

Date of Accident: April 21, 2022

Location: Covington, GA

NTSB File No.: ERA22FA199

Aircraft: Cessna 340

Registration No.: N84GR

Serial No.: 340-0178 (Year of Manufacture 1973)

Operator: Per FAA Registry:
Nixon Enterprises Inc.
154 NM Highway 467
Portales, NM 88130-9003

Written by: Les Doud - Air Safety Investigator

Report Date: June 19, 2023

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PROPELLER EXAMINATION REPORT

Date of Investigation: June 14, 2023

Location: Atlanta Air Salvage
1146 Uniform Road
Griffin, GA 30224

Representatives: Les Doud Hartzell Propeller Inc.
Eric Alleyne NTSB Investigator in Charge

ACCIDENT SYNOPSIS

The following synopsis is excerpted from the NTSB preliminary report:

“On April 21, 2022, about 1844, eastern daylight time, a Cessna 340, N84GR was destroyed when it was involved in an accident in Covington, Georgia. The private pilot and student pilot were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

According to the partner of the student pilot, both the student pilot and private pilot flew to Lubbock, Texas on a commercial airline the day prior to the accident to pick up the accident airplane. On the day of the accident, the student pilot intended to begin flight training with his flight instructor. She further stated that student pilot had recently met the private pilot and the private pilot told the student pilot that he could teach him how to fly the accident airplane.

According to preliminary radar data obtained from the Federal Aviation Administration, the airplane departed Dekalb-Peachtree Airport (PDK), Atlanta, Georgia about 1640. The airplane was tracked to Gwinnett County Airport-Briscoe Field (LZU), Lawrenceville, Georgia, where it arrived about 1650. The airplane departed (LZU) about 1712 and arrived at Lumpkin County-Wimpey’s Airport (9AO), Dahlonega, Georgia about 1731. The airplane then departed (9AO) about 1813, en route to Covington Municipal Airport (CVC), Atlanta, Georgia.

According to multiple witnesses in the vicinity of CVC, the airplane made a “hard right” banking turn, started to spiral downward, and then impacted a row of parked, empty semitruck trailers about 1 nautical mile southeast of CVC. Parking lot surveillance video revealed the airplane descending in a right spin at the time of the impact. The airplane was destroyed by post-impact fire.

Remnants of the right horizontal stabilizer, elevator, vertical stabilizer, and rudder were found within the debris area. Flight control cables located within the debris area were traced from the remnants of the control surfaces to their respective bellcranks, and to the flight controls within the cockpit. The cockpit and instrument panel were destroyed by post-impact fire.

Examination of both engines revealed fire and impact damage. A preliminary onsite examination revealed all fuel lines and ignition wiring on both engines were destroyed by post-impact fire.

The wreckage was recovered and retained for further examination.”

SUMMARY AND ANALYSIS OF FINDINGS

The accident propellers were recovered from the accident scene and presented for examination at Atlanta Air Salvage on June 14, 2023. The propellers were disassembled to remove the preload plates and blades. Measurements of internal impact signatures and assessment of blade damage was conducted to help determine state of operation at initial impact.

Both propellers exhibited similar impact damage. All three blades on both propellers were partially consumed in the post-crash fire. Photo #1 shows the relative damage between the left and right blades. Blade damage included visible chordwise/rotational scoring on some blades in each propeller, bending in the aft/drag direction, twisting towards low pitch, bending opposite rotation, and leading edge gouging that is consistent with impact while rotating with power ON. There was no damage to indicate either propeller was feathered at the time of impact.

Internal damage on the preload plates (Photo #2) and fork slots (Photo #3) indicated the blade angle on both propellers was in the low pitch range at impact.

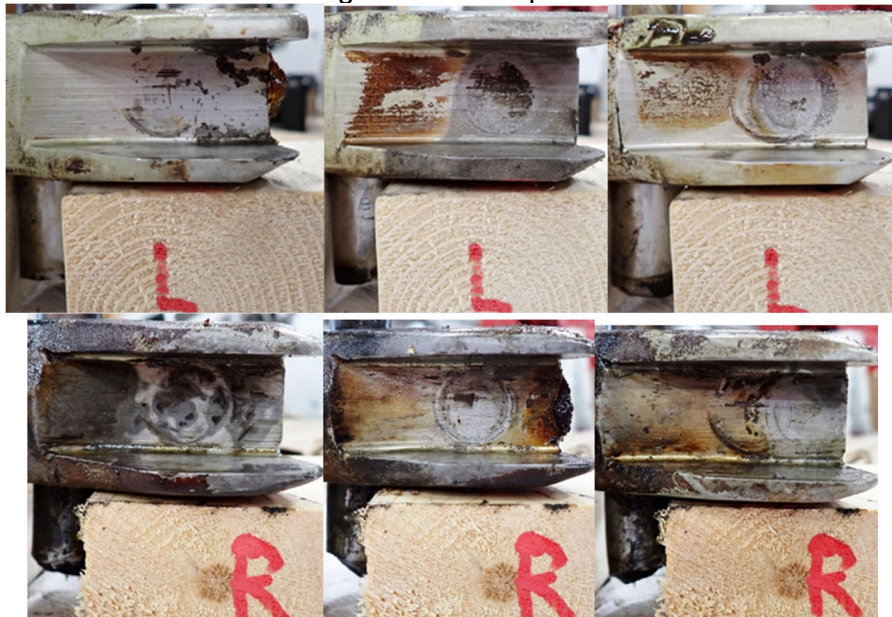
Photo #1 – Propeller blade damage comparison
Left Propeller Right Propeller



Photo #2 – Right/Left preload plate comparison



Photo #3 – Left/Right fork slot impact mark similarities



CONCLUSIONS

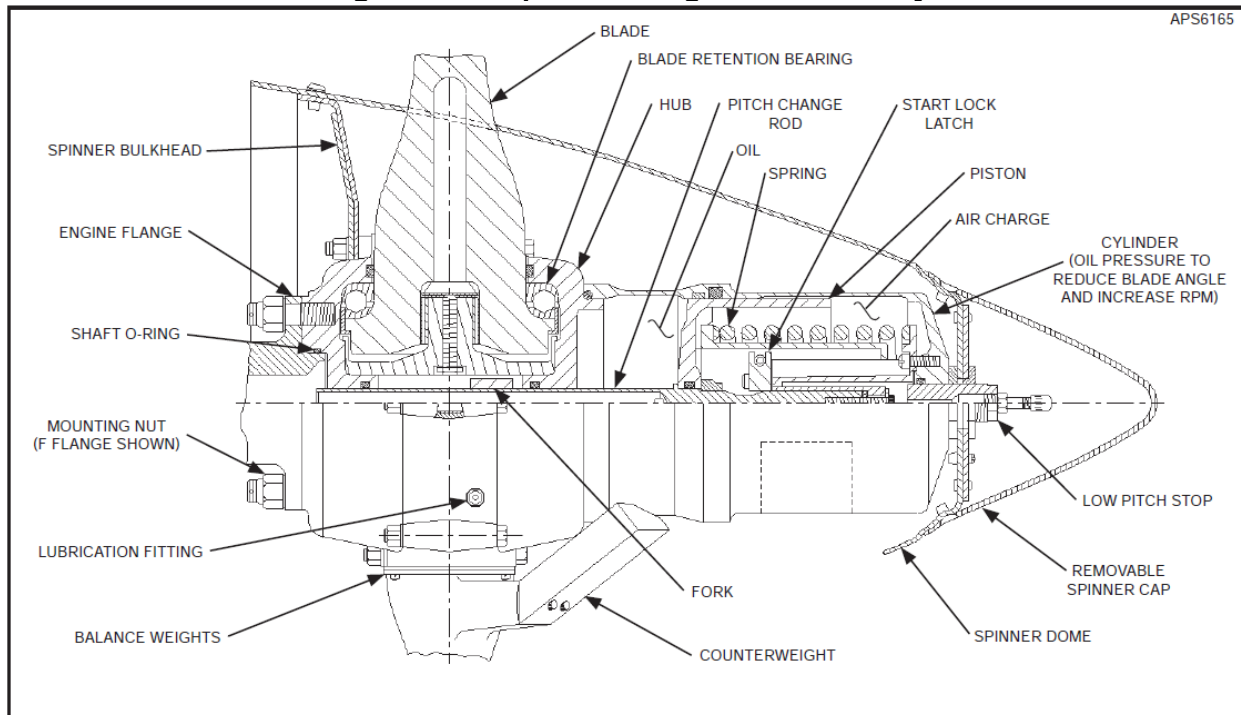
There were no discrepancies noted in the components examined that would prevent or degrade normal operation prior to impact with terrain. All damage was consistent with high impact forces. Impact signatures indicated the blade angle for both propellers was near the low pitch stop angle of 14° and rotating at low power.

GENERAL INFORMATION

Propeller Description: The propellers examined are 76" diameter, 3-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 start locks to keep propeller blade angle low to minimize the starting torque. The blades and hub are of aluminum construction. Propeller rotation is clockwise as viewed from the rear. See Figure 1 for a cutaway sketch of the propeller model series labeling the major components.

Installation Data: Refer to Hartzell Propeller Installation Data Sheet No. 426 (Data reference the 30-inch radius) and STC SA2346SW for additional information.

Low Pitch:	14.0 ± 0.1 degrees
Start lock:	19.5 ± 1.5 degrees
Feather:	84.0 ± 1.0 degrees

Figure 1 – Propeller Configuration Cutaway

PROPELLER FACTUAL FINDINGS**Position:** LEFT**Propeller Model:** PHC-C3YF-2UF with FC7663DB-2Q blades**Propeller Assembly Serial Number:** EB4474A

Service History: The propeller logbooks were not available at this examination therefore the service history is unknown. The propeller was sold new to RAM Aircraft in 1998. The blade S/Ns matched the original build records.

	<u>S/N</u>	<u>Date of Manufacture</u>	<u>TTSN</u>	<u>TSO</u>
Hub/Factory	A42979A	8/26/1998	Unk	Unk
Blade L1	J14497	5/6/1998	Unk	Unk
Blade L2	J14506	5/6/1998	Unk	Unk
Blade L3	J13382	5/6/1998	Unk	Unk

Blade Orientation: The blades were arbitrarily identified L1-L2-L3 counterclockwise as viewed from the rear of the propeller. The assembly serial number was between the L1 and L2 blades.

As Received Condition: The left propeller impact-separated from the propeller crankshaft flange during the impact sequence, was recovered and presented for examination at Atlanta Air Salvage as shown in Photo #4. The propeller was heavily damaged in the post-crash fire with extensive sooting and charring. All three blades were partially consumed. Two blades were in a low pitch position and one appeared to be in the feathered position. The spinner dome and bulkhead were crushed, torn and partially consumed. All six mounting studs and one of the two dowel pins had pulled from the hub. The hydraulic unit remained attached to the assembly via the pitch change rod but had separated from the hub mounting boss.

Spinner Dome: The spinner dome was crushed, torn and partially consumed. There were no distinguishable counterweight marks in the dome.

Spinner Bulkhead: The spinner bulkhead was bent, torn and partially consumed.

Engine/Propeller Mounting: All six propeller mounting studs and one down pin were pulled from the hub during the impact sequence. One dowel pin hole exhibited deformation in the direction of rotation (Photo #6).

Propeller Cycling: Propeller cycling with air pressure was not possible due to impact damage.

Cylinder: The cylinder was crushed to one side but remained intact (Photo #5).

Piston: The piston appeared intact but was trapped in the cylinder by the crushing deformation of the cylinder wall. No attempt was made to remove the piston.

Pitch Change Rod: The pitch change rod remained intact but was bent between the forward hub half and piston. The rod was cut forward of the hub to facilitate disassembly.

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Fork: The fork remained intact and attached to the pitch change rod. There were pitch change knob block impact marks in the low pitch range of travel (Photo #9).

Spring/Spring Guides: The feathering spring and spring guides were not removed from the cylinder assembly and thus not observed.

Pitch Stops: The low pitch stop had an impact mark where the pitch stop cap screw forcefully contacted the assembly (Photo #7). The feather stop and start lock assemblies were not removed and thus not observed.

Hub Assembly: The hub unit remained intact with no remarkable cracks or fractures in the blade retention areas. The cylinder mounting boss was fractured which is common under impact loads (Photo #10). All the hub thru-bolts were present and secure. Once the hub was opened there were signatures of heat exposure to the internal components; bearing grease dark and hardened, ball bearing spacers melted (Photo #8). The blade retention bearings appeared intact. The aft hub internal surface had fractures and marring in the blade retention pockets indicating predominate impact loads were in the aft/trailing edge direction (Photo #11).

Preload Plates: See Photo #12. All three preload plates exhibited damage to the aft corner and retention lip. Plate L3 had remarkable damage to the low pitch end of the knob slot indicating forceful rotation of the blade towards low pitch during the impact sequence. Plates L1 and L3 had knob contact marks between 37-40° forward of the split line suggesting blade angle was 8-11° or approximately near the low pitch stop angle. All fork/fork bumper damage to the plate faces were in the low pitch quadrant, forward of the split line.

Propeller Blade Properties: See Photos #13 through #16. All three blades were partially consumed near the tips by the post-crash fire and exhibited remarkable heat exposure damage. It could not be determined if there were any tip fracture damage. Blades L1 and L3 pitch change knobs fractured from the butts; fracture surfaces exhibited shear/overload failure which is common under impact loads. Impact crescent marks on the blade butts were in the aft/trailing edge quadrant indicating impact loads were in the helical direction. Chordwise/rotational scoring was evident on all three blades. Compound bending and twisting was also evident in the aft/low pitch directions. The deice boots were consumed along with some deice wires.

Photo #4 - Left propeller as-presented



Photo #5 - Left propeller hydraulic unit (cylinder, piston, feathering spring)
cut from assembly at pitch change rod



Photo #6 - Left propeller mouting flange

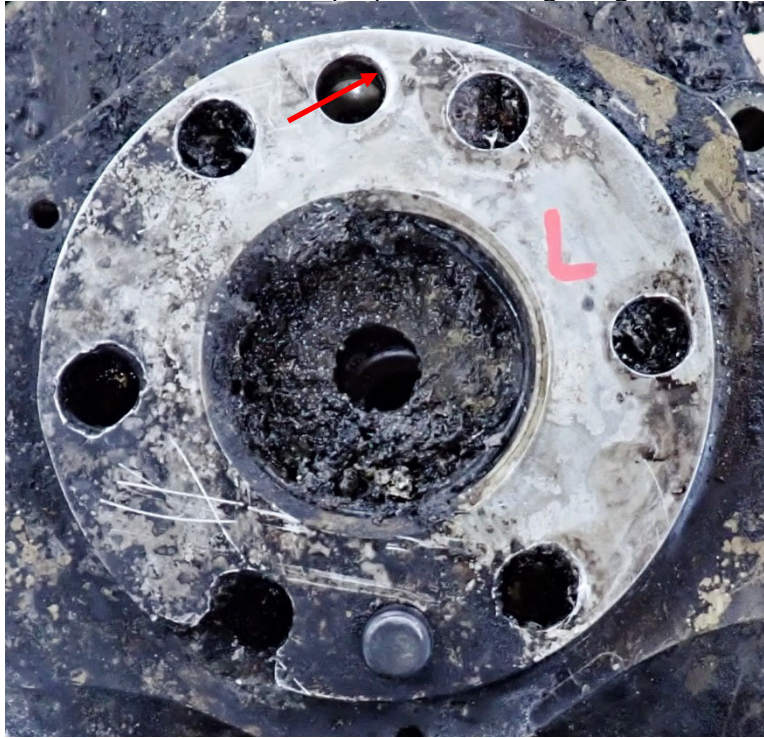


Photo #7 - Left propeller low pitch stop



Photo #8 - Left propeller internal heat damage



Photo #9 - Left propeller fork slots



Photo #10 - Left propeller forward hub half



Photo #11 - Left propeller aft hub half



Photo #12 - Left preload plates



Photo #13 - Left blade butts

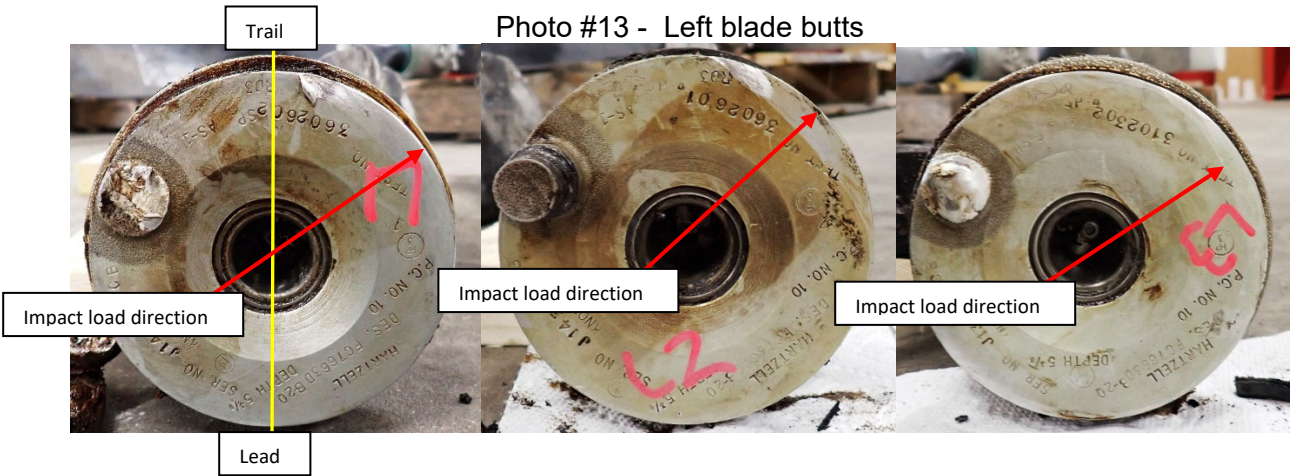


Photo #14 - Left propeller blades camber side



Photo #15 - Left propeller blades face side



Photo #16 - Left blades trailing edge view



Position: RIGHT

Propeller Model: PHC-C3YF-2UF with FC7663DB-2Q blades

Propeller Assembly Serial Number: EB5279B

Service History: The propeller logbooks were not available at this examination therefore the service history is unknown. The hub unit holding the propeller assembly S/N was sold as a replacement hub to Memphis Propeller Service in 2001.

	<u>S/N</u>	<u>Date of Manufacture</u>	<u>TTSN</u>	<u>TSO</u>
Hub/Factory	A56988B	7/31/2001	Unk	Unk
Blade R1	J18825	9/3/1998	Unk	Unk
Blade R2	H93205	9/6/1996	Unk	Unk
Blade R3	J18834	9/3/1998	Unk	Unk

Blade Orientation: The blades were arbitrarily identified R1-R2-R3 counterclockwise as viewed from the rear of the propeller. The hub serial number was between the R1 and R2 blades.

As Received Condition: The right propeller remained attached to the propeller crankshaft flange during the impact sequence, was recovered, removed from the engine and presented for examination at Atlanta Air Salvage as shown in Photo #18. The propeller was heavily damaged in the post-crash fire with extensive sooting and charring. All three blades were partially consumed. All three blades were in a low pitch position. The spinner dome and bulkhead were mostly consumed. All six mounting studs and both dowel pins remained in the aft hub. The hydraulic unit impact separated and was not recovered and/or presented for examination.

Spinner Dome: The spinner dome was consumed by the post-crash fire.

Spinner Bulkhead: The spinner bulkhead was bent and mostly consumed.

Engine/Propeller Mounting: All six propeller mounting studs and both dowel pins remained attached to the aft hub (Photo #21).

Propeller Cycling: Propeller cycling with air pressure was not possible due to impact damage.

Hydraulic Unit: The hydraulic unit including the cylinder, piston, feathering spring and pitch stops impact separated and was not presented for examination.

Pitch Change Rod: The pitch change rod fractured in a segment forward of the fork where it exits the forward hub half.

Fork: The fork remained intact and attached to the pitch change rod. There were pitch change knob block impact marks in the low pitch range of travel (Photo #22).

Hub Assembly: The hub unit remained intact with no remarkable cracks or fractures in the blade retention areas. The cylinder mounting boss was fractured which is common under impact loads (Photo #19). All the hub thru-bolts were present and secure. Once the hub was

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opened there were signatures of heat exposure to the internal components; bearing grease dark and hardened, ball bearing spacers melted (Photo #20). The blade retention bearings appeared intact. The aft hub internal surface had marring in the blade retention pockets indicating predominate impact loads were in the aft/trailing edge direction (Photo #23).

Preload Plates: See Photo #24. All three preload plates exhibited damage to the aft corner and retention lip. Plates R1 and R3 had knob contact marks between 32-36° forward of the split line suggesting blade angle was 12-16° or approximately near the low pitch stop angle. All fork/fork bumper damage to the plate faces were in the low pitch quadrant, forward of the split line.

Propeller Blade Properties: See Photos #25 through #27. All three blades were partially consumed by the post-crash fire and exhibited remarkable heat exposure damage. Blade R1 was the most intact but had some material consumed near the tip. It could not be determined if there were any tip fracture damage on R2 and R3. Blade R2 had a remarkable leading edge gouge. Blades R1 and R3 pitch change knobs fractured from the butts; fracture surfaces exhibited shear/overload failure which is common under impact loads. Chordwise/rotational scoring was evident on R1. Compound bending and twisting was also evident in the aft/low pitch directions. Blade R2 had remarkable bending opposite rotation. The deice boots were consumed along with some deice wires.

Photo #17 - Right propeller as-presented



Photo #18 - Right propeller as-presented, facing front hub



Photo #19 - Right propeller internal hub heat damage



Photo #20 - Right propeller mounting flange

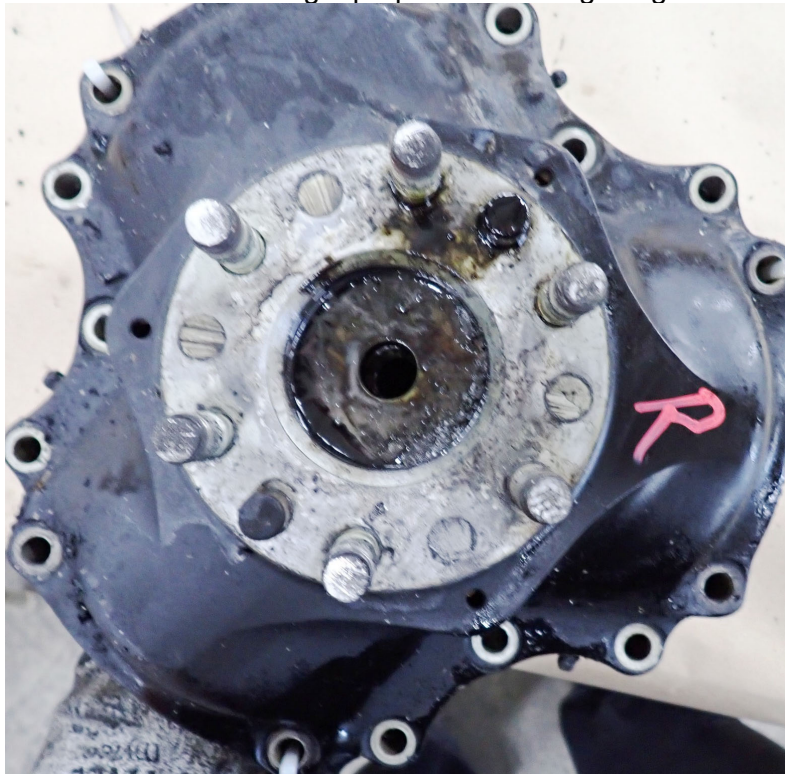


Photo #21 - Right propeller fork slots



Photo #22 - Right propeller aft hub half internal surface



Photo #23 - Right propeller preload plates



Photo #24 - Right blade butts



Photo #25 - Right propeller blades camber side



Photo #26 - Right propeller blades trail edge view (R1-R2-R3 left-to-right)

