



# Aviation Short Investigation Final Report

## Abnormal Runway Contact – (ARC) Learjet 60 – N357WP

**North Eleuthera Int'l Airport (MYEH), Eleuthera, Bahamas  
5<sup>th</sup> February 2023**

**AAIA Aviation Occurrence Investigation  
Report # OCC-2023/0006**

**Date of Final Report  
1<sup>st</sup> November 2023**

Released in accordance with Section 25 of the Aircraft Accident Investigation Authority Act (AAIA) 2019 and Section 1.445 of the AAIA Regulations 2021.

### **Publishing information**

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## About the AAIA

The Aircraft Accident Investigation Authority (AAIA) is the independent accident investigation agency under the Bahamas Ministry of Energy & Transport (MOE&T) charged with the responsibility of investigating all aviation accidents and serious incidents in the Bahamas.

The AAIA'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 AAIA 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 AAIA 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 AAIA performs its functions in accordance with the provisions of the Aircraft Accident Investigation Authority Act 2019 and Regulations 2021, International Civil Aviation Organization (ICAO) Annex 13 and, where applicable, relevant international agreements.

The Aircraft Accident Investigation Authority is mandated by the Ministry of Energy & Transport to investigate aviation 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 object of a safety investigation is to identify and reduce safety-related risk. AAIA investigations determine and communicate the safety factors related to the transport safety matter being investigated.

The AAIA makes public its findings and recommendations through accident reports, safety studies, special investigation reports, safety recommendations and safety alerts. When the AAIA 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.

## About this report

Decisions regarding whether to conduct an investigation, 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 short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

# AIRCRAFT ACCIDENT

## INVESTIGATION AUTHORITY

**Registered Owner:** Avventura Holdings LLC

**Operator:** Hera Flight

**Manufacturer:** Bombardier

**Aircraft Type:** Learjet 60

**Nationality:** United States of America

**Registration:** N357WP

**Place of Accident:** North Eleuthera International Airport (MYEH), Eleuthera, Bahamas

**Date and Time:** 5<sup>th</sup> February 2023, 8:56 am EST (1356 UTC)

**Notification:** Civil Aviation Authority Bahamas (CAA-B)  
National Transportation Safety Board (NTSB) United States  
Transportation Safety Board (TSB) Canada  
International Civil Aviation Organization (ICAO)

**Investigating Authority:** Aircraft Accident Investigation Authority,  
Ministry of Energy & Transport

**Investigator in Charge:** Saint-Tino Morley

**Accredited Representatives:** Beverley Harvey (TSB) Canada  
Brian Rayner (NTSB) United States

**Technical Advisers:** Michael Lemay (Bombardier)

**Releasing Authority:** Aircraft Accident Investigation Authority

**Date of Final** 1<sup>st</sup> November 2023

**Report Publication:**

## Occurrence Summary

On the 5<sup>th</sup> February 2023 at approximately 8:56 am eastern standard time (1356 UTC), a Learjet 60 with United States registration N357WP received damages when it was involved in an accident while landing at the North Eleuthera International Airport (MYEH), Eleuthera, Bahamas, with two (2) persons (Captain and First Officer) on board.

The aircraft was operated by Hera Flight LLC, an aviation company whose services include providing private jet charters under US Title 14 *Code of Federal Regulations* Part 135.

The flight originated from the Vero Beach Regional Airport (KVRB), Vero Beach, FL, USA with a departure shortly before 8:00 am that morning. The flight was conducted under Instrument Flight Rules (IFR). There was no indication, by either pilot, before or up until the accident, of any issue or concern relative to the aircraft.

During this leg of flight, the Captain assumed the duties of “Pilot Monitoring<sup>1</sup>” and the First Officer assumed the duties of “Pilot Flying<sup>2</sup>”

At approximately 8:43 am, while in contact with Miami Center Air Traffic Control at an altitude of 8,200 feet, the Captain made a request for a lower altitude due to weather. Miami Center advised N357WP to contact Nassau Approach (Air Traffic Control) on radio frequency 121.0. Upon establishing communication with Nassau Approach Control, and requesting a lower altitude, clearance was given to descend and maintain 2,000 feet.

Shortly after obtaining clearance, and in preparation for the impending approach into North Eleuthera, the First Officer stated to the Captain, “I’m assuming we’re gonna take, Ah, runway five because you don’t have the ATIS right....uhh, runway seven, not five, seven”

At approximately 8:49 am, the aircraft’s cockpit voice recorder (CVR) recorded the following exchange:

First Officer (Pilot Flying) – Yeah, I’m asking, this LNAV/VNAV<sup>3</sup> approach that we’re going into Bahamas right now, it says not authorized...

Captain (Pilot Monitoring) – Yeah ok...

First Officer (Pilot Flying) - What does that mean?

Captain (Pilot Monitoring) – It means not authorized, just go ahead and do it.....

First Officer (Pilot Flying) - Ok

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<sup>1</sup> monitors the aircraft state and system status, calls out any perceived or potential deviations from the intended flightpath, and intervenes if necessary

<sup>2</sup> The pilot who is controlling the path of the aircraft at any given time, in flight or on the ground.

<sup>3</sup> Lateral Navigation/Vertical Navigation (LNAV/VNAV) approaches provide both horizontal and approved vertical approach guidance

During the course of flight, it was observed that there was a stark difference in the type of conversation being conducted by the Captain versus the First Officer as the Captain limited his conversation to essential communication only that was necessary for the operation of the flight. Whereas, it was observed that the First Officer, at times, engaged in nonessential communication.

Less than two (2) minutes prior to touchdown, the IFR flight plan was cancelled with Nassau Approach Control and the flight crew was heard conducting the pre-landing checklist. During the pre-landing checklist process, the Captain was heard stating, “.....engine sync is off, the landing gear is down, three green,.....that’s where you say three green”. The First Officer then stated, “down three green”.

As the Captain was heard making the callout for an altitude of 200 feet above ground level, the Enhanced Ground Proximity Warning System (EGPWS) aural alert “SINKRATE, SINKRATE” sounded in the background.

Shortly after which, the Captain stated, “ref minus ten, ADD POWER!....ADD POWER!....ADD POWER!” The First Officer responded, “yeah I got it, I got it”.

This was followed by the sound of a loud crash of the aircraft impacting the runway, followed by a second loud crash as the aircraft become airborne momentarily after first impact and made a second forceful impact with the runway.

The Captain then stated, “my plane” to assume the role of Pilot Flying and the First Officer responded, “your plane, go for it”.

Upon assuming command of the aircraft, the Captain was eventually able to maintain directional control of the aircraft and he then taxied to the ramp area at MYEH.

There were no injuries to flight crew reported as a result of this occurrence. An assessment in the aftermath revealed damages to left main landing gear axle, left landing gear aft trunnion support, left wing trailing edge adjacent to aft trunnion support, left and right ventral fins.

## Aircraft Information

The Learjet 60 is a medium-size business jet manufactured by Bombardier Aerospace. It was designed as an improvement of the Learjet 55. It first flew on 10 October 1990 and received FAA certification in January 1993. Thrust reversers and single point refueling are standard equipment, and the aircraft features a full galley together with an aft toilet.

The Learjet 60 features several updates which set it apart from the Model 55. These include more powerful Pratt & Whitney Canada PW305A engines with 4,600 pounds of thrust, as well as the development of the "ogive" winglet trailing edge, which lowered drag and improved efficiency.

The Model 60 is primarily used by private operators, companies, and fractional jet operators. It is also used internationally for military and government purposes.

Aircraft Manufacturer		Registration	
Learjet Inc		N357WP	
Serial Number		Registered Owner	
300		Avventura Holdings LLC	
Model/Series		Aircraft Category	
60		Transport	
Engine Manufacturer		Engine Type	
P&W Canada		Turbo-fan	
Year of Manufacture		Airworthiness Date	
2006		10/16/2017	

The aircraft was equipped with a Flight Data Recorder Model FA2100, part number 2100-2042-00 and serial number 000341849 and a solid state Cockpit Voice Recorder with part number 1603-02-12 and serial number 1514.

Both recorders were retrieved from the aircraft to facilitate readout and analysis. This activity was conducted at the facilities of Applied Informatics and Research Inc. (AIRINC), Ottawa, Canada.

Additionally, the aircraft was equipped with a Honeywell Mark V Enhanced Ground Proximity Warning System (EGPWS). Designed for aircraft equipped with digital avionics, the Mark V (EGPWS) exceeds Class A terrain awareness and warning system (TAWS) requirements and provides protection against controlled flight into terrain (CFIT) and windshear.

The EGPWS is a Terrain Awareness and Alerting system providing terrain alerting and display functions with additional features meeting the requirements of TSO C151b Class A TAWS. The EGPWS uses aircraft inputs including geographic position, attitude, altitude, airspeed, and glideslope deviation. These are used with internal terrain, obstacles, and airport runway databases to predict a potential conflict between the aircraft flight path and terrain or an obstacle. A terrain or obstacle conflict results in the EGPWS providing a visual and audio caution or warning alert.

The EGPWS incorporates the functions of the basic Ground Proximity Warning System (GPWS). This includes the following alerting modes:

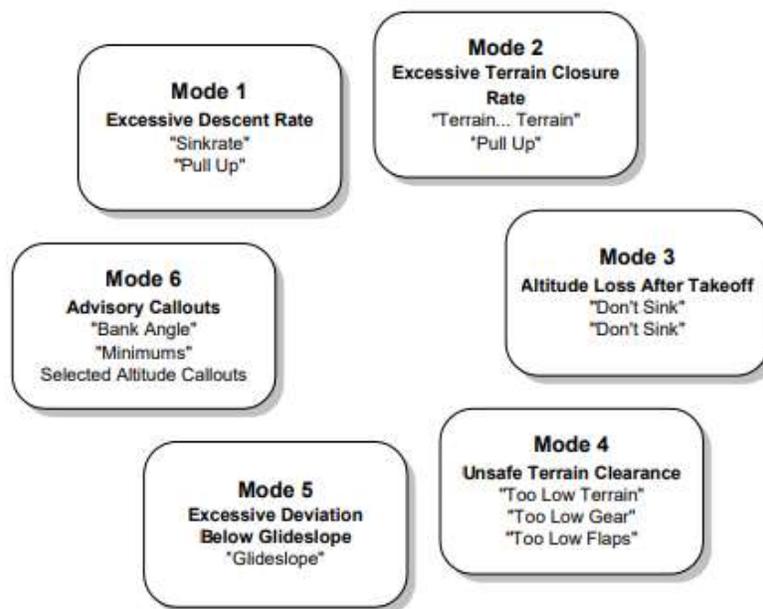
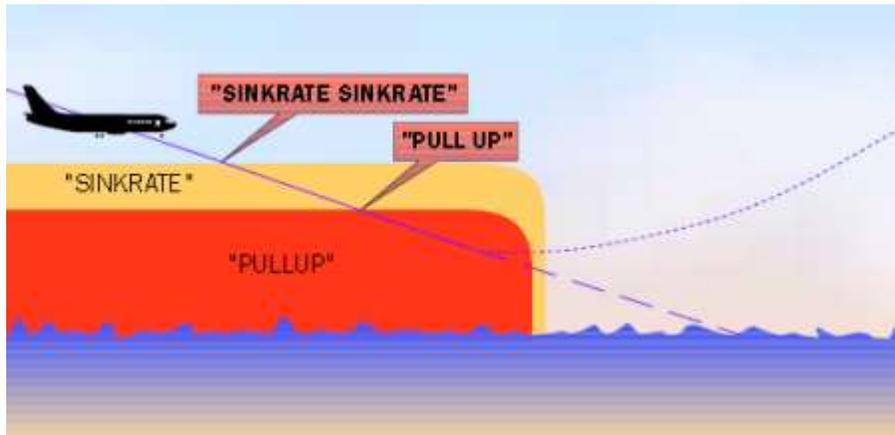


Fig. 1: EGPWS Modes

Additionally, Windshear alerting (Mode 7) is provided for specific aircraft types. Mode 7 provides windshear caution and/or warning alerts when an EGPWS windshear threshold is exceeded.

Mode 1 provides alerts for excessive descent rates with respect to altitude AGL and is active for all phases of flight. This mode has inner and outer alert boundaries as illustrated in the diagram and graph below. Penetration of the outer boundary activates the EGPWS caution lights and “SINKRATE, SINKRATE” alert annunciation. Additional “SINKRATE, SINKRATE” messages will occur for each 20% degradation in altitude.



**Fig. 2: Excessive descent rate diagram**

The review of the maintenance records for the aircraft showed that all necessary recommended maintenance practices and procedures for both engines and airframe were carried out as prescribed by the aircraft manufacture. The aircraft total flight time up to the day of the occurrence was 5055.5 hours with 2926 cycles.

The last airframe and engine log (#1 engine and #2 engine) sign off times are as follows:

#1 Engine: 31 <sup>st</sup> March 2022	#2 Engine: March 31, 2022	Airframe: 7 <sup>th</sup> October 2022
S/N PCE-CA045	S/N PCE-CA0459	Landings 2,850
Landings 2,815	Landings 2,815	Aircraft Flight Time 4,941.8 hours
Aircraft Flight Time 4,901.4 hours	Aircraft Flight Time 4,901.4 hours	
Cycles 2,767.0	Cycles 2,722.0	
TSN 4,812.74	TSN 4,685.09	

## Wreckage and Impact Information

Crew Injuries	Aircraft Damages
None	left main landing gear axle, left landing gear aft trunnion support, left wing trailing edge adjacent to aft trunnion support, left and right ventral fins
Passenger Injuries	Aircraft Fire
Not Applicable	Not Applicable
Ground Injuries	Aircraft Explosion
None	Not Applicable
Total Injuries	
None	

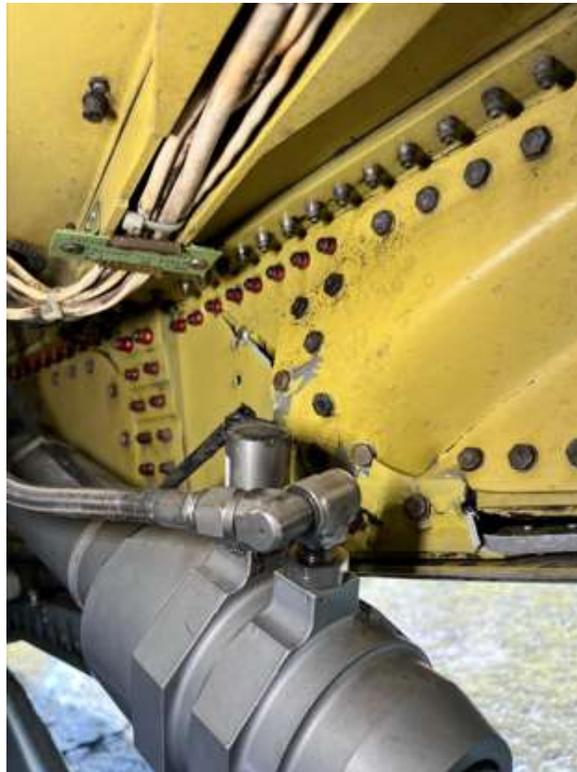


Fig. 3: Photo of damages to left landing gear aft trunnion support

# Investigation Findings

## Pilots

The Captain was 77 years of age at the time of the accident. He possessed an Airline Transport Pilot license issued 19<sup>th</sup> March 2021 with an Airplane Multiengine Land rating. He also held commercial privileges for Airplane Single Engine Land. He was type rated in the following aircraft: B-727, B-747, B-757, B-767, DC-9, EA-500, G-1159, G-V, LR-45, LR-60, N-265, RA-390S. The following limitations were noted: “English Proficient”; “EA-500 Second in Command Required” and “G-V SIC Privileges Only”.

He held a First Class medical certificate issued November 2022 with the limitations “Must wear corrective lenses” and “Not valid for any class after 05/31/2023”.

At the time of the accident, he had accumulated over 32,000 hours of total flight time, with over 30,000 hours in jet aircraft and over 17,000 hours of PIC time.

Hera Flight company indoctrination training was completed by the Captain on 24<sup>th</sup> September 2022 and recurrent type training (15 hours ground; 12 hours flight) on the Learjet 60 was successfully completed at Flight Safety International on 1<sup>st</sup> October 2022.

His date of hire was the 24<sup>th</sup> September 2022.

The First Officer was 31 years of age at the time of the accident. He possessed a Commercial Pilot license issued on 13<sup>th</sup> July 2021 with Airplane Multi-Engine, Single Engine and Instrument Ratings.

He held a First Class medical certificate issued 22<sup>nd</sup> June 2022 with the limitations “Must wear corrective lenses”.

The SIC accumulated approximately 1,350 hours of total flight time, with 1,210 hours of PIC time.

Hera Flight company indoctrination training was completed by the First Officer on 23<sup>rd</sup> November 2022 and the Learjet 60 Initial/Transition course (48.25 hours ground, 24 hours flight) was successfully completed at Flight Safety International on 13<sup>th</sup> December 2022.

His date of hire was the 27<sup>th</sup> November 2022.

# The Aerodrome<sup>4</sup>

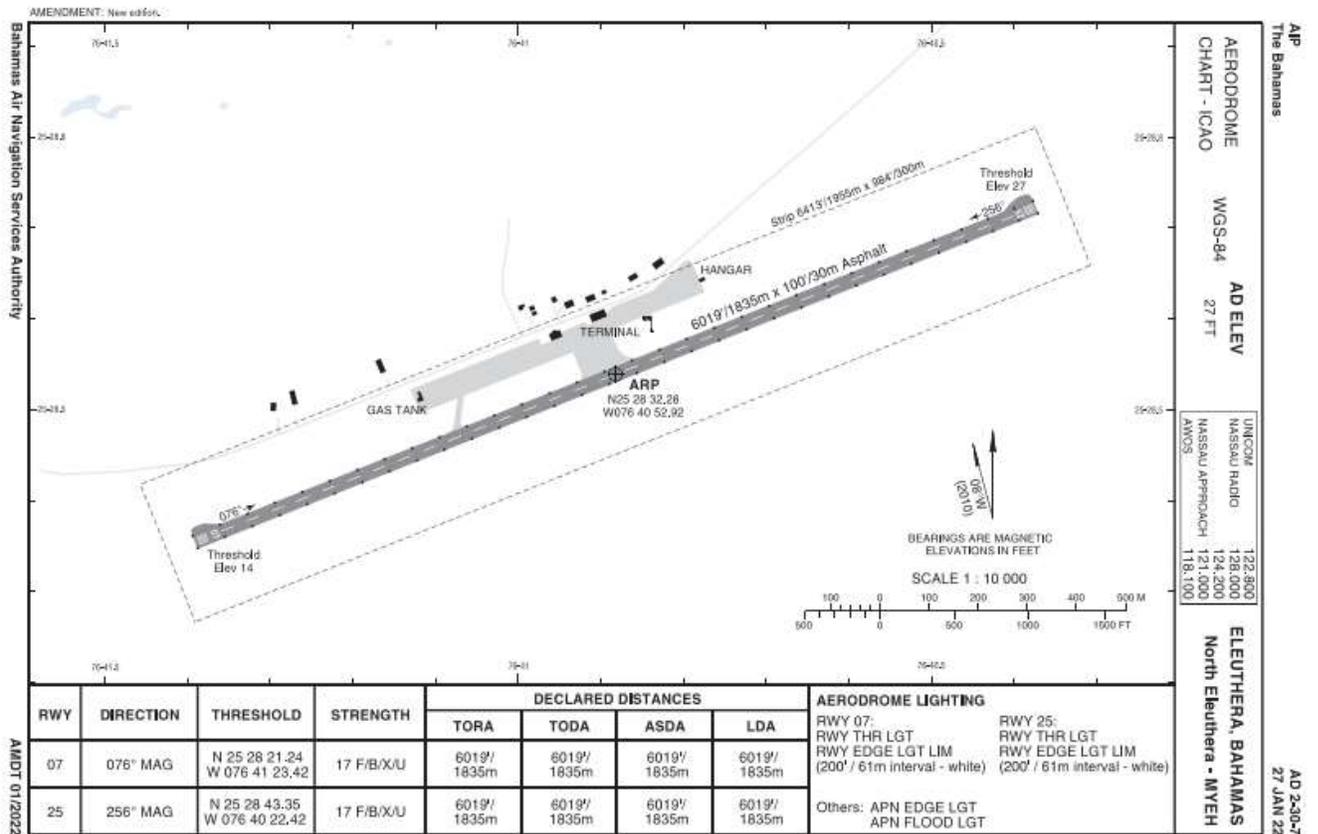


Fig. 4: North Eleuthera Airport Diagram

The North Eleuthera Airport (MYEH), is a government owned aerodrome on the island of Eleuthera, Bahamas that serves as a point of entry with provision of Bahamas Customs and Immigration services. It is serviced by one asphalt runway (07/25) with dimensions of length 6,019 feet and width 100 feet.

The hours of airport operations are from sunrise to sunset, unless special approval is granted upon request. The aerodrome is designated Category 5 for fire-fighting and the equipment available are 1 Oshkosh T-1500 unit and 2 x 300 pounds fire extinguisher.

<sup>4</sup> Information on aerodrome taken from Bahamas Aeronautical Information Publication 5<sup>th</sup> Edition 2022

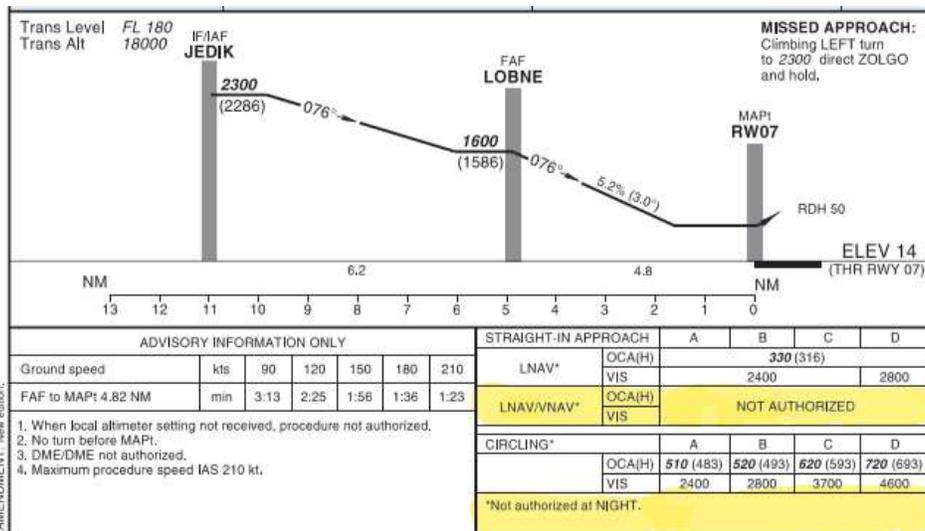
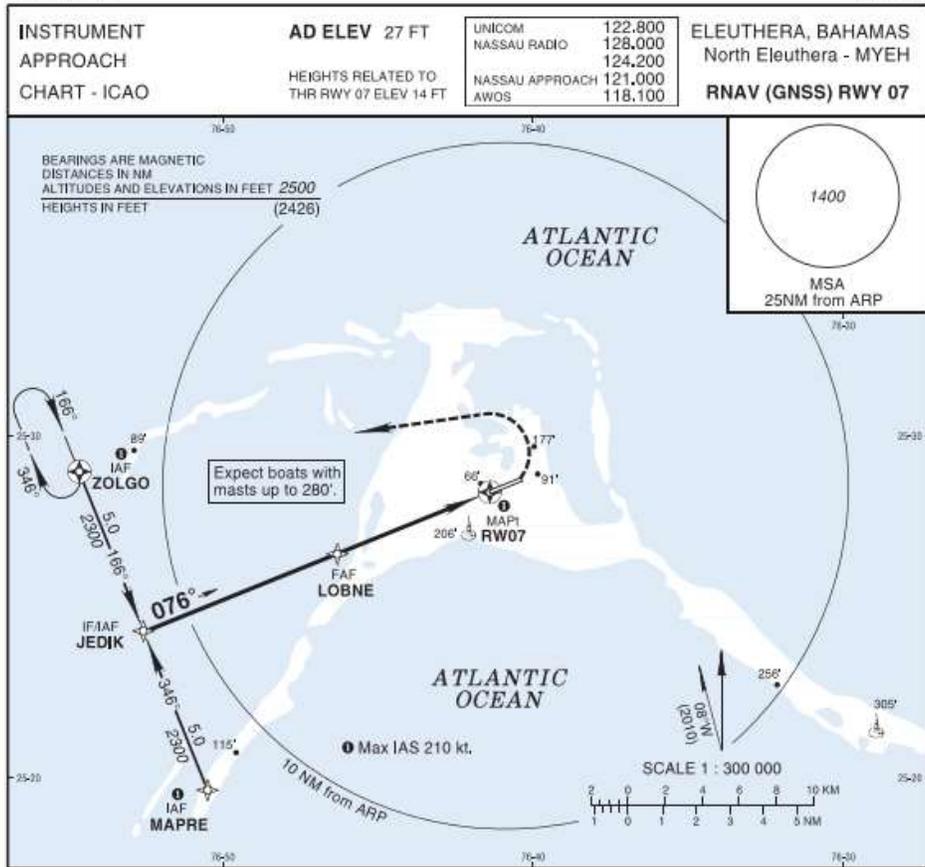


Fig. 5: Published Instrument Approach Procedure (RNAV RWY 07)

## Weather

### Meteorological Information:

<b>Conditions at Accident site</b>	<b>Condition of Light</b>
Visual Meteorological Conditions	Day
<b>Observation Facility Location</b>	<b>Observation Time</b>
Lynden Pindling Int'l Airport (MYNN) Nassau, Bahamas	8:00 am (1300 UTC)
<b>Distance from Accident Site</b>	<b>Temp /Dewpoint</b>
50 nautical miles	24° C /21° C
<b>Lowest Cloud Condition</b>	<b>Wind</b>
FEW021	120/10 KT
<b>Altimeter Setting</b>	<b>Visibility</b>
30.19 in. HG	>6 statute miles

## Analysis

In review and analysis of the recordings from the cockpit voice recorder (CVR) that captured the period of the last thirty minutes of flight, concerns were noted based on conversations between the flight crew.

In the first instance, it became apparent, based on cockpit conversations, that the First Officer was seemingly not adequately knowledgeable about the destination aerodrome, neither the instrument approach procedure into the aerodrome.

The First Officer appeared unsure of the aerodrome designation at the North Eleuthera Airport (MYEH) and incorrectly stated it initially as “runway five” instead of runway seven prior to the approach for landing.

Additionally, it also appeared that the First Officer was unfamiliar with the LNAV/VNAV instrument approach procedure for RNAV Runway 07 into MYEH, as he questioned the Captain about what was meant by the term “Not Authorized” which was stated in the approach minimums section of the published procedure.

During the course of flight, it was observed that there was a stark difference in the type of conversation being conducted by the Captain versus the First Officer as the Captain limited his conversation to essential communication only that was necessary for the operation of the flight. Whereas, it was observed that the First Officer, at times, engaged in nonessential communication.

Engaging in nonessential communication is a departure from what has been established as the “Sterile Cockpit Rule” which is characterized in US Title 14 *Code of Federal Regulations* Part 135.100 (b):

***No flight crewmember may engage in, nor may any pilot in command permit, any activity during a critical phase of flight which could distract any flight crewmember from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties. Activities such as eating meals, engaging in nonessential conversations within the cockpit and nonessential communications between the cabin and cockpit crews, and reading publications not related to the proper conduct of the flight are not required for the safe operation of the aircraft.***

There seemed to be an overall lack of focus and concentration, to some extent, on the part of the First Officer, who was tasked with the duties of “Pilot Flying” during a most critical phase of flight. This was evidenced, in part during the approach for landing by the Captain having to state, “that’s where you say three green” as a reminder to the First Officer of the required verbal challenge and response exchange between flight crew during the carrying out of checklist.

Both members of the flight crew were recent hires of Hera Flight, having less than six (6) months with the company.

This difference in overall experience, however, was apparent as the Captain seemed methodical in the carrying out of his duties as the Pilot Monitoring, whereas the First Officer overall seemed to take a more casual or cavalier approach, although being tasked with Pilot Flying duty.

At the juncture during final approach where the Captain would have stated “ref minus ten” is an indication that the aircraft landing reference speed or “ $V_{ref}$ ”, which is the final approach speed for landing that is calculated in consideration of such factors including aircraft landing weight and airport elevation, was below the determined calculated value to allow for a stabilized approach.

A stabilized approach can be accomplished only when certain criteria are met, including: the aircraft is on the correct flight path; only small changes in heading/pitch are required to maintain the correct flight path; the aircraft is not more than  $V_{ref}$  plus 20 knots indicated airspeed and not less than  $V_{ref}$  and power setting is appropriate for the aircraft configuration and is not below the minimum power for approach as defined by the aircraft operating manual.

The point at which the Captain had taken command of the aircraft was too late to arrest the situation as there was established already, an energy deficit as a result of low-air-speed during the approach and the activation of Mode 1 of the EGPWS aural SINKRATE, SINKRATE alert indicating that the descent rate was too excessive.

Within the cockpit environment, it has been established that Crew Resource Management (CRM), which is the effective utilization of all resources including crew members, aircraft systems, supporting facilities and persons to achieve safe and efficient operations, is key and vital for safe and efficient operation.

The overall objective of CRM is to enhance communication, interaction, human factors and management skills of the crew members concerned, with emphasis also on the non-technical aspects of crew performance.

As the Captain was the final authority on the operation of the aircraft, he could have made a judgement call to assume the duties of Pilot Flying at an earlier point during the flight based on the First Officer’s overall demeanor and seemingly lack of attention as it related to adequately performing and functioning in the role of Pilot Flying during a critical phase of flight.

Better utilization of CRM principles including situational awareness and decision making may have mitigated against the eventual outcome.

## Findings

These findings should not be read as apportioning blame or liability to any particular organization or individual.

- 1) The aircraft was certified, registered and equipped in accordance with applicable United States Aviation Regulations and approved procedures.
- 2) The maintenance records indicated that the aircraft was maintained in accordance with existing United States Aviation Regulations and approved procedures.
- 3) The Captain was appropriately licensed for the flight in accordance with existing United States Aviation Regulations.
- 4) The First Officer was appropriately licensed for the flight in accordance with existing United States Aviation Regulations.
- 5) The aircraft was equipped with a Flight Data Recorder Model FA2100, part number 2100-2042-00 and serial number 000341849 and a solid state Cockpit Voice Recorder with part number 1603-02-12 and serial number 1514.
- 6) Weather was not a factor in this occurrence.
- 7) There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.
- 8) There was no evidence of airframe failure or system malfunction prior to the accident.
- 9) The First Officer's statements as obtained from the CVR recordings, indicated that his knowledge of the destination aerodrome and understanding of the published instrument procedure RNAV RWY 07 at MYEH was inadequate.
- 10) The First Officer engaged in nonessential conversation during critical phase of flight.
- 11) An unstablized approach into MYEH was executed as evidenced by the activation of the EGPWS aural SINKRATE alert on approach and the Captain's command to the First Officer to "add power" three times after observing that the approach speed was 10 knots less than the value that was calculated as the landing reference speed  $V_{ref}$ .
- 12) The aircraft made a forceful impact upon landing and became momentarily airborne before making a second forceful impact with the runway.
- 13) The aircraft received damages to left main landing gear axle, left landing gear aft trunnion support, left wing trailing edge adjacent to aft trunnion support, left and right ventral fins.

## Probable Cause

The AAIA has determined the probable cause of this accident to be unstablized approach for landing resulting in abnormal runway contact.

Contributing factor(s) to this occurrence include:

- Inadequate crew resource management
- Inadequate pre-flight procedures (aerodrome information familiarization)
- Lack of compliance with sterile cockpit procedures

## Safety Recommendation(s)

There were no safety recommendations issued in relation to this occurrence.