

HARTZELL PROPELLER INC.

SERVICE BULLETIN

Propellers

Propeller - X and V Shank Propeller Inspection

1. Planning Information

A. Effectivity

This Bulletin is applicable to all Hartzell ()HC-()(2,3)(X,V)()-() series and HA-A2V20-1B propellers with aluminum blades. This includes all 2 and 3 blade, steel hub propellers with the letter X or V in the propeller model designation. The X or V designates propeller designs with "double shoulder" blades. Propellers are installed on, but not limited to, the aircraft applications shown in Table 2.

NOTE: The parenthesis shown in the model designations throughout this Bulletin indicate letter(s) that may or may not be present due to different configurations allowable on the various aircraft installations. Definition of propeller model designations and further details of letters that may be present are shown in Table 1.

B. Concurrent Requirements

- (1) FAA Airworthiness Directive AD 85-14-10R2 may be applicable. It affects propellers with C-3-() Blade Clamps with certain serial numbers. (C-3 Clamps are used on affected propellers). If affected, depending on clamp serial number, compliance requires replacement or visual and magnetic particle inspection of blade clamps within 60 days and thereafter reinspect (dye penetrant method) every 100 hours. Another serial number block requires a onetime visual and magnetic particle inspection. Inspection criteria are in Hartzell Service Instruction 159C.
- (2) The Time Between Overhaul specification for affected propellers has been reduced to 1000 hours of operation or 60 calendar months, whichever occurs first, except for HC-A3VF-7() turbine engine propellers which remain at 3000 hours of operation or 60 calendar months. Time Between Overhaul specifications are published in Hartzell Service Letter 61U (or subsequent revision).

C. Reason

- (1) There have been several instances of blade separations resulting from cracks in hubs, blades, or blade clamps in this series propeller. Blade separation may cause injury or death. Compliance with this Service Bulletin is required in order to maintain flight safety for this propeller type.

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- (2) There have been several recent reports of cracks in a blade shank retention radius that were not detected during dye penetrant inspection. The cracks were discovered using eddy current inspection methods. This situation raises concern that compliance with the repetitive dye penetrant inspection requirements contained in various existing Airworthiness Directives may not detect a possible fatigue crack. Therefore, a new eddy current inspection method has been developed and is now required during inspection of all X and V shank blades.
- (3) Numerous incidents of cracks in the propeller blade retention radius of X and V shank blades have been reported (over 30 cracked blades, including one fatal accident). Incidents typically have occurred on propellers already affected by existing Airworthiness Directives. However, these Airworthiness Directives have been in effect for over 20 years and the number of recent incidents indicates that the problem has not been eliminated and, in fact, the incidents may be increasing. Thus, there is a continuing need for blade inspections at intervals shorter than the originally specified overhaul intervals.
- (4) In addition to the blade retention radius inspection required in this Bulletin, when a propeller is disassembled for the blade inspection, other inspections are considered necessary. These requirements are specified as a result of service difficulty reports:
 - (a) The steel blade clamps must be magnetic particle inspected. There have been a few recent reports of cracked C-3-() blade clamps.
 - (b) The blade internal bearing bore must be dye penetrant inspected. There has been one incident of in-flight blade separation of an X shank blade due to fatigue cracks that originated from corrosion in the internal bearing bore radius.
 - (c) The steel hubs of all HC-(1,4,5,8)(2,3)(X,V)()-() propellers must be magnetic particle inspected. In the past there have been five incidents of in-flight blade separations due to fatigue cracks that originated at the hub retention radius where a split ring retainer is installed between the hub and blade bearing.

NOTE: The above condition is related to old hubs that use a split ring retainer. Later hubs, ()HC-(A,D)(2,3)(X,V)()-(), do not use a split ring retainer and have not had retention radius cracks.

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- (5) There are currently four FAA Airworthiness Directives applicable to various X and V shank propeller blades: 68-13-2, 68-19-4, 75-17-34, 77-14-07. The FAA is expected to supersede these ADs with a new AD that requires compliance in accordance with this Service Bulletin which provides improved blade shank inspection procedures, additional inspection requirements (paragraph (3) above), and expands applicability to all propeller models using X or V shank blades as listed in Table 2.

D. Description

This Bulletin provides requirements for:

- (1) inspection of the retention area of double shoulder (X, V shank) blades which includes fluorescent dye penetrant inspection and new procedures for eddy current inspection,
- (2) optical comparator inspection of the blade retention area,
- (3) dye penetrant inspection of the blade internal bearing bore radius,
- (4) magnetic particle inspection of all blade clamps,
- (5) magnetic particle inspection of certain hubs.

NOTE: Procedures for dye penetrant, optical comparator, magnetic particle, eddy current inspection and other overhaul procedures are published in other Hartzell publications.

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E. Compliance

NOTE: It is possible that the requirements for the Blade Internal Bearing Bore Inspection have been accomplished during a previous overhaul. A blade is in compliance with requirements of Internal Bearing Bore Inspection where service records document accomplishment of blade overhaul in accordance with Hartzell Aluminum Blade Manual 133C (dated May 20, 1996) or compliance with Service Bulletin 136G (dated Nov. 15, 1991) or Service Bulletin 136H (dated March 12, 1993). Also, new blades manufactured since November 1991 meet the initial requirements for internal bearing bore inspection.

(1) HC-(1,4,5,8)(2,3)(X,V)(-)(-) series propellers:

(a) Initial Inspection:

- 1 The initial inspection consists of compliance with all applicable Accomplishment Instructions in paragraph 3 of this Bulletin, this includes: Blade Internal Bearing Bore Inspection (if required, see Note above), Blade Clamp Inspection, Blade External Inspections, and Steel Hub Inspection.
- 2 If total time in service since new of the propeller is:
 - a less than 900 hours of operation, compliance is required upon reaching 1000 hours of operation. However, compliance must not exceed 60 calendar months from new or 24 calendar months from the date if this Bulletin revision, whichever occurs later.
 - b equal to or greater than 900 hours of operation or if total time is unknown, compliance is required within 100 hours of operation or 24 calendar months from the date if this Bulletin revision, whichever occurs first.

(b) Repetitive Inspection:

- 1 Perform Steel Hub Inspection (Accomplishment Instructions paragraphs 3.B, E, F, G) at intervals not to exceed 250 hours of operation or 60 calendar months from the date of last Bulletin compliance, whichever occurs first.
- 2 Perform Blade External Inspections and Blade Clamp Inspection (Accomplishment Instructions paragraphs 3.C, D, E, F, G) at intervals not to exceed 500 hours of operation or 60 calendar months from the date of last Bulletin compliance, whichever occurs first.

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- 3 Perform Blade Internal Bearing Bore Inspection (Accomplishment Instructions paragraph 3.A, E, F, G) at intervals not to exceed 60 calendar months from the date of last Bulletin compliance.
- (2) ()HC-(A,D)(2,3)(X,V)()-() series and HA-A2V20-1B propellers (except -7 models):
- (a) Initial Inspection:
 - 1 The initial inspection consists of compliance with all applicable Accomplishment Instructions, this includes: Blade Internal Bearing Bore Inspection (if required, see Note on page 4), Blade Clamp Inspection, and Blade External Inspections.
 - 2 If total time in service since new of the propeller blades is:
 - a less than 800 hours of operation, compliance is required upon reaching 1000 hours of operation. However, compliance must not exceed 60 calendar months from new or 24 calendar months from the date if this Bulletin revision, whichever occurs later.
 - b equal to or greater than 800 hours of operation or if total time is unknown, compliance is required within 200 hours of operation or 24 calendar months from the date if this Bulletin revision, whichever occurs first.
 - (b) Repetitive Inspection:
 - 1 Perform Blade External Inspections and Blade Clamp Inspection (Accomplishment Instructions paragraphs 3.C, D, E, F, G) at intervals not to exceed 500 hours of operation or 60 calendar months from the date of last Bulletin compliance, whichever occurs first.
 - 2 Perform Blade Internal Bearing Bore Inspection (Accomplishment Instructions paragraph 3.A, E, F, G) at intervals not to exceed 60 calendar months from the date of last Bulletin compliance.

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- (3) HC-A3VF-7() turbine engine propellers:
- (a) Initial Inspection:
- 1 The initial inspection consists of compliance with all applicable Accomplishment Instructions, this includes: Blade Internal Bearing Bore Inspection (if required, see Note on page 4), Blade Clamp Inspection, and Blade External Inspections.
 - 2 If total time in service since new or since overhaul of the propeller is:
 - a less than 2500 hours of operation, compliance is required upon reaching 3000 hours of operation. However, compliance must not exceed 60 calendar months from new or overhaul, or 24 calendar months from the date of this Bulletin revision, whichever occurs later.
 - b equal to or greater than 2500 hours of operation or if total time is unknown, compliance is required within 500 hours of operation. However, compliance must not exceed 24 calendar months from the date of this Bulletin revision.
- (b) Repetitive Inspection:
- 1 Perform Blade External Inspections and Blade Clamp Inspection (Accomplishment Instructions paragraphs 3.C, D, E, F, G) at intervals not to exceed 3000 hours of operation or 60 calendar months from the date of last Bulletin compliance, whichever occurs first.
 - 2 Perform Blade Internal Bearing Bore Inspection (Accomplishment Instructions paragraph 3.A, E, F, G) at intervals not to exceed 60 calendar months from the date of last Bulletin compliance.

F. Approval

This revision has been approved by the Manager, FAA, Chicago Aircraft Certification Office, ACE 115C, by approval document dated October 7, 1999 as an equivalent means of compliance with AD 97-18-02.

G. Manpower

If compliance is performed in the course of normal overhaul, the only additional manpower required is that for the eddy current inspection which requires approximately 30 minutes per blade. (All other inspection requirements in this Bulletin are previously established overhaul procedures.)

If work is performed outside of overhaul and includes internal blade bearing bore inspection: 14.0 man-hours is required for two blade propellers, 17.0 man-hours for three blade propellers (includes 2.0 hours for removal & installation).

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If work is performed outside of overhaul and if internal blade bearing bore inspection is not required: 9.0 man-hours is required for two blade propellers, 9.5 man-hours for three blade propellers (includes 2.0 hours for removal & installation).

H. Weight and Balance

Not Changed.

I. Electrical Load Data

Not Changed.

J. References

Hartzell Aluminum Blade Manual 133C (ATA # 61-13-33)

Hartzell Standard Practices Manual 202A (ATA # 61-01-02)

Hartzell Tool & Equipment Manual 165A (ATA # 61-0-65)

For Hartzell service literature and revisions, contact:

Hartzell Propeller Inc.

Telephone: 937.778.4299

Technical Publications Department

Fax: 937.778.4321

One Propeller Place

Piqua, Ohio 45356 U.S.A.

K. Other Publications Affected

Information in this Bulletin will be added to the Hartzell Aluminum Blade Manual 133C, Standard Practices Manual 202A, and Propeller Manuals 100D, 109A, and 114B.

2. Material Information

Special Tooling.

<u>Hartzell P/N</u>	<u>Description</u>
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BST-3075	Double Shoulder Blade Eddy Current Tool Kit (includes eddy current probe, blade fixture, calibration standard, tape and case)
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NOTE: Other specialized equipment for dye penetrant inspection, magnetic particle inspection, and eddy current inspection are required. Propeller repair stations that service Hartzell products should already possess such equipment. Information regarding these procedures is found in Hartzell Standard Practices Manual 202A (ATA # 61-01-02) and Hartzell Tool & Equipment Manual 165A (ATA # 61-0-65).

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3. Accomplishment Instructions

NOTE: The following procedures assume the blade has been removed from the propeller hub. Perform disassembly/assembly in accordance with the applicable propeller overhaul manual: 100D, 109A, or 114B. This inspection must be accomplished by an approved propeller repair station.

A. **Blade Internal Bearing Bore Inspection:**

- (1) Remove the blade internal bearings/bushing(s) and inspect the internal bearing bore in accordance with procedures in Hartzell Aluminum Blade Manual 133C, Blade Shank Overhaul chapter, paragraph 2G dated May 20/96 (or subsequent revision).
- (2) Blades with crack indications are to be retired from service. Blade internal bearing bores must meet acceptance criteria specified in Hartzell Aluminum Blade Manual 133C, Blade Shank Overhaul chapter, paragraph 2G dated May 20/96 (or subsequent revision).

B. **Steel Hub Inspection:**

- (1) The steel hubs of HC-(~~1,4,5,8~~)(2,3)(X,V)(-)(-) propellers must be visually and magnetic particle inspected in accordance with procedures in Hartzell Standard Practices Manual 202A. Pay particular attention to the blade arm retention radius in the area of contact with the split ring retainer.
- (2) No magnetic particle indications are allowed. Hubs with crack indications are to be retired from service. Hubs must meet acceptance criteria specified in Table 1706 of Hartzell Standard Practices Manual 202A (revision 6 or subsequent).

C. **Blade External Inspections:**

- (1) Perform cleaning, etching, and fluorescent dye penetrant inspection of the blade shank in accordance with procedures in Hartzell Standard Practices Manual 202A.

NOTE: While all external areas of the blade retention require inspection, reported incidents are typically circumferential cracks located in the radius of the inner blade retention groove and typically have been tight cracks that are not easily detected. For this reason, specialized eddy current inspection procedures are required for inspection of this area.

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- (2) Perform eddy current inspection of the blade retention radius in accordance with eddy current inspection procedures in Hartzell Standard Practices Manual 202A (Mar/97 revision or subsequent).

CAUTION: COMPLIANCE WITH BLADE SHANK DIMENSIONAL AND OPTICAL COMPARATOR REQUIREMENTS ARE IMPORTANT TO ASSURE OPTIMUM FUTURE SERVICE LIFE.

- (3) Perform dimensional and optical comparator inspection of the blade shank, and rework as required, in accordance with Hartzell Aluminum Blade Manual 133C, Blade Shank Overhaul chapter, paragraph 2C dated May 20/96 (or subsequent revision). Blades that cannot meet acceptance criteria are to be retired from service.
- (4) If not previously accomplished, shot peen propeller blade shank area in accordance with procedures in Hartzell Standard Practices Manual 202A.

NOTE: Any non-shot peened blades must be shot peened. Re-shot peening is not a requirement during each inspection. Re-shot peening is required if deemed necessary because of excessive wear/damage or repairs as defined in Hartzell Manual 133C.

- (5) No penetrant indications or eddy current indications are allowed. Blades with crack indications are to be retired from service. Indications of corrosion pitting may be repaired if within the limits specified in Manual 133C.

D. Blade Clamp Inspection:

- (1) Perform visual and magnetic particle inspection. Perform magnetic particle inspection of the steel blade clamps in accordance with procedures in Hartzell Standard Practices Manual 202A. For compliance with this inspection, removal of the counterweight from the clamp is required.
- (2) No magnetic particle indications are allowed. Clamps with crack indications are to be retired from service. Indications (visual or magnetic) of damage or corrosion pitting are not allowed but are repairable within the limits shown in Figure 1.

E. During re-assembly of blade clamps, use of new A-321 Screws and A-2043-1 Nuts is required. Replacement of other fasteners is "on condition".

F. Make logbook entry indicating compliance with this Bulletin.

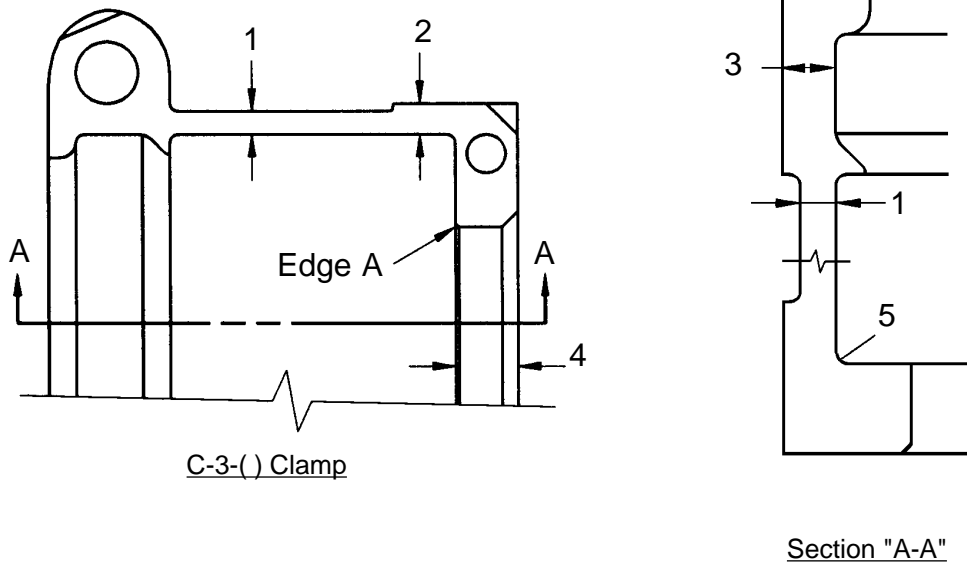
G. Report any incidents of parts with crack indications to the Hartzell Propeller Product Support Department.

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<u>Location</u>	<u>Description</u>	<u>Maximum Allowable rework</u>	<u>Minimum Allowable wall thickness after rework</u>
Item 1	Wall thickness - thin walled area	0.007 in.	0.132 in.
Item 2	Wall thickness - bearing retention area	0.007 in.	0.215 in.
Item 3	Wall thickness - blade retention area	0.007 in.	0.195 in.
Item 4	Inboard wall thickness - bearing retention area	0.007 in.	0.618 in., except 0.612 min. in area of link pin/arm
Item 5	Corner - inside wall	0.007 in.	Maintain radius of 0.050 to 0.070 in.

Clamp Inspection Areas and Rework Limits
Figure 1

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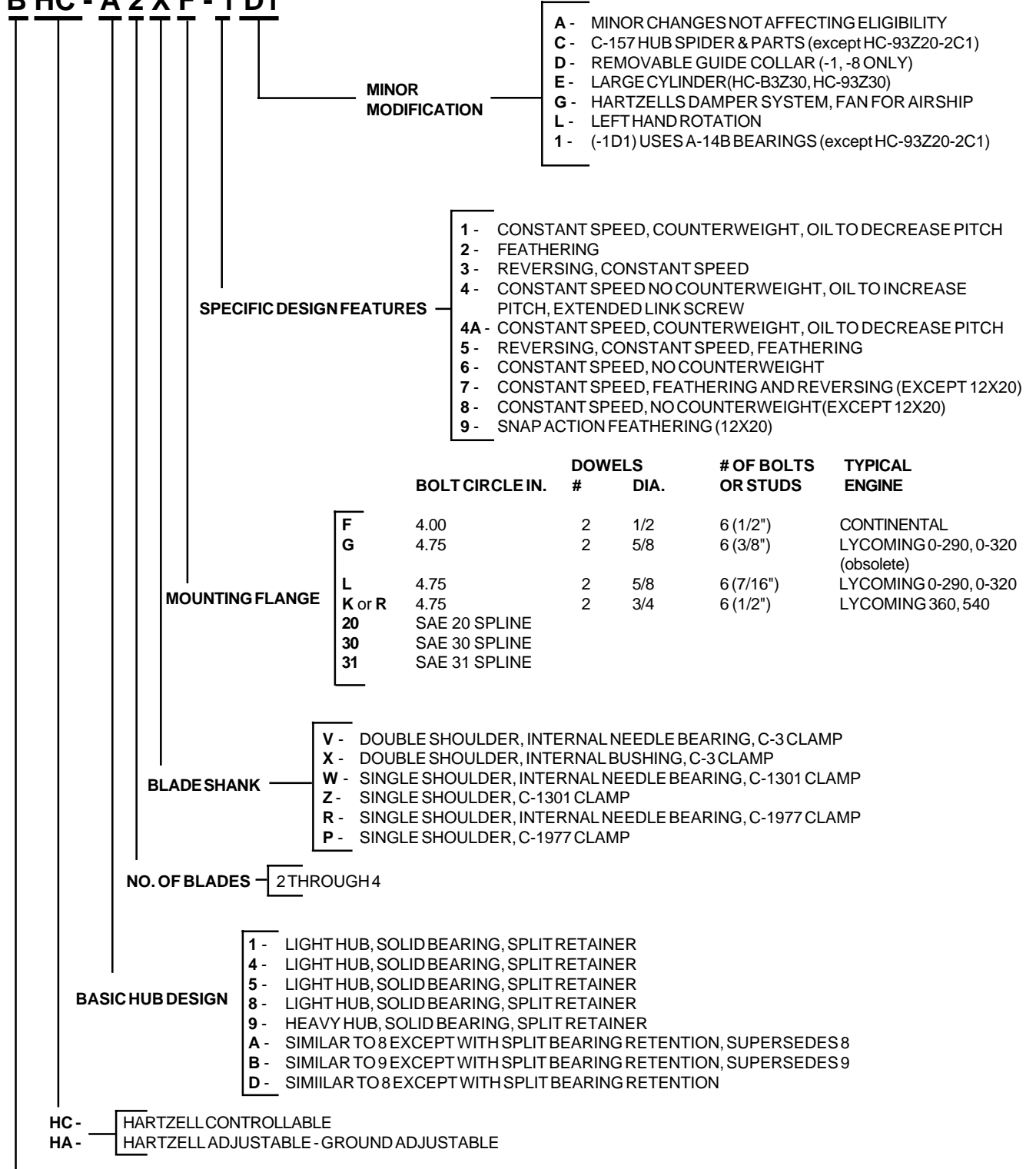
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Table 1. Model Designations for Steel Hub, Reciprocating Engine Propellers

B HC - A 2 X F - 1 D1



MOUNTING FLANGE DOWEL LOCATION

Apr 4/97

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HC-SB-61-217

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Table 2. Aircraft and Propeller Applications

<u>AIRCRAFT MODEL</u>	<u>TC/STC #</u>	<u>ENGINE</u>	<u>PROPELLER</u>	<u>BLADE</u>
AeroCommander (Twin Commander)				
500 AERO COMMANDER	STC-SA257CE	IO-540-A1A5	HC-A3VK-2	V7636D
500 AERO COMMANDER	STC-SA340SO	IO-520-D, -E	EHC-A3VF-2B	V7636D
500 AERO COMMANDER	6A1	O-540-A2B	HC-(A,8)2(X,V)K-2	(V)84333(N)-4
500 AERO COMMANDER	UNK	O-540-A2B	HC-A3VK-2B	V7636D
500A AERO COMMANDER	6A1	IO-470-M	HC-A2(X,V)F-2	(V)8433(N)-4
500B, 500S, 500U AERO COMM.	EXP	IO-540-	HC-A3VK-2B	V8433N-6Q
500B, 500U, 500S AERO COMM.	6A1	IO-540-B1(A,C)5, E1(A,B)5	HC-A3(X,V)K-2, -2A	(V)8433(N)-4
500U, 500S AERO COMM.	STC-SA2478SW	IO-720-B1B, -B1BD	HC-A3VK-2A	V8433(N)-4R, -4Q
520 AERO COMMANDER	6A1	GO-435-C2	HC-12X20-8C, 9C	9333C-3
520 AERO COMMANDER	6A1	GO-435-C2, -C2B, -C2B1	HC-82X20-2	9333C-3
520 AERO COMMANDER	6A1	GO-435-C2, -C2B, -C2B1	HC-83X20-2	8433
560 AERO COMMANDER	STC-SA2-89	GO-480-C1D6	HC-83X20-2	V8833(N)(-2), V8433(N)
560 AERO COMMANDER	6A1	GO-480-B, -B1C	HC-82X20-2	9333C-3
560A AERO COMMANDER	6A1	GO-480-D1A, -(C,G)1B6	HC-83X20-2	8433
560A, 560E AERO COMM.	6A1	GO-480-(C,G)1B6	HC-83X20-2	(V)8833(N)-2
680, 680E AERO COMMANDER	STC-SA439WE	IGSO-480-A1D6	HC-A3X20-2	9333C
680, 680E, 720 AERO COMM.	2A4	GSO-480-A1A6, -B1A6	HC-83X20-2	9333C
680F AERO COMMANDER	UNK	IO-720-B1B	HC-A3VK-2A	V8433B-6Q
680F, FP, FL, FLR AERO COMM.	STC-SA2891WE	IO-720-B1B	HC-A3VK-2A	V8433-R
B1 (CALLAIR)	A7WE, A8WE	IO-720-A1A	HC-A3VK-4	V8433(N)-4
Aeromere				
FALCO F.8.L	7A11	O-320-A1A	HC-82XL-1F	7636D-4
Aeronautica Macchi				
AL60-F5	7A12	IO-720-A1A	HC-A3VK-4	V8433
AM-3	A19EU	GTSIO-520-C	HC-A3VF-4	V8833
Bauger				
SAIL PLANE	UNK	O-290-D	HC-A2XL-2	7636D-4
Beech				
35 SERIES BONANZA	STC-SA4-1305		HC-12X20-7E	8433
35 SERIES BONANZA	STC-SA4-550	E-225-8	HC-12X20	8433
35 SERIES BONANZA	STC-SA4-785		HC-12X20-7D	(V)8433(N)
35 SERIES BONANZA	STC-SA4-819		HC-12X20-7D	(V)8433(N)
35 SERIES BONANZA	STC-SA609SW		PHC-A3VF-4	V8433-4, V8433N-4
35 SERIES BONANZA	STC-SA4-1146		HC-12X20-7C	(V)8433(N)
35, A35 BONANZA	A777	E-185-1	HC-12X20-7B	8433
35, A35, B35 BONANZA	A777	E-185-1, E-185-8	HC-12X20-7C	8433
35, A35, B35, C35, D35, E35, F35	STC-SA1-570	E-185-8, -11, -1; E225-8	HC-A2X20-4A1	(V)8433(N), (V)8833(N)-4
C35, D35 BONANZA	A777	GO-435-D1	HC-12X20-1	(V)9333C-3
G35, 35R BONANZA	STC-SA1-570	E-225-8	HC-A2X20-4A1	(V)8433(N), (V)8833(N)-4
S35, V35 BONANZA	3A15	IO-520-; TSIO-520-D	PHC-A3VF-4	8433-2R, -4R
V35A, V35B BONANZA	3A15	IO-520-; TSIO-520-D	PHC-A3VF-4	8433-4R
35-C33 DEBONAIR	3A15	IO-470-K	PHC-A3VF-4	V8433-4R(D)
35-C33A, E33A, F33A	3A15	IO-520-B, -BA, -BB	PHC-A3VF-4	8433-2R, -4R
50 SERIES TWIN BONANZA	STC-SA2-665	GO-480-C3C6, -C2D6	HC-83XF-2A	9333C-3
50 SERIES TWIN BONANZA	STC-SA2-87, 93	GO-480-C2C6, -C2D6	HC-83X20-2E	9333C-3
50 SERIES TWIN BONANZA	STC-SA2-602	GO-480-F4B6	HC-83XF-2A	9333C-3
50 SERIES TWIN BONANZA	STC-SA2-602	GO-480-F2A6	HC-83X20-2C	9333C-3
50 SERIES TWIN BONANZA	STC-SA2-1	GO-435-C2B	HC-83X20-2C	9333C-3
50, B50, C50 TWIN BONANZA	STC-SA2-66	GO-480-B, -B1(B,C,D), -F2A	HC-83X20-2C	9333C-3
58P, 58TC BARON	STC-SA538GL	TSIO-520-L, -LB, -WB	PHC-A3VF-5R	V7636NRB
BARON	STC-SA350SO	IO-520-E	EHC-A3VF-2B	V7636D(B)-2R
95-55, 95-A55, 95-B55 BARON	STC-SA126CE	IO-470	(P)HC-A3(X,V)F-2B	(V)7636D, V7636N
65, A65, 65-(B)80, 65-A80, 70	STC-SA444SW	IO-720-A1A, -A1B	HC-A3VK-2A	V8433-2R, -4R, -4Q
65, A65, A65-8200, 70	STC-SA2365WE		HC-83X20-2	9333C-3

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Table 2. Aircraft and Propeller Applications (continued)

<u>AIRCRAFT MODEL</u>	<u>TC/STC #</u>	<u>ENGINE</u>	<u>PROPELLER</u>	<u>BLADE</u>
B50 TWIN BONANZA	5A4	GO-435-C2B	HC-83X20-2C	9333C-3
C50 TWIN BONANZA	STC-SA2-233	GO-480-F4B6, -F4A6	HC-83XF-2A, -A3VF-2	9333C-3
C50 (EXCALIBER)	STC-SA360/242SW	GO-480-G2D6, -G2F6	HC-A3VF-2	V9333C-3 TO -4
D50, D50A, D50B, D50C, D50E	5A4	GO-480-(C,G)2(C,D,F)6	HC-(A,8)3(X,V)F-2A	9333C-3
Bellanca				
14-13	STC-SA2-848	O-435-C	HC-12X20-8D, -D2X20-8	8433-6
14-19	1A3	O-435-A	HC-12X20-8C, -D2X20-8	8433-6
14-19-2	1A3	O-470-K	HC-82XF-1, -A2XF-1A	8433S-6
14-19-3	1A3	IO-470-F	HC-A2XF-1A	8433-2
7GCA, 7GCB, 7GCC	STC-SA282AL		HC-82XL-1	7663D-4
DW-1 EAGLE	A4NW	W670-6N, -6A (R-670-4, -5)	HA-A2V20-1B	V10133N
Camair				
480	2A2	O-470-B	HC-82XF-2B	8433-2
480	2A2	O-470-D	HC-82XF-2B	8433-4
Cessna				
170	STC-SA1-245	O-340-A1A	HC-82XL-1F, -A2XL-1	8433-12
170	STC-SA135CE	O-320-(A,B)(1,3)(A,B)	HC-82XL-1F, -A2XL-1	7636D-4
170	STC-SA3-13	O-340	HC-82XL-1F, -A2XL-1	7636D-4
170A	STC-SA1-240	O-435-C	HC-(1,D)2X20-8(D), -5C	8433-6
172 SKYHAWK	STC-SA3-126	O-340-A1A	HC-82XL-1F	8433-12
172, 175	STC-SA610SW	O-320	HC-82XL-2	7636D-4
180, A, B, C, D, E, F, G, H	STC-SA816SW	O-470-A, -J, -R, -K, -L	BHC-A2VF-3	V8833
180, A, B, C, D, E, F, G, H	STC-SA816SW	O-470-A, -J, -R, -K, -L	BHC-A2VF-3	V8833
180, A, B, C, D, E, F	5A6	O-470-A, -J, -K, -L	(B)HC-(8,A)2(X,V)F-(1,6)	8433, 8833
182	STC-SA108CE		BHC-A2VF-3	V8433-2
182, 182A, B, C, D, E	STC-SA129EA	O-470-L	(B)HC-A2XF-G or -1	8433-2
182, A, B, C, D, E, F, G	3A13	O-470-L, -R	(B)HC-(8,A)2(X,V)F-1	8433-2
182E, F, G, H, J, K, L, M	STC-SA692SW		BHC-A2VF-3	8433-2
210, A, B, C, 5, 5A	3A21	IO-470-E, -S	HC-A2XF-1	8433-2
310	UNK	IO-540-(A,B)1(A,B)5	HC-A3(V,X)K-2B	V7636DB
310, 310A, 310B	3A10	O-470-B, -M	HC-(A,8)2(X,V)F-2	8433
310, 310B, 310G	STC-SA212SO	IO-540-A1A5	HC-A3(X,V)K-2B	(V)7636D(B)
310C, D, E, F, G, H, E310H	3A10	IO-470-D	HC-(A,8)2(X,V)F-2B	8433
320, 320-1 SKYKNIGHT	STC-SA285SO	IO-540-A1A5	HC-A3XK-2B	7636D
320, 320-1, 320A, 320B	3A25	TSIO-470-B, -C	HC-A2XF-2	8433-4
402 BUSINESSLINER	UNK	250-C18	HC-A3VF-7	V9333C-3R
411	A7CE	GTSIO-520-C	HC-A3VF-2D	V8833
WREN 460	STC-SA403SW		BHC-A2VF-3	V8433-2
WREN 460H, J, K, L, M	STC-SA485SW		BHC-A2VF-3	V8433-2
DeHavilland				
DH104 DOVE	STC-SA168SO	IO-720-A1A	HC-A3VK-2A	V8433-4R
DH114 HERON	STC-SA629SO	IO-540-G1B5	HC-A3VK-2A	V8433-7
DH114 HERON	STC-SA816WE	GYPSY QUEEN 30MK-2	HC-A3X21-2L	L7636D TO -1
Dornier				
DO27Q-6	A8IN	GO-480-B1A6	HC-82X20-1B, -A2X20-1	10133D-3
DO28A-1	7A13	O-540-A1D	HC-A2XK-2	8433-2
DO28B-1	7A13	IO-540-A1A5	HC-A3VK-2C	V8433-4
Fuji				
T-3, LM-2	UNK	IGSO-480-A1F6	HC-A3V20-1F	V9333N-3
GAF - Gov't. Aircraft Factories				
N22B, N24A, N22S, N22C	A7PC	250-B17B, -B17C,E,F	HC-A3VF-7, -7B	V10133(D,N)-11
Goodyear (Loral)				
GA22A GOODYEAR BLIMP	1A12	E-225-8	HC-12X20-5E	L8833
GZ19, 19A GOODYEAR BLIMP	1	GO-300-F	HC-82XF-3L	L9333CH-3
Great Lakes				
2T-1A-2	EXP	250-B17C	HC-A3VF-7	V10133AN-11

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Table 2. Aircraft and Propeller Applications (continued)

<u>AIRCRAFT MODEL</u>	<u>TC/STC #</u>	<u>ENGINE</u>	<u>PROPELLER</u>	<u>BLADE</u>
Grumman				
G44, G44A WIDGEON	A734	GO-435-C2, -C2B	HC-12X20-9	9333C
G44, G44A WIDGEON	A734	GO-435-C2, -C2B	HC-82X20-2	9333C-3
G44, G44A WIDGEON	A734	GO-435-C2B	HC-82X20-2	9333C-3
G44, G44A WIDGEON	A734	GO-435-C2B	HC-83X20-2A	8433
G44, G44A WIDGEON	STC-	IO-520-E	PHC-A3VF-2B	V7636N
G44, G44A WIDGEON	STC-	6-440-C5	HC-D2X20-8	8833
G44, G44A WIDGEON	STC-SA2-13	IO-470-D	HC-82XF-2B	8433
G44, G44A WIDGEON	STC-SA4-65,-64	GO-480-B1	HC-83X20-2A	8433
G44, G44A WIDGEON	STC-SA4-64	GO-435-C2B	HC-83X20-2A	8433
G44, G44A WIDGEON	STC-SA4-64	GO-435-C2B	HC-82X20-2	9333C-3
G44, G44A WIDGEON	STC-SA4-111	GO-480-C1D6	HC-83X20-2A	8433
G44, G44A WIDGEON	STC-SA835SO	GO-480-G2D6	HC-A3VF-5R	V9333C(H)-3
G44, G44A WIDGEON	STC-	6-440-C5	HC-A2V20-2	V8833NS
G44, G44A WIDGEON	A734	GO-480-B1	HC-83X20-2A	8433
G44, G44A WIDGEON	STC-SA2-13	O-470-B	HC-82XF-2C	8433
G21C, D GOOSE	4A24	GSO-480-B2D6	HC-83XF-3A	9333CH
Helio				
H-391 COURIER	1A8	GO-435-C2	HC-12X20-8C	9333C
H-391B COURIER	1A8	GO-435-C2B()	HC-82X20-1A,-1B	10133D
H-395A COURIER	1A8	GO-435-C2B2-6	HC-(8,A)2X20-1A,-1B	10133D
Luscombe				
11	STC-SA3-71	E-185-2	HC-A2XF-2	8433-1
11A	A-804	E-185-2	HC-42XF-2	8433-1
Mooney				
M20	2A3	O-320	HC-82XG-1B, -A2XL-1	7636D
Multitech (Temco)				
D16 TWIN NAVION	2A1	O-320-A1A	HC-82XG-2,-A2XL-2	7636C-2, D-2
D16 TWIN NAVION	2A1	O-290-D2A	HC-82XG-2,-A2XL-2	7636C-2
D16A, D16 TWIN NAVION	2A1	O-340-A1A	HC-82XG-2,-A2XL-2	8433-12
Nardi				
FN-333	7A5	IO-470-P	HC-A3X20-5L	L8433-6B
FN-333	7A5	IO-470-P	HC-(A,8)2X20-5L	L8433H
Navion				
NAVION	A782	E-185-3	HC-52X20-1	8433
NAVION	STC-SA1-635	E-185	HC-A2X20-4A1	8433
NAVION	STC-SA1-635	E-185-3, -9	HC-A2X20-4A1	8433
NAVION	STC-SA1-635	E-225-4	HC-A2X20-4A1	8433
NAVION	STC-SA1-635	E-225-4	HC-A2X20-4A1	8433
NAVION	STC-SA4-118		HC-12X20-7C	8433-0
NAVION B	STC-SA752WE	GO-480-B1D	HC-83X20?	9333C-3
NAVION B	A782	GO-435-C2	HC-12X20-8C	9333C
NAVION B	A782	GO-435-C2	HC-13X20-8D	8433
NAVION, NAVION A	A782	E-225-4	HC-12X20-7B	8433
NAVION, NAVION A	A782	E-185-3, -9	HC-12X20-7(),-8()	8433
NAVION, NAVION A	A782	E-185-3, -9	HC-12X20-5	8433
NAVION, NAVION A	A782	E-185-3, -9	HC-12X20-1	8433
Pacific Aerospace (Fletcher)				
FU-24, FU-24A	4A12	O-470-E	HC-82XF-1B	8833
Piaggio				
P-149D	UNK	GO-480-B1A6	HC-A3V20-1D	V8433N
P136-L1 ROYAL GULL	A813	GO-480-B, -B1B, -B1D	HC-83X20-2CL	L8433
P136-L2 ROYAL GULL	A813	GSO-480-A1A6	HC-83X20-2CL	L9333C
P149D	UNK	GO-480-G(), IGO-480-A1B6	HC-A3V20-1()	V9333C, V9333N
P166 ROYAL GULL	7A4	GSO-480-B1C6	HC-(A,8)3X20-2CL	L9333C(H)
P166 ROYAL GULL	UNK	GSO-480	HC-A3VF-5AL	VL9333CH-5

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Table 2. Aircraft and Propeller Applications (continued)

<u>AIRCRAFT MODEL</u>	<u>TC/STC #</u>	<u>ENGINE</u>	<u>PROPELLER</u>	<u>BLADE</u>
Pilatus				
PC-3	UNK	GO-435-C2A	HC-83X20-2A	8433
PC-6; PC-6-H1, -H2 PORTER	7A15	GSO-480-B1A6	HC-A3X20-1D,-83X20-1B	9333C
Piper				
PA-E23-250 AZTEC	STC-SA164CE	O-540-A1B5, -A3D5, -A1D5	HC-A3XK-2B	7636D-4
PA14 FAMILY CRUISER	STC-SA196SW	O-235-C1	HC-82XL-6F	7636D-4
PA18(A)(S)-150 SUPER CUB	STC-SA4-1143	O-320-A3B	HC-82XL-6F	7636D-2
PA18(A)(S)-150 SUPER CUB	STC-SA284AL	O-320-A2A, -A2A	HC-82XL-1,-2,-6	7636D-4
PA18A-150 SUPER CUB	STC-SA4-254	O-320-A2A, -A2B	HC-82XL-6F	7636D-4
PA22-150, PA22S-150 TRIPACER	1A6	O-320-A1A, -A1B	HC-82XL-6F	7636D-4
PA23	STC-SA179CE	IO-540-A1A5	HC-A3XK-2C	8433-10 TO -12
PA23	STC-SA179CE	IO-540-G1A5	HC-A3XK-2B	7636D-4
PA23 APACHE	1A10	O-320-A(1,3)(A,B)	HC-82XG-2	7636D
PA23 APACHE	1A10	O-320-A(1,3)(A,B)	HC-(8,A)2X(G,L)-2()	7636D-4
PA23 APACHE	STC-SA4-783	O-340-A1A	HC-82XL-2C	8433-12 V7636(D,N)
PA23 APACHE	STC-SA1-6	O-320-A(1,3)(A,B)	HC-82XG-2	7636D-4
PA23 SERIES APACHE	STC-SA2-1088	O-320-B3B	HC-82XL-2B	7636D-4
PA23, PA23-160 APACHE	STC-SA1-5	O-320-A(1,3)(A,B)-150hp	HC-(A,8)2XL-2C	7636D-4
PA23, PA23-160 APACHE	STC-SA1-5	O-320-(B,C)(1,3)(A,B)	HC-(A,8)2XL-2	7636D-4
PA23-160 APACHE	1A10	O-320-(B,C)(1,3)(A,B)	HC-82XG-2	7636D
PA23-160 APACHE	1A10	O-320-(B,C)(1,3)(A,B)	HC-(8,A)2X(G,L)-2(B,C)	7636D-4
PA23-235 APACHE	1A10	O-540-B1A5	HC-82XK-2C1, -A2XK-2	8433-10
PA23-235, 250 AZTEC	STC-SA495CE	O-540-B1A5	HC-A3VK-2B	V7636D-4
PA23-235, 250 AZTEC	STC-SA495CE	O-540-A1B5, -A1D5, -A3D5	HC-A3VK-2B	V7636D-4
PA23-250 AZTEC	STC-SA164CE	O-540-A1B5, -A3D5, -A1D5	HC-A3XK-2B	7636D-4
PA23-250 AZTEC SN<27-2000	1A10	IO-540-C(), O-540-A()	HC-A2XK-2	8433B-10
PA23-250 AZTEC SN<27-2505	1A10	IO-540-C(), O-540-A()	HC-82XK-2C1, -A2XK-2	8433-10
PA24-250 COMANCHE	1A15	O-540-A1(); IO-540-C1B5	HC-A2(X,V)K-1,-82XK-1D	8433-7
PA24-400 COMANCHE	1A15	IO-720-A1A	HC-A3VK-4	V8433-7
PA24S COMANCHE	STC-SA511WE	O-540-B1B5	HC-A2XK-1	8433-7
PA28 CHEROKEE	STC-SA222SW	O-320-A2B	HC-82XL-6F	7636D-4
PA28-140 CHEROKEE	STC-SA2052SE	O-320-E2A	HC-82XL-6F	8433-12
Prop Jets Inc.				
200	3A18	O-470-M	HC-82XF-1DB1,-A2XF-1A	8433S
200A,B,C	3A18	IO-470-D	HC-82XF-1DB1,-A2XF-1A	8433(R)-4
Republic (STOL Amphibian)				
RC3 SEABEE	STC-SA282NW	GO-480-F()	HC-A3XF-5AL	L9333C-6
RC3 SEABEE	UNK	GSO-480-B1C6	HC-A3V20-3L	LV9333N-6Q
RC3 SEABEE	STC-SA3-88	6A8-215-B8F	HC-D3X20-6L	L8433H-2
RC3 SEABEE	STC-SA3-88	6A8-215-B8F	HC-13X20-5L	L8433H-2
RC3 SEABEE	STC-SA282NW	GO-480-C1D6	HC-83X20-3L	L9333C-4
RC3 SEABEE	STC-SA282NW	GO-480-B()	HC-83X20-3L	L8433
RC3 SEABEE	STC-SA615NW	IGSO-540-A1B6	HC-A3V20-3L	LV9333CH-4 or -5
RC3 SEABEE	STC-SA615NW	GO-435-C2B	HC-A3V20-3L	LV9333N-5, LV9333CH-5
RC3 SEABEE	A769	6A8-215-B8F	HC-12X20-3,-3A,-3C,-3E	L8433
RC3 SEABEE	A769	6A8-215-B8F	HC-12X20-2	L8433
RC3 SEABEE	STC-SA282NW	GO-435	HC-83X20-3L	L8433
RC3 SEABEE	STC-SA282NW	GO-480-C(), -G()	HC-A3XF-5AL	L9333C-4
Scottish Aviation (BAE)				
B.206 SERIES 2 BEAGLE	A11EU	GTSIO-520-C	HC-A3VF-2D	V8833B
Stinson				
L-5	STC-	O-435-C	HC-D2X20-8	8433-6
108, -1, -2, -3	STC-SA4-46	O-435-1	HC-12X20-8D, -D2X20-8	8433-6
108-2-3	STC-SA1199WE	O-470-A, -J, -K, -L	HC-A2(X,V)F-1	8433
108-2-3	STC-SA4-398	O-435-C	HC-12X20-8D, -D2X20-8	8433-6

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<u>AIRCRAFT MODEL</u>	<u>TC/STC #</u>	<u>ENGINE</u>	<u>PROPELLER</u>	<u>BLADE</u>
Sud Aviation (SOCATA)				
GY.80-150 GARDAN	A12IN	O-320-A3C	HC-82XL-1	7636D-4
GY.80-160 GARDAN HORIZON	A12IN	O-320-B3C	HC-82XL-1	7636D-4
Swift				
GC-1B	UNK	IO-320-B1A	HC-82XL-1D	7636D-4
Taylorcraft				
20	3A3	O-470-A	HC-82XF-1	8433
20	3A3	O-470-J	HC-82XF-1	8433
Texas Bullet				
205	4A2	E-185-1-7	HC-12X20-7	8433-6
Windecker				
EAGLE	UNK	250-B17C	HC-A3VF-7A	V10133N-17Q