POWERUP
AIRCRAFT IGNITION SYSTEMS



# MAGNETO MAINTENANCE MANUAL

## P/N PM6001

# MAGNETO SERIES

# ES4300
# ES6300

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# TABLE OF CONTENTS

Thank you for purchasing a PowerUp™* magneto. We encourage you to read this manual thoroughly. It contains a wealth of information about how to properly install and maintain your magneto so that it may give you many years of safe and reliable service.

Should you have a question regarding your magneto that is not covered in the manual, Hartzell Engine Tech Product Support is ready to assist you. We may be reached at the following contact information:

Phone: +1.334.386.5400, option 2

E-mail: techsupport@Hartzell.aero

Fax: +1.334.386.5450

Web: www.Hartzell.aero/contact

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## RECORD OF REVISIONS

| Revision Letter | Issue Date | Page Revised | Description | Date |
|---|---|---|---|---|
| New | IR | N/A | New Release | 09 September 2024 |

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## SERVICE DOCUMENTS

| Service Document Number | Description | Service Document Revision | Date Incorporated |
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# AIRWORTHINESS LIMITATIONS

## A.1 General Information

**CAUTION!**

THE AIRWORTHINESS LIMITATIONS HEREIN ARE THOSE MANDATED BY HARTZELL ENGINE TECH. THESE LIMITATIONS ARE THE MINIMUM REQUIRED TO MEET CONTINUED AIRWORTHINESS BUT MAY BE SUPERSEDED BY MORE STRINGENT REQUIREMENTS AS PUBLISHED BY THE FAA, AIRCRAFT, ROTORCRAFT OR OTHER MANUFACTURERS THAT USE THESE MAGNETOS IN THEIR APPLICATIONS. FAILURE TO OBSERVE THESE LIMITATIONS MAY COMPROMISE THE MAGNETOS OR THE APPLICATIONS THEY ARE USED IN.

## A.2 Airworthiness Limitations Statement

A. The Airworthiness Limitations section is FAA accepted and specifies maintenance required under § 43.16 and § 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

### Airworthiness Limitation Revisions Log

| Revision Number | Description of Revision |
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### A.3 Life Limits

A. The FAA establishes specific life limits for certain parts as well as the complete magneto assembly. Such limits require replacement of the identified parts after a specified number of cycles or hours of use.

B. Additions of, or changes to, any life limit for magneto parts components will be noted in the Airworthiness Limitation Revision Log.

C. Life Limits

(1) Magnetos and their parts affected by this manual currently do not have any life limited parts.

(2) There are no new (or additional) Airworthiness Limitations associated with this equipment and/or installation.

# CHAPTER 1 – INTRODUCTION

## 1.1 General Information

**WARNING!**

IMPROPER OR UNAUTHORIZED APPLICATIONS OF THE INFORMATION CONTAINED IN THE MANUAL MAY RENDER THE AIRCRAFT OR THE COMPONENT UNAIRWORTHY AND RESULT IN LOSSES, DAMAGES, OR INJURY TO THE USER.

DO NOT USE OBSOLETE OR OUTDATED INFORMATION. PERFORM ALL INSPECTIONS OR WORK IN ACCORDANCE WITH THE MOST RECENT REVISION OF THE APPLICABLE AIRCRAFT/ENGINE SERVICE OR MAINTENANCE MANUAL. INFORMATION CONTAINED IN THESE MANUALS MAY BE SIGNIFICANTLY CHANGED FROM EARLIER REVISIONS. USE OF OBSOLETE INFORMATION MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

The accuracy and applicability of this manual has not been verified for any assembly, component or part not manufactured by Hartzell Engine Tech LLC (HET). Any use of the manual for other than its intended or implied purpose is prohibited. The use of the manual for the purpose of performing any installation, maintenance, replacement, adjustment, or inspection of any assembly, component or part not manufactured by HET is not approved, endorsed, or sanctioned by HET.

This manual has been approved by Hartzell Engine Tech LLC as the proper methods and procedures that FAA or other airworthiness authority Certificated Repair Stations and A/P Mechanics should use in the inspection and maintenance of Hartzell Engine Tech LLC magnetos.

No liability will be assumed by Hartzell Engine Tech LLC for actual, consequential, incidental or other types of damages directly or indirectly resulting from the unauthorized use of this manual for other than its stated purposes.

The liability for use of the authorized data herein for the maintenance, or return to service is limited to the specific terms and conditions stated under the applicable Limited Warranty in effect for each piece part, component, assembly or whole unit sold by HET.

Because of the numerous modifications, Supplemental Type Certificates (STC), Parts Manufacturing Approvals (PMA), or Form 337 Field Approvals that may apply, it is the responsibility of the repairman, mechanic, or maintenance facility to determine the proper engine or aircraft application of this magneto assembly. Please refer to the appropriate aircraft Type Certificate (TC), Supplemental Type Certificate (STC), aircraft equipment list, maintenance manuals, and/or Log Book entries for determination.

When performing installation, maintenance, replacement, adjustment, or inspection of any HET assembly, component or part, it is imperative that the latest revision of this HET manual or other product support document be referenced. Reference the HET website to be sure you have the latest revision before performing any work. (https://powerupignition.aero/support/maintenance-manuals/)

All reasonable attempts were made to make this manual as complete and accurate as possible. If you have any questions, comments, corrections or require clarification of any information contained herein, please write to Hartzell Engine Tech LLC, 2900 Selma Highway, Montgomery, Alabama, 36108 USA. TEL +1.334.386.5400, FAX +1.334.386.5410, or https://hartzell.aero/contact/.

### 1.2 General Specification (manual)

A. This manual follows general GAMA formatting using ATA 100 identification as required. Principle units of measure in the manual are U.S. units with International System of Units (SI) in parentheses.

B. The ES4300 and ES6300 series magneto models are considered herein. Variations of these magnetos may be noted as applicable.

C. All aircraft, rotorcraft, or engine applications are limited to the holder of the TC, STC, PMA or TSO and only at the date of that document publication or revision.

D. Only approved, competent persons with the necessary skills may do maintenance tasks described in the manual. This may include a certified pilot doing “preventative maintenance” as defined in FAR 43, Appendix A, paragraph C with guidance from AC 43-12A of latest change.

E. The manual describes maintenance on components as they are installed on aircraft and tasks that should be accomplished in a properly equipped service facility.

F. Maintenance tasks and subtasks are referenced in the manual but will have no specific identification numbers.

G. The manual contains: Description and Operation, Troubleshooting, Instruction for Continued Airworthiness (ICA) and Maintenance information along with part numbers required for basic maintenance tasks.

H. Maintenance instructions and parts lists beyond the scope of this ICA manual may be found in the relevant PowerUp™ Overhaul Manual PM6002.

I. Changes and updates to this manual can be found at www.powerupignition.aero. Revisions will be tracked and recorded in the Record of Revisions section of this document.

J. Service Bulletins and Service Letters issued subsequent to this ICA manual may contain information that supplements and supersedes information contained in this manual.

### 1.3 How to use the manual

A. Make sure the manual contains information applicable to your aircraft, engine, or replacement magneto. Look for the model number on the Title Page and if applicable, the part number of the replacement or superseded component.

B. It is imperative that you read, understand, and observe all the applicable **WARNINGS** and **CAUTIONS** before you do any work on this component.

C. Use only the sections needed. Use the check section to determine what actions may be needed periodically and the maintenance sections for servicing the magneto.

D. If you need to identify a part or find a part number, refer to illustrations or reference in this manual or in the applicable aircraft or engine service or maintenance manual.

E. Refer to the troubleshooting section to ensure that the observed or reported condition lies with the magneto.

F. Fully test the magneto per the instructions in this manual when running the aircraft. Utilize the aircraft and/or engine manufacturer's service manuals and publications before returning the aircraft to service. Use the AFM or POH for aircraft operations.

G. Some sections in this manual apply to all magnetos considered herein. Other sections will contain information specific to a particular magneto model or variation of a model.

### 1.4 Measurements

A. The measurements given in the manual are taken from original manufacturing drawings.

### 1.5 Units of Measure

A. SI Units

| | |
|---|---|
| A | Ampere |
| A · h | Ampere hours |
| F | Farad |
| g | Gram |
| N | Newton |
| N · m | Newton meter |
| V | Volt |
| °C | Degree Celsius |
| Ω | Ohm |
| W | Watt |
| Hz | Hertz |
| m | Meter |
| cm | Centimeter |
| kg | Kilogram |

B. U.S. Units

| | |
|---|---|
| ft | Foot |
| in | Inch |
| lb | Pound |
| lbf | Pound-force |
| lbf · in | Pound-force inch |
| lbf · ft | Pound-force foot |
| °F | Degree Fahrenheit |

C. Multiplying Prefixes

| | |
|---|---|
| µ | Micro |
| m | Milli |
| k | Kilo |
| M | Mega |
| p | Pico |

## 1.6 Abbreviations

A. The abbreviations given below are used in the manual: (upper or lower case)

| | |
|---|---|
| AFM | Aircraft Flight Manual |
| ATA | Air Transport Association of America |
| FAA | Federal Aviation Administration (USA) |
| GAMA | General Aviation Manufacturers Association |
| IAW | In Accordance With |
| IPL | Illustrated Parts List |
| ID | Inside Diameter |
| HET | Hartzell Engine Tech LLC |
| MAX | Maximum |
| MIN | Minimum |
| N/A | Not Applicable |
| OD | Outside Diameter |
| PMA | Parts Manufacturing Approvals |
| P/N | Part Number |
| POH | Pilot's Operating Handbook |
| SCFH | Standard Cubic Feet per Hour |
| S/N | Serial Number |
| STC | Supplemental Type Certificates |
| TBO | Time Before Overhaul |
| TC | Type Certificates |
| TDC | Top Dead Center |
| TIS | Time-In-Service |

## 1.7 Definitions

A. This paragraph defines the warnings and notifications used in this manual. **WARNINGS** place critical attention to use of tools, materials, procedures, or limitations, which must be followed without deviation to avoid injury to the technician or other persons. **CAUTIONS** place immediate attention to use of tools and procedures which must be followed to avoid injury, damage to equipment and/or facilities. **Notes** call attention to procedures which make the job easier.

B. The following are basic definitions of the terms used herein: (as related to this manual)

**BRUSH:** A device for making a connection between a rotating element and a stationary element. Brush assemblies often consist of a composite carbon brush and a wire spring.

**CONTINUITY:** The continuous path for the flow of current in an electrical circuit.

**MAGNETOS:** An electrical generator used to produce high-voltage pulses to the spark plugs via an external shielded ignition harness.

**MICROFARADS:** A microfarads (μF) is a unit of capacitance, equivalent to 0.000001 (of $10^{-6}$) farad (F).

**MULTIMETER:** Device for the measurement of voltage, current, or resistance.

**LEAKAGE:** Dissipation of voltage or current from a component or connection.

**OPEN:** Electrical term for a complete disruption of a conductive path in an electrical circuit. Will read infinite resistance.

**ROTOR:** Rotating magnet assembly used to create a moving magnetic field.

**SHORT:** Common term for a connection which has no or very little resistance as seen on an Ohmmeter in an electrical circuit. Typically an undesirable condition with respect to grounded elements.

**TDC:** Top Dead Center

**TEST BENCH:** Device so constructed as to allow testing of the magneto or component parts.

**TERMINALS:** Studs, screws or other devices that provide connections for electrical power.

**TIS:** Time in Service

**VOLT/OHM METER:** Device for the measurement of voltage or resistance.

**WOODRUFF KEY:** Device used to aid in coupling torque or facilitate indexing between rotating mechanical elements.

### 1.8 Disposal

A. HET magneto assemblies are designed to allow for overhaul and re-use of many of the sub-assemblies and components.

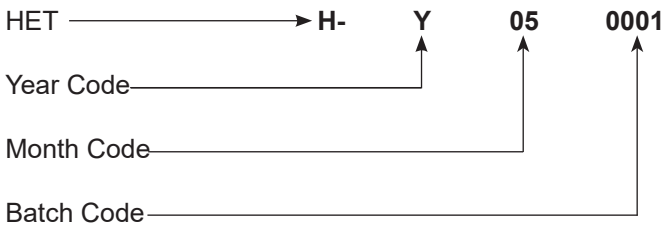
(1) Disposal of unairworthy parts and assemblies as well as required replacement parts should be as follows:

(a) Rejected parts should be tagged and scrapped per FAA requirements and parts deemed unairworthy must be rendered unusable prior to discard.

### 1.9 Model Identification

ES4301 - Impulse Coupled (CCW)
ES4302 - Direct Drive (CW)
ES4309 - Hub Drive (CCW)
ES4310 - Hub Drive (CCW)
ES4330 - Impulse Coupled (CW)
ES4333 - Impulse Coupled (CW)
ES4342 - Direct Drive (CCW)
ES4345 - Direct Drive (CCW)
ES4347 - Direct Drive (CCW)
ES4348 - Direct Drive (CW)
ES4353 - Direct Drive (CCW)
ES4354 - Impulse Coupled (CCW)
ES4370 - Direct Drive (CCW)
ES4371 - Impulse Coupled (CCW)
ES4372 - Impulse Coupled (CCW)
ES4373 - Impulse Coupled (CCW)
ES4374 - Impulse Coupled (CW)
ES4381 - Impulse Coupled (CCW)
ES6309 - Direct Drive (CW)
ES6310 - Impulse Coupled (CW)
ES6313 - Direct Drive (CW)
ES6314 - Impulse Coupled (CCW)
ES6320 - Impulse Coupled (CW)
ES6324 - Impulse Coupled (CCW)
ES6340 - Direct Drive (CW)
ES6350 - Direct Drive (CCW)
ES6351 - Impulse Coupled (CCW)
ES6355 - Impulse Coupled (CCW)
ES6360 - Direct Drive (CCW)
ES6361 - Impulse Coupled (CCW)
ES6362 - Impulse Coupled (CW)
ES6363 - Direct Drive (CCW)
ES6364 - Impulse Coupled (CCW)
ES6365 - Direct Drive (CCW)
ES6367 - Impulse Coupled (CW)
ES6371 - Direct Drive (CCW)
ES6377 - Impulse Coupled (CCW)
ES6379 - Impulse Coupled (CCW)
ES6380 - Impulse Coupled (CW)
ES6382 - Impulse Coupled (CW)
ES6390 - Direct Drive (CCW)
ES6391 - Direct Drive (CW)
ES6393 - Direct Drive (CCW)
ES6394 - Direct Drive (CW)

### 1.10 Serial number Identification




Example above: 2024, May, first unit of the month (batch). The year code advances one letter in alphabetical order for each succeeding year.

### 1.11 Warranties

A. Hartzell Engine Tech LLC (HET) offers a Limited warranty with each new magneto assembly or component (part) it sells through it's distribution system. **NO expressed or implied warranty exists** when repairing, or rebuilding any assembly or component using this manual except as it may apply to a new HET replacement part purchased. If you suspect that any warranty applies to the magneto assembly, it must be returned through an authorized HET distributor in a manner prescribed by that specific distributor. The affected magneto must be received by the factory fully assembled and not altered in any way for disposition by HET warranty department. **(Warranty shall be denied for any magneto received altered, modified, or disassembled.)**

B. The HET Limited warranty policy in affect for your magneto is determined at the time of purchase. (As the Warranty policy is revised from time to time, you must download the policy in affect for your unit for specific terms and conditions should a warranty condition occur. Only the terms and conditions stated in the warranty at the time of purchase will apply. For warranty information, visit our website at http://www.hartzell.aero.

### 1.12 References

See https://powerupignition.aero/support/ for Continental and Lycoming Application Charts.

# CHAPTER 2 – DESCRIPTION OF OPERATION

## 2.1 Description

A. General

(1) Hartzell Engine Tech (HET) ES4300 and ES6300 series magnetos are conventional aircraft magnetos designed to generate and distribute high voltage ignition energy for four and six cylinder engines.

B. Dimensions

(1) The basic dimensions of each magneto are shown in Fig. 2.1 thru 2.11. Dimensions are for reference only.

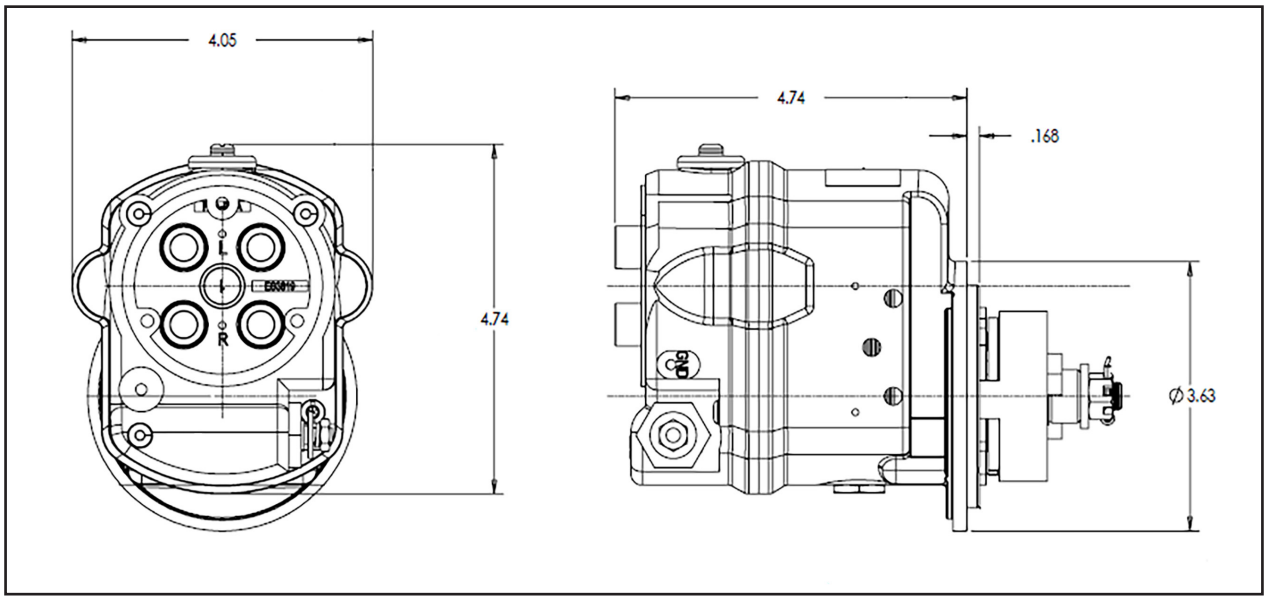



**Figure 2.1 – Typical ES4300 Dimensions**

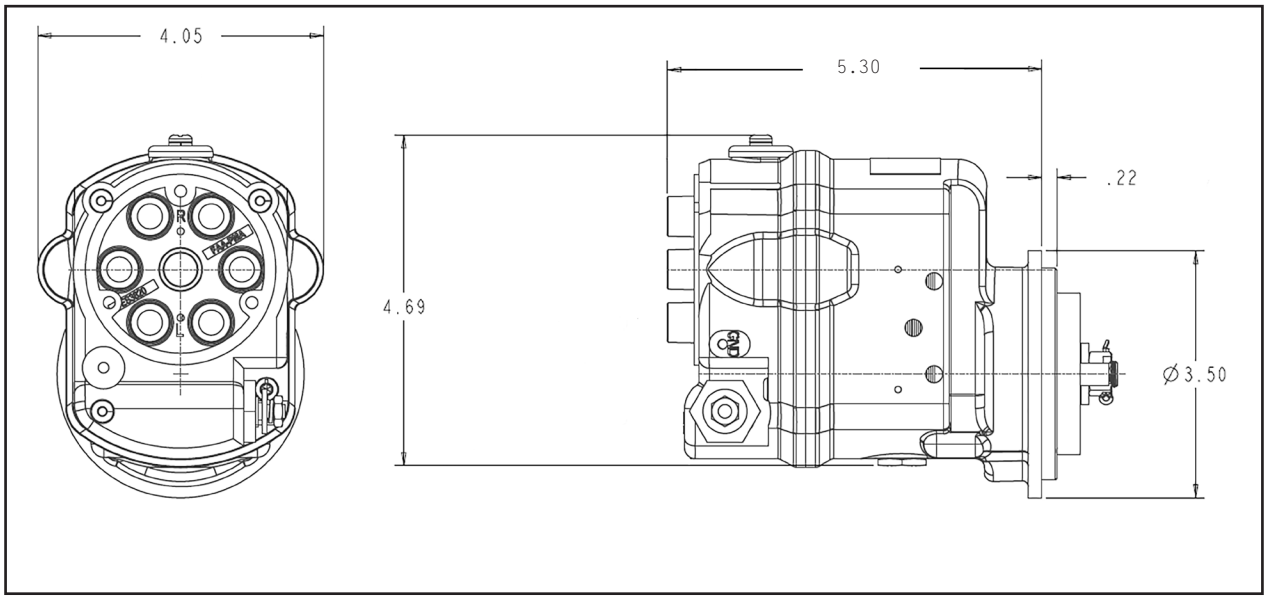



**Figure 2.2 – Typical ES6300 Dimensions – Long Frames**

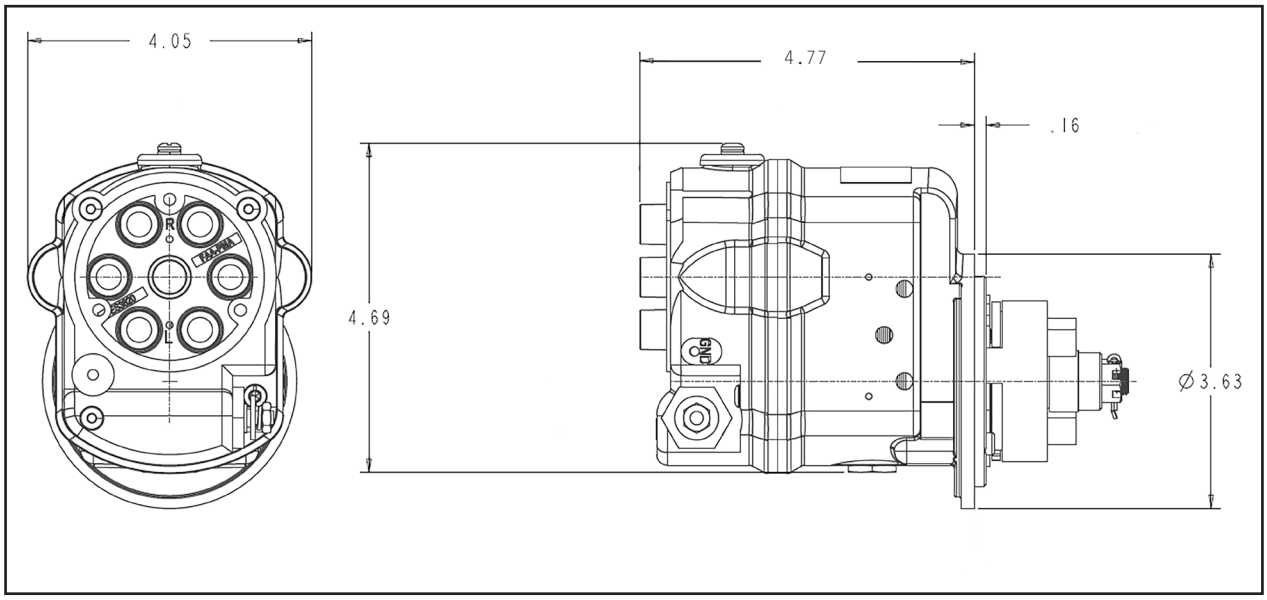



**Figure 2.3 – Typical ES6300 Dimensions – Short Frames**

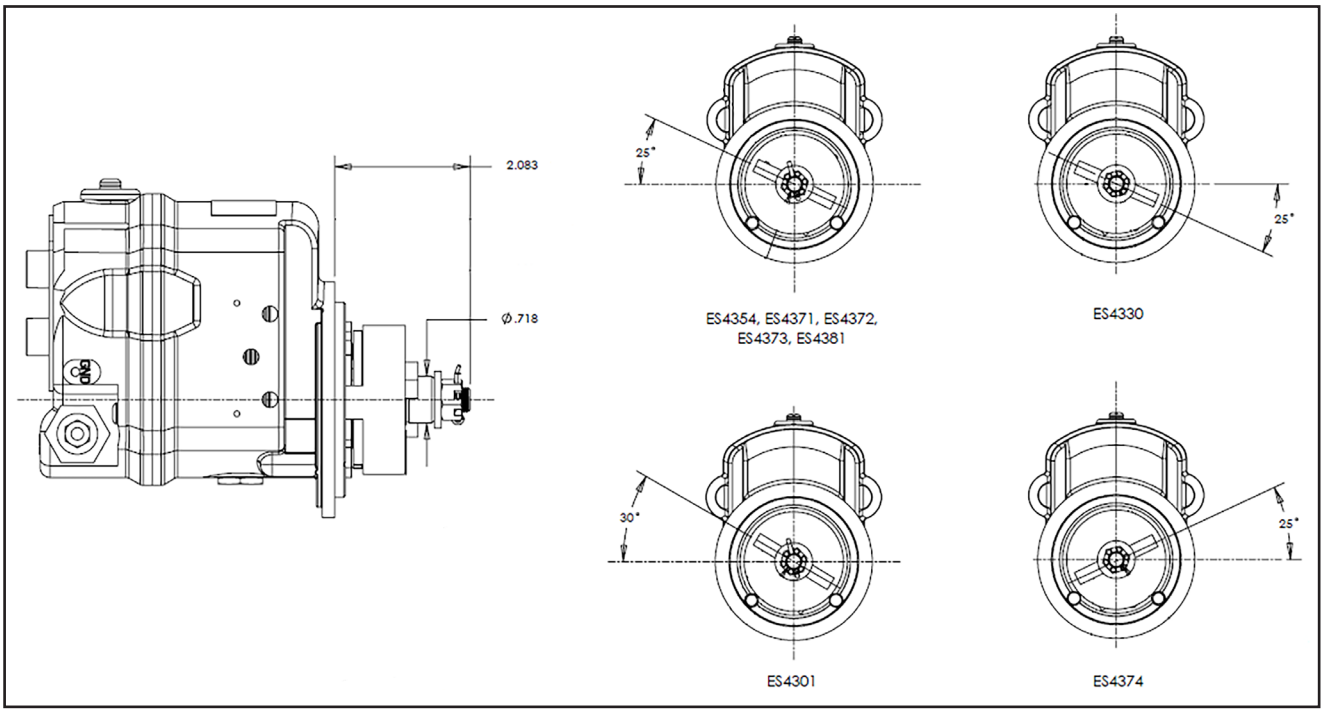



**Figure 2.4 – ES4300 Drive Type A Dimensions –
Impulse Coupled**

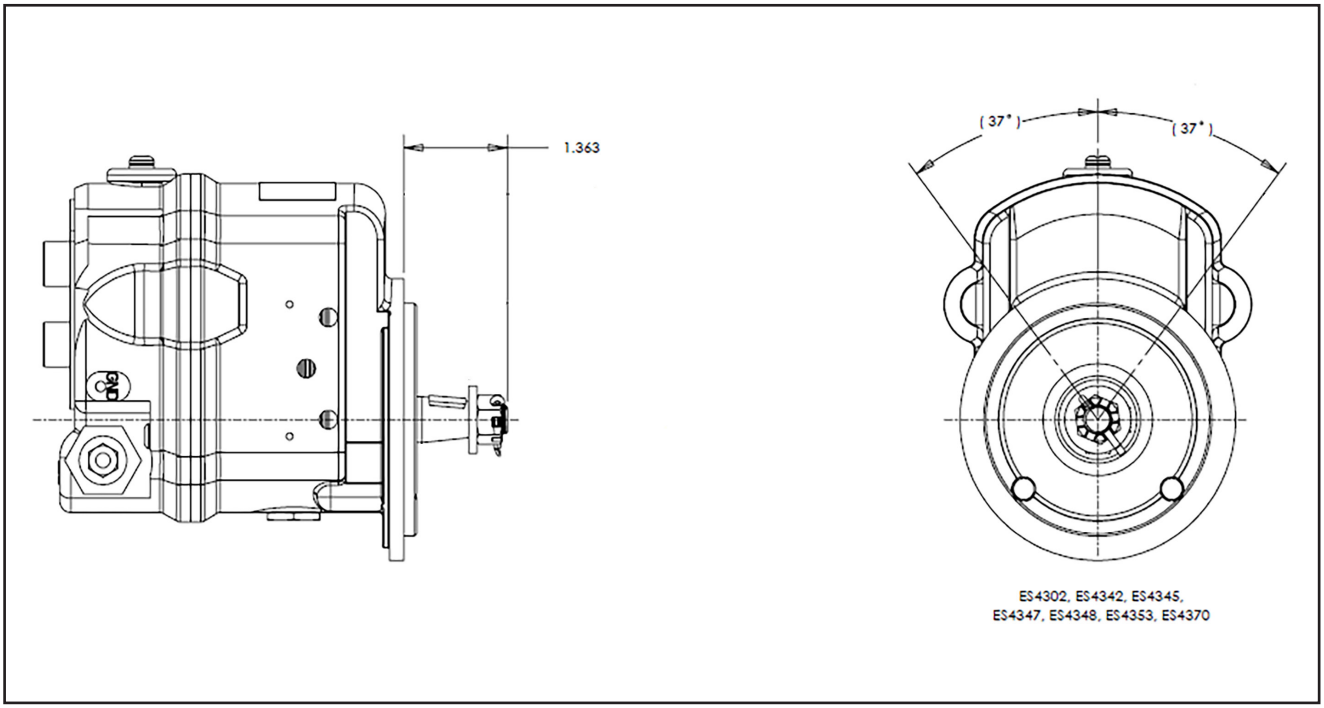



**Figure 2.5 – ES4300 Drive Type B Dimensions –
Direct Drive**

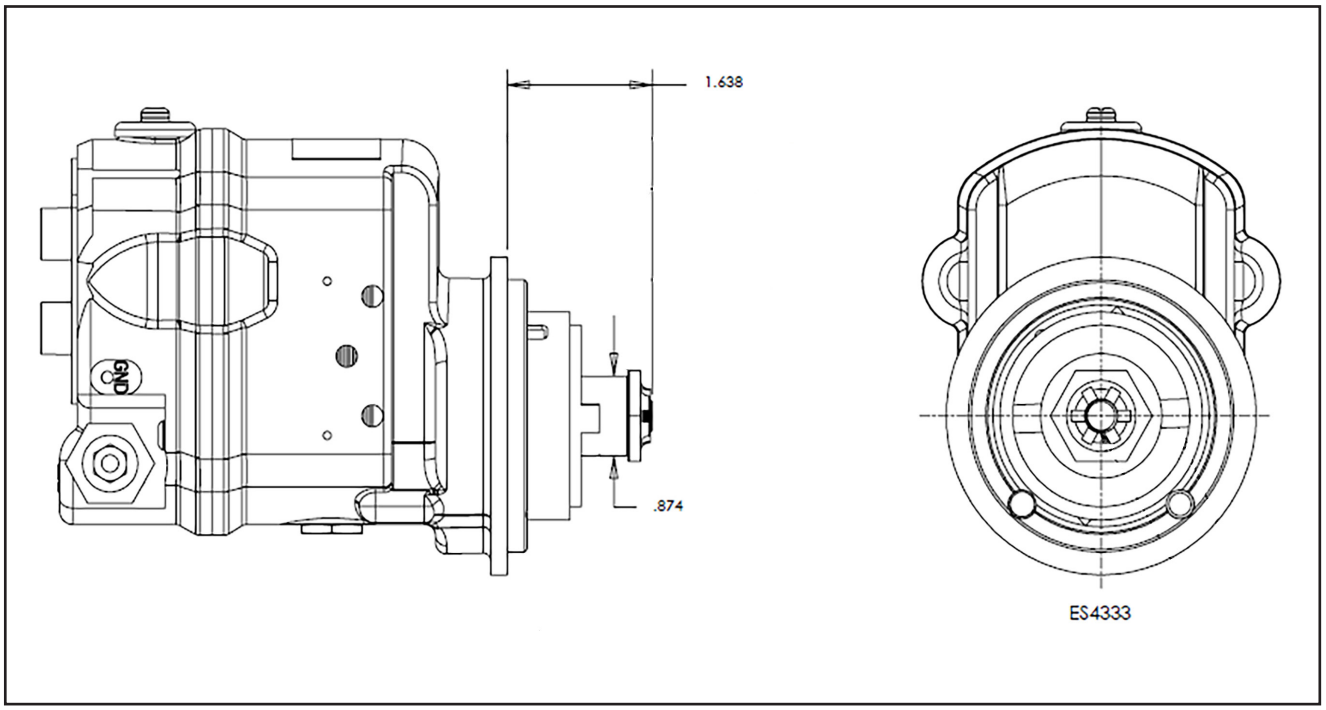



**Figure 2.6 – ES4300 Drive Type C Dimensions –
Impulse Coupled (Drive Gear Not Shown)**

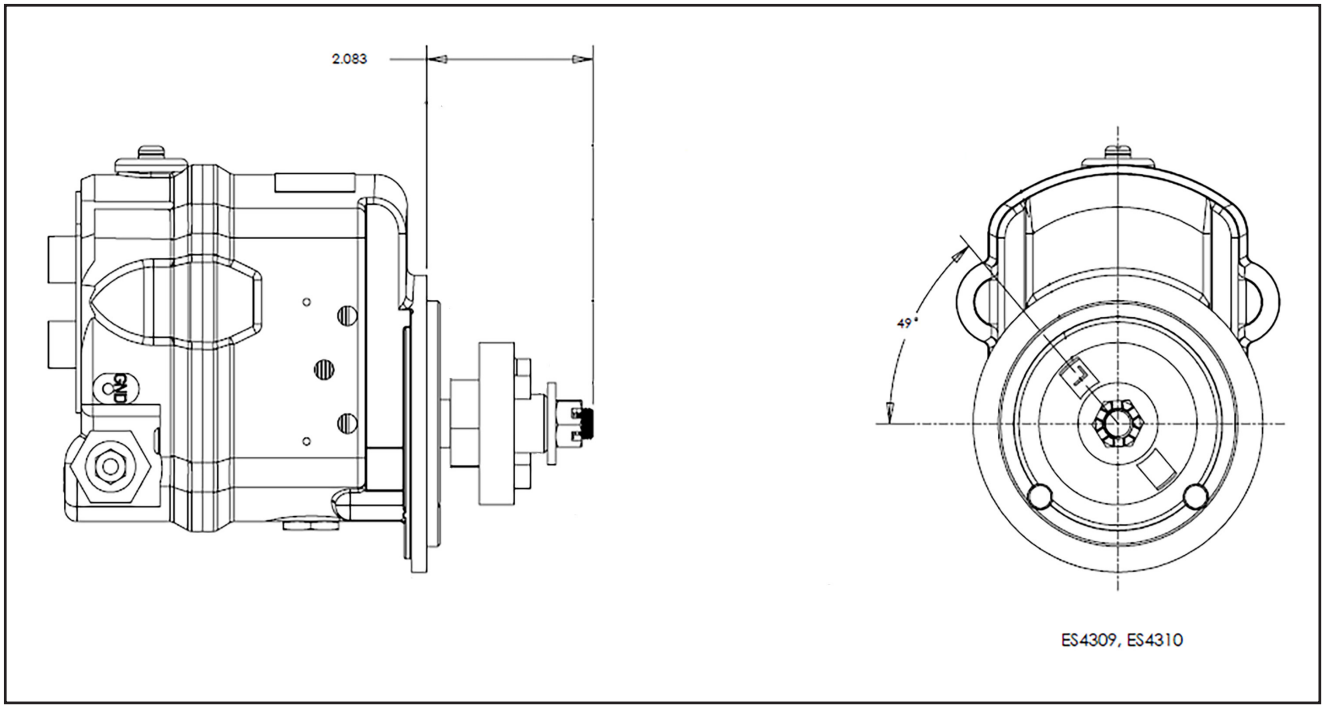



**Figure 2.7 – ES4300 Drive Type D Dimensions –
Hub Drive**

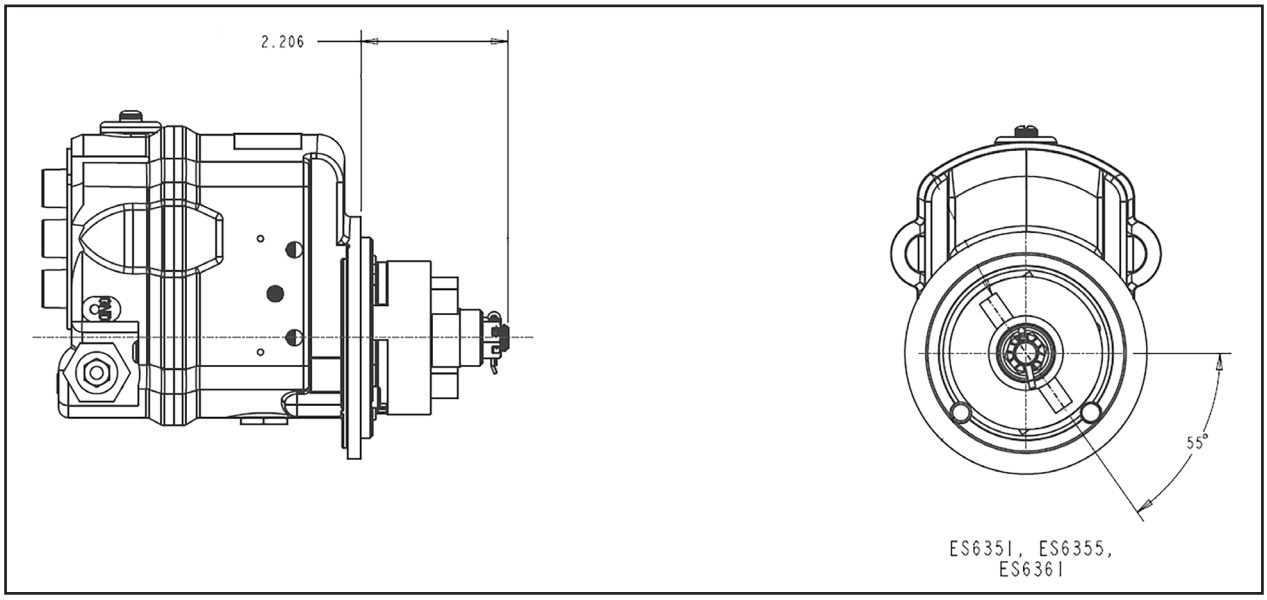



**Figure 2.8 – ES6300 Drive Type A Dimensions –
Impulse Coupled**

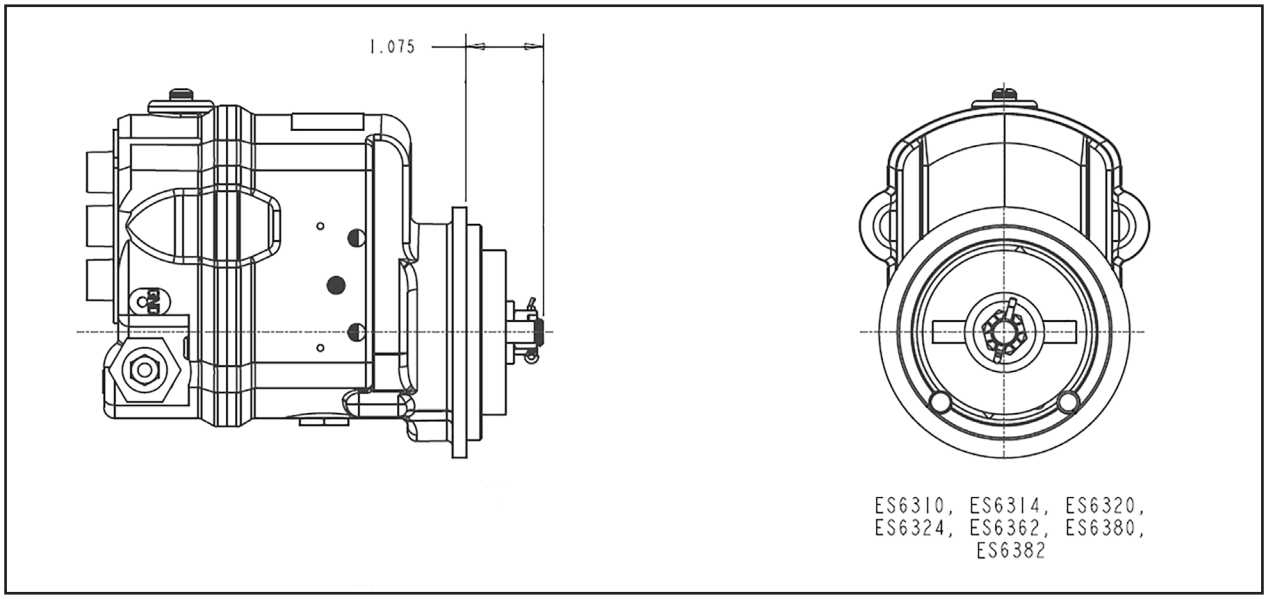



**Figure 2.9 – ES6300 Drive Type B Dimensions –
Impulse Coupled**

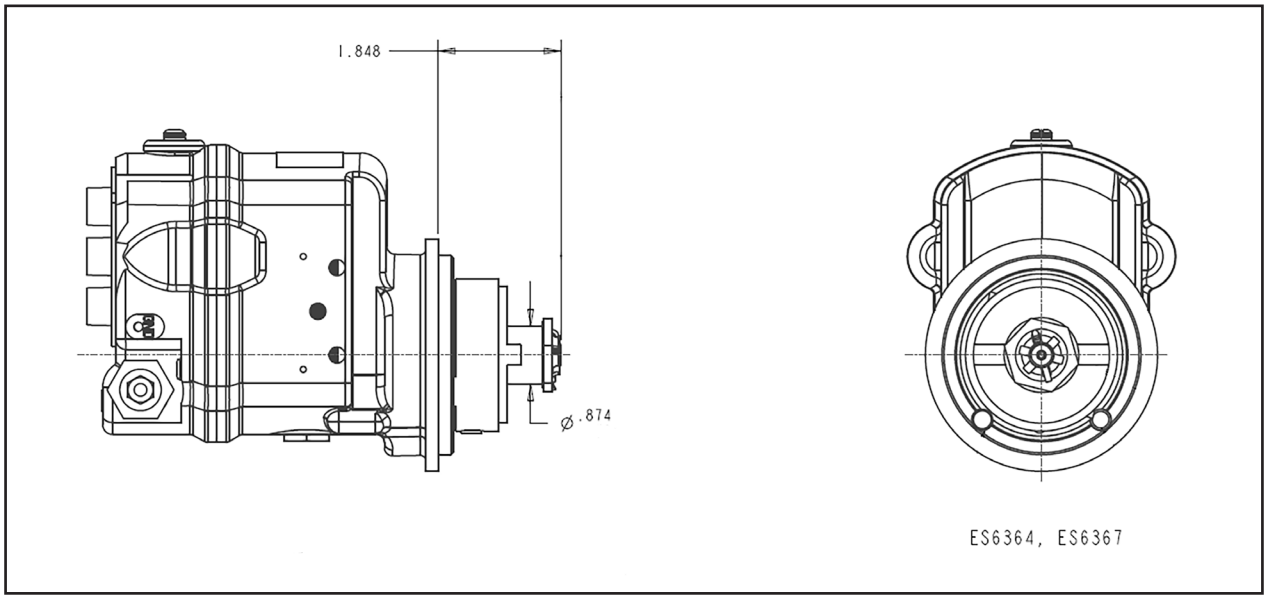



**Figure 2.10 – ES6300 Drive Type C Dimensions – Impulse Coupled**

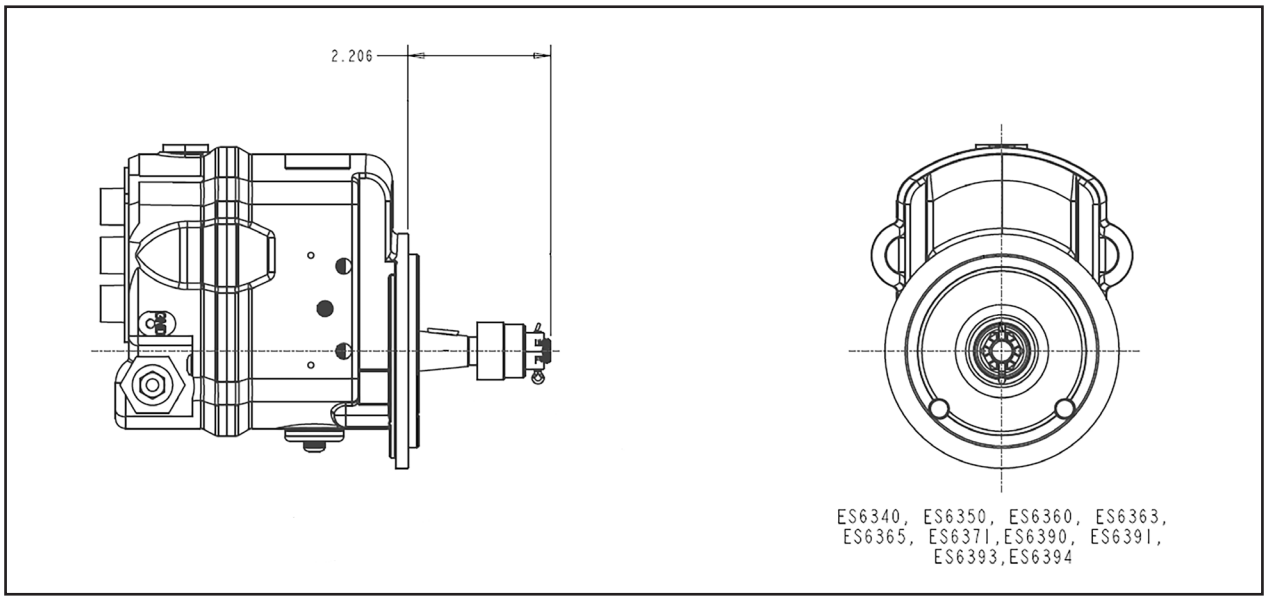



**Figure 2.11 – ES6300 Drive Type F Dimensions – Direct Drive**

## 2.2 Basic Component Description

A. The magneto is a self-contained generator of high voltage pulses. The pulses are distributed via an external shielded ignition harness to spark plugs where an arc initiates combustion of the fuel/air mixture in the combustion chambers of the engine cylinders. The voltage discharge at the spark plugs is synchronized to the engine combustion cycle for all engine operations, including start, idle, cruise, and full power. Aircraft piston engines require a delayed spark relative to piston position to optimize engine start performance. Conversely, aircraft piston engines require an advanced spark relative to piston position to optimize engine performance from idle to full power.

## 2.3 Technical Purpose

A. ES4300 and ES6300 Series magnetos generate and distribute spark energy essential to four-stroke, five-event Otto-Cycle aircraft gasoline engines. Additionally:

(1) HET ES4300 and ES6300 Series magnetos are designed to provide a delayed starting spark using two different magneto designs:

(a) Mechanical impulse coupling

1) Impulse systems can be used with one impulse magneto or two impulse magnetos. If one impulse magneto is used, it is located at the engine left location. A non-impulse magneto with a straight drive/direct drive is located at the engine right location, and is typically grounded during start operations.

(b) Primary and secondary contacts within the magneto used in conjunction with an airframe booster circuit.

1) Boosted magnetos are most often used in a pair with a straight drive magneto. A boosted magneto is located at the engine left location. A straight drive/direct drive is located at the engine right location, and is typically grounded during start operations.

## 2.4 Theory of Operation

A. Impulse Coupling Operation

(1) Impulse coupled magneto design incorporates a single contact assembly and a mechanical starting device referred to as an impulse coupling. The impulse coupling is a mechanical device that provides three functions: 1) delays ignition timing by an amount appropriate for engine cranking, 2) enables increased ignition energy at engine cranking speeds, and 3) at all times, it provides a means to connect the magneto rotor to the engine accessory gear train. It is a spring-loaded device that mechanically stops the rotation of the magneto rotor shaft when the impulse pawls are engaged against a stop pin in the magneto frame at engine starting speed RPM. As the crankshaft rotates, the spring tension of the impulse coupling increases as the crankshaft moves the piston toward the Top Dead Center (TDC) position within the combustion chamber of the cylinder. At a designated point of rotation, a machined guide on the impulse coupling body slides against the pawl to disengage the pawl from the magneto frame stop pin. When the pawl is disengaged and the impulse assembly is released, the impulse coupling spring releases tension and unwinds, rapidly accelerating the magneto rotor shaft. This rapid acceleration of the magneto rotor shaft leads to the magneto generating a high voltage pulse which results in an arc at the spark plug to ignite the fuel/air mixture, which causes piston movement by the generation of combustion pressure. As the engine sustains crankshaft rotation by the combustion process, the starter is disengaged and the impulse coupling pawls no longer engage the magneto frame stop pins due to centrifugal force. When the impulse coupling disengages, the magneto timing reverts to a static advanced timing optimized for engine power from idle to full power.

Because the impulse coupling is a mechanical device subject to wear from repeated mechanical loading during routine operation, it requires periodic inspection for mechanical wear or periodic replacement to ensure consistent starting operation and reliable service. Neglecting to accomplish scheduled impulse coupling inspections in accordance with HET and engine OEM requirements can lead to excessive impulse coupling wear that may result in impulse coupling failure and subsequent damage to the magneto or to the engine.

B. Dual Contact Assembly Operation

(1) Dual contact assembly magneto design incorporates a primary and secondary set of contact assemblies. During the starting process, the primary and secondary contact assemblies are interconnected through a switch external to the magneto. The secondary contact assembly aids in starting the engine by delaying the magneto ignition spark to occur approximately at the TDC position. This secondary contact assembly is actuated by the same cam as the primary contact assembly and utilizes the same basic design as the primary contact assembly. The secondary contact assembly is mechanically timed to open a specific number of degrees after the primary contact assembly opens to ignite combustion of the fuel/air mixture for optimum starting performance. A switching circuit external to the magneto engages a booster energized by the aircraft's battery to supplement energy to the magneto during the engine start process.

Secondary contact assemblies may also be used to provide a signal to a tachometer that is displayed as engine RPM on engine monitoring instruments. The secondary contact assembly signal can be used by engine or data controllers as a signal to drive other engine, propeller, or rotary wing RPM management devices. Proper maintenance of secondary contact assemblies is critical to the tachometer operation display and related devices.

C. Pressurized Magneto Operation

(1) Pressurized magnetos are designed for high altitude performance of magnetos installed on aircraft powered by turbocharged engines. Bleed air from the "upper deck" section of the engine turbocharging system is supplied to the magneto via engine-supplied hoses to increase the air density inside the magneto, which consequently reduces the potential for high altitude misfire. The density of air in the pressurized magneto is maintained by a combination of an engine pressurization system and a calibrated orifice incorporated into the magneto outlet air vent. The calibrated orifice in the pressurized magneto outlet air vent performs two important tasks: to provide a controlled air leakage rate of the pressurized air in order to maintain a limited pressure rise above ambient pressure, and to purge ozone that results from electrical discharge along with other contaminants from within the magneto. Ozone is a gas that is the result of an electrical arc in oxygen atmospheres. Ozone and other contaminants have properties that inhibit the magneto's ability to discharge sparks. Ozone is also corrosive when combined with moisture vapor and can degrade the internal metal and nylon parts of a magneto if not purged with clean, dry air. Maintenance of the engine, airframe, and magneto pressurization system is critical to the performance and service life of pressurized magnetos.

Pressurized magnetos must be maintained in accordance with the OEM engine, airframe, and magneto manufacturer requirements for inspection at scheduled intervals, pre-flight and post-flight operational checks, and other inspections as the conditions and service history of the magnetos require.

# CHAPTER 3 – TROUBLESHOOTING

## 3.1 General

A. Engine problems unrelated to the ignition system and ignition system problems may have similar symptoms. Diagnosing engine performance problems requires a thorough knowledge of aircraft engine systems and a methodical approach to isolate engine or malfunctions. It is strongly recommended that anyone who conducts magneto troubleshooting also refer to engine manufacturer service manuals and product support information when using the following troubleshooting guide.

B. This section provides general troubleshooting procedures for the magneto assembly for unscheduled maintenance and for possible fault detection prior to maintenance activity. It gives procedures to follow to determine the best course of action prior to disassembly. Block type troubleshooting charts are also provided. Upon determination of fault(s), refer to the CHAPTER 5 – TESTING for applicable test procedure(s).

**WARNING!**

WHEN SERVICING, REPAIRING, OR OVERHAULING MAGNETOS, GREAT CARE AND CAUTION MUST BE TAKEN TO AVOID HAZARDOUS SITUATIONS. WHEN MOUNTED ON AN AIRCRAFT OR ROTORCRAFT, THE MAGNETOS PRESENT A PHYSICAL HAZARD FROM PROPELLERS, ROTORS AND OTHER ROTATING DEVICES.

## 3.2 Procedure

**WARNING!**

WHEN SERVICING, REPAIRING, OR OVERHAULING THE MAGNETO, GREAT CARE AND CAUTION MUST BE TAKEN TO AVOID HAZARDOUS SITUATIONS. WHEN MOUNTED ON AN AIRCRAFT OR ROTORCRAFT, THE MAGNETO PRESENTS A PHYSICAL HAZARD FROM PROPELLERS, ROTORS AND OTHER ROTATING DEVICES. THE MAGNETO PRODUCES A HIGH ELECTRICAL CURRENT OUTPUT AND ALSO PRESENTS AN ELECTRICAL SHOCK HAZARD, THAT CAN RESULT IN SERIOUS INJURY IF PROCEDURES IN THIS MANUAL OR THE AIRCRAFT/ ROTORCRAFT SERVICE MANUALS ARE NOT FOLLOWED.

**NOTE:** It is required to reference the aircraft or rotorcraft AFM or POH as well as the applicable service or maintenance manual as required.

A. The Charts on the following pages represent the leading areas of trouble that may be associated with the ignition system. Choose the applicable symptom and follow the trouble shooting chart flow.

(1) Hard Starting

(2) Propeller Kickback During Engine Start

(3) Rough Running

(4) Rough Running or Vibration in Specific RPM Range

(5) Excessive RPM Drop During Magneto Check During Engine Run Up

(6) Magneto Will Not Produce Spark

(7) Magneto Remains On and Does Not Turn Off

(8) Engine Power Loss

(9) Magneto Mounting Flange Broken

(10) Excessive Electrical Arc Erosion of Contact Assemblies

(11) Coil High Tension Lead Worn

(12) Coil Cracked or Electrical Arcing in Magneto Frame

(13) Electrode Loose on Distributor Gear

(14) Distributor Block Electrodes Scored or Excessively Burned Distributor Gear

(15) Distributor Block Bushings Show Accelerated Wear

(16) Distributor Block Bearing Bar Burned

(17) Internal Contamination and Corrosion (Pressurized Magnetos Only)

### 3.3 Troubleshooting Tables

**Table 3.1 – Troubleshooting (Cont.)**

| Symptom or Trouble | Possible Causes | Remedies |
|---|---|---|
| **Hard Starting** | Incorrect or Non-Standard Starting Procedures | Consult engine manufacturer's operation manual for proper operation and performance. Correct as required |
| | Malfunctioning Fuel Delivery System | Consult engine manufacturer's manual for specifications and operation. Correct as required |
| | Fouled Spark Plugs | Service spark plugs in accordance with spark plug manufactuer specifications |
| | Incorrect Spark Plug Gap | Re-gap spark plug in accordance with spark plug manufacturer's spefications |
| | Worn of Damaged Ignition Switch | Inspect ignition switch for grounding and proper operation. Repair or replace as required |
| | Incorrect Magneto-to-Engine Timing | Reset magneto-to-engine timing per engine manufacturer's specification (If magneto-to-engine timing measures more than 4 degrees difference to nominal timing, remove magneto from engine to service worn or damaged parts and reset magneto internal timing) |
| | Incorrect Internal Timing | Check Magneto internal timing per § 6.21.H. If timing light does not indicate state change with pin installed, reset internal timing per § 6.13.E and subsequent assembly steps |
| | Malfunctioning Impulse Coupling | Test impulse coupling per § 5.3, Inspect impulse coupling per § 4.9.B.(3) |
| | Over Torqued Impulse Coupling Nut | Torque nut to 120-320 in-lbs (Magnetos with attached drive gears must have play between drive gear and impulse coupling. Correct as required) |
| | Corrosion on Harness Lead Contact Springs and Terminals | Clean, inspect, and replace as required |
| | Broken Rotor Shaft at Cam Slot | Replace rotor shaft |
| | Contact Assemblies | Inspect for burning, pitting, corrosion, timing setting, and general operation. Replace as required |
| | Cam | Inspect cam for excessive wear or unevenness that would cause "cam spread" Replace as required |
| | Capacitor | Inspect for damaged P-lead connection, P-lead stud for over-torqued condition, damaged contact assemblies connector and damaged groundings Replace as required |
| | Coil | Inspect for burning, cracks, damage to high tension contact or contact assemblies connector, and continuity of windings. Replace as required |

| Table 3.1 – (Cont.) Troubleshooting | | |
|---|---|---|
| **Symptom or Trouble** | **Possible Causes** | **Remedies** |
| **Hard Starting (Cont.)** | Distributor Gear | Inspect distributor gear electrode for looseness, gear teeth damage, and shaft damage. Confirm continuity of connection between the electrode and shaft per § 4.9.B.(7). Inspect carbon brush for damage. Replace as required |
| | Distributor Block | Inspect distributor electrode for evidence of abrasion or excessive burning. Examine rotor gear bushings for wear. Replace as required |
| | Inoperative Secondary Contact Assembly Circuit | Inspect wiring connections and operation of contact assemblies. Correct as required |
| **Propeller Kickback During Engine Start** | Non-Impulse or non-Booster Magneto Not Grounded While Starter Engaged | Inspect for correct function of airframe switching circuit. Correct as required |
| | Impulse Coupling Not Engaged While Starter Operating | Test impulse coupling per § 5.3, Inspect impulse coupling per § 4.9.B.(3) |
| | Inoperative Secondary Contact Assembly Circuit | Inspect for correct function of airframe switching circuit, damaged wiring, timing, or inoperative contact assemblies. Correct as required |
| | Broken Rotor Shaft at Cam Slot | Replace rotor shaft |
| **Rough Running** | Fouled Spark Plugs | Service spark plugs in accordance with manufacturer's specifications |
| | Incorrect Spark Plug Gap | Gap spark plug in accordance with manufacturer's specifications |
| | Worn or Damaged Spark Plug | Test spark plug according to manufacturer's specifications |
| | Malfunctioning Fuel Delivery System | Consult engine manufacturer's operations manual for proper operation and performance. Correct as required |
| | Malfunctioning Induction System | Inspect for leaks and faulty valve operation. Consult engine manufacturer's specifications for proper operation and performance |
| | Malfunctioning Exhaust System | Inspect for obstructions in exhaust pipes and mufflers, faulty valve operation. Consult engine manufacturer's specifications for proper operation and performance |
| | Damaged Ignition Lead | Inspect and correct as required |
| | Excessive Heat | Inspect baffling or cooling air duct. Correct as required |
| | Incorrect Magneto-to-Engine Timing | Consult engine manufacturer's manual for specifications. Correct as required |

| Table 3.1 – (Cont.) Troubleshooting | | |
|---|---|---|
| **Symptom or Trouble** | **Possible Causes** | **Remedies** |
| **Rough Running (Cont.)** | Incorrect Internal Timing | Check Magneto internal timing per § 6.21.H. If timing light does not indicate state change with pin installed, reset internal timing per § 6.13.E and subsequent assembly steps |
| | **Magneto Internal Part:** | |
| | Contact Assemblies | Inspect for burning, pitting, corrosion, timing, setting, and general operation. Replace as necessary |
| | Cam | Inspect cam for excessive wear or unevenness that could cause "cam spread". Correct as required |
| | Capacitor | Inspect for damaged P-Lead connection, P-lead stud for over torqued condition, damaged contact assembly lead connector, and damaged grounding. Replace as required |
| | Coil | Inspect for burning, cracks, damage to high tension contact or contact point lead connector and integrity of windings. Replace as necessary |
| | Distributor Gear | Inspect for burning, cracks, damage to high tension contact or contact assembly lead connector and integrity of windings. Replace as necessary |
| | Distributor Block | Inspect distributor block electrodes for evidence of abrasion or excessive burning. Examine rotor gear bushings for wear. Replace as necessary |
| | Broken Rotor Shaft at Cam Slot | Refer to § 4.9.B.(5)(c) for service information. Replace Rotor Shaft |
| | Propeller Out of Track or Unbalanced | Consult propeller manufacturer's manual for specifications. Correct as required |
| **Rough Running or Vibration in Specific RPM Range** | Propeller Imbalanced or Installed Incorrectly | Consult airframe manufacturer's and/or propeller manufacturer's technical data. Correct as required |
| | Propeller/Engine Harmonic Resonance | Consult propeller manufacturer's manual for specifications. Correct as required |
| | Obstructed Carburetor or Fuel Delivery Circuit | Consult carburetor manufacturer's manuals for troubleshooting guidance. Correct as required |
| | Malfunctioning Fuel Delivery System | Consult engine manufacturer's manual for specifications and operation. Correct as required |
| | Malfunctioning Induction System | Inspect for leaks and faulty valve operation. Consult engine manufacturer's specifications for proper operation and performance |

| Table 3.1 – (Cont.) Troubleshooting | | |
|---|---|---|
| **Symptom or Trouble** | **Possible Causes** | **Remedies** |
| **Rough Running or Vibration in Specific RPM Range (Cont.)** | Malfunctioning Exhaust System | Inspect for obstructions in exhaust pipes and mufflers, faulty valve operation. Consult engine manufacturer's specification for proper operation and performance |
| | **Magneto Internal Part:** | |
| | Contact Assemblies | Inspect for burning, pitting, corrosion, timing, setting, and general operation |
| | Cam | Inspect cam for excessive wear or unevenness that could cause "cam spread". Correct as required |
| | Capacitor | Inspect for damaged P-lead connection, P-lead stud for over torqued condition, damaged contact assembly lead connector, and damaged grounding. Replace as required |
| | Coil | Inspect for burning, cracks, damage to high tension contact, damaged contact assembly lead connector, and integrity of windings. Replace as required |
| | Distributor Gear | Inspect for burning, cracks, damage to high tension contact, damaged contact assembly lead connector, and integrity of windings. Replace as required |
| | Distributor Block | Inspect distributor block electrodes for evidence of abrasion or excessive burning. Examine rotor gear bushings for wear. Replace as required |
| | Broken Rotor Shaft at Cam Slot | Replace rotor shaft |
| **Excessive RPM Drop During Magneto Check During Engine Run Up** | Fouled, Worn, Or Damaged Spark Plugs | Service spark plug in accordance with spark plug manufacturer requirements |
| | Incorrect Spark Plug Gap | Re-gap spark plug to manufacturer’s specifications |
| | Damaged Ignition Lead | Correct as required |
| | Corrosion On Harness Lead Contact Springs | Clean or replace ignition lead contact springs |
| | Incorrect Magneto-to-Engine Timing | Consult engine manufacturer's manual for specifications of ignition timing. Correct as required |
| | Incorrect Internal Timing | Check Magneto internal timing per § 6.21.H. If timing light does not indicate state change with pin installed, reset internal timing per § 6.13.E and subsequent assembly steps |
| | Broken Rotor Shaft At Cam Slot | Replace rotor shaft |

| Table 3.1 – (Cont.) Troubleshooting | | |
|---|---|---|
| **Symptom or Trouble** | **Possible Causes** | **Remedies** |
| **Excessive RPM Drop During Magneto Check During Engine Run Up (Cont.)** | Malfunctioning Tachometer | Confirm tachometer accuracy RPM where magneto drop noted. Correct as required |
| | Malfunctioning Ignition Switch | Inspect ignition switch for possibility of intermittent grounding and proper operation. Repair or replace as required |
| **Magneto Will Not Produce Spark** | Malfunctioning Capacitor | Inspect for damaged P-lead connection, broken P- lead stud, damaged contact assembly lead connector, and damaged grounding. Replace as required |
| | Point Gap Setting Incorrect | Correct as required |
| | Broken Rotor Shaft at Cam Slot | Replace rotor shaft |
| | Malfunctioning Ignition Switch | Inspect ignition switch for possibility of intermittent grounding and proper operation. Repair or replace as required |
| **Magneto Remains On and Does Not Turn Off** | Broken "P" Lead Wire | Repair as Required |
| **Engine Power Loss** | Incorrect Magneto-to-Engine Timing | Consult engine manufacturer's manual for specifications of ignition timing. Correct as required |
| | Malfunctioning Tachometer | Confirm tachometer accuracy at RPM where power loss noted. Correct as required |
| | Broken Rotor Shaft at Cam Slot | Replace rotor shaft |
| **Magneto Mounting Flange Broken** | Hold Down Clamp Over Torqued | Torque hold-down nuts to manufacturer's specifications |
| | Hold Down Clamps Torqued Unevenly | When magneto is reinstalled, ensure that clamps are tightened with even pressure |
| | Magneto Gasket Residue on Accessory Case Mounting Pad | Ensure that magneto mounting face is free of gasket residue |
| **Excessive Electrical Arc Erosion of Contact Assemblies** | Malfunctioning Capacitor | Replace as required |
| | Improper Spark Plug Gap | Re-gap plugs according to manufacturer's specifications |
| | Excessive Heat | Inspect baffling or cooling air duct. Correct as required |
| **Coil High Tension Lead Worn** | Improper Tension Between High Tension Lead and Carbon Brush | Correct as Required |
| **Coil Cracked or Electrical Arcing In Magneto Frame** | Malfunctioning Coil | Inspect coil and replace as required |
| | Improper Spark Plug Gap | Correct as required |
| | Damaged Spark Plug | Service spark plug according to spark plug manufacturer's specifications |
| | Excessive Heat | Inspect baffling or cooling air duct. Correct as required |

| Table 3.1 – (Cont.) Troubleshooting | | |
|---|---|---|
| **Symptom or Trouble** | **Possible Causes** | **Remedies** |
| **Electrode Loose on Distributor Gear** | Timing Pin Wedged Between Electrode and Distributor Block During Timing Process | Replace block and gear assembly |
| **Distributor Block Bushings Show Accelerated Wear** | Improper Lubrication of Bushing | Inspect and replace as required |
| **Distributor Block Bearing Bar Burned** | Carbon Tracking Due to Excessive Carbon Brush Wear | Repair as required |
| **Internal Contamination and Corrosion (Pressurized Magnetos Only)** | Malfunctioning Pressurization or Filtration System | Consult engine manufacturer's manual for pressurization system specifications and maintenance actions |

# CHAPTER 4 – CHECK

## 4.1 General

A. This section defines the various checks and inspections needed to ensure reliable and safe operation of the PowerUp™ ES4300/ES6300 Series magnetos while in service. They are listed in hours for time-in-service (TIS) or in calendar time, whichever is applicable and is the first to occur when offered a choice. Some maintenance is one time initial and others are recurring. These inspections and service intervals are the minimum requirement and may be performed more frequently as operating experience or magneto conditions require.

B. HET recommended maintenance and checks including TIS may be superseded by the aircraft or engine manufacturer's established time limits and schedules based on experience and/or unique requirements under engine or airframe Type Certificate.

C. Basic scheduled maintenance events are summarized as follows:

(1) Installation check

(2) Pre-flight operational check

(3) Post flight operational check

(4) Every 100 Hours of operation and/or annual inspection

(5) Every 250 Hours of operation – ES6351, ES6355, and ES6361 Magnetos

(6) Every 500 Hours of operation – All Magnetos

(7) Engine Overhaul (TBO)

## 4.2 Installation Check

A. Install magnetos in accordance with the instructions of § 6.21 and applicable Engine Manufacturer and Airframe Manufacturer approved service data.

B. Pressurized magnetos only: It is mandatory that a magneto pressurization system test be completed in accordance with engine OEM and airframe OEM service requirements prior to release to service. Pressurized magnetos may not be run on an engine without an airworthy pressurization system attached.

C. Confirm that P-lead wires from ignition switch are connected to the corresponding magneto when the switch is positioned to run a specific magneto in accordance with airframe manufacturer data. (Example: Switch selected to Left position, Left magneto is "On" to run, Right magneto is grounded and disabled.)

D. Complete a magneto and engine performance check in accordance with the POH and AFM requirements.

E. After the engine shut down, confirm that no oil is leaking at the magneto to engine mounting and gasket area and all electrical are secure.

F. Document magneto installation and operational check with appropriate logbook entries.

### 4.3 Pre-Flight Operation Check

**WARNING!**

DO NOT ATTEMPT CONTINUED ENGINE OPERATION OR FLIGHT IF EITHER OR BOTH MAGNETOS DO NOT MEET THE REQUIRED OPERATIONAL CRITERIA SPECIFIED IN THE PILOT'S OPERATING MANUAL AND AIRCRAFT FLIGHT MANUAL.

A. Start engine in accordance with procedures detailed in the POH and AFM.

B. Complete engine run-up and performance check in accordance with procedures detailed in the POH and AFM. Confirm operation of engine when running on one magneto by individually selecting Left, Right and Both magnetos. Confirm that both the Left and Right magneto are operating prior to each flight.

C. If either the Left or Right magneto demonstrate any malfunction or do not meet the operational requirements of the POH and AFM, do not attempt continued flight operations until the problem is corrected.

### 4.4 Post Flight Operation Check

**WARNING!**

DO NOT ATTEMPT CONTINUED ENGINE OPERATION OR FLIGHT IF EITHER OR BOTH MAGNETOS DO NOT MEET THE REQUIRED OPERATIONAL CRITERIA SPECIFIED IN THE PILOT'S OPERATING MANUAL AND AIRCRAFT FLIGHT MANUAL.

A. After landing and prior to engine shut down, complete an engine run-up and performance check in accordance with procedures detailed in the POH and AFM. Confirm operation of engine when running on one magneto by individually selecting Left, Right and Both magnetos. Confirm that both the Left and Right magnetos are operating prior to engine shutdown.

B. If either the Left or Right magneto demonstrate any malfunction or do not meet the operational requirements of the POH and AFM, do not attempt continued flight operations until the problem is corrected.

### 4.5 100 Hour Inspection and/or Annual Inspection

A. All Magnetos

(1) The following list must be checked at 100 hours TIS:

- Magneto-to-Engine Timing
- High tension Wiring Conditions and Connections
- Vent Holes
- P-Lead Attachment Security and Condition
- Delay or Tachometer Drive Contact Wire Security and Condition
- Engine to Magneto Pressurization System (Pressurized Magnetos Only)

(2) Check magneto-to-engine timing per engine manufacturer's specifications. If magneto-to-engine timing is found to be more than 4 degrees different from manufacturer's specification, remove magneto from engine to inspect and repair as necessary. If magneto-to-engine timing is found to be 4 degrees or less different from manufacturer's specification, reset magneto-to-timing per engine manufacturer's specification. Ensure magneto is correctly secured to the engine per engine manufacturer's specifications.

(3) Inspect integrity and condition of wiring connectors, wires, and continuity of connection to ignition switch.

(4) Confirm that ignition switch wire is connected to appropriate Left or Right magneto and ignition switch turns on or off magnetos in the correct Left and Right sequence.

(5) Confirm that magneto switch turns off engine when switched to “OFF”.

**CAUTION!**

DO NOT TURN SWITCH BACK TO LEFT, RIGHT OR BOTH ONCE TURNED TO OFF. WHEN SWITCHED TO OFF, ALLOW ENGINE TO COME TO A COMPLETE STOP BEFORE ATTEMPTING TO TURN THE SWITCH BACK TO BOTH TO RE-START THE ENGINE. BACKFIRE AND SIGNIFICANT DAMAGE TO THE EXHAUST SYSTEM, MAGNETOS, AND OTHER ENGINE ACCESSORIES CAN OCCUR IF ENGINE IS SWITCHED BACK FROM OFF TO LEFT, RIGHT, OR BOTH IF THE ENGINE IS STILL TURNING.

B. Dual Contact Assembly Magnetos

(1) Inspect integrity and condition of wiring connectors, wires, and connection to ignition switch and starting booster.

C. Tachometer Drive Dual Contact Assembly Magneto

(1) Inspect integrity and condition of wiring connectors, wires, and connection to tachometer and any related circuit.

**NOTE:** Some airframe manufacturers modify the OEM Hartzell Engine Tech configuration of the magneto by removing the factory installed and calibrated magneto vent orifice to install an electronic tachometer sensor. Electronic tachometer sensors are not manufactured, supplied, or installed and tested in the magneto by Hartzell Engine Tech. Inspect, the airframe manufacturer installed tachometer sensor in accordance with the requirements of the airframe maintenance and service data.

D. Pressurized Magnetos Only

**WARNING!**

COMPLETE MAINTENANCE IN ACCORDANCE WITH MAGNETO, ENGINE AND AIRFRAME MANUFACTURER’S REQUIREMENTS IS CRITICAL TO THE SAFE OPERATION OF ENGINES AND AIRFRAMES THAT USE PRESSURIZED MAGNETOS. REFER TO CHAPTER 6 OF THIS MANUAL, THE ENGINE MANUFACTURER AND AIRFRAME MANUFACTURER MAINTENANCE AND SERVICE DATA FOR INSPECTION REQUIREMENTS SPECIFIC TO PRESSURIZED MAGNETOS AND PRESSURIZED MAGNETO SYSTEMS.

(1) Remove harness retaining screws from the harness cap. Inspect screws for signs of corrosion for signs of corrosion or apparent water contamination. Remove harness cap from magneto. Inspect inside harness cap and distributor block for corrosion or apparent water contamination.

(a) If harness screws, cap, or distributor block display signs of corrosion or apparent water contamination, remove magneto from engine for complete service per PM6002 Overhaul manual.

(b) If harness screws, cap, or distributor block do not display signs of corrosion or apparent water contamination, and harness is otherwise undamaged, reinstall harness and screws. Apply torque IAW Table 6.2 in CHAPTER 6 – MAINTENANCE.

(2) Inspect the inlet air supply from the engine. Ensure hoses, regulators, filters, and all related hardware are free of contaminants, corrosion, or any unintended restrictions to airflow.

(3) Inspect the bleed air orifice in the vent or tachometer sensor. The bleed air orifice must be free of contaminants, corrosion, or any restrictions to airflow.

(4) Confirm pressurization and airflow operation of magnetos and complete magneto pressurization system are operating in accordance with magneto, engine and airframe manufacturer requirements.

(5) Document the 100 hour pressurized magneto inspection with appropriate logbook entries.

### 4.6 250 Hour Inspection

A. ES6351, ES6355, ES6361 Impulse Coupled Magnetos as used on AEIO-540, IO-540, O-540, and TIO-540 series engines must be inspected for impulse coupling wear and condition at intervals not to exceed 500 hours. Because procedures for inspection at the 250-hour interval are identical to impulse coupling inspections conducted at the 500 hour interval, refer to procedures detailed below in § 4.7.

### 4.7 500 Hour Inspection

A. All Magnetos

**NOTE:** Comply with Mandatory Parts Replacement as detailed in § 4.8.

(1) The following list must be checked at 500 hours TIS:

- Structural Damage
- Rotor
- Impulse Coupling (as applicable)
- Drive Coupling (as applicable)
- Coil
- Contact assemblies
- Capacitor
- Distributor Block Assembly
- Carbon Brush Assembly
- Lubrication
- Magneto-to-Engine Timing
- High tension Wiring Conditions and Connections
- Vent Holes
- P-Lead Attachment Security and Condition
- Switch and delay Wire condition
- Tachometer Drive Contact Wire
- Engine to Magneto Pressurization System (Pressurized Magnetos Only)

B. All Magnetos Except Pressurized Magnetos

(1) Standard, non-pressurized magnetos are recommended to be inspected every 500 hours and may be returned to service if found to be airworthy in accordance with the inspection criteria of § 4.9.B.

(2) Confirm magneto is timed to engine in accordance with engine manufacturer specifications.

(3) Inspect integrity and condition of wiring connectors, wires, and connection to ignition switch.

(4) Confirm that ignition switch wire is connected to the appropriate Left or Right magneto and that the ignition switch turns magnetos on or off in the correct Left and Right sequence.

(5) Confirm that magneto switch turns off the engine when switched to “OFF”.

**CAUTION!**

DO NOT TURN SWITCH BACK TO LEFT, RIGHT OR BOTH ONCE TURNED TO OFF. WHEN SWITCHED TO OFF, ALLOW ENGINE TO COME TO A COMPLETE STOP BEFORE ATTEMPTING TO TURN THE SWITCH BACK TO BOTH TO RE-START THE ENGINE. BACKFIRE AND SIGNIFICANT DAMAGE TO THE EXHAUST SYSTEM, MAGNETOS AND OTHER ENGINE ACCESSORIES CAN OCCUR IF ENGINE IS SWITCHED BACK FROM OFF TO LEFT, RIGHT, OR BOTH IF THE ENGINE IS STILL TURNING.

(6) Document the 500 hour inspection with appropriate logbook entries.

C. Pressurized Magnetos

**WARNING!**

COMPLETE MAINTENANCE IN ACCORDANCE WITH MAGNETO, ENGINE AND AIRFRAME MANUFACTURER'S REQUIREMENTS ARE CRITICAL TO THE SAFE OPERATION OF ENGINES AND AIRFRAMES THAT USE PRESSURIZED MAGNETOS. REFER TO SECTION 4.0 OF THIS MANUAL, THE ENGINE MANUFACTURER AND AIRFRAME MANUFACTURER MAINTENANCE AND SERVICE DATA FOR INSPECTION REQUIREMENTS SPECIFIC TO PRESSURIZED MAGNETOS.

(1) Inspect pressurized magnetos at intervals not to exceed 500 hours of operation. Replace and discard mandatory replacement parts in accordance with the requirements in § 4.8.

(2) Inlet air supply from the engine must be free of contaminants, corrosion, or any restrictions to airflow.

(3) It is mandatory that a magneto pressurization system test be completed in accordance with engine OEM and airframe OEM service requirements prior to release of magneto installed on an engine configured with a magneto pressurization system to service. Confirm pressurization and airflow operation of magnetos and complete magneto pressurization system in accordance with magneto, engine and airframe manufacturer requirements.

(4) Confirm magneto is timed to engine in accordance with engine manufacturer specifications.

(5) Inspect integrity and condition of wiring connectors, wire insulation, center conductors, and connection to ignition switch.

(6) Confirm that ignition switch wire is connected to appropriate Left or Right magneto and ignition switch turns on or off magnetos in the correct Left and Right sequence.

(7) Confirm that magneto switch turns off engine when switched to "OFF".

**CAUTION!**

DO NOT TURN SWITCH BACK TO LEFT, RIGHT OR BOTH ONCE TURNED TO OFF. WHEN SWITCHED TO OFF, ALLOW THE ENGINE TO COME TO A COMPLETE STOP BEFORE ATTEMPTING TO TURN THE SWITCH BACK TO BOTH TO RE-START THE ENGINE. BACKFIRE AND SIGNIFICANT DAMAGE TO THE EXHAUST SYSTEM, MAGNETO OR OTHER ENGINE ACCESSORIES CAN OCCUR IF ENGINE IS SWITCHED BACK FROM OFF TO LEFT, RIGHT, OR BOTH IF THE ENGINE IS STILL TURNING.

(8) Document the 500 hour inspection with appropriate logbook entries.

### 4.8 Mandatory Replacement Parts for 500 TIS – Pressurized Magnetos Only

A. The following parts must be replaced at the 500 hour inspection:

(1) Pressurized Gasket Kit

(2) All parts that exhibit corrosion or damage.

### 4.9 Return to Service – All Magnetos

A. General

(1) The following parts must be inspected and may be returned to service if found to be airworthy in accordance with the inspection criteria of § 4.9.B:

(a) Impulse Assembly

(b) Magneto Drive Gear (ES3998, used on ES4333 magneto only)

(c) Drive Coupling (ES5265, used on ES4309, ES4310 magnetos only)

(d) Rotor Shaft

(e) Magneto Frame

(f) Magneto Housing

(g) Distributor Block, Gear and Bearing Bar Assembly

(h) Contact Assembly and Cam

(i) Coil

(j) Capacitor

(k) Bearing Cap, Wave Washer , Bearing Cap Clamps

B. Inspection

(1) General

(a) Inspection requirements will be accomplished for magnetos, as required by the maintenance intervals stated in CHAPTER 4 – CHECK, within the following maintenance intervals:

1) 250 Hours of operation – ES6351, ES6355 and ES6361 Magnetos

2) 500 hours of operation – All Magnetos

3) On Condition – All Magnetos.

(b) The following describes the inspection of serviceable parts and criteria for return to service. As an alternative, installing new parts may be a more cost effective option than inspection. Some parts are mandatory replacement and are identified in the 500 hours, or as conditions require.

**NOTE:** Disassemble the magneto only to the extent necessary to access parts and features to be inspected per § 6.4.

(2) Inspect magneto drive gear (Part Number ES3998, used on ES4333 magneto only)

(a) Inspect gear for general condition. Gear must be free of damage, including but not limited to corrosion, nicks, gouges, cracks, missing or deformed teeth.

(b) Additionally, inspect the gear teeth for damage and wear. Normal wear produces finely polished tooth thrust faces. Gears showing uneven teeth profiles, scoring, burns, or pits are unacceptable.

(c) Discard unacceptable gears.

(3) Inspect Impulse Coupling

**WARNING!**

THE USE OF THE SLICK T-155 RIVET WEAR GAUGE IS NOT PERMITTED TO INSPECT HET IMPULSE PAWL AXLES AND PAWL ASSEMBLY FOR WEAR. THE FEELER GAUGE MEASUREMENT LIMIT OF .150 INCH FOR LEFT ROTATION COUPLINGS DOES NOT APPLY TO THE HET IMPULSE COUPLINGS.

(a) Separate impulse coupling body and spring from impulse assembly. Discard the impulse coupling spring regardless of apparent condition.

**CAUTION!**

THE IMPULSE COUPLING SPRING IS UNDER STRONG TENSION. WEAR GLOVES AND SAFETY GLASSES WHEN RELIEVING TENSION OF IMPULSE COUPLING SPRING.

(b) Clean impulse coupling body and impulse assembly with solvent to remove oil and surface residue.

(c) Inspect impulse coupling body for cracks or chipping. Dye penetrant and magnetic particle non-destructive testing methods are acceptable. Discard any impulse coupling body that exhibits cracks or chipping.

(d) Inspect the impulse coupling cam assembly for corrosion. Light polishing to remove surface corrosion is acceptable. Corrosion that results in pits or erosion of material is unacceptable and requires replacement of the impulse assembly.

(e) Inspect the impulse assembly for cracks or chipping. Dye penetrant and magnetic particle non-destructive testing methods are acceptable. Cracks or chipping are unacceptable and impulse coupling must be replaced if any cracks or chipping are detected.

(f) Inspect the contact end of the impulse coupling pawls. If the contact end of the pawl is rounded, deformed, or worn, these conditions are unacceptable and the impulse coupling must be replaced.

(g) Inspect the snap rings that retain the pawl to the impulse assembly axle. If the snap rings are corroded, deformed or missing, then the impulse assembly must be replaced.

(h) Inspect impulse coupling pawls and axles for wear using the ES155T Pawl Wear Go/No Go Gauge.

**CAUTION!**

TO PREVENT AN INACCURATE READING, DO NOT USE SLICK T-155 RIVET WEAR GAUGE FOR THIS PROCESS.

1) Install the ES155T Pawl Wear Go/No Go Gauge to fit the OD of the impulse pawl axle into the ID of the ES155T Pawl Wear Go/No Go Gauge.

2) While holding the ES155T Pawl Wear Go/No Go Gauge in place, align the outer edge radius of the impulse pawl to align with the outer edge radius of the impulse assembly. Refer to Figure 4.1.

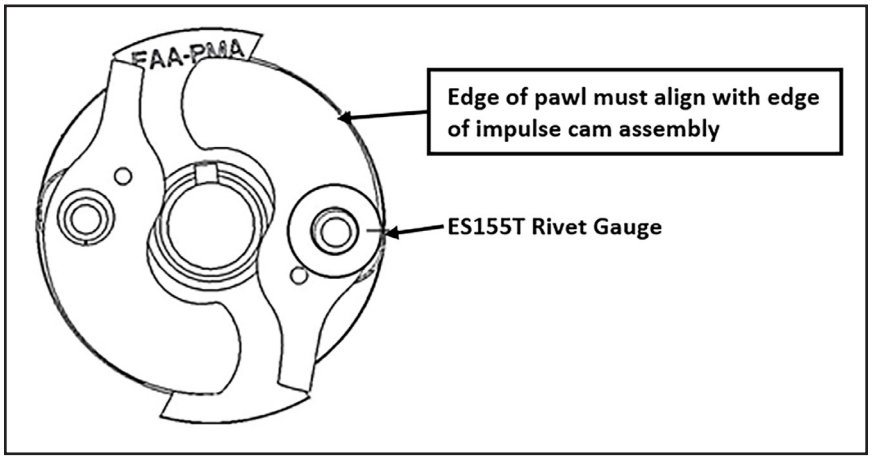



**Figure 4.1 – Inspecting Pawls for Wear**

3) Lift the inner edge of the pawl and apply pressure to the pawl to push outward while keeping the edges of the pawl radius and the impulse assembly base plate radius in parallel alignment. The inner edge of the pawl must be lifted or the gauge observations will not be accurate. Reference Figure 4.2.

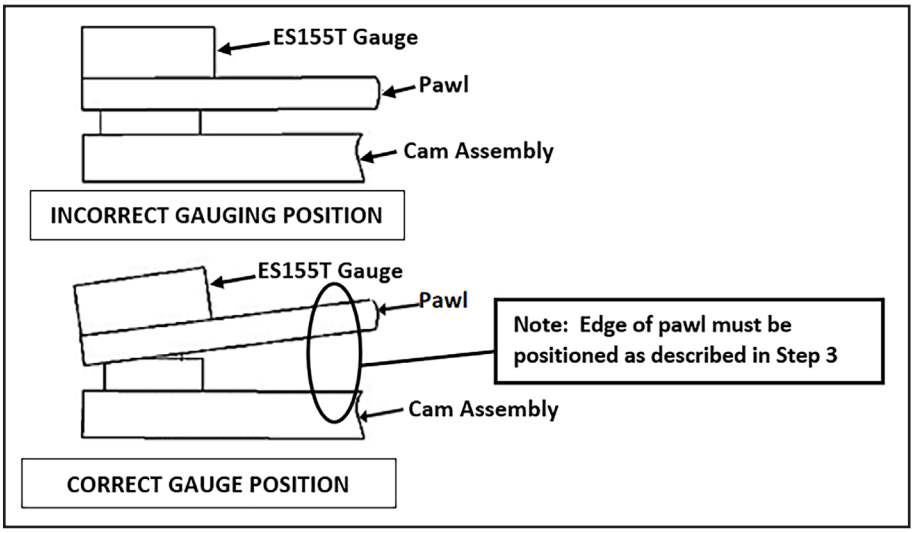



**Figure 4.2 – Correct Gauge Position**

4) If the edge radius of the pawl extends beyond the edge of the ES155T Pawl Wear Go/No Go Gauge, then the impulse assembly is worn and must be replaced and discarded. Reference Figure 4.3.

(i) Measure the clearance between the boss on the underside of each of the two impulse pawls and the impulse assembly using a 9/64 drill shank or .140 in. wire gauge.

1) Align the outer edge radius of the impulse pawl to align with the outer edge radius of the impulse assembly. Reference Figure 4.4.

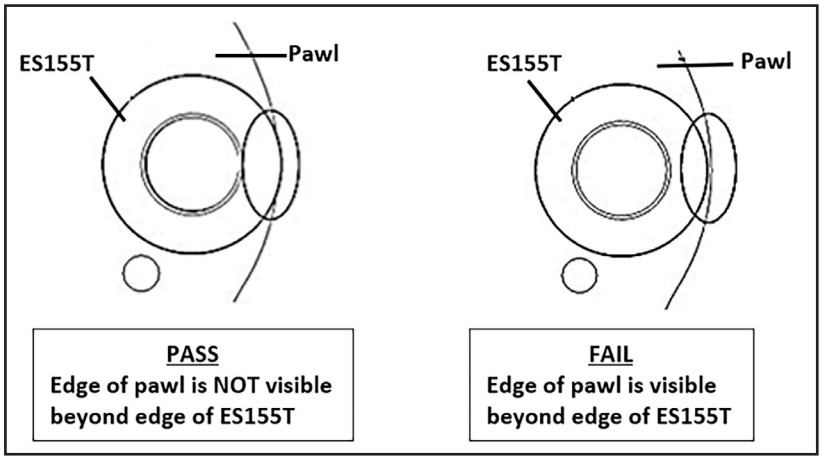



**Figure 4.3 – Correct Pawl Visual**

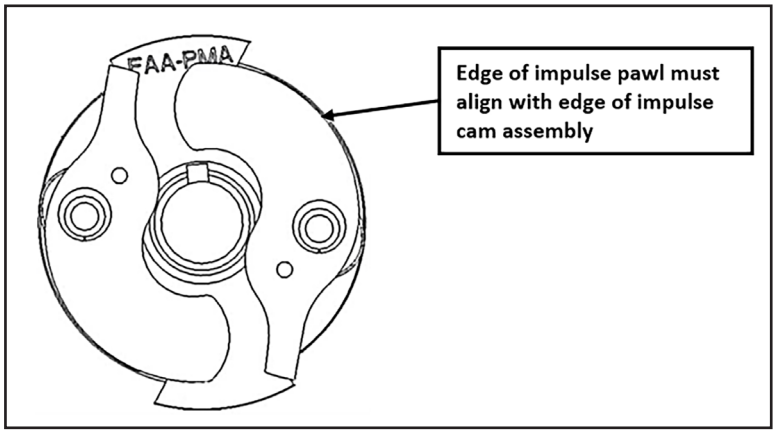



**Figure 4.4 – Pawl Clearance**

2) Position the latching end of the impulse pawl over the impulse assembly and measure the gap as shown in Figure 4.5. Replace and discard if gap measures equal to or greater than 9/64 in. or .140 in.

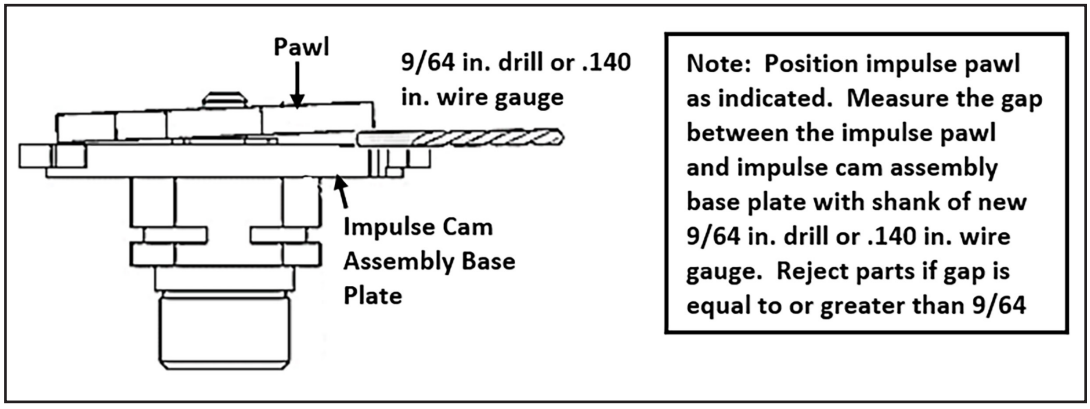



**Figure 4.5 – Measuring Pawl Gap**

(4) Critical Inspection of Calibrated Orifice Vent – Pressurized Magnetos Only

**WARNING!**

YELLOW OR WHITE PARTICLES, OIL FILM, OR CORROSION IN ANY OF THE INLET PORTS, OUTLET VENTS, OR INSIDE THE MAGNETO INDICATES MOISTURE CONTAMINATION AND MAGNETO PRESSURIZATION FAILURE. DO NOT CONTINUE FLIGHT OR OPERATION OF THE ENGINE IF MAGNETO PRESSURIZATION SYSTEM HAS NOT CONFIRMED TO BE OPERATING IN ACCORDANCE WITH BOTH ENGINE AND AIRFRAME MANUFACTURER REQUIREMENTS FOR MAGNETO PRESSURIZATION PERFORMANCE.

(a) Inspection of ES3179 Calibrated Orifice Vent is mandatory at 500 hour inspections. Inspection of the calibrated orifice vent may be accomplished more frequently than the 500 hour inspection requirements, as conditions require.

(b) Calibrated Orifice Vent must be completely cleaned and free of debris or contaminants. Gauge the bleed air orifice to confirm inner diameter of .025 in. + .005. Replace Calibrated Orifice Vent if orifice does not measure to specifications.

(c) Tachometer Sensor (if installed): The tachometer sensor installed in the magneto vent hole is not supplied or manufactured by HET. The tachometer sensor is supplied by the airframe manufacturer or engine manufacturer and replaces the HET installed Calibrated Bleed Air Orifice installed in HET ES Series magnetos. When the HET bleed air orifice is removed from the HET ES Series magneto, it is mandatory that the magneto be tested with the tachometer sensor installed in accordance with the procedures detailed in § 4.9.B(4)(a)(e) of this manual before releasing the magneto and engine to service. Additionally, the tachometer sensor bleed air orifice vent must be inspected in accordance with sensor manufacturer, engine manufacturer and airframe manufacturer requirements before release to service at the 250 hour and 500 hour inspections.

(d) Document inspection, replacement and testing of the HET supplied Calibrated Orifice Vent with appropriate logbook entries.

(e) If applicable, document inspection and testing of the tachometer sensor calibrated bleed air vent with appropriate logbook entries.

(5) Inspect the Magneto

(a) General

**NOTE:** Should a part or subassembly listed here fail inspection, overhaul of the magneto is required per PM6002 Overhaul Manual.

1) The following parts and subassemblies are inspected at this stage and are not disassembled from the magneto:

a) Drive Coupling (Disassembly of drive coupling from magneto is optional)

b) Rotor Shaft

c) Frame

d) Coil

e) Bearing Cap Assembly

f) Contact Assemblies

(b) Inspect Drive Coupling (ES5265, used on ES4309, ES4310 magnetos only)

1) Clean drive coupling to remove oil and surface residue.

2) Visually inspect the drive coupling.

3) Drive coupling must be free of damage, including but not limited to cracks, corrosion, nicks, gouges, or missing material. Replace as required.

(c) Inspect Rotor Shaft

**CAUTION!**

ROTOR SHAFT IS MAGNETIZED AND CAN ATTRACT METALLIC DEBRIS. FAILURE TO REMOVE METALLIC DEBRIS CAN RESULT IN INTERFERENCE BETWEEN THE ROTOR SHAFT AND THE FRAME THAT CAN INTERFERE WITH FREE ROTATION OF THE ROTOR SHAFT AND CAUSE FAILURE OF THE MAGNETO.

1) The shaft must be free of debris and metal shavings. As necessary, use ES123T Timing Drive Adapter or similar drive piece to ensure the shaft turns freely on its ball bearings by rotating the shaft from the drive end. The rotor must turn freely and smoothly on its bearings. Two magnetic neutral positions will present as detents at 180 degree intervals of rotation.

2) If accessible, visually inspect threads on drive end of shaft for deformation. No damage is acceptable, replace as required.

3) If accessible, visually inspect cotter pin hole on drive end of shaft.

4) For impulse coupled magnetos only, the area just outside of the oil seal can be contacted by the inner end of the drive coupling pawls. The contact from the pawls can form indentations in the rotor shaft. As necessary, lightly dress the shaft with a Scotchbrite pad to remove raised material and blend edges. Mask oil seal area to ensure debris from this operation does not contaminate the seal. Refer to Figure 4.6.

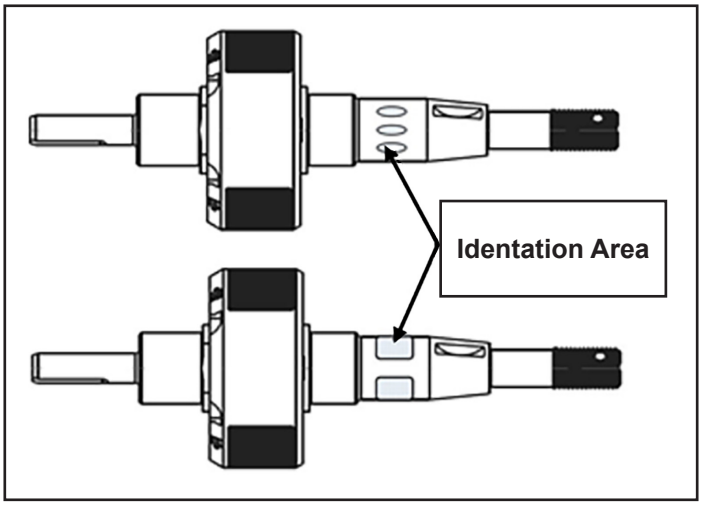



**Figure 4.6 – Acceptable Pawl Indentations**

5) Inspect the cam slot for cracks at the radius of the bottom well of the slot. Use a 10X magnifier and lamp. No cracks are permissible, replace rotor shaft if cracks are detected.

(d) Inspect Frame

1) Inspect impulse coupling stop pin (if applicable) for wear, loose fit or corrosion. Maximum flat spot wear in stop pin is .050 in.

2) Inspect magneto frame screw holes for damage. Thread damage may not affect more than two threads in a single hole.

3) Inspect inside frame for signs of oil leakage or other contaminating debris. Small amounts of dust may be wiped from inside the frame. If heavy oil presence is indicated, the source of the leak must be identified and corrected.

4) Inspect frame mounting flange for distortion or cracks.

(e) Inspect Coil

1) Inspect coil for visible radial cracks and for cracking around the lamination ends using a 10X magnifier and light. No cracks are permissible. Ensure coil is secure in the frame, with both wedges firmly seated and ground wire secured to lug and screw.

a) Signs of heat distress, including discoloration and/or burned smell require further examination of the coil not described here.

2) Inspect coil ground and contact assembly lead wires for wire insulation and connector damage and wire insulation cracks or damage where the wire exits the insulation. Wire insulation deterioration or connector damage is not permissible.

3) Inspect the coil for Primary and Secondary circuit resistance and continuity.

a) Primary resistance is measured between the lead that connects to the contact assemblies to ground. Resistance is .5 to 1.2 Ohms.

b) Secondary resistance is measured between the metal contact in the center of the coil to ground. Resistance is 13,000 to 20,500 Ohms at 20 °C (68 °F).

4) Inspect for wear of the coil secondary winding metal high tension contact. The thickness of the coil high tension contact is 0.032 in. ± 0.003 in. nominal. The allowable wear is 0.015 in. maximum with at least 0.014 in. remaining.

(f) Inspect Bearing Cap Assembly

1) When access allows, inspect screw hole threads. Thread damage may not affect more than two threads in a single hole.

2) Inspect Bearing Cap Clamps for deformation or damage.

(g) Inspect Contact Assemblies

**NOTE:** Contact assemblies are subject to mechanical wear of the mechanical assembly and cam as well as electrical erosion of the contact faces. The condition and operation of the contact assembly is critical to proper magneto operation.

1) Inspect Primary Contact Assembly

a) Inspect contact faces for excessive pitting and electrical wear. Contact faces with normal wear will have a white, frosty surface at the contact face edges. The surface of the contact faces may be slightly irregular but should not have any significant pitting or concave/convex features.

b) If contact faces are excessively worn, replace contact assembly.

c) Contact rivets must not be loose or rotate. Replace if this condition is found.

d) Inspect contact spring for cracks. Replace contact assembly if cracks are detected.

e) Set Primary contact timing per § 6.13.E. If contacts will not adjust within specified limits, the contact assembly must be replaced.

f) Inspect cam for damage, deformation, or unevenness. Replace cam if any of these conditions are detected.

2) Inspect Secondary Contact Assembly

a) Inspect contact faces for excessive pitting and electrical wear. Contact faces with normal wear will have a white, frosty surface at the contact face edges. The surface of the contact faces may be slightly irregular but should not have any significant pitting or concave/convex features.

b) If contact faces are excessively worn, replace contact assembly.

c) Contact rivets must not be loose or rotate. Replace if this condition is found.

d) Inspect contact spring for cracks. Replace contact assembly if cracks are detected.

e) Set Secondary contact timing per § 6.13.F. If contacts will not adjust within specified limits, the contact assembly must be replaced.

f) Inspect cam for damage, deformation, or unevenness. Replace cam if any of these conditions are detected.

3) Inspect Tachometer Drive Contact Assembly

**NOTE:** Secondary contact assemblies are used to provide a signal to a tachometer that is displayed as engine RPM on engine monitoring instruments. The secondary contact assembly signal can be used by engine or data controllers as a signal to drive other engine, propeller or rotary wing RPM management devices. Proper maintenance of secondary contact assemblies is critical to the operation of RPM display or engine management devices.

a) Inspect contact faces for excessive pitting and electrical wear. Contact faces with normal wear will have a white, frosty surface at the contact face edges. The surface of the contact faces may be slightly irregular but should not have any significant pitting or concave/convex features.

b) If contact faces are excessively worn, replace contact assembly.

c) Contact rivets must not be loose or rotate. Replace if this condition is found.

d) Inspect contact spring for cracks. Replace contact assembly if cracks are detected.

e) Set tachometer contacts timing per § 6.6. If contacts will not adjust within specified limits, the contact assembly must be replaced.

f) Inspect cam for damage, deformation, or unevenness. Replace cam if any of these conditions are detected.

(6) Inspect Housing and Capacitor Assembly

(a) Housing

1) Inspect housing for general condition, wear to screw holes and threads. Thread damage may not affect more than two threads in as single hole. Housing must be free of damage, including cracks, holes, and corrosion.

(b) Capacitor Assembly

1) Inspect the capacitor housing for general condition. The capacitor must be free of damage, including cracks and corrosion.

2) Inspect the capacitor wire for fraying or broken connections. Capacitor terminal should fit contact assembly terminal with enough tension to firmly maintain the connection. No repair of damaged wires is approved.

3) Measure the capacitor value using equipment capable of measuring capacitance. Ensure continuity from flag terminal to stud terminal. Capacitor value is between .315 µF to .385 µF.

(7) Inspect Distributor Block Assembly/Rotor Gear

(a) Inspect Distributor Block Assembly

**CAUTION!**

DO NOT ALLOW SOLVENTS OR CLEANER TO COME INTO CONTACT WITH THE BRONZE OILITE BEARINGS THAT SUPPORT THE DISTRIBUTOR GEAR IN THE DISTRIBUTOR BLOCK AND BEARING BAR. CLEANERS WILL DILUTE OR WASH AWAY THE OIL IMPREGNATED INTO THE OILITE BUSHING AND COULD CAUSE THESE BEARINGS TO FAIL.

1) Clean the distributor block for inspection by wiping with a dry, clean cloth or lightly clean with detergent and rinse with clear water.

2) Inspect the distributor block surfaces and bearing bar surfaces for cracks and signs of arcing to the surface areas of the distributor block and bearing bar. Any unusual wear, cracks, or burning due to arcing is unacceptable and the affected parts must be replaced.

3) Inspect the distributor electrodes for wear or evidence of strikes by distributor gear electrode. Surface burning and erosion is normal, discard distributor block if wear exceeds 30% of thickness of electrode.

4) Measure the inside diameter of the oilite bushings in both the distributor block and the bearing bar. The bearing ID service limits are 0.245 in. to 0.248 in.

5) Lubricate the oilite bushings in the distributor block and bearing bar.

a) Clean the oilite bearing ID to remove any oil or residue on the surface of the bearing.

b) The bearing bar oilite bearing requires a cork seal on the distributor facing side of the bearing bar.

c) Install the cork to seal the end of oilite bearing but only cover 1/16 in. into the depth of the bearing. The cork may require shaping to seal the end of the oilite bearing as instructed above.

d) Fill the open ends of the bearings with HET AB-391200 Lubricant.

e) Bake the distributor block and bearing bar in an oven for 2-3 hours at 190 °F to 220 °F (88 °C to 104 °C).

f) After the bake process is complete, remove the parts from oven and cool to room temperature. The oilite bearings continue to absorb oil as they cool, allow bearings to cool for a minimum of 30 minutes to achieve room temperature.

g) Discard any remaining oil and remove cork from bearing bar.

h) Wipe any excess oil from the surface of the distributor block and bearing bar. Do not remove oil from oilite bearing ID.

6) Oilite bushing should be free of debris and distributor gear should spin freely when spun in distributor block assembly.

(b) Inspect Distributor Gear

1) Clean the distributor gear for inspection by wiping with a dry, clean cloth or lightly clean with detergent and rinse with clear water.

2) Inspect the distributor gear teeth for wear, replace if noted.

3) Inspect distributor gear for color. Distributor gears with a light brown or darker color must be replaced and discarded.

4) Inspect the areas that support the distributor electrode for burning or dark discoloration. Some light discoloration is normal, but no burning is permitted. Replace as required.

5) Inspect the distributor gear electrode for looseness. The electrode must be tight to the shaft and no movement is permitted. Replace if loose.

6) Confirm electrical continuity between distributor gear shaft and electrode using a multimeter or continuity tester. Discard and replace the gear if no continuity is detected between the distributor gear shaft and electrode.

7) As necessary, lightly dress the end of the electrode with an abrasive tool to remove carbon build up or loose material due to electrical discharge. Wipe gear clean of debris with a lint-free cloth.

8) Measure the outer diameter of the distributor gear shaft. The shaft service limits are 0.241 in. to 0.244 in.

(c) Inspect Carbon Brush Assembly

**NOTE:** Do not disassemble carbon brush and spring for inspection, inspect as an assembled unit.

1) Measure the carbon brush. The overall length of the carbon brush must be greater than 0.297 in. and the outer diameter (OD) of the brush diameter must be uniform. Carbon brushes that do not meet these limits must be replaced.

2) Inspect the tension spring. The overall uncompressed length must be greater than 0.297 in. It is not permitted to stretch the spring to meet the service limits. Inspect for flat spots on the spring windings. If the spring appears to be worn or does not meet the overall length requirements, then the brush assembly must be replaced.

(d) Inspect Rotor Gear

1) Inspect rotor gear for cracks or worn gear teeth. Replace if worn teeth or cracks are noted.

2) Replace and discard rotor gear if discolored to light brown color or darker.

(8) Inspect All Other Miscellaneous Hardware

(a) Inspect hardware for deformation, stripped threads, tooling damage to head and corrosion. Replace as required. All installed hardware must be secured and correct torque applied as applicable.

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# CHAPTER 5 – TESTING

## 5.1 General

A. This chapter outlines the tests and inspections required to determine the condition of the magneto removed for scheduled and unscheduled maintenance. Refer to the procedures given in the TROUBLESHOOTING Section prior to applying any test for maintenance.

B. Where applicable, components called out in this section will correspond to the item number listed in CHAPTER 6 – MAINTENANCE.

## 5.2 Post Assembly Testing

A. Mount the magneto on a suitable magneto test stand.

B. Install an ignition harness on the magneto and connect each output lead to a 5mm spark gap. Refer to Figure 5.1.

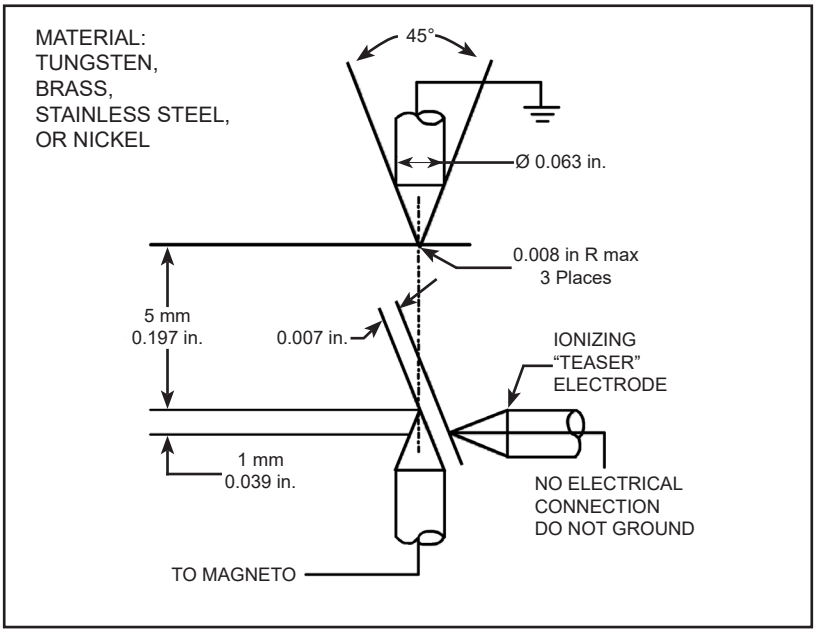



**Figure 5.1 – Spark Gap**

## 5.3 Impulse Coupling Test

A. Rotate the test stand drive motor in the same direction of rotation as stated on the magneto data plate.

B. Impulse coupling must fully engage at speeds up to 150 RPM minimum. If the impulse coupling pawls slip past the stop pin or engage intermittently, the impulse coupling is not operating properly and must be replaced. Intermittent engagement is permissible above 150 RPM up to 475 RPM, at which point the impulse coupling must be fully disengaged. Engagement at speeds above 475 RPM is not permissible and is cause for replacement. Refer to Table 5.1.

| Table 5.1 – Electrical Component Tolerances | |
|---|---|
| RPMs | Impulse Coupling Expected Condition |
| 0-150 | Fully Engaged |
| 151-475 | Intermediate Engagement Permissible |
| >475 | Fully Disengaged |

### 5.4 Coming-In Speed

A. Determine the lowest RPM that the magneto can be operated and generate a spark at all 5mm gaps without missing.

B. Non-impulse magnetos: The test gaps must begin to spark consistently at or below 250 RPM.

C. Impulse coupled magnetos

(1) Impulse coupling engaged: With the impulse coupling fully engaged, the test gaps must begin to spark consistently at or below 150 RPM.

(2) Impulse coupling disengaged: The impulse coupling should be completely disengaged at 475 RPM and above, and the test gap must spark consistently.

### 5.5 High RPM Test

A. Operate the magneto at 1000, 2000, and 3000 RPM for two minutes at each speed setting.

B. Observe sparking regularity at the spark gaps. Magneto must produce a consistent spark at all speed settings.

### 5.6 Pressurized Magneto Test

**CAUTION!**

COMPLETE MAINTENANCE OF THE ENTIRE ENGINE, AIRFRAME AND MAGNETO PRESSURIZATION SYSTEM IS CRITICAL AND REQUIRED FOR THE SAFE PERFORMANCE AND SERVICE LIFE OF PRESSURIZED MAGNETOS. BENCH CHECKING THE PERFORMANCE OF PRESSURIZED MAGNETOS IS ONLY ONE STEP OF THE ENTIRE PROCESS OF PRESSURIZED MAGNETO SYSTEM MAINTENANCE. PRESSURIZED MAGNETOS THAT HAVE PASSED A BASIC BENCH TEST MAY NOT BE RELEASED TO SERVICE OR OPERATED IN FLIGHT UNLESS THE MAGNETO IS INSTALLED ON THE ENGINE AND THE ENTIRE MAGNETO PRESSURIZATION SYSTEM IS INSPECTED AND DOCUMENTED TO BE OPERATING IN A SAFE, AIRWORTHY CONDITION IN COMPLIANCE WITH ALL APPLICABLE ENGINE MANUFACTURER AND AIRFRAME MANUFACTURER REQUIREMENTS.

A. Magneto must be fully assembled for this test.

B. Testing will be conducted with magneto at room temperature.

C. Configure test equipment to the following specifications:

(1) Air supply to deliver regulated 15 psig.

(2) Air supply must be filtered to prevent moisture contamination.

(3) Position pressure gauge immediately in-line with airflow gauge to eliminate any discrepancy of line loss from pressure supply to airflow gauge.

(4) Dwyer MMA-7 Flowmeter capable of measuring a range of 5 to 60 Standard Cubic Feet per Hour (SCFH).

(5) Install a sealed pressurized harness cap with sealing O-ring and three harness cap screws. Apply torque to screws IAW Table 6.2 in CHAPTER 6 – MAINTENANCE. Attach filtered air hose to the inlet port of the magneto.

D. Apply 15 psig to magneto pressure line. Airflow range is 11-40 SCFH. If airflow exceeds these limits, reposition harness cap, gaskets and torque the housing and harness cap screws IAW Table 6.2 in CHAPTER 6 – MAINTENANCE. Reference Figure 5.2 for the general configuration of equipment set up.

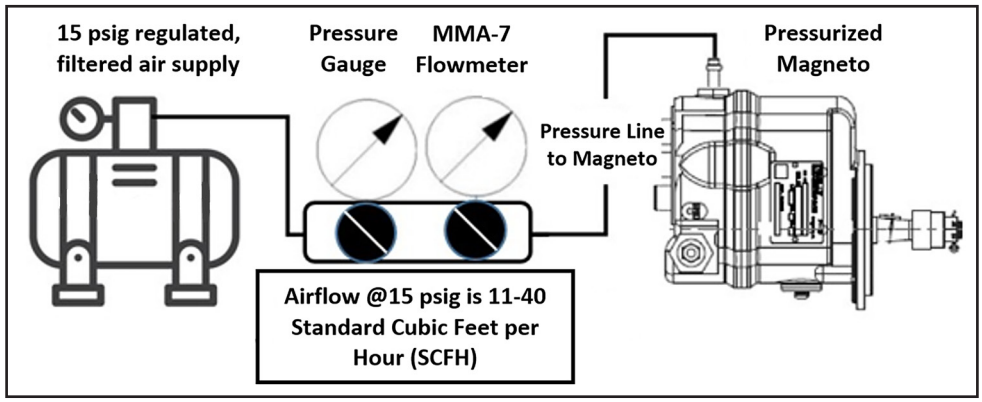



**Figure 5.2 – General Configuration of Equipment Set up**

## 5.7 Post-Test Assembly

A. **ALL MAGNETOS:** Install parts not installed previously to testing, such as p-lead nut and related washers, drive bushing, and drive nut. These parts may be installed snug for transit prior to magneto-to-engine installation.

B. ES4333 Magneto with retained drive gear.

(1) Remove nut.

(2) Install gear to engage with impulse coupling drive features.

(3) Install the impulse coupling nut. Torque nut IAW Table 6.2 in CHAPTER 6 – MAINTENANCE.

(4) Ensure gear endplay and free motion under the nut. Ensure the impulse coupling snaps and operates freely by engaging impulse while turning the rotor shaft.

(5) Install and secure cotter pin.

### 5.8 Thread Lock

A. Apply Loctite 242 to:

(1) Distributor Block mounting screw threads

(2) Distributor Housing mounting screw threads.

### 5.9 Electrical Component Tolerances

| Table 5.2 – Electrical Component Tolerances | |
|---|---|
| Primary Coil Circuit | .5 – 1.2 Ohms |
| Secondary Coil Circuit | 13,000 – 20,500 Ohms |
| Capacitor | .315 µF ± .385 µF |

# CHAPTER 6 – MAINTENANCE

## 6.1 General

A. This section contains information regarding recommended maintenance for all magnetos listed in this manual. These recommendations assure reliable and safe operation of the magnetos while in service. Maintenance is listed in hours time-in-service (TIS) or calendar time, whichever is applicable and the first to occur. Some maintenance is one time initial and others are recurring. Refer to CHAPTER 4 – CHECK for required inspections.

B. HET recommended maintenance, checks and TIS may be superseded by the aircraft or engine manufacturers established time limits and schedules based on experience and/or unique requirements under it's Type Certificate or other certifications.

## 6.2 Periodic Maintenance

**NOTE:** The aircraft and/or engine manufacturers periodic or event checks are contained in the respective maintenance manual or service information.

A. The ignition system should be inspected at regular intervals, the frequency of which should be determined by the type of service and the conditions under which the aircraft is operated. Since many airframe and engine maintenance tasks will directly or indirectly affect magneto function, it is recommended that the aircraft manufacturer's and engine manufacturer's periodic inspection/maintenance be followed prior to or in conjunction with any HET prescribed magneto maintenance. These include and are not limited to:

(1) **Battery** - A battery condition and capacity check.

(2) **Wiring** - All magneto, booster, and applicable control circuit wiring and terminal condition check.

(3) **Spark Plugs** - Wear, gap, and cleanliness check. Use the appropriate AFM, POH, service information or maintenance manual as applicable.

(4) **Ignition Harness** - Condition and installation check.

## 6.3 Lubrication

**Table 6.1 – Lubrication**

| | |
|---|---|
| A-13081-8 | Cam Grease - Contact Assembly Cam |
| AB-391200 | Lubricant |

## 6.4 Torque Specifications

**CAUTION!**

APPLYING TORQUE BEYOND THE VALUES SET IN TABLE 6.2 WILL SEVERELY DAMAGE THE MAGNETO. EXCEEDING THESE VALUES MAY REQUIRE OVERHAUL OR REPLACEMENT OF THE MAGNETO.

| Table 6.2 – Dry Torque Specifications | | |
|---|---|---|
| A-13081-2 | Primary Contact Assembly Screw | 15 - 18 in-lbs. |
| ES3637-4 | Secondary Contact Assembly Screw | 15 - 18 in-lbs. |
| ES3637-5 | Secondary Contact Assembly Screw | 15 - 18 in-lbs. |
| AM-3183-1 | P-Lead Nut at Installation / Secondary Wire Connection Nut at Installation | 13 - 15 in-lbs. |
| ES1077 | Air Vent, No Cover | 80 - 90 in-lbs. |
| ES3084-1 | Air Vent, With Cover | 80 - 90 in-lbs. |
| ES3084-3 | Air Vent Cover Screw | 5 - 7 in-lbs. |
| ES1280 | Pressure Fitting | 80 - 90 in-lbs. |
| ES3179 | Pressure Vent with Orifice | 80 - 90 in-lbs. |
| AM-3021 | Housing Screw | 18 - 28 in-lbs. |
| AM-3015 | Housing Screw | 18 - 28 in-lbs. |
| ES3019, ES3492 | Rotor Shaft Nut | 120 - 320 in-lbs. |
| AM-3020 | Contact Assembly / Coil Ground | 20 - 24 in-lbs. |
| AM-3021 | Distributor Block Screw | 18 - 28 in-lbs. |
| AK-3984 | Capacitor | 150 - 160 in-lbs. |
| ES3221 | Bearing Cap Screw | 20 - 24 in-lbs. |
| ES1553 | Harness Cap Screw | 18 - 28 in-lbs. |

## 6.5 Magneto Inspection and Maintenance Disassembly Procedures

**NOTE:** Disassembly procedures detailed herein are limited to those necessary for the periodic or on-condition inspections and maintenance.

A. Magneto Disassembly Procedures. Refer to Fig. 6.21 and 6.22 for parts index

**NOTE:** Review the Mandatory Parts Replacement listed in § 4.8 500 Hour Inspection. Discard and replace parts as directed. Parts not subject to mandatory replacement may be inspected and continue into service if determined to be in an airworthy condition.

(1) Magneto will be disassembled in the following general order:

(a) Drive Gear or Drive Coupling

(b) Impulse Coupling Assembly

(c) Pressure Vent Plug – Pressurized Magnetos Only

(d) Magneto Housing

(e) Distributor Assembly and Rotor Gear

(f) Contact Assembly/Cam

(g) Capacitor

(h) Coil

B. Remove Magneto Drive Gear or Drive Coupling

**CAUTION!**

EXCESSIVE FORCE APPLIED BY THE PULLING TOOL TO THE END OF THE ROTOR SHAFT CAN DEFORM THE END OF THE ROTOR SHAFT OR COLLAPSE THE COTTER PIN HOLE. USE THE NUT – INSTALLED CASTLE SIDE DOWN – TO SUPPORT THE END OF THE SHAFT TO PREVENT DAMAGE TO THE SHAFT DURING PULLING OPERATIONS.

**NOTE:** For magnetos equipped with impulse coupling, removal of the magneto drive gear is necessary to access and inspect the impulse coupling. For magnetos not equipped with impulse coupling, removal of the drive gear/drive coupling is optional.

(1) Impulse coupled magneto: Remove the cotter pin (1), nut (2), washer (3), and drive gear (29). Discard cotter pin (1).

(2) Non-impulse coupled magneto: Remove the cotter pin (1), nut (2) and washer (3). Thread nut (2) onto the shaft to cover the cotter pin hold for support. Use a puller to remove drive gear or drive coupling. Remove puller, nut, and drive gear or drive coupling. Discard cotter pin.

C. Remove Impulse Coupling Assembly

**CAUTION!**

IMPULSE COUPLING SPRING IS UNDER STRONG TENSION. WEAR GLOVES AND SAFETY GLASSES WHEN RELIEVING TENSION OF IMPULSE COUPLING SPRING.

(1) Grasp the impulse body (4c) of the impulse coupling assembly (4) to pull the impulse body (4c) and impulse spring (4a) away from the impulse cam assembly (4b).

(2) Turn the impulse body (4c) to relieve spring (4a) tension.

(3) Remove the impulse body (4c) and impulse spring (4a) from the impulse cam assembly (4b). Discard the impulse spring (4a).

(4) Thread nut (2) onto the rotor shaft to cover and support the cotter pin hole. Install the HET ES106T Impulse Coupling Puller lugs into the groove of the impulse cam assembly (4b). Carefully increase tension of the ES106T Impulse Coupling Puller by turning the center bolt while holding the puller body and remove the impulse cam assembly (4b). Refer to Figure 6.1.

D. Pressure Vent Assembly (6a) – Pressurized Magnetos Only

(1) Loosen and discard screw.

(2) Remove air vent hood.

(3) Remove pressure vent plug from frame.

E. Remove Magneto Housing

(1) Remove the screws (21, 22) from the distributor housing (20).

(2) Lift the distributor housing (20) from the magneto frame (6), taking care not to apply excessive pulling force to the capacitor (23) wire that connects to the contact assembly (11).

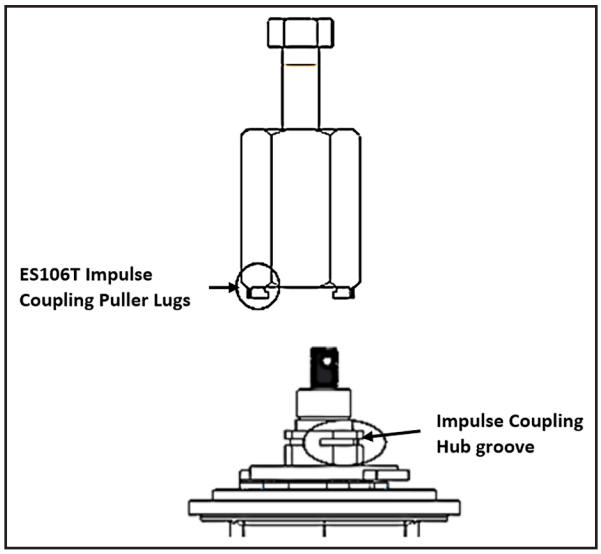



**Figure 6.1 – Engaging Lugs**

(3) Disconnect the capacitor (23) wire from the contact assembly (11).

(4) Secondary Contact magnetos only: Remove the lead wire from the contact assembly (11).

(5) Tachometer Drive magnetos only: Disconnect the lead wire from the contact assembly (11).

F. Remove Distributor Block Assembly and Rotor Gear

(1) Remove the screws (21) that secure the distributor block assembly (27a) to the magneto frame (6).

(2) Remove the distributor block and gear assembly (27) from the magneto frame (6).

(3) Remove the two spacers (27d) that support the distributor block assembly (27a).

(4) Gently pry the rotor gear (11a) from the end of the rotor shaft.

G. Remove Contact Assemblies

**NOTE:** Contact assemblies (11) removal is not necessary for inspection. If a contact assembly needs to be replaced, proceed with the following steps.

(1) Disconnect the coil (17) lead wire from contact assembly (11).

(2) Remove the screws (12, 14, 15) that retain the contact assemblies (11) to the bearing cap (8). Remove contact assemblies from the bearing cap.

(3) Remove the cam (9) by lightly prying it out of the cam slot.

H. Remove Coil

**NOTE:** Coil (17) removal is not necessary for inspection. If the coil needs to be replaced, proceed to § 6.4.H(1) below.

(1) Coil Removal

(a) Remove coil (17) ground screw.

(b) Use the ES122T Coil Wedge Extractor to remove coil wedges (19), remove coil from the frame (6). Refer to Figure 6.2.

(c) Discard coil wedges (19).

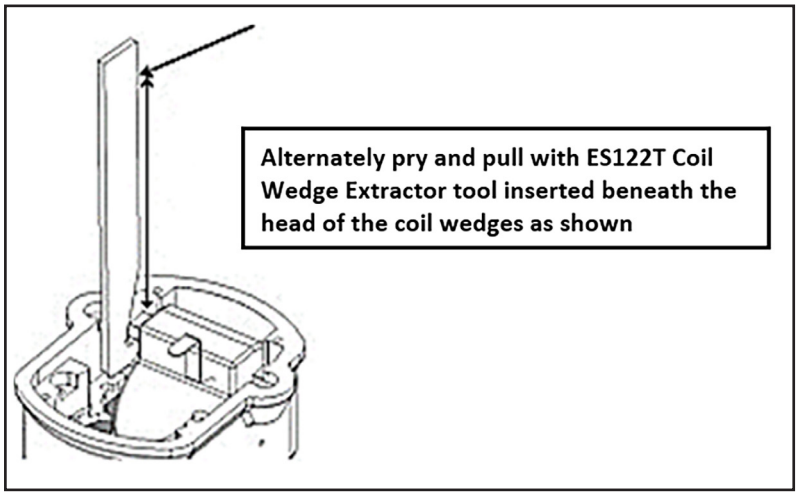



**Figure 6.2 – Remove Coil Wedges**

I. Remove Capacitor

**NOTE:** Capacitor (23) removal is not necessary for inspection. If the capacitor needs to be replaced, proceed to § 6.4.I(1) below.

(1) Remove the capacitor (23) from the housing (20).

## 6.6 Magneto Assembly

A. Tools Required

(1) HET ES4300/ES6300 series magnetos are assembled using common shop tools. The following are suggested tools:

(a) HET ES200T Magneto Assembly Tool Kit

(b) Arbor Press

(c) T20 Torx head drive coupling

(d) 6 in. flat blade screwdriver

(e) 6 in. needle nose pliers

(f) Wire feeler gauges ranging from 0.011 in. to 0.015 in. (Tachometer points only)

(g) Magneto Timing Light

(h) Magneto test stand

(i) Dwyer Instruments Model MMA-7 Flowmeter, clean pressurized air supply, meters and hoses as described.

(j) Torque Wrenches, range 5 - 320 in-lbs.

**NOTE:** Similar tools can be substituted as required to accomplish basic assembly processes.

## 6.7 Magneto Assembly – ES200T Assembly Tool Kit

A. HET ES4300/6300 series magnetos can be assembled using the optional ES200T Magneto Assembly Tool Kit. Refer to Figure 6.3 and Table 6.3.

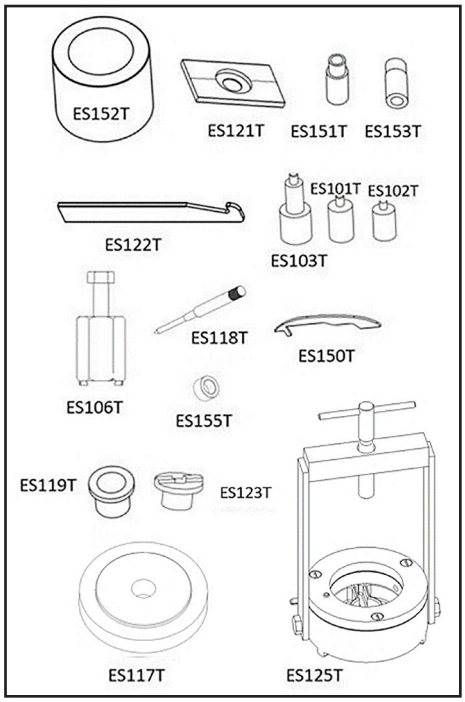



**Figure 6.3 – ES200T Magneto Assembly Tool Kit Contents**

**Table 6.3 – ES200T Magneto Assembly Tool Kit Contents**

| P/N | Description | Qty |
|---|---|---|
| ES101T * | Bearing Assembly Tool | 1 |
| ES102T * | Bearing Assembly Tool | 1 |
| ES103T * | Oil Seal Assembling Tool | 1 |
| ES106T | Impulse Coupling Puller | 1 |
| ES117T | Base Plate | 1 |
| ES118T | Timing Pin | 1 |
| ES119T | Bushing, Adapter Plate | 1 |
| ES121T * | Bearing Separator (2 halves) | 1 |
| ES122T * | Coil Wedge Extractor | 1 |
| ES123T | Timing Drive Adapter | 1 |
| ES125T | Assembly Base | 1 |
| ES150T | "E" Gap Gauge | 1 |
| ES151T | Cam and Rotor Set | 1 |
| ES152T | Spacer | 1 |
| ES153T | Alternate Cam and Rotor Set | 1 |
| ES155T | Pawl Wear Go/No Go Gauge | 1 |
| ES509T | Spacer (included with ES125T) | 1 |

* Indicated tools are used for magneto overhaul only.

### 6.8 Assemble Impulse Coupling

**NOTE:** This step is for an impulse coupled magneto only. If the magneto is not impulse coupled, proceed to § 6.11.

A. **IMPORTANT:** Apply a generous coating of clean aircraft engine oil to all surfaces of all impulse coupling assembly (4) parts prior to assembly.

B. Install the impulse coupling spring (4a) into the impulse body (4c).

C. Assemble the inner loop at the end of the impulse coupling spring (4a) into the vertical groove in the impulse cam assembly (4b). The impulse body (4c) should nest onto the impulse cam assembly with little or no tension on the impulse spring. Refer to Figure 6.4 and 6.5.

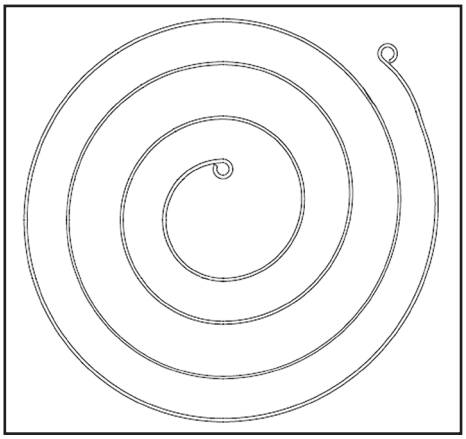


**Figure 6.4 – Impulse Coupling Spring, Clockwise**

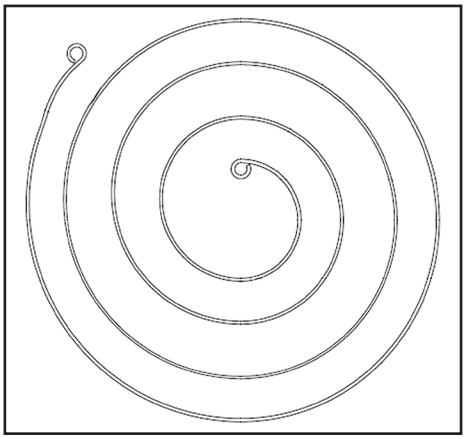


**Figure 6.5 – Impulse Coupling Spring, Counter Clockwise**

D. Hold the impulse body (4c) with one hand and pull the impulse cam assembly (4b) away from the body slightly so that the cam assembly can be turned to wind the impulse spring (4a) to operating tension.

E. Hold the impulse body (4c) stationary and rotate the impulse cam assembly (4b) approximately 90 degrees to apply tension to the impulse spring (4a). The extended edges of the impulse cam assembly will seat against the trip lugs on the impulse body and hold the spring in tension. Push the body down onto the impulse cam assembly to complete the assembly process.

F. When the impulse body (4c) is seated, check that the impulse body can move freely when the body is turned in a direction that applies winding tension to the impulse spring (4a).

### 6.9 Install Impulse Coupling – Magnetos Fitted with a Retained Drive Gear

**NOTE:** This step is for an impulse coupled magneto only. If the magneto is not impulse coupled, proceed to § 6.11.

**NOTE:** Because many magneto test benches are not capable of driving magnetos with gears attached to the magneto, and because engine drive gears may not be available at the time of magneto maintenance, magnetos fitted with retained drive gears are assembled at this stage without drive gears. Drive gears may then be assembled after Testing per § 5.7 or before Magneto to Engine Installation per § 6.21.

A. Confirm that woodruff key(s) (7a) are installed.

B. Assemble impulse coupling assembly (4) onto shaft so that woodruff key (7a) in rotor (7) shaft nests in woodruff key slot in impulse body (4c).

C. Install the impulse coupling nut (2) and tighten to 120-320 in-lbs. to seat the impulse coupling assembly (4) on the rotor (7) shaft.

D. Ensure the impulse coupling assembly (4) snaps and operates freely by engaging the impulse while turning magneto rotor (7) shaft.

### 6.10 Install Impulse Coupling – Magnetos Not Fitted with a Drive Gear

**NOTE:** This step is for an impulse coupled magneto only. If the magneto is not impulse coupled, proceed to § 6.11.

A. Confirm that woodruff key (7a) is installed.

B. Assemble impulse coupling assembly (4) onto the rotor (7) shaft so that the woodruff key (7a) in the rotor shaft nests in woodruff key slot in the impulse body (4c).

C. Install the impulse coupling nut (2) and tighten to 120-320 in-lbs. to seat impulse coupling assembly (4) on the rotor (7) shaft.

D. Install cotter pin (1) and secure for final installation.

E. Check to confirm that the impulse coupling assembly (4) snaps and operates freely by engaging the impulse while turning the magneto rotor (7) shaft.

### 6.11 ES4309, ES4310 Non-Impulse Coupled Magnetos Fitted with a Drive Coupling

A. Install the drive coupling (28) onto the rotor (7) shaft.

B. Install the nut (26) and washer (25), torque IAW Table 6.2.

### 6.12 Install Coil

A. If the coil (17) was removed, position the magneto frame (6) into the ES125T Assembly Tool.

B. Insert the coil (17) into the frame (6), the center high tension contact aligned to point towards the slotted end of the rotor shaft (7).

C. Insert new coil wedges (19).

D. Using a hammer and flat face punch, drive the coil wedges (19) in so that they are tight between the coil laminations and frame (6).

E. Attach the coil (17) grounding wire to the frame (6) and torque IAW Table 6.2.

F. Align the high tension contact so that it is parallel to the mating surface of the magneto frame (6) and adjusted to a height of flush to 1/32 below the frame.

**WARNING!**

IF THE COIL HIGH TENSION CONTACT IS SET ABOVE THE MAGNETO FRAME, IT CAN MAKE CONTACT WITH THE DISTRIBUTOR GEAR AND CAUSE THE MAGNETO TO MALFUNCTION.

### 6.13 Install Primary Contact Assembly

A. Install Primary Contact Assembly – Single Contact Magnetos Only

**WARNING!**

USE ONLY A-13081-2 SCREWS SUPPLIED WITH THE A-13081 CONTACT ASSEMBLY. DUAL PRIMARY AND SECONDARY CONTACT ASSEMBLY MAGNETOS USE LONGER SCREWS. IT IS CRITICAL TO CONFIRM THE CORRECT SCREW LENGTH PRIOR TO ATTEMPTING ASSEMBLY OF THE PRIMARY CONTACT ASSEMBLY TO THE BEARING CAP.

(1) Attach the contact assembly (11) to the bearing cap (8) using the A-13081-2 contact assembly mounting screws (12) and lock washer (13) as shown in Figure 6.6.

(2) Proceed to § 6.13.D.

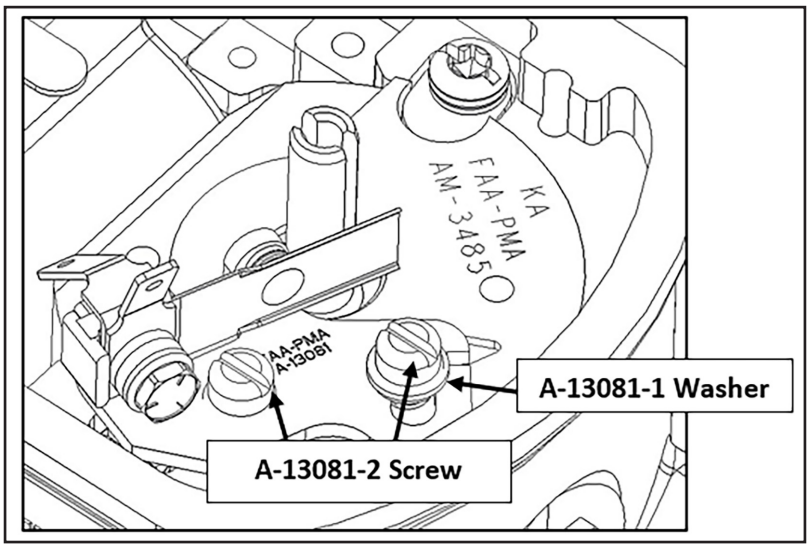



**Figure 6.6 – Attach the Contact Assembly**

B. Install Primary Contact Assembly – Dual Point Magnetos Only

**WARNING!**

USE THE BLACK COLOR ES3637-5 SCREW TO MOUNT ES3637 CONTACT ASSEMBLY TO BEARING CAP. DUAL PRIMARY AND SECONDARY CONTACT ASSEMBLY MAGNETOS USE LONGER SCREWS. IT IS CRITICAL TO CONFIRM CORRECT SCREW LENGTH PRIOR TO ATTEMPTING ASSEMBLY OF THE DUAL CONTACT ASSEMBLIES TO THE BEARING CAP.

**NOTE:** Install the primary contact assembly before installing secondary contact assembly.

(1) Attach the contact assembly (11) to bearing cap (8) using the BLACK color contact assembly mounting screw (15). Reference Figure 6.7.

(2) Do not tighten screws until contact assemblies (11) are adjusted in § 6.13.E.

(3) Proceed to § 6.13.D.

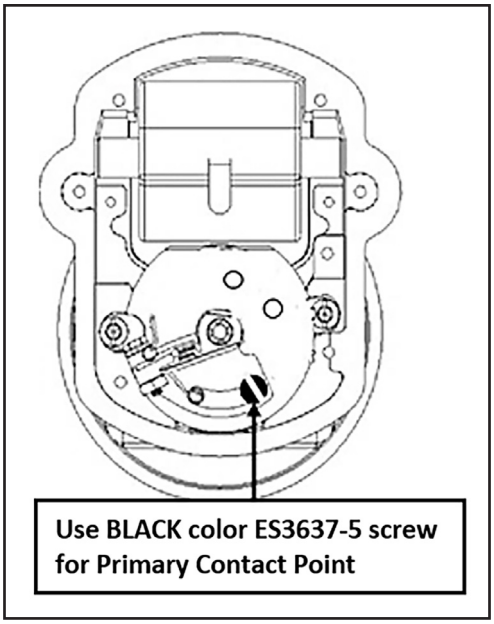



**Figure 6.7 – Attach the Contact Assembly (Cont.)**

C. Install Secondary Contact Assembly – Secondary Contact Assembly Magnetos

**WARNING!**

USE ONLY THE GOLD COLOR ES3637-4 SCREW TO MOUNT ES3637 CONTACT ASSEMBLY TO BEARING CAP. DUAL PRIMARY AND SECONDARY CONTACT ASSEMBLY MAGNETOS USE LONGER SCREWS. IT IS CRITICAL TO CONFIRM CORRECT SCREW LENGTH PRIOR TO ATTEMPTING ASSEMBLY OF THE SECONDARY CONTACT ASSEMBLY TO BEARING CAP.

**NOTE:** Install the primary contact assembly before installing secondary contact assembly.

(1) Place the washer (16) on the bearing cap and attach the secondary contact assembly (11) using the GOLD color secondary contact mounting screw (14). Reference Figure 6.8.

(2) Do not tighten screw until contact assemblies are adjusted in § 6.13.E.

(3) Proceed to § 6.13.D.

D. Install Contact Assembly – Cam in Rotor Shaft

(1) Install cam (9) into slot in end of rotor (7) shaft.

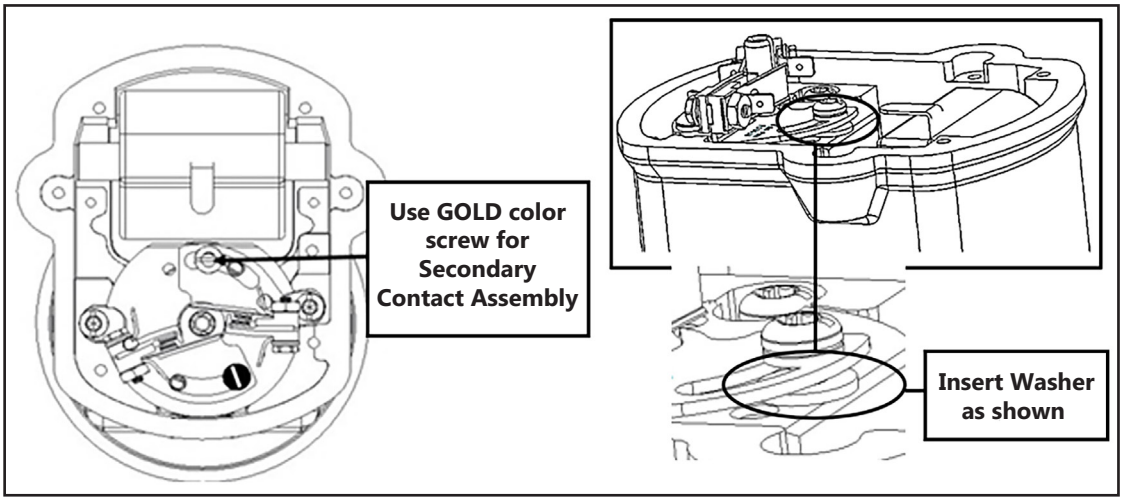



**Figure 6.8 – Attach the Secondary Contact Assembly**

(2) Press by hand or tap lightly (while supporting rotor shaft from drive end) on the top of the cam (9) until it touches bottom of slot.

E. Align the Contact Assembly to E-Gap – All Primary Contact Assemblies

(1) Remove the degree wheel portion of the ES125T Assembly Base.

(2) Remove the T-handle screw assembly portion of the ES125T Assembly Base.

(3) Insert the magneto into the ES125T Assembly Base.

(4) Align the magneto so that the ignition coil (17) is in the 12 o'clock position with the stop pin in the ES125T Assembly Base on the left side of the magneto frame.

(5) Identify the location of the magneto frame (6) laminations that contact the laminations in the center of the ignition coil (17).

(6) Identify the location of the slots in the rotating magnet marked "L" and "R". Refer to Figure 6.9.

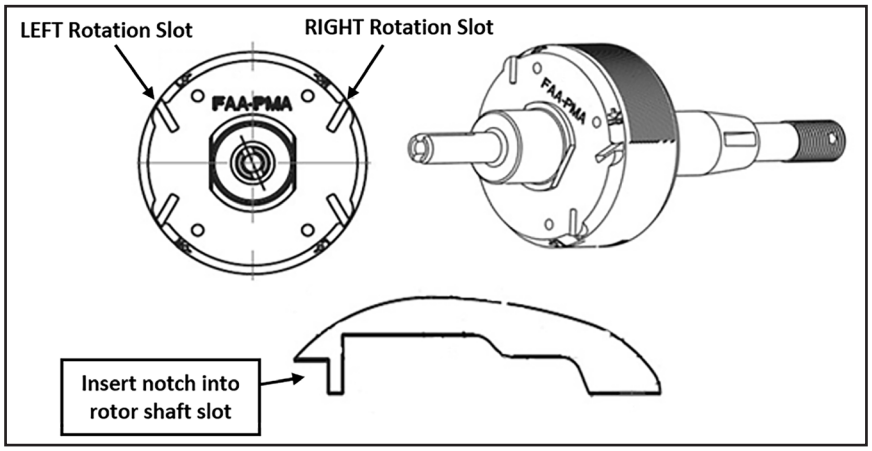



**Figure 6.9 – Rotation Slot Locations**

(7) Identify the rotation of the magneto by the letter “R” or “L” that is stamped in the box labeled “ROT” on the magneto data plate. Refer to Figure 6.10.

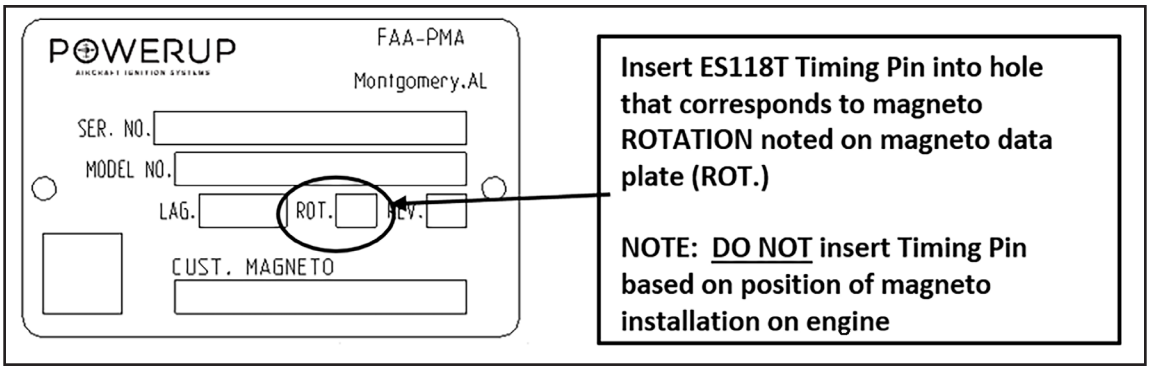



**Figure 6.10 – Magneto Rotation Identification**

(8) For LEFT rotation magnetos: Insert the ES150T “E” Gap Gauge I into the slot marked “L”. Turn the rotor shaft until the ES150T “E” Gap Gauge is held against the frame laminations on the left side of the magneto. For RIGHT rotation magnetos: Insert the ES150T “E” Gap Gauge into the slot marked “R”. Turn the rotor shaft until the ES150T “E” Gap Gauge is held against the frame (6) lamination on the right side of the magneto. Refer to Figure 6.11.

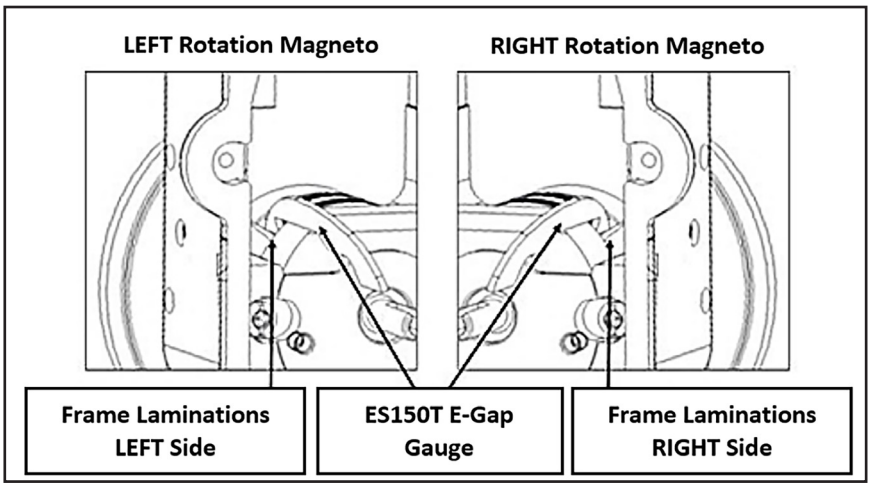



**Figure 6.11 – Frame Laminations**

(9) Attach the ignition coil (17) lead wire to the vertical terminal of the primary point assembly. Connect a magneto timing light tool to the contact assembly (11) and frame (6) ground.

**NOTE:** Many modern magneto timing lights will not function unless the ignition coil (17) is attached to the contact assembly (11).

**NOTE:** Lamp logic is not consistent between timing light brands: Be mindful of the meaning of “light on” and “light off” relative to contacts open or contacts closed as described by the timing light manufacturer.

(10) Adjust the contact assembly (11) until the timing light indicates the assembly just opened.

(11) Tighten the screws (21) that secure the contact assembly (11) to the bearing cap (8).

(a) Single contact assembly magnetos: Torque the adjusting screw (14) IAW Table 6.2. Torque the pivot screw (15) IAW Table 6.2.

(b) Dual Point magnetos: Torque the tightening screw (22) IAW Table 6.2.

(12) Apply cam grease sparingly to each lobe of the cam (9). Attach the ignition coil (17) lead wire to the vertical terminal of the primary contact assembly (11).

F. Align Secondary Contact Assembly

(1) Confirm that primary contact assembly (11) has been set to E-Gap. Secondary contact assemblies (11) are set using the primary contact assembly for reference. Secondary contacts cannot be completed if the primary contact assembly is not aligned as detailed in § 6.13.E.

(2) Remove the magneto from the ES125T Assembly Base.

(3) Reinstall the degree disc into the bottom of the ES125T Assembly Base and loosely clamp in place with screws and washers included with ES125T Assembly Base. The disc should be retained by the screws and washers but free to turn.

(4) Install the ES123T Timing Drive Adapter onto magneto rotor (7) shaft.

(5) Set the magneto rotating magnet to the E-gap position as detailed in § 6.13.E. Hold the magneto in the E-Gap position and insert so that the drive lugs of the impulse coupling assembly (4) or the ES123T Timing Drive Adapter insert into slot in timing disk.

(6) Left Hand rotation magnetos only: Turn magneto and timing disk together counter- clockwise with the magneto in the E-Gap position until the stop pin on the ES125T Assembly Base contacts the left side of the magneto frame (6). Proceed to Step (8).

(7) Right Hand rotation magnetos only: Turn magneto and timing disk together clockwise with the magneto in the E-Gap position until the stop pin on the ES125T Assembly Base contacts the right side of the magneto frame (6).

(8) Hold the magneto and ES125T Assembly Base and invert the assembly, taking care not to let to magneto or timing disk move out of position. Tighten one timing disk screw to hold the disk in place. When the disk is secured, remove the magneto from the ES125T Assembly Base.

(9) Make a mark on the timing disk to align with the index mark cast into the ES125T Assembly Base. This mark is the reference point for E-Gap for the magneto that is being assembled. This mark may not be used for other magnetos and a new reference must be established for each subsequent magneto that requires secondary contact assembly (11) timing.

(10) Identify the lag angle of magneto from the number marked on the data plate in the box labeled LAG. Each mark on the ES125T Assembly Base timing disk represents five degrees. The timing disk will be turned to align a timing mark with the index mark cast into the ES125T Assembly Base to establish the correct position to use as a reference point to set the secondary contact assemblies (11). Figure 6.12 and Table 6.4 shows how the secondary contact assembly lag angle corresponds to the marks on the disk.

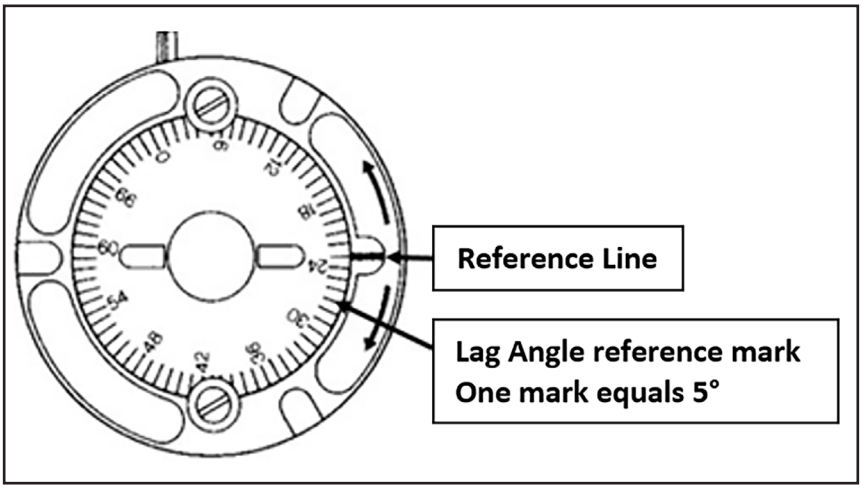



**Figure 6.12 – Lag Angle Reference**

**Table 6.4 – Lag Angle**

| Magneto Lag Angle | Move Timing Disk This Many Marks From Index Mark |
|---|---|
| 5 ° | 1 |
| 10 ° | 2 |
| 15 ° | 3 |
| 20 ° | 4 |
| 25 ° | 5 |
| 30 ° | 6 |
| 35 ° | 7 |
| 40 ° | 8 |

**EXAMPLE:**

Lag angle noted on data plate: 25° Rotation noted on data plate: L

To set the timing disk, turn the timing disk 5 marks (5x5=25°) counterclockwise from initial reference mark aligning disk to cast index mark on ES125T Assembly Base.

(11) Tighten timing disk screws to lock disk in place.

(12) Insert magneto into ES125T Assembly Base.

(13) Remove the ES150T “E” Gap Gauge from the magneto.

(14) Left Hand rotation magnetos only: Rotate the magneto counterclockwise until the stop pin on the ES125T Assembly Base is against the right side of the magneto frame (6).

(15) Right Hand rotation magnetos only: Rotate the magneto clockwise until the stop pin on the ES125T Assembly Base is against the left side of the magneto frame (6).

(16) Connect a magneto timing light tool to the contact assemblies (11).

**NOTE:** Many modern magneto timing lights will not function unless the ignition coil (17) is attached to each contact assembly (11) during the timing process. It is advised to temporarily install a jumper wire between the two sets of contacts to set secondary contacts. Remove Jumper once timing is complete.

**NOTE:** Lamp logic is not consistent between timing light brands: Be mindful of the meaning of “light on” and “light off” relative to contacts open or contacts closed as described by the timing light manufacturer.

(17) Adjust the secondary contact assembly (11) until the timing light tool indicates the contacts have just opened. Tighten the screws (14, 15) for the secondary contact assembly in this position. Torque screws (14, 15) IAW Table 6.2.

(18) If not previously accomplished, apply cam grease sparingly to each cam (9) lobe.

G. Install Tachometer Drive Points – Tachometer Drive Magnetos Only

(1) Ensure the primary contact assembly (11) is set using the instructions § 6.13.E.

(2) Adjust the tachometer drive contact assembly (11) to open .013 in., (± .002) with the rotor (7) oriented so that the contacts are open at the maximum lift of the cam (9).

(3) Tighten the screws (14, 15) for the secondary assembly (11) in this position. Torque screws (14, 15) IAW Table 6.2.

(4) If not previously accomplished, apply cam grease sparingly to each cam (9) lobe.

### 6.14 Install Capacitor

A. **Dual Contact assembly magnetos only:** Prior to installation of the capacitor (23), route secondary contact assembly (11) wire from terminal stud through the channel cast in the housing (20) that runs beneath the capacitor installation.

B. **All magnetos:** Install the capacitor (23) into the capacitor threaded mounting hole in the distributor housing (20). Rotate the capacitor lead wire clockwise as the capacitor is installed to prevent the wire from becoming damaged.

C. Torque screw (21) IAW Table 6.2.

### 6.15 Distributor Gear Assembly

A. Distributor Gear Assembly

(1) Install the carbon brush (31) and spring assembly (4) into the distributor gear (27) shaft inner diameter. Turn the carbon brush and spring assembly counterclockwise until the spring seats in the shaft. Do not exert excessive pressure on spring when turning to seat the spring as the spring can be damaged by compressing it too tightly.

(2) When installed, gently compress the brush (31) and spring assembly (4) until the spring seats on the bottom of the shaft. The top of the carbon brush will extend from the top of the shaft by approximately 1/4 inch.

B. Assemble Distributor Block – All Magnetos

**NOTE:** HET distributor blocks (27a) are supplied as an assembly and ready to install. If distributor block is disassembled for inspection, gear replacement or service, proceed with steps 1 thru 2 below:

(1) Assemble the distributor gear ( 27b) into the distributor block (27a).

(2) Assemble the bearing bar into the distributor block (27a). Distributor gear (27b) should spin freely when assembled into bearing bar and distributor block.

### 6.16 Align Rotor Shaft Gear – All Magnetos

A. Identify the rotation of the magneto by the letter R or L in the box labeled “ROT” on the data plate.

(1) **LEFT ROTATION MAGNETOS:** Align the gear tooth labeled “L” on the rotor shaft gear (11a) so that it aligns with the high tension lead on the coil (17). Refer to Figure 6.13.

**NOTE:** Alignment of this gear is critical. Alignment with the coil (17) high tension lead must be maintained during assembly.

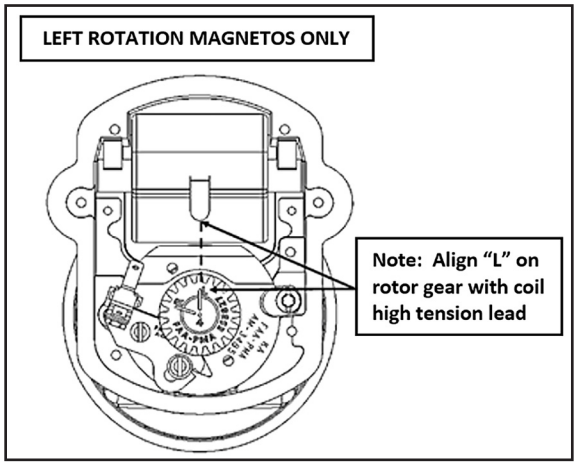



**Figure 6.13 – Left Rotation Alignment**

(2) **RIGHT ROTATION MAGNETOS:** Align the gear tooth labeled “R” on the rotor shaft gear (11a) so that it aligns with the high tension lead on the coil (17). Refer to Figure 6.14.

**NOTE:** Alignment of this gear is critical. Alignment with the coil (17) high tension tab must be maintained during assembly.

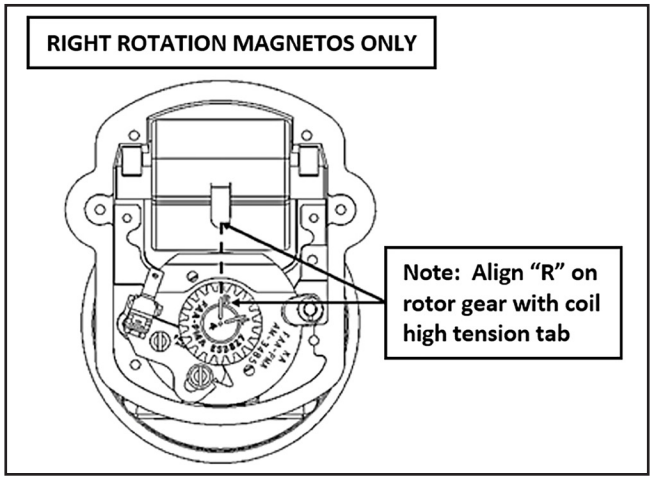



**Figure 6.14 – Right Rotation Alignment**

### 6.17 Align Distributor Gear Assembly To Rotor Shaft Gear

A. Identify the rotation of the magneto by the letter R or L in the box labeled “ROT” on the data plate.

B. Left Rotation magnetos only: Align the “L” hole in the distributor gear with the “L” hole in the distributor block assembly (27a). Lock the distributor gear (27b) in position by inserting the ES118T Timing Pin through the hole marked “L”. Refer to Figure 6.15.

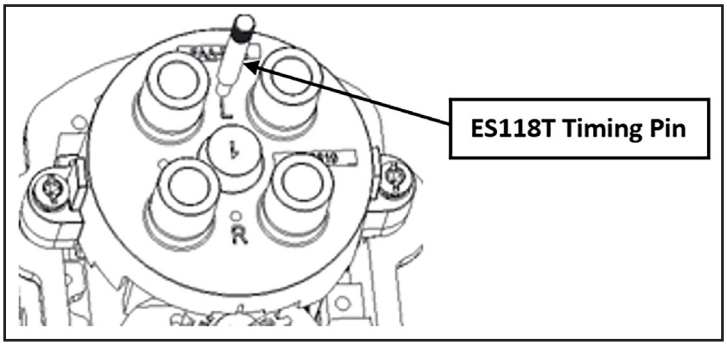



**Figure 6.15 – Left Rotation**

C. Right Rotation magnetos only: Align the “R” hole in the distributor gear (25b) with the “R” hole in the distributor block assembly (25a). Lock the distributor gear in position by inserting the ES118T Timing Pin through the hole marked “R”. Refer to Figure 6.16.

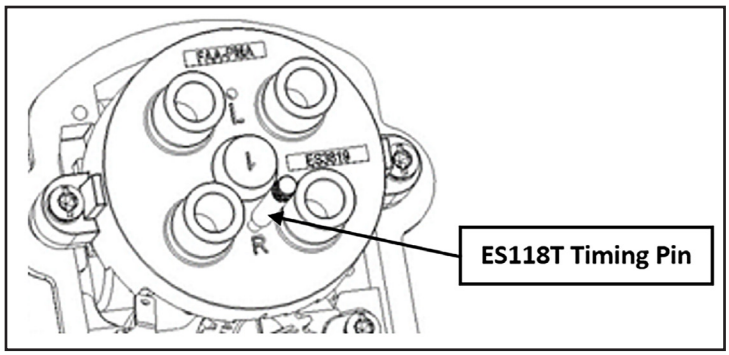



**Figure 6.16 – Right Rotation**

D. Install the distributor block supporting spacers (27d) into the frame (6) of the magneto where the distributor block mounting screws (21) will insert.

E. Left Rotation magnetos only

(1) Confirm that the rotor shaft gear (11a) tooth marked “L” is aligned to the high tension lead in the coil (17).

(2) Install the distributor block supporting spacers (27d) into the frame (6) of the magneto where the distributor block mounting screws (21) will insert.

(3) Install the distributor block assembly (27) onto the magneto frame (6). The alignment and mesh of the gears is correct if the index mark on the rotor gear (11a) aligns with the reference mark on the distributor block (27a). Refer to Figure 6.17.

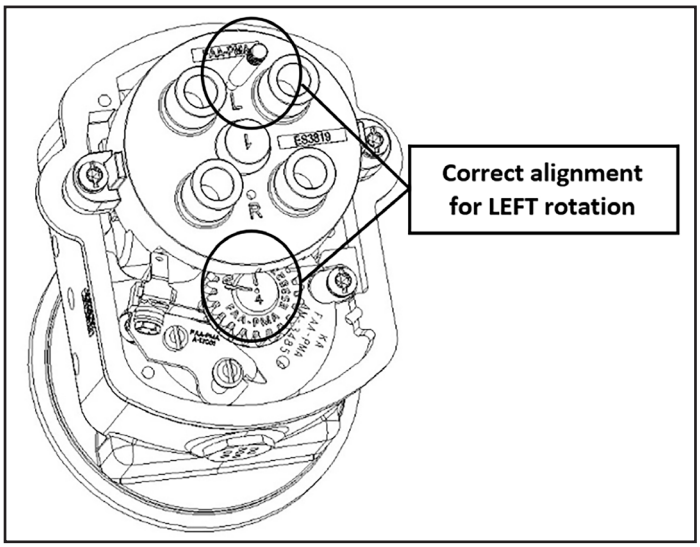



**Figure 6.17 – Correct Alignment - Left**

(4) Secure the distributor block assembly (27) to the magneto frame (6). Apply one drop of Loctite 242 thread locker to the start threads of the distributor block screws (21). Torque screws IAW Table 6.2.

F. Right Rotation magnetos only

(1) Confirm that the rotor shaft gear (11a) tooth marked “R” is aligned to the high tension lead in the coil (17).

(2) Install the distributor block assembly (27) onto the magneto frame (6). The alignment and mesh of the gears is correct if the index mark on the rotor gear (11a) aligns with the reference mark on the distributor block (27a). Refer to Figure 6.18.

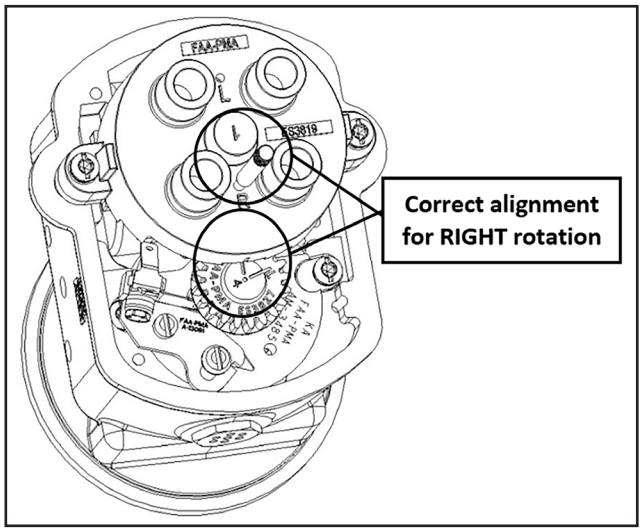



**Figure 6.18 – Correct Alignment - Right**

(3) Secure the distributor block assembly (27) to the magneto frame (6). Apply Loctite 242 thread locker to the start threads of the screws (21). Torque screws IAW Table 6.2.

### 6.18 Connect Capacitor Wire to Primary Contact Assemblies

A. Connect the capacitor (23) wire to the primary male terminal on the contact assemblies (11). Reference Figure 6.19.

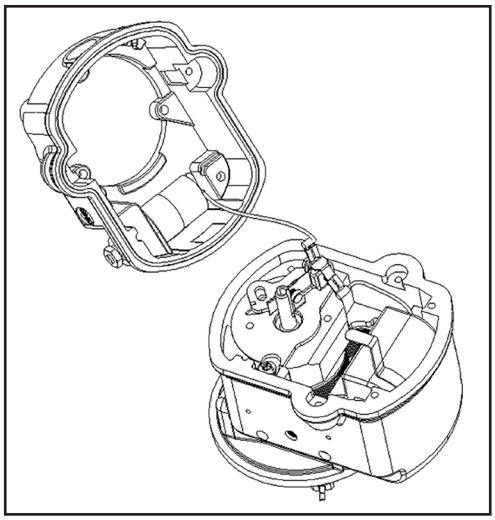


**Figure 6.19 – Capacitor Wire Connection**

### 6.19 Connect Secondary/Tachometer Contact Assembly Wire – Dual Contact Assembly Magnetos Only

A. Connect the wires to the Secondary or Tachometer contact assemblies (11). Reference Figure 6.20.

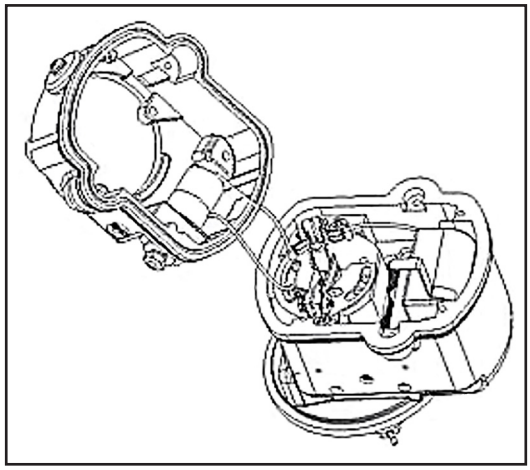


**Figure 6.20 – Connect Secondary/Tachometer Contact Assembly Wire**

### 6.20 Attach Distributor Housing

A. Place the distributor housing (20) on the frame (6).

B. Apply Loctite 242 to the start threads of the screw (21, 22) threads. Torque screws IAW Table 6.2.

C. Remove the ES118T Timing Pin.

### 6.21 Magneto to Engine Installation

A. Confirm that the magneto is correct for the engine application.

B. Magnetos with engine-supplied drive gear or drive coupling (28):

(1) Remove nut (2), washer (3), and bushing (31), as applicable.

(2) Install gear or drive coupling (28) to engage with drive features or woodruff key (7a), as applicable.

(3) Install washer (3) or bushing (31), as applicable.

(4) Install the nut (2). Tighten nut to IAW Table 6.2.

(5) For retained gears, ensure gear endplay and free motion under the nut (2). As applicable, ensure the impulse coupling assembly (4) snaps and operates freely by engaging impulse while turning the rotor (7) shaft.

(6) Install and secure cotter pin (1).

C. Identify the label on the magneto data plate that identifies Magneto Shaft Rotation. Magneto Shaft Rotation will be identified by the letter “L” for LEFT (Counterclockwise shaft rotation as viewed looking at the shaft end of the magneto) and the letter “R” for RIGHT (Clockwise shaft rotation as viewed looked at the shaft end of the magneto). Refer to Figure 6.21.

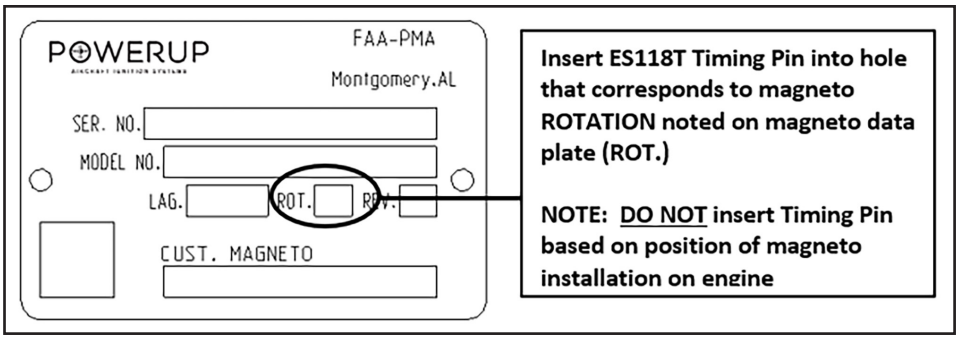



**Figure 6.21 – Magneto Rotation Label**

**WARNING!**

THE LETTERS L OR R DO NOT IDENTIFY MAGNETO POSITION ON THE ENGINE. THE LETTERS DENOTE ROTATION ONLY AND THE MAGNETOS SHOULD ONLY BE ALIGNED TO THE DIRECTION OF ROTATION SHOWN ON THE DATA PLATE. NEVER USE THE LETTERS TO INSTALL THE MAGNETO TO THE LEFT OR RIGHT POSITION ON THE ENGINE. FAILURE TO USE THE TIMING PIN HOLE CONSISTENT WITH THE ROTATION SHOWN ON THE DATA PLATE WILL RESULT IN FAILURE OF THE MAGNETO TO PERFORM OR ENGINE DAMAGE.

D. Locate the holes in the distributor block marked “L” and “R”. Refer to Figure 6.22.

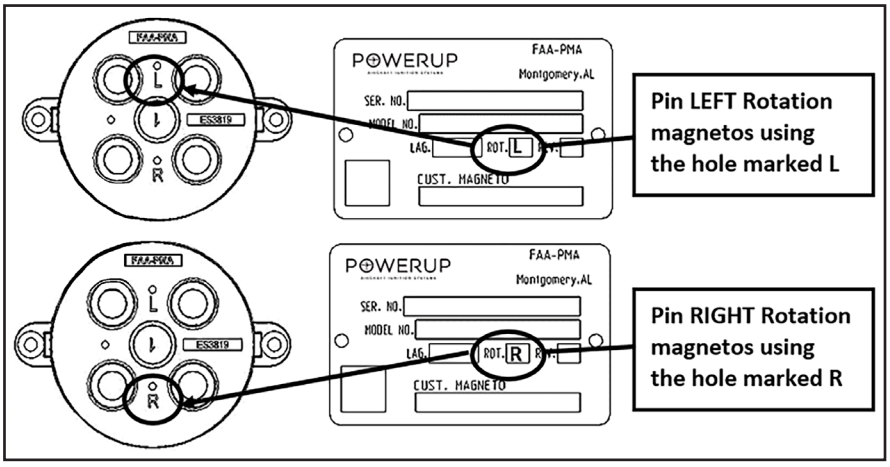



**Figure 6.22 – Correct Timing Pin Hole**

E. Insert the ES118T Timing Pin into the distributor block and carefully turn the magneto rotor shaft so that the ES118T Timing Pin can insert into the appropriate timing hole in the distributor gear.

F. The ES118T Timing Pin is fully and correctly inserted when the first step in the pin is seated against the face of the distributor block. Refer to Figure 6.23.

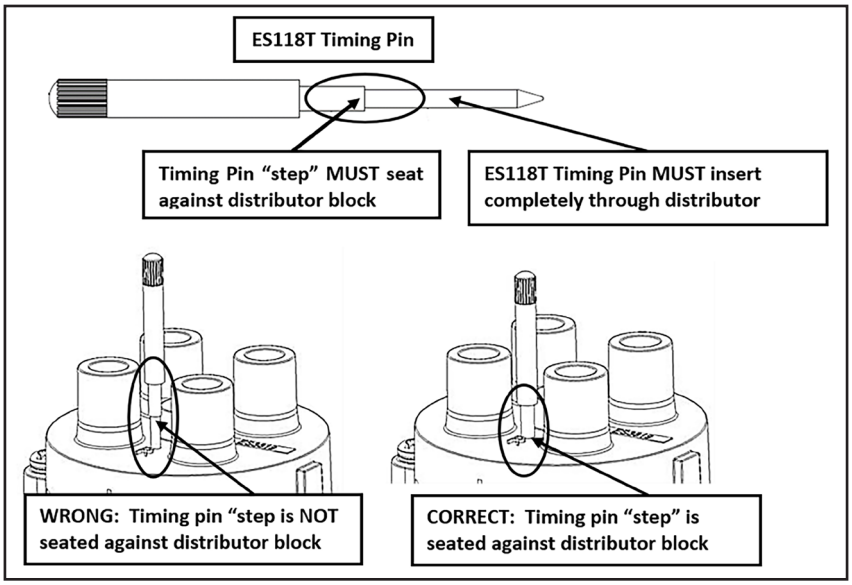



**Figure 6.23 – ES118T Timing Pin**

**CAUTION!**

THE DISTRIBUTOR GEAR HAS NUMEROUS FEATURES THAT MAY INTERFERE WITH THE SEATING OF THE ES118T TIMING PIN. AS THE ROTOR SHAFT IS TURNED TO ALIGN THE GEAR FOR TIMING, THE ES118T TIMING PIN WILL NEED TO BE LIFTED TO CLEAR THE DISTRIBUTOR ELECTRODE AND OTHER GEAR FEATURES. THE ES118T TIMING PIN CAN ONLY INSERT INTO THE DISTRIBUTOR TIMING HOLE THAT CORRESPONDS TO THE "L" OR "R" HOLE EMBOSSED ON THE DISTRIBUTOR BLOCK FACE. THE ES118T TIMING PIN IS INSERTED CORRECTLY WHEN THE FIRST STEP ON THE PIN IS SEATED AGAINST THE FACE OF THE DISTRIBUTOR GEAR.

G. With the ES118T Timing Pin inserted and seated into the distributor block assembly (27a), connect a magneto timing light tool to the capacitor (23) lead of the magneto. Ground the timing light tool to the frame (6) of the magneto.

H. The magneto rotor (7) shaft can be moved slightly within the range of the magneto gear lash. The internal timing of the magneto is confirmed to be correct if magneto timing light tool indicates that the contact assemblies (11) are opening and closing when the rotor shaft is gently moved with the ES118T Timing Pin correctly inserted into the distributor block and gear assembly (27).

**WARNING!**

REFER TO ENGINE MANUFACTURER INSTRUCTIONS FOR SPECIFIC MAGNETO TO ENGINE TIMING REQUIREMENTS. FAILURE TO FOLLOW ENGINE MANUFACTURER REQUIREMENTS CAN RESULT IN MAGNETO DAMAGE OR ENGINE DAMAGE AND WILL VOID MAGNETO WARRANTY.

I. Align the engine to the advance timing position on the compression stroke for the #1 cylinder.

J. With the ES118T Timing Pin correctly inserted, loosely install the magneto onto the engine with correct gasket clamps, nuts and lock washers. Assure the magneto is snug under the clamps, but is not tight. REMOVE THE PIN.

**WARNING!**

REMOVE THE TIMING PIN BEFORE THE MAGNETO OR ENGINE CRANKSHAFT IS TURNED AFTER THE MAGNETO IS INSTALLED ONTO THE ENGINE. ANY DAMAGE CAUSED BY FAILURE TO REMOVE TIMING PIN WILL VOID MAGNETO WARRANTY.

K. Synchronize the magneto to the engine in accordance with the engine manufacturer's specifications.

**NOTE:** Lamp logic is not consistent between timing light brands: Be mindful of the meaning of "light on" and "light off" relative to contacts open or contacts closed as described by the timing light manufacturer.

L. Secure the magneto to the engine by tightening the magneto gasket clamp nuts per the engine manufacturer's specifications.

M. Secure P-lead to capacitor. Torque nut IAW Table 6.2.

N. As applicable, attach airframe wire to secondary contact stud. Torque nut IAW Table 6.2.

### 6.22 Illustrated Parts List

A. Illustrated Parts Breakdown

(1) The following HET magneto assembly parts are available from authorized Hartzell Engine Tech Distributors: Item numbers marked with Δ, are required replacement parts any time they are removed from the magneto assembly.

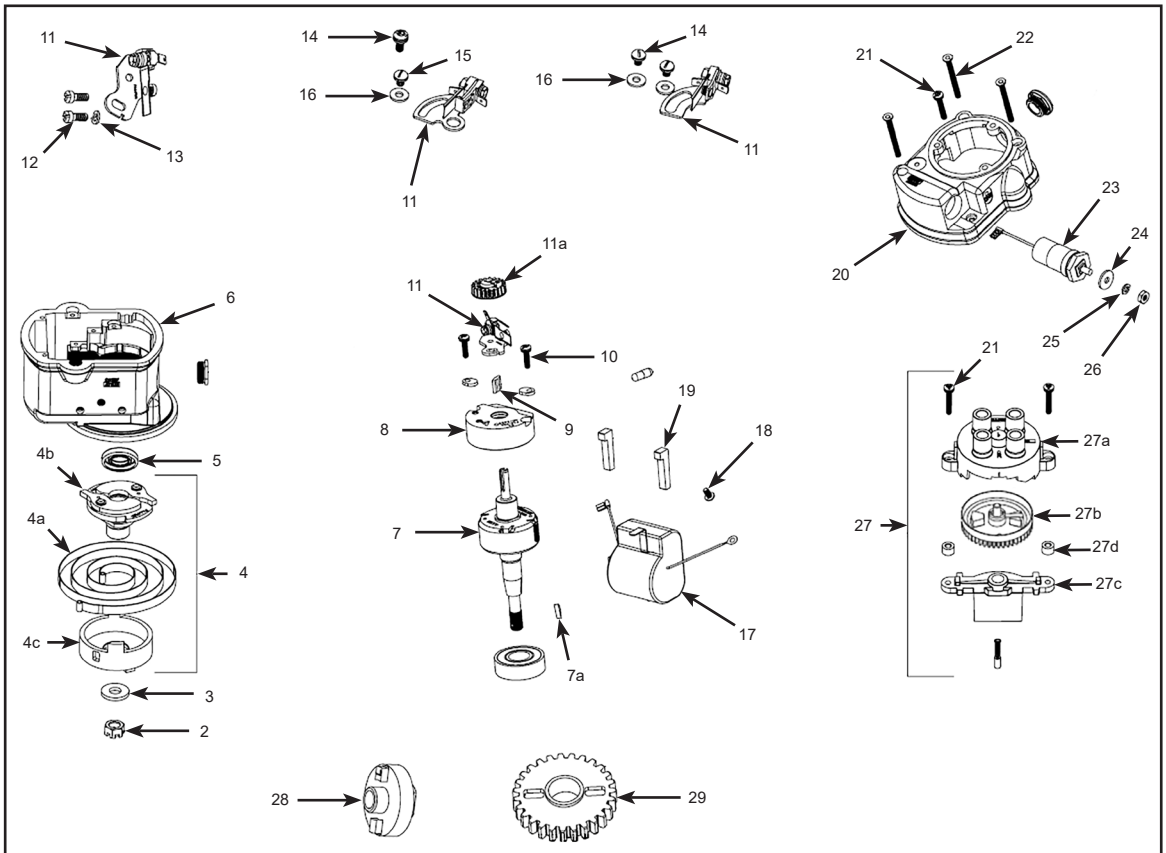
B. Annotations

(1) N/A - Not Applicable to this assembly number.

(2) A/R - As Required.

**NOTE**

Illustration for reference only -- may not resemble actual part. Use index and part number to select part required.




## Key to ES4300 Magneto

| | | | | | |
|---|---|---|---|---|---|
| 1 | Cotter Pin † Δ | 11a | Rotor Gear | 27 | Dist. Block & Gear Assy. |
| 2 | Nut | 12 | Screw Δ | 27a | Block Assy - 4 CYL |
| 3 | Washer | 13 | Washer Δ | 27b | Gear Assy. - 4 CYL |
| 4 | Impulse Coupling Assy. | 14 | Screw Δ | 27c | Bridge Assy. - 4 CYL |
| 4a | Impulse Spring Δ | 15 | Screw Δ | 27d | Spacer |
| 4b | Impulse Cam Assy. | 16 | Washer Δ | 28 | Drive Coupling |
| 4c | Impulse Body | 17 | Coil, Ignition | 29 | Drive Gear |
| 5 | Oil Seal | 18 | Screw Δ | 30 | Clamp Kit † |
| 6 | Frame | 19 | Coil Wedge | 31 | N/A |
| 6a | N/A | 20 | Housing | 32 | N/A |
| 7 | Rotor | 21 | Screw Δ | | |
| 7a | Woodruff Key | 22 | Screw Δ | | |
| 8 | Bearing Cap Assy. | 23 | Capacitor | | |
| 9 | Cam | 24 | Phenolic Washer | | |
| 10 | Screw Δ | 25 | Washer Δ | | |
| 11 | Contact Assembly | 26 | Nut | | |

†* Not shown
†† See § 6.4 for disassembly.

**NOTE**

If marked with Δ, replace with new whenever parts are removed.

**Figure 6.24 – ES4300 Magneto, Typical**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES4301 | ES4302 | ES4309 | ES4310 | ES4330 | ES4333 | ES4342 | ES4345 | ES4347 | ES4348 | ES4353 | ES4354 |
| 1 | AM-2556 | COTTER PIN * (not shown) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | ES3019 | NUT | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | ES3492 | NUT | | | | | | 1 | | | | | | |
| 3 | ES3172 | WASHER | 1 | 1 | | | 1 | N/A | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | ES5372 | WASHER | | | 1 | 1 | | N/A | | | | | | |
| 4 | ES3007 | IMPULSE COUPLING ASSY. ** | 1 | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4 | ES3068 | IMPULSE COUPLING ASSY. ** | | N/A | N/A | N/A | 1 | | N/A | N/A | N/A | N/A | N/A | |
| 4 | ES3100 | IMPULSE COUPLING ASSY. ** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4 | ES3163 | IMPULSE COUPLING ASSY. ** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4 | ES3529 | IMPULSE COUPLING ASSY. ** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | 1 |
| 4 | ES3689 | IMPULSE COUPLING ASSY. ** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4 | ES3994 | IMPULSE COUPLING ASSY. ** | | N/A | N/A | N/A | | 1 | N/A | N/A | N/A | N/A | N/A | |
| 4a | ES917 | IMPULSE SPRING ** | 1 | N/A | N/A | N/A | 1 | 1 | N/A | N/A | N/A | N/A | N/A | 1 |
| 4b | ES3007-1 | IMPULSE CAM ASSY.** | 1 | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4b | ES3068-1 | IMPULSE CAM ASSY.** | | N/A | N/A | N/A | 1 | | N/A | N/A | N/A | N/A | N/A | |
| 4b | ES3100-1 | IMPULSE CAM ASSY.** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4b | ES3163-1 | IMPULSE CAM ASSY.** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4b | ES3529-1 | IMPULSE CAM ASSY.** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | 1 |
| 4b | ES3689-1 | IMPULSE CAM ASSY.** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4b | ES3994-1 | IMPULSE CAM ASSY.** | | N/A | N/A | N/A | | 1 | N/A | N/A | N/A | N/A | N/A | |
| 4c | ES15013-29 | IMPULSE BODY** | 1 | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4c | ES15014-70 | IMPULSE BODY** | | N/A | N/A | N/A | 1 | | N/A | N/A | N/A | N/A | N/A | |
| 4c | ES15013-26 | IMPULSE BODY** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | 1 |
| 4c | ES15014-86 | IMPULSE BODY** | | N/A | N/A | N/A | | | N/A | N/A | N/A | N/A | N/A | |
| 4c | ES15010-87 | IMPULSE BODY** | | N/A | N/A | N/A | | 1 | N/A | N/A | N/A | N/A | N/A | |
| 5 | - | OIL SEAL | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 | - | FRAME | 1 | | | | | | | | | | | 1 |
| 6 | - | FRAME | | | | | 1 | | | | | | | |
| 6 | - | FRAME | | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | |
| 6 | - | FRAME | | | | | | 1 | | | | | | |
| 6a | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d

**Table 6.5 – Magneto Model ES4300 (Cont.)**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES4301 | ES4302 | ES4309 | ES4310 | ES4330 | ES4333 | ES4342 | ES4345 | ES4347 | ES4348 | ES4353 | ES4354 |
| 7 | - | ROTOR | 1 | | 1 | 1 | | | | | | | | |
| 7 | - | ROTOR | | | | | 1 | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | 1 |
| 7 | - | ROTOR | | 1 | | | | | | | | 1 | | |
| 7 | - | ROTOR | | | | | | | 1 | 1 | 1 | | 1 | |
| 7 | - | ROTOR | | | | | | 1 | | | | | | |
| 7a | - | WOODRUFF KEY | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | - | BEARING CAP ASSY. | 1 | 1 | 1 | | 1 | 1 | | | | | | |
| 8 | - | BEARING CAP ASSY. | | | | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 |
| 9 | AM3611 | CAM | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 | ES3221 | SCREW | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 11 | A-13081 | CONTACT ASSEMBLY | 1 | 1 | 1 | | 1 | 1 | | | | | | |
| 11 | ES3637 | CONTACT ASSEMBLY | | | | 2 | | | 1 | 2 | 2 | 2 | 2 | 2 |
| 11 | ES3740 | CONTACT ASSEMBLY | | | | | | | 1 | | | | | |
| 11a | ES3827 | ROTOR GEAR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 12 | A-13081-2 | SCREW | 2 | 2 | 2 | N/A | 2 | 2 | N/A | N/A | N/A | N/A | N/A | N/A |
| 13 | A-13081-1 | WASHER | 1 | 1 | 1 | N/A | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | ES3637-4 | SCREW | N/A | N/A | N/A | 3 | N/A | N/A | 3 | 3 | 3 | 3 | 3 | 3 |
| 15 | ES3637-5 | SCREW | N/A | N/A | N/A | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | ES3637-6 | WASHER | N/A | N/A | N/A | 2 | N/A | N/A | 2 | 2 | 2 | 2 | 2 | 2 |
| 17 | AK-3975 | COIL, IGNITION | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 18 | AM-3020 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 19 | ES3040 | COIL WEDGE | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 20 | - | HOUSING | | | | 1 | | | | 1 | 1 | 1 | 1 | 1 |
| 20 | - | HOUSING | | | | | | | 1 | | | | | |
| 20 | - | HOUSING | 1 | 1 | 1 | | 1 | 1 | | | | | | |
| 21 | AM-3021 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 22 | AM-3015 | SCREW | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 23 | AK-3984 | CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 24 | AM-3183-3 | PHENOLIC WASHER | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 25 | AM-3183-2 | WASHER, CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 26 | AM-3183-1 | NUT, CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27 | ES3822 | DIST. BLOCK & GEAR ASSY. *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27a | ES3819 | BLOCK ASSY. - 4 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d

**Table 6.5 – (Cont.) Magneto Model ES4300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES4301 | ES4302 | ES4309 | ES4310 | ES4330 | ES4333 | ES4342 | ES4345 | ES4347 | ES4348 | ES4353 | ES4354 |
| 27b | ES510406 | GEAR ASSY. - 4 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27c | ES510275-4 | BRIDGE ASSY. - 4 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27d | ES3826 | SPACER *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 28 | ES5265 | DRIVE COUPLING | N/A | N/A | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | ES3998 | DRIVE GEAR | N/A | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | ES3520 | CLAMP KIT * (not shown) | | | | | | 1 | | | | | | |
| 30 | ES3784 | CLAMP KIT * (not shown) | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 |
| 31 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d

**Table 6.5 – (Cont.) Magneto Model ES4300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES4370 | ES4371 | ES4372 | ES4373 | ES4374 | ES4381 | | | | | |
| 1 | AM-2556 | COTTER PIN * (not shown) | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 2 | ES3019 | NUT | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 2 | ES3492 | NUT | | | | | | | | | | | |
| 3 | ES3172 | WASHER | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 3 | ES5372 | WASHER | | | | | | | | | | | |
| 4 | ES3007 | IMPULSE COUPLING ASSY. ** | N/A | | | | | 1 | | | | | |
| 4 | ES3068 | IMPULSE COUPLING ASSY. ** | N/A | | | | | | | | | | |
| 4 | ES3100 | IMPULSE COUPLING ASSY. ** | N/A | | 1 | | | | | | | | |
| 4 | ES3163 | IMPULSE COUPLING ASSY. ** | N/A | 1 | | | | | | | | | |
| 4 | ES3529 | IMPULSE COUPLING ASSY. ** | N/A | | | 1 | | | | | | | |
| 4 | ES3689 | IMPULSE COUPLING ASSY. ** | N/A | | | | 1 | | | | | | |
| 4 | ES3994 | IMPULSE COUPLING ASSY. ** | N/A | | | | | | | | | | |
| 4a | ES917 | IMPULSE SPRING ** | N/A | 1 | 1 | 1 | 1 | 1 | | | | | |
| 4b | ES3007-1 | IMPULSE CAM ASSY.** | N/A | | | | | 1 | | | | | |
| 4b | ES3068-1 | IMPULSE CAM ASSY.** | N/A | | | | | | | | | | |
| 4b | ES3100-1 | IMPULSE CAM ASSY.** | N/A | | 1 | | | | | | | | |
| 4b | ES3163-1 | IMPULSE CAM ASSY.** | N/A | 1 | | | | | | | | | |
| 4b | ES3529-1 | IMPULSE CAM ASSY.** | N/A | | | 1 | | | | | | | |
| 4b | ES3689-1 | IMPULSE CAM ASSY.** | N/A | | | | 1 | | | | | | |
| 4b | ES3994-1 | IMPULSE CAM ASSY.** | N/A | | | | | | | | | | |
| 4c | ES15013-29 | IMPULSE BODY** | N/A | 1 | 1 | | | 1 | | | | | |
| 4c | ES15014-70 | IMPULSE BODY** | N/A | | | | | | | | | | |
| 4c | ES15013-26 | IMPULSE BODY** | N/A | | | 1 | | | | | | | |
| 4c | ES15014-86 | IMPULSE BODY** | N/A | | | | 1 | | | | | | |
| 4c | ES15010-87 | IMPULSE BODY** | N/A | | | | | | | | | | |
| 5 | - | OIL SEAL | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 6 | - | FRAME | | 1 | 1 | 1 | | 1 | | | | | |
| 6 | - | FRAME | | | | | 1 | | | | | | |
| 6 | - | FRAME | 1 | | | | | | | | | | |
| 6 | - | FRAME | | | | | | | | | | | |
| 6a | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d

**Table 6.5 – (Cont.) Magneto Model ES4300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES4370 | ES4371 | ES4372 | ES4373 | ES4374 | ES4381 | | | | | |
| 7 | - | ROTOR | | | | | 1 | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | |
| 7 | - | ROTOR | | 1 | 1 | 1 | | 1 | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | |
| 7 | - | ROTOR | 1 | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | |
| 7a | - | WOODRUFF KEY | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 8 | - | BEARING CAP ASSY. | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 8 | - | BEARING CAP ASSY. | | | | | | | | | | | |
| 9 | AM3611 | CAM | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 10 | ES3221 | SCREW | 2 | 2 | 2 | 2 | 2 | 2 | | | | | |
| 11 | A-13081 | CONTACT ASSEMBLY | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 11 | ES3637 | CONTACT ASSEMBLY | | | | | | | | | | | |
| 11 | ES3740 | CONTACT ASSEMBLY | | | | | | | | | | | |
| 11a | ES3827 | ROTOR GEAR | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 12 | A-13081-2 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 13 | A-13081-1 | WASHER | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 14 | ES3637-4 | SCREW | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |
| 15 | ES3637-5 | SCREW | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |
| 16 | ES3637-6 | WASHER | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |
| 17 | AK-3975 | COIL, IGNITION | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 18 | AM-3020 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 19 | ES3040 | COIL WEDGE | 2 | 2 | 2 | 2 | 2 | 2 | | | | | |
| 20 | - | HOUSING | | | | | | | | | | | |
| 20 | - | HOUSING | | | | | | | | | | | |
| 20 | - | HOUSING | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 21 | AM-3021 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 22 | AM-3015 | SCREW | 3 | 3 | 3 | 3 | 3 | 3 | | | | | |
| 23 | AK-3984 | CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 24 | AM-3183-3 | PHENOLIC WASHER | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 25 | AM-3183-2 | WASHER, CAPACITOR | 2 | 2 | 2 | 2 | 2 | 2 | | | | | |
| 26 | AM-3183-1 | NUT, CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 27 | ES3822 | DIST. BLOCK & GEAR ASSY. *** | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 27a | ES3819 | BLOCK ASSY. - 4 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |

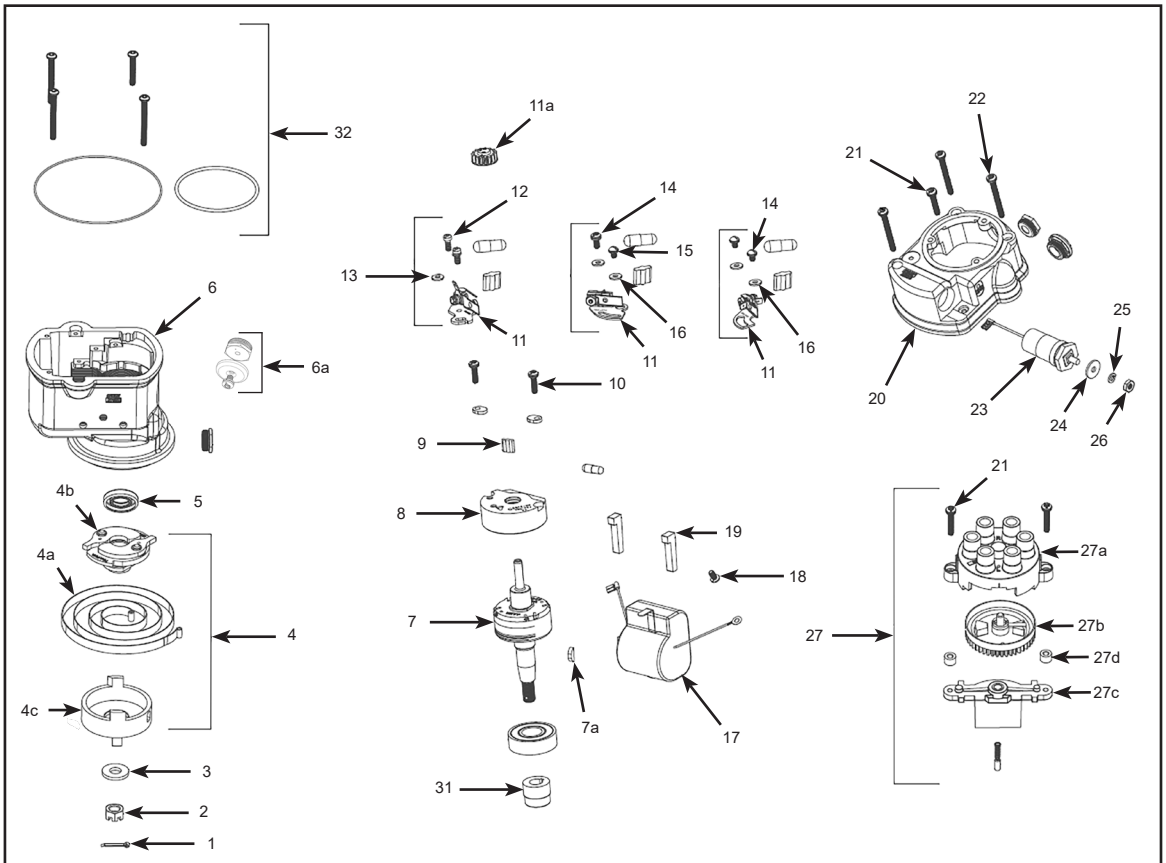
* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d

**Table 6.5 – (Cont.) Magneto Model ES4300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES4370 | ES4371 | ES4372 | ES4373 | ES4374 | ES4381 | | | | | |
| 27b | ES510406 | GEAR ASSY. - 4 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 27c | ES510275-4 | BRIDGE ASSY. - 4 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 27d | ES3826 | SPACER *** | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 28 | ES5265 | DRIVE COUPLING | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |
| 29 | ES3998 | DRIVE GEAR | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |
| 30 | ES3520 | CLAMP KIT * (not shown) | | | | | | | | | | | |
| 30 | ES3784 | CLAMP KIT * (not shown) | 1 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 31 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |
| 32 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | | | | |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d

**Table 6.5 – (Cont.) Magneto Model ES4300**




## Key to ES6300 Magneto

| | | | | | |
|---|---|---|---|---|---|
| 1 | Cotter Pin † Δ | 11a | Rotor Gear | 27 | Dist. Block & Gear Assy. |
| 2 | Nut | 12 | Screw Δ | 27a | Block Assy - 6 CYL |
| 3 | Washer | 13 | Washer Δ | 27b | Gear Assy. - 6 CYL |
| 4 | Impulse Coupling Assy. | 14 | Screw Δ | 27c | Bridge Assy. - 6 CYL |
| 4a | Impulse Spring Δ | 15 | Screw Δ | 27d | Spacer |
| 4b | Impulse Cam Assy. | 16 | Washer Δ | 28 | N/A |
| 4c | Impulse Body | 17 | Coil, Ignition | 29 | N/A |
| 5 | Oil Seal | 18 | Screw Δ | 30 | Clamp Kit † |
| 6 | Frame | 19 | Coil Wedge | 31 | Bushing |
| 6a | Vent Assembly Δ | 20 | Housing | 32 | Gasket Pressure Kit Δ |
| 7 | Rotor | 21 | Screw Δ | | |
| 7a | Woodruff Key | 22 | Screw Δ | | |
| 8 | Bearing Cap Assy. | 23 | Capacitor | | †* Not shown |
| 9 | Cam | 24 | Phenolic Washer | | †† See § 6.4 for disassembly. |
| 10 | Screw Δ | 25 | Washer Δ | | |
| 11 | Contact Assembly | 26 | Nut | | |

**Figure 6.25 – ES6300 Magneto, Typical**

**NOTE**

Illustration for reference only -- may not resemble actual part. Use index and part number to select part required.

**NOTE**

If marked with Δ, replace with new whenever parts are removed.

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES6309 | ES6310 | ES6313 | ES6314 | ES6320 | ES6324 | ES6340 | ES6350 | ES6351 | ES6355 | ES6360 | ES6361 | ES6362 |
| 1 | AM-2556 | COTTER PIN * | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | ES3019 | NUT | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | ES3172 | WASHER | 1 | 1 | 1 | | 1 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| 3 | ES5372 | WASHER | | | | 1 | | | N/A | N/A | N/A | N/A | N/A | N/A | |
| 4 | ES3050 | IMPULSE COUPLING ASSY.** | N/A | 1 | N/A | | 1 | | N/A | N/A | | | N/A | | 1 |
| 4 | ES3089 | IMPULSE COUPLING ASSY.** | N/A | | N/A | 1 | | 1 | N/A | N/A | | | N/A | | |
| 4 | ES3333 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | | | N/A | N/A | 1 | | N/A | 1 | |
| 4 | ES3524 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4 | ES3590 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4 | ES5014 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4 | ES5020 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4 | ES3635 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | | | N/A | N/A | | 1 | N/A | | |
| 4a | ES917 | IMPULSE SPRING** | N/A | 1 | N/A | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A | 1 | 1 |
| 4b | ES3050-1 | IMPULSE CAM ASSY.** | N/A | 1 | N/A | | 1 | | N/A | N/A | | | N/A | | 1 |
| 4b | ES3089-1 | IMPULSE CAM ASSY.** | N/A | | N/A | 1 | | 1 | N/A | N/A | | | N/A | | |
| 4b | ES3333-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | | | N/A | N/A | 1 | | N/A | 1 | |
| 4b | ES3524-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4b | ES3590-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4b | ES5014-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4b | ES5020-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4b | ES3635-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | | | N/A | N/A | | 1 | N/A | | |
| 4c | ES15004-53 | IMPULSE BODY** | N/A | 1 | N/A | | 1 | | N/A | N/A | | | N/A | | 1 |
| 4c | ES15003-92 | IMPULSE BODY** | N/A | | N/A | 1 | | 1 | N/A | N/A | | | N/A | | |
| 4c | ES15003-34 | IMPULSE BODY** | N/A | | N/A | | | | N/A | N/A | 1 | | N/A | 1 | |
| 4c | ES15010-23 | IMPULSE BODY** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4c | ES15009-38 | IMPULSE BODY** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4c | ES15063-11 | IMPULSE BODY** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4c | ES15063-17 | IMPULSE BODY** | N/A | | N/A | | | | N/A | N/A | | | N/A | | |
| 4c | ES15003-85 | IMPULSE BODY** | N/A | | N/A | | | | N/A | N/A | | 1 | N/A | | |
| 5 | - | OIL SEAL | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 5 | - | OIL SEAL | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d
♦ Screw ES3084-3 in the Vent Assembly ITM# 6a is a 100% replacement part at disassembly

**Table 6.6 – Magneto Model ES6300 (Cont.)**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES6309 | ES6310 | ES6313 | ES6314 | ES6320 | ES6324 | ES6340 | ES6350 | ES6351 | ES6355 | ES6360 | ES6361 | ES6362 |
| 6 | - | FRAME | | 1 | | | 1 | | | | | | | | 1 |
| 6 | - | FRAME | | | | 1 | | 1 | | | | | | | |
| 6 | - | FRAME | | | | | | | | | | | | | |
| 6 | - | FRAME | | | | | | | | | | | | | |
| 6 | - | FRAME | | | | | | | | | | | | | |
| 6 | - | FRAME | | | | | | | | | 1 | 1 | | 1 | |
| 6 | - | FRAME | | | | | | | 1 | 1 | | | 1 | | |
| 6 | - | FRAME | 1 | | 1 | | | | | | | | | | |
| 6a | ES3179 | VENT ASSEMBLY ♦ | N/A | N/A | N/A | N/A | 1 | 1 | 1 | N/A | N/A | N/A | 1 | 1 | N/A |
| 7 | - | ROTOR | | 1 | | | 1 | | | | | | | | 1 |
| 7 | - | ROTOR | | | | 1 | | 1 | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | 1 | | | 1 | |
| 7 | - | ROTOR | | | | | | | | | | 1 | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | 1 | | 1 | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | 1 | | | 1 | | |
| 7 | - | ROTOR | | | | | | | 1 | | | | | | |
| 7a | - | WOODRUFF KEY | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | - | BEARING CAP ASSY. | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | - | BEARING CAP ASSY. | 1 | | | | | | | | | | | | |
| 9 | AM3611 | CAM | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 | ES3221 | SCREW | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 11 | A-13081 | CONTACT ASSEMBLY | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 11 | ES3637 | CONTACT ASSEMBLY | 2 | | | | | | | | | | | | |
| 11 | ES3740 | CONTACT ASSEMBLY | | | | | | | | | | | | | |
| 11a | ES3828 | ROTOR GEAR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 12 | A-13081-2 | SCREW | N/A | 1 | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A |
| 13 | A-13081-1 | WASHER | N/A | 2 | N/A | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | N/A |
| 14 | ES3637-4 | SCREW | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | ES3637-5 | SCREW | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | ES3637-6 | WASHER | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d
♦ Screw ES3084-3 in the Vent Assembly ITM# 6a is a 100% replacement part at disassembly

**Table 6.6 – (Cont.) Magneto Model ES6300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES6309 | ES6310 | ES6313 | ES6314 | ES6320 | ES6324 | ES6340 | ES6350 | ES6351 | ES6355 | ES6360 | ES6361 | ES6362 |
| 17 | AK-3975 | COIL, IGNITION | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 18 | AM-3020 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 19 | ES3040 | COIL WEDGE | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 20 | - | HOUSING | 1 | | | | | | | | | | | | |
| 20 | - | HOUSING | | | | | | | | | | | | | |
| 20 | - | HOUSING | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 21 | AM-3021 | SCREW | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 22 | AM-3015 | SCREW | 3 | 3 | 3 | 3 | N/A | N/A | N/A | 3 | 3 | 3 | N/A | N/A | 3 |
| 23 | AK-3984 | CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 24 | AM-3183-3 | PHENOLIC WASHER | N/A | 1 | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A |
| 25 | AM-3183-2 | WASHER, CAPACITOR | N/A | 1 | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A |
| 26 | AM-3183-1 | NUT, CAPACITOR | N/A | 1 | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A |
| 27 | ES3823 | DIST. BLOCK & GEAR ASSY. *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27a | ES3820 | BLOCK ASSY. - 6 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27b | ES510404 | GEAR ASSY. - 6 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27c | ES510275-6 | BRIDGE ASSY. - 6 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27d | ES3826 | SPACER *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 28 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | ES3328 | CLAMP KIT * (not shown) | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | 1 |
| 30 | ES3520 | CLAMP KIT * (not shown) | | | | | | | | | | | | | |
| 30 | ES3784 | CLAMP KIT * (not shown) | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | |
| 31 | ES3343 | BUSHING | N/A | N/A | N/A | N/A | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | N/A |
| 32 | ES3007 | GASKET PRESSURE KIT | N/A | N/A | N/A | N/A | 1 | 1 | 1 | N/A | N/A | N/A | 1 | 1 | N/A |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d
♦ Screw ES3084-3 in the Vent Assembly ITM# 6a is a 100% replacement part at disassembly

**Table 6.6 – (Cont.) Magneto Model ES6300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES6363 | ES6364 | ES6365 | ES6367 | ES6371 | ES6377 | ES6379 | ES6380 | ES6382 | ES6390 | ES6391 | ES6393 | ES6394 |
| 1 | AM-2556 | COTTER PIN * | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | ES3019 | NUT | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | ES3172 | WASHER | N/A | N/A | N/A | N/A | N/A | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A |
| 3 | ES5372 | WASHER | | | | | | | | | | | | | |
| 4 | ES3050 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | N/A | | | 1 | 1 | N/A | N/A | N/A | N/A |
| 4 | ES3089 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4 | ES3333 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4 | ES3524 | IMPULSE COUPLING ASSY.** | N/A | | N/A | 1 | N/A | | | | | N/A | N/A | N/A | N/A |
| 4 | ES3590 | IMPULSE COUPLING ASSY.** | N/A | 1 | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4 | ES3635 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4 | ES5014 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | N/A | 1 | | | | N/A | N/A | N/A | N/A |
| 4 | ES5020 | IMPULSE COUPLING ASSY.** | N/A | | N/A | | N/A | | 1 | | | N/A | N/A | N/A | N/A |
| 4a | ES917 | IMPULSE SPRING** | N/A | 1 | N/A | 1 | N/A | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A |
| 4b | ES3050-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | N/A | | | 1 | 1 | N/A | N/A | N/A | N/A |
| 4b | ES3089-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4b | ES3333-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4b | ES3524-1 | IMPULSE CAM ASSY.** | N/A | | N/A | 1 | N/A | | | | | N/A | N/A | N/A | N/A |
| 4b | ES3590-1 | IMPULSE CAM ASSY.** | N/A | 1 | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4b | ES5014-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | N/A | 1 | | | | N/A | N/A | N/A | N/A |
| 4b | ES5020-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | N/A | | 1 | | | N/A | N/A | N/A | N/A |
| 4b | ES3635-1 | IMPULSE CAM ASSY.** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4c | ES15004-53 | IMPULSE BODY** | N/A | | N/A | | N/A | | | 1 | 1 | N/A | N/A | N/A | N/A |
| 4c | ES15003-92 | IMPULSE BODY** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4c | ES15003-34 | IMPULSE BODY** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4c | ES15010-23 | IMPULSE BODY** | N/A | | N/A | 1 | N/A | | | | | N/A | N/A | N/A | N/A |
| 4c | ES15009-38 | IMPULSE BODY** | N/A | 1 | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 4c | ES15063-11 | IMPULSE BODY** | N/A | | N/A | | N/A | 1 | | | | N/A | N/A | N/A | N/A |
| 4c | ES15063-17 | IMPULSE BODY** | N/A | | N/A | | N/A | | 1 | | | N/A | N/A | N/A | N/A |
| 4c | ES15003-85 | IMPULSE BODY** | N/A | | N/A | | N/A | | | | | N/A | N/A | N/A | N/A |
| 5 | - | OIL SEAL | | 1 | | 1 | | 1 | 1 | 1 | 1 | | | | |
| 5 | - | OIL SEAL | 1 | | 1 | | 1 | | | | | 1 | 1 | 1 | 1 |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d
♦ Screw ES3084-3 in the Vent Assembly ITM# 6a is a 100% replacement part at disassembly

**Table 6.6 – (Cont.) Magneto Model ES6300**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES6363 | ES6364 | ES6365 | ES6367 | ES6371 | ES6377 | ES6379 | ES6380 | ES6382 | ES6390 | ES6391 | ES6393 | ES6394 |
| 6 | - | FRAME | | | | | | | | | | | | | |
| 6 | - | FRAME | | | | | | | | | | | | | |
| 6 | - | FRAME | | | | | | | | 1 | 1 | | | | |
| 6 | - | FRAME | | 1 | | | | | | | | | | | |
| 6 | - | FRAME | | | | 1 | | | | | | | | | |
| 6 | - | FRAME | | | | | | 1 | 1 | | | | | | |
| 6 | - | FRAME | 1 | | 1 | | 1 | | | | | 1 | 1 | 1 | 1 |
| 6 | - | FRAME | | | | | | | | | | | | | |
| 6a | ES3179 | VENT ASSEMBLY ♦ | 1 | N/A | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A | 1 |
| 7 | - | ROTOR | | | | | | | | 1 | 1 | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | | 1 | | | | | | | | | | | |
| 7 | - | ROTOR | | | | 1 | | | | | | | | | |
| 7 | - | ROTOR | | | | | | | | | | | | | |
| 7 | - | ROTOR | | | | | | 1 | 1 | | | | | | |
| 7 | - | ROTOR | 1 | | 1 | | 1 | | | | | 1 | | 1 | |
| 7 | - | ROTOR | | | | | | | | | | | 1 | | 1 |
| 7a | - | WOODRUFF KEY | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | - | BEARING CAP ASSY. | | 1 | | 1 | | 1 | 1 | 1 | 1 | | | | |
| 8 | - | BEARING CAP ASSY. | 1 | | 1 | | 1 | | | | | 1 | 1 | 1 | 1 |
| 9 | AM3611 | CAM | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 | ES3221 | SCREW | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 11 | A-13081 | CONTACT ASSEMBLY | | 1 | | 1 | | 1 | 1 | 1 | 1 | | | | |
| 11 | ES3637 | CONTACT ASSEMBLY | 2 | | 2 | | 2 | | | | | | 2 | 2 | 2 |
| 11 | ES3740 | CONTACT ASSEMBLY | | | | | | | | | | 1 | | | |
| 11a | ES3828 | ROTOR GEAR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 12 | A-13081-2 | SCREW | N/A | 2 | N/A | 2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 13 | A-13081-1 | WASHER | N/A | 1 | N/A | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | ES3637-4 | SCREW | 1 | N/A | 1 | N/A | 1 | N/A | N/A | N/A | N/A | N/A | 1 | 1 | 1 |
| 15 | ES3637-5 | SCREW | 1 | N/A | 1 | N/A | 1 | N/A | N/A | N/A | N/A | N/A | 1 | 1 | 1 |
| 16 | ES3637-6 | WASHER | 1 | N/A | 1 | N/A | 1 | N/A | N/A | N/A | N/A | N/A | 1 | 1 | 1 |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d
♦ Screw ES3084-3 in the Vent Assembly ITM# 6a is a 100% replacement part at disassembly

**Table 6.6 – Magneto Model ES6300 (Cont.)**

| Index Number | ITEM P/N | Description | Magneto Part Number | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ES6363 | ES6364 | ES6365 | ES6367 | ES6371 | ES6377 | ES6379 | ES6380 | ES6382 | ES6390 | ES6391 | ES6393 | ES6394 |
| 17 | AK-3975 | COIL, IGNITION | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 18 | AM-3020 | SCREW | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 19 | ES3040 | COIL WEDGE | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 20 | - | HOUSING | 1 | | 1 | | 1 | | | | | | 1 | 1 | 1 |
| 20 | - | HOUSING | | | | | | | | | | 1 | | | |
| 20 | - | HOUSING | | 1 | | 1 | | 1 | 1 | 1 | 1 | | | | |
| 21 | AM-3021 | SCREW | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 22 | AM-3015 | SCREW | N/A | 3 | N/A | 3 | 3 | 3 | 3 | 3 | 3 | 3 | N/A | 3 | N/A |
| 23 | AK-3984 | CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 24 | AM-3183-3 | PHENOLIC WASHER | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | 1 | 1 | 1 |
| 25 | AM-3183-2 | WASHER, CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | 1 | 1 | 1 |
| 26 | AM-3183-1 | NUT, CAPACITOR | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | N/A | N/A | 1 | 1 | 1 |
| 27 | ES3823 | DIST. BLOCK & GEAR ASSY.*** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27a | ES3820 | BLOCK ASSY. - 6 CYL *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27b | ES510404 | GEAR ASSY. - 6 CYL*** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27c | ES510275-6 | BRIDGE ASSY. - 6 CYL*** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 27d | ES3826 | SPACER *** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 28 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | ES3328 | CLAMP KIT * (not shown) | | | | | | | | 1 | 1 | | | | |
| 30 | ES3520 | CLAMP KIT * (not shown) | | 1 | | 1 | | | | | | | | | |
| 30 | ES3784 | CLAMP KIT * (not shown) | 1 | | 1 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 |
| 31 | ES3343 | BUSHING | 1 | N/A | 1 | N/A | 1 | N/A | N/A | N/A | N/A | 1 | N/A | 1 | 1 |
| 32 | ES3007 | GASKET PRESSURE KIT | 1 | N/A | 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A | 1 |

* Use Cotter pin ITM# 1 with Clamp Kit ITM# 30
** Use Impulse Coupling Assy. ITM# 4 with Impulse Spring ITM# 4a, Impulse Cam Assy. ITM# 4b, and Impulse Body ITM# 4c
*** Use Dist. Block & Gear Assy. ITM# 27 with Block Assy ITM# 27a, Gear Assy. ITM# 27b, Bridge Assy. ITM# 27c, and Spacer ITM# 27d
♦ Screw ES3084-3 in the Vent Assembly ITM# 6a is a 100% replacement part at disassembly

**Table 6.6 – (Cont.) Magneto Model ES6300**

### 6.23 Storage and Shelf Life

A. Recommended Storage

When storing a new magneto, there are two categories to consider, short term storage or a long term storage on or off the aircraft. Short term storage will be considered as storage up to but not exceeding thirty-six (36) calendar months. Long term storage picks up at thirty-six (36) calendar months but does not exceed twelve (12) calendar years. There is no special environment required except the storage space should be clean and covered.

Short term, if on the shelf, requires only that the unit be kept in it original packaging. If the unit is being stored on the aircraft, follow the engine manufacturer's procedures relating to storage.

Long term, if on the shelf, requires that the magneto be removed from the packaging and examined on an annual basis. Remove from the plastic bag as originally packaged and discard the bag as long term use may allow condensation in bag. (If bag contains a desiccant and color does not indicate moisture, unit may be kept in original bag.) If removed from bag, wipe or lightly spray outside with preservative oil and wrap tightly with corrosion inhibiting VCI paper. Place back into original shipping container.

B. Shelf Life

All magnetos have a shelf life of up to, but not to exceed twelve (12) calendar years at which time the unit must be replaced. This statement does not express or imply any warranty.