SERVICE INFORMATION LETTER

Contains Useful Information Pertaining To Your Engine Ignition System

SUBJECT: Engine Supplemental Type Certificate (STC) Installation Instructions for CMI Unpressurized Shower-of-Sparks S-1200 Series Magnetos

PURPOSE: To provide installation instructions for CMI S-1200 Series Magnetos on certain Lycoming® TIO-540 engines in support of AML-STC SA04424AT.

COMPLIANCE: At time of S-1200 Series Magnetos installation per AML-STC SA04424AT

MODELS AFFECTED: Engines as listed in AML-STC SA04424AT, (see Table on page 5)

I. GENERAL INFORMATION

Most aircraft utilizing four and six cylinder engines have included one of two systems to assist magneto ignition during engine start; either an impulse coupling(s) or Shower-of-Sparks booster technology.

Installation of Continental Motors (CMI) S-1200 Series "Shower-of-Sparks" magnetos, when used in conjunction with a Continental Starting Vibrator (see CMI Service Document SIL671, Aircraft Supplemental Type Certificate (STC) Installation Instructions for Shower-of-Sparks Starting Vibrator Booster Systems, and associated aircraft AML-STC SA04424AT), provide improved starting performance and eliminate required repetitive impulse coupling inspections per the latest revision of Lycoming®[1] Service Bulletin SB478A and Slick Service Bulletin 1-86C.

Installation of CMI large S-1200 Series "Booster" magnetos, provides suitable altitude performance and eliminates required repetitive pressurization system inspections and adjustments per the latest revision of Lycoming® Service Instruction No. 1308E and Slick Aircraft Products Service Bulletin 1-88B.

A. Start Assist

An impulse coupling is a mechanical device integral to the magneto and attached to the magneto shaft. During cranking, the impulse coupling stores energy in a spring and releases that energy suddenly at a retarded timing position near Top Dead Center (TDC). Thus, each magneto fitted with an impulse coupling delivers a single high-energy spark at each ignition event until engine start. Impulse couplings also incorporate moving parts that are subject to wear.

Shower-of-Sparks technology, pioneered as booster coils and booster magnetos before WWII, was introduced for light aircraft about 1960. Shower-of Sparks functions similarly to impulse couplings (adding energy to the ignition system during starting, automatically retarding timing), but does so electrically instead of mechanically.

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Using the familiar twist-to-start or push-to-start rotary ignition and start switch, the pilot rotates the switch full clockwise, to command **START**. Battery current is then supplied through a solenoid to the starter motor and to the starting vibrator. The starting vibrator uses an electromechanical oscillator to "chop" the battery DC into a pulsating DC, which is connected back to the switch BO (Booster Output) terminal. The switch splits the BO signal and sends it to both, the **left magneto's** main (advance or switch) terminal and **left retard** terminal through parallel connecting wires. Internal to the left magneto, a secondary set of "retard" contacts (adjusted to a prescribed retard timing) is mounted along with the main, or "advance" contacts.

During the start sequence, the BO signal is grounded until both (left advance and retard) contacts are open from ground, at approximately TDC. When the retard contacts open, the BO signal flows through the magneto's coil primary wire, where it induces high voltage in the coil secondary. The high voltage is then distributed to the spark plugs. Sparks commence at approximately top-dead-center (TDC) and continue at a fixed frequency as the engine rotates until the main contacts close again, approximately 25 crankshaft degrees later. Each of these spark events have more energy than is typical with an impulse-generated spark, and each sequential spark multiplies the opportunity to ignite less-than-optimally vaporized fuel-air charges. A jumper on the switch automatically disables the right magneto during starting. Once the engine starts, the spring-loaded switch returns to the **BOTH** position, and the starter and starting vibrator are disconnected from electric power, with both magnetos fire at advance timing.

B. Pressurization

Likewise, magneto pressurization is a mature technology to improve altitude performance of smaller magnetos. Air is used as an electrical insulator inside all magnetos. Air density - and the air's ability to insulate - decreases as altitude increases. A pressurized magneto system taps the "upper deck" air of a turbocharged engine's induction system to supply insulating air to specially-prepared magnetos. This system, too, requires additional maintenance and inspections. CMI unpressurized S-1200 Series magnetos are larger, and thus have more insulating air built into them, without the need for a pressurizing system.

Many TIO-540 engines utilize a pressure regulator to deliver upper deck air to an array of hoses, and ultimately to magnetos that have been sealed to ensure pressure containment, but which also have a bleed port to ensure ionized gases are exhausted overboard. Introduced in the 1960s, Continental S-1200 unpressurized magnetos have been used successfully on high performance aircraft such as the Piper PA-31-350, PA-31-P, and Beech Duke 60, with engines rated at up to 425 horsepower at 45.5 in. Hg manifold pressure, and TCDS maximum altitudes up to 30,000 feet.

AML engines originally equipped with Slick pressurized impulse magnetos, conversion to CMI Unpressurized S-1200 Shower-of-Sparks ignition involves:

- Removal of pressurization hoses and regulator from the engine.
- Plugging upper deck pressure source.
- Removal of Slick magnetos and harness from the engine.
- Assembly and adjustment of Continental S-1200 Series magnetos to the engine.
- Installation of Starting Vibrator as detailed in the latest revision of CMI Service Document SIL671, Aircraft Supplemental Type Certificate (STC) Installation Instructions for Shower-of-Sparks Starting Vibrator Booster Systems, per AML-STC SA04424AT.

NOTE: Piper PA-46-350P and PA-46R-350T aircraft are factory-equipped with Continental Shower-of-Sparks, and do not require changes to aircraft wiring or equipment configurations.

II. INSTALLATION INSTRUCTIONS

CAUTION: It is the responsibility of the installer to determine the compatibility of other supplier's STC products when installed in conjunction with STC approved CMI products.

CMI authorizes the installer to use the STC and detailed instructions contained in this document to accomplish the installation of the products described within the STC. This Service Information Letter (SIL672) provides step-by-step instructions for converting aircraft listed in AML-STC SA04424AT to the Continental S-1200 series unpressurized Shower-of-Sparks magnetos.

In conjunction with installation of CMI Shower-of-Sparks magnetos on the engine, the aircraft must also be retrofitted to the CMI Shower-of-Sparks configuration. See the latest revision of Service Document SIL671, Aircraft Supplemental Type Certificate (STC) Installation Instructions for Shower-of-Sparks Starting Vibrator Booster Systems, and AML-STC SA04424AT for details.

A. Parts Required

Each S-1200 series AML STC kit, (P/N 10-400396), includes parts needed for installation and are approved for use in all engines listed in AML-STC SA04424AT.

NOTE: Parts may be purchased separately. Use of new or rebuilt magnetos are permissible.

Table 1. Kit, Continental S-1200 Series, Magnetos and Related Parts (P/N 10-400396)[1]

Item (see Figures 1 & 2	Quantity (each)	Continental Part Number	Description
1	1	10-349290-1	Magneto S6LN-1208, Left
2	1	10-349310-1	Magneto S6LN-1209, Right
3	1	10-821684-2	Harness, S-1200, ¾-20
4	2	AEL12681	Gasket
5	2	AEL73000	Coupling
6	4	MS51967-5	Nut
7	4	AE51413-5	Washer, Lock
8	1	MS90725-58	Bolt
9	1	AE51412-6	Washer, Flat
10	1	538556	Washer, Seal

1. Additionally, four *Lycoming® clamps (P/N 66M19385) are required to complete the installation. Clamps are customer responsibility and must be installed per instructions according to the latest revision of Lycoming® primary ICAs.

B. Weight Change

Net weight change is as follows:

- TIO-540-AE2A = +4 lbs.
- TIO-540-AF1A, AF1B, AG1A, AH1A, AJ1A, AK1A = +3 lbs.

C. Required Reference Materials

Refer to the following publications for instructions on installation, continued airworthiness, maintenance and overhaul, and parts catalogs:

- CMI X42001, S-1200 Series Magnetos Service Support Manual
- CMI X43001, Harness Service Support Manual
- CMI Service Document SIL671, Aircraft Supplemental Type Certificate (STC) Installation Instructions for Shower-of-Sparks Starting Vibrator Booster Systems
- Lycoming® 60294-7, Overhaul Manual

D. Detailed Instructions

1. Disconnect and secure the negative lead away from the aircraft battery to prevent inadvertent contact.
2. Remove pressurization hoses and pressurization regulator from the engine.
3. Assemble the bolt (8), flat washer (9), and seal washer (10) as shown in Figure 1. Thread bolt into manifold and apply 155 -175 in. lbs. torque to bolt.
4. Remove Slick 6300 Series Magnetos and harness.
5. Install coupling (5) to drive shaft of each magneto per latest revision of Continental X42001, S-1200 Series Magnetos Service Support Manual (see Figure 2).
6. Install and adjust CMI S6LN-1208 (1) at **LEFT** magneto mount location, and CMI S6LN-1209 (2) at **RIGHT** magneto mount location per latest revision of Lycoming® 60294-7, Overhaul Manual.
7. Install and adjust ignition harness (3) per latest revision of CMI X43001, Harness Service Support Manual.
8. Attach magnetos to Shower-of-Sparks Start boost system, either already installed, or install per AML-STC SA04424AT as detailed in the latest revision of CMI Service Document SIL671.

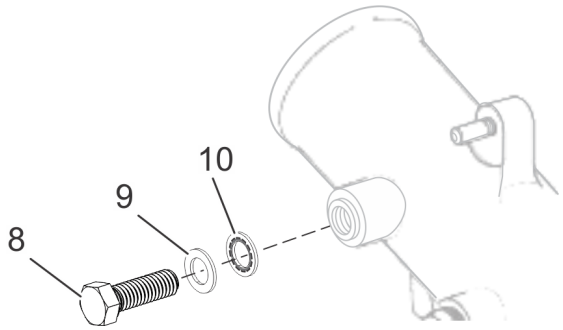

Figure 1. Sealing Pressure Source

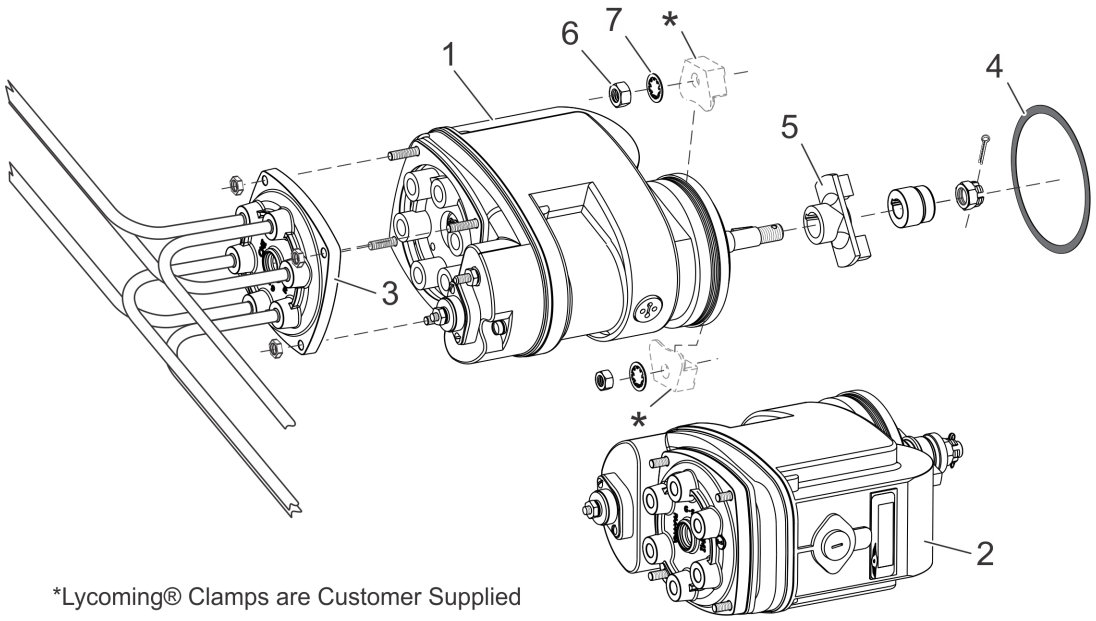

Figure 2. Magnetos, and Related Parts

NOTE: Additionally, four Lycoming® clamps (P/N 66M19385) are required to complete the installation. Clamps are customer responsibility and must be installed per instructions according to the latest revision of Lycoming® primary ICAs.

Table 2. FAA Approved Model List (AML) No. SE04445AT
Installation of CMI Unpressurized Magnetos and Associated Parts

Item	Make	Model/ Series	Cert Basis/ Amendment/ Category	TCDS No.	MDL/ Inst DWG	FMS	ICA	MFG P/N	Model Specific Notes	Initial Approve Date	Amended Date
1	Lycoming Engines	TIO-540-AE2A, AF1A, AF1B, AG1A, AH1A, AJ1A, AK1A	CAR 13/ Through Amendment 4	E14EA	10-400396 dated 5/03/2018 or latest FAA approved revision	N/A	X42001, Refer to Rev.3, dated 2/15/2019 or latest FAA approved revision	10-349290-1 (S6LN-1208) 10-349310-1 (S6LN-1209)	N/A	July 11, 2019	N/A

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

Number: SE04445AT

This certificate issued to: Continental Motors, Inc.
2039 South Broad Street
Mobile, AL 36615

*certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part * of the Regulations.*

Original Product – Type Certificate Number: *See attached FAA Approved Model List (AML) No. SE04445AT for a list of Approved engine models and applicable airworthiness regulations
Make: *
Model: *

Description of Type Design Change:
Installation of Continental Motors, Inc. (CMI) S-1200 Series Magnetos (10-349290-1 and 10-349310-1) and associated hardware in accordance with FAA Approved Model List (AML) SE04445AT and Service Information Letter (SIL) 672 that provides Installation Instructions for CMI Unpressurized Shower-of-Sparks S-1200 Series Magnetos, dated July 11, 2019, or latest FAA approved revision.

Limitations and Conditions:

See limitation notes on AML SE04445AT. This modification is to be maintained in accordance with the CMI Service Support Manual, Publication X42001, Revision 3, dated Feb 15, 2019, or later FAA approved revisions. Approval of this change in type design applies only to the models of engines listed in AML SE04445AT. This approval should not be extended to engines of these models on which other previously approved modifications are incorporated unless it is determined that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effects upon the airworthiness of the engine. A copy of this Certificate, AML SE04445AT, and the FAA Form 337, must be maintained as part of the permanent records for the modified engine. The installer must determine whether this design is compatible with previously approved modifications. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, and revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of Application: October 24, 2018 *Date Reissued:*

Date of Issuance: July 22, 2019 *Date Amended:*

By Direction of the Administrator

Signature _____

Title (for) Christina M. Underwood
Manager, Atlanta ACO Branch

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both. This certificate may be transferred or made available to third persons by licensing agreements in accordance with 14 CFR 21.47. Possession of this Supplemental Type Certificate (STC) document by persons other than the STC holder does not constitute rights to the design data nor to alter an aircraft, aircraft engine, or propeller. The STC's supporting documentation (drawings, instructions, specifications, flight manual supplements, etc.) is the property of the STC holder. An STC holder who allows a person to use the STC to alter an aircraft, aircraft engine, or propeller must provide that person with written permission acceptable to the FAA. (Ref. 14 CFR 21.120).

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Figure 3. AML-STC SA04445AT, reprographic