AIRCRAFT ALTERNATOR MAINTENANCE MANUAL

P/N PP2003

ALTERNATOR MODELS:

C14-100	**C28-150**
C14-100S	**C28-150S**
15-2000-6	**15-2000-7**

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

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

Should you have a question regarding your alternator that is not covered in the manual, Hartzell Engine Technologies 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/

WARNING:

People who fly should recognize that there are various types of risks are involved in this activity; and they should take all precautions to minimize them, since they cannot be eliminated entirely. The alternator is an important component of the aircraft. An alternator failure could result in an unplanned landing or even more severe consequences creating an unsafe condition that may result in death, serious bodily injury, and/or substantial property damage. It is, therefore, essential that the alternator is properly maintained according to the recommended service procedures and monitored to detect impending problems before they become serious. Any unusual operation should be investigated and corrected, as it may be a warning of impending failure.

THIS PAGE INTENTIONALLY LEFT BLANK

RECORD OF REVISIONS

Revision Level	Issue Date	Page(s) Revised	Description
NEW	10/24/2022	ALL	Approved via PCO-111343

AIRWORTHINESS LIMITATIONS

A.1 General Information

CAUTION:

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 THESE LIMITATIONS ARE THE MINIMUM REQUIRED TO MEET CONTINUED AIRWORTHINESS BUT MAY BE SUPERSEDED BY MORE STRINGENT REQUIREMENTS AS PUBLISHED BY THE FAA, AIRCRAFT, ROTORCRAFT OR OTHER MANUFACTURERS THAT USE THESE COMPONENTS IN THEIR APPLICATIONS.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

A.2 Airworthiness Limitations Statement

A. The Airworthiness Limitations section is FAA approved 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

A.3 Life Limits

A. The FAA establishes specific life limits for certain component parts as well as the complete alternator. 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 alternator components will be noted in the Airworthiness Limitation Revision Log.

C. Life Limits

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

(2) There are no new (or additional) Airworthiness Limitation associated with this equipment.

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 Technologies 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 Technologies 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 Technologies LLC alternators.

No liability will be assumed by Hartzell Engine Technologies 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 alternator 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. (http://www.hartzell.aero/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 Technologies LLC, 2900 Selma Highway, Montgomery, Alabama, 36108 USA. TEL +1.334.386.5400, FAX +1.334.386.5410, or http://hartzell.aero/contact/.

1.2 General Specification (manual)

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

B. The C14-100, C14-100S, C28-150, and C28-150S, 15-2000-6, and 15-2000-7 alternator models are considered herein.

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

1.3 How to use the manual

A. Make sure the manual contains information applicable to your aircraft, engine, or replacement alternator. 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 alternator.

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

E. Refer to the troubleshooting section to assure that the observed or reported condition lies with the alternator.

F. Fully test the alternator 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 alternators considered herein. Other sections will contain information specific to a particular alternator model or variation of a model.

1.4 Measurements

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

1.5 Units of Measure

A. SI Units

A	Ampere
A · h	Ampere hours
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
ºF	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
ALT	Alternator
ATA	Air Transport Association of America
DE	Drive End (housing)
DIA	Diameter
FAA	Federal Aviation Administration (USA)
FIG.	Figure
GAMA	General Aviation Manufacturers Association
ID	Inside Diameter
HET	Hartzell Engine Technologies LLC
MAX	Maximum
MFR	Manufacturer
MIN	Minimum
NO.	Number
N/A	Not Applicable
OD	Outside Diameter
PCB	Printed Circuit Board
P/N	Part Number
PARA.	Paragraph
POH	Pilots Operating Handbook
REF.	Refer To
S/A	Subassembly
S/N	Serial Number
SRE	Slip Ring End (housing)

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)

ALTERNATOR: The complete unit which transforms rotational energy from a powerplant into electrical energy . At a given voltage, produces alternating current (AC) which is converted to direct current (DC).

BRUSH: Device for conducting current to the slip rings of the rotor. It is a composite carbon block which includes a spring, lead and contact.

BRUSH HOLDER: Device that retains multiple brush assemblies and is comprised of a holder, contacts, and terminals.

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

COOLING COVER: Device attached to the alternator to provide cooling air from an external source. May be provided with alternator or required by the airframe manufacturer. (Also known as the “Blast Tube”, referring to ram air cooling source.)

EMI: Electro Magnetic Interference. A disturbance in the radio-frequency spectrum that is generated by an external source that affects electrical devices or circuits by electromagnetic induction, electrostatic coupling, or conduction.

FRONT HOUSING: Part of the external housing which contains the components of the alternator. This end has structure typically used for mounting. It may also be referred to as the Drive End Housing or D.E.

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

REAR HOUSING: Part of the external housing which contains the components of the alternator. It may also be referred to as the Slip Ring End or S.R.E.

RECTIFIER: An electrical circuit used to convert AC into DC current. The rectifier is an arrangement of diodes that causes the current to flow in only one direction.

RFI: Radio Frequency Interference. Electromagnetic energy in the radio-frequency spectrum. Electrical interference may be created by poor slip ring/brush connection, defective rectifiers, or other poor connections. This is a normal by-product of electrical generators.

ROTOR: Rotating electro magnet used to create a magnetic field. SLIP RING: Device which provides a sliding contact surface for the brush assemblies. The slip rings are smooth surface copper “rings” pressed onto the rotor shaft.

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.

STATOR: A stationary set of conductors wound in coils on an iron core.

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

THROUGH BOLT: Special bolts which connect front and rear alternator housings.

1.8 Disposal

A. The alternator assembly is designed to allow for re-use of many alternator subassemblies and components. Disposal of unairworthy parts and assemblies as well as required replacement parts should be as follows: Rejected parts should be tagged and scrapped per FAA requirements. Any part deemed unairworthy must be rendered unusable prior to discard. Rectifiers and PCB components may be considered hazardous waste and should be discarded whole through your local hazardous waste management system.

1.9 Model Identification

C14-100 Gear Driven (12 Volt)

C14-100S Gear Driven (12 Volt)

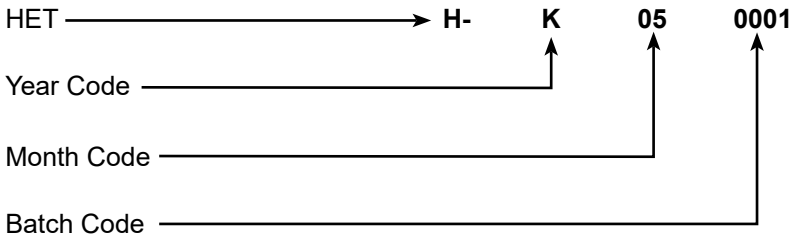
C28-150 Gear Driven (24 Volt)

C28-150S Gear Driven (24 Volt)

15-2000-6 Gear Driven (24 Volt)

15-2000-7 Gear Driven (24 Volt)

1.10 Serial number Identification



Example above: 2010, 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 Technologies LLC (HET) offers a Limited warranty with each new, overhauled, or rebuilt Alternator assembly or component (parts) it sells through it's distribution system. **NO expressed or implied warranty exists** when repairing, overhauling, or rebuilding any assembly or component using this manual except as it may apply to any new HET replacement part purchased. If you suspect that any warranty applies to the Alternator assembly, it must be returned through an authorized HET distributor in a manner prescribed by that specific distributor. The affected Alternator must be received by the factory fully assembled and not altered in any way for disposition by the HET warranty department. (**Warranty shall be denied for any alternator received altered, modified, or disassembled.**)

B. The HET Limited warranty policy in affect for your Alternator was delivered with the unit at the time of purchase. (As the Warranty policy is revised from time to time, you must check the policy delivered with your unit for specific terms and conditions should a warranty condition occur. If needed for reference, obtain the most current policy from the authorized HET distributor nearest you -or- visit our website at www.hartzell.aero.

CHAPTER 2 - DESCRIPTION OF OPERATION

2.1 Description

A. General

(1) Hartzell Engine Technologies (HET) small frame, gear and belt driven alternators have been designed and constructed to provide extended periods of trouble-free operation with a minimum amount of maintenance. They are intended to withstand the vibration and extreme temperature changes encountered in aircraft applications. Basic features are identified in Fig. 2.1 thru 2.3 below.

B. Operational Data

Gear Driven:	-
Air Cooled:	-
Rotation:	Bi-directional - Optimal performance when clock-wise viewed from the drive end
Max Continuous operating speed:	10,000 RM
12V Operating Speed: C14-100(S):	1,200 RPM MIN
12V Operating Output (Rated): C14-100(S):	14.3 volts, 100 amps
24V Operating Speed: C28-150(S), 15-2000-6, 15-2000-7:	2,000 RPM MIN
24V Operating Output (Rated): C28-150(S):	28.4 volts, 150 amps
Weight:	13.0 lbs
Max Rated Altitude:	30,000 ft

C. Dimensions

(1) The basic alternator dimensions are shown in Fig. 2.2 and 2.3.

2.2 Basic Component Description

A. The principle components of the aircraft alternators described herein are the slip ring end housing assembly with bearing, the rectifier assembly, the stator, the rotor, the drive end housing assembly with bearing, and the brush holder assembly with spring and brushes.

B. A simplified electrical diagram is shown in Fig. 2.1 which shows the basic electrical operating points and connections.

2.3 Technical Purpose

A. The purpose of the alternator is to produce electrical energy. This energy is used to maintain the proper state of charge in the battery and supply current to the electrically powered equipment and accessories in the aircraft. It performs this function by converting mechanical energy derived from its rotating parts into electricity.

(1) The BATTERY is the source of electrical power whenever the BAT Master Switch is ON and is the source of power for starting the aircraft. Once started, the ALTERNATOR becomes the electrical power source whenever the engine is running and the ALT Switch is turned ON. (Control systems may vary with the aircraft/rotorcraft.)

2.4 Physical Detail

A. The brush holder assembly consists of a brush holder housing and two brush assemblies. The brush assemblies are made from a carbon-graphite brush having a flexible braided copper wire lead fitted to a coil spring. Each brush is electrically connected to a separate terminal pin in the field connector housing of the brush assembly. The brush holder assembly is mounted in a position and manner that allows one brush to ride on each ring providing for a continuous sliding electrical connection while the rotor spins.

B. The rotor assembly is composed of a shaft, two pole-shoes, a coil assembly and a slip ring assembly. The coil assembly is a simple enameled-wire coil wound on a bobbin form. The coil is fitted between two iron pole-shoes which serve as magnetic flux guides. The rotor shaft is pressed through the pole-shoes forming a heavy interference fit making a permanent assembly fixing the poles in place on the shaft. The slip ring assembly is composed of two copper rings mounted on a non-metallic, insulating hub. The hub is fixed to the rotor shaft with one ring electrically connected to each end of the coil assembly winding.

C. The stator assembly is formed by winding six separate coils of enameled copper wire on a common laminated iron core. The coils are symmetrically spaced around the core and overlap one another. Slot insulators are used to protect the windings from abrasion damage due to contact with the core. One end of each coil is electrically connected to the bridge rectifier network. The other end of each coil is connected to the other end of two of the separate coils.

D. The auxiliary terminal is electrically isolated from but mechanically mounted to the rectifier heat sink and SRE housing. It is electrically connected to one end of one stator winding and provides an electrical voltage signal that varies with frequency changing directly with speed.

E. A full-wave bridge rectifier is formed from discrete positive and negative diodes mounted within the alternator. The positive diodes are installed in a crescent-shaped aluminum heat sink. The mechanical connection between the diode casings and the heat sink forms the positive electrical connection for the bridge leaving the heat-sink electrically energized. As such, the heat sink is mounted in a manner that keeps it electrically isolated from the alternator housings. The alternator's battery terminal (B+) is mechanically and electrically connected to the heat sink. The negative diodes are installed in a crescent-shaped aluminum heat sink mechanically connected to the SRE housing. The mechanical connection between the diode casings and the housing forms the ground electrical connection for the bridge. The alternator's ground terminal is mechanically and electrically connected to the SRE housing.

F. The rotor assembly is supported by bearings at either end allowing the rotor to spin freely. The bearings are mounted in the DE and SRE housings. The stator assembly is so arranged within the DE and SRE housings as to align concentrically with the rotor assembly. The laminated iron core of the stator assembly surrounds the pole-shoes of the rotor assembly. The slip rings align with the brushes so as to allow one brush to contact one ring.

G. The brush holder and terminal assembly contains an electrical filter to minimize EMI and RFI noise. The filter is a conventional thin film capacitor.

2.5 Theory of Operation

A. Power to drive the alternator is derived from the aircraft powerplant by means of a belt for belt-driven type alternators and by means of a gear for direct-driven type alternators. Torque in transmitted though the drive to the alternator rotor shaft resulting in rotor rotation.

B. During operation, the F1 terminal is electrically excited by an external voltage regulator. The F2 terminal is either electrically connected to the SRE housing (ground) internal to the alternator, externally at the alternator, or remotely by means of the aircraft electrical system. As current flows through the rotor coil a magnetic field is created with lines of flux being concentrated between the pole-shoe fingers. As the rotor turns these lines of flux are swept over the stationary stator coil windings inducing an alternating current flow within them. This three-phase alternating current is conducted to the bridge rectifier circuit which converts the alternating current to direct current. This rectified, DC current is made available to external loads via the +B terminal.

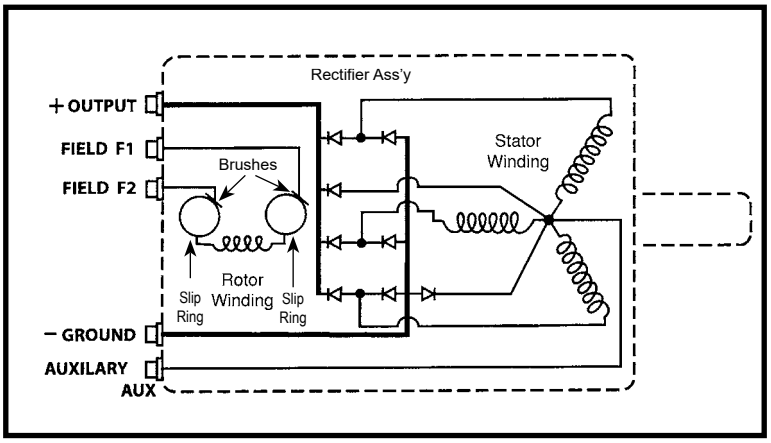


Figure 2.1 - Basic Electrical Diagram

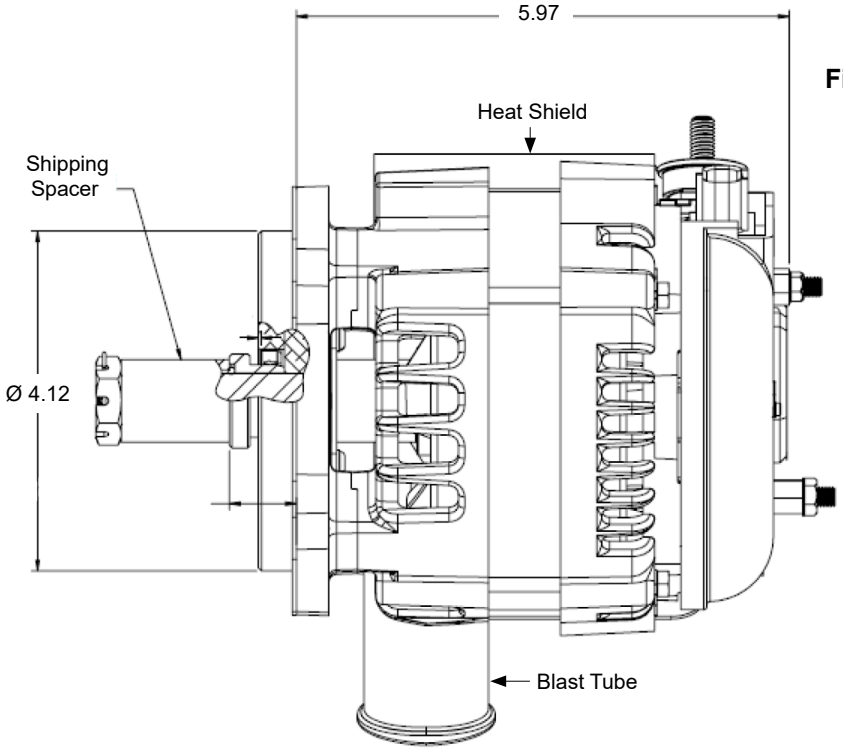


Figure 2.2 - C28-150(S) C14-100(S) Dimensions
C14-100 Shown *

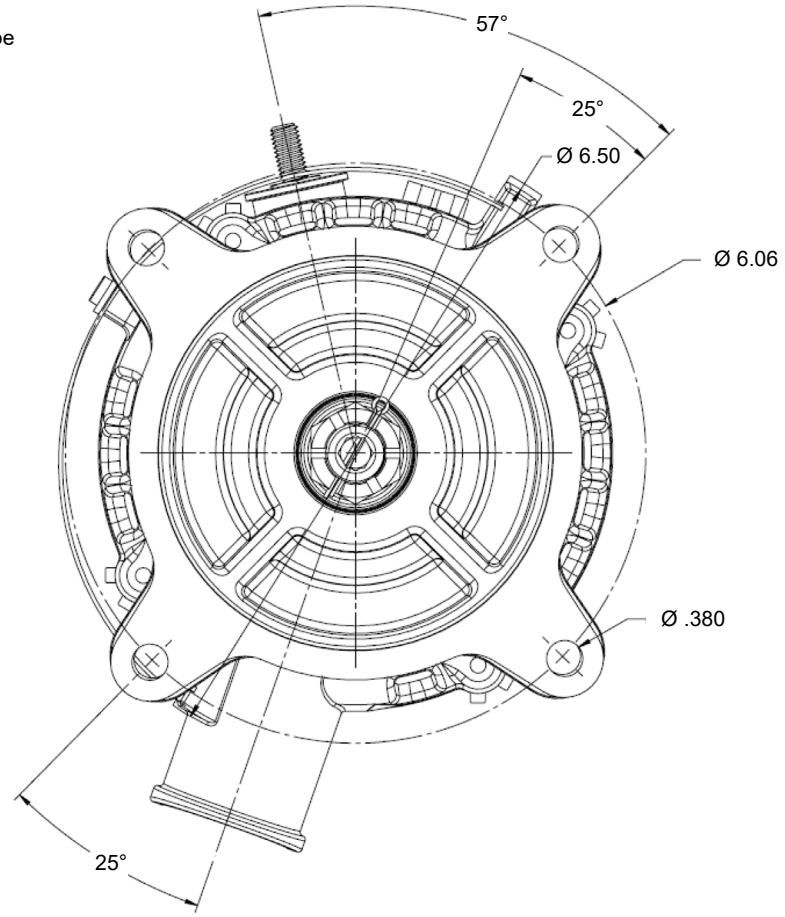


Figure 2.3 - C28-150(S) C14-100(S) Dimensions
C14-100 Shown *

* Basic dimensions are shared between the C14-100(S) & C28-150(S) models. (S) models represent less heat shield and blast tube;
15-2000-6 is identical to C28-150;
15-2000-7 is identical to C28-150S.

CHAPTER 3 - TROUBLESHOOTING

3.1 General

A. In the event of malfunction in electrical power, it should not be assumed to be an alternator fault before employing proper troubleshooting procedures. The overall objective of trouble-shooting is to find the cause of trouble and take corrective action to prevent a recurrence. Even perfectly operational alternators cannot compensate for improper adjustments, corroded or worn parts, and improper installation or lack of maintenance.

B. This section provides general troubleshooting procedures for the alternator 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 TESTING (Chapter 5) for applicable test procedure(s).

3.2 Procedure

WARNING

WHEN SERVICING, REPAIRING, OR OVERHAULING THE ALTERNATOR, GREAT CARE AND CAUTION MUST BE TAKEN TO AVOID HAZARDOUS SITUATIONS. THE ALTERNATOR WHEN MOUNTED ON AN AIRCRAFT OR ROTORCRAFT, PRESENT A PHYSICAL HAZARD FROM PROPELLERS, ROTORS AND OTHER ROTATING DEVICES. THE ALTERNATOR 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 following troubleshooting chart (Table 3.1) may also be obtained from the Hartzell Engine Technologies' web portal at:

(1) *Troubleshooting Guide for Externally Regulated Alternators*

B. Perform all tests with:

(1) Alternator switch to ON

(2) Master switch ON

(3) Engine OFF

(4) Magnetos OFF or grounded

C. Additional Notes:

(1) Voltage drop of .5 volts MAX at all points except across the voltage regulator.

(2) Voltage drop of 1 to 1.5 volts across the actual regulator acceptable.

(3) MAX resistance of .2 ohms at ground points, across switches and conductors.

(4) MAX of 1 volt AC at ALT B+ Terminal.

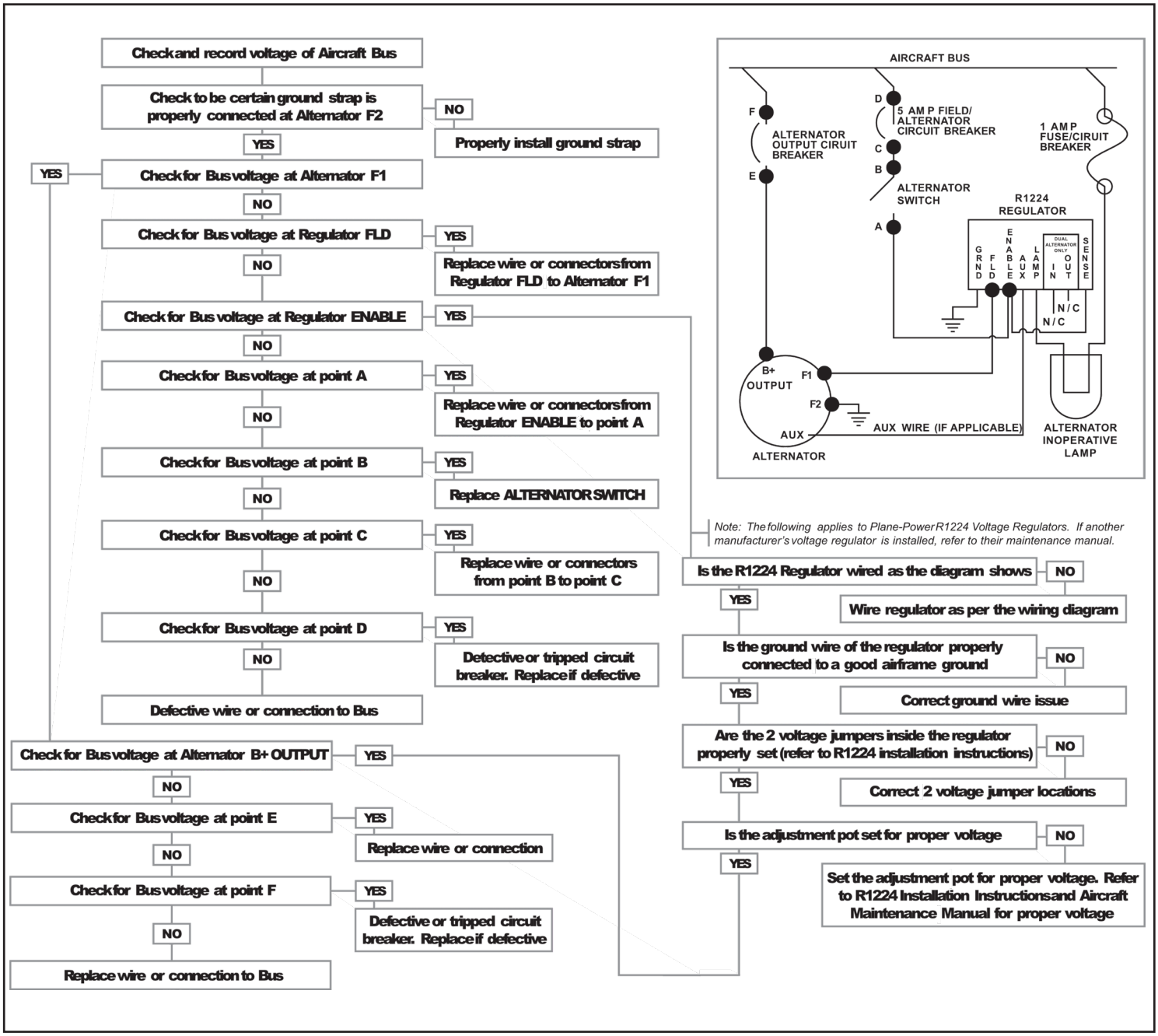


Table 3.1 - Troubleshooting Guide

CHAPTER 4 - CHECK

4.1 General

A. This section defines the various checks and inspections needed to assure reliable and safe operation of the alternator while in service. They are listed in hours time in service (TIS) or in calendar time, whichever is applicable and are the first to occur when offered a choice. Some maintenance is one time initial and others are recurring.

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.

4.2 Inspection Checks

100 Hours TIS & each 100 hours thereafter. (or each annual/event, the first to occur)

Perform a check of the alternator assembly. Note through-bolt security, re-torque if bolts are found loose. Check the alternator to engine mounting bolts for proper torque per aircraft, rotorcraft and/or engine service instructions or maintenance manual. Check all terminal hardware for tightness and insulators for condition.

500 Hours TIS & each 500 hours thereafter. (or each two years, the first to occur)

With the alternator removed, check bearings for abnormal roughness. Remove each brush and check for wear or damaged brushes; use a standard 6" caliper to measure brushes. If brush shows more than 50% wear or has chips or damage, replace brushes as a set, refer to chapter 6. New brushes are 0.50 inch (12.7 mm) in length.

2000 hours TIS or TBO of Engine (whichever is less)

Replace alternator. When published, aircraft OEM recommendations supersede this recommendation.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 5 - INSPECTION & TESTING

5.1 General

A. Refer to the aircraft/engine maintenance manuals and the AFM or POH while conducting alternator operational checks.

B. Prior to replacing the alternator for a suspected fault, ensure to follow the troubleshooting steps outlined in Chapter 4 of this manual.

5.2 Special Tools

- Torque wrench, 0-150 pound-inch
- Precision digital or dial caliper, 6-inch
- Volt-Ohm-Milliammeter

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 6 - MAINTENANCE

6.1 General

A. This section contains information regarding recommended maintenance for all alternators listed in this manual. These recommendations assure reliable and safe operation of the alternator while in service. Maintenance is listed in hours time in service (TIS) or calendar time, whichever is applicable but each are the first to occur. Some maintenance is one time initial and others are recurring. Refer to Chapter 4, “Checks” 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 Brush Holder Removal and Installation

NOTE: Refer to Table 6-1 for new brush holder assembly (Fig. 6.1, ITM# 1). Brush holder assembly includes new brushes pre-installed.

A. Removal:

(1) Make sure aircraft battery and external power source has been disconnected.

(2) To remove the alternator from the engine, refer to the applicable engine and/or aircraft service and maintenance manuals.

(3) Remove the two M5 nuts (2), remove the ground terminal stud (3), and lift off the SRE cover (4).

(4) Remove the two screws (5) that hold the brush holder assembly (1) in the slip ring end housing (SRE).

WARNING!

ONLY REMOVE LABELED COMPONENTS SHOWN IN FIG. 6.2. TAKE CARE NOT TO REMOVE THE AUX ASSEMBLY AS IT CONTAINS SOLDERED CONNECTIONS TO THE ALTERNATOR.

(5) Remove the brush holder assembly from the SRE assembly.

B. Installation:

(1) Install the brush holder assembly (1) with the insulated brush retaining wire in-place. Install the two brush holder screws (5).

(2) Torque the brush holder screws (5) 11-12 lbf · in (1.24-1.36 N · m).

(3) Remove insulated brush retaining wire from brush holder assembly. Rotate the shaft in running direction and listen for smooth operation.

(4) Using a Volt-Ohm-Milliammeter, perform a pin-to-pin continuity test. Refer to Fig. 6.3.

NOTE: If continuity is not observed while performing a pin-to-pin test, ensure the brush retaining wire is removed from the brush holder assembly. Refer to Fig. 6.4.

(5) Install the SRE cover and the two M5 nuts (2). Torque nuts (2) 20-35 lbf · in (2.26-3.95 N · m).

(6) Install the ground terminal stud (3) and torque to 20-35 lbf · in (2.26-3.95 N · m).

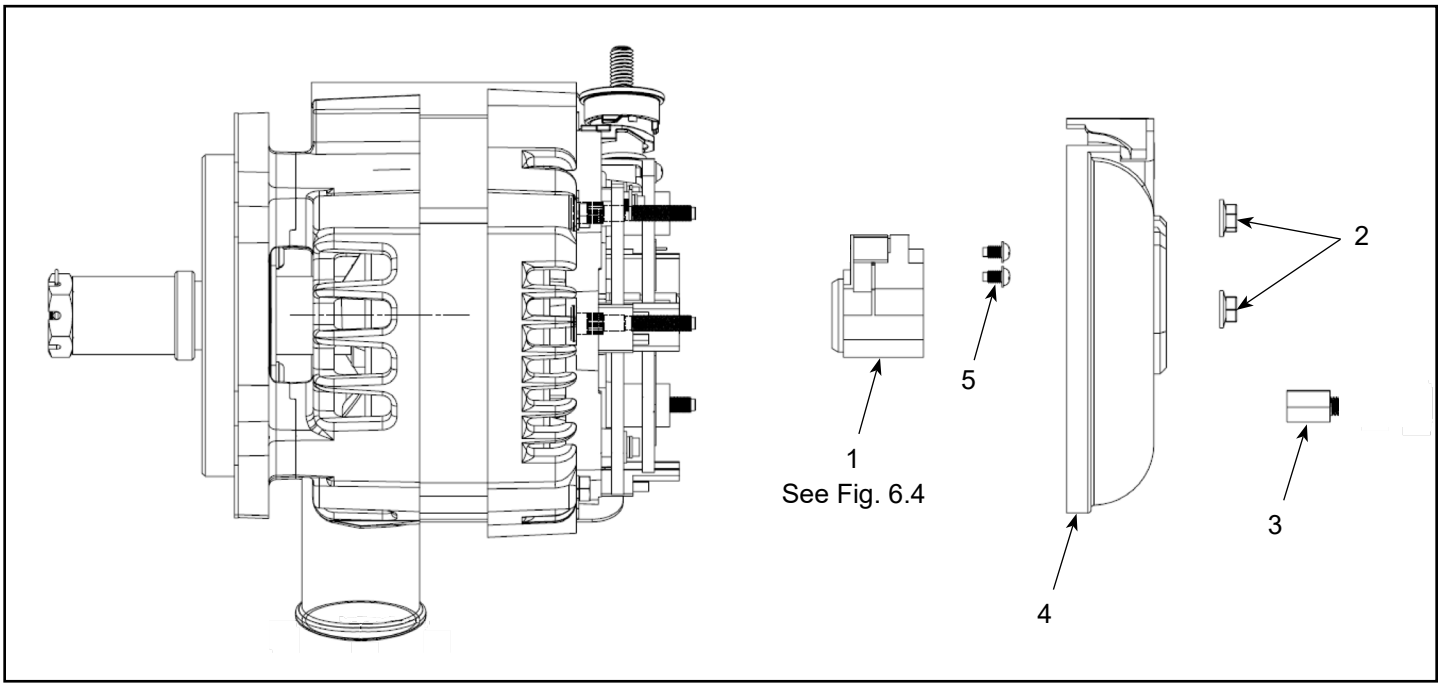
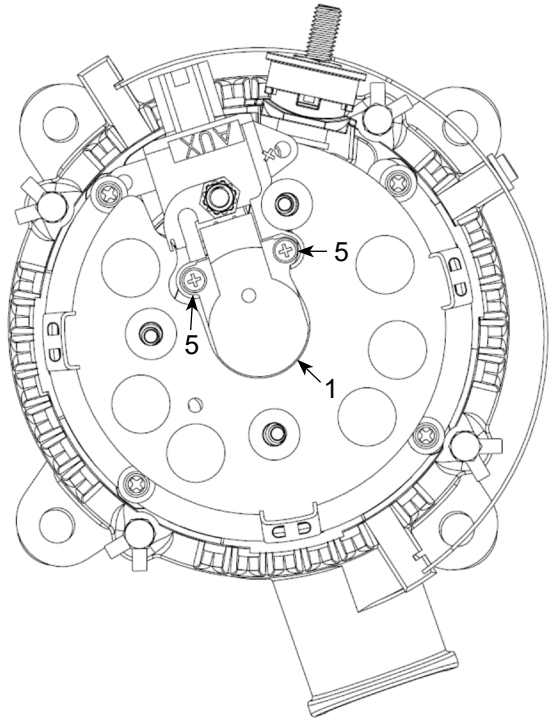


Figure 6.1 - Brush Holder Replacement



WARNING!

ONLY REMOVE LABELED COMPONENTS SHOWN. TAKE CARE NOT TO REMOVE THE AUX ASSEMBLY AS IT CONTAINS SOLDERED CONNECTIONS TO THE ALTERNATOR

Figure 6.2 - Brush Holder Assembly Removal

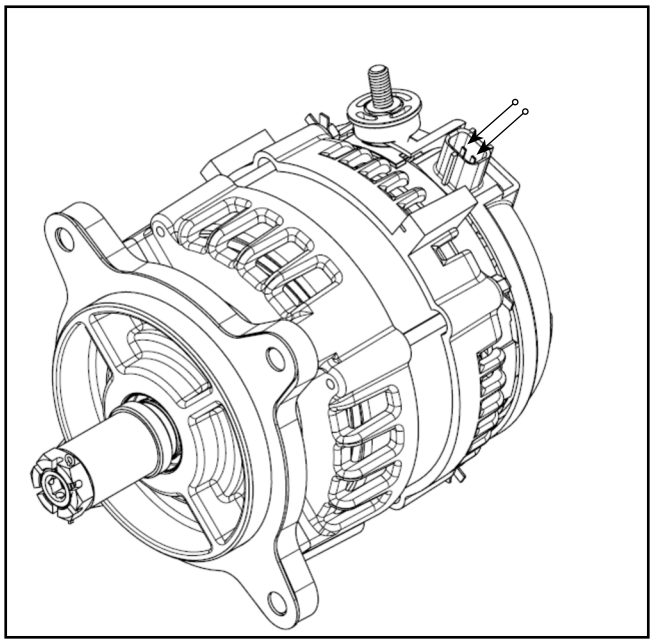


Figure 6.3 - Pin-to-Pin Continuity Test

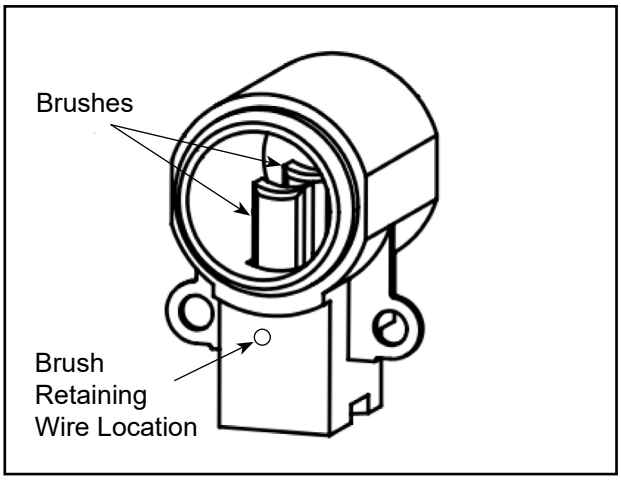


Figure 6.4 - Brush Holder Assembly

6.3 Installation of Alternator on Engine

A. To install the alternator onto the engine, refer to the applicable engine and/or aircraft service and maintenance manuals.

B. **Perform the following tasks ONLY if the alternator being installed is not of the same model/series that was removed, or converting from a generator:**

(1) Cut the ring lug off of the wire removed from the F or F1 terminal (Field) of the original alternator or generator. Connect the wire to EITHER white wire from the supplied 15-5050 Wire Harness/Plug using an M7928/5-4 environmental splice.

(2) If a second Field wire (F2) was removed, connect it to the other white wire from the supplied 15-5050 Wire Harness/Plug using M7928/5-4 environmental splice.

(3) If no separate Field wire (F2) was removed, connect the remaining white wire from the supplied 15-5050 Wire Harness/Plug to the elevated post (ground) on the rear of the alternator using an appropriate ring lug. If a separate Ground wire (- or GND) was removed from the original alternator, re-connect it to the elevated post (ground) on the rear of the alternator using an M7928/1-42 lug and torque 20-35 lbf · in (2.26 to 4.00 N · m).

(4) If an Aux wire was removed from the original alternator (generators will not have one), connect it to Aux terminal of the alternator with an M7928/1-43 ring lug. Hold Aux post with a wrench and torque nut 20-35 lbf · in (2.26 to 4.00 Nm).

(5) Place the ring lug of the “+” wire (large alternator output wire), and any other wire removed from the output (+) terminal of the original alternator on the M8 output bolt of the alternator. Torque the M8 nut to 45-50 lbf · in (5.08 to 5.65 N · m). If currently installed ring lug is not sized for M8 stud, remove existing lug and replace with an M7928/1-44 lug. Similarly modify all other existing wire attached to the “+” post of the original alternator or generator.

(6) Start aircraft and check the alternator output for proper operation. Refer to the applicable AFM or POH.

(7) Recheck and inspect the entire installation. Complete FAA form 337, make appropriate log book entry, update the aircraft equipment list, and revise weight and balance if necessary.

6.4 Special Conditions:

NOTE: For engine OEM’s Special Condition “Sudden Stoppage”, refer to the latest revision of Continental Aerospace Technologies’ M-0.

A. Sudden Engine Stoppage (gear drive):

(1) If the engine has experienced “sudden stoppage” as defined by the engine manufacturer, the alternator may be impacted critically by this event. Although the alternator drive system is designed with an OEM supplied elastomer drive coupling which protects the engine from seizure of the rotating components inside the alternator, the coupling may place unknown strain on the alternator shaft from the sudden stoppage of the engine drive train. The shaft may be weakened, cracked, or have unseen damage from this event, setting up for a future failure under normal operating conditions if not thoroughly inspected.

(2) If “sudden stoppage” as defined by the engine manufacturer has occurred, the gear driven alternator must be repaired or replaced. Refer to the appropriate engine or airframe manuals to remove the alternator. ***Item 3 must be performed on any sudden stoppage by a qualified repair shops.***

(3) If the alternator has been involved in an accident with sudden stoppage and the alternator is to be replace, it is required that a qualified technician perform a magnetic particle inspection (ASTM E 1444) to check the condition of the rotor shaft.

B. **Lightning Strike**

(1) Lightning strike is a very unpredictable event both in occurrence and in resultant damage. A lightning bolt entry point may have many exit points or only one. On a well bonded aluminum aircraft, the lightning bolt will stay on the outer surface throughout the aircraft with little damage to components. The path of the electrical current cannot easily be determined in most cases because while the current may surge through well bonded areas without damage, a gap in any metal contact point will result in an arc or flash burn. This is especially true of rotating parts such as gears or shaft.

(2) If a report of a potential or actual lightning strike is made the first thing to do is to inspect the aircraft for entry and exit points for the lightning bolt. The purpose is to assure that there was indeed a strike. The points of entry or exit are generally on the aircraft extremities such as the wing tip, propeller tips, spinner tip or the tips of tail surfaces. Commonly, the entry point is a single burn mark and the exit several burn marks or burnt static wicks. This discussion is important because if there was a strike it may have coursed through the engine. Cowlings, especially fiberglass or other non-metallic types may not have as good a bond. Many cowlings will not be well bonded due to frequent removal. This many times will force the electric charge to take a route through the engine components. Lightning will arc at any gap where the path of resistance is less that the surrounding air.

(3) If a strike has occurred, (especially if arc burns appear on the propeller) remove the alternator and inspect for arc marks. Observe the drive coupling teeth as an arc here may leave raised metal which will also cause further damage when running. If belt driven, the most likely damage will occur within the alternator or it's attachments or mounting brackets. Observe the mounting points and bracketry for arc marks at joints and attachments. Use the appropriate engine and/or aircraft, manufacturers maintenance manuals or service instructions to accomplish this task.

(4) If evidence of a strike is observed and the alternator is being replaced due to this evidence or due to malfunction, it is advised that the entire aircraft/rotorcraft electrical system be inspected. Use the appropriate engine and/or aircraft/rotorcraft manufacturers maintenance manuals or service instructions to accomplish this task.

(5) If there is no indication of arcing or other damage and a lightning strike cannot be confirmed, reinstall the alternator and check per the applicable airframe and engine manufacturers maintenance or service instructions.

(6) Upon completion, test run the engine per the POH or AFM prior to returning the aircraft to service. Make an appropriate logbook entry concerning the lightning strike.

6.5 Storage and Shelf Life:

A. Storage

When storing a new or repaired alternator, there are several categories to consider. Short term storage or long term storage on or off the aircraft. Short term storage will be considered as storage up to but not exceeding twenty-four (24) calendar months. Long term storage will be considered as storage up to but not exceeding twelve (12) calendar years. There are different methods for each type of storage.

(1) Short term, if on the shelf, requires only that the unit be kept inside in the original packaging. If unit is on the aircraft (or unmounted engine) no additional action other than that required for the engine or aircraft is needed.

(2) Long term, if on the shelf, requires that the alternator be removed from the box and from the plastic bag as originally packaged. Discard the bag. Wipe or lightly spray outside and all openings with electrically friendly preservative oil. Wrap tightly with a waxed type paper (new bags may be used if specifically formulated for the storage of metal products). Place back into original shipping container and store in a cool dry environment.

(3) If it is anticipated or determined that the aircraft (or unmounted engine) will be in a long term storage situation, as soon as practicable, lightly spray outside and all openings with electrically friendly preservative oil. No additional action other than that required for the engine or aircraft is needed.

(4) At the expiration of twelve (12) calendar years from date of manufacture, regardless of storage or usage, the unit must be replaced.

B. Shelf Life

(1) All alternators (HET, Kelly, ESI, Prestolite or others now manufactured by HET) have a shelf life of up to, but not to exceed, twelve (12) calendar years at which time the unit must be replaced. *Shelf life time applies only if storage requirements are observed.*

Index No.	Part Number	Description	Alternator PN												
			C14-100	C14-100S	C28-150	C28-150S	15-2000-6	15-2000-7							
1	15-5005	Brush Holder Assembly ▲	1	1	1	1	1	1							
2	15-5090	Nut (M5), SRE cover	2	2	2	2	2	2							
3	15-2019	Terminal Stud, Ground	1	1	1	1	1	1							
5	15-5007	Screws (M4), Brush Holder	2	2	2	2	2	2							

▲ Includes brush holder, brushes, & brush retaining wire.

Table 6.1 - List of Materials

THIS PAGE INTENTIONALLY LEFT BLANK