National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

ERA23FA024

ACCIDENT EXAMINATION

10/18/2022

A. ACCIDENT

Location: Marietta, Ohio, Auto Dealership Parking Lot
Date: October 18, 2022
Time: 0709
Airplane: Beech King Air E-90
Reg Number: N515GK

B. ACCIDENT EXAMINATION

NTSB IIC	Aaron McCarter NTSB Washington DC
Textron	Casey Love Textron Wichita, Kansas
Pratt & Whitney's	Mike Hodge P&W Canada Bridgeport, WV
	Jeff Davis P&W Canada Bridgeport, WV
Hartzell	Les Doud Hartzell Propellers Piqua, Ohio
FAA	David Schluep (ASI) Operations Federal Aviation Administration Columbus, Ohio

C. SUMMARY

On October 18, 2022, at 0709 eastern daylight time, a Beech E-90, N515GK, was substantially damaged when it was involved in an accident in Marietta, Ohio. The two commercial pilots were fatally injured. Communications were normal. The pilot contacted PKB requesting about the RNAV approach to runway 21 and was instructed to report MIDCO the Final Approach Fix (FAF) for that runway. The pilots were subsequently cleared for the RNAV RWY 21 approach. The airplane leveled off. The pilots were instructed to contact the PKB control tower. As the airplane was on a several miles approach, the controller notified the pilots that there was a vehicle on the runway checking for wildlife and it would be cleared shortly; The communication was acknowledged.

Witnesses reported that the airplane emerged from the cloud layer. The pilots were cleared to land on runway 21. There were no additional communications received from the flight

crew. The airplane experienced a rapid descent and impacted a car dealership parking lot and struck several vehicles (unoccupied) Witnesses and security video confirmed loss of control.

Retrieved three (3) security video camera recordings from the surrounding area, one of which contained audio.

NTSB UAS (Drone) captured the overhead accident scene.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

The airplane impacted an automobile dealership parking lot at an elevation of 614 ft msl, about 3 miles northeast of the approach end of runway 21 at PKB. The airplane struck several vehicles before coming to rest on level pavement. The wreckage path was compact and oriented on a heading of 305° magnetic (Figure 1) All major components of the airplane were accounted for at the accident scene. The cockpit and forward portions of the fuselage were crushed aft.

A significant post-impact fire ensued, consuming a majority of the fuselage and the cockpit area. The fuselage above the floorboards was totally consumed by fire. The instrument panel and all associated instrumentation, gauges and switches were severely impact and thermally damaged. The left and right flaps, which were significantly damaged by impact and post impact fire, remained attached to their respective mounts; the actuators indicated a flap position of 15°.

Figure 1 NTSB UAS overhead View of Accident Site

2.0 Airframe Examination

2.1 Fuselage

Destroyed. The cockpit and passenger cabin were destroyed by impact forces and a significant post impact fire. The entire cabin was burned down to the floorboards that were crushed.

2.2 Empennage

The empennage remained partially attached to the fuselage via control cables and floor structure. The rudder and elevators remained attached to the empennage at their respective hinges. The right side of the elevator was thermally and impact damaged. The elevator trim control surface remained attached. The rudder and elevator control cables were traced through the wreckage to their respective locations. All breaks in the cables were indicative of overload

and had a “broom straw” appearance. The up elevator control cable was separated at the turnbuckle and appeared as though it was melted, and a post-accident NTSB materials visual review informed the IIC that the turnbuckle was melted post impact.

Figure 2 Empennage, Rudder, Elevators and Trim


Figure 3 Elevator cable and turnbuckle. Visual exam revealed it was melted post impact.

2.3 Wings and Flight Controls

Partial flight control continuity from the cockpit to the ailerons, elevator, and rudder was established through cables, bell cranks, and push pull rods. All breaks in the cables consisted of

a “broom straw” appearance indicative of overload and push/pull rod damage was consistent with overload and thermal damage.

3.0 Flaps

The left flap actuators were thermally damaged. The signatures on the actuator pistons were measured and consistent with the actuators being extended to the 15° position. The right flap was destroyed.

4.0 Landing Gear

Landing Gear: The tricycle retractable landing gear (3) was discovered in the down position. All three were impact damaged. The corresponding landing gear handle in the cockpit could not be functionally verified due to impact and thermal damage.

4.1 Cockpit

All cockpit instrumentation, gauges and switches were exposed to post-impact fire and extreme impact forces. There was limited identifying instrumentation or gauges that could be verified however, the fuel flow gauges, although damagedshowed the left and right at 480 lbs. per hour and 465 lbs. per hour respectively. All other controls both electronic and manual were severely impact and thermally damaged.

Figure 4 L/R Fuel flow gauges.

4.2 Fuel/Fuel System

There was no residual fuel, and all fuel tanks were compromised. The majority of the fuel system including bladders and lines was consumed by fire. The fuel filters were not observed. The fuel quantity gages were thermally damaged.

5.0 Engine and Component Examination

Both engines (Pratt & Whitney Canada) were located in the wreckage in their respective attachment locations, and both displayed significant impact and thermal damage. Both engines displayed rotational contact signatures to their internal and external components indicative of power generation at impact. P&W Canada sent two investigators to conduct a thorough on scene examination. P&W investigators completed their examination on scene.

The Left engine and Components: The left engine was severely impact and thermally damaged. It is resting on top of a pickup truck that was destroyed during impact. The left-hand propeller shaft fractured adjacent to the propeller mounting flange. The shaft fracture displayed features consistent with torsional overload. Rotational scoring evident the compressor turbine, both sides of the power turbine vane, center baffle and on the upstream side of the power turbine. There are rotational contact signatures on the internal components.

- No evidence of inflight fire to the left engine.
- No evidence of FOD ingestion.
- Oil Filter damaged by heat but free of contamination.
- Fuel Filter was impact damaged.
- Compressor Turbine: Rotational scoring, rotational distress. The blades had trailing edge damage and rotational damage from contact with the nonmoving structure. Rub marks on the shroud.
- The Power Turbin Section: Overload damage, rotational scoring. On both upwind and downwind portions.
- Compressor: Blades bent in opposite direction of rotation.
- Reduction gearbox: Shaft fractured. Looks like overload.
- Accessory Gearbox: Thermally and impact damaged.
- Ignition: Present and attached although damaged by impact and fire.
- Fuel Pump and Control Unit: Impact and thermal damage.
- Fuel Nozzles: Impact and thermal damage.
- Compressor Bleed Valve: Remained attached at its respective location.

LEFT HAND (LH) ENGINE
Engine Model: PT6A-28, Serial No.: 50640
Time Since New (TSN): 10,130.8 per the engine logbook dated 8/10/2022
Cycles Since New (CSN): 10,008 per the engine logbook dated 8/10/2022
Time Since Overhaul (TSO): 6,495.5 per the engine logbook dated 8/10/2022
Cycles Since Overhaul (CSO): Not recorded in engine logbook dated 8/10/2022


Figure 5 Left engine Assy resting on truck.

The right-hand Engine and Components: The right engine was severely impact and thermally damaged. It is partially embedded about 3 inches into the asphalt. The propeller shaft was fractured adjacent to the propeller mounting flange. The shaft fracture displayed features consistent with torsional overload. Rotational scoring was evident on the upstream and downstream side of the compressor turbine, both sides of the power turbine vane, center baffle and on the upstream side of the stage power turbine. There are rotational contact signatures to the internal components.

- No evidence of inflight fire to the left engine.
- No evidence of FOD ingestion.
- Oil Filter damaged by heat but free of contamination.
- Fuel Filter was impact damaged.
- Compressor Turbine: Rotational scoring, rotational distress. The blades had trailing edge damage and rotational damage from contact with the nonmoving structure. Rub marks on the shroud. The compressor turbine disk was impact separated at the front stub shaft.
- The Power Turbin Section: Overload damage, heavy rotational scoring. On both upwind and downwind portions. The power turbine blades were fractured.
- Compressor: Blades fractured with a couple that remained attached bent in the opposite direction of rotation.
- Reduction gearbox: impact damaged and torsional overload.
- Accessory Gearbox: Thermally and impact damaged. 80% consumed by post impact fire.
- Ignition: Present and attached although damaged by impact and fire.
- Fuel Pump and Control Unit: Impact and thermal damage.
- Fuel Nozzles: Impact and thermal damage.
- Compressor Bleed Valve: Remained attached at its respective location.

RIGHT HAND (RH) ENGINE
Engine Model: PT6A-28, Serial No.: 50645
Time Since New (TSN): 9,622.8 per the engine logbook dated 8/29/2022
Cycles Since New (CSN): 9,500 per the engine logbook dated 8/29/2022
Time Since Overhaul (TSO): 6,495.5 per the engine logbook dated 8/29/2022
Cycles Since Overhaul (CSO): Not recorded in engine logbook dated 8/29/2022

Figure 6 Right engine Assy embedded in pavement.

6.0 Propeller Examination

Both propellers exhibited similar impact damage Both left and right propeller assemblies were attached on their respective engines and all 4 blades on each of the 2 assemblies remained attached to their respective flange. All four blades on both sides exhibit severe s-bending, chordwise scraping, and leading edge gouges. 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. There was no damage to indicate either propeller was feathered or at low pitch/idle power at the time of impact. No propeller discrepancies were found on the accident site by the IIC or Textron. Hartzell provided a propeller investigator to assist with the investigation. According to Hartzell, fork anti-rotation bumper marks on the preload plates in figure 7, indicated both propellers were in a similar blade angle range at impact… Bumper impact marks on the (Left) L3 and L4 preload plates suggested the blade angle was in the range of 26-30°. and would be consistent with power levels between 166 Hp to 404 Hp. Similar marks on the (Right) R3 and R4 preload plates indicated a blade angle range of 30-32° which is consistent with power levels of 304 Hp to 542 Hp. See the public docket for Hartzell report.

Figure 7 Propellers after retrieval at accident site.

Figure 8 Propeller preload plates indicate blade angle at time of impact. Photo courtesy of Hartzell.

7.0 Meteorological Information

Location.....: KPKB
Day of month.....: 18
Time.....: 10:53 UTC
Wind.....: true direction = 260 degrees; speed = 3 knots

Visibility.....: 10 Statute Miles
Cloud coverage.....: overcast (8 oktas) at 1400 feet above aerodrome level
Temperature.....: 03 degrees Celsius
Dewpoint.....: 01 degrees Celsius
QNH.....: 29.80 inHg

Remarks
site is automated and has a precipitation sensor.
Sea Level Pressure...: 1009.4 Mb
Temperature.....: 3.3 degrees Celsius
Dew Point.....: 0.6 degrees Celsius

KPKB 181150Z 26006KT 10SM OVC013 03/01 A2981 RMK AO2
accident 1110 UTC
KPKB 181053Z 26003KT 10SM OVC014 03/01 A2980 RMK AO2 SLP094 T00330006
KPKB 180953Z AUTO 26008KT 10SM OVC016 03/00 A2979 RMK AO2 RAB20E30 SLP089 P0000 T00330000
lots of PIREPs throughout the area of trace to moderate icing conditions
no PRECIP hitting the ground, but all those moisture particles just sitting the in clouds...
AIRMETs out for moderate icing, mountain obscuration, IFR
Wx satellite data shows supercooled liquid water clouds from 1,300 ft agl through roughly 8k ft msl...
icing graphic shows SLD threat potential around 1100 UTC for the accident area...

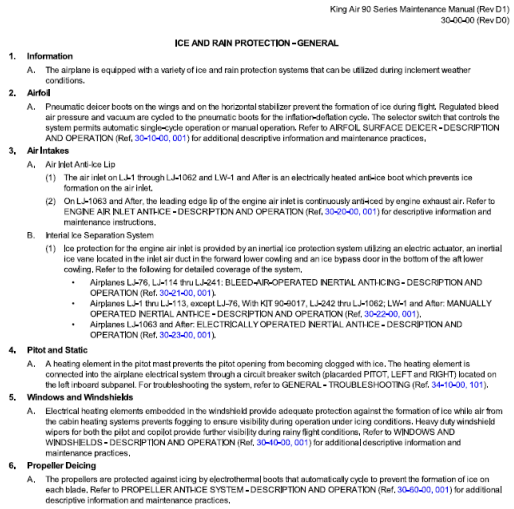
There were reports of icing in the area and possible through entire fight. Pilot reports and weather at the scene and surrounding areas was conducive for icing conditions. Requested a comprehensive weather study. There were no physical signs of icing on the airframe due to impact and thermal damage to the entire airplane and all flight surfaces.

8.0 MX Documentation

Records review at Anglin's Aircraft recovery during subsequent off scene examination.

9.0 Deicing System

The deicing system switches were impact damaged and their positions were unreliable. Each of the flight surfaces leading edges and their respective deicing boots were destroyed by impact and post impact fire. All pneumatic lines and associated deice plumbing and mechanical operations equipment was severely impact and thermally damaged or consumed and could not be tested. (Figure 8)



King Air 90 Series Maintenance Manual (Rev D1)
30-00-00 (Rev D0)

ICE AND RAIN PROTECTION - GENERAL

1. **Information**
   A. The airplane is equipped with a variety of ice and rain protection systems that can be utilized during inclement weather conditions.
2. **Airfoil**
   A. Pneumatic deicer boots on the wings and on the horizontal stabilizer prevent the formation of ice during flight. Regulated bleed air pressure and vacuum are cycled to the pneumatic boots for the inflation-deflation cycle. The selector switch that controls the system permits automatic single-cycle operation or manual operation. Refer to AIRFOIL SURFACE DEICER - DESCRIPTION AND OPERATION (Ref. 30-10-00, 001) for additional descriptive information and maintenance practices.
3. **Air Intakes**
   A. Air Inlet Anti-Ice Lip
      (1) The air inlet on LJ-1 through LJ-1062 and LW-1 and After is an electrically heated anti-ice boot which prevents ice formation on the air inlet.
      (2) On LJ-1063 and After, the leading edge lip of the engine air inlet is continuously anti-iced by engine exhaust air. Refer to ENGINE AIR INLET ANTI-ICE - DESCRIPTION AND OPERATION (Ref. 30-20-00, 001) for descriptive information and maintenance instructions.
   B. Inertial Ice Separation System
      (1) Ice protection for the engine air inlet is provided by an inertial ice protection system utilizing an electric actuator, an inertial ice vane located in the inlet air duct in the forward lower cowling and an ice bypass door in the bottom of the aft lower cowling. Refer to the following for detailed coverage of the system.
         - Airplanes LJ-76, LJ-114 thru LJ-241: BLEED-AIR-OPERATED INERTIAL ANTI-ICING - DESCRIPTION AND OPERATION (Ref. 30-21-00, 001).
         - Airplanes LJ-1 thru LJ-113, except LJ-76, With KIT 90-9017, LJ-242 thru LJ-1062; LW-1 and After: MANUALLY OPERATED INERTIAL ANTI-ICE - DESCRIPTION AND OPERATION (Ref. 30-22-00, 001).
         - Airplanes LJ-1063 and After: ELECTRICALLY OPERATED INERTIAL ANTI-ICE - DESCRIPTION AND OPERATION (Ref. 30-23-00, 001).
4. **Pitot and Static**
   A. A heating element in the pitot mast prevents the pitot opening from becoming clogged with ice. The heating element is connected into the airplane electrical system through a circuit breaker switch (placarded PITOT, LEFT and RIGHT) located on the left inboard subpanel. For troubleshooting the system, refer to GENERAL - TROUBLESHOOTING (Ref. 34-10-00, 101).
5. **Windows and Windshields**
   A. Electrical heating elements embedded in the windshield provide adequate protection against the formation of ice while air from the cabin heating systems prevents fogging to ensure visibility during operation under icing conditions. Heavy duty windshield wipers for both the pilot and copilot provide further visibility during rainy flight conditions. Refer to WINDOWS AND WINDSHIELDS - DESCRIPTION AND OPERATION (Ref. 30-40-00, 001) for additional descriptive information and maintenance practices.
6. **Propeller Deicing**
   A. The propellers are protected against icing by electrothermal boots that automatically cycle to prevent the formation of ice on each blade. Refer to PROPELLER ANTI-ICE SYSTEM - DESCRIPTION AND OPERATION (Ref. 30-60-00, 001) for additional descriptive information and maintenance practices.

Figure 9 King Air 90 Series Deice System

Submitted by:

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