

HARTZELL PROPELLER INC.

Aircraft Accident/Incident Report No.: 150211
Revision 1 – 5/3/16

Date of Accident: 11 February 2015

Location: Miami, FL

NTSB File No.: ERA15FA129

Aircraft: Beech 1900C

Registration No.: YV1674

Serial No.: UC-47

Operator: per FAA registry:

Servicio Pan American de Proteccion and operated
by Brinks Inc.

Written by: Daniel Boggs – Air Safety Investigation Manager
Revision 2, Les Doud – Air Safety Investigator

Date: April 27, 2015
Rev. 1 – May 3, 2016

NOTE: All changes are indicated by a black vertical line along the left margin.

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ACCIDENT SYNOPSIS

The NTSB preliminary report stated that the aircraft crashed “on February 11, 2015, at 1439 eastern standard time, a Beech 1900C, Venezuelan registration VY1674, registered to Servicio Pan American de Proteccion and operated by Brinks Inc., was destroyed during collision with terrain, following a loss of engine thrust during initial climb from Kendall-Tamiami Executive Airport (KTMB), Miami, Florida. The two foreign certificated pilots and two passengers were fatally injured. The repositioning flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the planned flight to Providenciales International Airport (MBPV), Providenciales, Turks and Caicos”.

“The twenty-one-seat airplane, serial number UC-47, was manufactured in 1988. It was powered by two Pratt and Whitney Canada PT6A-65B, 1,100 horsepower engines, equipped with four-blade, controllable-pitch, Hartzell HC-B4MP-3C propellers. Review of maintenance records revealed that the left engine propeller had been due for overhaul. It was removed and replaced with an overhauled propeller prior to the accident flight and the accident flight was the first flight after the overhauled propeller was installed on the left engine”.

“Review of radar and communication data from the Federal Aviation Administration revealed that the flight was cleared for takeoff at 1436:45. At 1438:15, one of the pilots reported an "engine failure" to air traffic control. The controller asked the pilot if he would like to return to the airport and the pilot replied affirmative. The controller then offered a 180-degree turn to runway 9R and the pilot requested a left traffic pattern to runway 27L, which the controller approved; however, the airplane subsequently impacted a utility pole and terrain about 2 miles west of the runway. Review of radar data revealed that six targets were recorded during the accident flight. The first target was recorded at 1438:18, at an altitude of 200 feet mean sea level (msl) about 1,000 feet beyond the departure end of runway 27L. The next three targets indicated a slight left turn at 300 feet msl. The fifth target indicated a continued slight left turn at 200 feet msl. The last target was recorded at 1439:19, indicating 100 feet msl, next to the utility pole that was struck. Witnesses observed the airplane flying low, with the left wing down and the left propeller turning slower than the right propeller, before the airplane impacted the utility pole”.

Aircraft Damage: Destroyed
Injuries: 4 on board, 4 fatal.

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PROPELLER TEARDOWN REPORT

Date of Investigation: February 19, 2015
Second exam of left propeller – March 3, 2016

Location: Ft. Pierce airport, FL
Piqua, OH (second exam of left propeller on 3/3/16)

Propeller Model: HC-B4MP-3A with M10877K blades

Representatives: Dan Boggs Hartzell Propeller Inc.
Ricardo Asensio Beech
Jeffrey Kennedy NTSB
Arlander Barker FAA

Second Examination on March 3, 2016
Les Doud Hartzell Propeller Inc.
Ricardo Asensio Textron Aviation
Robert Hunsberger NTSB

General Comments:

This type propeller is a 4-blade single-acting, hydraulically operated, constant speed model with feathering and reversing capabilities. Oil pressure from the propeller governor is used to move the blades to the low pitch (blade angle) direction. Blade mounted counterweights and feathering springs actuate the blades towards the high pitch direction in the absence of governor oil pressure. The propeller incorporates a Beta mechanism that actuates when blade angles are lower than the flight idle position. The blades are of a composite construction. The hub and blade clamps are steel. Propeller rotation is clockwise as viewed from the rear.

Installation Data: Refer to Installation Data Sheet No. 280
(Data reference the 42-inch station)

Reverse: -14.0 $\pm$ 0.5 degrees
Flight idle: 18.0 $\pm$ 0.1 degrees
Feather: 80.0 $\pm$ 0.5 degrees

Service History: (Left propeller times taken from logbook entry dated 11/14/14)

	<u>S/N</u>	<u>Date of manufacture</u>	<u>TTSN</u>	<u>TSO</u>
Left Hub	FWA2232	04/24/1997	2523.13	0.0
Blades	6991	05/18/1987	2523.13	0.0
	6095	09/22/1982	2523.13	0.0
	6617	05/28/1985	2523.13	0.0
	6761	05/01/1985	2523.13	0.0

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Right Hub	FWA3216	03/18/2000	Unknown	Unknown
Blades	6883	03/13/1987	Unknown	Unknown
	6491	10/08/1984	Unknown	Unknown
	6395	07/31/1984	Unknown	Unknown
	MISSING		Unknown	Unknown

Position Right

Hub Serial Number: FWA3216 Factory No.: B8283A

Blade Model: M10877K

S/N	R1:	6883
S/N	R2:	6491
S/N	R3:	6395
S/N	R4:	Missing

Blade Orientation:

The blades were identified as R1-R2-R3-R4 clockwise as viewed from the rear of the propeller. The hub serial number was between the 2 and 3 blades.

“As Received” Condition:

See pictures on page 6.

The propeller had several yards of fencing wrapped around the engine shaft and blade shanks when received. Blow torches were used to cut off the tightly wound fencing from the propeller and engine shaft. The propeller was still attached to the engine and had to be cut off the engine due to impact damage. The propeller had extreme thermal damage. The blades were broken and burnt away. One blade was missing. The propeller was in a normal operating range when received. The piston and cylinder was stripped off the hub and being held in place by the guide rods only.

Spinner Dome:

The spinner dome was missing.

Spinner Bulkhead:

The spinner bulkhead was mostly melted away, only a small piece remained attached to the propeller.



Photo #1, right propeller as received.



Photo #2, right propeller as received.

Propeller Cycling:

Propeller cycling was not possible due to impact damage.

Engine/Propeller Mounting:

The engine to propeller mounting was intact and unremarkable. All bolts were installed and safety wired.

Blade/Clamp Rotation:

There was too much thermal damage to tell if the blades rotated in the clamps.

Pitch Stops:

Low Pitch Stop: The low pitch stop was intact and unremarkable.

Feather Stop: The feather stops were intact and unremarkable.

Beta rods: The Beta rods were bent and thermally damaged.

Piston:

The piston was intact, however it was thermally damaged, the top of the piston had drooping metal and cracking around the dome of the piston.

Link Arms:

The link arms were all intact. L3 link arm was fractured off the blade clamp and the mounting hole for the clamp was elongated.

Cylinder:

The cylinder was intact, however it was thermally damaged.

Feathering Spring Assembly:

The feathering spring was intact, however it was thermally damaged.

Pitch Change Rod:

The pitch change rod was intact and unremarkable. The rod was not removed from the feather spring assembly due to improper tooling available to remove the “C” rings from the assembly.

Clamps and Counterweights:

The clamps and counterweights were all intact, however they had extreme thermal damage. Clamp #4, the bolts were fractured and the clamp was partially opened. The blade was missing from this clamp.

Clamp serial numbers:

R1: D2471

R2: D2598

R3: D7514

R4: D2678

Hub Unit:

The hub unit was thermally damaged. R4 pilot tube was fractured off. The cylinder mounting threads were stripped off. The hub mounting was intact. There were no impression marks from the blades.

Blades:

See Photos #3 and #4.

All four blades were made of composite. The four blades were fractured off at the blade butts. Fragmented pieces of propeller blades were picked up in the field but it could not be determined what propeller they were from.



Photo #3, fragmented propeller blades.



Photo #4, fragmented propeller blade.

Position Left

Hub Serial Number: FWA2232

Factory No.: A9606A

Blade Model: M10877K

S/N L1: 6991

S/N L2: 6095

S/N L3: 6617

S/N L4: 6761

Blade Orientation:

The blades were identified as L1-L2-L3-L4 clockwise as viewed from the rear of the propeller. The hub serial number was between the 1 and 2 blades.

“As Received” Condition:

See Photos #5 and #6.

The propeller was still attached to the engine and had to be cut off the engine due to impact damage. The propeller had extreme thermal damage. Three of the four blades were broken and burnt away. One counterweight was punched through the spinner dome and moving into a feather position. Once the spinner dome was moved slightly, the propeller moved into the feather position. Half of the spinner dome was melted away.

Spinner Dome:

Half of the spinner dome was melted away. The other half of the spinner dome was dented; however there was no frontal damage to the dome.

Spinner Bulkhead:

The spinner bulkhead was thermally damaged and dented around the edges.

Propeller Cycling:

Propeller cycling was not possible due to impact damage.



Photo #5, left propeller as received.



Photo #6, left propeller as received.

Engine/Propeller Mounting:

The engine to propeller mounting was intact and unremarkable. All bolts were installed and safety wired.

Blade/Clamp Rotation:

There was too much thermal damage to accurately determine if blades #1, #3 and #4 had rotated in the clamps. Hub arm and blade butt impact marks as well as clamp slip marks indicated that blade #2 had rotated in the clamp during the impact sequence towards high pitch, such that the face side of the blade shank area was facing forward.

Pitch Stops:

Low Pitch Stop: The low pitch stop was intact and unremarkable.

Feather Stop: The feather stop screws were bent on one side implying forceful contact with piston during the impact sequence (see Photo #9).

Beta rods: The beta rods were intact but bent.

Piston:

The piston was thermally damaged but intact. The top, internal surface of the piston showed evidence of several impact marks with the feather stop screws (see Photo #10).

Link Arms:

The link arms were thermally damaged but intact and showed no obvious signs of stretch or compression.

Cylinder:

The cylinder was intact and unremarkable.

Feathering Spring Assembly:

The feathering spring was intact and unremarkable.

Pitch Change Rod:

The rod was removed from the feather spring assembly and was intact and unremarkable. The spring retainer split rings left an impression in the aft spring retainer.

Clamps and Counterweights:

The clamps and counterweights were all intact; however they had extreme thermal damage.

Clamp serial numbers:

L1: F2481
L2: F4229
L3: F23643
L4: F23644

Hub Unit:

The hub unit was thermally damaged. The hub mounting was intact. There were impression marks from the blade butts on blade arm flanges #1, #2 and #3. When blade #1 was aligned with the hub impression marks, the blade was in near-feathered position (see Photo #11).

Blades:

See Photos #7 and #8.

The blades are made of composite. Three blades were fractured off outboard of the blade butts. The fourth blade was burnt and twisted. Fragmented pieces of propeller blades were picked up in the field but it could not be determined what propeller they were from.



Photo #7, left propeller blades.



Photo #8, left propeller blades.



Photo #9, damaged feather stop screws.



Photo #10, top, internal surface of piston.



Photo #11, Blade #1 with impact marks aligned.

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

P1010941.JPG	accident site.
P1010942.JPG	accident site.
P1010943.JPG	accident site.
P1010944.JPG	fragmented propeller blade.
P1010945.JPG	fragmented propeller blades.
P1010946.JPG	fragmented propeller blade.
P1010947.JPG	fragmented propeller blade.
P1010948.JPG	accident site.
P1010949.JPG	accident site.
P1010950.JPG	accident site.
P1010951.JPG	accident site.
P1010952.JPG	accident site.
P1010953.JPG	accident site.
P1010954.JPG	accident site.
P1010955.JPG	accident site.
P1010956.JPG	accident site.
P1010957.JPG	accident site.
P1010958.JPG	accident site.
P1010959.JPG	accident site.
P1010960.JPG	accident site.
P1010961.JPG	accident site.
P1010962.JPG	accident site.
P1010963.JPG	accident site.
P1010964.JPG	accident site.
DSCN2937.JPG	right propeller as received.
DSCN2938.JPG	right propeller as received.
DSCN2939.JPG	right propeller as received.
DSCN2940.JPG	misc. propeller blades.
DSCN2941.JPG	misc. propeller blades.
DSCN2942.JPG	misc. propeller blades.
DSCN2943.JPG	right hub.
DSCN2944.JPG	piston.
DSCN2945.JPG	cylinder assembly.
DSCN2946.JPG	hub.
DSCN2950.JPG	serial number.
DSCN2951.JPG	pilot tube.

DSCN2952.JPG	pilot tube.
DSCN2953.JPG	pilot tube.
DSCN2954.JPG	fractured pilot tube.
DSCN2955.JPG	counterweights.
DSCN2956.JPG	counterweights.
DSCN2957.JPG	counterweights.
DSCN2958.JPG	counterweights.
DSCN2959.JPG	counterweights.
DSCN2960.JPG	blade butt.
DSCN2961.JPG	blade butt.
DSCN2962.JPG	blade butt.
DSCN2963.JPG	link arm.
DSCN2964.JPG	link arm.
DSCN2965.JPG	link arm.
DSCN2966.JPG	link arm.
DSCN2967.JPG	feathering spring assembly.
DSCN2968.JPG	feather stops.
DSCN2969.JPG	feather stops.
DSCN2970.JPG	cylinder.
DSCN2971.JPG	clamp.
DSCN2972.JPG	clamp.
DSCN2973.JPG	clamp.
DSCN2974.JPG	clamp.
DSCN2975.JPG	left propeller as received.
DSCN2976.JPG	left propeller as received.
DSCN2977.JPG	left propeller as received.
DSCN2978.JPG	left propeller as received.
DSCN2979.JPG	left propeller as received.
DSCN2980.JPG	left propeller as received.
DSCN2981.JPG	feather stops.
DSCN2982.JPG	cylinder and hub.
DSCN2983.JPG	piston.
DSCN2984.JPG	piston.
DSCN2985.JPG	feather stops.
DSCN2986.JPG	feather stops.
DSCN2987.JPG	hub.
DSCN2988.JPG	hub.
DSCN2989.JPG	hub.
DSCN2990.JPG	hub.
DSCN2991.JPG	hub.
DSCN2992.JPG	piston and feathering spring assembly.
DSCN2993.JPG	clamps.
DSCN2994.JPG	clamps.
DSCN2995.JPG	clamps.
DSCN2996.JPG	clamps.
DSCN2997.JPG	clamps.
DSCN2998.JPG	clamps.
DSCN2999.JPG	clamps.
DSCN3000.JPG	clamps.

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DSCN3001.JPG	clamps.
DSCN3002.JPG	blade butt.
DSCN3003.JPG	blade butt.
DSCN3004.JPG	blade butt.
DSCN3005.JPG	blade butt.
DSCN3006.JPG	spinner dome.
DSCN3007.JPG	spinner dome.
DSCN3008.JPG	serial number.
DSCN3009.JPG	clamp.
DSCN3010.JPG	clamp.
DSCN3011.JPG	clamp.
DSCN3012.JPG	clamp.

The following pictures were taken during the re-examination of the left propeller on March 3, 2016.

<u>Picture File Name</u>	<u>Description</u>
DSCN2528.JPG	Shipping crate as-received
DSCN2529.JPG	Shipping crate docs A
DSCN2530.JPG	Shipping crate docs B
DSCN2531.JPG	Contents of shipping crate A
DSCN2532.JPG	Contents of shipping crate A
DSCN2533.JPG	Clamp #1 A
DSCN2534.JPG	Clamp #1 B
DSCN2535.JPG	Clamp #1 C
DSCN2536.JPG	Clamp #2 A
DSCN2537.JPG	Clamp #2 B
DSCN2538.JPG	Clamp #3 A
DSCN2539.JPG	Clamp #3 B
DSCN2540.JPG	Clamp #4 A
DSCN2541.JPG	Clamp #4 B
DSCN2542.JPG	Feather stop screws A
DSCN2543.JPG	Feather stop screws B
DSCN2544.JPG	Feather stop screws C
DSCN2545.JPG	Feather stop screws D
DSCN2546.JPG	Internal piston marks A
DSCN2547.JPG	Internal piston marks B
DSCN2548.JPG	Feather stop screws E
DSCN2549.JPG	Feather stop screws F
DSCN2550.JPG	Feather stop screws G
DSCN2551.JPG	Blade #2 shank A
DSCN2552.JPG	Blade #2 shank B
DSCN2553.JPG	Blade #2 shank C
DSCN2554.JPG	Blade #3 shank A
DSCN2555.JPG	Blade #3 shank B
DSCN2556.JPG	Blade #2 butt A
DSCN2557.JPG	Blade #2 butt B
DSCN2558.JPG	Blade #3 butt
DSCN2559.JPG	Blade #4 butt

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DSCN2560.JPG	Feather screws removed A
DSCN2561.JPG	erroneous movie file of feather screws
DSCN2562.JPG	Feather screws removed B
DSCN2563.JPG	Blade #1 butt A
DSCN2564.JPG	Blade #1 camber side A
DSCN2565.JPG	Blade #1 camber side B
DSCN2566.JPG	Blade #1 tip area A
DSCN2567.JPG	Blade #1 tip area B
DSCN2568.JPG	Blade #1 camber side C
DSCN2569.JPG	Blade #1 butt B
DSCN2570.JPG	Aft spring retainer
DSCN2571.JPG	Spring assembly components
DSCN2572.JPG	Blade arm #2 A
DSCN2573.JPG	Blade arm #2 B
DSCN2574.JPG	Prop assembly S/N
DSCN2575.JPG	Blade arm #3
DSCN2576.JPG	Blade arm #4
DSCN2577.JPG	Blade arm #1 A
DSCN2578.JPG	Blade arm #1 B
DSCN2579.JPG	Blade arm #2 C
DSCN2580.JPG	Mounting flange
DSCN2581.JPG	Cylinder and beta rods
DSCN2582.JPG	Cylinder interior
DSCN2583.JPG	Blade #1 with impact marks aligned
DSCN2584.JPG	Spinner dome A
DSCN2585.JPG	Spinner dome B
DSCN2586.JPG	Spinner dome C
DSCN2587.JPG	Spinner dome D
DSCN2588.JPG	Spinner dome E
DSCN2589.JPG	Spinner dome F
DSCN2590.JPG	Blade #3 with impact marks aligned
DSCN2591.JPG	Blade #2 with impact marks aligned
DSCN2592.JPG	Blade arm #4 bearing retainer ring A
DSCN2593.JPG	Blade arm #4 bearing retainer ring B
DSCN2594.JPG	Bearing races
DSCN2595.JPG	Blade clamps
DSCN2596.JPG	Blade clamp #1 cleaned
DSCN2597.JPG	Blade clamp #2 cleaned
DSCN2598.JPG	Blade clamps #3 and #4
DSCN2599.JPG	Blade clamp #3
DSCN2600.JPG	Blade clamp #4
DSCN2646.JPG	New blade example A
DSCN2647.JPG	New blade example B
DSCN2648.JPG	New blade example camber side
DSCN2649.JPG	New blade example edge view
DSCN2650.JPG	New blade example with shank angle estimated positions