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Belize Aircraft Accident and Incident Investigation Unit

Report #: SI-001-02-90
Name: Final Report
Registration: V3-HDV & N4905W
Model: B737 AND BN2A

**23NM SOUTH OF THE PHILIP GOLDSON INT'L AIRPORT
STANN CREEK DISTRICT, BELIZE C.A.
11TH FEBRUARY 1990**

Elaborated by: BDCA INVESTIGATION TEAM

Belize Aircraft Accident and Incident Investigation Unit, Belize C.A

Approved by:

Minister responsible for Belize Aircraft Accident and Incident Investigation

Publication Date:

Attention:

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THE AIRCRAFT INVOLVED:

1. The Reporter or First Reporter

Operator: TACA^x International Airlines, Aeropuerto Internacional de El Salvador.

Aircraft: Type: Boeing 737

Model: Series 400

Nationality: United States of America

Registration: N 4905 W^x

Colour Scheme: White with Blue, Yellow and Red in TACA scheme.

Radio Callsign: TACA 410

2. The Second Reporter or Non-Reporter

Operator: Maya Airways Ltd. 6 Fort Street, Belize City, Belize. •

Aircraft: Type: Britten Norman BN2A

Model: -26 Islander

Nationality: Belize

Registration: V3-HDV

Colour Scheme: White with green in Maya scheme.

Radio Callsign: Hotel Delta Victor

Geographic Location: 22 nautical miles on 182 degrees from the Philip S W Goldson International Airport, Belize at an altitude of 5700 feet.

Date and time of Airmis: 11th February, 1990 at 1523hrs.

Times in this report are UTC (Local time is UTC - 6 hours.)

SYNOPSIS

The Airmis was first notified to the Civil Aviation Department by the Approach Control Officer who had received a radioed Airmis report from TACA 410 at 1524 followed by a confirming report by HDV at 1526hrs.

The TACA aircraft was engaged on the scheduled flight number 410 from San Salvador International Airport to the PSW Goldson International Airport, Belize flying according to Instrument Flight Rules.

Civil Aviation Department
Airmiss Report 1/90

Immediately before the Airmiss this TACA aircraft was cleared to descend from 7,000ft to 4,000ft by the Airport Approach Controller.

The Maya aircraft was engaged on the scheduled flight from from Belize City Municipal Aerodrome to Punta Gorda Aerodrome flying according to Visual Flight Rules.

Immediately before the Airmiss this Maya aircraft was climbing to its cruise altitude of 6,500ft.

The Maya aircraft pilot sighted the TACA aircraft at one mile distance and took evasive action by turning hard to the right and then diving.

The TACA aircraft crew sighted the Maya aircraft at a range of 600 metres which was too late to take evasive action. As the Islander aircraft closed, the commander of the TACA aircraft lowered the left wing to increase the clearance as the Islander passed over it in its 90 degree banked turn.

The aircraft are assessed to have missed by 50 metres and there had been an actual risk of collision.

The Airmiss was caused by the permitted presence within the Terminal Area (TMA) of a flight operating according to Instrument Flight Rules under procedural approach control, and a flight operating under Visual Flight Rules maintaining its own clearance from other aircraft.

1 FACTUAL INFORMATION

1.1 The TACA Flight 410

Aircraft Registration N 4905 W is a Boeing 737 Series 400 operated by the San Salvadorian airline, TACA International Airlines.

On the 11th February, 1990 the aircraft was engaged on a scheduled passenger flight from San Salvador to Belize flying under Instrument Flight Rules. When 90nm South of the PSW Goldson International Airport, Belize (BZE) it was cleared by CENAMER to leave Flight Level 200 and descend to 7,000 ft altitude and contact Belize Approach Control (BZE APP). This radio contact was made at 15.17hrs on 121.00MHz when 410 reported passing through 18,000ft for 7,000ft. BZE APP replied with further instructions to report at AVAKO, a reporting point of entry into the Terminal Area which extends for a radius of 25nm from BZE, the current airport weather state and information that a Twin Otter was Southbound at 6,500ft outside of 23nm, and an Islander within 25nm of BZE was following and climbing to 6,500ft. This information was acknowledged by 410.

At 1521hrs 410 reported reaching AVAKO at 7,000ft and in reply, was further cleared by BZE APP to descend to 4,000ft and report at that altitude, and this clearance was acknowledged by 410.

On being given this descent clearance, 410 assumed his two opposite direction aircraft had left the TMA to the south and were behind him.

At 1522, 410 reported leaving 7,000ft and 2 minutes later reported he had to take violent evasive action to avoid collision with a "Twin Otter" aircraft.

410 was descending on a track of 002 degs at 320kts IAS in daylight, good visibility and no cloud. Approaching 6,000ft they sighted HDV approaching head-on at 600 metres range. With so little time for evasion 410 increased its descent angle and banked left to permit HDV to pass over the left wing. 410 estimated they missed HDV by 50 metres horizontally and 75 metres vertically, and assessed there had been a very high risk of collision with this white and green aircraft.

1.2 The Maya Flight HDV

Aircraft Registration V3-HDV is a Britten-Norman BN2A-26 Islander operated by the Belize airline Maya Airways Ltd.

On the 11th February, 1990 the aircraft was engaged on scheduled passenger flight Maya 103 from Belize City Municipal Aerodrome to Punta Gorda, Belize under Visual Flight Rules. After take-off radio contact was made with BZE APP and reported he was climbing to 6,500ft enroute to Punta Gorda. BZE APP acknowledged the call and gave traffic information to the effect there was one 737 inbound from the South followed by a second 737. When HDV heard BZE APP informing the 737s of the presence of the Twin Otter and the Islander, to improve the visibility of his aircraft to the opposite direction traffic, HDV switched on his two landing lights.

Whilst climbing at 100kts on a track of 210 degrees and passing 5,500ft altitude HDV sighted the 410 descending and approaching very rapidly from the opposite direction, at approximately 1nm range.

HDV took violent evasive action by banking up to 90 degrees right and diving. During this action HDV lost visual contact with 410 but estimated the two aircraft passed very close and there had been a very high risk of collision.

After hearing 410 report the Airmis to BZE Approach, HDV confirmed the event with BZE APP at 1525hrs.

1.3 Air Traffic Control

- 1.3.1 A Tropic Air Twin Otter - callsign Tango Alpha and a Maya Islander - callsign HDV took off from the International Airport and Municipal Aerodrome respectively enroute to Punta Gorda to climb and maintain 6,500ft. The Twin Otter climbed to 6,500ft on reaching 23nm south of the BZE and reported so at 15:12:04. The Islander made radio contact with Approach Control at 15:12:42 informing them he was crossing the Western Highway and climbing through 1,500ft for 6,500ft. This call was acknowledged by Approach with:

"Into Punta Gorda 6.5, the QNH 29.98 or 1015. Traffic information B-737 will descend on radial 182 from BZE VOR estimating at time 29 descending initially to 7,000. Another one still at high level, B-737 estimating BZE at 1537. Report Gales Point."

Gales Point is a visual reporting point 2nm within the boundary of the TMA. AVAKO is a reporting point for IFR traffic nearby on the TMA boundary.

- 1.3.2 The recording of the subsequent radio communications on the Approach frequency 121.00MHz are transcribed as follows:

At 15:13:14 HDV acknowledged the above with:

"29.98, looking for the traffic, call you Gales Point - DV."

At 15:16:59 TACA 410 made contact with Approach Control and the following exchange took place:

410 "Belize Approach - TACA 410."

APP "TACA 410 Good Morning."

410 "Good Morning Sir, TACA 410 passing through 180.2 for 7,000."

APP "Roger. Report AVAKO for lower altitude. Active runway 25 expect no delay for VOR approach for runway 25. The wind 280 at 15, visibility 10 plus, 1 cumulus 2,500, temperature 25 and 21, QNH 29.98. Traffic information outside 23 miles Twin Otter Southbound at 6,500 followed by Islander inside 25 miles Southbound climbing to 6,500, over."

At 15:17:42, 410 replied with:

"Okay. TACA 410 passing through 160 for 7,000. Will call you AVAKO."

1.3.3 As the two aircraft closed, the radio communications continued:

At 15:21:27, 410 called with:

"Belize Approach TACA 410 reaching 7,000 AVAKO."

APP "Roger, descend to 4,000 feet, report reaching 4,000."

410 "4,000 Roger, will report leaving 7,000."

At 15:21:59 410 called with:

"Belize TACA 410 leaving 7,000."

APP "Roger, report reaching 4,000."

410 "4,000 Roger, TACA 410."

At 15:24:11, 410 called with:

"Okay Belice. Ese trafico estaba aproximadamente a 5,500 pies. Hubo que hacer maniobra violenta para quitarlo tuvimos a punto de colicionar se nos fue informado que estaba a 6,500."

APP "You are referring to the Islander, correct?"

410 "Afirmativo, no es un Twin Otter, creo."

APP "OK, the Twin Otter was outside 25 miles at 6.5. Inside 25 miles still moving South was Islander climbing 6,500, that is the information I gave you."

410 "Bueno, presente estamos a 4,000 nosotros con 8 fuera. Tenemos pista a la vista para proceder por contacto."

APP "Roger, TACA 410 usual approach approved for runway 25, left hand, report passing 3,000 feet, 737 to depart."

410 "Roger."

At 15:25:20 HDV called with:

"Belize Approach HDV."

APP "DV Belize."

DV "Ah - we going by 25 miles. We are passing 5.5, I heard you inform the traffic of us. We knew of the traffic, we were looking, and this traffic was, must, have been travelling in excess of - ah - 300 knots."

APP "Roger, that is the traffic information I gave you about. Confirm you had the traffic in sight?"

DV "Ah - because of the rate of speed the traffic was travelling, we caught him just probably a mile in front of us and we diverted to our right and I believe he did the same."

APP "Roger."

410 "Belize, TACA 410, we left 3,000 and left downwind, runway 25."

APP "410 Roger, 737 to depart on runway 25, contact Tower 118.0."

After 410 had landed the crew visited the Air Traffic Control and briefly discussed the incident, they concluded by stating they would be filing an Airmis Report. Later the incident was discussed on the telephone by the controller and the pilot of HDV who said he would also be filing an Airmis Report.

1.4 Meteorological information

The weather as reported by both crews was; daylight, no cloud, no precipitation and visibility approximately 8nm and unlimited respectively. The morning sun was high in the East.

1.5 Aids to navigation

TACA 410 was navigating by information from the BZE VOR and DME. Maya DV was navigating by visual contact with the surface features.

1.6 Communications

During the whole period of the incident both aircraft were working Belize Approach on 121.00MHz.

1.7 Additional information

The control of air traffic in Belize upper airspace is Procedural by CENAMER. The Transition Altitude is 19,000 feet.

Belize Territorial Airspace below the Transition Altitude is an uncontrolled Flight Information Region with the exception of a Terminal Area (TMA) and a Control Zone (CTZ) centred on the BZE VOR/DME. The TMA extends 25nm radius from the BZE with a base of 2,000ft and rises to 19,000ft. The CTZ extends 10nm radius from the BZE, from the surface to the base of the TMA at 2,000ft. Within the TMA and CTZ, Belize P S W G International Airport Air Traffic Control provides IFR traffic with a procedural Approach Control Service, and VFR traffic with a Flight Information Service.

See drawing in Appendix B.

2 ANALYSIS

2.1 Conduct of TACA 410

The commander conducted his descent according to advisory information outside the TMA and to the clearance issued by the Approach Controller within the TMA boundary. In reply to 410's initial contact call to Belize Approach, the Approach Controller asked for a report at the TMA boundary, gave the Airport weather state and then informed 410 that an Islander was within the TMA, Southbound and climbing to 6,500ft. Receipt of all this information was acknowledged by 410 with the term "Okay".

Without any further information on the position of the opposite direction Islander, 410 assumed this traffic had passed him and he accepted the descent clearance at the TMA boundary to leave 7,000ft for 4,000ft.

Some 6 minutes after receiving the opposite direction Islander traffic information, 410 first sighted DV at 600m range, possibly as it commenced collision avoidance by applying right bank, so changing its relative position in the windshield of the B737. Without the time available for the standard avoidance manoeuvre of turning right, 410's instinctive reaction was to lower his left wing to increase the vertical clearance as the Islander passed over it in a 90 degree right bank.

2.2 Conduct of Maya HDV

The commander commenced his flight by climbing within the CTZ directly on track for Punta Gorda. Radio contact was made with Belize Approach Control as DV left the CTZ climbing through 1,500ft stating he was Southbound to Punta Gorda and climbing to 6,500ft. The Approach Controller in his reply included traffic information that a B737 will descend on the radial 182 BZE estimating BZE in 16 minutes time and descending initially to 7,000ft.

To this traffic information, DV replied he would be looking for the traffic. 4 minutes later, on hearing TACA 410 being given traffic information about his flight, the commander switched on the Islander's wingtip mounted landing lights for increased conspicuity.

After a further 5 minutes when DV was approximately 7nm within the TMA boundary, 410 announced he was at the TMA boundary and leaving 7,000ft.

DV continued to climb on a track reciprocal to 410's and first saw the descending B737 1nm ahead. DV's commander immediately took standard avoiding action by turning right. The fast closing speed required a hard right turn using 90 degrees of bank and the climb was changed to a steep dive. On entering the steep turn DV would have lost visual contact with 410.

2.3 Conduct of Air Traffic Control

The Belize PSWC International Airport Approach Controller provides an unofficial but useful Flight Information Service during the descent from

CENAMER's controlled Upper Airspace to the boundary of the TMA, and Procedural Approach Control for IFR traffic within the TMA. There was no restriction to the passage of VFR traffic within the TMA, though entry and exit reports were required.

Following 410's position report at AVAKO, the TMA boundary, at 7,000ft, the controller cleared 410 to descend to 4,000ft. After a pause of 39 seconds, 410 reported leaving 7,000ft and a further 2 minutes later, reported the Airmis with DV.

From the recording of the radio communications there is no doubt the controller had sufficient information on 410 and DV to assess their respective tracks and progress along them. Though this information was known and from it, a possibility of a confliction could be deduced, DV was not asked for his position before 410 was cleared to descend through DV's height, and there was no reference to the closure of the two aircraft in the controller's two exchanges with 410 between his initial traffic information and the Airmis occurring.

- 2.4 The relative flight paths of the two aircraft immediately before and during the Airmis are illustrated in Appendix A.

3 CONCLUSIONS

(a) Findings

- (i) There was an actual risk of collision between TACA 410 and MAYA HDV.
- (ii) There existed an air traffic control environment which permitted the free mixing within the TMA of IFR traffic under procedural approach control and VFR traffic under no obligations other than reporting entering and leaving the TMA, and maintaining separation from other air traffic through visual contact.
- (iii) Having received traffic information on the other's presence within the TMA, and in the absence of any subsequent information that the two aircraft had passed each other, both commanders displayed insufficient concern over the possibility of encountering each other after 410 left 7,000ft. In so doing they jeopardized the safety of their respective commands.
- (iv) Sufficient information on the two aircraft was known to the Approach Controller to alert him to the possibility the flight paths of the two aircraft would coincide. This being the case, the controller should have been especially vigilant and not cleared 410 to descend below 7,000ft until DV was at a greater range from BZE than 410. In omitting to take this precaution, the controller jeopardized the safety of 410, the aircraft under his control.

(b) Cause

The Airmis resulted from the mixing of uncontrolled air traffic flying according to Visual Flight Rules with traffic flying according to Instrument Flight Rules under procedural control within the TMA.

4 SAFETY RECOMMENDATIONS

It is recommended that:

- 4.1 The procedures for - the conduct of flights according to Visual Flight Rules in the TMA - be changed to restrict VFR traffic in TMA airspace to an altitude below 3,000ft when there is IFR traffic in or soon to enter the TMA.
- (Such changes were introduced on the 16th March, 1990 and the relevant AIC A-01/90 is included as Appendix B to this report.)
- 4.2 The ad-hoc arrangements for providing a Flight Information Service outside the TMA and below the Transition Altitude be formalized with the commissioning of the new air traffic control tower and additional radio equipment. During the two peak traffic periods, the FIS and Approach functions be carried out by separate controllers, and 'out of peak' periods, the two functions be combined.
- 4.3 Consideration given to the provision of an aircraft position plotting pin-board covering the TMA and nearby airspace, to assist the controllers managing the airspace.

K. E. FOSTER
Investigating Officer

Civil Aviation Department
Belize

3rd April, 1990

APPENDIX A

