TITLE

GENERAL INFORMATION:

Name of Operator:	Roraima Airways Limited
Aircraft Manufacturer:	Britten Norman Company
Aircraft Model:	BN2A-26
Nationality and Registration Marks:	8R-GRA
Place of Accident/Region:	Eteringbang Airstrip/Region#7, Guyana – 06 43.03N 61 7.80W
Date of Accident:	25th July 2017
Time of Accident:	21:55hrs UTC

REPORT No. GAAIU 3/1/17

This investigation was conducted in accordance with ICAO Annex 13 and therefore, it is not intended to apportion blame, or to assess individual or collective liability. Its sole objective is to draw lessons from the occurrence which may help to prevent future accidents. Consequently, the use of this report for any purpose other than for the prevention of future accidents could lead to erroneous conclusions.

Note: - All times in this report are Coordinated Universal Time (UTC) unless otherwise stated. UTC is four hours ahead of Guyana Standard Time (GST).

CONTENTS:

GLOSSARY OF ABBREVIATIONS

ACA	-	Approved Check Airman
AIP	-	Aeronautical Information Publication
AMO	-	Approved Maintenance Organisation
AOC	-	Air Operator Certificate
APC	-	Aircraft Proficiency Check
ATC	-	Air Traffic Control
CPL	-	Commercial Pilot Licence
CRM	-	Crew Resource Management
EFCIA	-	Eugene F. Correia International Airport
FOM	-	Flight Operations Manual
GAAIU	-	Guyana Aircraft Accident and Incident Investigation Unit
GARs	-	Guyana Aviation Requirements
GCAA	-	Guyana Civil Aviation Authority
GCARs	-	Guyana Civil Aviation Regulations
ICAO	-	International Civil Aviation Organisation
IPC	-	Instrument Proficiency Check
MEL	-	Minimum Equipment List
NTSB	-	National Transportation Safety Board USA
RAI	-	Roraima Airways Inc.
RWY	-	Runway
S/N	-	Serial Number
SOPs	-	Standard Operating Procedures
Sta.	-	Station
TBO	-	Time before Overhaul
TSN	-	Time since New
TSO	-	Time since Overhaul
VMC	-	Visual Meteorological Conditions

Synopsis

The aircraft was approaching the Eteringbang Airstrip to land. The aircraft was seen proceeding along the eastern side (right downwind) RWY03, apparently with the intention of landing on RWY03. Shortly after the aircraft passed the threshold and turning on a tight right base leg of RWY03, it made a sudden dive and went nose down into the ground.

The pilot, who was the sole occupant of the aircraft, was killed.

There was no fire.

1. Factual Information

1.1. History of the Flight

The aircraft departed from the company base at the Eugene F. Correia International Airport (EFCIA) for Eteringbang Airstrip, on 25th July 2017. It was rostered to shuttle fuel between Eteringbang and Ekereku Bottom Airstrips for two days for a customer. The records indicate that the aircraft departed EFCIA at 12:00hrs and landed at Eteringbang Airstrip at 13:22hrs; and commenced shuttling at 15:48hrs. The accident flight was the ninth shuttle of the day. The accident occurred at 21:55hrs.

Eyewitnesses on the ground at Eteringbang reported that the aircraft was observed coming from the east. It turned and proceeded along right downwind of the runway, with the probable intention of landing on RWY03. The aircraft flew past the threshold and suddenly nosedived into the ground.

1.2. Injuries to Persons

Table: 1- Showing Injuries to Persons

Injury	Crew	Passengers	Others	Total
Fatal	1	0	0	**1**
Serious	0	0	0	**0**
Minor/None	0	0	0	**0**
Total	**1**	**0**	**0**	**1**

1.3. Damage to Aircraft

Most of the cockpit was buried in the ground and was crushed and pushed back into the cabin. The roof was caved in. The propeller blades were bent and twisted. Both engines were damaged.

1.4. Other Damage

There was no other significant damage.

1.5 Personnel Information - Pilot

Gender:	Male
Date of Birth/Age:	14th August 1977/39 years
Nationality:	Guyanese
License:	Guyana CPL #305
Date of issue:	28th May 2012
Date of last medical:	19th April 2017
Valid until:	31st October 2017
Aircraft type ratings:	C172, BN2 Islander,
Last APC/IPC Type:	27th February 2017
Total hours:	4760hrs
Total Hours on Type:	Unknown
Hours in last 90 days:	320:28hrs
Hours in last 30days:	126:29hrs
Hours in last 7 days	33:43hrs
Hours in last 24 hours:	5:48hrs

There are no limitations on the pilot's Class 1 Medical.

1.6 Aircraft Information

1.6.1 General

Manufacturer:	Britten Norman Aircraft Company
Year of Manufacture:	1981
Aircraft Model:	BN2A-26
Aircraft S/N:	3006
Certificate of Registration:	Issued – 11th May 1995
Certificate of Airworthiness:	Valid until 2oth April 2018
Total Airframe Hours:	24,716:36hrs
Maximum Take-off Weight:	6600lbs
Last Scheduled Inspection:	100hrs
Time since last Inspection:	28:22hrs

Next Inspection Due:	50hrs/21:38hrs
Port Engine Model:	Lycoming O-540-E4C5
Engine S/N:	RL-18368-40E
Engine TSN:	581:56hrs (rebuilt)
Starboard Engine Model:	Lycoming O-540-E4C5
Engine S/N:	RL-18753-40E
Engine TSN:	581:56hrs (rebuilt)
Port Propeller Type:	Hartzell HC-C2YK-2CUF
Propeller S/N:	AU11324B
Propeller TSO:	42:25hrs
Starboard Propeller Type:	Hartzell HC-C2YK-2CUF
Propeller S/N:	AU11324B
Propeller TSO:	581:56hrs
Fuel Type:	AVGAS 100LL

The BN2A Islander is a ten-seater, utility aircraft. It is a high-wing cantilever monoplane with a rectangular fuselage and two wing-mounted engines. The rectangular cross section fuselage, is furnished with a conventional tail unit and fixed tricycle landing gear. Its fuselage is light alloy monocoque with aluminum spars, stringers, and frames covered by aluminum alloy skins. On the ground, the aircraft is steered by its nose gear and the rudder control.

1.6.2. Maintenance

Examination of the aircraft maintenance records indicates that there were no outstanding maintenance issues. All required and scheduled maintenance had been performed and all Airworthiness Directives had been complied with. There were no outstanding MEL items on the aircraft.

1.6.3. Mass and Balance

Information from the Load Sheet indicates a flight payload of 100lbs and a computed takeoff weight of 4514lbs. The cargo consisted of six empty 45-gallon plastic drums.

1.7 Meteorological Information

The weather reported at the time of the occurrence was – Wind calm, visibility – unlimited, with clear skies. The incident occurred in the afternoon, during daylight hours.

1.8 Aids to Navigation

Not applicable.

1.9 Communications

At the time of the occurrence the aircraft was preparing to land. Throughout the day the aircraft completed eighteen movements prior to the accident flight. Except for the first movement, from EFCIA to Eteringbang, the aircraft was not in direct contact with the Air Traffic Control (ATC), but movements were relayed to the Flight Information Center (FIC) by the operator via telephone. At 21:40hrs, the operator called to report closing the aircraft's flight plan for the day and stated that this aircraft and another company aircraft were both safe on the ground at Eteringbang.

At 22:29hrs, ATC was advised by Police Force Control that they were investigating a report of a crashed aircraft at Eteringbang Airstrip. The Duty Air Traffic Controller checked with the operator who confirmed that their aircraft, 8R-GRA had crashed near Eteringbang Airstrip.

1.10 Aerodrome Information

The following information, pertinent to the Eteringbang Airstrip, was taken from the Guyana Aeronautical Information Publication.

Aerodrome Identification:	SYET
Coordinates:	06 43 00.92N 061 07 50.11W
Elevation:	276 ft.
Runway orientation:	03/21
Runway length:	1800ft

Runway width: 36ft

The airstrip is located in Region No.7 in the western area of Guyana, on the border with Venezuela. The area is hilly and heavily forested. The runway surface is finished with unsealed laterite. The surface is level, but the finishing material is easily eroded, and the surface becomes spongy and potholed after rainfall. The airstrip slopes downward after the first 1000ft from the beginning of RWY21. Both takeoff and landing are restricted to one direction, due to the presence of a Venezuelan military base located just off the threshold of RWY21.

There are no visual or other navigation aids at this runway.

1.11 Flight Recorders

This aircraft is not required by regulation to be equipped with a flight recorder.

1.12 Wreckage and Impact Information

The aircraft was observed nose-down in the ground 250meters away and right of the threshold of RWY03. The aircraft did not break up prior to or during impact but was severely damaged by the impact.

1.13 Medical and Pathological Information

A Post Mortem was conducted on the deceased by a Guyana Government Forensic Pathologist.

The external examination showed damage to the bones of both the right and left legs, and to both arms. There were abrasions to the middle chest, and the face and head were severely damaged.

The internal examination showed damages to the head, neck, brain and spine. There were also damages in the thoracic cavity, the lungs were collapsed and organs in the abdominal cavity were damaged.

There was evidence of multiple blunt trauma to the body, and the cause of death was stated as multiple injuries.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The cockpit of the aircraft was crushed by the impact. The pilot's seat, seat harness and seat belt were intact. This accident was not survivable

1.16 Tests and Research

1.16.1. Propeller Examination

Both propellers were sent to the Hartzell Engineering Test Lab in Piqua, Ohio for examination under the supervision of the NTSB. The examination was done on 28th November 2017.

Both the left and right propellers were examined. The left propeller exhibited more damage than the right one. The left propeller had discernible chordwise/rotational abrasion on one blade with aft bending and twisting leading edge down, indicating that the propeller was rotating at impact.

Both propellers exhibited some characteristics suggesting similar power states on both. There was impact damage in the preload plate pockets of each hub that were similar; material deformation on the trailing edge side of one blade pocket and on the leading edge of the side of the other blade pocket. Pre-load plate marks on both propellers suggested blade angles in the low range of operation at the time of impact. Impact marks on the low pitch stop assembly suggested that the blade angles were at or near the low pitch stop. There was no evidence to suggest that either propeller was in the feathered position. Damage suggested both propellers were rotating with low to no power while at or near the low pitch stop blade angle.

1.16.3. Engine Examination

Both engines were sent to the Textron Avco Lycoming Engine Factory in Williams-port Pennsylvania, for examination under the supervision of the NTSB. The examinations were done from 12th to 14th December 2017.

The port engine showed more significant damage than the starboard engine. The port engine had a ¾ inch puncture on the oil sump and the crankshaft was bent by 40 points. This made it unsafe to do a port engine run.

The engineers were able to build up the starboard engine. The starboard engine start, and run were satisfactory.

1.17 Organisational and Management Information

1.17.1 Roraima Airways Inc.

Roraima Airways Inc. has more than twenty years of experience as an aircraft operator in Guyana. The company operates a fleet of three BN2A Islanders and two BN2A Trislander aircraft. The company acquired its Guyana Air Operator Certificate No. 003 from the Guyana Civil Aviation Authority in 2004. The AOC was reissued in January 2016. The company does domestic scheduled and charter, passenger and cargo operations, and international mail/cargo operations.

The company's Flight Operations Manual (FOM) was reviewed. The list of nominated post holders includes the Accountable Manager, the Director of Operations, the Chief Pilot and the Safety and Quality Manager.

Section A 5.3.2. of the Manual requires the Director of Operations to be a holder of a Guyana Commercial Pilots' Licence (CPL) with type Rating on aircraft assigned and current Instrument Rating (IR) along with a Class 1 Medical Certificate. Practical requirements include 2500hrs total time and 1000hrs as Pilot in Command in a multi-engine aircraft.

According to Section A 1.3.2.2. of the FOM, the Director of Operations is responsible to the Accountable Manager for ensuring safe and efficient operations and procedures that comply with applicable regulations. He is also responsible for production of manuals. The Director of Operations is also responsible for operational control of flights, including ensuring that, properly equipped and airworthy aircraft are used; properly qualified personnel are available to support and conduct each flight; proper flight planning and preparation are done; and correct flight locating and flight following procedures are adhered to.

The Manual lists the duties and responsibilities of the Operations Manager, the Operations Superintendent, the Operations Supervisor and the Operations Officer, in Sections A.1.3.2.8, A.1.3.2.9, A.1.3.2.10 and A.1.3.2.11 respectively. There is also a comprehensive training programme in Part D of the Manual, which includes both initial and recurrent training, for Operations Staff along with the requirement for annual competency checks to retain their authorization to carry out flight dispatch duty.

Part A-7, paragraph 13.1 of the manual states that the times taken for pre- and post-flight duties are included in the maximum flight duty period. Thirty minutes is allowed for pre-flight duties and fifteen minutes for post flight duties. At paragraph 14.1 the manual makes allowance for extension of the flying duty period if it is interrupted by split duty, but the extension will count only if a quiet place, not open to the public is available for the pilot to rest. Table B paragraph 13 allows flying duty between 11hours and 8 hours within a 24-hour period, depending on the number of sectors flown. Paragraph 20.1 allows a limit of 34hrs in one week; 120hrs in thirty days; and 300hrs within ninety days.

Part C Appendix B of the manual has specific procedures for airstrips that are considered to be difficult or have restrictions. There are general procedures for other airstrips. There is a procedure for operations to Eteringbang. This procedure states, '*takeoff and land in the same direction, extreme caution when wet, danger of aquaplaning*'. Paragraph 5 of the manual also contains general guidance for Approach, Missed Approach and Departure Procedures.

The company carries out its own maintenance and acquired its Approved Maintenance Organisation Certificate No.008 issued by the GCAA in 2016.

1.17.2. Interviews with Company Personnel

The person who identified himself as the Director of Operations is not listed in this position in the Company Operations Manual. He explained that this change was on hold pending a total rewrite of the Manual, as mandated by the GCAA, due to pending changes in the regulations. He stated that he has a letter of approval from the GCAA to hold the position. He agreed that he does not hold the required

qualifications as stated in the manual but stated that he meets those of the Regulations. Following an accident in 2014, the 'Director of Operations' was required to do retraining; but up to the date of this accident in 2017, this training had not been completed. He stated that the retraining was not done because he had been very busy with other company tasks. It was also noted that he did not renew his Class 1 Medical that had expired in September 2014. Thus, his CPL#279 was not currently valid. However, notwithstanding his lack of currency for the position, the Director of Operations said that he has the respect of management, crew and other staff. He has the leeway to get his job done with no push back from the owners of the company and he had recently started the required retraining.

He stated that as Director of Operations he has general oversight responsibility for the flight, but he was not involved in the planning and dispatch of this flight. He has an operations manager, an operations superintendent and operations supervisor, who would have been more directly involved.

It was agreed that the Company manual has no specific procedures related to shuttle operations. The operation is by charter; there is no predetermined number of shuttles that the pilot is required to complete in a fixed period, but he is expected to do as many shuttles within the time, provided he does not exceed the stated flight and duty times limitations. According to the Company Manual, the more sectors flown the shorter is the duty period. The pilot is usually assigned to the hinterland for a maximum of 3 days after which he returns to Georgetown for an off-duty period.

Route checks are done yearly by an Approved Check Airman (ACA) or a senior company pilot. The route checks are scheduled to be done on an actual passenger/cargo flight. The pilot does not necessarily know when the check will be done. Airplane Proficiency Check and Instrument Proficiency Check (APC/IPC) are done twice per year by an ACA.

The Director of Operations noted that the accident pilot was designated as a Captain in 2014, after more than 1200hrs under supervision, much of which was done by a senior company pilot. He considered that the accident pilot was very disciplined and was receptive to correction. Although he was a very confident

person generally, he thought that the pilot displayed no arrogance or any attitude of bravado or nonchalance. He however opined, that generally, as pilots approach captaincy they become nonchalant, in that they tend not to observe the attitude, speed and distance limitations of the aircraft, as they are now more aware that they can handle the aircraft. However, he had never noticed or heard about this behaviour by the accident pilot.

He continued to explain that the company has a high-pressure pump for refueling and this process takes about 5 minutes. The pilot supervises the refueling. The pump is inspected regularly and is transported to Georgetown after each series of shuttles for detailed inspection and repairs as necessary. The pump has an aviation authorized Velcon filter which is also inspected. The backup is the traditional chamois and funnel. The chamois is also inspected for rips, tears and other degradation before every shuttle. He noted that some pilots still prefer the chamois system as this allows them to see if there are any contaminants in the fuel.

The Director of Operations stated that the Operations Supervisors, who are in control of the base operations center, are trained IAW the training programme in the manual. This includes company procedures indoctrination, dangerous goods, monitoring, etc.

At present, monitoring at Eteringbang is facilitated by communications through cell phone and internet. The aircraft also has a spot tracker on board, which accurately tells when the aircraft is on the ground and when it is off; and at all times a staff, in the office, is assigned to monitor it. The Director of Operations said that as part of their internal investigation, they conducted an evaluation of flights and determined that the spot tracker logs are absolute. The spot tracker reports are sent to several senior staff, so they are always aware of where the company aircraft are at any given time. The Spot tracker logs are based on location and time and once it is turned on, it cannot be manipulated.

Most pilots use a portable GPS which is a time device, using satellite and triangulation to establish position, as an aid to navigation. However, this device is not approved for primary navigation in Guyana.

There was another pilot at Eteringbang who was also flying for Roraima Airways. He had also departed EFCIA on the day of the accident and arrived at Eteringbang before the accident aircraft. He started duty at 11:00hrs. He began shuttling from Eteringbang at 12.42hrs that morning and finished flying shortly after the accident aircraft had crashed.

1.17.3 Interview with the Other Pilot

This pilot stated that the two aircraft had departed EFCIA on the morning of the accident for shuttle operations between Eteringbang and Ekereku Bottom. He reached to Eteringbang first and did one shuttle. The weather was good. The runway was in satisfactory condition but there were some soft spots. When he returned to Eteringbang after the first shuttle, the accident pilot was on the ground and expressed some concerns about the soft spots. Together they enlisted assistance from civilians on the ground and did some filling and rolling of the soft spots. The runway was damp due to overnight rain. They had lunch together before commencing shuttles. He knew the accident pilot quite well and as far as he was aware the accident pilot seemed to be normal that day.

He stated that he had done ten shuttles for the day.

For the last shuttle, he took off from Eteringbang after 21:00hrs. The accident pilot departed from Ekereku Bottom when he was about four miles from that location, and he confirmed that he was heading back to Eteringbang and it was his last shuttle of the day. He did a quick turnaround at Ekereku Bottom and was about 4-5 minutes behind the accident pilot, who advised him that he was landing and would see him on the ground.

He noted that the track from Ekereku Bottom to Eteringbang is 330° which puts the aircraft on a right base for RWY 03 at Eteringbang, but in keeping with normal procedure, he proceeded to left base and on to final RWY 03. It was from this position that he noticed the crashed aircraft off to his right. It was vertical in the trees.

He landed, shut down his aircraft, returned to the beginning of the airstrip and onto the crash site. The wreckage was 250 meters from the beginning of the runway

and 30° left of centerline. The aircraft was vertical, nose down and fuel was leaking from it. He took control of the accident site and assessed that nothing could be done to help the pilot. While waiting for the fuel to stop leaking, he reported the accident to the Company Owner/Chief Pilot.

The front of the aircraft had to be cut to access the pilot who was in a heap of metal. They broke the seat back, pulled out the seat belt and got the body out. The body was extracted through the pilot exit, which also had to be cut to facilitate access to the body. After consulting with his Chief Pilot, he flew the pilot's body to the EFCIA.

The cargo on the crashed aircraft was six empty drums. These had been strapped in. There was nothing else on board.

He confirmed that he had flown regularly with and had also trained the accident pilot. During his training phase, the accident pilot followed procedures. He noted that the accident pilot was generally a confident pilot who became very competent and he was quite skilled conducting MEDIVACS. He also noted that the pilot is normally very meticulous, and his log books are usually up-to-date.

When the accident pilot started shuttling, he did observe that he (the accident pilot) would execute certain maneouvres and he had warned him to slow down. He noted that particularly on short legs, the accident pilot tended to cut from left base to final, slipping the aircraft in. He had told him that he should desist as it was not an aerobatic aircraft and was not designed for such manoeuvres.

There were no procedures established for shuttling, but he agreed that shuttling was different from other operations. He agreed that it is normal for the aircraft to fly over the runway to observe conditions on the ground, but this was not done during shuttles, because the legs are usually not more than 15minutes, so having left the runway a short while before, the pilot would be familiar with conditions there.

Other company personnel interviewed by the Accident Investigation Team included the Operations Manager, the Safety Officer and an ACA. The Operations Manager and the Safety Officer both said that they considered the accident pilot to

be highly skilled and an excellent pilot. While flying with him, they had not experienced any unprofessional behaviour.

The ACA stated that during training he had occasion to remind the pilot to operate IAW Standard Operating Procedures. Most of their flights together were international that required a full instrument approach in which the required speeds would be maintained.

For him, flying from Ekereku to Eteringbang the normal approach was to overhead the field and turn on to left downwind/left base then final to land. Noting how close the aircraft was to the runway, he agreed that an attempt to turn on to final from that position, that is from a right base on to final, would require a very steep bank, and if the instruments are not properly monitored, this situation could result in a loss of control.

When queried about unusual manoeuvres at the end of the day, he explained that this was not necessarily a show and the manoeuvres may be quite legal, but it would just be different from a landing during shuttling and was usually intended to give an indication that this was the pilot's last shuttle for the day.

1.18 Additional Information

1.18.1. Visit to the Accident Site

The Accident Investigation Team visited the Accident site the day after the accident. At the site, it was confirmed that the wreckage was guarded overnight by soldiers of the GDF. Examination of the visible prop parts led to the determination that the engine was powered at time of impact. The cockpit was crushed and had moved back to within 5ft of the aircraft rear door. At the accident site the technical log book was picked up just in front of the wrecked aircraft.

Apart from inspection of the wreckage, the opportunity was taken to interview eyewitnesses. Several persons observed the aircraft as it approached the airstrip, from the east and turned alongside the runway. They saw the aircraft low. It was generally agreed that this was an unusual manoeuvre. It was also agreed that it was not unusual for pilots to do certain manoeuvres especially for the last flight of the

day and some pilots are influenced by pressure from onlookers on the ground as well as other pilots. The aircraft sounded normal.

Only one person reported that he observed the aircraft as it fell. He explained that normally when aircraft came to the airstrip, it would approach from the east, cross the airstrip, turn south on the western side and travel parallel to the airstrip before turning on to final to land. The accident aircraft came from the east and instead of crossing the airstrip and then heading south, it made a sudden cut on the east side of the airstrip and continued parallel to it, very low between the trees and the runway. From his years at the airstrip he knew that this was not normal and felt that something was wrong, so he continued to watch the aircraft and saw when it dived down. He said that the aircraft did not sound unusual, it did not turn, or spin in the air, it just dived down. He has been working for years at the airstrip, so he is very familiar with how aircraft would normally operate here.

A visit was made to the position where this eyewitness said he was standing when he made his observations. It was confirmed that from this position he would have had a clear view of the progress of the aircraft as he described it. He did not recall the aircraft spinning, but he noticed the black underside of the aircraft as it went down. He expressed surprised that the aircraft did not fly in the usual manner.

1.18.2. Examination of the Technical Log

Inspection of the technical log book showed that the aircraft departed EFCIA at 12:00hrs and landed at Eteringbang at 13:02hrs but the flying time is recorded as 1:22hrs which would have put his on time at 13:22hrs. After the aircraft first arrived at Eteringbang it remained parked until 15:48hrs. It took off at 15:55hrs and flew until 18:29hrs. There was a break of 24 minutes until 18:53hrs, after which it flew uninterrupted until the time of the crash. The only time when refueling could have been done was in the 24-minute period between 18:29hrs and 18:53hrs. It was also noted that for the eighteen movements between Eteringbang and Ekereku Bottom on the day of the accident, the block time was recorded as 19 minutes and the flight time was recorded as 15 minutes each. The final movement of the day was recorded

as departing from Ekereku Bottom at 21:48hrs and landing at Eteringbang at 22:07hrs. It was noted that the accident happened at 21:52hrs.

1.18.3. ATC Records

Air Traffic Services provided a recording from a telephone conversation in which a female staff of Roraima Airways Inc. had called to advise ATC that both aircraft 8R-GRA and 8R-GRB were safely on the ground and closing flight plans at 17:40 GST (21:40hrs).

2. Analysis

2.1. The Pilot

The pilot was 39 years old. He obtained his Guyana CPL #305 in 2012. He was properly qualified for the flight. There was no evidence of any pre-existing medical or behavioural conditions which may have adversely affected the pilot's performance during this flight. He was quite familiar with the airstrip, having operated there regularly for more than one year.

The post mortem report stated the cause of death as multiple injuries.

Noting that the pilot had recorded an arrival time prior to the time of the crash, and the regularity of block and flight time entries in the technical log, led to the realization that the pilot did not accurately record the times. All log books are official and legal documents. It is unacceptable for pilots and especially senior pilots to make mistakes in log books or to deliberately record erroneous information in them.

Eyewitness statements indicate that the pilot did not follow the normal procedure when approaching the airstrip for landing. Instead of crossing the airstrip from east to west and proceeding south on a downwind leg for RWY 03, the pilot turned and flew low along the eastern side of the runway. There is no sure indication of what he intended to do after this, as the aircraft fell out of the sky shortly after it passed the runway threshold.

2.2. The Aircraft

2.2.1. Maintenance

The aircraft has a Certificate of Airworthiness which is valid until 2oth April 2018. Records indicate that the aircraft was being maintained in accordance with the approved maintenance schedule. Examination of the propellers reveal that there were no discrepancies noted that would degrade or prevent normal operation of the aircraft. All damage was consistent with high impact forces.

The results of the starboard engine run, and internal examination of the port engine, support the conclusion that at the time of the accident both engines were functioning satisfactorily.

2.3. The Airstrip

The airstrip has a total length of 1800ft and width of 36ft. The entire surface is unsealed and is not properly prepared for aircraft operations. The finishing material is easily affected by the weather and wear and tear. The condition of the airstrip is not considered to be a contributary factor to this accident.

Operations at Eteringbang are challenging because of its location on the Guyana/Venezuela Border. Part C of the Flight Operations Manual has specific procedures for airstrips that have restrictions. There is a procedure for operations at Eteringbang, but these need to be further developed.

2.4. Assessment of the Wreckage

Based on eyewitness accounts and the proximity of the wreckage to the threshold of the runway, it is probable that the aircraft had flown a little right of track approaching Eteringbang from the east. The aircraft turned left and flew low parallel to the runway. The aircraft was configured for landing, with full flaps. When the aircraft went pass the threshold, it is believed that an attempt was made to do a tight right turn as if to move from downwind onto final with the throttle close to idle. The pilot may have aggressively applied right rudder to increase the rate of turn, and with the aircraft in the landing configuration, in terms of flaps and speed, he found himself in a difficult situation and lost control of the aircraft. The nose pitched downwards, and the aircraft went down almost vertically.

There was negligible horizontal damage to the tree tops because the aircraft made a vertical entry into the ground. The aircraft wings contacted some trees while in the vertical dive, which would account for the few broken trees around the wreckage site.

It was noted that the combination of low speed, low altitude, steep bank and aggressive right rudder input may all have contributed to loss of control of the aircraft.

It was also posited that the pilot may have banked the aircraft steeply to look for the runway, which was on his right. He may not have been paying attention to the aircraft's instruments and thus may not have been aware of the dangerous flight attitude of the aircraft.

2.5. The Weather

This accident occurred during the afternoon. At the time of the accident, it was reported that there was bright sunshine and clear skies at the airstrip. Weather conditions did not contribute to this occurrence.

2.6. Survival Aspects

Both the pilot's seat and his seat belt were intact after the accident. The back of the pilot seat had to be broken and the seat belt was pulled out to remove the pilot's body from the wreckage.

This accident was not survivable.

2.7. The Company

2.7.1. General

The company was appropriately certified for the operation. The review of the FOM showed that the individual identified as the Director of Operations is not listed therein. Further research revealed that a request was made, and he was found to be satisfactory, for this position, by the GCAA in April 2016. There is no record of the appropriate amendment page being submitted for insertion into the FOM. Notwithstanding this, it was noted that the currency of this individual's Guyana CPL#279 had expired since September 2014. Therefore, he does not meet requirements to hold this position, as the FOM requires the position holder to hold

a Guyana CPL with type ratings and current instrument rating among other things. This is a violation of GARs Part 9 Paragraph 9.2.2.2.

It should be noted that the Director of Operations of any AOC holder is the lead technical person in that organisation. The appointment of an unqualified person to this position gave rise to concerns that the company may have underrated the significance of this position and the importance of following guidance set out in the manual. Further, his suitability to give guidance, instructions and directions to pilots and other operations staff is jeopardised.

The company expected that their pilots would not exceed the established flight and duty period but did not have a limit on the number of shuttles the pilot could do within that period. Although the company recognized that shuttling is different from routine commercial operations and presents a very high workload, more so for single pilot operations, it provided no guidance for fatigue management for its pilots and relied only on the flight and duty times limitations.

Further, the flight and duty times limitations were not strictly enforced by the company. Having started duty at 11:30hrs, the accident pilot was still on duty more than ten hours later. The other pilot who was also shuttling at Eteringbang had commenced duty at 11:00hrs and was still on duty eleven hours later. It was noted that the pilot should have stayed on the ground at Ekereku Bottom, but he proceeded to Eteringbang and crashed while exceeding his duty time.

The company's communications and flight following systems, should have alerted its operations staff to be aware when both pilots were approaching their flight and duty times limitations and the operations staff should have advised the pilots accordingly. It is necessary for the company to re-enforce the need for pilots to operate IAW SOPs whether they are supervised or not.

The report from the company's operations staff that both aircraft were on the ground and had completed operations for the day at 21:40hrs, when neither of the two aircraft was even near to Eteringbang, is indicative of a serious misrepresentation of the facts, bordering on negligent conduct, especially bearing

in mind the company's confidence in the accuracy of the spot tracker. It is obvious that some operations staff are not aware of the seriousness of their functions; and the quality of training that is provided to the company's operations staff is questionable. It must be noted that if this accident had occurred at an uninhabited airstrip, there may have been no accounting for the crashed aircraft.

The inaccurate times recorded in the journey log were noted. The time between Eteringbang and Ekereku is about 13-15minutes. For every flight recorded in the technical log, the block time is reported as 19 minutes and the flight time is reported as 15 minutes. This consistency in time is highly unlikely. Review of times for other similar flights, on other days, show the same consistency. It is apparent that this situation is acceptable to the company. Further, noting that this may have an adverse effect on the aircraft and engines maintenance schedules, the company should ensure that pilots refrain from this practice.

3. Conclusion

3.1 Probable Cause

The pilot flew a non-standard traffic pattern very low and very close to the runway. The excessive and extreme fight manoeuvres to position the aircraft for the landing resulted in a loss of aircraft control.

3.2 Contributory Factors

The pilot's failure to operate in accordance with established standard operating procedures when approaching the runway to land.

3.3 Findings

3.3.1. The Pilot

1. The pilot's CPL #305 which he obtained in 2012, was valid.
2. His current medical was valid until 31st October 2017.
3. His last APC/IPC on type was satisfactorily completed on 27th February 2017.
4. The pilot was familiar with the airstrip conditions, having operated into the airstrip frequently for more than one year.
5. Eyewitness reports indicate that the pilot did not follow the normal procedure for the approach to land.

3.3.2. The Company

1. The company holds an Air Operator Certificate and an Approved Maintenance Operator Certificate.
2. The company's Director of Operations is not qualified to hold this position because he does not hold a current and valid Guyana Commercial Pilot Licence. This is a violation of GARs Part 9 Paragraph 9.2.2.2.
3. The company may be condoning the actions of its pilots who make incorrect entries in technical logs which are legal documents. This is a violation of the Guyana Civil Aviation Regulations No.6 of 2001, paragraph 12. (2)(a).

4. The company's maintenance programme may be adversely affected due to the failure of its pilots to accurately record their flying times.

3.3.3. The Aircraft

1. The aircraft had a valid Certificate of Airworthiness and was maintained in compliance with regulations.
2. The aircraft was not overweight.
3. The aircraft was destroyed in the accident.

3.3.4. The Weather

The weather was not a contributory factor to this accident.

3.3.5. The Airstrip

The airstrip was not a contributory factor to this accident.

3.3.6. GCAA

The GCAA gave approval for the company to appoint an unqualified person to hold the position of Director of Operations.

4. Safety Recommendations

4.1. The Company

1. The company must ensure that its management staff are suitably qualified for the positions they are expected to hold.
2. The company must re-enforce the need for pilots' integrity to be beyond reproof.
3. The company should review its special procedures and develop more comprehensive approach procedures for Eteringbang and other similar airstrips. These should include, among other things, charted routes, arrival and departure procedures, identification of obstacles.
4. The company should consider limiting the number of flights that pilots are required to complete within the normal duty time, during shuttle operations, taking into account the greater fatigue pilots will experience during shuttling.
5. The company should implement measures to ensure that Captains and other pilots are regularly reminded that their responsibilities should not be underestimated. Their integrity should be impeccable. Their decision-making ability should be above reproof. They should be so self-disciplined that whether they are under observation or not, they would operate in keeping with SOPs. The importance of observing the tenets of single crew CRM should also be stressed.
6. Pilots should be reminded that the company aircraft are not certified for aerobatic manoeuvres.
7. The company should sanction irresponsible and dishonest behavior among pilots.
8. It was also noted that although some pilots display very poor habits and lack basic aviation knowledge, some operators are quick to deem the pilots involved as heroes. The company must be cognizant of these issues and should ensure proper monitoring and supervision of pilots before they are released as captains. Further, hailing such pilots as heroes may result in junior pilots imitating these bad habits with the expectation of being called a hero.

4.4. The GCAA

1. The GCAA should be more careful to ensure that requests made by the company are carefully considered before approvals are given.

2. Because most aircraft in Guyana are single-pilot operated, some consideration should be given to the requirement for a basic flight recorder to be installed in all such aircraft. This would provide some record of what the aircraft was doing, especially in situations such as this one in which the pilot perished.

5. Actions Taken Since the Accident

1. The company has advised that, in response to a demand by the GCAA, a Shuttle Manual is being prepared for submission to the GCAA. This will include stricter monitoring of operations, operations procedures and other guidance.

END