United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

Number SA1137SC

This certificate issued to: Hartzell Engine Technologies LLC
2900 Selma Highway
Montgomery, AL 36108

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 23 *of the* Federal Aviation *Regulations.*

Original Product – Type Certificate Number: See Approved Model List

Make: See Approved Model List
Model: See Approved Model List

Description of Type Design Change:
Installation of Plane-Power ALT-FLX alternator in accordance with Installation Instructions, Drawing No. 17-1001, dated November 24, 2011, or later FAA Approved revision. Alternator type design data is contained in Aircraft Engine Alternator Parts List, Drawing No. 17-0000, dated November 24, 2011, or later FAA Approved revision. Instructions for Continued Airworthiness are contained in Drawing No. 17-1001.

Limitations and Conditions:
The installer must determine whether this design change is compatible with previously approved modifications. If the holder agrees to permit another person to use this certificate to alter a product, the holder must give the other person written evidence of that permission.

Certification Basis:

(See continuation Sheet 3 of 3)

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: May 18, 2012
Date of issuance: March 14, 2013

Date reissued: 03/26/13; 05/10/13; 07/17/14
Date amended:

By direction of the Administrator

Signature for Scott A. Horn

Title
Manager, Aircraft Certification Office,
Southwest Region

United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number: SA11137SC
Date of Issuance: March 14, 2013
Reissuance Date: July 17, 2014

Certification Basis (Continued):
14 CFR Part 23.901(a)(b){23-62}, 23.1041{23-51}, 23.1163{23-42}, 23.1301(a)(b)(c){23-62}, 23.1309(a)(b)(c)(d){23-62}, 23.1351 (a){23-49}, 23.1359(c){23-49}, 23.1365(d){23-49}, 23.1431(b){23-62}, 23.1529{23-26}

-END-

FAA APPROVED MODEL LIST (AML)

SA11137SC

Hartzell Engine Technologies LLC
2900 Selma Highway
Montgomery, AL 36108

Date of issuance: March 14, 2013
Date reissued: March 26, 2013; May 10, 2013; July 17, 2014

Aircraft Make	Aircraft Model	Original Type Certificate Number	Regulation/Part
Aerostar Aircraft Corporation	360, 400	A11WE	FAR 23
Aerostar Aircraft Corporation	PA-60-600 (Aerostar 600), PA-60-601 (Aerostar 601), PA-60-601P (Aerostar 601P), PA-60-602P (Aerostar 602P), PA-60-700P (Aerostar 700P)	A17WE	FAR 23
AERMACCHI S.p.A.	S.205 – 18/R, S.205 – 20/F, S.205 – 20/R, S.205 – 22/R, S.208, S.208A	A9EU	FAR 23
AERMACCHI S.p.A.	F.260, F.260B, F.260C, F.260D, F.260E, F.260F	A10EU	CAR 3
American Champion Aircraft Corporation	7ECA 7GC, 7CGA, 7GCAA, 7GCB, 7GCBA, 7GCBC, 7HC, 7KC, 7KCAB	A-759	CAR 4a
American Champion Aircraft Corporation	8GCBC, 8KCAB	A21CE	FAR 23
Aviat Aircraft Incorporated	A-1, A-1A, A-1B, A1C-180, A1C-200	A22NM	FAR 23
Aviat Aircraft Incorporated	S-1S, S-1T, S-2, S-2A, S-2B, S-2C	A8SO	FAR 23
Brantley Helicopters Industries U.S.A. Co., Ltd.	305	H3SW	CAR 6
Brantley Helicopters Industries U.S.A. Co., Ltd.	B-2 (YHO 3BR), B-2A, B-2B	2H2	CAR 6
Cessna Aircraft Company	172I, 172K, 172L, 172M, 172N, 172P, 172Q	3A12	CAR 3
Cessna Aircraft Company	172R, 172S	3A12	FAR 23
Cessna Aircraft Company	F172L, F172M, F172, F172P	A4EU	CAR 3
Cessna Aircraft Company	177, 177A, 177B	A13CE	FAR 23
Cessna Aircraft Company	177RG	A20CE	FAR 23
Cessna Aircraft Company	F177RG	A26EU	FAR 23
Cessna Aircraft Company	180, 180A, 180B, 180C, 180D, 180E, 180F, 180G, 180H, 180J, 180K	5A6	CAR 3
Cessna Aircraft Company	182, 182A, 182B, 182C, 182D, 182E, 182F, 182G, 182H, 182J, 182K, 182L, 182M, 182N, 182P, F182P, 182Q, 182R, T182, TR182, T182T	3A13	CAR 3
Cessna Aircraft Company	185, 185A, 185B, 185C, 185D, 185E, A185E, A185F	3A24	CAR 3
Cessna Aircraft Company	188, A188, 188A, A188A, 188B, A188B, T188C	A9CE	FAR 23
Cessna Aircraft Company	210-5 (205), 210-5A (205A), 210, 210A, 210B, 210C, 210D,	3A21	CAR 3

	210E, 210F, 210G, 210H, 210J, 210K, 210L, 210M, 210N, 210R, T210F, T210G, T210H, T210J, T210K, T210L, T210M, T210N, T210R, P210N, P210R		
Cessna Aircraft Company	206, 206H, P206, P206A, P206B, P206C, P206D, P206E, U206, U206A, U206B, U206C, U206D, U206E, U206F, U296G, T206H, TP206A, TP206B, TP206C, TP206D, TP206E, TU206A, TU206B, TU206C, TU206D, TU206E, TU206F, TU206G	A4CE	CAR 3
Cessna Aircraft Company	207, 207A, T207, T207A	A16CE	FAR 23
Cessna Aircraft Company	152, A152	3A19	CAR 3
Cessna Aircraft Company	F152, FA152	A13EU	CAR 3
Cessna Aircraft Company	172RG	3A17	CAR 3
Cessna Aircraft Company	310, 310A, 310B, 310C, 310D, 310E, 310F, 310G, 310H, 310I, 310J, 310K, 310L, 310M, 310N, 310P, 310Q, E310H, E310K	3A10	CAR 3
Cessna Aircraft Company	320, 320-1, 320A, 320B, 320C	3A25	CAR 3
Cirrus Design Corporation	SR20	A00009CH	FAR 23
CPAC, Incorporated	112, 114, 112TC, 112B, 112TCA, 114A, 114B, 114TC	A12SO	FAR 23
Cub Crafters	CC18-180, CC18-180A	A00006SE	FAR 23
Diamond Aircraft Industries GmbH	DA 40, DA 40 F	A47CE	JAR 23
The Enstrom Helicopter Corporation	F28, F-28A, F-28C, F-28C-2, F-28C, F-28C-2R, F-28F, F-28F-R, 280, 280C, 280F, 280FX	H1CE	CAR 6
Extra Flugzeugproduktions	EA-300, EA-300/S, EA-300/L, EA-300/200	A67EU	FAR 23
Hawker Beechcraft Corporation	19A, B19, M19A, 23, A23-19, A23-24, B23, C23, A24, A24R, B24R, C24R	A1CE	CAR 3
Fred Garcia	480	2A2	CAR 3
Hawker Beechcraft Corporation	35-33, 35-A33, 35-B33, 35-C33, E33, F33, G33, H35, J35, K35, M35, N35, P35, S35, V35, V35A	3A15	CAR 3
Hawker Beechcraft Corporation	60, A60, B60	A12CE	FAR 23
Hawker Beechcraft Corporation	76	A29CE	FAR 23
Hawker Beechcraft Corporation	77	A30CE	FAR 23
Hawker Beechcraft Corporation	95, B95, 95-55, 95-A55, B95A, D95A, E95, 95-B55, 95-B55A, 95-B55B, 56TC, A56TC	3A16	CAR 3
Lavia Argentina S.A.	PA-25, PA-25-235, PA-25-260	2A10	CAR 8.10(b)
Maule Aerospace Technology, Incorporated	M-4-180V, M-5-180C, M-5-200, M-5-210TC, M-5-235C, M-6-180, M-7-235, M-7-235A, M-7-235B, M-7-235C, M-7-260, M-7-260C, M-8-235, M-9-235, MT-7-235, MT-7-260, MX-7-160, MX-7-160C, MX-7-180, MX-7-180A, MX-7-180AC,	3A23	CAR 3

	MX-7-180B, MX-7-180C, MX-7-235, MXT-7-160, MXT-7-180, MXT-7-180A		
Mooney Airplane Company, Incorporated	M20, M20A, M20B, M20C, M20D, M20E, M20F, M20G, M20J, M20M	2A3	CAR 3
Piper Aircraft, Incorporated	PA-23, PA-23-160, PA-23-235, PA-23-250, PA-E23-250	1A10	CAR 3
Piper Aircraft, Incorporated	PA-24-180, PA-24-250, PA-24-260, PA-24-300	1A15	CAR 3
Piper Aircraft, Incorporated	PA-28-140, PA-28-150, PA-28-151, PA-28-160, PA-28-161, PA-28-180, PA-28-201T, PA-28-235, PA-28-236, PA-28R-180, PA-28R-200, PA-28RT-201, PA-28S-160, PA-28S-180	2A13	CAR 3
Piper Aircraft, Incorporated	PA-31, PA-31-300, PA-31-325, PA-31-350	A8EA	CAR 3
Piper Aircraft, Incorporated	PA-32-260 PA-32R-301 (SP), PA-32-300 PA-32R-301 (HP), PA-32S-300, PA-32R-301T, PA-32R-300, PA-32-301, PA-32RT-300, PA-32-301T, PA-32RT-300T, PA-32-301FT, PA-32-301XT	A3SO	CAR 3
Piper Aircraft, Incorporated	PA-34-200	A7SO	FAR 23
Piper Aircraft, Incorporated	PA-44-180	A19SO	FAR 23
Piper Aircraft, Incorporated	PA-46-310P, PA-46-350P, PA-46-500TP, PA-46R-350	A25SO	FAR 23
Revo, Incorporated	LAKE LA-4-200, LAKE MODEL 250	1A13	CAR 3
Robinson Helicopter Company	R22, R22 Alpha, R22 Beta, R22 Mariner	H10WE	FAR 27
Robinson Helicopter Company	R44, R44 II	H11NM	FAR 27
SOCATA	Rallye 150T, Rallye 150ST, Rallye 235C, Rallye 235E, MS 892A-150, MS 892E-150, MS 893A, MS 893E, MS 894A, MS 894E	7A14	CAR 10 CAR 3
SOCATA	TB9, TB10, TB20, TB21, TB200	A51EU	FAR 23
SOCATA	GA-7	A17SO	FAR 23
Sierra Hotel Aero, Incorporated	Navion D, E, F, G, H	A-782	CAR 3
Sikorsky Aircraft Corporation	269A, 269A-1, 269B, 269C, 269C-1	4H12	CAR 6
True Flight Holdings LLC	AA-1, AA-1A, AA-1B, AA-1C	A11EA	FAR 23
True Flight Holdings LLC	AA-5, AA-5A, AA-5B, AG-5B	A16EA	FAR 23
Twin Commander Aircraft LLC	500, 500B, 500-S	6A1	CAR 3
Twin Commander Aircraft LLC	700	A12SW	FAR 23
Vulcanair, S.p.A	P68, P 68B, P 68C, P 68C-TC, P68 "Observer", P68TC "Observer", P68 "Observer 2"	A31EU	FAR 23

Hartzell Engine Technologies LLC

Aircraft Engine Alternator Parts List

DRAWING NO. 17-0000 Rev. D

Created: 11/24/2011 Last Revised: 10/5/2016

Rev.	Date	By	Revisions
A	Nov. 12, 2012	JH	
B	10/16/2013	BRJ	UPDATED 17-1001 REV B
C	9/12/2014	BRJ	1) FIRST RELEASE TO HET DESIGN DATA. 2) HEADING WAS "PLANE POWER LDT." 3) DRAWING 17-1001 UPDATED TO REV C
D	10/5/2016	CMB	1) UPDATED STRUCTURE TO NEW SCHEME, REPLACED SINGLE ALT-FLX WITH ALT-FLX-1 THRU -9; 2) ADDED MOUNTING KIT SECTION, REMOVED REDUNDANT PART NUMBERS

Part No.	Rev*	Description	ALT-FLX-1	ALT-FLX-2	ALT-FLX-3	ALT-FLX-4	ALT-FLX-5	ALT-FLX-6	ALT-FLX-7	ALT-FLX-8	ALT-FLX-9
INSTALLATION INSTRUCTIONS											
17-1001	D	INSTALLATION INSTRUCTIONS	X	X	X	X	X	X	X	X	X
ALTERNATOR ASSEMBLY											
17-2000-1	C	ALTERNATOR ASSEMBLY	X								
17-2000-2	C	ALTERNATOR ASSEMBLY		X	X						
17-2000-3	C	ALTERNATOR ASSEMBLY				X	X	X	X		
17-2000-4	C	ALTERNATOR ASSEMBLY								X	
17-2000-5	C	ALTERNATOR ASSEMBLY									X
MOUNTING KIT											
17-9099	A	ALT-FLX CMI MOUNTING KIT		X	X						
17-1089	A	ALT-FLX MOUNTING KIT LYC				X	X				
17-1099	A	ALT-FLX MOUNTING KIT LYC						X	X	X	
REGULATOR											
R1224B	L	VOLTAGE REGULATOR		X		X		X			

* OR LATER APPROVED REVISION

Drawing No.: 17-1001
ALT-FLX INSTALLATION INSTRUCTIONS

READ AND THOROUGHLY UNDERSTAND ALL OF THE INSTRUCTIONS BEFORE BEGINNING INSTALLATION.

If a FORD DOFF-series (Cessna 611501, 611502, etc. Grumman American DOFF-10300, etc.) Alternator is being replaced; the ALT-FLX will fit using all existing brackets, belt and hardware. Use ALT-FLX-1.

If a Prestolite, Chrysler, Delco or other alternator or a generator is being replaced; new brackets, tension arm and mounting hardware are required, see 17-0000.

If desired, the original alternator regulator may be replaced with a R1224 or R1224B regulator. If a generator is being replaced, the generator regulator must be replaced with a R1224 or R1224B regulator (the R1224B mounts using the same holes as most generator regulators). Remove the original regulator and install the R1224 or R1224B in the same location using the R1224 installation and wiring instructions. For Generator Conversions, wire the R1224 per the GENERATOR CONVERSION section of this document. Ensure that the R1224 or R1224B is set for the voltage matching that of the aircraft's electrical system.

MULTI-ENGINE INSTALLATIONS: For proper load-balancing operation, R1224 or R1224B regulators must be installed for each alternator and wired per the R1224 Installation Instructions (12-1001).

INSTALLING THE ALT-FLX:

NOTE

Reference applicable aircraft/engine maintenance manual and FAA AC43-13-1B for guidance on standard methods and practices for electrical, mechanical, and structural work on the aircraft. Follow all WARNINGS and CAUTIONS noted in the aircraft documentation related to the working being accomplished.

NOTE

Electrical lug and splice sizes are given as a reference. Confirm on aircraft actual wire gauge and associated lug or splice before terminating wires.

1. Gain access to the location where the work is to be accomplished.
2. Label then remove wiring from the existing alternator or generator. Remove the alternator.
3. 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.
4. If a second field wire (F2) was removed, connect it to the other white wire from the supplied 15-5050 Wire Harness/Plug using an M7928/5-4 environmental splice. 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 ALT-FLX using an M7928/1-42 lug and torque 20-35 in-lbs.

5. If an AUX wire was removed from the original alternator (generators will not have one) connect it to AUX terminal of the ALT-FLX with an M7928/1-43 ring lug. Hold the AUX post with a wrench and torque the AUX post nut to 20-35 in-lbs. If an R1224 or R1224B regulator is being installed and there was not an AUX wire, connect a new wire (minimum 20AWG per MIL-W-22759/16) to the ALT-FLX AUX terminal using a ring lug. Route this wire to the location that the regulator is being installed.

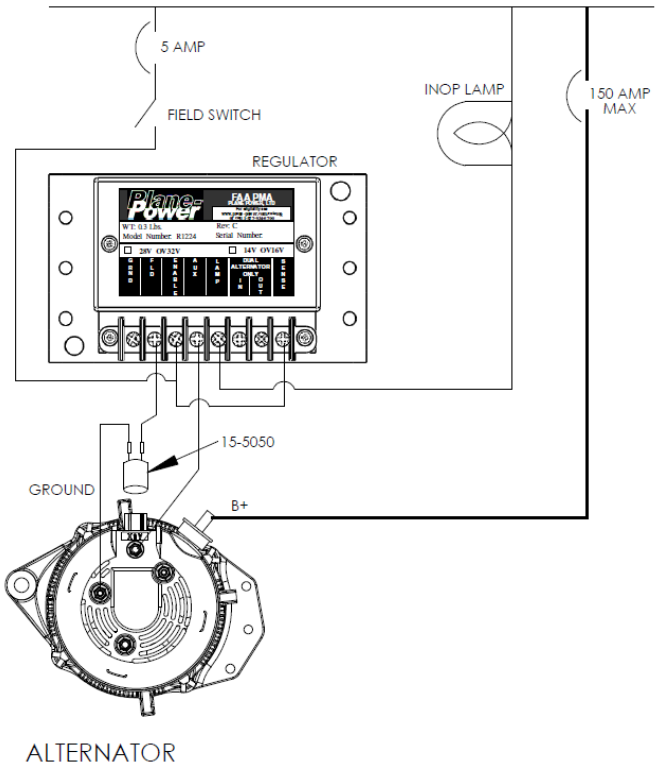
6. If a separate ground wire (- or GND) was removed from the original alternator or generator, reconnect it to the elevated post (ground) on the rear of the ALT-FLX. Hold the ground post with a wrench and torque the ground post nut to 20-35 in-lbs. If it is needed to terminate the wire due to lug size, remove existing lug, and terminate with M7928/1-42 lug.

7. Place the ring lug of the "+" wire (large output wire), and any other wires removed from the output (+) terminal of the original alternator or generator on the M8 output bolt of the ALT-FLX. Torque the M8 nut to 45-50 in-lbs. If currently installed ring lug is not sized for a M8 stud, remove existing lug and terminate with an M7928/1-44 lug. Similarly modify all other existing wires attached to the "+" post of the original alternator or generator.

8. Tension the belt and torque the adjusting bolt to 200 in-lbs and safety with stainless steel 0.032" diameter safety wire. Refer to appropriate engine and airframe service manuals for belt tension and other torque values. Safety wire other drilled mounting bolts.

9. Start the aircraft and check the alternator output for proper operation.

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



Generator Conversion

NOTE: <u>IF AIRCRAFT DOES NOT HAVE A CIRCUIT BREAKER OR CURRENT LIMITING DEVICE IN THE OUTPUT AND REGULATOR INPUT CIRCUIT THEY MUST BE INSTALLED.</u>

NOTE

Reference applicable aircraft/engine maintenance manual and FAA AC43-13-1B for guidance on standard methods and practices for electrical, mechanical, and structural work on the aircraft. Follow all WARNINGS and CAUTIONS noted in the aircraft documentation related to the working being accomplished.

NOTE

Electrical lug and splice sizes are given as a reference. Confirm on aircraft actual wire gauge and associated lug or splice before terminating wires.

WIRING THE R1224

1) If not already in place, install and label an alternator Field switch and a 5 amp fuse or circuit breaker in the panel. Connect the input of the circuit breaker to the positive bus and the output to the ENABLE terminal of the R1224.

2) Wire the system as follows, following the R1224 Installation Instructions for additional information:

   a. **<u>Install a R1224 or R1224B alternator voltage regulator in the same location from which the generator regulator is removed. Ensure regulator voltage setting matches airframe electrical system.</u>**

   b. Connect the field terminal on the voltage regulator to EITHER white wire from the supplied 15-5050 Wire Harness/Plug using a connector per M7928/1.

   c. Connect the other white wire from the supplied 15-5050 Wire Harness/Plug to the elevated post (ground) on the rear of the ALT-FLX using a ring lug per M7928/1.

   d. Hold the ground post with a wrench and torque the ground post nut to 20-35 in-lbs.

   e. If the aircraft has a “Generator Inoperative” indicator lamp rated at 100mA or less, it may be used. If a lamp is not currently installed or is not compatible, install an appropriate lamp per MS18235 in the panel with placards in view of the pilot. Wire one lead of the lamp to the positive bus and the other to the R1224 LAMP terminal. Use minimum 20AWG wire per MIL-W-22759/16.

   f. Connect the AUX terminal of the ALT-FLX to the regulator AUX terminal. Use minimum 20AWG wire per MIL-W-22759/16.

   g. Connect the GND terminal of the regulator to aircraft ground. Use minimum 18AWG wire per MIL-W-22759/16.

   h. Jumper the regulator SENSE and ENABLE terminals.

   i. <u>For multi-engine installations, refer to the R1224 Installation Instructions (12-1001) for additional wiring.</u>

g. Place the ring lug of the “+” wire (large output wire) on the M8 output bolt of the alternator. Torque the M8 nut to 45-50 in-lbs. If currently installed ring lug is not sized for a M8 stud, replace with M8 ring lug per AS7928.

h. Start the aircraft and check the alternator output for proper operation.

i. Recheck and inspect the entire installation. Complete FAA Form 337, make a log book entry, update aircraft equipment list, and revise the weight and balance as necessary.

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Annual / 100 hour inspections:

1. Remove drive belt and turn alternator rotor to check condition of bearings for abnormal noise or roughness.
2. Return to HET if problem is detected.

5 year or 1,000 hour intervals:

1. Repeat: Annual / 100 hour inspection.
2. Remove field brush assembly and inspect brushes for excess wear. Replace brush assembly if brushes extend less than .250” from edge of brush holder case.