**PRELIMINARY ACCIDENT REPORT**

## Accident and Incident Investigations Division

Accident
- Preliminary Report -
AIID Ref No: CA18/2/3/10054


**Figure 1:** Bombardier BD-700-1A10, 9H-VJM. (Source: www.jetphotos.com)

Description:

On Wednesday morning, 13 October 2021 at 0518Z, a Bombardier BD-700-1A10 aircraft with registration 9H-VJM was involved in an accident when the crew was taxiing through the Echo security gate at O.R. Tambo International Aerodrome (FAOR). As the aircraft approached the gate, the (motorised) gate had already started to close and it impacted the right-wing leading-edge slat of the aircraft, causing substantial damage to the number 2 slat. This was an international non-scheduled flight from FAOR to Dubai International Aerodrome (OMBD).

## DESCRIPTION OF THE ACCIDENT

| | |
|---|---|
| **Reference number** | **:** CA18/2/3/10054 |
| **Name of owner** | **:** Cavic Aviation Leasing (Ireland) 26 Co. |
| **Name of the operator** | **:** VistaJet Ltd |
| **Type of operation** | **:** Private (Part 91) |
| **Manufacturer** | **:** Bombardier Aerospace |
| **Model** | **:** BD-700-1A10 (Global 6000) |
| **Nationality** | **:** Republic of Malta |
| **Registration markings** | **:** 9H-VJM |
| **Place** | **:** Echo Gate, O.R. Tambo International Aerodrome (FAOR) |
| **Date** | **:** 13 October 2021 |
| **Time** | **:** 0518Z |

*All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.*

**Purpose of the Investigation:**

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and* ***not to apportion blame or liability****.*

Any person who has information concerning this accident should contact the Accident and Investigations Division (AIID) on AIIDinbox@caa.co.za

**Investigation Process:**

The AIID was informed of an accident by air traffic control (ATC) at O.R. Tambo International Aerodrome (FAOR) on Wednesday morning, 13 October 2021, involving a Bombardier BD-700-1A10 at Echo gate. The AIID has appointed an investigator-in-charge and a co-investigator who dispatched to the accident site. The State of Design and Manufacture of the aircraft, which is Canada, was informed of the accident as per ICAO Annex 13 protocol. They had appointed a non-travelling Accredited Representative. The State of Registry and the Operator, the Republic of Malta, was informed of the accident; they have not appointed an Accredited Representative. The AIID will lead the investigation and issue the final report.

The information contained in this preliminary report is derived from the factual information gathered during the on-going investigation into the occurrence. Later, an interim report or the final report may contain altered information in case new evidence is found during the on-going investigation that require changes to the information depicted in this report.

The AIID reports are made available to the public at:
http://www.caa.co.za/Pages/Accidents%20and%20Incidents/Aircraft-accident-reports.aspx

Notes:

1. Whenever the following words are mentioned in this report, they shall mean the following:

    - Accident – this investigated accident
    - Aircraft – the Bombardier BD-700-1A10 involved in this accident
    - Investigation – the investigation into the circumstances of this accident
    - Pilots – the pilots involved in this accident
    - Report – this accident report

2. Photos and figures used in this report were obtained from different sources and may be adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report are limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or the addition of text boxes, arrows or lines.

**Disclaimer:**

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| Abbreviation | |
|---|---|
| AFM | Airplane Flight Manual |
| AGL | Above Ground Level |
| AIID | Accident and Incident Investigations Division |
| AMC | Airport Management Centre |
| AMO | Aircraft Maintenance Organisation |
| AMSL | Above Mean Sea Level |
| AOC | Air Operator Certificate |
| APU | Auxiliary Power Unit |
| ATC | Air Traffic Control |
| ATPL | Airline Transport Pilot Licence |
| ˚C | Degrees Celsius |
| CAR | Civil Aviation Regulations |
| CAVOK | Cloud and Visibility OK |
| CCTV | Close Circuit Television |
| CDU | Control Display Unit |
| CLD | Clearance Delivery Control |
| CVR | Cockpit Voice Recorder |
| EMS | Electrical Management System |
| FAOR | O.R. Tambo International Aerodrome (ICAO code) |
| FBO | Fireblade Operations |
| FL | Flight Level |
| FO | First Officer |
| FDR | Flight Data Recorder |
| ft | Feet |
| GMC | Ground Movement Control |
| GPS | Global Positioning System |
| hPa | Hectopascal |
| ICAO | International Civil Aviation Organisation |
| m | Metre |
| METAR | Meteorological Routine Aerodrome Report |
| MHz | Megahertz |
| OMDB | Dubai International Aerodrome (ICAO code) |
| PIC | Pilot-in-command |
| QNH | Barometric Pressure Adjusted to Sea Level |
| SACAA | South African Civil Aviation Authority |
| SAWS | South African Weather Service |
| SID | Standard Instrument Departure |
| TBO | Time Between Overhaul |
| UTC | Co-ordinated Universal Time |
| VFR | Visual Flight Rules |
| VHF | Very High Frequency |
| Z | Zulu (Term for Universal Coordinated Time – Zero Hours Greenwich) |

## 1. FACTUAL INFORMATION

### 1.1 History of Flight

1.1.1 On Wednesday morning, 13 October 2021, a Bombardier BD-700-1A10 aircraft with registration 9H-VJM and call sign VistaJet 850 (VJT850) was on a non-scheduled international flight from O.R. Tambo International Aerodrome (FAOR) to Dubai International Aerodrome (OMBD). Two cockpit crew members (pilots) and one cabin crew member were on-board the aircraft.

1.1.2 At 04:50:41Z, the crew of VJT850 called Clearance Delivery Control (CLD) on the very high frequency (VHF) 121.70-Megahertz (MHz) for clearance; the crew was asked to standby. At 04:52:42Z, the CLD controller called the aircraft and cleared them on the standard instrument departure (SID) Runway 21R Exobi 3B.

1.1.3 According to the flight data recorder (FDR) information, the number 2 engine was started at 05:10:26Z, followed by the number 1 engine at 05:11:06Z.

1.1.4 At 0514Z, the VJT850 identified themselves on Denel Campus Radio 132.50 MHz and requested to proceed through the flight line at the Denel Campus for departure at FAOR for OMDB. The VJT850 aircraft was requested to proceed at own discretion and to report "*through the Echo gate*".

1.1.5 Meanwhile, at 0457Z, the ZS-AAK aircraft contacted Apron control on VHF 122.65 MHz requesting a parking bay at the Delta apron; the aircraft was allocated D7. At 05:59:26Z, the ZS-TMB aircraft parked at Fireblade Operations (FBO) requested Apron control to open the Echo gate. Apron control then called the control room and requested the gate controller to open the Echo gate. At 05:02:23Z, the aircraft ZS-TMB called *"through the gate".* The aircraft ZS-AAK requested taxi from the Denel Campus Run-up Bay to the Echo gate for repositioning to the Delta apron at FAOR. The Denel Campus operator requested the crew of VJT850 to give way to ZS-AAK as the aircraft was already near the gate, which the crew of VJT850 acknowledged. The crew of ZS-AAK then contacted Apron control on the VHF frequency 122.65 MHz requesting them to open the Echo gate. According to Apron control, the aircraft ZS-AAK proceeded through the gate at 05:13:11Z. Once clear of the gate and on the airside, they informed Apron control *"through the gate".* Apron control then called the control room and instructed the gate controller to close the gate. Apron control was not aware of the aircraft VJT850 as the crew did not call Apron control to open the gate. The next transmission heard on 132.50 MHz was "*Apron the gate*" which the Denel Campus operator assumed was VJT850. Due to gate visibility limitations from the Denel Campus operator station, the operator could not see that the gate was closing whilst the VJT850 aircraft was taxiing towards the gate. After the "*Apron the gate*" transmission was heard, the Denel Campus operator went to the window to see what was happening at the gate; that is when she observed

the VJT850 aircraft stationary in the middle of the lane with the Echo gate very close to the aircraft's wing.

1.1.6 The operator immediately telephoned FBO to check if the VJT850 aircraft was on their frequency and to ascertain if they knew what was happening because the aircraft was not on 132.50 MHz as communication could not be established.

1.1.7 FBO operations advised that they would send a vehicle to ascertain if the gate was just close to the aircraft's wing or if it had impacted the aircraft's wing. The aircraft did not declare any emergency status or stated what the situation was. When the FBO vehicle arrived at the Echo gate, they notified the Denel Campus operator that the gate had impacted the aircraft on the right wing. Aerodrome apron control was advised of the accident.

1.1.8 From available close circuit television (CCTV) footage, *the aircraft ZS-AAK is seen exiting the gate and through to the airside; then the VJT850 aircraft is seen taxiing towards the gate. The traffic lights installed on the airside of the gate are green at this time (this is visible on the footage). As the aircraft approaches the gate, the gate starts to close at a slow speed and the traffic light (green signal) switches off. (It is not possible to see if the traffic light's red signal is active at this stage.) The gate is in motion for 28 seconds before it impacts the aircraft's right wing. Just prior to impact, the aircraft suddenly veers off to the left after the pilot's input from within the cockpit. (There is no indication that the crew attempted to bring the aircraft to a stop prior to the gate impacting the aircraft.) After impact, the gate continues to close (moving towards the fuselage of the aircraft) for another 11 seconds before it stops.* The gate covers a distance of approximately 70m from the fully open position to the close position.

1.1.9 The Echo gate is controlled remotely. If the crew of any aircraft wants to enter or exit the Denel Campus, they would need to make radio contact with Aerodrome Apron control on VHF 122.65 MHz; the Apron controller is stationed in the Airport Management Centre (AMC), which is located in the Domestic Terminal building. Following communication with an aircraft, the Apron controller then telephones the gate controller via a landline to either open or close the gate. The gate controller is stationed in the control room located in the International Terminal building. The gate controller could monitor the gate via CCTV screen at their workstation. Apart from selecting the gate either to OPEN or CLOSE position, the gate controller can also STOP the gate at any time.

1.1.10 The accident occurred during daylight at the Echo gate at FAOR at Global Positioning System (GPS) co-ordinates determined to be 26°08'49.74" South, 028°15'24.13" East, at an elevation of 5 524 feet (ft).


**Figure 2:** The yellow pin (9H-VJM) indicates the point of impact with the gate. (Source: Google Earth)

## 1.2 Injuries to Persons

| Injuries | Pilot | Crew | Pass. | Total On-board | Other |
|---|---|---|---|---|---|
| Fatal | - | - | - | - | - |
| Serious | - | - | - | - | - |
| Minor | - | - | - | - | - |
| None | 2 | 1 | - | 3 | - |
| **Total** | **2** | **1** | **-** | **3** | **-** |

## 1.3 Damage to Aircraft

1.3.1 The number 2 leading edge slat on the right wing was substantially damaged.

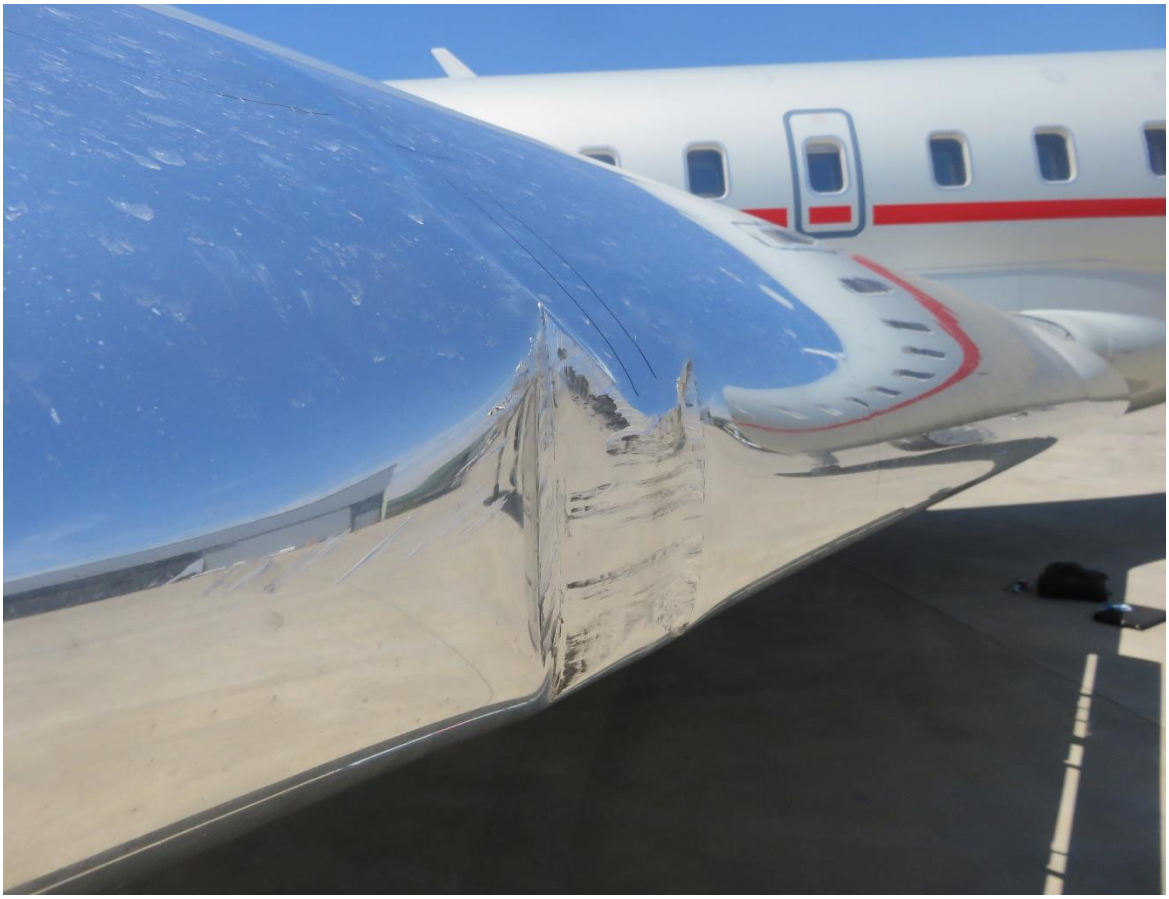


**Figure 3:** Deformation of the number 2 leading edge slat on the right wing.

## 1.4 Other Damage

1.4.1 The security gate sustained minor structural damage during the accident sequence.

## 1.5 Personnel Information

Pilot-in-command (PIC)

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Spanish | Gender | Male | Age | 43 |
| Licence Number | FCL 00015583 | Licence Type | Airline Transport Pilot Licence | | |
| Licence Valid | Yes | Type Endorsed | Yes | | |
| Ratings | Instrument | | | | |
| Medical Expiry Date | 23 February 2022 (Class 1) | | | | |
| Restrictions | None | | | | |
| Previous Accidents | None | | | | |

Flying Experience:

| | |
|---|---|
| Total Hours | 7 500.0 |
| Total Past 90 Days | 164.7 |
| Total on Type Past 90 Days | 164.7 |
| Total on Type | 2 611.0 |

First Officer (F/O)

| | | | | | |
|---|---|---|---|---|---|
| Nationality | German | Gender | Male | Age | 37 |
| Licence Number | DE.FCL.31611 | Licence Type | Commercial Pilot Licence | | |
| Licence Valid | Yes | Type Endorsed | Yes | | |
| Ratings | Instrument | | | | |
| Medical Expiry Date | 13 November 2021 (Class 1) | | | | |
| Restrictions | None | | | | |
| Previous Accidents | None | | | | |

Flying Experience:

| | |
|---|---|
| Total Hours | 4 622.0 |
| Total Past 90 Days | 167.55 |
| Total on Type Past 90 Days | 167.55 |
| Total on Type | 1 397.08 |

## 1.6 Aircraft Information

Airframe:

| | | |
|---|---|---|
| Type | Bombardier BD-700-1A10 | |
| Serial Number | 9630 | |
| Manufacturer | Bombardier Aerospace | |
| Year of Manufacture | 2014 | |
| Total Airframe Hours (at time of the accident) | 5 959.32 | |
| Last Maintenance Inspection (hours & date) | 5 881.09 | 30 September 2021 |
| Hours Since Last Inspection | 78.23 | |
| C of A (issue date) | 1 July 2015 | |
| C of A (expiry date) | 30 June 2022 | |
| C of R (issue date) (Present Owner) | 26 May 2021 | |
| Operating Categories | Large Aeroplanes | |
| MTOW | 45 132 kg (99 500 lbs) | |

Engine No. 1:

| | |
|---|---|
| Type | Rolls Royce BR710A2-20 |
| Serial Number | 22389 |
| Hours Since New | 5 546.45 |
| Hours Since Overhaul | Modular engine |

Engine No. 2:

| | |
|---|---|
| Type | Rolls Royce BR710A2-20 |
| Serial Number | 22388 |
| Hours Since New | 5 959.32 |
| Hours Since Overhaul | Modular engine |

## 1.7 Meteorological Information

1.7.1 The meteorological routine aerodrome report (METAR) for FAOR on 13 October 2021 at 0500Z was as follows: METAR FAOR 130500Z 27005KT CAVOK 20/M01 Q1025 NOSIG=

| | | | | | |
|---|---|---|---|---|---|
| Wind Direction | 270˚ | Wind Speed | 5 knots | Visibility | + 10 km |
| Temperature | 20˚C | Cloud Cover | Nil | Cloud Base | Nil |
| Dew Point | -1˚C | QNH | 1025hPa | | |

1.7.2 METAR for FAOR 130530Z 27005KT 240V310 CAVOK 20/M02 Q1025 NOSIG=

| | | | | | |
|---|---|---|---|---|---|
| Wind Direction | 270˚ | Wind Speed | 5 knots | Visibility | + 10 km |
| Temperature | 20˚C | Cloud Cover | Nil | Cloud Base | Nil |
| Dew Point | -2˚C | QNH | 1025hPa | | |

1.7.3 Satellite Image:

The Fog A satellite image of the MeteoSat Second Generation (MSG) below indicates a thin layer of high-level cloud between 0515Z and 0530Z as shown by the indigo shade. The location for FAOR is indicated within the yellow circle on the satellite image.

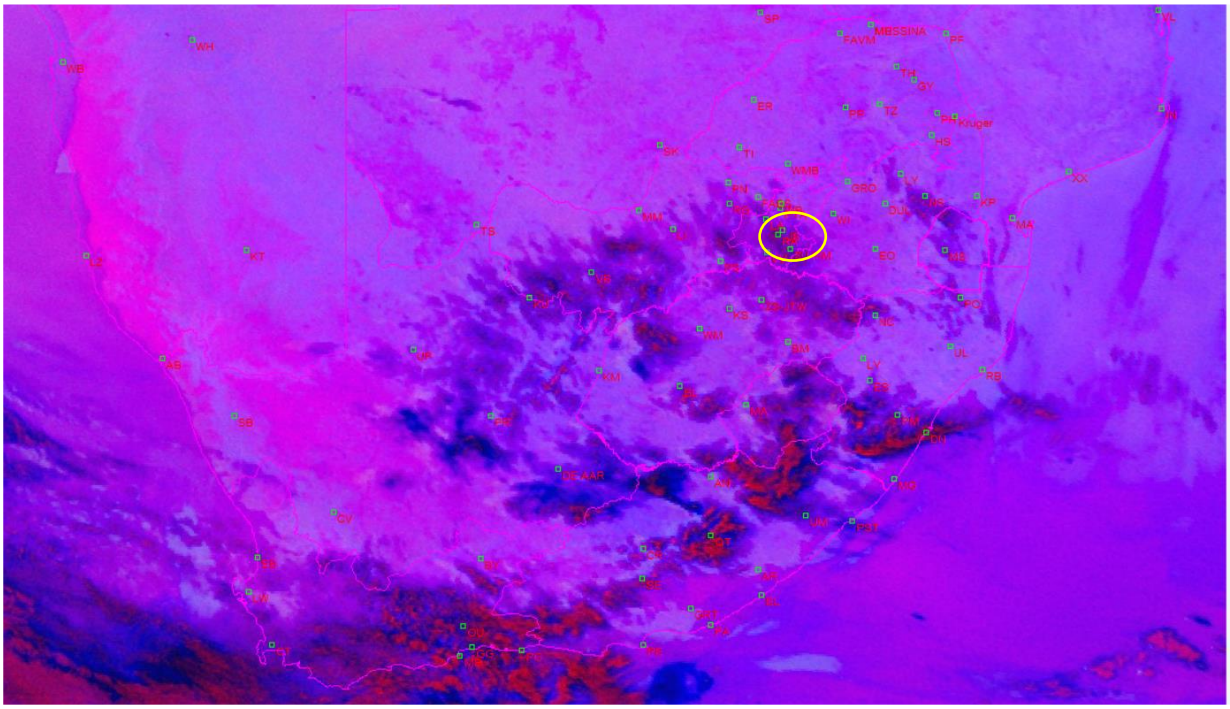


**Figure 4:** Fog A satellite image at 0530Z. (Source: SAWS report)

1.7.4 According to the official weather report summary received from the South African Weather Service (SAWS), there was no significant weather over FAOR between 1515Z and 0530Z.

## 1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigation equipment as approved by the Regulator (SACAA). There were no records that indicated the navigation system was unserviceable prior to the flight.

## 1.9 Communication

1.9.1 The aircraft was equipped with standard communication equipment as approved by the Regulator, and was fitted with three VHF radios.

1.9.2 The crew was in radio contact with FBO operations prior to start and taxi on VHF 130.725 MHz.

1.9.3 The aircraft was fitted with a transponder and was issued a squawk code 7334 by the CLD controller during communication with the VJT850 crew on VHF 121.70 MHz. It was from this frequency that the crew obtained their departure clearance. The crew of VJT850 was in communication with CLD while the aircraft was still parked in the apron at FBO, before starting the engines for taxi.

1.9.4 According to available information, the crew of VJT850 did not speak to FAOR tower on VHF 118.10 MHz at any stage during the intended flight. The crew did not ask for start clearance nor did they request taxi clearance on this frequency.

1.9.5 According to available information, the crew of VJT850 did not speak to Aerodrome Apron control on VHF 122.65 MHz before proceeding to taxi towards Echo gate, which started to close as the aircraft approached the gate.

1.9.6 According to the Denel Campus operator, the crew of VJT850 made contact on the Campus radio VHF 132.50 MHz at 0514Z. The crew requested permission to taxi through the flight line for departure at FAOR to OMBD. The crew was requested to proceed at own discretion and to report "*through the Echo gate*".

## 1.10 Aerodrome Information

1.10.1 The accident occurred at FAOR.

| | | |
|---|---|---|
| Aerodrome Location | O.R. Tambo International Aerodrome (FAOR) | |
| Aerodrome Status | Licensed | |
| Aerodrome Co-ordinates | 26°08'01.30" South 028°14'32.34" East | |
| Aerodrome Elevation | 5 558ft | |
| Runway Headings | 03L/21R | 03R/21L |
| Runway Dimension | 4 421m x 60m | 3 405m x 60m |
| Runway Used | 21R | |
| Runway Surface | Asphalt | |
| Approach Facilities | Runway lights, PAPI, DVOR / DME (JSV), ILS LOC and ILS GP for both runways | |
| Tower Frequency (West) | 118.10 MHz | |
| Tower Frequency (East) | 118.60 MHz | |
| Approach Frequency (South) | 124.50 MHz | |
| Approach Frequency (West) | 124.50 MHz | |
| Approach Frequency (East) | 123.70 MHz | |

## 1.11 Flight Recorders

1.11.1 This aircraft was fitted with a flight data recorder (FDR), type L-3 Communication model FA2100, Part No. 2100-2045-22 with Serial No. 000998780 and a solid-state cockpit voice recorder (CVR), type L-3 Communication model FA2100, Part No. 2100-1025-24 with Serial No. 000931420.

1.11.2 Both flight recorders were found mounted in their original locations on the aircraft and were undamaged. Both these units were removed from the aircraft and were downloaded

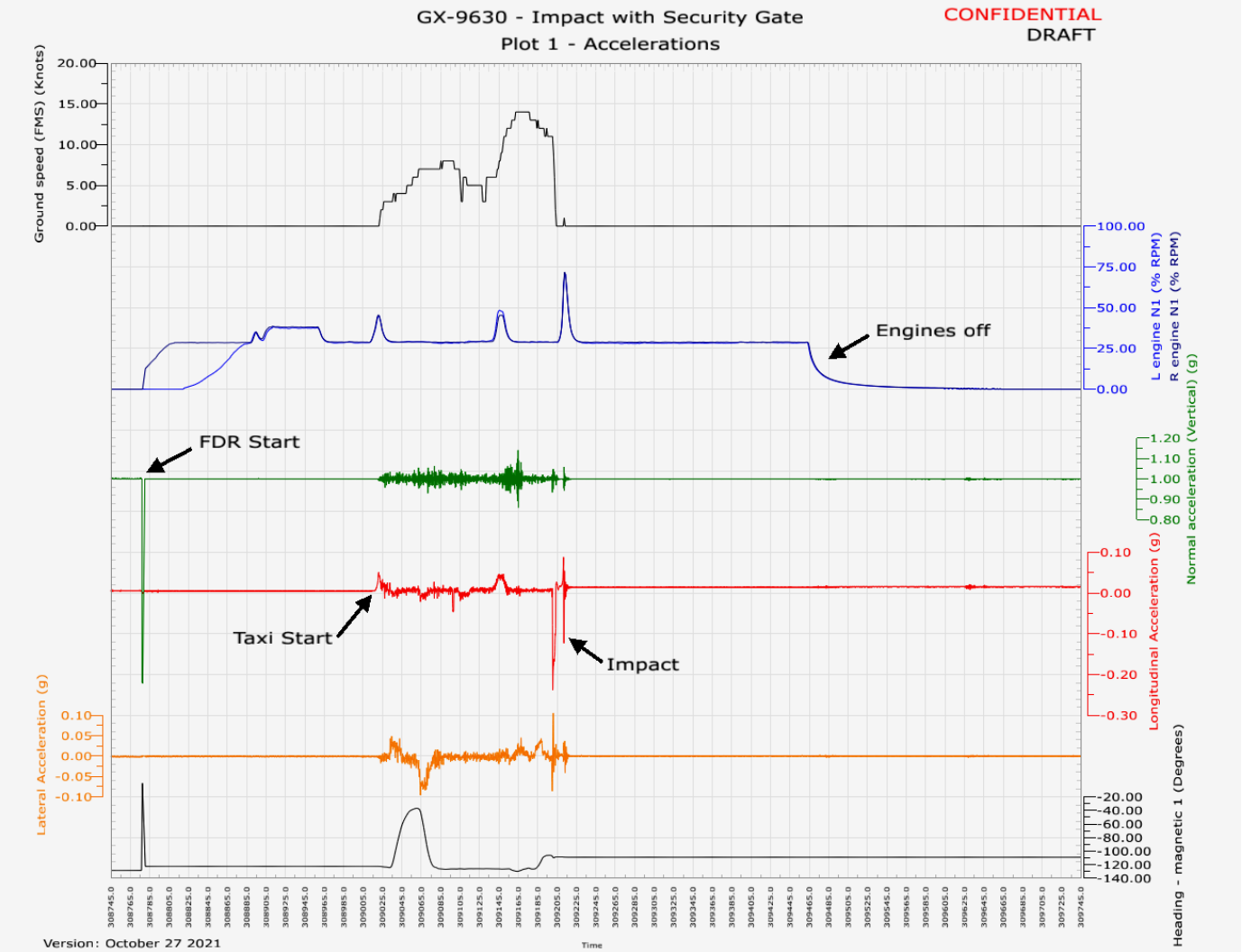
on Thursday, 14 October 2021.

1.11.3 The investigation team had listened to the CVR recording with the objective to prepare a transcript. The recording capacity of this unit was 2 hours and 1 minute, however, it was found that the crew had not deactivated the non-thermal CVR circuit breaker following the accident and the entire recording was overwritten as they kept the auxiliary power unit (APU) running until the crew disembarked from the aircraft before it was towed back to the apron. No communication pertaining to the accident was available on the CVR. This was found to be in contravention to the standard operating procedures (SOP) of the operator.

1.11.4 The raw FDR data was interrogated with the assistance of the aircraft manufacturer and the investigating authority of the State of Design and Manufacture. It was noted that the number 2 engine was first started (right side), followed by the number 1 engine (left side). It was further noted that the maximum speed the aircraft was taxied at was 14 knots. Hydraulic pressures on all three systems were normal between 3 000 and 3 200 pounds per square inch (psi). The maximum brake pedal application was 41%, this was measured on the PIC side on the left pedal, as he was taxiing the aircraft. The maximum brake pressures captured were as follows:

| Item | Maximum pressures captured (psi) |
|---|---|
| Inboard brake pressure left | 867 |
| Inboard brake pressure right | 1787 |
| Outboard brake pressure left | 867 |
| Outboard brake pressure right | 1784 |

1.11.5 The FDR parameters downloaded showed that the aircraft and all its systems was serviceable at the time and could not have contributed or have caused the accident. The FDR data graph (below) displays no abnormalities with the operation of the aircraft.




**Graph 1:** The FDR data shows no abnormalities with the operation of the aircraft.

## 1.12 Wreckage and Impact Information

1.12.1 The aircraft was taxied from the FBO apron area (where it was parked) to the Echo gate. As the aircraft approached the motorised gate, the gate had already started to close. The last phase of taxi was captured on CCTV footage; four screenshots were taken (see Figures 5, 6, 7 and 8) which illustarate the sequence of events as the gate impacted the aircraft. Figure 9 (picture) was taken by the first responders to the accident scene; it illustrates the position of the gate relative to the damage on the leading edge slat, which was deployed to 20° as required for take-off.

**Figure 5:** In this screenshot, the aircraft ZS-AAK exits the gate as shown in the yellow window.

**Figure 6:** In this screenshot, the VJT850 aircraft approaches the gate, which had already started to close.


**Figure 7:** In this screenshot, the VJT850 aircraft's right wing makes contact with the gate.


**Figure 8:** In this screenshot, the gate stops moving, which was 11 seconds after first contact with the right wing.

**Figure 9:** The gate whilst in contact with the leading-edge slat. (Source: Fireblade Aviation)

### 1.13 Medical and Pathological Information

1.13.1 Not applicable.

### 1.14 Fire

1.14.1 There was no evidence of a pre- or post-impact fire.

### 1.15 Survival Aspects

1.15.1 The accident was survivable as the crew was properly restrained, and impact with the gate was at low speed.

### 1.16 Tests and Research

1.16.1 To be discussed in the final report.

## 1.17 Organisational and Management Information

1.17.1 This was a positioning flight from FAOR to OMBD with only the crew on-board.

1.17.2 The operator was issued an Air Operating Certificate (AOC) by the State of Registry and State of Operator, the Republic of Malta, on 3 February 2017 with a re-issue on 12 November 2019.

## 1.18 Additional Information

1.18.1 Leading edge slat deployment

As per the Airplane Flight Manual (AFM), Chapter 4, Normal Procedures

The after-engine start checklist require the crew to set the slats for departure, this check is again repeated in the taxi and take-off checklist as highlighted below.

**B. After Engine Start Check**

| | | |
|---|---|---|
| 1. | APU | As required |
| 2. | Electrics (AC/DC synoptic pages) | Checked |
| 3. | Wing and cowl anti-ice | Checked / As required |
| 4. | Slat / Flap lever | Check / Set for departure |
| 5. | Flight controls | Checked |
| 6. | Flight spoilers | Checked / Retracted |
| 7. | GND LIFT DUMP | Checked |

▼

**4. TAXIING AND TAKE-OFF**

**A. Taxi Check**

| | | |
|---|---|---|
| 1. | Brakes | Checked |
| 2. | Thrust Reversers (First Flight of the Day) | Checked |
| 3. | Flight instruments | Checked and set |
| 4. | Flight director | Set for take-off |
| 5. | Fuel quantity and balance / XFEED SOV | Checked / Closed |
| 6. | Slat / Flap lever | Set for departure |
| 7. | Trims | Set for departure |

### 1.18.2 Security gates

There are two gates at this location. The Denel Campus gate (see Figure 10) has been decommissioned several years ago and currently stands in the fully open position. There is a security guard at this gate, with a guard house. The other gate is on the Fireblade Aviation side.

**Figure 10:** The Denel Campus gate stationary in the fully open position.

A traffic light at this gate is located next to the guard house. This light was not working as there was power failure in the area at the time. The traffic light is not connected to an alternate power supply in case of power failures.


**Figure 11:** The Denel Campus gate traffic light.

The aerodrome gate (Echo gate) was functional and was being controlled remotely. The gate was equipped with safety barriers which failed in operation on the day. At the gate, five safety beams are installed. When the gate is in motion and one of these beams is obstructed by an aircraft's fuselage, a vehicle or any similar type object, this gate should stop immediately. The fuselage of the aircraft obstructed all five safety beams, yet the gate did not stop, it continued to close for another 11 seconds after impacting the right wing of the aircraft before it finally stopped.

**Figure 12:** The Echo gate with three of the safety beams visible in the yellow windows.

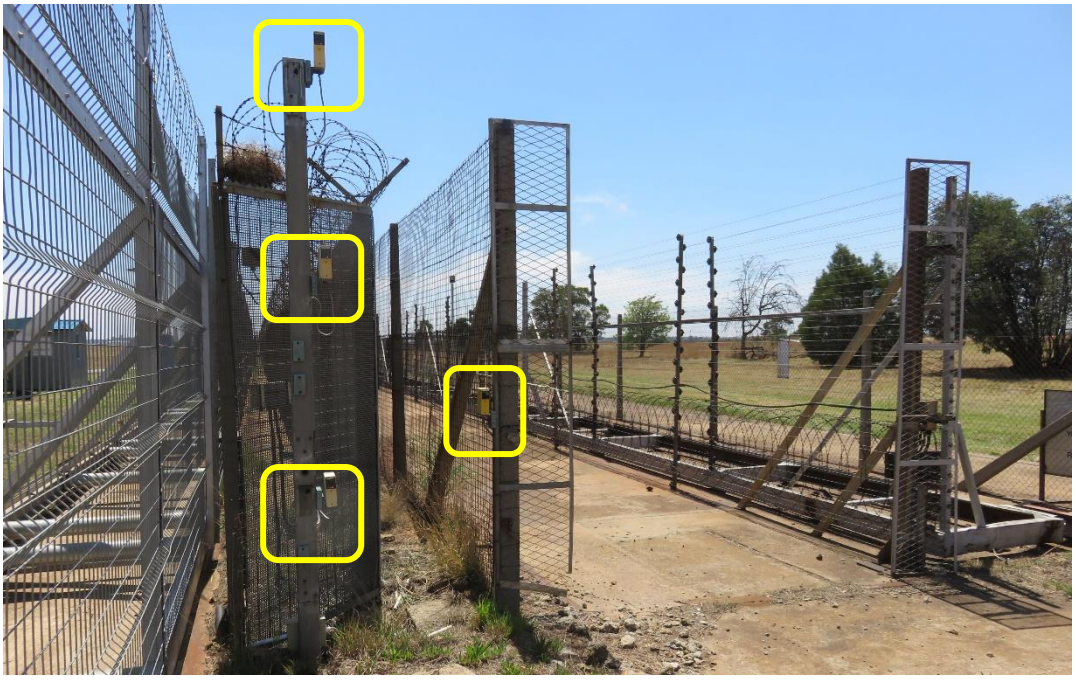


**Figure 13:** The Echo gate with four of the safety beams visible in the yellow windows.

A gate control box with seven buttons is installed at the guard house at the Echo gate. The top red knob is the E-STOP (Emergency stop), which can be activated in case of an emergency, and which will bring the gate to an immediate stop. The security guard, who was the only person at this station, was not allowed to interfere with the operation of the gate and, therefore, did not activate the E-STOP knob. By the time this report was concluded, it was not clear who, and in what capacity was this person allowed to activate this E-STOP knob.

**Figure 14:** The gate control box installed at the guard house at Echo gate.


**Figure 15:** The gate control box with the E-STOP button at the top.

A traffic light is located on both sides of the Echo gate, one being near the guard house (gate open side), and the other light is on the 'gate close' side. These lights were working at the time as the traffic light on the 'gate close side' was visible on the CCTV footage. The light was green while the gate was in open position, as soon as the gate started to move to the close position, the green light switched off. The pictures in Figures 16 and 17 were taken on 19 October 2021 by the investigator. These traffic lights were not working on 13 October 2021 when the investigation team inspected the gate.

**Figure 16:** The traffic light at the gate open position.

**Figure 17:** The traffic light at the gate close position.

The FBO apron is fenced off, and aircraft had to taxi through the security gate into the Denel Campus area. This gate is controlled by FBO operations, located in the FBO building and looking out onto the apron area.

**Figure 18:** The FBO fenced off area and the view of the gate from the Denel Campus side.

**Figure 19:** The FBO apron area. The picture was taken from the FBO operations centre.

**Figure 20:** The FBO apron gate and the traffic light (on green) at the gate.

1.18.3 Cockpit crew statement:

Both cockpit crew members provided the investigating team with the same statement. *Note: the statement is presented verbatim.*

*"9H-VJM (*VJT850) *was taxiing out from Fireblade handling apron, we were contacting Denel tower on 132.5 and they clear us to go to E holding point RWY 21L and informed us that automatic door was clear (Green) to go and cross. The controller changed us to freq 118.1 tower, and once again clearance to hold at RWY 21L E point. We were following another plane, a Dornier 328, we were instructed to give way to them before the gate. Previous plane crossed the gate and when we were passing through the gate, the fence started to move hitting us on the right-wing leading slat edge. Green light was visible." (SIC)*

## 1.19 Useful or Effective Investigation Techniques

1.19.1 To be discussed in the final report if any.

# 2 Findings

## 2.1 General

From the evidence available, the following preliminary findings were made with respect to this accident. These shall not be read as apportioning blame or liability to any particular organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusions heading:

- **Findings —** are statements of all significant conditions, events or circumstances in this accident. The findings are significant steps in this accident sequence, but they are not always causal or indicate deficiencies.

## 2.2 Findings

Although the investigation is on-going, the following provisional findings were made:

The Crew

2.2.1 The PIC was in possession of an Airline Transport Pilot Licence (ATPL). According to his logbook, he had flown a total of 7 500.0 hours, of which 2 611.0 hours were on the aircraft type.

2.2.2 The PIC was issued a valid Class 1 aviation medical certificate on 28 January 2021 with an expiry date of 23 February 2022.

2.2.3 The FO was in possession of a Commercial Pilot Licence. According to his logbook, he had flown a total of 4 622.0 hours, of which 1 397.08 hours were on the aircraft type.

2.2.4 The FO was issued a valid Class 1 aviation medical certificate on 29 October 2021 with an expiry date of 13 November 2021.

2.2.5 The crew were informed about the FBO apron and Denel Campus operating procedures prior to their flight to South Africa. This was the crews' first visit to this facility.

The Aircraft

2.2.6 The aircraft was issued a Certificate of Airworthiness on 1 July 2015 with an expiry date of 30 June 2022.

2.2.7 The aircraft was issued a Certificate of Registration on 26 May 2021.

2.2.8 The last scheduled maintenance inspection carried out on the aircraft prior to the accident flight was certified on 30 September 2021 at 5 881.09 airframe hours. The aircraft had accumulated a further 78.23 airframe hours since the said inspection.

2.2.9 There were no recorded defects entered in the Technical Log of this aircraft prior to the flight, nor was there any mechanical malfunction detected with any of the systems from the FDR data.

2.2.10 The number 2 leading edge slat on the right wing was substantially damaged and had to be replaced.

Environment

2.2.11 Fine weather conditions prevailed at the time of the accident. The weather was found to have no bearing to the accident.

Aviation Operating Certificates (AOC)

2.2.12 The operator was in possession of a valid AOC certificate that was issued by the State of Registry, which is the same as the State of Operator, on 3 February 2017. The AOC certificate was re-issued on 12 November 2019.

Aerodrome

2.2.13 FOAR is a licensed facility.

2.2.14 The Aerodrome Apron controller who communicated with the crew of the aircraft on VHF frequency 122.65 MHz was located in the Airport Management Centre (AMC) in the Domestic Terminal building.

2.2.15 The gate is controlled remotely by the gate controller who is located in a control room in the International Terminal building.

2.2.16 There was a security guard at the gate at the time of the accident.

2.2.17 There is an E-STOP (Emergency Stop) button at the guard house at the gate, which when activated will stop the gate immediately. The security guard was not allowed to interfere with the operation of the gate and, therefore, did not activate the E-STOP button.

2.2.18 There are five safety beams installed at the gate, which are designed to stop the gate once the beam/signal is disturbed/obstructed by an aircraft's fuselage, vehicle, person, etc. This function was inoperative.

2.2.19 There are several CCTV cameras installed at the gate which allow the gate controller to monitor the gate on a screen at the workstation.

2.2.20 The gate controller has the option to STOP the gate immediately via his gate control system, should he or she observe any potential risk that could result in damage to an aircraft/vehicle or injury to a person(s).

2.2.21 There was no notice/information board installed at the gate on both sides (airside and land side) that informs pilots to obtain clearance from apron control on 122.65 MHz before proceeding through the gate.

2.2.22 The gate was already closing when the aircraft approached the gate.

2.2.23 The traffic light on the 'gate close' side was green (as seen on CCTV footage), when the gate started to move towards the close position, the light switched off.

2.2.24 The Denel Campus gate was decommissioned several years ago and now stands open.

2.2.25 The Denel Campus gate traffic light was not working at the time due to a power failure in the area.

2.2.26 The FBO apron area is also a fenced off/gated area. The FBO gate was in the open position when the crew taxied out.

Radio communication

2.2.27 The VJT850 crew communicated to FBO operations on VHF 130.725 MHz.

2.2.28 The VJT850 crew communicated to CLD on VHF 121.70 MHz.

2.2.29 The VJT850 crew did not communicate to FAOR tower on VHF 118.10 MHz.

2.2.30 The VJT850 crew did not communicate to Aerodrome Apron control on 122.65 MHz (aerodrome gate control).

2.2.31 The VJT850 crew communicated to the Denel Campus operator on VHF 132.50 MHz.

2.2.32 The VJT850 crew allowed the aircraft ZS-AAK to taxi through the gate ahead of them by giving way to the aircraft.

## 3. Safety Recommendations

3.1 It is recommended that Airports Company South Africa (ACSA) and Denel Aviation consider moving the control (operation) of Echo (V4) gate (opening and closing) from the control room to the AMC building.

3.2 It is recommended that ACSA and Denel Aviation consider the installation of a stop sign on both sides of Echo (V4) gate and a visible notice board which must include the following statement:

"BEFORE PROCEEDING THROUGH THE GATE, PLEASE CONTACT ACSA GATE CONTROL ON THE VHF FREQUENCY 122.65 MHZ."

3.3 It is recommended that ACSA and Denel Aviation ensures that the safety beams fitted at the gate to keep the gate opened when the aircraft brakes the beam are kept in working

condition. Alternatively, the gate should be kept opened at all times when the airport is in operation.

3.4 It is recommended that Denel Aviation consider installing an alternate power source for communication records at the Denel Campus Operations to prevent loss of communication should the main power source be unavailable.

## 4. On-going Investigation

4.1 The AIID investigation is on-going and will investigate all other aspects of this accident, which may or may not have safety implications.

**This report is issued by:**
**Accident and Incident Investigations Division**
**South African Civil Aviation Authority**
**Republic of South Africa**