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ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation AO-2008-073
Final

Airspace-related event - Mackay Airport, Qld 16 October 2008

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Abstract

On 16 October 2008, at about 0615 Eastern Standard Time, the pilot of a Fairchild Industries SA227, registered VH-UZA, took off from runway 32 at Mackay Airport, Qld. At the same time, the flight crew of another Fairchild Industries SA227, registered VH-EEO, was conducting a backtrack on the active runway 32.

The crews of both aircraft took avoiding action.

There were a number of opportunities for the departing pilot to have confirmed that his aircraft radio was operating correctly, and to have verified the actual position of the backtracking aircraft. Had the departing pilot availed himself of those opportunities, he would have been afforded an increased level of assurance that the runway was clear.

Confirmation that runway 32 was clear prior to commencing the departure was attempted, but not obtained, by the departing pilot.

FACTUAL INFORMATION

History of the flight

At about 0612 Eastern Standard Time[1] on 16 October 2008, the flight crew of a Fairchild Industries SA227, registered VH-EEO (EEO), landed on runway 32 at Mackay Airport, Qld after an instrument flight rules (IFR) scheduled freight service from Brisbane. That flight also involved pilot in command upgrade training, and the landing included a simulated emergency landing for the upgrade candidate. The simulated emergency meant that the aircraft's nosewheel steering and flaps were unavailable, and resulted in a greater than normal landing distance.

During the landing roll, the aircraft passed the runway 05 intersection (Figure 1) and continued along the runway to the turning node that was located at the upwind end of the runway (runway 14 threshold). From that position, the flight crew commenced a backtrack[2], with the intention to vacate the runway via the crossing runway 05. The flight crew cancelled SARWATCH[3] on area frequency 135.5 MHz (Brisbane Centre) and began the after landing checklist. Those checks were completed prior to taxiway Golf.

The pilot in command of a second Fairchild Industries SA227, registered VH-UZA (UZA), was waiting to enter runway 32 and then backtrack to that runway threshold for departure on a single-pilot IFR scheduled freight service to Townsville.

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 The action by a pilot, having landed on an active runway, to turn the aircraft through 180°, and then to proceed in the opposite direction along that runway.

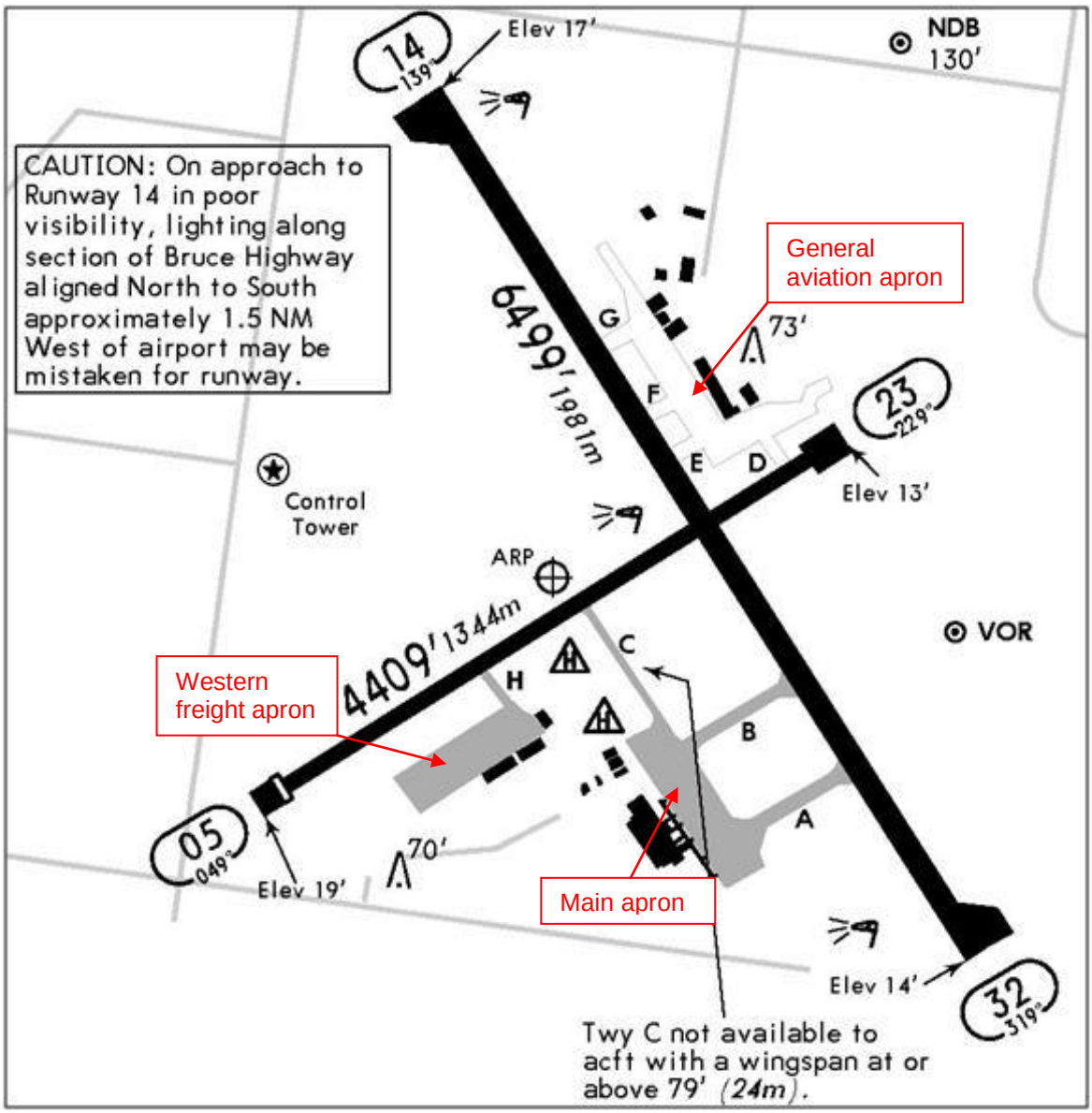
3 SARWATCH. A generic term that covered Search and Rescue (SAR) alerting that was based on either full reporting, scheduled reporting or on the nomination of a SARTIME.

The pilot reported that, when the landing aircraft, which was known to be EEO from earlier radio transmissions, cleared the runway 05 intersection, he taxied UZA onto runway 32 and backtracked to the departure threshold. Once at the threshold, the pilot turned and lined the aircraft up for departure.

The flight crew of both aircraft reported that they operated regularly at Mackay Airport, and were familiar with each other's operations.

The pilot of UZA reported that EEO was not sighted from the threshold of runway 32. The pilot broadcast the intention to commence the takeoff, and queried whether EEO was clear of runway 32. That radio broadcast was on Common Traffic Advisory Frequency (Radio) (CTAF(R))[4] 124.5 MHz. The pilot of UZA recalled that he heard no response from the pilot of EEO and, as a result, he assumed that EEO had cleared the runway, and that its pilot was off frequency.

Figure 1: Mackay Aerodrome Chart[5]



4 CTAF(R). A designated frequency on which pilots made positional broadcasts when operating in the vicinity of an aerodrome that required the carriage and use of a radio.

5 Courtesy Jeppesen.

The pilot of UZA commenced the takeoff and, when passing a speed of about 70 kts, observed EEO backtracking to the runway 32/05 intersection. The pilot elected to continue the departure, and manoeuvred to the left of the runway centreline in order to avoid EEO.

The flight crew of EEO sighted UZA when they were at a position between taxiway Golf and taxiway Foxtrot, and moved to the left edge of the runway to avoid UZA.

Both crew reported seeing the other aircraft's landing lights during the avoiding action.

After the avoiding action, the pilots in command of both aircraft communicated with each other on the CTAF(R) frequency and on another operational channel. No radio problems were reported by either crew during those radio transmissions. In addition, on reaching the western freight apron, the pilot in command of EEO had a short radio conversation with the airport safety officer.

The pilot of UZA continued to Townsville.

The radios of both aircraft were tested by the respective operators. The radios in UZA were reported to have been serviceable. The radio test report for EEO indicated that there was nothing to prevent radio reception.

Pilot information

The pilot in command of EEO held an Air Transport Pilot (Aeroplane) Licence (ATPL(A)) that was issued in 2006. He had accumulated a total aeronautical experience of about 5,500 flying hours, with about 2,500 hours on type. He was appropriately endorsed, and held a valid Class 1 aviation medical certificate. During the flight, he was operating as a check and training pilot.

The pilot upgrade candidate in EEO, who was operating in command under supervision (ICUS)[6] at the time of the incident, held an ATPL(A) that was issued in 2000. He had accumulated a total aeronautical experience of about 6,562 flying hours, with about 2,348 hours on type. Of those hours on type, 179 hours were accumulated in the last 3 months. He was appropriately endorsed, and held a valid Class 1 aviation medical certificate. That certificate required the pilot to wear distance correction. It was reported that he was wearing glasses at the time of the incident.

The pilot of UZA held a Commercial Pilot (Aeroplane) Licence (CPL(A)) that was issued in 2005. He had accumulated a total aeronautical experience of about 1,850 flying hours, with about 118 hours accumulated on type in the previous 2 months. He was appropriately endorsed, and held a valid Class 1 aviation medical certificate.

Weather conditions

The crew of both aircraft reported that there was no cloud in the immediate vicinity of the airport, and that the visibility was greater than 10 km.

First light was at 0508, and the position of the sun was determined not to be a factor in the occurrence.

Airport information

The operating hours of the Mackay Control Tower were from 0725 to 2100. During those hours, the airspace surrounding Mackay at or below 4,500 ft above mean sea level (AMSL) was classified as Class D[7] airspace and pilots were provided with an air traffic control tower service. Outside those hours, that airspace was reclassified Class G[8], and CTAF(R) procedures applied.

When CTAF(R) procedures were in operation at Mackay, the tower frequency of 124.5 MHz

6 ICUS. Performing the duties and functions of the pilot in command (PIC), while under the supervision of the actual PIC, who had been approved for that purpose.

7 The Australian Flight Information Region (FIR) was divided into a number of different classes of airspace, depending on the level of service provided by Air Traffic Services (ATS), and on the requirements affecting pilots. Class D airspace required controllers to provide differing levels of separation service, depending on a flight's category of operation and other factors.

8 In Class G, or non-controlled airspace, IFR flights received traffic information and a flight information service. VFR flights received a flight information service if requested.

became the CTAF(R) frequency, and incorporated an Aerodrome Frequency Response Unit (AFRU).

That unit provided an automatic response to pilot radio transmissions on that frequency as follows:

- when there had been no transmission on the CTAF(R) for at least 5 minutes, a more than 2 seconds transmission by a pilot would cause the automated transmission 'Mackay CTAF'
- when a pilot had made a more than 2 seconds transmission within the last 5 minutes, a 300 millisecond tone or 'beep' was transmitted by the facility.

The Aeronautical Information Publication (AIP) GEN 3.4 – Communication Services, paragraph 3.4.5 stated that:

> The operation of the AFRU provides additional safety enhancements by confirming the operation of the aircraft's transmitter and receiver, the volume setting, and that the pilot has selected the correct frequency for use at that aerodrome.

The potential benefits of an ARFU have been examined previously in a number of Australian Transport Safety Bureau (ATSB) transport safety reports, including 200605091 and AO-2007-006 (available at www.atsb.gov.au).

Communication information

The requirements for the carriage and use of radio in Class G airspace were outlined at AIP ENR 1.1 Section 56 – Communications. Those requirements included the note that:

> ...the carriage and use of radio is required at aerodromes depicted on charts and in ERSA as CTAF<frequency>(R). At these aerodromes pilots must commence monitoring and broadcasting prior to and during all operations in the vicinity of the aerodrome.

and required that:

> Pilots should make all of the recommended broadcasts unless operational considerations preclude them from doing so.

Recommended radio calls for aircraft departing a CTAF(R) aerodrome

The recommended radio broadcasts by pilots of aircraft departing CTAF(R) aerodromes included:

- before taxiing
- upon entering the departure runway, including with their intentions for the departure
- a departure broadcast on the relevant Area frequency once airborne.

Radio broadcasts by the pilot of UZA

The available onboard and other recording media at Mackay Airport indicated that, at about 0609, the pilot of UZA transmitted on the CTAF(R) frequency that he intended to enter and backtrack on runway 32. After receiving advice from the crew of EEO that they were established on a 6 NM (11 km) final to land on runway 32, the pilot held on runway 05, clear of runway 32.

At about 0612, and prior to entering runway 32, the pilot broadcast that he was entering and backtracking on runway 32.

While backtracking, and prior to commencing the take-off roll on runway 32, the pilot of UZA had a short radio conversation with a pilot of a third aircraft that was taxiing at the Mackay Airport general aviation apron.

The pilot then transmitted that he was commencing the takeoff and also noted that he could not see EEO and asked the crew of that aircraft to confirm they were clear of the runway.

Recommended radio transmissions for arrival at a CTAF(R) aerodrome

The recommended radio broadcasts by pilots for arrival at CTAF(R) aerodromes included:

- an inbound broadcast before 10 NM (19 km) that included their intentions
- when entering the circuit

- when conducting a straight-in approach, at 3 NM (6 km) and 1 NM (2 km) final, including with their intentions
- once clear of the runway.

Radio broadcasts by the flight crew of EEO

The available onboard and other recording media at Mackay Airport indicated that, at about 0607, the flight crew of EEO made a 10 NM (19 km) inbound broadcast. In addition, and in response to a broadcast from the pilot of UZA, they reported '…established 6 NM (11 km) final for runway 32' at about 0609. There were no more recorded radio broadcasts by the flight crew until they contacted Brisbane Centre on the area frequency at about 0614 to cancel their SARWATCH.

The flight crew of EEO reported that they did not hear any transmissions from the pilot of UZA during the landing roll, or during the backtrack on runway 32. The aircraft's onboard recording equipment confirmed that not all of the pilot's radio transmissions from UZA were received, including the take-off broadcast and request for clarification that they were clear of the runway from the pilot of UZA. However, the AFRU 'beep' transmission as a result of those transmissions, was received by EEO.

Neither of the flight crew recalled ever experiencing communication difficulties with the Mackay CTAF(R) frequency.

Additional information

Previous occurrences at Mackay Airport

A search of the ATSB occurrence database was carried out to ascertain the frequency of similar occurrences at Mackay Airport. The results of that search indicated that there were no reported similar occurrences in the last 5 years. That suggested that terrain or other shielding of radio transmissions during routine aircraft operations at Mackay was unlikely.

Expectation and human performance

In general, a person develops a mental picture of an event based upon information that is provided by the senses. However, experiences and expectations can also contribute to the formulation of that mental picture.[9]

Expectancy can have a significant effect on human performance. Humans have a tendency to see what they expect to see, to hear what they expect to hear, and to make decisions based on what they expect to be the case.[10]

ANALYSIS

The lack of any fault in either aircraft's radios that would have contributed to the occurrence, suggested either an intermittent radio fault, which was unable to be replicated by the investigation, or some operational factor.

Confirmation that runway 32 was clear prior to commencing the departure was attempted, but not obtained, by the departing pilot of UZA. The inability to communicate with, and to visually acquire EEO on the runway, reinforced the departing pilot's mental picture that the runway was clear. Given the receipt of the AFRU beep, transmissions from third parties, as well as earlier transmissions from the pilot of UZA, the investigation could not rationalise the lack of receipt by the flight crew of EEO of the departing pilot's take-off broadcast and request for clarification of their position.

A number of opportunities existed for the pilot of UZA to verify that the runway was clear for the departure, including: by seeking assistance from, or re-transmission by the airport safety car, or by the pilot of the third aircraft. The use of those resources could have ruled out the possibility that UZA had sustained a radio failure, and provided alternatives to verify the actual position of EEO.

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9 Green RJ et al (1996). *Human factors for pilots*. Second Edition: University Press, Cambridge.

10 Hawkins FH (1993). *Human factors in flight*. Second Edition, edited by HW Orlady. Ashgate: Hants, UK.

FINDINGS

From the evidence available, the following findings are made with respect to the airspace-related event that occurred at Mackay Airport, Qld on 16 October 2008, and involved two Fairchild Industries SA227 aircraft, registered VH-UZA and VH-EEO. They should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- The runway was not confirmed as being clear prior to the takeoff.
- The attempted pre-takeoff communication between the crews was ineffective.

Other key findings

- There was no fault found with either aircraft's radios that would have contributed to the occurrence.

SOURCES AND SUBMISSIONS

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the Executive Director may provide a draft report, on a confidential basis, to any person whom the Executive Director considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the Executive Director about the draft report.

A draft of this report was provided to the pilots, the aircraft operators and the Civil Aviation Safety Authority (CASA). No submissions were received from those parties.