

CEN21FA272 (N704AK) – Airframe and Engine Examination Report

Onsite:

- The airplane impacted rolling prairie in Parker, CO. The area is private property that is used for cattle grazing. The area is considered an unincorporated area of Douglas County, Colorado.
- The FAA (Matt Cady) responded in addition to the NTSB investigator-in-charge (IIC) on June 16, 2021. The South Metro Fire Rescue and the Douglas County Sheriff's Office were present. Later, the Douglas County Coroner's Office showed up to remove the two bodies and the dog. Excel Energy was onsite to examine the damage to the power lines. Hooper Corporation was onsite to do repairs to the damaged power lines.
- The airplane came to rest 3.40 miles from the approach end of runway 35R at APA, at a heading of 336°, and at an elevation of about 6,270 ft above mean sea level.
- The wreckage was located about 200 ft due north of the east to west running powerlines at an approximate 50° incline.
- The airplane had impacted two transmission static lines, that were strung between two transmission towers. The two transmission towers had a flashing light mounted on the top and the various wires in between the two transmission towers were marked with various colored marker balls.
- Upon impact with the rolling prairie, a fire commenced, and the composite airframe was incinerated.
- The airplane was destroyed.
- The area that was burned by the postimpact fire exceeded the planform of the entire airplane and spread south of the wreckage to where the power lines were located.
- Media sources reported an aerial firefighting helicopter was called in and dropped water on the wreckage to help extinguish the fire on the wreckage and the surround area.
- Control continuity checks were not performed, due to the lack of control surfaces present. The control surfaces were incinerated from the postimpact fire.
- Both wings, most of the fuselage, and the empennage were not present due to being incinerated from the postimpact fire.
- The engine (Pratt & Whitney Canada, PT-6) was found intact but detached from the airframe.
- The wood propeller blades were absent, with the exception of two partially fractured blades (5-blade system, MT Propeller).
- The airplane impacted two transmission static lines that were hung between transmission tower #736 (the easterly one) and #737 (the westerly one). #736 is about 177 feet tall. #737 is about 126 feet tall.
- 5 multi-colored marker balls were recovered by Excel Energy.
- The pilot's logbook was found relatively intact in the wreckage and the various pages were photographed.

- The South Metro Fire Rescue took various overhead photos with their drone, which the photos were given to the NTSB.
- The wreckage was recovered by Beegles Aircraft Services on 06/17/2021.

The wreckage of N704AK was laid out and examined at Beegles Aircraft Service, Greeley, Colorado, on September 21 and September 22, 2021. Present during the examination on both days was Mike Hodges (NTSB IIC), Matt (FAA), Roger Miller (FAA), Jeff Edwards (Lancair Owner and Builders Organization), and Leslie Ederer (Pratt & Whitney Canada).

Airframe:

- N704AK – Lancair, Evolution (serial number EVO - 070). Experimental, amateur-built airplane, from a kit. The airframe data plate was not identified during the examination.
- The airframe was destroyed by the impact sequence and a postimpact fire.
- Various large pinto bean bags were staged inside the hangar at Beegles Aircraft Service. Investigative team members emptied the bags and went through the various pieces of wreckage.
- The flight control surfaces were destroyed during the postimpact fire. A full layout of all flight control surfaces could not be accomplished.
- Flight control continuity is connected via a series of small, hollow aluminum tubing. The tubing could not be identified in the wreckage, as it was likely destroyed by the postimpact fire. Flight control continuity could not be established during the examination. A single set of two rudder cables (the only cables used for flight controls) were found mixed in the wreckage, as one side of the cables were cut during the recovery and the other side has showed signs consisted with overstress.
- The fuel lines, fuel selector system, and the fuel tanks were not identified due to postimpact damage and fire and could not be examined.
- The cockpit and cabin were destroyed by the postimpact fire.
- The two cockpit seats were Cirrus Aircraft products and were not the standard Lancair Evolution kit seats.
- A few components remained that could be identified by the investigative team were:
 - a. The left portion of the instrument panel was found with the G900X MFD and SD cards installed. The unit was badly burned in the postimpact fire. The touch screen (mfg. unknown) was installed as well as a standby EFIS (mfg. unknown).
 - b. The upper portion of the pilot cabin door was closed and latched.
 - c. The Garmin GFC700 roll and pitch servos were present in their installed locations. Both servo boxes were intact but were subject to heat from the postimpact fire.
 - d. The main landing gear actuators were fully extended indicating the landing gear were extended at impact.

e. The electric flap actuator was recovered. The right flap inboard portion remained attached to the spar. The flap to actuator hardware was present with the aluminum push rod (portion) attached to the inboard flap. Notably, the AN3-10A bolt attaching the control rod bearing to the 209-0065 push pull flap bracket was not safety wired per the build manual. The left flap inboard portion (unburned) was found with the 209-0065 push pull flap bracket attached. The control rod and AN3-10A bolt were absent and the 209-0065 push pull flap bracket did not exhibit evidence of overload failure.

Engine:

- The Pratt & Whitney Canada, PT-6A-135A (serial number PCE-PZ0030) turboprop engine was examined. The engine data plate was identified during the examination and the serial number was confirmed as PCE-PZ0030.
- The rear of the engine was covered mostly in burnt airframe carbon fiber residue.
- The view of the engine forward of the burnt residue mass showed airframe structure around the intake and gas generator case region.
- The propeller hub was still attached onto the reduction gearbox (RGB).
- The RGB was still attached to the engine. The RGB could not be rotated. Impact damage to the bottom of the RGB front housing had fractured away the scavenge tubes housing and magnetic chip detector (MCD) opening the RGB in this region to the environment.
- The left exhaust duct showed some mechanical damage, while the right exhaust duct was flattened against the gas generator case.
- The gas generator case (GGC) with the air frame components and right exhaust duct removed showed compressive deformation mostly on the right side of the case.
- For the accessory gearbox and inlet case, the front intake housing was fractured at all the struts.
- The CAM box was intact. The fuel control unit (FCU) connecting rod was in place. The reversing cable was attached at the CAM box and was attached through to the interconnect rod and propeller governor (CSU) reset arm. The beta lever was mechanically damaged resulting in the carbon block being displaced from the propeller sleeve.
- The P3 line was fractured off at the P3 filter. The P3 filter showed heat exposure and was mechanically damaged preventing further examination.
- The PY line was attached and secure to the CSU and to the FCU. The connection at the GGC fire wall was found loose and showed mechanical damages to the lockwire and surrounding region.
- The RGB magnetic chip detector was fractured from the front housing and was not present with the engine debris.
- The main oil filter was burnt and was fracturing during attempted removal from the filter housing, and as a result was not removed.
- The fuel filter housing was mechanically damaged and fractured from the main oil pump and as a result could not be removed. Heat damage to the fuel filter was evident on the exposed section.

Compressor Turbine (CT) Section

Due to the impact damages to the exhaust case and GGC, the cases had to be mechanically sectioned to separate the PT module from the GGC. The CT blades showed occasional impact damages at the trailing edge of the blades as well as some circumferential rubbing most likely from contact with fractured PT stator. The CT disc and blades for firtree region showed circumferential rubbing wear. The CT disc bore lip was mechanically damaged circumferentially, the region around the bore lip was circumferentially worn/scored and the balancing rim was mechanically machined off. The CT disc was removed revealing the trailing edge of the CT blades were mechanically bent inwards for the entire circumference and the blade tips showed rubbing contact with the CT shrouds. The upstream showed no foreign object damages (FOD) and circumferential rubbing wear was observed in the firtree region from contact with the CT inner shroud wall. The CT shroud housing was deformed from mechanical damage and partial circumferential scoring were observed on the shroud segments. The CT stator trailing edge was intact, with circumferential rubbing observed on the inner shroud wall from contact with the upstream side of the firtree region of the CT disc. From the upstream side CT stator vanes were found intact, however, the shroud inner wall was fractured over an arc of approximately 180° degrees.

Combustion Section

The small exit duct showed operational discoloration. The large exit duct which otherwise showed no pre-event anomalies, could not be removed due to the subsequent impact damages. The combustion liner other than mechanical damages both from the impact and from disassembly showed only operational discoloration.

Power Turbine (PT) Section

The PT module showed extensive mechanical damages. The PT stator inner shroud wall along with the baffle were fractured with many pieces missing. The PT baffle section with remnants of the PT stator inner shroud wall showed significant mechanical damages and circumferential rubbing contact with the CT disc. The downstream side of the PT baffle section showed also significant mechanical damages and circumferential rubbing from contact with PT disc. Two of the thermocouples were fractured and the rest were intact showing mechanical damages to various degrees. The PT disc showed all the blades to be fractured with some displaced towards the downstream side. The remnants of the PT blade showed the trailing edge bent over. Removal of a PT blade showed P/N 3121032-01 and exhibited a fracture morphology indicative of overload, like the fracture surfaces of the adjacent blades that could be observed. The leading edge of the PT blades all showed mechanical wear resulting in material loss from likely contact with the PT stator airfoils at some point during the impact. Due to the physical displacement of the PT disc and its mechanical damages it was not removed. The upstream face of the PT disk showed extensive circumferential wear/scoring from contact with the PT stator baffle and likely remnants of the PT stator. The PT blades shroud housing showed extensive circumferential rubbing and damages. The PT stator vane housing and retaining ring showed mechanical impact damages. The thermal temperature busbar and connectors were other than some impact damages were intact.

Compressor Section

The front inlet case was fractured through all its struts exposing the first stage compressor rotor blades. The first stage compressor rotor, which could be partially rotated with resistance and noise, showed all the airfoils to be bent in the opposite direction of rotation.

Reduction Gearbox (RGB)

The reduction RGB was split at the "B" flange with no original distress observed on the first stage

and second stage carrier assemblies. Some circumferential rubbing contact was observed on the outer diameter face of the first stage carrier flange and the inner diameter face of the second stage carrier flange. The RGB scavenge strainer, which has been exposed to the environment, showed some sludge accumulation, appeared to be composed of predominantly environmental debris.

Accessory Gearbox (AGB): The AGB could not be rotated. The AGB front housing showed mechanical damages, was heat discolored and melted in some locations. The RGB scavenge pump pad showed remnants of fractured and melted pump housing.

Ignition Plugs: The left ignition plug showed only operational wear, while the right ignition plug was fractured due to impact.

Ignition Leads: The ignition leads appeared burnt and the leads were fractured from the exciter box end. The lead's ignitor plug ends were intact, although the right-side lead had to be cut off.

Ignition Exciter: The exciter box could not be identified with certainty among the engine debris.

Fuel Oil Heat Exchanger (FOHE): The FOHE was fractured from the engine with the main section not found with the engine debris.

Fuel Pump: The fuel pump, which was mechanically damaged, and the filter fractured off, was still attached to the AGB housing and the remnants of FCU.

Fuel Control Unit (FCU): The FCU was both heat damaged and mechanically damaged with most of the FCU body either exposed or missing.

Flow Divider Valve (FDV): The FDV appeared intact.

Fuel Nozzles: The fuel nozzles other than occasional mechanical damage appeared to be in good condition.

Compressor Bleed Valve (BOV): The BOV showed heat distress to its inner components, however it could still be freely moved by hand.

Propeller Governor (CSU): The CSU showed was mechanically damaged.

Overspeed Governor (OSG): The OSG was intact.

Propeller:

- MT Propeller, MTV 27-1-E-C-F-R (P)/CFR210-58d (serial number 160667). Wood propeller. The propeller data plate was not identified during the examination. A decal with information was found on one blade remnant, however the decal was severely damaged, and the data on the decal could not be confirmed.
- The five-blade propeller was destroyed from the impact sequence. Three of the blades were separated at the blade root, at the hub. One blade was separated about mid-span. One blade was separated about one quarter of the way up from the blade root at the hub. Various pieces of the blade remains were collected from the wreckage and kept aside.
- The metal spinner remained intact and attached to the blade hub. The spinner exhibited signs consistent with power applied, as the spinner was showing the metal being twisted to the right (from the pilot's view in the cockpit).

Maintenance Records:

- Historical maintenance records were previously received from the family attorney (Jeff Harris) and the insurance adjuster (Jessica Kernan). No maintenance records were found during the wreckage examination.
- A review of the maintenance records revealed that the airplane was painted in June 2019 at 190.1 hours total time. During this paint work, all flight controls were noted to be removed, painted, and reinstalled.