HARTZELL PROPELLER INC.

Aircraft Accident/Incident Report No.: 100807

Date of Accident:	August 7, 2010
Location:	Saltzberg, PA
NTSB File No.:	ERA10FA404
Aircraft:	Beech 58 Baron
Registration No.:	N28MR
Serial No.:	TH-1328
Operator:	unknown

Written by:	Tom McCreary Air Safety Investigation Manager
Date:	May 19, 2011

Contents:

	Page
Accident Synopsis	2
Conclusion	2
Propeller Teardown Report	3
Photographic Summary	11

ACCIDENT SYNOPSIS

According to the NTSB preliminary report, the aircraft was in a spin and crashed into a house followed by a severe post-impact fire.

Aircraft Damage: Destroyed
Injuries: Two persons on board, two fatal

SUMMARY AND ANALYSIS

Both propellers were so severely fire damaged that the teardown and inspection provided almost no meaningful information.

The blades from both propellers were largely consumed by the fire. The blade remnants did not provide clues to rotation or power at the time of impact.

Both propellers were at a low pitch position. Damage indicated that the propellers were at this position at the time of the fire. While the propellers were found at a low pitch position post-impact, there is no evidence to indicate that they were at a low pitch position prior to impact. There was no evidence to suggest that either propeller was feathered.

CONCLUSIONS

The pre-impact state of the propellers could not be determined.

There were no discrepancies noted that would preclude normal operation. All damage was consistent with impact damage and thermal damage.

Propeller Teardown Report

Date of Investigation: May 13, 2011

Location: Hartzell Propeller Inc.

Propeller Model: HC-C4YF-2E with FC7063Q blades

Representatives:

Tom McCreary	Hartzell Propeller Inc.
Bob Craig	FAA - FSDO Cincinnati

General Comments:

This type propeller is a 4-blade single-acting, hydraulically operated, constant speed model with feathering capability. Oil pressure from the propeller governor is used to move the blades to the low pitch (blade angle) direction. A spring, counterweights, and an air charge move the blades to the high pitch/feather direction in the absence of governor oil pressure. The propeller incorporates a start lock mechanism that holds the blades at a low blade angle during engine start. The blades and hub are of aluminum construction. Propeller rotation is clockwise as viewed from the rear.

Installation Data: (Data reference the 30-inch station)

Low Pitch:	13.5	± 0.1	degrees
Start Lock:	19.0	± 1.5	degrees
Feather:	82.0	± 1.0	degrees

Service History:

Logbook records were not available. Blade serial numbers listed below are from Hartzell manufacturing records. Blade serial numbers were not physically examined during teardown; it is possible that blades could have been replaced after the original manufacture.

	S/N	Date of manufacture	TTSN	TSO
Left Hub	GL163	10/15/1997	unknown	unknown
Blades	J06509			
	J06508			
	J06503			
	J06505			
Right Hub	GL164	10/15/1997	unknown	unknown
Blades	J06506			
	J06502			
	J06507			
	J06504			

Position: **LEFT**

Hub Serial Number: GL163 **Factory No.:** A40018

Blade Model: FC7063Q (per manufacturing record)

Blade serial numbers were undetermined because the blade butts could not be physically examined.

Blade Orientation:

The blades were identified as L1-L2-L3-L4 clockwise as viewed from the rear of the propeller.

As Received Condition:

See photos on Page 5.

The propeller had severe thermal damage. All four blades had been melted outboard of the blade counterweights. The outboard portions of the blades were missing. The spinner assembly was missing. The cylinder assembly was melted and mostly missing. The low pitch stop, air valve, feather stop, start lock mechanism, and feather spring guides were also missing. The mounting studs were missing. Two of the four blade counterweights had separated from the blades; the blades were melted in the area of the counterweight boss.

All four blades and the piston were at a low pitch position.

A coarse screen mesh was imbedded into melted aluminum in the area of the piston/cylinder.

Spinner Assembly:

Missing

Propeller Cycling:

Cycling of pitch change mechanism was not possible.

Engine/Propeller Mounting:

All six mounting studs were missing. One of the two mounting flange dowel pins was missing. The mounting flange was cracked and partially deformed.

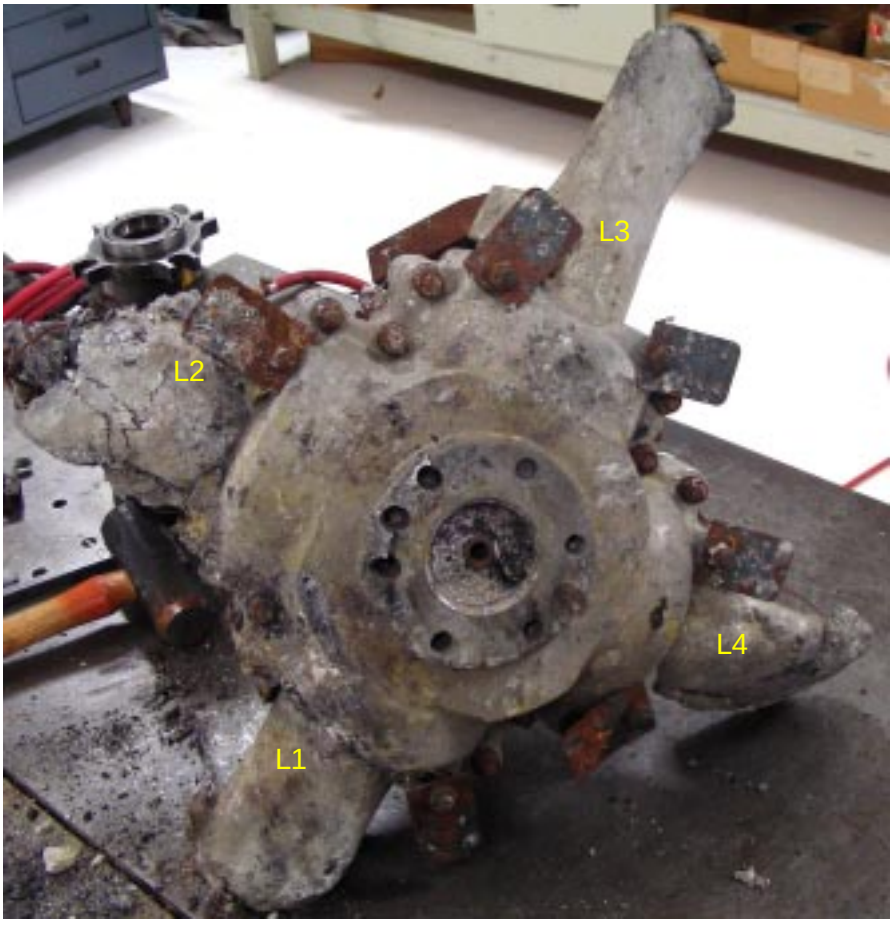
Cylinder:

The cylinder was largely missing. A fragment of the cylinder was crushed and torn and remained attached to the feather spring.

Piston:

The piston was largely melted/missing.


L2
L3
L1
L4


L3
L2
L4
L1

Pitch Change Rod:

The pitch change rod appeared to be intact, but was not completely observed.

Fork:

The fork was intact but corroded.

Spring/Spring Guides:

The feather spring was deformed and corroded. The Delrin spring guides were missing.

Pitch Stops:

The low pitch stop, feather stop, and start locks were missing.

Hub Assembly:

The hub was thermally damaged, portions were melted. Four of the hub through bolts were missing (from the melted area of the hub). The mounting studs were missing; stud holes stripped. The mounting flange was damaged/cracked.

Preload Plates:

The preload plates were not observed because the hub could not be split apart for detailed inspection.

Blades:

An evaluation of the blades could not be made. The outer portion of the blades were melted/ missing. The blade stubs remained in the hub and could not be visually examined.

Position: **RIGHT**

Hub Serial Number: GL164 **Factory No.:** A40017

Blade Model: FC7063Q (per manufacturing record)

Blade serial numbers were undetermined because the blade butts could not be physically examined.

Blade Orientation:

The blades were identified as R1-R2-R3-R4 clockwise as viewed from the rear of the propeller.

As Received Condition:

See photos on Page 8.

The propeller was blackened and had extensive thermal damage. The spinner dome was mostly missing. All four blades were at a low pitch position.

Spinner Assembly:

The spinner dome was missing except for a small portion attached to the front of the cylinder. The spinner bulkhead was fragmented and partially melted with portions missing.

Propeller Cycling:

Cycling of the pitch change mechanism was not possible.

The air valve was broken and did not retain an air charge.

Engine/Propeller Mounting:

The mounting flange was intact and unremarkable.

Cylinder:

The cylinder was intact and unremarkable.

Piston:

The piston was intact and unremarkable.

Pitch Change Rod:

The pitch change rod was intact. It could not be removed from the front hub half. It was blackened except in the area that was masked by the font hub half. This discoloration indicated that the rod was at a low pitch position during the fire.


R2
R2
R1
R3
R
R4


R1
R2
R2
R2
R1
R4
R3
R3

Fork:

The fork was intact but corroded.

Spring/Spring Guides:

The feather spring was intact. The Delrin spring guides were missing (ash only).

Pitch Stops:

Low Pitch Stop: The low pitch stop had an impact mark.

Feather Stop: The feather stop was intact and unremarkable.

Start Lock: The start lock mechanism was intact and undamaged except for thermal damaged to the springs.

Hub Assembly:

The hub was blackened and thermally damaged but otherwise intact and unremarkable.

Preload Plates:

The preload plates did not have impact marks that could be used to calculate a blade angle. However, they did have a rust mark caused by the proximity to the rusted fork. The fork was at a low pitch position when the rust transferred to the preload plates.

The preload plates were seized/corroded and could not be removed from the blade butts.

Propeller Blades:

See photos on Page 10.

R1 blade was straight. The outer 1/2 of the blade was melted/missing.

R2 blade was bent aft approximately 90^{o} degrees and was not twisted.

R3 and R4 blades were melted/missing outboard of the blade counterweights.

All four blade pitch change knobs were intact and all four blade counterweights were intact.


R1
R1
R2
R3
R4

PHOTOGRAPHIC SUMMARY

NOTE: The following digital photographs are original and unedited and available on compact disc. The numbering sequence may not be chronological as some may have been deleted if out-of-focus, too dark, redundant, etc. Photos used in the text of this report are taken from photos on this list but may have been adjusted from the original. Modifications to images used in the report are limited to cropping, magnification, file compression, or enhancement of color, brightness, or contrast for the sole purpose to improve clarity of the report. No other alterations are permitted.

PHOTOGRAPH NUMBER	DESCRIPTION
Dscn5943.jpg	propellers, shipping container
Dscn5944.jpg	propellers, as received
Dscn5945.jpg	propellers, as received
Dscn5946.jpg	propellers, as received
	LEFT PROPELLER
Dscn5947.jpg	left propeller, as received
Dscn5948.jpg	left propeller, as received
Dscn5949.jpg	left propeller, as received
Dscn5950.jpg	left propeller, as received
Dscn5951.jpg	left propeller, as received
Dscn5952.jpg	propeller with hub bolts removed
Dscn5953.jpg	propeller with hub bolts removed
Dscn5954.jpg	propeller with hub bolts removed
	RIGHT PROPELLER
Dscn5955.jpg	right propeller, as received
Dscn5956.jpg	right propeller, as received
Dscn5957.jpg	right propeller, as received
Dscn5958.jpg	right propeller, as received
Dscn5959.jpg	right propeller, as received
Dscn5960.jpg	rear hub half removed
Dscn5961.jpg	rear hub half removed
Dscn5962.jpg	rear hub half removed
Dscn5963.jpg	rear hub half, internal
Dscn5964.jpg	mounting flange
Dscn5965.jpg	miscellaneous parts
Dscn5966.jpg	front hub half, internal
Dscn5967.jpg	pitch change rod
Dscn5968.jpg	piston
Dscn5969.jpg	R1 preload plate
Dscn5970.jpg	R2 preload plate
Dscn5971.jpg	R3 preload plate
Dscn5972.jpg	R4 preload plate
Dscn5973.jpg	bearings, bolts, counterweights
Dscn5974.jpg	all four blades
Dscn5975.jpg	all four blades
Dscn5976.jpg	all four blades
Dscn5977.jpg	piston, internal; start locks
Dscn5978.jpg	cylinder

Dscn5979.jpg	low pitch stop
Dscn5980.jpg	feather spring
Dscn5981.jpg	start lock sleeve
Dscn5982.jpg	feather stop
	BOTH PROPELLERS
Dscn5983.jpg	parts returned to box for shipment