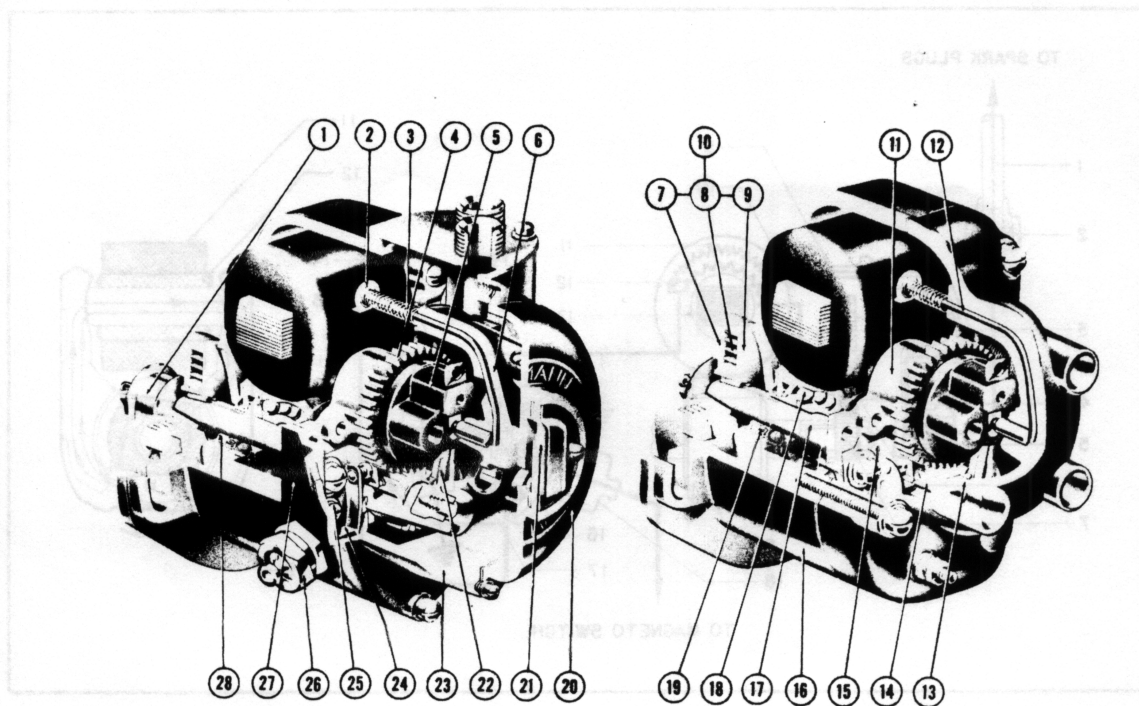


Figure 4. Lag and Lug Angle Relations



**Figure 5. Cutaway View**

- |                          |                                 |                                    |
|--------------------------|---------------------------------|------------------------------------|
| 1. Drive Gear Bushing    | 10. Impulse Starter             | 20. End Cover (LA only)            |
| 2. High Tension Terminal | 11. Oilite Bearing Housing      | 21. End Cover Ventilator (LA only) |
| 3. Coil Contactor        | 12. High Tension Pickup         | 22. Condenser                      |
| 4. Distributor Gear      | 13. Distributor Plate Electrode | 23. Adapter (LA only)              |
| 5. Distributor Rotor     | 14. Pinion Gear                 | 24. Grounding Spring               |
| 6. Distributor Plate     | 15. Breaker Assembly            | 25. Eccentric Stud (LA only)       |
| 7. Impulse Drive Cup     | 16. Housing                     | 26. Ground Terminal Assembly       |
| 8. Impulse Spring        | 17. Magnet Rotor                | 27. End Plate                      |
| 9. Flange Assembly       | 18. Ball Bearing                | 28. Oil Slinger                    |
|                          | 19. Oil Seal                    |                                    |

## INSTALLATION

When the magneto drive gear is to be mounted on the magneto rotor shaft, care should be exercised to insure the proper order of assembling these members by noting the following sequence:

- (1) Install impulse coupling retaining washer.
- (2) Install gear bushing.
- (3) Install drive gear.
- (4) Install drive shaft nut.

Securely tighten the drive shaft nut and lock with a suitable cotter pin. Be sure that the drive gear does not bind and is free to move upon its bushing. To tighten the drive shaft nut, the magneto drive gear may be held in a soft-jawed vise.

When installing the magneto on the engine, make sure that the piston in number-one cylinder is in the correct timing position as specified by the engine manufacturer.

Correct distributor rotor position for firing #1 cylinder is obtained as follows:

On LA magnetos, remove the end cover and turn the rotor shaft in reverse of operating direction (to avoid engagement of the impulse starter on models so equipped) until the rotating electrode is centered in the distributor plate window as illustrated in figure 6. For AM models, remove the distributor plate after noting position of the distributor plate electrode marked #1. Turn the rotor shaft in reverse of operating direction until the rotating electrode is in

approximately the same position as #1 distributor plate electrode.

If the magneto is equipped with a driving gear, the timing mark on this gear should be aligned with the corresponding timing mark on the engine gear. If these marks do not line up, the magneto drive gear should be removed from the drive shaft, rotated 180 degrees and reassembled.

Tighten the magneto mounting screws sufficiently to hold the magneto in place but not tight enough to prohibit the movement of the magneto around its drive shaft.

Connect one cable of a suitable timing indicator to the ground terminal and the other cable to the magneto frame. Rotate the magneto on the flange pilot until the timing indicator shows the contact points are just separating. Keep the magneto in this position and securely tighten the mounting screws.

On engines requiring synchronized magnetos, mount the second magneto in the above manner, leaving the engine crankshaft in the same position. If the engine requires "staggered" timing, turn the crankshaft to the second specified engine timing position.

On AM models, replace the magneto distributor plate, being careful that the center carbon brush makes proper contact with the center of the distributor rotor and the high-tension pickup eyelet makes proper contact with the high-tension terminal on the coil.

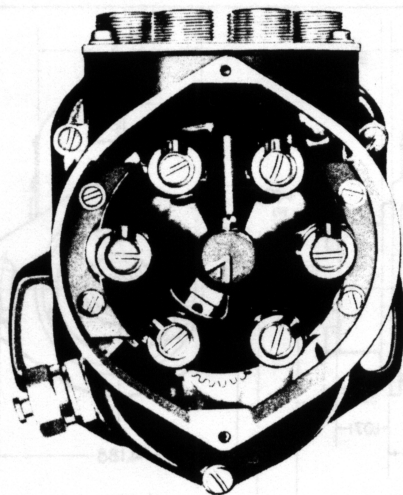


Figure 6. Model LA-6 Magneto with Cover Plate Removed

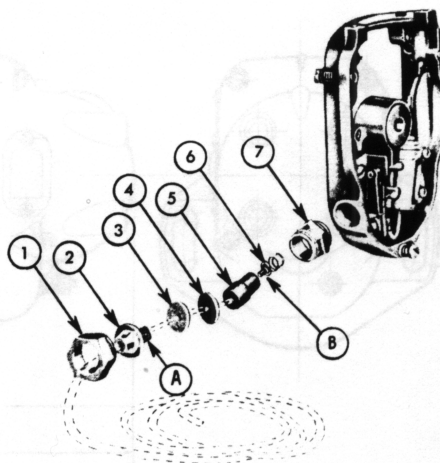


Figure 7. Ground Lead and Terminal Parts

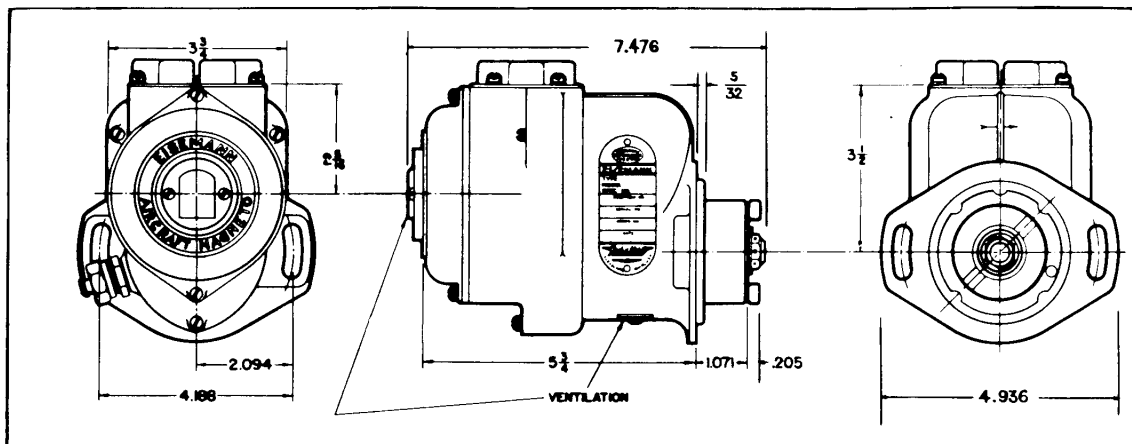


Figure 8. Dimensional Drawing. LA Magneto

Install high tension cables from the magneto to the spark plugs, being careful that the cables from the magneto connect with the proper spark plug in accordance with the firing order of the engines. The distributor ends of LA high tension cables should be fitted with Eisemann terminal tubes H26-748.

The firing order of the magneto is a direct sequence starting from number one which is indicated on the distributor plate, i.e.: The cable from number one terminal on the magneto distributor plate should go to the number one cylinder on the engine; the second terminal on the distributor plate in the proper magneto firing sequence, as determined by the direction of rotation of the magneto, should

be connected to the second cylinder in the firing order of the engine (not necessarily number two cylinder), etc.

On LA-4 and -6 Magnetos, attach the ground lead to the ground terminal parts as shown in figure 7. The metal cable sheathing is spread as indicated at (A) which holds the ground lead in position when secured between the ferrule (2) and washer (3). Solder the connections at (B). With the magneto switch in the "OFF" position and the ground lead attached install the ground terminal assembly in the magneto and tighten the self-locking nut (1).

Reinstall the end cover on LA models after the distributor plate has been replaced.

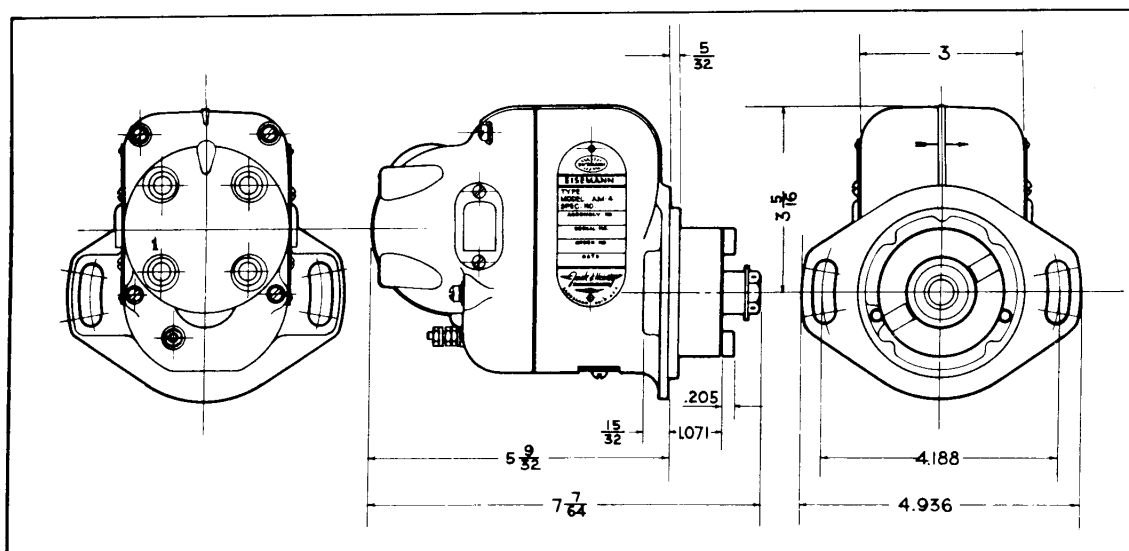


Figure 9. Dimensional Drawing. AM Magneto

## SERVICE INSPECTION

**WARNING:** Under no condition should any work be performed on the engine while the magneto's high-tension cables are connected to the spark plugs, without first checking the following:

- (1) Ignition switch "OFF".
- (2) Ignition switch properly grounded to the engine.
- (3) Ground connection between ignition switch and magneto properly made.

On AM Models, remove the ignition cables from the distributor plate, noting the proper cylinder number of each cable. Check for chafed or broken cables, condition of cable clips and brass inserts. When necessary to replace the cable clips, use only clip H21-961 as it is especially designed to fit the cable receptacle. Remove the screws holding the distributor plate to the housing, checking to see that the gasket is not damaged.

On LA Models, remove the screws holding the end cover and take out the ignition cables, noting the proper cylinder number of each. Check for chafed or broken cables.

Remove the screws holding the top plate and adapter to the end plate. Carefully remove this assembly from the magneto. Clean by wiping inner surface of distributor plate with a clean, lint-free cloth; remove any corrosion on the electrodes of the distributor plate, distributor rotor, or distributor rotor face; inspect the carbon brush and spring for freedom of movement in the holder and see that the outer end of the brush extends sufficiently beyond the holder to make the proper contact with the distributor rotor. The high tension spring assembly on the distributor plate should be free on the high tension pickup post. After cleaning, if a solvent has been used, thoroughly dry all parts before reassembling. Never use an emery cloth, sand paper or other abrasive material in cleaning the distributor plate and distributor rotor.

A visual inspection should be made to insure that the contact points are free from dirt, oil, or other foreign substances.

At regular inspection periods, check the adjustment of the breaker contact points. The breaker is so arranged that the contact point opening should be within .018 - .022 inches. In making this check, the cam follower must be on the high portion of the breaker cam.

If the contact opening is not between these limits, loosen (do not remove) breaker plate fastening screw, move the entire breaker assembly in either direction --toward the cam to increase gap, or away from cam to decrease gap. On LA magnetos, the breaker unit is adjusted by the eccentric stud. Recheck gap after tightening breaker fastening screw. Do not disturb hexagonal nut holding breaker tension springs.

Visually inspect the ground connection for proper contact of the breaker grounding spring.

If it is found necessary to readjust the contact points, the magneto timing to the engine should be checked as outlined in the Installation section.

Do not lubricate sintered breaker cam or distributor oilite bearing as these are oil-impregnated parts.

Before a magneto is assumed to be defective, and the cause of possible ignition failure, the spark plugs, high tension cables, switches and connections should be carefully checked and tested.

In most instances, tampering with magnetos by inexperienced personnel does more harm than good. Therefore, if a magneto performs in a questionable manner, it is advisable to refer the magneto to an authorized Eisemann Service Station.

Common troubles, their corresponding causes and remedies are listed below. If these remedies fail to overcome the difficulty, the magneto should be re-

moved from the engine and inspected according to the directions given in the Major Overhaul section of this handbook.

#### TRUBLE SHOOTING CHART

| TROUBLE                                | PROBABLE CAUSE  | REMEDY  |
|--|---|---|
| ENGINE FAILS TO START                  | Short circuit in ground lead or switch.                             | Remove ground lead from the magneto and test ground lead and switch.                            |
|  | Weak or dead condenser.   | Replace condenser.  |
|  | Moisture on magneto distributor plate.                              | Thoroughly dry all internal parts.  |
|  | Improper timing of magneto to engine or internal timing of magneto. | Refer to engine manufacturer's timing specification and Installation section of this handbook.  |
|  | Weak or dead coil.  | Remove magneto from engine and follow instructions according to Major Overhaul.                 |
| ENGINE IS ROUGH - OPERATES ERRATICALLY | Dirty contact points.   | Clean contact points.   |
|  | Loose connections in magneto primary circuit.                       | Check leads to condenser post for loose wires in terminals and tighten round nut.               |
|  | Improper timing of magneto to engine or internal timing of magneto. | Refer to engine manufacturer's timing specifications and Installation section of this handbook. |
|  | Moisture in magneto.  | Dry all dielectric parts of magneto.  |
|  | Dirty contact points.   | Clean contact points.   |

## **MAJOR OVERHAUL**

The following instructions are given for overhauling the complete unit after it has been removed from the engine.

During disassembly, the condition of each part should be carefully noted and necessary replacement parts obtained before starting reassembly. Bearings should be replaced as a unit (outer race, cage assembly and inner race).

To select the correct replacement part, refer to **Eisemann Light-Aircraft Service Parts Catalog No. 4032**. Parts listed in the first column are used on all **AM-LA** models without exception. The second column indicates those parts which require some selection before the correct part can be determined. To assist in the selection of proper parts, identifying notations and symbols are given. These symbols are also listed in the **Complete Magnetos** section of **Price List #AIS-60**, opposite the magneto assembly number. After the magneto assembly number has been obtained from the magneto nameplate, match up the symbol given in the **Parts Catalog** with that given in the **Price List** opposite the magneto assembly number. In this manner, selection of the proper part can be made.

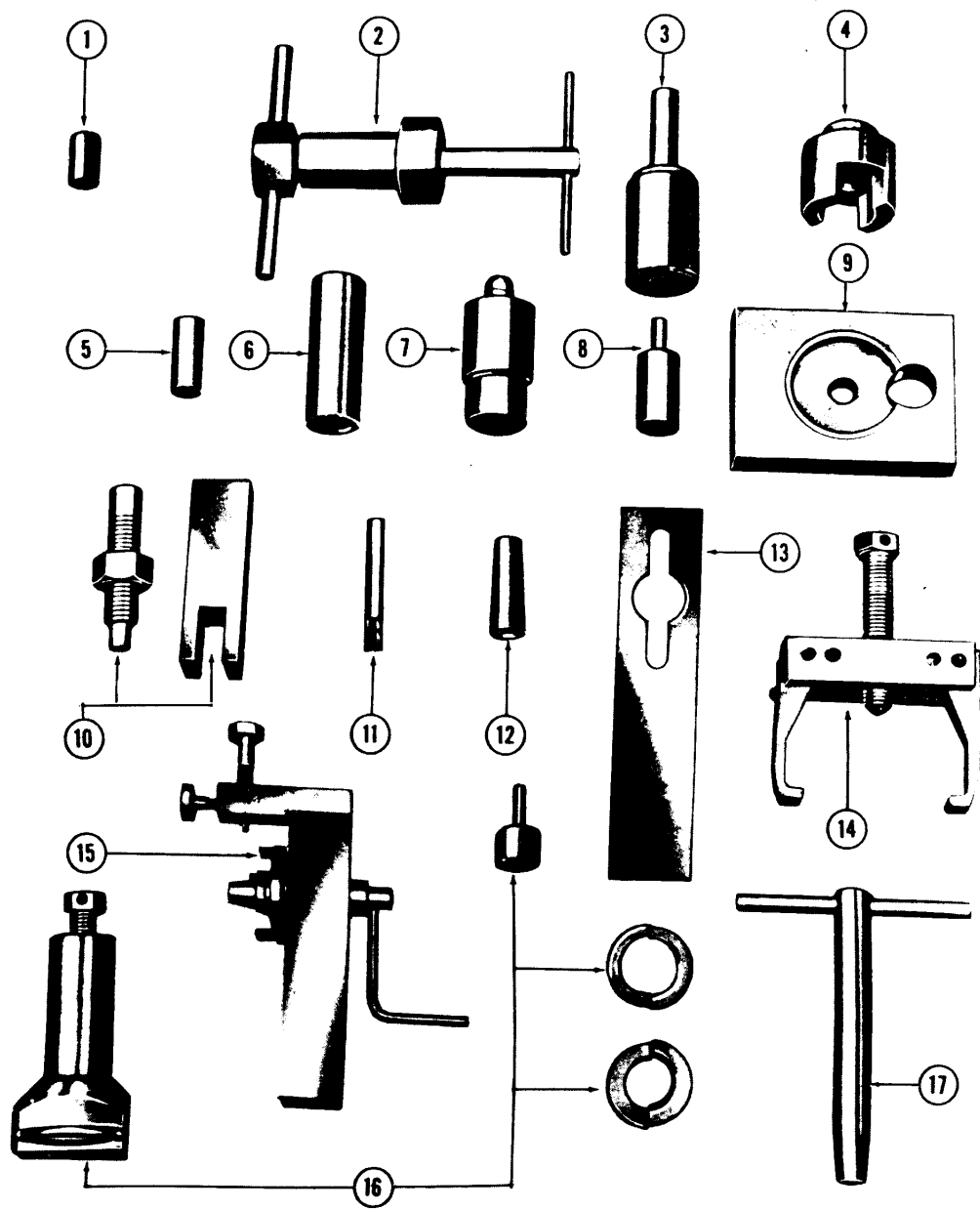


Figure 10. Overhaul Tools



## EISEMANN TOOLS SPEED-UP MAJOR OVERHAULS

These tools, designed specifically to facilitate the removing and replacing of LA Series Magneto parts, make possible a far easier, better and faster major overhaul. Each tool serves a particular overhaul step and is made of highest quality material for strength and durability.

| INDEX | PART NO. | NOMENCLATURE        | APPLICATION  |
|-------|----------|---------------------|--|
| 1.    | H27-170  | Bushing             | For removing inner ball races                            |
| 2.    | H19-923  | Complete Puller     | For removing outer ball races                            |
| 3.    | H19-932  | Drift               | For assembling outer ball races to housing and end plate |
| 4.    | H19-933  | Support Block       | Used with Part No. H19-932                               |
| 5.    | H19-934  | Support Bushing     | Used with Part No. H19-935                               |
| 6.    | H19-935  | Tubular Drift       | For assembling inner ball races                          |
| 7.    | H19-936  | Reversible Arbor    | For removing and replacing oil seal in housing           |
| 8.    | H19-937  | Drift               | For removing and replacing distributor rotor bearing     |
| 9.    | H19-938  | Base Plate          | To fit or remove distributor rotor bearings              |
| 10.   | H19-940  | Puller              | For removing catch pin                                   |
| 11.   | H19-944  | Catch Pin Installer | For installing Impulse Starter                           |
| 12.   | H19-945  | Thimble Sleeve      | For protection of oil seal                               |
| 13.   | H19-999  | Wrench              | To hold Impulse Starter                                  |
| 14.   | H19-946  | Puller              | For removing Impulse Starter                             |
| 15.   | H27-824  | Spring Winding Tool | For assembling Impulse Starter                           |
| 16.   | H19-995  | Bearing Puller Set  | For removing all bearings (Inner Race)                   |
| 17.   | H27-825  | Spring Remover Tool | For disassembling Impulse Starter                        |

In addition to the above special tools, ordinary wrenches, screw drivers, measuring tools and an arbor press are required to complete major overhauls.

## DISASSEMBLY OF COMPONENT PARTS

### IMPULSE STARTER

Remove the cotter pin (10), and drive nut (11). (See figure 17). Remove the impulse starter from the drive end of the magneto by using puller tool No. H19-946. While performing this operation, exercise caution to avoid allowing the starter spring to jump free.

Insert spring remover tool H27-825 into the taper of the flange in the impulse starter.

Firmly holding the cup, slightly turn the tool so that the spring is given a little additional wind-up.

Slowly pull the cup and flange assembly apart until the cup is free to turn with respect to the flange.

Permit the spring to slowly unwind.

Examine the drive cup, the spiral spring, and the flange and pawl assembly.

(See figure 11). Replace any or all of the parts if necessary.

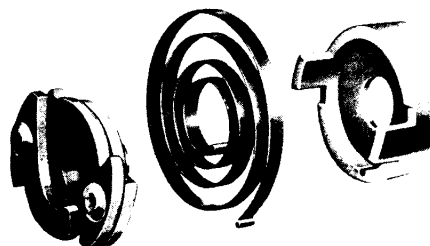
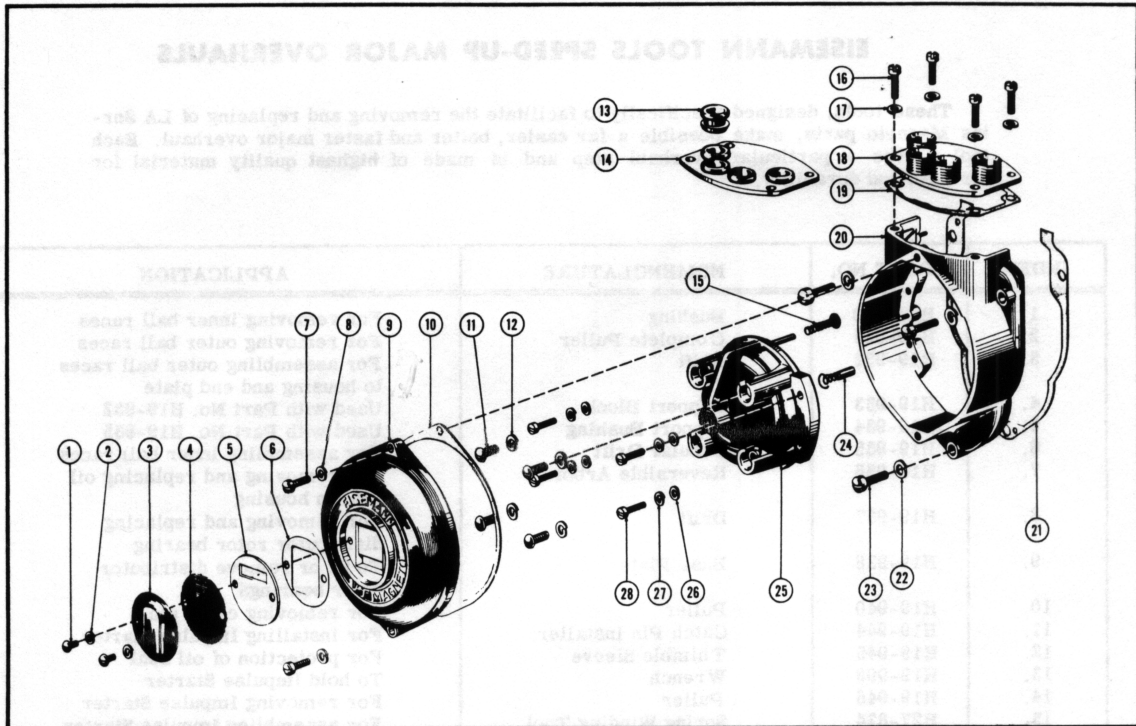
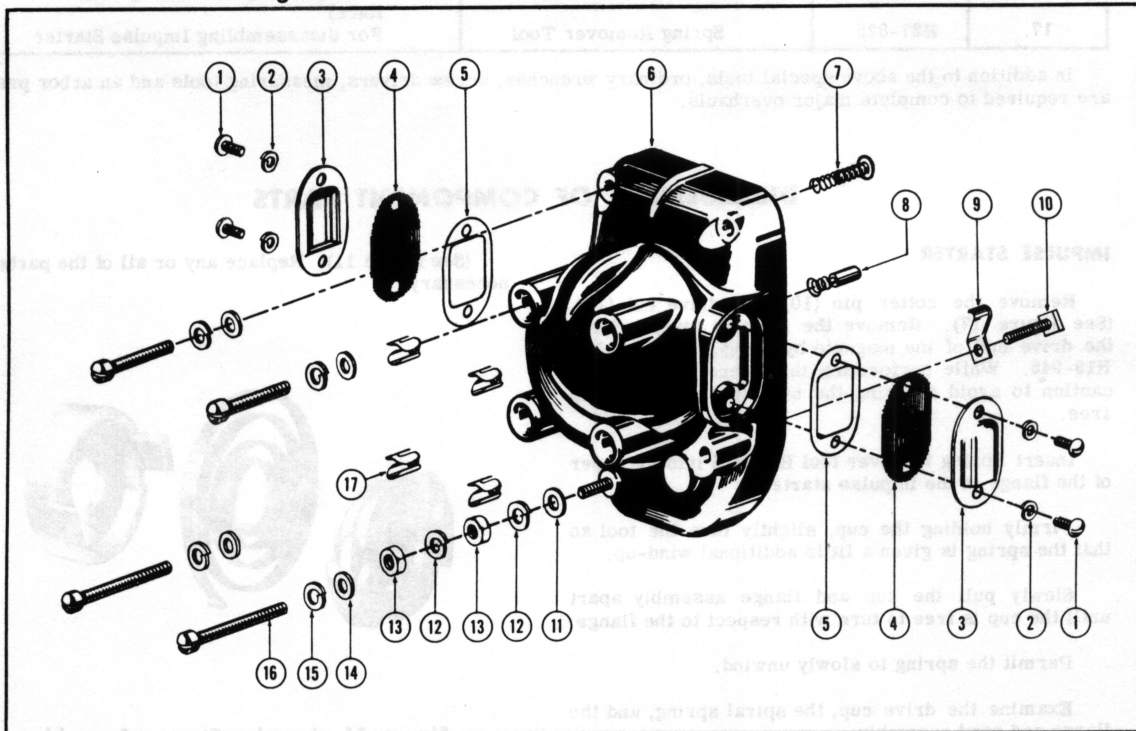


Figure 11. Impulse Starter Assembly



**Figure 12. Model LA-4 End Cover and Adapter Assembly**



**Figure 13. Model AM-4 Distributor Plate Assembly**

## DISTRIBUTOR PLATE, END COVER AND ADAPTER ASSEMBLIES

### LA Models

(See figure 12). Remove the four screws (16) and lockwashers (17) fastening the top plate to the adapter and end plate assembly. Lift the top plate (14 or 18) from the magneto and inspect the grommets (13) or ferrules for security. Inspect the top plate gasket (19) and replace if necessary.

Remove the end cover assembly (9) by taking out the two screws (7) and lockwashers (8). (Some models have sem screws). Take off the ventilator hood (3), screen (4), baffle plate (5) and gasket (6). Examine these parts particularly for dirt clogging.

Remove the four screws (11) and washers (12) holding the distributor plate (25) to the adapter plate (20). Slide the distributor plate out of the adapter plate, noting the dowel pins used for positioning. Remove the three screws (23) and lockwashers (22). Slide the adapter plate off the end plate dowel pins. Examine the adapter plate for cracks or dents and replace if necessary.

### AM Models

(See figure 13). Remove the four screws (16), lockwashers (15) and plain washers (14), noting that two screws are longer than the others. Slide the distributor plate (6) off the magneto, noting the dowel pins used for positioning. Remove and inspect the

gasket and replace if necessary. Remove the four screws (1), lockwashers (2), filter hoods (3), filter screens (4) and filter gaskets (5). Clean all parts and replace those in poor condition.

### LA and AM Models

Examine the center distributor carbon for freedom of movement in the insert and for sufficient length to insure contact with the center of the distributor electrode. Replace if necessary. Inspect the spring sleeve and eyelet assembly for freedom of movement on the high-tension pickup post and good contact with the high tension terminal of the coil. Check the binding post of the switch for tightness and condition of contact spring. On some distributor plates, the binding post or ground terminal is moulded in place, while on others it is removable.

Clean and inspect the distributor plate electrodes. Remove any corrosion and carbon dust by the method outlined on page 7.

Examine the distributor plate for cracks or other damage and replace if necessary.

## END PLATE ASSEMBLY

### LA Models

(See figure 17). Remove the nut (1), lockwasher (2) and pinion gear from the breaker end of the rotor shaft. (See figure 14). Remove the condenser post nut (12) from the condenser terminal post and remove

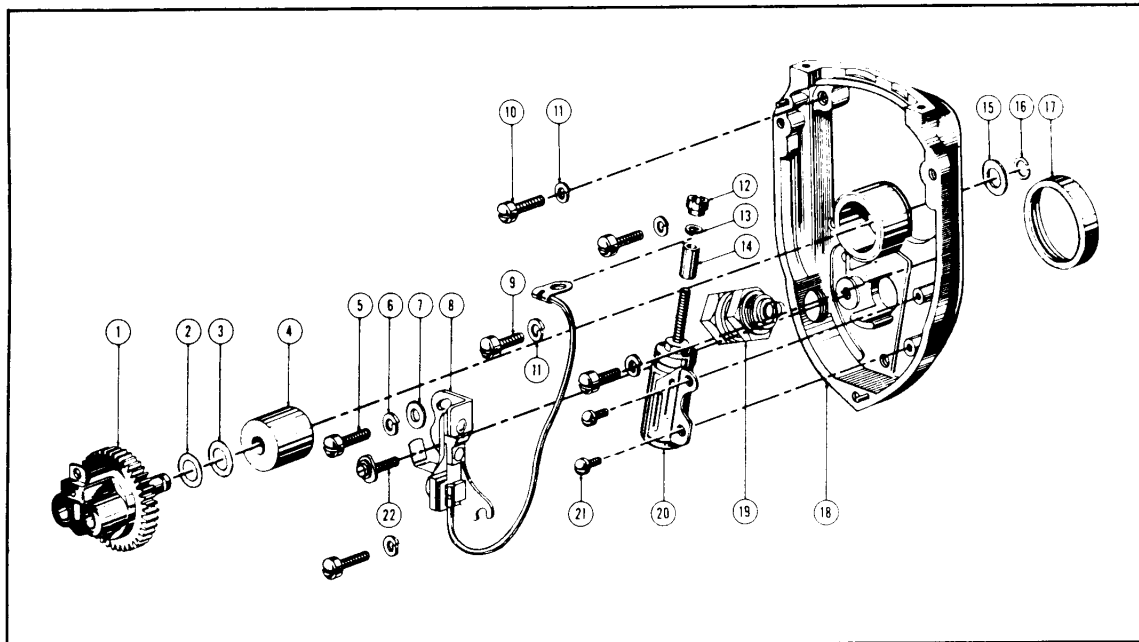


Figure 14. End Plate Assembly, LA Magnetos

the high tension coil lead from the condenser (20).

Remove the five fillister-head screws (9 and 10) and lockwashers (11).

Slide the breaker end plate (12) from the magneto rotor shaft and housing. Note that a dowel pin is used to align the end plate to the housing.

Lift the breaker lead off the condenser terminal post and remove the condenser post spacer (14).

Remove the two sem screws (21) and lift the condenser off the end plate.

Remove the screw (5), lockwasher (6) and plain washer (7).

Lift the breaker assembly (8) off the pivot post of the end plate.

Examine the eccentric stud (22) for freedom of fit in the end plate and for any burring or other damage. Replace if necessary.

#### AM Models

(See figure 17). Remove the nut (1), lockwasher (2) and pinion gear (3) from the breaker end of the rotor shaft.

(See figure 15). Remove the condenser post nut (9) from the condenser terminal and remove the high tension coil lead from the condenser (16).

Remove the three fillister-head screws (22) and lockwashers (21).

Slide the breaker end plate (12) from the magneto rotor shaft and housing. Note that a dowel pin is used to align the end plate to the housing.

Lift the breaker lead off the condenser terminal post and remove the condenser post spacer (11).

Remove the two sem screws (17) and lift the condenser off the end plate.

Remove the screw (5), lockwasher (6) and plain washer (7).

Remove the lock spring (20) and plain washer (19).

Lift the breaker assembly (8) off the end plate pivot post.

#### LA and AM Models

Test the condenser on any appropriate condenser tester, such as an Allen E191, or a Weidenoff. The capacity of the condenser should be between 0.17 - 0.22 microfarads; a series resistance of not over 0.4 ohm; a leakage resistance of not less than 50,000 ohms.

Inspect the breaker for the following:

- (1) Excessive burning, pitting, etc. of contact points. If the contact points are unsatisfactory, it is recommended that the complete breaker assembly be replaced. The dressing of contact points is not generally advisable. However, in an emergency, contact resurfacing may be accomplished by the use of a

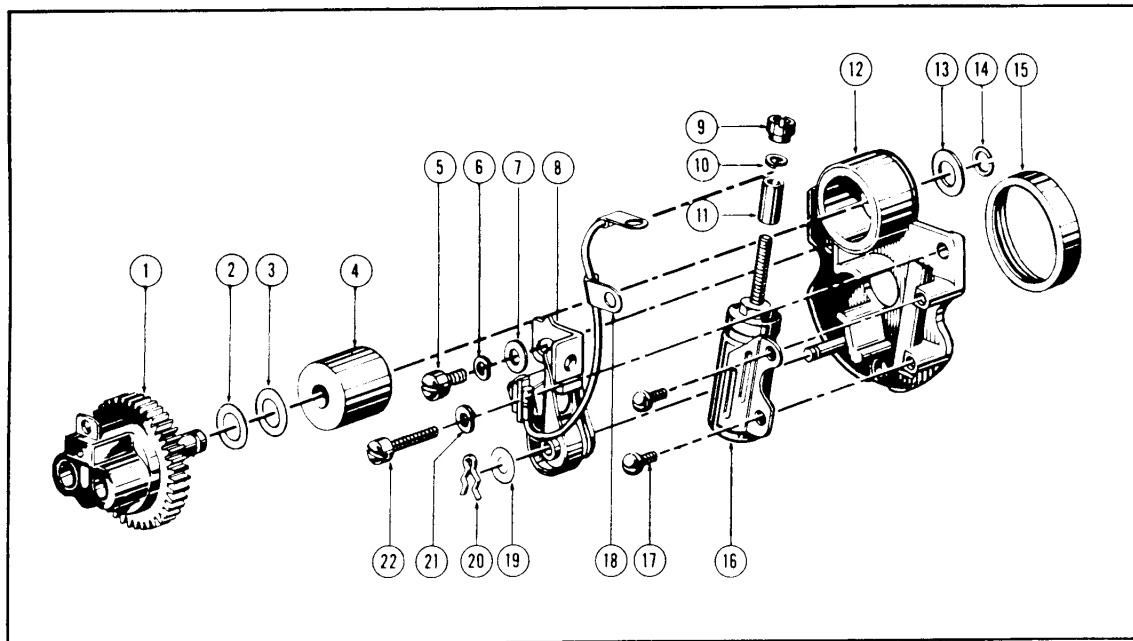


Figure 15. End Plate Assembly, AM Magnetos

very fine, flexible carborundum stone known as Flexstone. This stone should be thin enough to dress the points in their assembled position on the breaker. Dressing with a file has generally proven unsatisfactory.

- (2) Check the tension of the breaker spring (see figure 16). Tension should be between 15 and 30 ounces for LA models, and between 10 and 18 ounces for AM units.

Remove the snap ring (figure 14, ref. 16 and figure 15, ref. 14) from the groove in the distributor gear and rotor shaft by means of a suitable snap ring tool.

Remove the spacer or shim washer (figure 14, ref. 15 and figure 15, ref. 13) and withdraw the shaft from the oilite bearing (ref. 4, figures 14 and 15).

Remove the spacer or shim washers (refs. 2 and 3, figures 14 and 15) from the inner end of the shaft.

Inspect the distributor rotor assembly for wear on the electrode and for tightness to the distributor gear.

If necessary, replace the entire assembly.

If the distributor rotor bearing is faulty, remove by placing the end plate, outer race side up, on base plate fixture H19-938. Line up the bearing with the hole in the base plate, place drift H19-037 in the bearing hole and press out the bearing.

If the outer ball bearing race is scored or otherwise damaged, remove it with bearing puller H19-923.

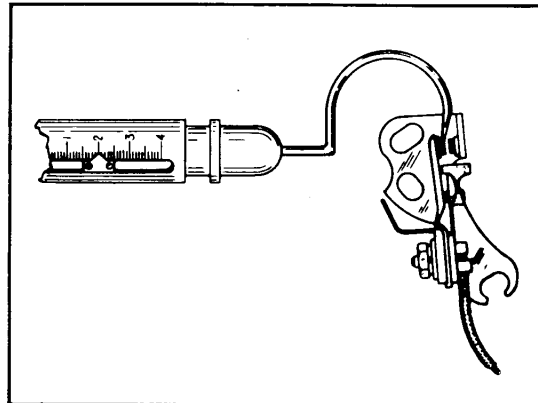


Figure 16. Checking Breaker Spring Tension

Inspect the end plate for damage, condition of dowel pins (if installed), and replace if necessary.

#### ROTOR SHAFT ASSEMBLY

(See figure 17). Remove breaker cam (4) and woodruff key (8) from the breaker end of the magneto rotor shaft.

Press drive-end of shaft out of the housing until the oil slinger (12) is free. Remove the slinger.

Remove the rotor shaft from the housing and take off the two ball bearing cage assemblies (5).

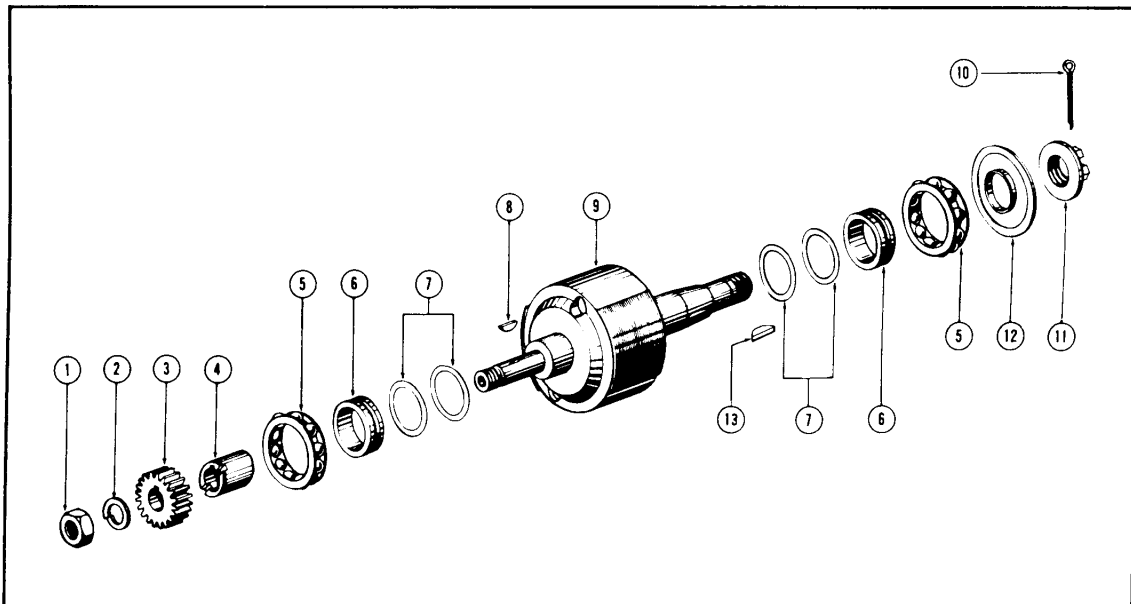


Figure 17. Rotor Shaft Assembly

Remove the two inner ball races (6) by means of bearing puller H19-995, if their condition necessitates replacement. If the inner ball races are to be removed, remove the shims (7) from both ends of the rotor shaft, noting the quantity and relative position.

#### HOUSING ASSEMBLY

(See figure 18). Remove the four screws (1), lockwashers (2) and the two coil clamps (3).

Remove the coil (4) from the housing (5) by tapping the open end of the housing against a wooden block, being careful not to damage the coil or dowel pin (11) of the housing. If the outer ball race (12) needs to be replaced, it may be removed with bearing puller H19-923.

When necessary to remove the oil seal (6), use reversible arbor H19-936.

If necessary, the catch pin (7) may be removed with catch pin puller H19-940. Note from which of the two holes in the flange the pin was removed.

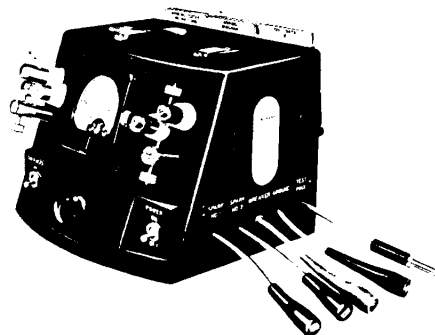


Figure 19. Eisemann Winding Tester

Remove the ventilator screw (10), cover (9) and screen (8).

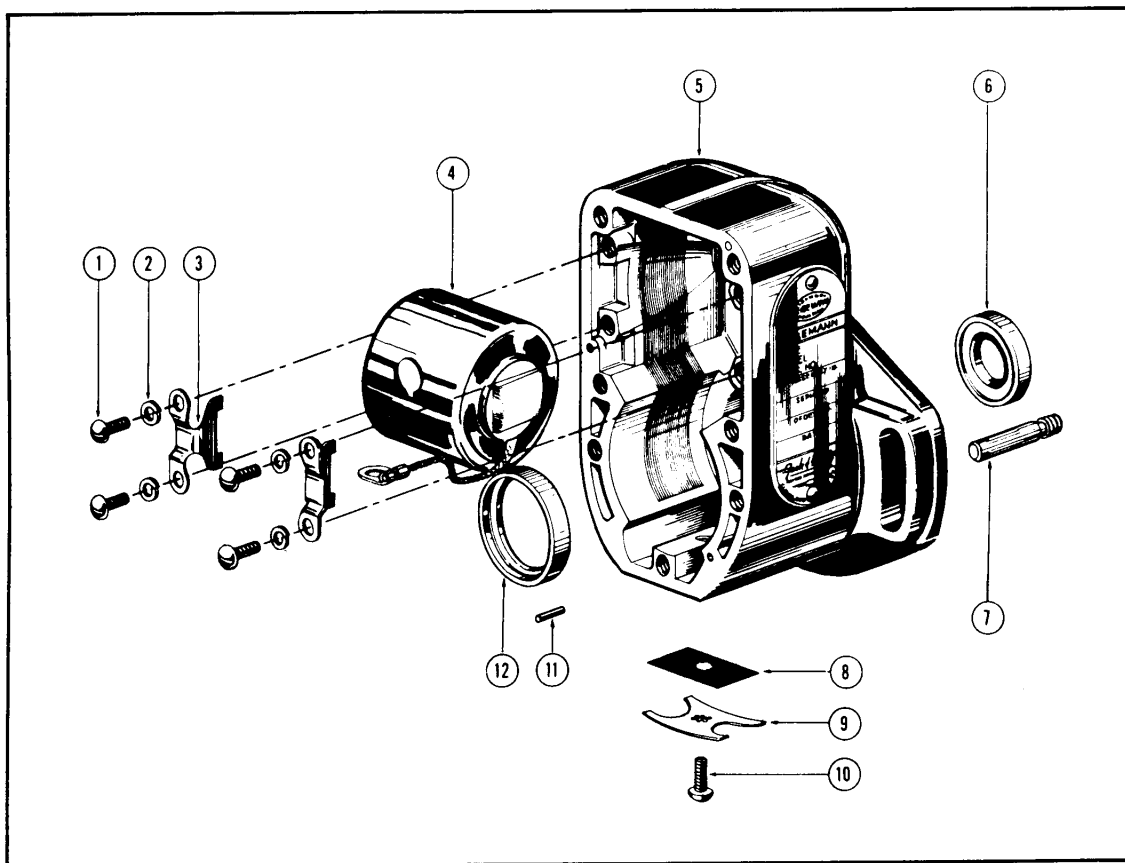


Figure 18. Housing Assembly

## CLEANING AND TESTING

Clean all parts thoroughly in a suitable solvent, with the exception of the condenser, coil, oil-impregnated oilite bearing, oil seal, cam, and breaker assembly. Filter screens should also be dismantled and cleaned. Dry all parts thoroughly. Examine the magneto rotor and the housing tunnel in which it re-

volves, to make sure both are free from metal particles, burrs, chips or other foreign matter. The coil winding should be tested on Eisemann Winding Tester H27-750, as shown in figure 19. Complete operating instructions, as well as coil data, are furnished on cards located in the case on the back panel of the tester.

## REASSEMBLY OF COMPONENT PARTS

### IMPULSE STARTER

(See figure 20). Set spring winding tool H27-824 in a vise, with the tool-winding handle in down position.

Raise plunger "A" and fasten in raised position with screw "B".

Slide the flange assembly on the tapered shaft, with pin "C" entering the spring anchoring hole in the flange. When sliding the flange on the shaft, the flange pawls should be fitted under the two ears provided.

Place the starter spring's inner anchoring hook into the anchoring hole in the flange. (The spring should then spiral to the right for clockwise rotation; to the left for anti-clockwise rotation). Rotate the shaft until the spring's outer anchoring hook can be held in position by the slot in the plunger. Release

screw "B" and slide plunger "A" down as far as it will travel. Insert spring anchoring hook in plunger slot. Retighten screw "B". The spring is now ready to be rewound. For clockwise starters, face the starter spring and turn the tool handle one and one-half turns in an anti-clockwise direction. For anti-clockwise starters, turn the handle the same number of turns in the opposite direction.

After the spring has been wound, lightly lubricate it with H29-000 grease. To complete the assembly, hold the drive cup so that the anchoring hole of the cup slides over the anchoring hook on the outer end of the spring and the cup interlocks with the flange assembly.

Loosen screw "B", raise plunger "A" and retighten the screw.

Snap the drive cup into full engagement with the flange and slide the starter off the tool by applying pressure on the flange pawls.

When properly assembled, the two ends of the spring will be on opposite sides of the drive cup.

### HOUSING ASSEMBLY

Install the ventilator screen, cover and fastening screw.

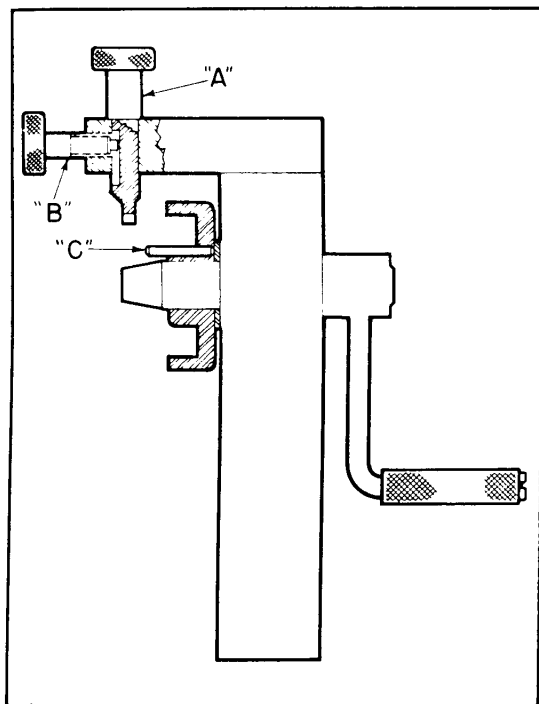


Figure 20. Spring Winding Tool

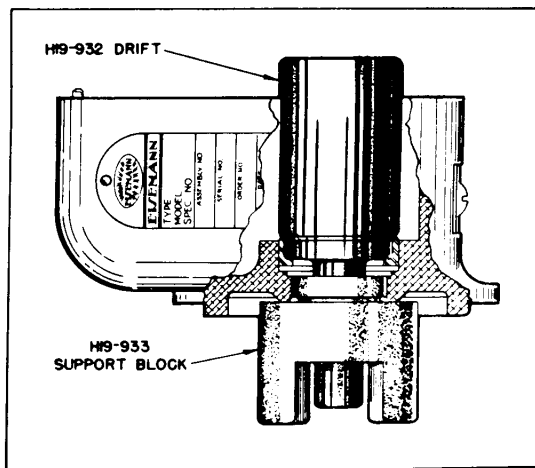


Figure 21. Replacing Outer Race in Housing

Install the catch pin in the housing hole from which it was removed, using catch pin installer H19-944.

Install the outer ball race, using support block H19-933 and drift H19-932, as shown in figure 21. When replacing outer ball races of old style housings, insure the proper fit by using suitable shim strips and shim washers around and behind the bearing race.

Install the coil, with core end radius fitting into the corresponding radius in the housing lamination. Install the two coil clamps with the high tension lead terminal under the clamp. Fasten the two clamps with the four screws and lockwashers.

#### END PLATE ASSEMBLY

Install the outer ball race from the end plate, using support block H19-933 and Drift H19-932, as shown in figure 22.

Replace the distributor rotor bearing by placing the end plate in base plate H19-938 so that the ball bearing side is down and set into the base plate recess and the bearing hole is toward the solid end of the base plate. Use drift H19-937 to press bearing (recessed end down) flush with the bottom of the end plate. Stake the oilite bearing to the end plate on the outer ball bearing race side. (See figure 23).

Replace the spacer washer on the inner end of the distributor rotor shaft and insert the distributor rotor in the oilite bearing.

Replace the shim washers and snap ring on the other end. Check to see that the distributor rotor turns freely.

Place the eccentric stud in the end plate (LA Models). On AM Models, lightly lubricate the pivot pin in the end plate, mount the breaker assembly, re-

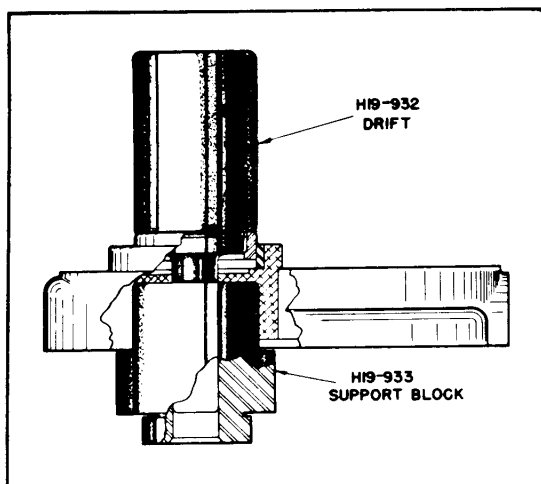


Figure 22. Replacing Outer Race in End Plate

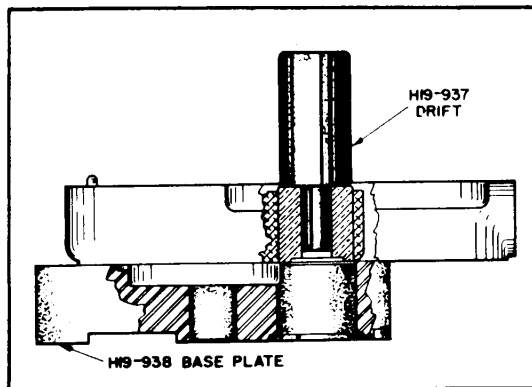


Figure 23. Replacing Oilite Bearing

place the washer and lock spring. Replace the breaker fastening screw, lockwasher and flat washer.

Assemble the condenser to the end plate with screws and lockwashers. On LA models, the breaker lead must lay against the two screw posts before the condenser can be assembled to the end plate. On AM models, the top screw holding the condenser to the end plate holds the breaker lead clamp in position.

#### ROTOR SHAFT ASSEMBLY

Replace the bearing end shims on the shaft in the quantity and positions in which they were disassembled.

Install the two inner ball races using tubular drift H19-935 and support bushing H19-934.

Repack ball bearing cages with H29-000 grease and replace on inner races.

#### MAGNETO ASSEMBLY

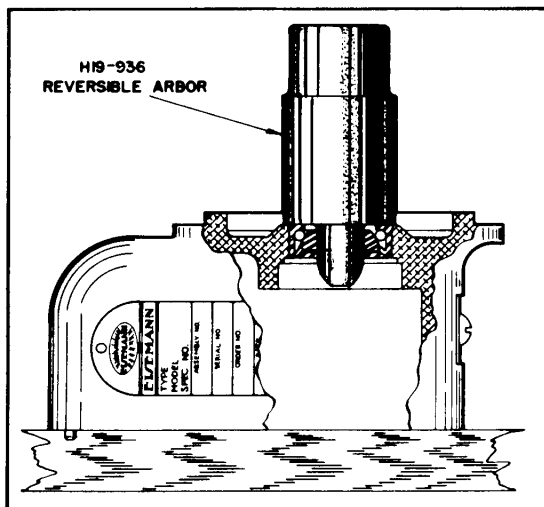
Check the rotor end play by the following procedure:

- (1) Place the rotor in the housing and assemble the end plate to the housing.
- (2) Check rotor for freedom of rotation, making sure there is no end play.
- (3) Reshim and recheck until proper bearing adjustment is obtained.

Install the oil seal in the housing, using reversible arbor H19-936 as shown in figure 24.

Replace the woodruff key and breaker cam on the rotor shaft with the slots or directional arrows facing outward or inward as required for proper magneto rotation. Note that most cams are reversible and may be used for either clockwise or anti-clockwise rotation. For anti-clockwise rotation, the slots must face in toward the bearing race.





**Figure 24. Replacing Oil Seal in Housing**

Place sleeve H19-945 on shaft taper to protect the oil seal while installing the rotor in the magneto housing.

Fasten the end plate to the housing with the screws and lockwashers required.

Using drift H19-935 and support bushing H19-934, press the oil slinger on the drive end of the rotor shaft. Leave a space of .010" between the oil slinger and housing, using tool H19-920.

Install the woodruff key on the drive end of the rotor shaft.

Install the driving members (impulse starter, etc.) using the reverse order of disassembly.

Install the cotter pin.

Install the pinion gear so that the timing mark on the gear lines up with the desired timing mark (i. e. clockwise or anti-clockwise) on the distributor gear. Secure the pinion gear with lockwasher and hexagon nut.

#### **TIMING**

The breaker contact points should be set as described on page 7.

In these magnetos, except where cam H27-635 is used, a spark of maximum intensity is delivered when the contact point interruption coincides with an edge gap of 1.5 mm to 3.5 mm (.059-.138 inches). (See figure 25). Where cam H27-635 is supplied, but no impulse starter is used, the edge gap limits are 0.2 mm - 2.2 mm (.008 - .086 inches). The number "7" is stamped on one end of cam H27-635 for identification.

It is recommended that a timing light be used to check the point at which the breaker contacts begin to open. If a timing light is not available, feeler strips, not exceeding .0015 inch thickness and free from oil and dirt, may be used. Feeler strips are not recommended as they do not give an accurate check and may foul the contact surfaces with foreign matter.

If the internal timing is not within the prescribed limits, replace the complete breaker assembly.

Place the condenser post spacer, coil and breaker lead terminals, and lockwasher on the condenser post. Lock securely with the condenser nut.

#### **DISTRIBUTOR PLATE, END COVER AND ADAPTER ASSEMBLIES**

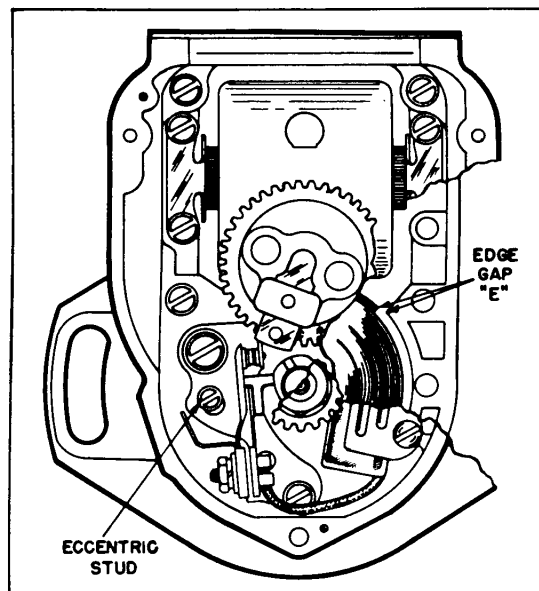
##### **LA Magnetos**

Fasten the distributor plate to the adapter plate with the four screws, lockwashers and plain washers. Before completing the following steps, test the magneto as directed in paragraph (1) of the "Running Test" given on page 20.

Securely fasten the adapter plate to the end plate (with the gasket in place) with the three screws and lockwashers.

Install the distributor cover, ventilator gasket, plate, screen, hood and the two screws and lockwashers.

Install the distributor cover and gasket, and fasten in place with the two screws and lockwashers.



**Figure 25. Checking Edge Gap**

Securely fasten the top plate and gasket in place with the four screws and lockwashers.

#### AM Magnetos

Install the filter gaskets, screens and hoods and fasten with the four screws and lockwashers.

Before completing the following steps, test the magneto as directed in paragraph (1) of the "Running Test" given on this page.

Install the gasket between the distributor plate and magneto housing, and slide the distributor plate into position, noting the dowel pins used for alignment.

Fasten the distributor plate to the magneto housing by means of the four screws, lockwashers and plain washers.

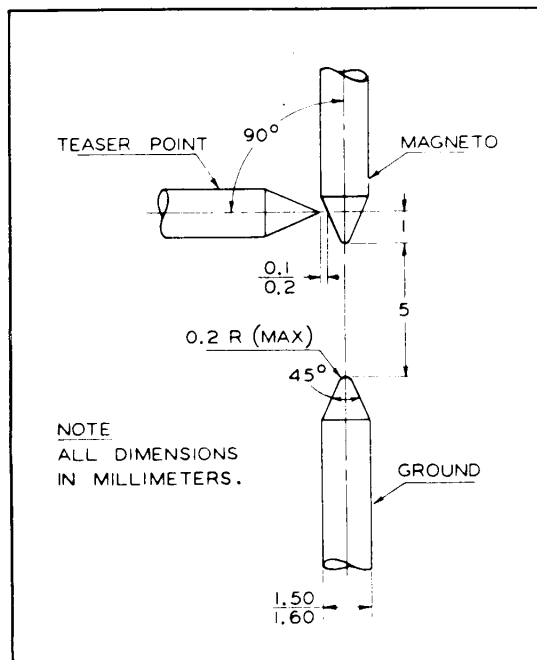
#### RUNNING TEST

Mount the magneto on any approved test stand, with a variable speed range and approved three-point test gap rack, such as the Eisemann H19-960.

The magneto should conform to the following specifications:

(1) With the adapter (LA Models) and distributor plate removed from the magneto, connect the high tension terminal on the coil with a suitable test lead to one of the test gaps set to a standard 5 mm opening as shown in figure 26. Run the magneto through a speed range to a maximum speed of 2000 R.P.M. for AM magnetos and 5000 R.P.M. for the LA models. The breaker assembly should operate without excessive arcing between the contact points. Excessive arcing may indicate a faulty condenser or loose connection. Oil, dirt or other foreign matter on the contact surfaces will also cause arcing between the points.

(2) With the adapter and distributor plate re-assembled to the magneto, connect the high tension



**Figure 26. Spark Gap Setting**

cables from the distributor plate to a test rack on which the three-point test gaps have been set to a 5 mm opening. The magneto should fire the test gaps regularly at a speed of 150 R.P.M. or less.

(3) On magnetos equipped with an impulse starter, test the starter as follows: Up to 160-260 R.P.M., the pawls on the flange of the impulse starter should engage the catch pin on the housing and the starter should operate. Above this speed, the flange pawls should cease engaging the catch pin and the starter should act as a direct drive coupling.