SOUTH AFRICAN CIVIL AVIATION AUTHORITY

*Section/division* **Accident and Incident Investigation Division** Form Number: CA 12-12b

# AIRCRAFT INCIDENT REPORT AND EXECUTIVE SUMMARY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Reference: | CA18/3/2/1067 | | |
| **Aircraft Registration** | **ZS-NMF / ZS-SZZ** | **Date of Incident** | 10 July 2014 | | **Time of Incident** | 1108Z | |
| **Type of aircraft** | Bombardier CL600 / Airbus A320 | | **Type of operation** | | Part 121 - Commercial | | |
| **Pilot-in-command licence type** | Airline Transport | | **Age** | 38 | **Licence valid** | Yes | |
| **Pilot-in-command flying experience** | Total flying hours | | 8 724.1 | | Hours on type | 1 657.5 | |
| **Last point of departure** | King Shaka International aerodrome (FALE), Kwa-Zulu Natal province | | | | | | |
| **Next point of intended landing** | Port Elizabeth aerodrome (FAPE), Eastern Cape province | | | | | | |
| **Location of the incident site with reference to easily defined geographical points (GPS readings if possible)** | | | | | | | |
| Overhead Port Elizabeth (GPS position: 33°59'38.02" South 025°35'35.30" East) | | | | | | | |
| **Meteorological information** | Surface wind; 040°/5 knots, Temperature; 18°C, Visi bility; +10 km | | | | | | |
| **Number of people on board** | 3 + 27 | **No. of people injured** | 0 | **No. of people killed** | 0 | | |

## Synopsis


Expressways 336 (EXY336) was on a domestic scheduled flight from FALE to FAPE with twenty-seven passengers and three crew members on board. The aircraft was cleared on final approach for runway 26 with the intention to do a full-stop landing when SAA410 (an Airbus A320 aircraft) was cleared for *"immediate"* take-off by the controller, *"no stopping on the runway"* ahead of the aircraft on approach. The crew of EXY336 elected to do a go-around due to insufficient separation between them and the departing aircraft SAA410; this decision was followed almost immediately by an instruction by the controller to go around. According to radar data the vertical separation between the two aircraft was 263 feet (80 m) and horizontally 0.2 nautical miles or 370 metres. The crew of EXY336 turned out right for the visual circuit. SAA410 contacted approach control advising them that they had obtained a traffic alert and collision avoidance system (TCAS) resolution advisory (RA) warning, and they were instructed by the controller to turn left onto a heading of 230° and to continue with the climb. A short while later SAA410 reported clear of traffic and was instructed to turn further left on a heading of 110°. Flight EXY336 landed safely on runway 26 at 1116Z and flight SAA410 continued to O.R. Tambo International aerodrome (FAOR) as per flight plan. Nobody was injured on board either of the aircraft during this incident.


## Probable cause

The controller did not effectively monitor the flight progress of the aircraft on final approach, which resulted in a loss in separation, resulting in evasive action being taken by the crew of EXY336.

| | | | |
|---|---|---|---|
| ASP date | | Release date | |

# AIRCRAFT INCIDENT REPORT

| | |
|---|---|
| **Name of Owner** | **:** SA Express / South African Airways (Pty) Ltd |
| **Name of Operator** | **:** SA Express / South African Airways (Pty) Ltd |
| **Manufacturer** | **:** Bombardier / Airbus |
| **Model** | **:** CL600-2B19 / A320-232 |
| **Nationality** | **:** South African |
| **Registration Marks** | **:** ZS-NMF / ZS-SZZ |
| **Place** | **:** Port Elizabeth |
| **Date** | **:** 10 July 2014 |
| **Time** | **:** 1108Z |

*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 (1997) 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 establish legal liability****.*

**Disclaimer:**

*This report is produced without prejudice to the rights of the CAA, which are reserved.*

## 1. FACTUAL INFORMATION

### 1.1 History of flight

1.1.1 Flight EXY336, with twenty-seven passengers and three crew members on board, departed from King Shaka International aerodrome (FALE) on a scheduled domestic flight to Port Elizabeth aerodrome (FAPE). The flight was conducted under the provisions of Part 121 of the Civil Aviation Regulations (CARs) of 2011 as amended.

1.1.2 The aircraft was cleared by the controller at FAPE to the 10 mile centre fix for a

visual approach onto runway 26. The First Officer (FO) was the pilot flying (PF) this sector. At 11:05:52 flight EXY336 called on long final approach runway 26 and was instructed to continue with the approach. At 11:07:31 flight SAA410 called ready in sequence. The controller asked flight SAA410 if they were ready for an immediate take-off, *"no stopping on the runway"* to which the crew replied *"affirmative".* The crew acknowledged the clearance and proceeded to taxi onto the runway and commenced with the take-off roll. At this stage flight EXY336 was at approximately 3 DME, and the crew was told: *"continue with the approach, landing assured".*

1.1.3 Following an assessment of the situation by the flight crew of EXY336, it was decided that there was insufficient separation between them and the departing aircraft, which was still on the runway, and a go-around was executed followed by a right turn. The decision by the crew was made basically simultaneously with the instruction of the controller, who told them to execute a go-around and to report on a left downwind. This instruction followed 32 seconds after the controller advised flight EXY336 *"continue with the approach, landing assured"*. During the go-around the traffic alert and collision avoidance system (TCAS) resolution advisory (RA) warning was received in the cockpit of flight EXY336. The PF stated that he had SAA410 in sight, which was approximately 5° to 10° to the left of them and slightly below them. He then banked the aircraft to the right, and at the same time the TCAS RA commanded a descent of approximately 1 000 feet/minute. Due to visual meteorological conditions (VMC) prevailing, the PF elected to continue with the right turn and not to directly follow the RA, which would have put the aircraft in close proximity to the ground with the possibility of an enhanced ground proximity warning system (EGPWS) activation. Having the traffic visual, the safer option was not to follow the RA. They then positioned the aircraft on a right downwind for runway 26.

1.1.4 At 11:09:31 flight EXY336 was observed turning right at 1 800 feet, 0.5 nm behind flight SAA410, which was also at 1 800 feet. SAA410 was issued with a left turn as EXY336 turned right.

1.1.5 At 11:10:08 separation was re-established and EXY336 continued on the right-hand visual approach for runway 26 and landed safely at 11:16:00, with flight SAA410 continuing as per the flight plan.

1.1.6 The radar data depicted in figure 1 indicates the flight path flown by EXY336 (green track), which approached FAPE over the sea from the northeast and following the go-around flew a right-hand circuit followed by a full stop landing on runway 26. The blue track indicates the flight path flown by SAA410, which was instructed to

turn left after take-off. The aircraft continued its flight to FAOR as per flight plan.


**Figure 1.** The radar data display of the track flown by EXY336 (in green) and SAA410 (in blue)

1.1.7 According to radar data, the vertical separation between the two aircraft was 263 feet (80 m) and the horizontal separation was 0.2 nautical miles (370 m).

1.1.8 The serious incident occurred during daylight conditions at a geographical position that was determined to be 33°59'38.02" South 025°35 '35.30" East.

## 1.2 Injuries to persons

1.2.1 On board ZS-NMF

| Injuries | Pilot | Crew | Pass. | Other |
|---|---|---|---|---|
| Fatal | - | - | - | - |
| Serious | - | - | - | - |
| Minor | - | - | - | - |
| None | 2 | 1 | 27 | - |

1.2.2 On board ZS-SZZ

| Injuries | Pilot | Crew | Pass. | Other |
|---|---|---|---|---|
| Fatal | - | - | - | - |
| Serious | - | - | - | - |
| Minor | - | - | - | - |
| None | 2 | 5 | 133 | - |

## 1.3 Damage to aircraft

1.3.1 There was no damage caused to either of the aircraft involved.

## 1.4 Other damage

1.4.1 No other damage was caused.

## 1.5 Personnel Information

1.5.1 Flight crew of ZS-NMF

Pilot-in-command (PIC)

| Nationality | South African | Gender | Male | Age | 38 |
|---|---|---|---|---|---|
| Licence number | 0270442494 | Licence type | Airline Transport | | |
| Licence valid | Yes | Type endorsed | Yes | | |
| Ratings | Instrument, Flight Instructor Grade II, Flight test – multi engine piston | | | | |
| Medical expiry date | 30 April 2015 | | | | |
| Restrictions | None | | | | |
| Previous incidents | None | | | | |

Flying experience:

| Total hours | 8 724.1 |
|---|---|
| Total past 90 days | 170.0 |
| Total on type past 90 days | 170.0 |

| | |
|---|---|
| Total on type | 1 657.5 |

First Officer (FO)

| | | | | | |
|---|---|---|---|---|---|
| Nationality | South African | Gender | Male | Age | 53 |
| Licence number | 0270202708 | Licence type | Airline Transport | | |
| Licence valid | Yes | Type endorsed | Yes | | |
| Ratings | Instrument, Flight Instructor Grade III, Flight test – multi engine piston | | | | |
| Medical expiry date | 31 May 2015 | | | | |
| Restrictions | Must wear corrective lenses | | | | |
| Previous incidents | None | | | | |

Flying experience:

| | |
|---|---|
| Total hours | 3 511.2 |
| Total past 90 days | 168.5 |
| Total on type past 90 days | 168.5 |
| Total on type | 1 075.8 |

1.5.2 Flight crew of ZS-SZZ

Pilot-in-command (PIC)

| | | | | | |
|---|---|---|---|---|---|
| Nationality | South African | Gender | Male | Age | 49 |
| Licence number | 0270271844 | Licence type | Airline Transport | | |
| Licence valid | Yes | Type endorsed | Yes | | |
| Ratings | Instrument, Flight test – multi engine piston | | | | |
| Medical expiry date | 30 November 2014 | | | | |
| Restrictions | Must wear corrective lenses | | | | |
| Previous incidents | None | | | | |

Flying experience:

| | |
|---|---|
| Total hours | 16 504.0 |
| Total past 90 days | 191.0 |
| Total on type past 90 days | 191.0 |
| Total on type | 1 410.0 |

First Officer (FO)

| | | | | | |
|---|---|---|---|---|---|
| Nationality | South African | Gender | Female | Age | 28 |
| Licence number | 0271059586 | Licence type | Airline Transport | | |
| Licence valid | Yes | Type endorsed | Yes | | |
| Ratings | Instrument, Flight test – multi engine piston | | | | |
| Medical expiry date | 31 October 2014 | | | | |
| Restrictions | None | | | | |
| Previous incidents | None | | | | |

Flying experience:

| | |
|---|---|
| Total hours | 5 822.9 |
| Total past 90 days | 184.4 |
| Total on type past 90 days | 106.6 |
| Total on type | 1 581.9 |

1.5.3 Air Traffic Controller (ATC)

| | | | | | |
|---|---|---|---|---|---|
| Nationality | South African | Gender | Male | Age | 37 |
| Licence number | ATS0749 | Licence type | Air Traffic Service | | |
| Licence valid | Yes | Type endorsed | Yes | | |
| Ratings | Aerodrome control, Instructor rating | | | | |
| Medical expiry date | 31 August 2014 | | | | |
| Restrictions | None | | | | |
| Previous incidents | None | | | | |

During an interview with the controller he indicated that he was busy instructing a student when the incident occurred. The incident occurred 16 minutes after he commenced with duty. He had four aircraft under his control at the time: one departing, two arrivals and a calibration aircraft, which was in the hold to the south of the aerodrome. He indicated that flight calibrations were taking place at the aerodrome at the time and he was not familiar with the operating procedures of the calibration aircraft, as this was his first time he was exposed to a calibration aircraft at this aerodrome. He further indicated that he was preparing for a runway change due to a change in wind direction. He indicated that he was well rested (had a 24

hours' rest period) prior to commencing with duty. The controller was removed from his position following the incident.

## 1.6 Aircraft Information

1.6.1 The Bombardier CL600-2B19 is a single-aisle aircraft which seats 2 passengers on each side of the aisle and has a typical seating for 50 passengers. It is fitted with two turbofan engines.


**Figure 2.** A photo of the aircraft ZS-NMF

**Airframe:**

| | | |
|---|---|---|
| Type | Bombardier CL600-2B19 | |
| Serial number | 7287 | |
| Manufacturer | Bombardier | |
| Year of manufacture | 1998 | |
| Total airframe hours (at time of incident) | 30 904 | |
| Last maintenance inspection (hours & date) | 30 507 | 8 May 2014 |
| Hours since last maintenance inspection | 397 | |
| C of A (issue date) | 17 October 2007 | |
| C of A (expiry date) | 16 October 2014 | |

| | |
|---|---|
| C of R (issue date) (present owner) | 13 December 2007 |
| Operating categories | Standard Part 121 |
| Maximum take-off mass | 24 041 kg |

**Engine No. 1:**

| | |
|---|---|
| Type | General Electric CF34-3A1 |
| Serial number | GEE872369 |
| Hours since new | 35 950 |

**Engine No. 2:**

| | |
|---|---|
| Type | General Electric CF34-3A1 |
| Serial number | GEE872404 |
| Hours since new | 19 210 |

1.6.2 The Airbus A320 family consists of short to medium range, narrow body, commercial passenger jet airliners, manufactured by Airbus. It is a single-aisle aircraft with a seat capacity that can vary depending on the customer configuration of the aircraft. Depending on the seating configuration it can accommodate between 150 to 180 passengers. The Airbus A320 was the first civilian airliner to include a full digital fly-by-wire flight control system.


**Figure 3.** A photo of the aircraft ZS-SZZ

**Airframe:**

| | | |
|---|---|---|
| Type | Airbus A320-232 | |
| Serial number | 4990 | |
| Manufacturer | Airbus | |
| Year of manufacture | 2011 | |
| Total airframe hours (at time of incident) | 4 923.1 | |
| Last maintenance inspection (hours & date) | 4 454.4 | 2 May 2014 |
| Hours since last maintenance inspection | 468.7 | |
| C of A (issue date) | 23 February 2012 | |
| C of A (expiry date) | 22 May 2015 | |
| C of R (issue date) (present owner) | 6 March 2012 | |
| Operating categories | Standard Part 121 | |
| Maximum take-off mass | 77 000 kg | |

**Engine No. 1:**

| | |
|---|---|
| Type | IAE V2527-A5 |
| Serial number | V16088 |
| Hours since new | 4 923.1 |

**Engine No. 2:**

| | |
|---|---|
| Type | IAE V2527-A5 |
| Serial number | V16092 |
| Hours since new | 4 923.1 |

## 1.7 Meteorological information

1.7.1 The weather information was obtained from the Port Elizabeth weather office (South African Weather Services) for 10 July 2014 at 1100Z.

| | | | | | |
|---|---|---|---|---|---|
| Wind direction | 040° | Wind speed | 5 kts | Visibility | + 10 km |
| Temperature | 18℃ | Cloud cover | Nil | Cloud base | Nil |
| Dew point | Unknown | | | | |

1.7.2 At 11:08:49, the controller communicated with the aircraft flying under the call sign AVQ352 and provided it with the prevailing wind at the aerodrome, which was 050° at 5 knots.

1.7.3 The aircraft on approach (EXY336) experienced a tailwind component.

## 1.8 Aids to navigation

1.8.1 Both aircraft were properly equipped for the flight as per regulatory requirements.

## 1.9 Communication

1.9.1 A transcript of the communication between the controller and both aircraft involved in this serious incident can be found attached to this report as Annexure A.

1.9.2 The communication took place on the Port Elizabeth tower frequency 118.10 MHz. It was clear from the communication that the voice intensity/strength of the controller never changed throughout the sequence of the incident, even when the two aircraft came within close proximity to one another.

1.9.3 The controller instructed EXY336 to go around when the aircraft was on short final approach for runway 26. This instruction followed thirty-two (32) seconds after he had informed the aircraft; *"continue approach landing assured"*. During an interview with the flight crew of EXY336, they stated that they had never heard this terminology before. The operator was consulted in this regard and stated that it was not standard air traffic terminology that was used by the controller at the time.

1.9.4 There was a calibration aircraft in the circuit at the time. The controller indicated that this was the first time he was exposed to a calibration aircraft at this aerodrome and he was not familiar with the operating procedures of this aircraft.

1.9.5 There was no ground radar available at Port Elizabeth aerodrome.

## 1.10 Aerodrome information

| | | |
|---|---|---|
| Aerodrome location | Port Elizabeth Aerodrome (FAPE) | |
| Aerodrome co-ordinates | 33°59'24.05" South 025°36'37 .00" East | |
| Aerodrome elevation | 226 feet above mean sea level (AMSL) | |
| Runway designations | 08/26 | 17/35 |
| Runway dimensions | 1 980 x 46 m | 1 677 x 46 m |
| Runway used | 26 | |
| Runway surface | Asphalt | |
| Approach facilities | ILS, VOR, DME, PAPIs, runway lights | |
| Aerodrome status | Licensed | |

The instrument landing system (ILS) at the aerodrome was not available due to scheduled calibrations being conducted at the time. All inbound aircraft had to fly visual approaches.

AERODROME CHART 33°59'24.05'S 025°36'37.00"E ELEV 226'

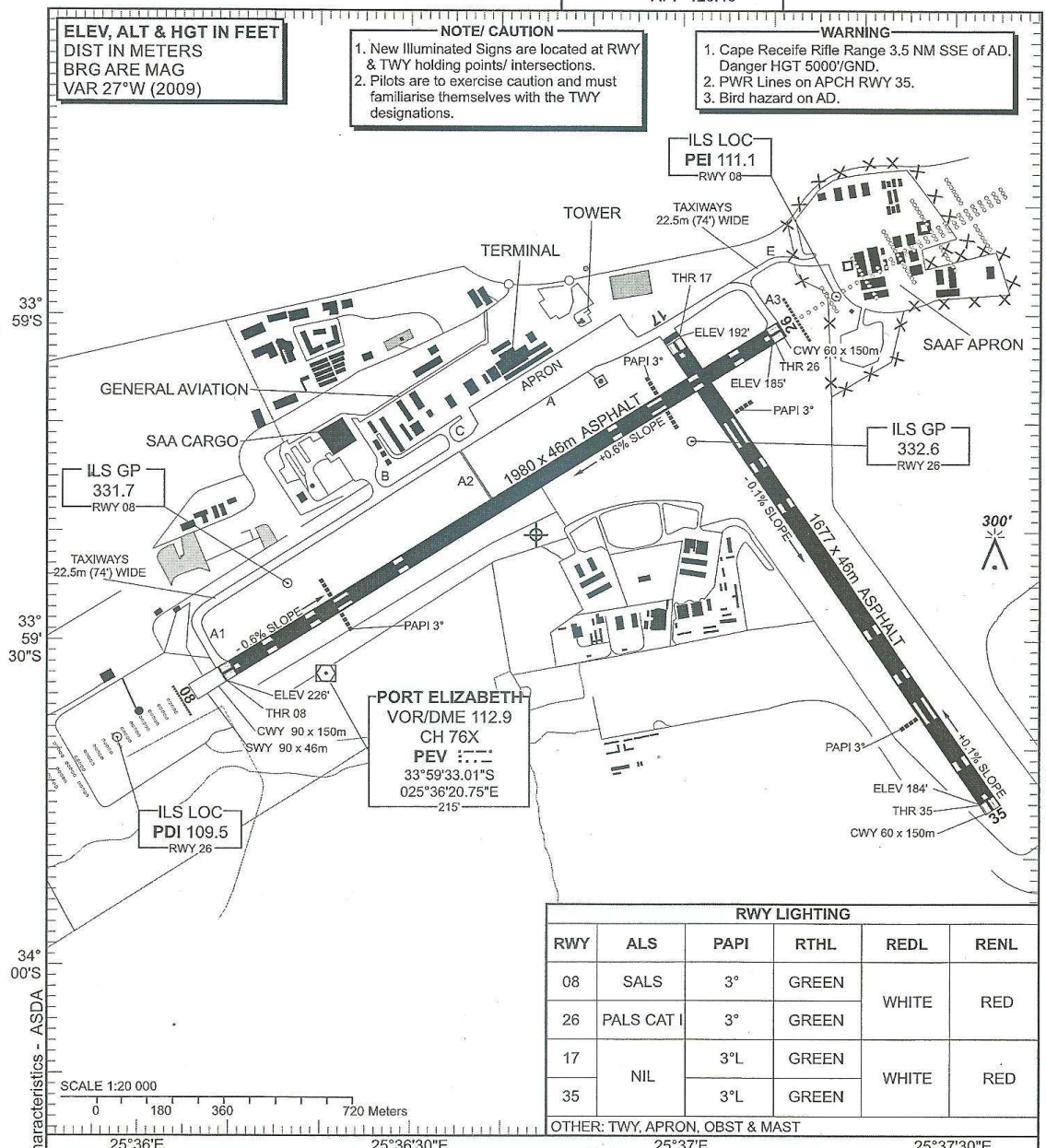
FAPE ATIS 126.80
APN 122.65
TWR 118.10
APP 120.40

PORT ELIZABETH INTL
FAPE

ELEV, ALT & HGT IN FEET
DIST IN METERS
BRG ARE MAG
VAR 27°W (2009)

NOTE/ CAUTION
1. New Illuminated Signs are located at RWY & TWY holding points/ intersections.
2. Pilots are to exercise caution and must familiarise themselves with the TWY designations.

WARNING
1. Cape Receife Rifle Range 3.5 NM SSE of AD. Danger HGT 5000'/GND.
2. PWR Lines on APCH RWY 35.
3. Bird hazard on AD.




RWY LIGHTING

| RWY | ALS | PAPI | RTHL | REDL | RENL |
|---|---|---|---|---|---|
| 08 | SALS | 3° | GREEN | WHITE | RED |
| 26 | PALS CAT I | 3° | GREEN | | |
| 17 | NIL | 3°L | GREEN | WHITE | RED |
| 35 | | 3°L | GREEN | | |

OTHER: TWY, APRON, OBST & MAST

PHYSICAL CHARACTERISTICS

| RWY | DIRECTION | THR COORDINATES | THR ELEVATION | TORA (m) | TODA (m) | ASDA (m) | LDA (m) | SWY (m) | CWY (m) | SLOPE | SURFACE | BEARING STRENGTH | CIRCUIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08 | 058° | 33°59'34.79"S 025°36'06.02"E | 226' | 1980 | 2040 | 1980 | 1980 | 0 | 60 | 0.006 D | ASPH | PCN 50/F/B/X/T | R |
| 26 | 238° | 33°59'00.85"S 025°37'11.53"E | 185' | 1980 | 2070 | 2070 | 1980 | 90 | 90 | 0.006 U | | | L |
| 17 | 146° | 33°59'01.81"S 025°36'58.63"E | 192' | 1677 | 1737 | 1677 | 1677 | 0 | 60 | 0.001 D | ASPH | PCN 50/F/B/X/T | UNK |
| 35 | 326° | 33°59'46.78"S 025°37'35.51"E | 184' | 1677 | 1677 | 1677 | 1677 | 0 | 0 | 0.001 U | | | |

CHANGE: RWY Physical Characteristics - ASDA

EFF: 17 OCT 13

SOUTH AFRICAN CIVIL AVIATION AUTHORITY

AD-01

## 1.11 Flight recorders

1.11.1 The flight data recorder (FDR) of flight EXY336 was removed from the aircraft and the data pertaining to the flight in question was downloaded and made available to the Accident & Incident Investigation Division (AIID). The cockpit voice recorder (CVR) was not downloaded as the unit was not removed from the aircraft following the incident in question. The CVR having a limited recording capacity, the voice data was overwritten/deleted/erased from the unit on the next sector the aircraft flew. The FDR data provided only calibrated airspeed information, which was observed to be between 130 and 135 knots during the final approach phase of the flight, prior to the go around. Due to the absence of ground speed data it could not be determined if upper winds might have had an effect on the ground speed of the aircraft during the final approach sector.

1.11.2 The FDR data of flight SAA410 was requested from the operator in an official letter. By the time this report was concluded no such data had been made available to AIID.

## 1.12 Wreckage and impact information

1.12.1 According to radar data obtained the vertical separation between the two aircraft deceased to 263 feet (80 m) and the horizontal distance to 0.2 nm (370 m), as illustrated in Figure 4.

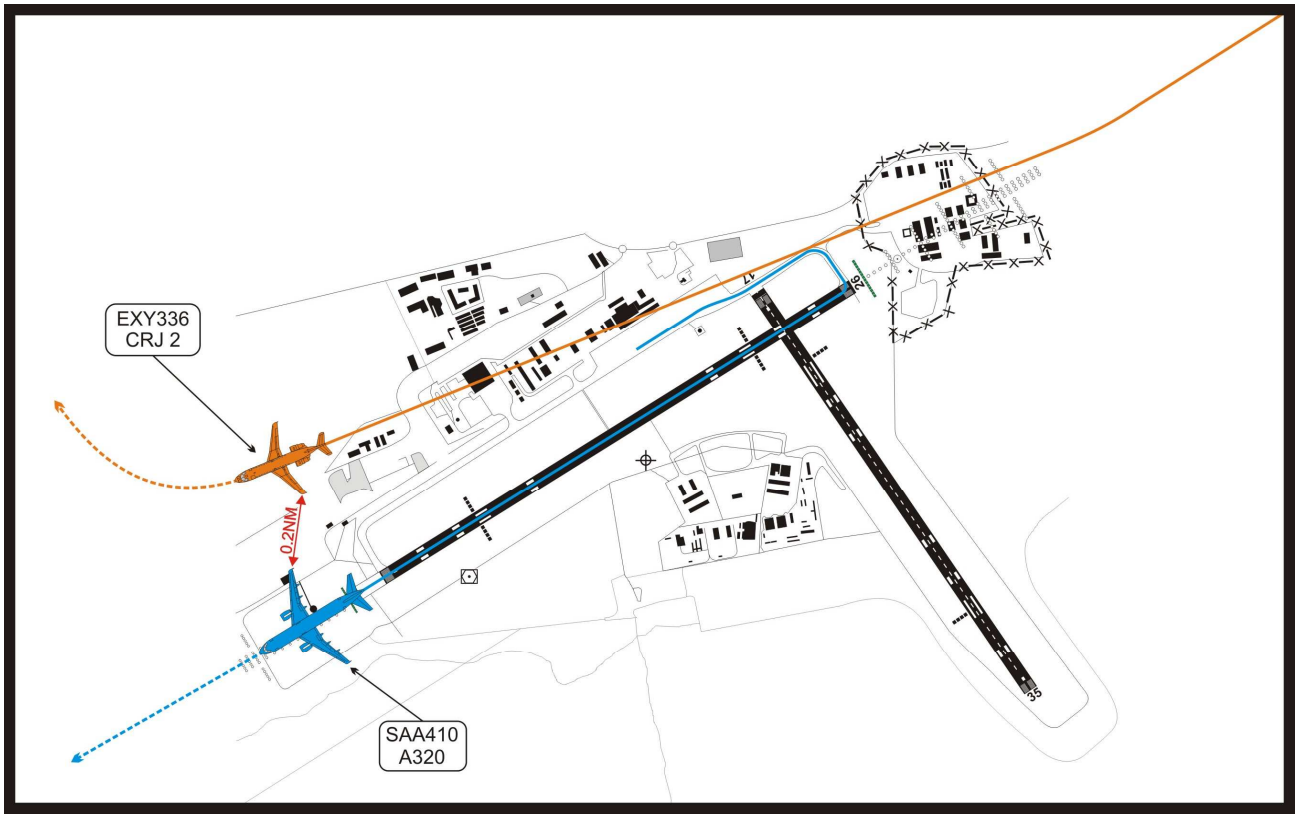



**Figure 4.** Illustration of the separation between the two aircraft in the horizontal plane.

## 1.13 Medical and pathological information

1.13.1 Not applicable.

## 1.14 Fire

1.14.1 There was no pre- or post-impact fire.

## 1.15 Survival aspects

1.15.1 This was a survivable incident. There were no injuries to any of the occupants on board either of the aircraft involved.

## 1.16 Tests and research

1.16.1 None carried out.

## 1.17 Organisational and management information

1.17.1 Both aircraft were operated under Part 121 of the CARs of 2011. Both operators were in possession of an air service licence as well as a valid air operating certificate (AOC) that was issued by the regulator.

## 1.18 Additional information

1.18.1 Chronological description of event

Source: Air Traffic Navigational Services

*"At 11:05:52 flight EXY336 called on long final approach runway 26 and was instructed to continue with the approach.*

*At 11:07:31 flight SAA410 called ready in sequence. Tower asked if the aircraft was ready for an immediate departure "no stopping on the runway", to which the crew replied "affirmative". The aircraft was then cleared for the immediate departure. At that time flight EXY336 was at approximately 3 DME. Following the read back flight EXY336 was told to continue with the approach and that landing was assured.*

*At 11:08:25 flight EXY336 was approximately 2 DME. Tower instructed the aircraft to execute a go-around and to report left downwind. No transmission was made to flight SAA410 who continued with their departure.*

*At 11:08:56 flight EXY336 was instructed that, when safe and able, they should commence early left turn.*

*At 11:09:12 flight EXY336 was advised of essential traffic, a Citation holding to the south of the aerodrome. By this stage flight SAA410 was airborne and on the climb as cleared to FL070 passing approximately 1 300 feet. Flight EXY336 was observed on radar maintaining 1 800 feet.*

*At 11:09:31 flight EXY336 was observed turning right at 1 800 feet, 0.5 nm behind flight SAA410 who was also at 1 800 feet. Flight SAA410 then made contact with FAPE Approach and was issued a left turn as flight EXY336 was observed turning right. FAPE approach then issued essential traffic information to flight SAA410.*

*At 11:10:08 separation was re-established and flight EXY336 continued on the visual approach for runway 26 and landed safely at 11:16:00. Flight SAA410 continued as per the flight plan".*

1.18.2 ICAO doc 4444 (Procedures for Air Navigation Services)

*"**5.3.2 Vertical separation minimum***

*The vertical separation minimum (VSM) shall be:*

*a) a nominal 300 m (1 000 ft) below FL 290 and a nominal 600 m (2 000 ft) at or above this level, except as provided for in b) below; and*

*b) within designated airspace, subject to a regional air navigation agreement: a nominal 300 m (1 000 ft) below FL 410 or a higher level where so prescribed for use under specified conditions, and a nominal 600 m (2 000 ft) at or above this level".*

**5.7 Separation of departing aircraft from arriving aircraft**

*"5.7.1 Except as otherwise prescribed by the appropriate ATS authority, the following separation shall be applied when take-off clearance is based on the position of an arriving aircraft.*

*5.7.1.1 If an arriving aircraft is making a complete instrument approach, a departing aircraft may take off:*

*a) in any direction until an arriving aircraft has started its procedure turn or base turn leading to final approach;*

*b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach after the arriving aircraft has started procedure turn or base turn leading to final approach, provided that the take-off will be made at least 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway (see figure 5).*

*5.7.1.2 If an arriving aircraft is making a straight-in approach, a departing aircraft may take off:*

*a) in any direction until 5 minutes before the arriving aircraft is estimated to be over the instrument runway;*

*b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach of the arriving aircraft:*

*1) until 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway (see figure 5); or*

*2) before the arriving aircraft crosses a designated fix on the approach track; the location of such fix to be determined by the appropriate ATS authority after consultation with the operators".*

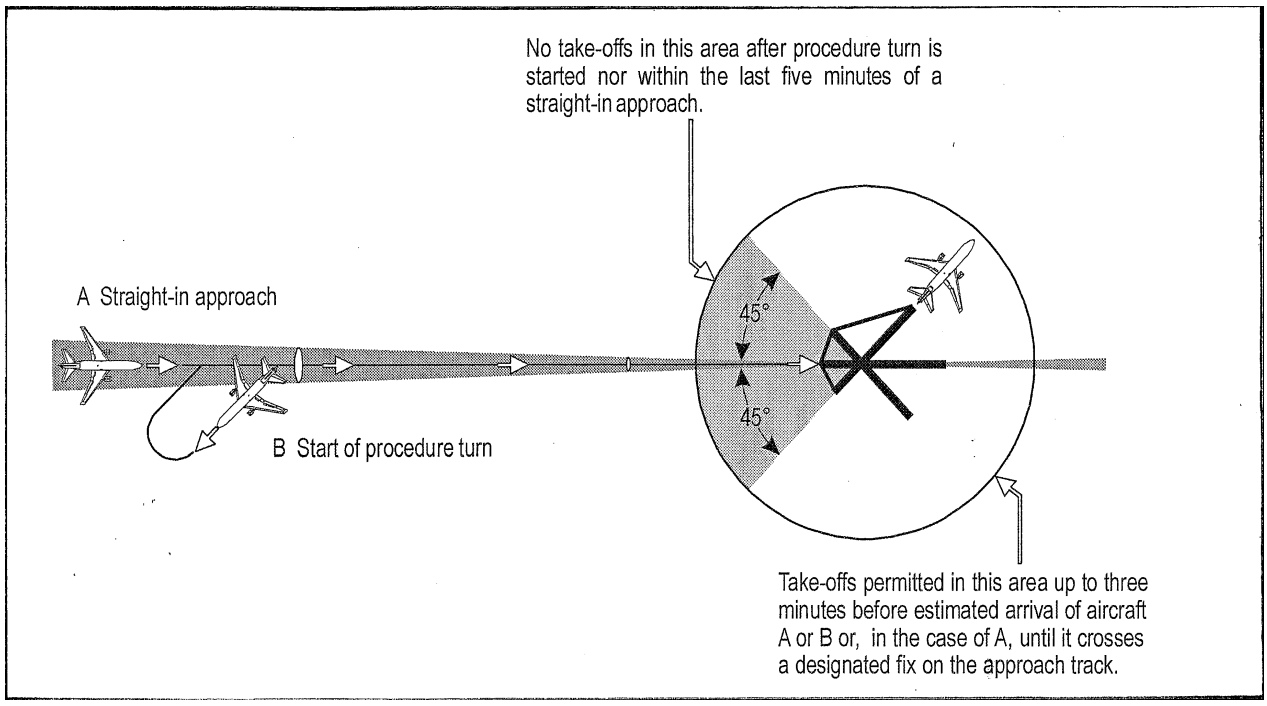



**Figure 5.** Separation of departing aircraft from arriving aircraft

### 7.4.1.4 Runway incursion or obstructed runway

*"7.4.1.4.1 In the event the aerodrome controller, after a take-off clearance or a landing clearance has been issued, becomes aware of a runway incursion or the imminent occurrence thereof, or the existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, appropriate action shall be taken as follows:*

*a) cancel the take-off clearance for a departing aircraft;*

*b) instruct a landing aircraft to execute a go-around or missed approach;*

*c) in all cases inform the aircraft of the runway incursion or obstruction and its location in relation to the runway".*

**7.8 Order of priority for arriving and departing aircraft**

*"An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway".*

1.18.3 Operations Manual – Air Navigation Services

Operations Manual, Section 6 – Separation Methods and Minima, Chapter 2 – Vertical Separation, Paragraph 1.2

*"Vertical separation exists when the vertical distance between aircraft is never less than the prescribed minima. The vertical separation minima are:*

*a) 1 000 feet up to FL290 between all aircraft;*
*b) 1 000 feet between FL290 and FL410 between RVSM approved aircraft only;*
*c) 2 000 feet between FL290 and FL410 between non RVSM approved aircraft and any other aircraft;*
*d) 2 000 feet between all aircraft above FL410".*

The controller allowed the separation minima to reduce below 1 000 feet.
Operations Manual, Section 6 – Separation Methods and Minima, Chapter 6 – ATS Surveillance system Separation Minima, Paragraph 1.1

| ***Type of Separation*** | ***Minima*** | ***Application*** |
|---|---|---|
| *Between primary targets.* | *5 nm* | *From the centre of each target* |
| *Between ATS Surveillance System position indicators incorporating a primary and secondary element.* | *5 nm* | *From the centre of each target* |
| *Between ATS Surveillance System* | *5 nm* | *From the centre of each* |

| | | |
|---|---|---|
| *position indicators not incorporating a primary element.* | | *target* |

The controller allowed the separation minima to reduce below 5 nm.

1.18.4 Essential traffic information

Operations Manual, Section 6 – Separation Methods and Minima, Chapter 1 – General, Paragraph 5 – Loss of Separation states the following;

*"If, for any reason, a controller is faced with a situation in which two or more aircraft, or an aircraft and an obstruction, or an aircraft and terrain are separated by less than the prescribed minima (for example, air traffic control errors or differences in the pilot's estimated and actual times over reporting points) he/she is to:*

*a) Use every means at his/her disposal to obtain the required minimum separation with the least possible delay, and*
*b) Pass essential traffic information as soon as possible".*

In this incident the controller had instructed the aircraft EXY336 to execute a missed approach when he realised that spacing was insufficient and requested the aircraft to turn left and report on a left downwind. The crew turned right, the controller again instructed the aircraft to turn left. The crew responded to a TCAS RA warning on board the aircraft as they deemed it to be the safer option at the time, nor was the aircraft configured for the left turn. The crew, however, did not advise the controller that the clearance issued could not be complied with due to the aircraft configuration at the time, even though they read back the controller's clearances.
ICAO doc 9432, Chapter 2 - General Operating Procedures, paragraph 2.8.3.10 states the following:

*"If at any time a pilot receives a clearance or instruction which cannot be complied with, that pilot should advise the controller using the phrase "UNABLE" and give the reasons".*

1.18.4 Before take-off checklist Airbus A320

The before take-off checklist can be found attached to this report as Annexure B. The checklist calls for *"Approach clear of traffic - Check",* whereupon it needs to be announced *"Approach path and runway clear"* by the applicable crew member.

Depending on the runway in use, the pilot who occupies the left or right seat at the time will have to look out for possible aircraft on the approach to the runway and whether the approach is clear (safe to proceed onto the runway for the take-off) or not.

During an interview with the flight safety division of the operator they indicated that on 1 July 2014 they had incorporated their revised procedures, which included the introduction of the aircraft being taxied from either side, pending on who would be the pilot flying (PF) the sector. He or she would taxi the aircraft from either the left or right-hand side. This procedure was new to the operator and all the flight crew involved, as all aircraft manoeuvring on the ground used to be done from the left-hand side. In this incident the FO was the PF in this sector, and she was taxiing the aircraft from the right-hand side following push-back. The Airbus A320 was a fairly new aircraft on this route at the time of this incident.

1.18.5 Port Elizabeth control tower

The control tower is located on the north-eastern side of the aerodrome and elevated above the administration building, which is a single-level building. The tower was found to be low if compared with several other control towers in the country and abroad, taking into consideration that the aerodrome held an international licence. For illustration purposes a photo (figure 6) was taken from inside the tower onto the apron area and in the direction of the threshold of runway 08.

**Figure 6.** View from the control tower onto the apron area and threshold of runway 08

**Figure 7.** The aerodrome controller's work station in the tower

Figure 8 illustrates a view from the control tower looking towards final approach to runway 26. During daytime, in good weather conditions, the sun causes a substantial brightness/reflection/glare on the sea (photo tried to illustrate this

phenomenon) for a substantial period of the day, which makes it very difficult for the controller to visually observe aircraft on final approach, even if the aircraft are properly illuminated by external lights. Glare shields had been installed inside the tower, and the controller can move them up or down to try and alleviate the problem; however, if the controller took his eyes off the approaching aircraft and wanted to refocus, he or she might not be able to pick up the aircraft again. Estimating the distance to an aircraft on the approach by looking at it poses a challenge, and the radar display screen does provide such information; but with the aircraft on short final approach the controller does not look at the radar display. With Port Elizabeth being one of the windiest places in South Africa, wind can have a profound effect of the ground speed of the aircraft on the approach, as upper winds might vary substantial in speed, strength and direction relative to surface winds. Aircraft might therefore be flying much faster (greater ground speed) on the approach than the controller might anticipate.

**Figure 8.** A view from the control tower looking towards final approach of runway 26

During an inspection of the tower facility during daytime, runway 26 was the active runway, with clear skies prevailing. Several aircraft were observed coming in to land, and certain aircraft were found to be much more visible on the approach as a result of the external lighting they displayed. The Bombardier series of aircraft that was observed was found not to be as visible on the approach as some of the other aircraft.

### 1.19 Useful or effective investigation techniques

1.19.1 No new methods were applied.

## 2. ANALYSIS

2.1 Man (Pilot)

Flight EXY336 was cleared for the approach runway 26, *"landing assured"* according to the controller. On short final approach the crew made the decision to perform a go-around *(A go-around is performed when for any reason it is judged that an approach cannot be continued to a successful landing; a missed approach or a go-around is flown*) due to the fact that the runway was obstructed by flight SAA410, which the controller cleared for immediate take-off ahead of the approaching aircraft. Separation was regarded as insufficient to continue with the approach and subsequent landing, and the crew initiated a go-around. This decision was followed immediately by the clearance from the controller, who instructed the aircraft to go around. The crew initiated a right turn, although the controller had instructed them to turn left. Following an assessment of the data the crew most probably initiated the go-around seconds before the controller instructed them to do so. The controller was not informed that they could not comply with the left turn due to the configuration of the aircraft. The go-around manoeuvre, as well as the flight path to be followed afterwards, had been discussed during the approach preparations and the crew followed the procedure as discussed. The crew's actions prevented a possible collision.

The aircraft on final approach appeared not to have posed any safety risk to the crew of flight SAA410, as they did not communicate with the controller at any stage after conforming to the clearance that the traffic on final approach was too close and that they would rather wait for the aircraft to land and then proceed onto the runway for take-off. The aircraft therefore proceeded onto the runway; however, the approaching aircraft was faster than anticipated and had to initiate evasive action.

Man (The controller)

The incident occurred 16 minutes after the controller commenced with duty. He was well rested and appropriately licensed as a controller. At the time he was also giving instruction to a student controller. Under his control at the time were one

aircraft departing (SAA410) and three aircraft in the circuit, which included flight EXY336, which was on final approach for runway 26. There was also a light aircraft (Piper Cherokee) on a long final approach, number two for landing as well as a Cessna Citation that was busy with flight calibrations and was holding towards the south of the aerodrome at the time.

The Airbus A320 aircraft was a new type of aircraft to the aerodrome and therefore the controller was not familiar with the operation of the aircraft. Nevertheless he made a conscious decision to clear SAA410 for immediate take-off, *"no stopping on the runway",* knowing that he had an aircraft on final approach within the 5 nm window. The crew of SAA410 accepted the clearance from the controller and proceeded to taxi onto the runway and commence with the take-off roll. No communication was forthcoming from the crew indicating that they felt there was insufficient separation between them and the aircraft on approach. ICAO doc 4444 subheading 7.8 states; *"An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway".*

Due to a recent change in the wind direction, the aircraft on approach encountered a tailwind, which most probably resulted in an increased ground speed. Once the controller recognized that there was a substantial loss in separation between the two aircraft, he instructed the crew of EXY336 to conduct a go-around. However, the crew had already initiated a go-around several seconds prior to the controller issuing the instruction and turned right. The controller requested them to turn left, but the aircraft proceeded with a right-hand circuit and landed safely several minutes later.

The controller workload was regarded as high from the time he commenced with duty. He became preoccupied (diverted attention) and in doing so he most probably did not monitor the aircraft on final approach effectively, resulting in a loss in separation between the approaching and the departing aircraft. It was noted that a period of thirty-two (32) seconds had passed between the controller telling the crew *"continue approach landing assured"* until he instructed them to perform a go-around. This indicates that in a short space of time, the status quo had changed significantly, which necessitated evasive action by the crew on final approach. There was also a student controller in the tower at the time this person was only there in a surveillance capacity.

## 2.2 Machine (Aircraft)

Both aircraft were serviceable and in possession of a valid certificate of airworthiness. The traffic avoidance equipment on board both aircraft was serviceable and provided both cockpit crews with the required information. Both aircraft were in radio communication with the control tower. The crew of flight EXY336 had selected external lights on as stipulated in the checklist for approach and landing. During an assessment of the visibility of the external lights in clear sky conditions, the external lights being displayed by the aircraft type in question were found not to be as visible as certain other manufacturers' aircraft when viewed from the control tower.

## 2.3 Infrastructure

The control tower at FAPE was found to be very low when compared with a number of other control towers in the country and abroad, taking into consideration that this is an aerodrome with international status. It was observed that the reflection of the sun on the sea during a certain time of the day can cause the controller(s) to have some difficulty following an aircraft visually on the approach for runway 26, something that could not be ruled out as a contributory factor to this incident. The tower was found to be equipped with glare shields to limit this phenomenon; however, there might be instances where the glare shield might not be properly adjusted for a certain controller at a certain time and the aircraft might not be immediately visible to the controller.

## 2.4 Environment

The incident occurred during daylight conditions with fine weather conditions in the Port Elizabeth area. Clear skies prevailed and the visibility was more than 10 km. The wind was reported to be 040° at 5 knots, which resulted in a tailwind component for the aircraft on approach for runway 26.

# 3. CONCLUSION

## 3.1 Findings

3.1.1 The flight crew of flight EXY336 were properly licensed and had the aircraft type endorsed on their licences. The FO was the PF this sector.

3.1.2 The flight crew of flight SAA410 were properly licensed and had the aircraft type endorsed on their licences.

3.1.3 The FO was taxiing the aircraft (SAA410) from the right-hand side as she was the PF for this sector. This was a new procedure to the operator and had become effective on 1 July 2014.

3.1.4 The controller was properly licensed to perform his duties. He was on duty for 16 minutes when the incident occurred.

3.1.5 Both aircraft were properly maintained and had a valid Certificate of Airworthiness.

3.1.6 Both aircraft received TCAS RA alerts and both crews responded to them.

3.1.7 There was no breakdown in air-ground communications.

3.1.8 During an inspection of the tower facility, runway 26 was the active runway and clear skies prevailed. Several aircraft were observed landing during this period. Some aircraft were much more visible than others due to the external lighting being displayed by each aircraft. The Bombardier series of aircraft was noted not to be as visible from the tower on final approach as certain other aircraft types viewed.

3.1.9 The crew of flight EXY336 made the decision to perform a go-around while on final approach for runway 26 due to insufficient separation between them and the departing aircraft SAA410.

3.1.10 The controller instructed EXY336 to go around when the aircraft was on short final approach for runway 26. This instruction followed 32 seconds after the controller communicated with the aircraft, stating: *“continue approach landing assured”*.

3.1.11 The controller used non-standard phraseology while communicating with EXY336 (*“landing assured”*).

3.1.12 The controller cleared flight SAA410 for immediate take-off before the aircraft approaching runway 26 had landed.

3.1.13 The controller did not effectively monitor the position of flight EXY336 on final approach.

3.1.14 The controller allowed the minima horizontal separation to reduce below 5 nm.

3.1.15 The controller allowed the minima vertical separation to reduce below 1 000 feet.

3.1.16 The controller workload was high with four aircraft under his direct control as well providing training to a student controller.

3.1.17 There was no damage to any of the aircraft.

3.1.18 Nobody was injured on board either of the aircraft.

3.1.19 The incident occurred during daylight conditions with clear sky conditions prevailing; visibility was more than 10 km. The prevailing wind was from the north-east (040°) at 5 knots, with the aircraft on approach experiencing a tailwind component.

3.1.20 The instrument landing system (ILS) at the aerodrome was not available due to scheduled calibrations being conducted. All inbound aircraft had to fly visual approaches.

### 3.2 Probable cause

3.2.1 The controller did not effectively monitor the flight progress of the aircraft on final approach, which resulted in a loss in separation, resulting in evasive action being taken by the crew of EXY336.

## 4. SAFETY RECOMMENDATIONS

4.1 It is recommended that a person should not be allowed to control and provide training to a student while aerodrome calibrations flights are being conducted at a licenced aerodrome. Furthermore such a controller(s) should be familiar with the flight calibration procedure.

4.2 It is recommended that training of controllers be conducted when there is more than one controller on duty in the tower during peak periods.

4.3 It is recommended that the regulating authority develop standards and recommended practise for air traffic control in South Africa, which is in line with the ICAO standards and recommended practise.

## 5. APPENDICES

5.1 Annexure A (Transcript of communication between ATC and aircraft concerned)
5.2 Annexure B (Before take-off checklist Airbus A320)

## ANNEXURE A

Transcript of communication between the controller, EXY336 and SAA410.

This communication was on the Port Elizabeth tower frequency 118.10 MHz.

| Time | From | To | Text of transmission |
|---|---|---|---|
| 11:05:52 | EXY336 | ATC | Port Elizabeth tower Express Ways three three six, good afternoon, long final runway 26. |
| 11:05:58 | ATC | EXY336 | Express Ways three three six, good day continue approach runway 26, surface wind zero eight zero degrees less than five knots. |
| 11:06:05 | EXY336 | ATC | Continue approach runway 26, Express Ways three three six. |
| 11:06:10 | ATC | EXY336 | Express Ways three three six …. Charlie Alpha Romeo number three in sequence number one is a regional jet eight nautical miles finals number two is a Cherokee behind on the visual, we're gonna get you in behind the Cherokee. |
| 11:06:24 | ZS-CAR | ATC | Copy that Charlie Alpha Romeo. |
| 11:06:26 | ZS-CAR | ATC | Charlie Alpha Romeo. |
| 11:06:52 | ATC | ZS-CAR | Charlie Alpha Romeo you can report at twelve nautical miles final runway 26. |
| 11:07:03 | ZS-CAR | ATC | Charlie Alpha Romeo we'd like to start our ARC from our current position at four nautical miles from South to North. |
| 11:07:10 | ATC | ZS-CAR | Charlie Alpha Romeo copy just do one orbit to the right for spacing I just wanna get the Cherokee in ahead of you. |
| 11:07:17 | ZS-CAR | ATC | Can we continue with the left orbit? |
| 11:07:20 | ATC | ZS-CAR | Charlie Alpha Romeo continue the left orbit report re-established eight nautical miles ARC correction four nautical miles arc. |
| 11:07:28 | ZS-CAR | ATC | Left orbit report four nautical miles ARC. Charlie Alpha Romeo. |
| 11:07:30 | ATC | ZS-CAR | Charlie Alpha Romeo. |
| 11:07:31 | SAA410 | ATC | Tower, Springbok four one zero ready in sequence. |
| 11:07:36 | ATC | SAA410 | Springbok four one zero ready for immediate departure no stopping on the runway. **(EXY336 at 3 DME)** |
| 11:07:40 | SAA410 | ATC | Affirm Springbok four one zero. |
| 11:07:42 | ATC | SAA410 | Springbok four one zero no stopping on runway, |

| | | | |
|---|---|---|---|
| | | | runway 26 cleared take-off surface wind light and variable, enjoy your flight. |
| 11:07:51 | SAA410 | ATC | Thank you, cleared take-off no stopping, Springbok four one zero. |
| 11:07:53 | ATC | EXY336 | Springbok four one zero, break break Express Ways three three six, continue approach landing assured. |
| 11:07:57 | EXY336 | ATC | Express Ways three three six. |
| 11:08:25 | ATC | EXY336 | Express Ways three three six, go around, I say again go around, report left downwind. **(EXY336 at 2 DME)** |
| 11:08:34 | EXY336 | ATC | Going around say again left downwind? |
| 11:08:36 | ATC | EXY336 | Express Ways affirm. |
| 11:08:39 | EXY336 | ATC | Express Ways three three six. |
| 11:08:43 | AVQ352 | ATC | Tower, good afternoon, Avic three five two. |
| 11:08:49 | ATC | AVQ352 | Avic three five two continue approach, surface wind zero five zero at five knots. |
| 11:08:52 | AVQ352 | ATC | Avic three five two. |
| 11:08:56 | ATC | EXY336 | Express Ways three three six when safe and able early left. |
| 11:08:59 | EXY336 | ATC | Express Ways three three six. |
| 11:09:05 | ZS-CAR | ATC | Charlie Alpha Romeo ready for the ARC. |
| 11:09:12 | ATC | ZS-CAR | Charlie Alpha Romeo orbit to the right in present position please, got a regional jet I wanna get in ahead of you. |
| 11:09:15 | ZS-CAR | ATC | Orbit to the right. |
| 11:09:19 | ATC | EXY336 | Charlie Alpha Romeo, break break Express Ways three three six your traffic is a Citation orbiting to the South of the field remaining clear. |
| 11:09:30 | EXY336 | ATC | Express Ways three three six. |
| 11:09:36 | ATC | EXY336 | Express Ways three three six report right downwind runway 26. **(EXY336 observed turning right)** |
| 11:09:44 | EXY336 | ATC | Right downwind runway 26. |
| 11:09:46 | ATC | EXY336 | Express Ways three three six. |
| 11:10:08 | EXY336 | ATC | Express Ways three three six turning right downwind runway 26. |
| 11:10:12 | ATC | EXY336 | Express Ways three three six report final runway 26. |
| 11:10:16 | EXY336 | ATC | Report final runway 26, Express Ways three three six. |
| 11:10:19 | ATC | AVC352 | Express Ways three three six, break break Avic three five two cleared to land runway 26, surface wind zero four zero degrees less than eight knots. |
| 11:10:28 | AVC352 | ATC | Clear to land Avic three five two. |
| 11:10:30 | ATC | AVC352 | Avic three five two. |
| 11:10:43 | ZS-CAR | ATC | Charlie Alpha Romeo request descent to five hundred |

| | | | |
|---|---|---|---|
| | | | feet to commence with one orbit. |
| 11:10:51 | ATC | ZS-CAR | Charlie Alpha Romeo copy that report five hundred feet |
| 11:10:53 | ZS-CAR | ATC | Report five hundred feet, Charlie Alpha Romeo. |
| 11:10:54 | ATC | EXY336 | Express Ways three three six continue on downwind standby final, number two behind Cherokee on final 26. |
| 11:11:00 | EXY336 | ATC | Continue approach Express Ways three three six. |
| 11:11:02 | ATC | EXY336 | Express Ways three three six. |
| 11:11:09 | ATC | AVC352 | Avic three five two nest speeds. |
| 11:12:11 | ATC | | Avic Ways three three six report final runway 26. |
| 11:12:17 | ATC | EXY336 | Correction Express Ways three three six report final runway 26. |
| 11:12:20 | EXY336 | ATC | Final next Express Ways three three six. |
| 11:13:35 | ATC | AVC352 | Avic three five two vacate right alpha one two two decimal six five for the gates, enjoy. |
| 11:13:41 | AVC352 | ATC | Vacate right alpha one two two decimal six five for the gates, thanks Avic three five two. |
| 11:13:57 | ATC | EXY336 | Express Ways three three six cleared to land runway 26, surface wind light and variable. |
| 11:14:04 | EXY336 | ATC | Cleared to land, Express Ways three three six. |
| 11:14:06 | ATC | EXY336 | Express Ways three three six. |
| | | | |
| | | | **After landing the aircraft proceed to the parking bay. No further communication relevant to the incident followed.* |

# ANNEXURE B



## BEFORE TAKEOFF

| PF | PM |
|---|---|
| | TAKEOFF / LINEUP CLEARANCE.....OBTAIN<br>*When takeoff is imminent announce on PA*<br>***"CABIN CREW YOUR STATIONS FOR DEPARTURE"*** |
| TAKEOFF RUNWAY.....CONFIRM | |
| | TCAS.....TA or TA/RA |
| APPROACH CLEAR OF TRAFFIC.....CHECK | |
| ANNOUNCE.....***"APPROACH PATH AND RUNWAY CLEAR"*** | |
| SLIDING TABLE.....STOWED<br>PACKS 1 + 2.....REQUEST AS RQRD | SLIDING TABLE.....STOWED<br>PACKS 1 + 2.....SET AS RQRD<br>STROBE LIGHTS.....ON<br>BRAKE TEMP.....CHECK<br>BRAKE FANS (if installed).....OFF<br>ENGINE MODE SELECTOR.....AS RQRD |
| REQUEST<br>***"BEFORE TAKEOFF CHECKLIST BELOW THE LINE"*** | |
| | READ THE BEFORE TAKEOFF CHECKLIST BELOW THE LINE. |
| WHEN CLEARED FOR TAKEOFF | |
| | EXTERIOR LIGHTS.....SET FOR T/O |

## TAKEOFF

| PF | PM |
|---|---|
| TAKEOFF.....ANNOUNCE<br>BRAKES.....RELEASE | |
| | GLARESHIELD CHRONO.....START |
| CAPTAINS HAND ON THRUST LEVERS UNTIL $V_1$ | |
| THRUST LEVERS.....FLEX/TOGA<br>DIRECTIONAL CONTROL.....USE RUDDER<br>PFD.....SCAN<br>FMA.....ANNOUNCE | PFD / ND.....MONITOR |
| | ANNOUNCE.....**"CHECKED"** |
| | - BELOW 80KT:<br>N1 / EPR.....CHECK<br>**"THRUST SET"**.....ANNOUNCE<br>PFD / ENG PARAMETERS.....MONITOR |
| ANNOUNCE.....***"CHECKED"*** | - AT 100KT:<br>ONE HUNDRED KNOTS.....ANNOUNCE |
| | - AT $V_1$:<br>$V_1$.....MONITOR or ANNOUNCE |
| ROTATION.....PERFORM | - AT $V_R$<br>ROTATION.....ORDER |
| | - WHEN POSITIVE CLIMB *(PFD & V/S)*:<br>POSITIVE CLIMB.....ANNOUNCE |
| GEAR UP.....ORDER | LDG. GEAR.....SELECT UP<br>ANNOUNCE.....***"GEAR UP"*** |
| AUTOPILOT.....AS RQRD<br>FMA.....ANNOUNCE | |

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