



# Aviation Short Investigation Final Report

Gear collapse and runway excursion  
BE65-90, C6-CAM

**Clarence Bain Airport, Mangrove Cay Andros, Bahamas, on  
May 30<sup>th</sup> 2017**

**AAID Aviation Occurrence Investigation**

**AO-17-002062**

**Final Report – April 8<sup>th</sup>, 2019**

### **The Air Accident Investigation Department (AAID)**

The Air Accident Investigation Department (AAID) is the independent accident investigation department under the Bahamas Ministry of Tourism and Aviation (MOTA) charged with the responsibility of investigating all aviation accidents and incidents in the Bahamas.

The AAID's function is to promote and improve safety and public confidence in the aviation industry through excellence in:

- Independent investigation of aviation accidents and other safety occurrences
- Safety data recording, analysis and research
- Fostering safety awareness, knowledge and action.

**The AAID does not investigate for the purpose of apportioning blame or to provide a means for determining liability.** At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the AAID endeavors to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

The AAID performs its functions in accordance with the provisions of the Bahamas Civil Aviation Act 2016, Civil Aviation (Investigations of Air Accidents and Incidents) Regulations and Amendment Regulations 2017, International Civil Aviation Organization (ICAO) Annex 13 (Eleventh edition, July 2016 – latest revision) and, where applicable, relevant international agreements.

The Air Accident Investigation Department is mandated by the Ministry of Tourism and Aviation to investigate air transportation accidents and incidents, determine probable causes of accidents and incidents, issue safety recommendations, study transportation safety issues and evaluate the safety effectiveness of agencies and stakeholders involved in air transportation. The objective of a safety investigation is to identify and reduce safety-related risk. AAID investigations determine and communicate the safety factors related to the transport safety matter being investigated.

The AAID makes public its findings and recommendations through accident reports, safety studies, special investigation reports, safety recommendations and safety alerts. Unless otherwise indicated, recommendations in this report are addressed to the regulatory authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those authorities to decide what action is taken. When the AAID issues a safety recommendation, the person, organization or agency is required to provide a written response without delay. The response shall indicate whether the person, organization or agency accepts the recommendation, any reasons for not accepting part or all of the recommendation(s), and details of any proposed safety action(s) resulting from the recommendation(s) issued.

Official Copies of accident reports can be obtained by contacting:

Air Accident Investigation Department  
2nd Floor, Manx Corporate Center  
#45 West Bay Street  
P. O. Box CB-11702  
Nassau N. P., Bahamas  
Tel: 1 (242) 397-5513 / 5509 / 5520 / 5525  
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Additional copies of the reports can be viewed on the AAID's website at: <http://www.baaid.org> or requested by email: [baaid@bahamas.gov.bs](mailto:baaid@bahamas.gov.bs)

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**AIR ACCIDENT  
INVESTIGATION DEPARTMENT**

**Registered Owner:** Golden Wings Charter

**Manufacturer:** Beechcraft

**Aircraft Type:** BE-65-90

**Nationality:** Bahamas

**Registration:** C6-CAM

**Place of Accident:** Mangrove Cay, Clarence Bain Airport (MYAB)

**Date and Time:** 30<sup>th</sup> May 2017, (2044 UTC)

**Notification:** BCAA, NTSB

**Investigating Authority:** Air Accident Investigation Department,  
Ministry of Tourism and Aviation

**Investigator in Charge:** Kendall Dorsett Jr.

**Accredited Representatives:** None Assigned

**Technical Advisors:** Andrew Hall (Textron)

**Releasing Authority:** Air Accident Investigation Department

**Date of Final  
Report Publication:** 8<sup>th</sup> April, 2019

## What Happened?

On 30<sup>th</sup> May 2017 at approximately 4:45 pm Eastern Standard Time, (2045 UTC), aircraft C6-CAM a Beechcraft King Air BE65-90 operated by Golden Wings Charter was involved in an occurrence on runway 09 at the Clarence A. Bain Airport, Mangrove Cay, Andros (MYAB), Bahamas.

The aircraft had previously departed the Lynden Pindling International Airport (MYNN) with a crew of two on board.

After landing and during rollout, the right main landing gear strut separated from its trunnion.<sup>1</sup> As a result, a runway excursion occurred. The pilot stated he executed emergency procedures, shutting down both engines, fuel and electrical systems. The aircraft veered to the right and came to rest in bushes 101 ft. from the side of the runway. Both pilots subsequently evacuated the aircraft, uninjured.

During the onsite investigation, the right wheel assembly (still attached to strut) was discovered on the runway 451 ft. from the point where the aircraft came to rest.

## Investigation Findings

The upper torque knee was found to have fractured at the connection to the lower torque knee

## Analysis

In support of this investigation, a detailed material and process engineering examination was carried out by the aircraft manufacturer, Textron Aviation. The upper and lower torque knees were found to be broken at their connecting point, which resulted in the separation of the lower half of the right main landing gear from the upper. This location is highlighted in Service Bulletin 32-3134 as a critical area for the potential of cracks in the torque knee of this model aircraft.

The torque knees and outer cylinder of the aircraft's right main landing gear were sent to material and process lab for analysis. The following findings were uncovered.

1. The upper torque knee was found to have fractured at the connection to the lower torque knee.
2. Corrosion was found to have assisted the irritation of the crack; propagation was through fatigue. Final fracture was due to ductile overload.
3. Torque knee connection was found to have not been lubricated regularly.
4. Torque knees from LJ-108 were not replaced as recommended in SB 32-3116. The fracture location on the upper torque knee is consistent to the inspection region depicted in Service Bulletin 32-3134.
5. Material conductivity, tensile properties, chemistry and microstructure are consistent with aluminum alloy 2014 in the T6 condition.

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<sup>1</sup> Trunnion - In aviation, the term refers to the structural component that attaches the undercarriage or landing gear to the airframe. For aircraft equipped with retractable landing gear, the trunnion is pivoted to permit rotation of the entire gear assembly. ([https://en.wikipedia.org/wiki/Trunnion#In\\_vehicles](https://en.wikipedia.org/wiki/Trunnion#In_vehicles))

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C6-CAM on right side of RWY 09



Detached right gear strut and tire assembly



Photo 3: Shock absorber assembly  
(Right Main Gear) and Torque Knee

## Crew Experience

### Pilot

The pilot-in-command (male) of the aircraft was 38 years old at the time of the accident and possessed an Airline Transport Pilot license with multi-engine land and HS-125 ratings as well as a private pilot airplane single-engine land rating. He also possessed a valid Class 1 medical certificate with no limitations or waivers attached.

### The Aircraft

The airplane is a seven- to ten-place, pressurized, all-metal, low-wing, twin-engine, turboprop airplane with retractable landing gear.

This airplane is certified in the normal category. In the normal category all aerobatic maneuvers including spins are prohibited. The airplane is approved for day and night VFR/IFR operations when equipped in accordance with US Code of Federal Aviation Regulations (FAR) Part 91 or FAR Part 135.

The King Air 90 is powered by two Pratt and Whitney turboprop PT6A engines, each rated at 750 shaft horse power (shp). They are three-stage, axial-flow engines, with a single stage compressor and single-stage reaction turbine. A pneumatic fuel control schedules fuel flow.

Propeller speed remains constant within the governing range for any given propeller control lever position.

The airplane fuel system consists of two separate tank systems, one for each engine, connected by a common crossfeed line. Each of the tank systems is further divided into a main and an auxiliary system. Each main system consists of a nacelle tank, two wing leading-edge tanks, all of which gravity feed into the nacelle tanks. Each main system has a total of 194 usable gallons. The auxiliary fuel system consists of a 41-gallon usable fuel tank located in the wing inboard of the engine nacelle. It employs an automatic fuel transfer system to supply the fuel to the main system. Each engine drives a high-pressure fuel pump and a low-pressure boost pump. In addition, and electrically driven low-pressure standby boost pump is in the bottom of each nacelle tank.

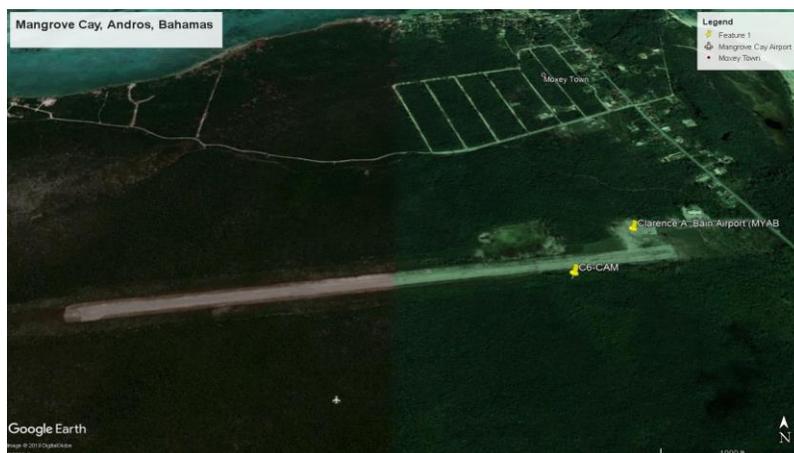
The airplane electrical system is a 28-VDC system which receives power from a 24-volt, 34-ampere hour nicad battery, two 250-ampere starter-generators, or through an external power receptacle. A hot battery bus is provided to power certain convenience lights, emergency equipment, and other items. These items have power available at all times, regardless of the BATT switch position.

C6-CAM was added to the Bahamian aircraft registry with a total time of 11,224.0 hrs and 15,795 cycles in January of 2009.

### **Airport Information**

The Clarence A. Bain Airport (MYAB) is a government owned aerodrome situated on the island of Andros. It is uncontrolled and operates from sunrise to sunset. The lone runway, 09/27 is surfaced with Bitumen and has dimensions 5,015' x 100'.

The aerodrome elevation is 12.4 ft. and airspace classification is E. Only VFR traffic is permitted, and communication is carried out via UNICOM frequency 122.8 MHz and Nassau Radio is available via frequency 128.0 MHz.



### **Weather**

Weather was determined not to be a factor in this accident.

## Safety Action

Whether or not the AAID identifies safety issues in the course of an investigation, relevant organizations may proactively initiate safety action in order to reduce their safety risk.

## Conclusion

The probable cause of this accident has been determined to be the fracture of the lower and upper torque knees (right main gear) due to ductile overload. Contributing to this fracture was the presence of corrosion and the lack of required lubrication.

## Safety Message

Every investigation undertaken by the AAID is intended to have the effect of advancing the safety of aviation in some way, shape, or form. Usually, this would be accomplished via the issuance of safety recommendations that were developed in the aftermath or during the process of an accident/incident investigation. However, the dynamic nature of aviation makes each accident scenario unique, and as such, each occurrence must be evaluated on its own merit and a determination made as to the method by which safety can be promoted.

With regard to this particular occurrence, the AAID deems it unnecessary to issue associated safety recommendation(s) as there already existed, processes to mitigate against such accidents in the form of Service Bulletin 32-3134 – Landing Gear Torque Knee Inspection (April, 1998) and Service Bulletin 32-3116 – Main Landing Gear Torque Knee Replacement (October, 1999). Therefore, it is incumbent upon the AAID to instead, reiterate and stress the importance of owners and operators adhering to **ALL** applicable service bulletins, airworthiness directives, orders and other industry best practices that lessens the likelihood of their aircraft being involved in an accident or incident.

Although adhering to the above may not provide an absolute panacea against accidents and incidents, it does lessen the probability of such occurrences which bodes well for all stakeholders.

## About this report

Decisions regarding whether to investigate, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a summary report and allow for greater industry awareness of potential safety issues and possible safety actions.

By the Air Accident Investigation Department



Delvin R. Major  
Chief Investigator of Air Accidents