AIRCRAFT SERIOUS INCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		CA18/3/2/1391	
Aircraft Registration	**ZS-ASN (DC3) and ZS-ZWF (B738)**	**Date of Incident**		8 February 2022	**Time of Incident**		0834Z
Type of Aircraft	Douglas DC3-TP67 and Boeing 737-800			**Type of Operation**		Part 135 and Part 121	
Pilot-in-Command Licence Type (ZS-ASN)		Airline Transport Pilot Licence	**Age**	52	**Licence Valid**		yes
Pilot-in-Command Flying Experience		**Total Flying Hours**		7 856.1	**Hours on Type**		3473.1
Pilot-in-Command Licence Type		Airline Transport Pilot Licence	**Age**	49	**Licence Valid**		Yes
Pilot-in-Command Flying Experience		**Total Flying Hours**		19 123	**Hours on Type**		15 983
Last Point of Departure (ZS-ASN)		Lanseria International Aerodrome (FALA), Gauteng Province					
Last Point of Departure (ZS-ZWF)		King Shaka International Aerodrome (FALE), KwaZulu-Natal Province					
Next Point of Intended Landing (ZS-ASN and ZS-ZWF)		Lanseria International Aerodrome (FALA), Gauteng Province					
Number of People On-board	4+0 and 6+108	**Number of People Injured**	0	**Number of People Killed**	0	**Other (On Ground)**	0
Damage to Aircraft		None					
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)							
Approximately a7.17nm on final approach Runway 07 at FALA at GPS co-ordinates: 26° 02' 10" South 27° 48' 27" East, at an elevation 4877 feet							
Meteorological Information	Surface wind: 330º/05 kts; temperature: 23ºC; dew point: 15ºC; cloud cover: FEW; cloud base: 1500 ft; visibility: 10km; QNH: 1021Pa						

Synopsis

On Tuesday morning, 8 February 2022, a crew of four members on-board a MacDonnell Douglas DC3-TP67 with registration ZS-ASN took off on a local flight from Lanseria International Aerodrome (FALA) to Magaliesburg general flying area (GFA). Upon their return from the GFA at 6400 feet (ft), the pilot flying requested if he could execute a simulated Area Navigation (RNAV)/ Global Navigation Satellite System (GNSS) approach for Runway 07 (RWY 07). The air traffic control officer (ATCO) approved this request and instructed the pilot to report 6 nautical miles (nm) final approach.

Meanwhile, ZS-ZWF Boeing 737-800 (B738) aircraft was inbound to FALA from King Shaka Aerodrome (FALE). After their release from O.R. Tambo International Aerodrome (FAOR) approach control, the crew requested a visual approach for RWY 07 while on radial 215-14 Distance Measuring Equipment (DME). The ATCO approved this request and cleared the aircraft for right visual approach RWY 07, thereafter, instructed them to report 5 nautical miles (nm) final approach and to reduce to the minimum safe approach speed. However, the pilot did not read back the speed instruction, and the ATC did not ask the pilot to acknowledge/confirm.

The ZS-ZWF (B738) aircraft, being a faster aircraft, caught up with ZS-ASN. This resulted in an aircraft proximity(AIRPROX.) Both aircraft received traffic collision avoidance system resolution advisory (TCAS RA) and complied with and ATCO instructions, and were clear of each other.

Probable Cause
The ATCO permitted visual for two aircraft on the same runway, but did not warn them of each other's status (proximity). The faster aircraft (B738) caught up with the slower aircraft (DC3), which resulted in reduced aerodrome separation.
Contributing Factors
• Poor situational awareness: late conflict detection. • Instruction given to ZS-ASN (DC3) was late and provided without a reason and/or traffic information. • The ATCO cleared ZS-ZWF (B738) for visual approach as requested and provided instructions of what to do next. The ATCO did not pick up that the pilot did not read back the speed instructions. • The frequency was busy, there were 12 aircraft under the ATC's jurisdiction at the time of the incident.

SRP Date	14 March 2023	Publication Date	31 March 2023

Occurrence Details

Reference Number	**:** CA18/3/2/1391
Occurrence Category	**:** Serious Incident
Type of Operation	**:** Part 135 (Air Transport Operation)
	: Part 121 (Commercial Transport Operations)
Name of Operator	**:** Fly Jetstream
	: Comair
Aircraft Registration	**:** ZS-ASN
	: ZS-ZWF
Aircraft Make and Model	**:** McDonnell Douglas DC3-TP67
	: Boeing Aircraft Company, B737-800
Nationality	**:** South African
	: South African
Place	**:** Lanseria International Aerodrome (FALA), Gauteng Province
Date and Time	**:** 8 February 2022, 0834Z
Injuries	**:** None
Damage	**:** None

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.

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.

Investigation Process

The Accident and Incident Investigations Division (AIID) of the South African Civil Aviation Authority (SACAA) was notified of the occurrence on 8 February 2022 at 0900Z. The occurrence was classified or categorised as a serious incident according to the CAR 2011 Part 12 and ICAO STD Annex 13 definitions. The notifications were sent to the States of Registry, Operator, Design and Manufacturer in accordance with the CAR 2011 Part 12 and ICAO Annex 13 Chapter 4. The State of Manufacturer did not appoint an accredited representative. The investigator-in-charge (IIC) did not dispatch for this serious incident site.

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Serious Incident — this investigated serious incident
   Aircraft — the McDonnel Douglas DC3-TP67 and the Boeing 737-800 involved in this serious
   Investigation — the investigation into the circumstances of this serious incident
   Pilots — the pilots involved in this serious incident
   Report — this serious incident report

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

Disclaimer

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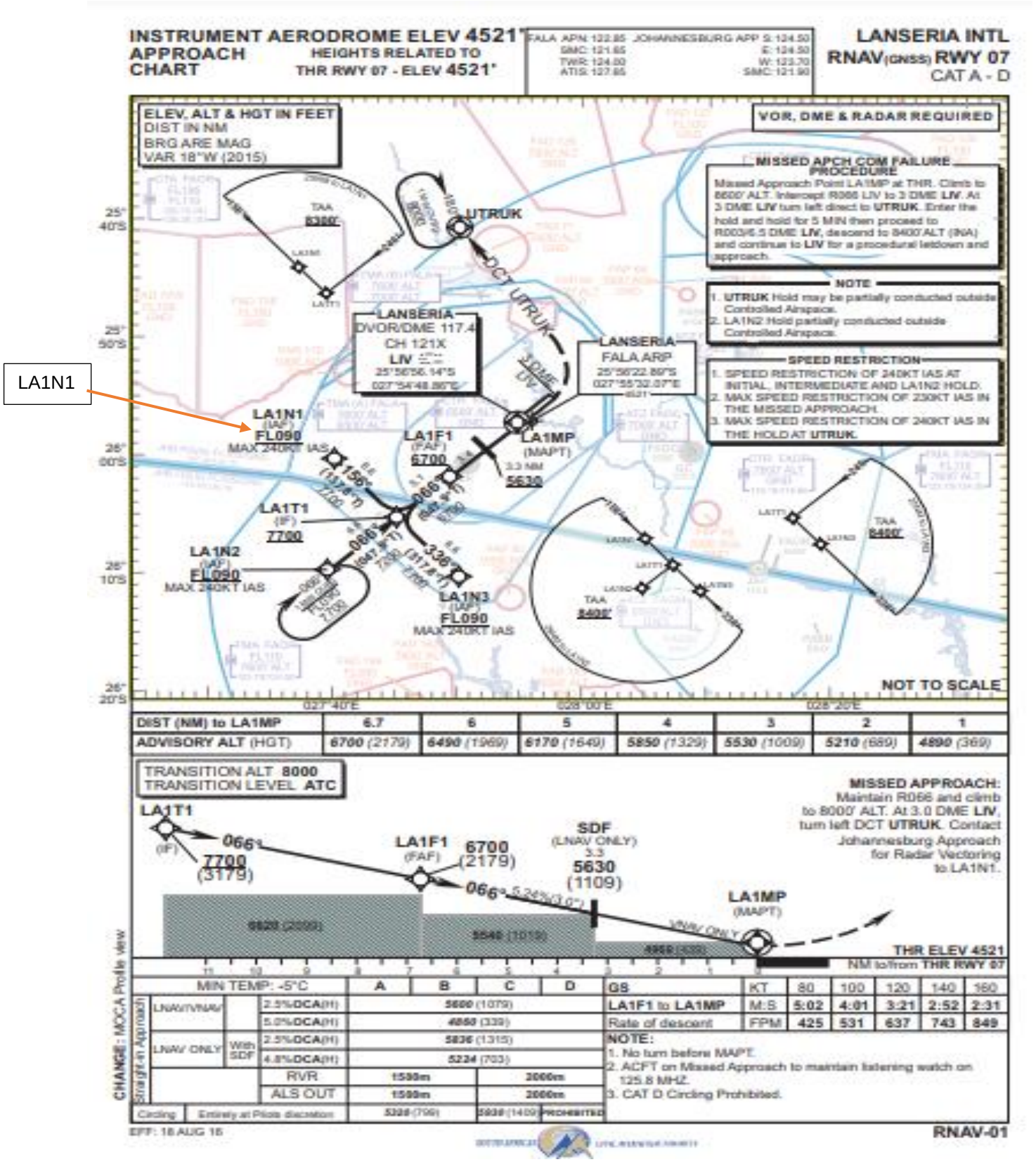
Abbreviation	Description
°	Degrees
°C	Degrees Celsius
ACAS	Advisory, Conciliation and Arbitration Service
AIID	Accident and Incident Investigations Division
AIRPROX	Near Collision/Aircraft Proximity/Loss of minimum separation
AOC	Air Operating Certificate
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATO	Aviation Training Organisation
ATPL	Airline Transport Pilot Licence
CAR	Civil Aviation Regulations
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CRS	Certificate of Release to Service
CVR	Cockpit Voice Recorder
DME	Distance Measuring equipment
DVOR	Doppler Very High Frequency Omni Range
E	East
FACT	Cape Town International Aerodrome
FAEL	East London Aerodrome
FAPA	Port Alfred Aerodrome
FDR	Flight Data Recorder
FO	First Officer
ft	Feet
GPS	Global Positioning System
hPa	Hectopascal
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
ILS	Instrument Landing System
kt	Knots
m	Metres
MEL	Minimum Equipment List
METAR	Meteorological Routine Aerodrome Report
MHz	Megahertz
MPI	Mandatory Periodic Inspection
NM	Nautical mile(s)
PAPI	Precision Approach Path Indicator
PF	Pilot Flying
PIC	Pilot-in-command
QNH	Barometric Pressure Adjusted to Sea Level
RTF	Radiotelephony
RWY	Runway
S	South
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
SP	Student Pilot
SPL	Student Pilot Licence
TCAS TA	Traffic Collision Avoidance System Traffic Avoidance
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
Z	Zulu (Term for Universal Co-ordinated Time – Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1 On Tuesday morning, 8 February 2022 at approximately 0830Z, four crew members (a pilot and three crew) on-board a MacDonnell Douglas DC3 aircraft with registration ZS-ASN were on a return flight from the general flying area (GFA), having taken off from FALA earlier that morning. The crew was conducting proficiency checks on the aircraft type. The flight was conducted under visual flight rules (VFR) by day and under the provisions of Part 135 of the Civil Aviation Regulations (CAR) 2011 as amended. Another aircraft, a Boeing 737-800 with registration ZS-ZWF with two pilots, four crew and 108 passengers on-board was also due to land at FALA; it was handed over by Johannesburg approach. The aircraft took off from King Shaka International Airport (FALE) on a scheduled flight. Clear weather conditions prevailed at the time leading to the serious incident. The flight was conducted under instrument flight rules (IFR) and under the provisions of Part 121 of the CAR 2011 as amended.

1.1.2 During initial contact with FALA air traffic control (ATC), ZS-ASN requested a simulated Area Navigation (RNAV)/Global Navigation Satellite Systems (GNSS) approach for Runway 07 (RWY 07). The air traffic control officer (ATCO) approved the request and cleared the aircraft to route to position LA1N1 below FALA Terminal Control Area (TMA) at an altitude of 6400 feet on a QNH of 1021. Upon reaching LA1N1, the ATCO cleared the aircraft for the simulated approach and advised that they report at 6 nautical miles (nm) final approach for RWY 07. See FALA RNAV GNSS Approach for Runway 07 on Figure 1.



LA1N1

Figure 1: FALA RNAV GNSS Approach for Runway 07.

1.1.3 About 2 minutes and 8 seconds later, the ZS-ZWF aircraft contacted FALA ATC and requested a right visual approach for RWY 07. The ATCO asked ZS-ZWF to report their (position) radial distance measuring equipment Lanseria very high frequency omnidirectional range (DME LIV) crossing, which was radial 215 and 14 DME. After about 20 seconds, the ATCO cleared ZS-ZWF for right visual approach RWY 07 at a Query:

nautical height (QNH) of 1021, as well as instructed them to report at 5nm final approach and reduce to the minimum safe approach speed. The pilot read back the instructions but did not read back the speed restriction. The ATCO did not verify that the pilot acknowledges the speed restriction. The ZS-ZWF (B738) aircraft, being a faster aircraft, caught up with ZS-ASN (DC3-TP67) at approximately 7.17nm from the threshold of Runway 07, resulting in a 500 feet (ft) vertical loss of separation and 68.7 metre (m) lateral separation. The ZS-ZWF was above ZS-ASN and both aircraft were on final approach for RWY 07.

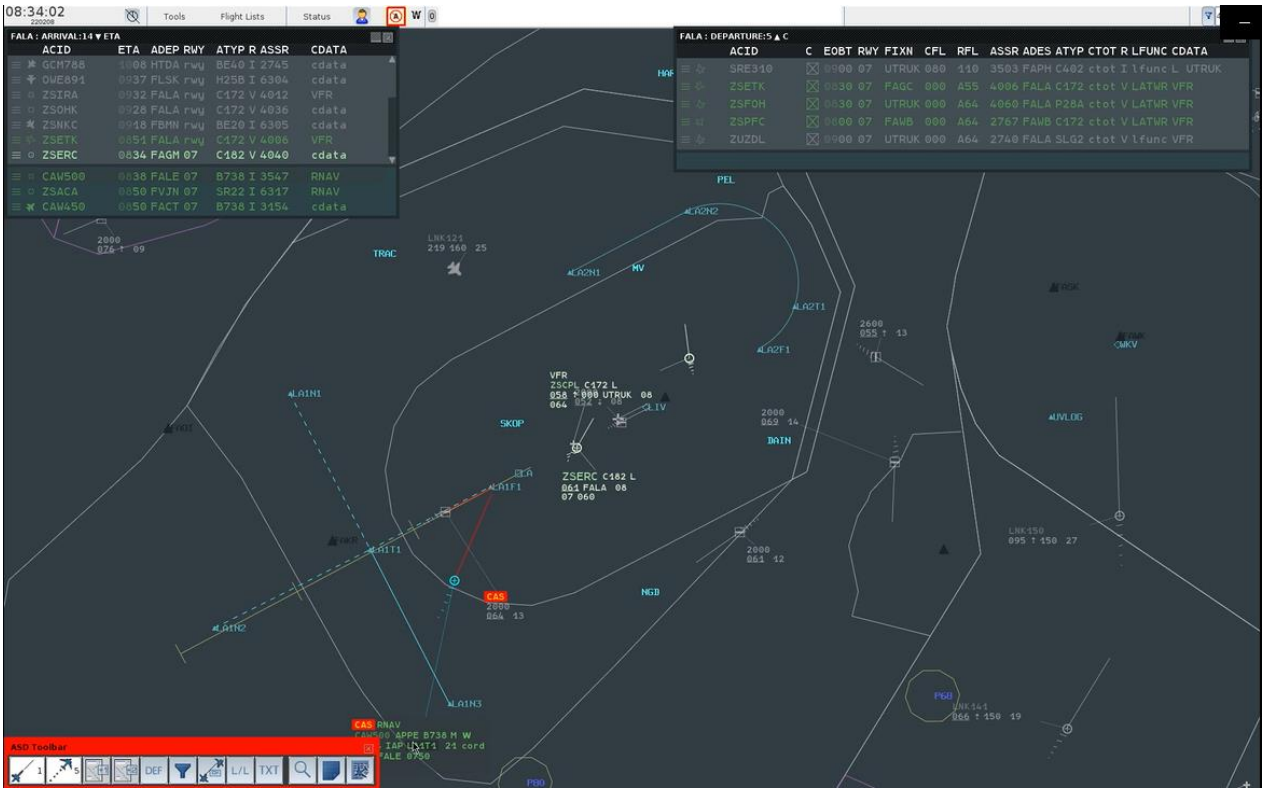


Figure 2: The still picture of the Air Situation Display used for monitoring at FALA. Both aircraft are in red. (source: ANSP)

1.1.4 The air situation display turned red (see Figure 2) which made the ATCO aware of the reduced separation. The ATCO called the ZS-ASN aircraft to break off the approach, orbit to the left and re-join the late left downwind RWY 07. The ZS-ASN reported that they were 8nm for final approach. They found this confusing as they were getting ready to call at 6nm final approach as previously requested. They asked for confirmation on the north bound turn, and downwind reporting. The ATCO affirmed “turn left now, continue routing north”. The ATCO then told ZS-ZWF to continue approach and also made the crew aware of the ZS-ASN aircraft that was breaking off to the left, routing north. The pilot of ZS-ZWF told the ATCO that he had the other traffic in sight.

1.1.5 The ZS-ASN crew stated that as they commenced the turn to the north, the Airborne Collision Avoidance System/Traffic Collision Avoidance System (ACAS/TCAS) displayed a Resolution Advisory (RA) with the instruction to descend immediately. A descent was initiated by the ZS-ASN crew. The ZS-ZWF aircraft approached from behind ZS-ASN and was approximately 500 feet (ft) above at the time (see Figure 3 – the red dots show the ZS-ASN flight path, and the yellow dots show the ZS-ZWF flight path). A few seconds later, the RA was cancelled on both aircraft, which were clear of the threat. One minute and 9 seconds later, the ZS-ASN pilot called the ATCO and stated that they were climbing back to their last assigned altitude of 6400ft and that they had encountered an RA.

1.1.6 Meanwhile, the ZS-ZWF pilot informed the ATCO that they were on final approach. The ATCO instructed them to continue approach RWY 07 and that there was traffic which was about to vacate the runway. The ZS-ASN informed the ATCO that they were repositioning to late left downwind; the ATCO acknowledged and asked if they still wanted the GNSS/RNAV approach; ZS-ASN opted to cancel but continued with the circuits. The ATCO then cleared ZS-ZWF to land on RWY 07 and gave them the surface wind. The ZS-ASN aircraft completed three circuits before landing.

1.1.7 Post-incident, the ZS-ZWF crew stated that at 2nm before position LA1F1 whilst turning for final approach, they had a TCAS RA warning instructing them to climb. They climbed as per the TCAS RA warning which cleared them of the traffic, they continued with final approach and landed on RWY 07. At the time leading to the incident, there were 12 aircraft under the ATC's jurisdiction. Both aircraft were not damaged during this serious incident.

1.1.8 The serious incident occurred during day light, approximately 7.17nm on final approach for landing RWY 07 at FALA and at Global Positioning System (GPS) co-ordinates determined to be 26°01'14.58" South 27°49'28.27" East, at an elevation of 4796ft.

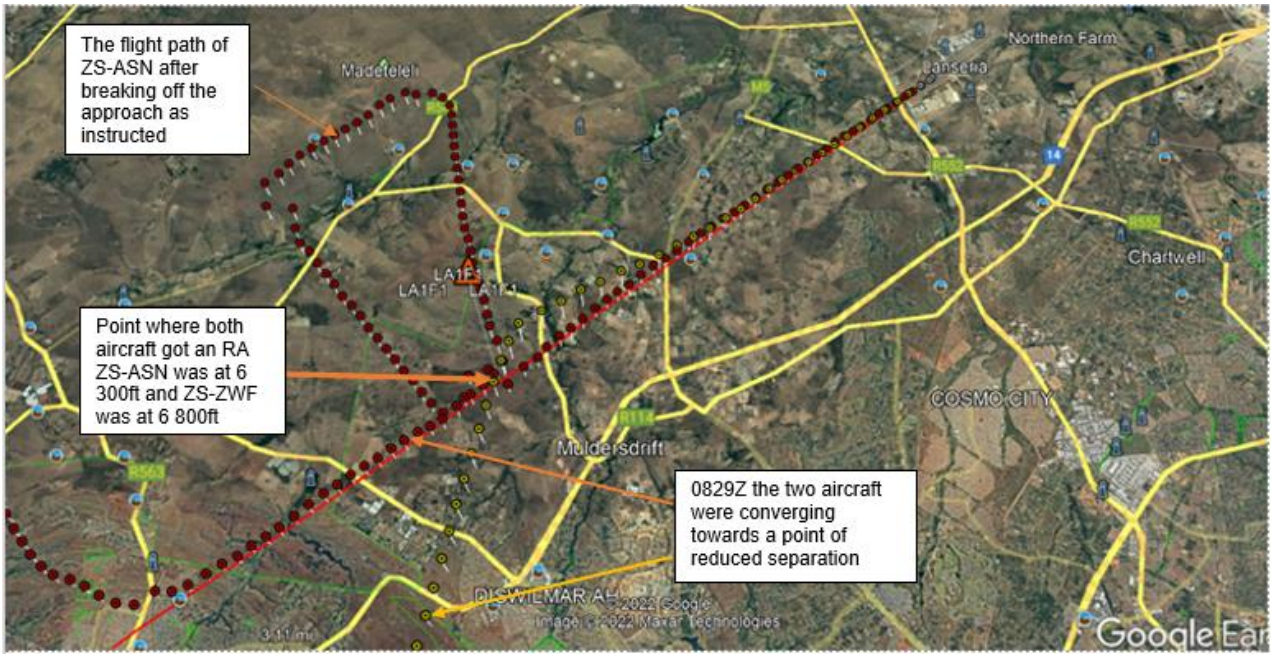


Figure 2: Serious incident location, approximately 7.17nm from RWY 07 at FALA. The red dots show the flight path of ZS-ASN and the yellow dots show ZS-ZWF. (Source: Google Earth)

1.2. Injuries to Persons

1.2.1. Persons on-board ZS-ASN:

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	1	3	-	4	-
Total	**1**	**3**	**-**	**4**	**-**

Note: Other means people on the ground.

1.2.2. Persons on-board ZS-ZWF:

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	2	4	108	114	-
Total	**2**	**4**	**108**	**114**	**-**

Note: Other means people on the ground.

1.3. Damage to Aircraft

1.3.1. Neither aircraft sustained damage.

1.4. Other Damage

1.4.1. None.

1.5. Personnel Information

1.5.1. ZS-ASN Crew:

Pilot-in-command (PIC):

Nationality	South African	Gender	Male	Age	52
Licence Type	Airline Transport Pilot Licence (ATPL) Aeroplane (A)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument				
Medical Class & Expiry Date	Class 1; 30 September 2022				
Restrictions	None				
Previous Incidents	None				

Note: Previous serious incidents refer to past serious incidents the pilot was involved in, when relevant to this incident.

Flying Experience:

Total Hours	7 856.1
Total Past 24 Hours	1.5
Total Past 7 Days	2.7
Total Past 90 Days	7.2
Total on Type Past 90 Days	7.2
Total on Type	3 473.1

- The pilot was initially issued an Airline Transport Pilot Licence (ATPL) on 30 March 1994. The pilot conducted his revalidation on 9 April 2021 with an expiry date of 30 June 2022. The pilot was issued a Class 1 aviation medical certificate on 3 September 2021 with an expiry date of 30 September 2022.

Pilot flying (PF):

Nationality	South African	Gender	Male	Age	37
Licence Type	Airline Transport Pilot Licence (ATPL) Aeroplane (A)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument				
Medical Class & Expiry Date	Class 1; 31 August 2022				
Restrictions	None				
Previous Incidents	None				

Note: Previous serious incidents refer to past serious incidents the pilot was involved in, when relevant to this incident.

Flying Experience:

Total Hours	5 241.6
Total Past 24 Hours	1.5
Total Past 7 Days	5
Total Past 90 Days	4.6
Total on Type Past 90 Days	1.5
Total on Type	1369.4

- The PF was initially issued an ATPL on 4 May 2017. The pilot conducted his revalidation on 9 April 2021 with an expiry date of 30 June 2022. The pilot was issued a Class 1 aviation medical certificate on 4 August 2021 with an expiry date of 31 August 2022.

1.5.2. ZS-ZWF Crew:

Pilot-in-command (PIC):

Nationality	South African	Gender	Male	Age	49
Licence Type	Airline Transport Pilot Licence (ATPL) (A)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument Rating				
Medical Class & Expiry Date	Class 1; 30 November 2022				
Restrictions	None				
Previous Incidents	None				

Note: Previous serious incidents refer to past serious incidents the pilot was involved in, when relevant to this incident.

Flying Experience:

Total Hours	19 123
Total Past 24 Hours	12
Total Past 7 Days	6.8
Total Past 90 Days	166
Total on Type Past 90 Days	166
Total on Type	15 983

- The ZS-ZWF pilot was initially issued an ATPL on 14 August 1997. The pilot conducted his revalidation on 15 December 2021 with an expiry date of 31 May 2022. The pilot was issued a Class 1 aviation medical certificate on 3 November 2021 with an expiry date of 30 November 2022.

Co-pilot:

Nationality	South African	Gender	Male	Age	37
Licence Type	Airline Transport Pilot Licence (ATPL) (A)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument Rating, Instructor Grade 2				
Medical Class & Expiry Date	Class 1; 31 December 2022				
Restrictions	None				
Previous Incidents	None				

Note: Previous serious incidents refer to past serious incidents the pilot was involved in, when relevant to this incident.

Flying Experience:

Total Hours	7 515
Total Past 24 Hours	6.1
Total Past 7 Days	26.1
Total Past 90 Days	166
Total on Type Past 90 Days	166
Total on Type	4 542

- The ZS-ZWF co-pilot was initially issued an ATPL on 12 May 2011. The co-pilot carried out his revalidation on 1 October 2021 with an expiry date of 30 June 2022. The co-pilot was issued a Class 1 aviation medical certificate on 3 September 2021 with an expiry date of 28 February 2022.

1.5.3. FALA Air Traffic Control Officer:

Nationality	South African	Gender	Male	Age	41
Licence Type	Air Traffic Services (ATS)				
Licence Issue & Expiry Date	23 December 2021		22 December 2022		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Aerodrome and Approach Control				
Medical Class & Expiry Date	Class 3; 30 June 2022				
Restrictions	None				

Experience:

Ratings Issued

Name	Issue Date	Expiry Date
Aerodrome Control	14 March 2008	22 December 2023
Approach Procedural	9 September 2011	22 December 2023
Designated Examiner	15 March 2013	25 March 2022

Rating validation

Rating	Unit	Last proficiency	Expiry Date
Aerodrome Control	FALA	23 December 2021	22 December 2022
Approach Procedural	FALA	23 December 2021	22 December 2022

Instructor rating

Rating	Unit	Last proficiency	Expiry Date	Grade
Aerodrome Control	FALA	23 December 2021	22 December 2022	1
Approach Procedural	FALA	23 December 2021	22 December 2022	1

Experience

Years Approach Procedural	10 years
Years Aerodrome Control	14 years
Total years in Air Traffic Service	17 years

- The ATCO was initially issued an Aerodrome Control Rating on 14 March 2008. The ATCO completed his proficiency for Approach Procedural at FALA on 23 December 2021 and was issued a licence on the same date with an expiry date of 22 December 2022.

- The ATCO relocated to Kruger Mpumalanga Aerodrome from 26 January 2018 where he worked as an ATCO. On 23 February 2018, the ATCO was involved in a runway incursion incident on Runway 07 with a Cirrus 20 (SR20) and a Cessna 172 (C172) while working on the tower. The ATCO made an assumption of the position of the C172 and told them to line up on Runway 07 just after he had cleared the SR20 for take-off. The Air Navigation Service Provider (ANSP) stated that the main contributing factors to the runway incursion was that the ATCO assumed he knew the position of the C172, and he was not constantly aware of all the aircraft in the manoeuvring area. He did not keep a visual watch on the manoeuvring area and did not use the flight progress board to maintain his situational awareness.

- On 7 February 2020, the ATCO was involved in an aircraft proximity (AIRPROX) which occurred between the Diamond (DA-42) and the C172 in Lanseria circuit pattern Runway 07. The ATCO was a training instructor and providing on-the-job training at the time of the occurrence. According to the ANSP report, the C172 was instructed to carry out an orbit on the early downwind whilst the DA-42 was on the crosswind behind the C172. Neither of the aircraft were informed of each other's position. After the orbit, the C172 was parallel to the DA-42, and they were both at circuit altitude. They flew parallel to each other until the base leg when the ATCO told DA-42 to orbit, and was on the inside of the C172 circuit pattern. The DA-42 had to cross the flight path of the C172. No traffic information was shared with both aircraft. The ANSP report stated that the main contributing factors for the AIRPROX were: lack of conflict identification and resolution, non-provision of essential traffic information, controlling technique (the ATC could not maintain a mental picture of the traffic scenario and did not maintain the required visual watch over the manoeuvring area), aerodrome procedure (non-standard), high work load and complexity level (one aircraft was a slow and the other was a fast performing aircraft with complex operating procedures), and radio telephony procedures (non-standard phraseology).

- On 15 October 2021, the ATCO was involved in a runway incursion with two vehicles and a Boeing 737-800 (B738). According to the ANSP report, the ATCO and the student received an incomplete read back from the vehicles; this led to the vehicles crossing Runway 07 with a Boeing 737-800 on final approach. The main contributing factors for the runway incursion was that the vehicles did not read back the correct clearance and the ATC and the student did not correct them.

1.6. Aircraft Information

1.6.1. ZS-ASN Aircraft Information:

1.6.1.1 *The McDonnell Douglas DC3-TP67 was manufactured in the United States of America in 1944 by McDonnell Douglas Corp. The aircraft is a propeller driven airliner fitted with two Pratt & Whitney PT6 engines and a two blade Hartzell propellers.* (Source: https://centreforaviation.com/data/profiles/aircraft/dc-3t)

Figure 1: McDonnell Douglas DC3-TP67, ZS-ASN aircraft. (Source: Operator)

Airframe:

Manufacturer/Model	McDonnell Douglas DC3-TP67	
Serial Number	33581	
Year of Manufacture	1944	
Total Airframe Hours (At Time of Serious Incident)	45 966.9	
Last MPI (Date & Hours)	28 June 2021	45 961.0
Airframe Hours Since Last Inspection	5.9	
CRS Issue Date	28 June 2021	
C of A (Original Issue Date & Expiry Date)	25 February 2008	28 February 2022
C of R (Issue Date) (Present Owner)	15 February 2008	
Operating Category	Part (Part 91)	
Type of Fuel Used	Avgas 100 LL	
Previous Serious Incidents	None	

Note: Previous serious incidents refer to past serious incidents the aircraft was involved in, when relevant to this incident.

Engine 1:

Manufacturer/Model	Pratt & Whitney PT6-67R
Serial Number	PCE-106187
Hours Since New	15 458.5
Hours Since Overhaul	4732.7

Engine 2:

Manufacturer/Model	Pratt & Whitney PT6-67R
Serial Number	PCE-106188
Hours Since New	14 913.8
Hours Since Overhaul	1468.5

Propeller 1:

Manufacturer/Model	HARTZELL / HC-B5MA-3M
Serial Number	HBA-1554
Hours Since New	3062.6
Hours Since Overhaul	91.4

Propeller 2:

Manufacturer/Model	HARTZELL / HC-B5MA-3M
Serial Number	HBA-1553
Hours Since New	3062.6
Hours Since Overhaul	91.4

1.6.1.2 The investigation found no technical defects with the airframe or installed systems and components that were recorded in the logbook or defect reports which may have led to this serious incident.

1.6.2. ZS-ZWF Aircraft Information:

1.6.2.1. *The Boeing 737-800 was manufactured in the United States of America in 2015 by The Boeing Company. The aircraft is a narrow body aircraft featuring a redesigned wing with a larger area, a wider wingspan, greater fuel capacity, and a higher maximum take-off weight (MTOW). It is equipped with CFM International CFM56-7 series engines and a glass cockpit* (Source: https://www.boeing.com/commercial/737ng/)

Figure 2: The Boeing 737-800, ZS-ZWF aircraft. (Source: www.jetphotos.com)

Airframe:

Manufacturer/Model	Boeing Aircraft Company, 737-800	
Serial Number	40856	
Year of Manufacture	2015	
Total Airframe Hours (At Time of Incident)	15 877.38	
Last Phased Inspection (Date & Hours)	10 December 2021	15 385.28
Hours Since Last Phased Inspection	492.1	
C of A (Original Date of Issue)	16 October 2016	
C of A Expiry Date	31 October 2022	
C of R (Issue Date) (Present Owner)	12 October 2015	
Type of Fuel Used in the Aircraft	Jet-A1	
Previous Incidents	None	

Note: Previous serious incidents refer to past serious incidents the aircraft was involved in, when relevant to this incident.

Engines:

	Engine 1	Engine 2
Manufacturer/Model	CFM International, S.A. – CFM56-B26E	
Serial Number	PP862489	PP862512
Hours Since New	16 428:44	16428:44
Hours Since Overhaul	11864	11864

1.7. Meteorological Information

1.7.1. The weather information below was obtained from the Meteorological Aerodrome Report (METAR) that was issued by the South African Weather Service (SAWS), recorded at FALA weather station on 8 February 2022 at 0800Z.

Wind Direction	030°	Wind Speed	04kts	Visibility	9999m
Temperature	19°C	Cloud Cover	CAVOK	Cloud Base	None
Dew Point	08°C	QNH	1020hPa		

1.8. Aids to Navigation

1.8.1. Both aircraft were equipped with standard navigational equipment as per their operational requirements, Parts 135 and 121, approved by the Regulator (SACAA) for the aircraft types. There were no records indicating that the navigational equipment were unserviceable prior to the serious incident. Both aircraft were under the control of the same ATCO.

1.8.2. Air navigation radio aids, ATC radar systems and air-ground radio communication systems relevant to the operations of the ZS-ASN and ZS-ZWF aircraft were operating normally at the time of the serious incident.

1.9. Communication

1.9.1 Both aircraft were equipped with standard communication systems as per their operational requirements, Parts 135 and 121, approved by the Regulator for the aircraft types. There were no records indicating that the communication systems were unserviceable prior to the serious incident.

1.10. Aerodrome Information

1.10.1. The serious incident occurred at approximately 7.17nm on final approach for Runway 07 at FALA.

Aerodrome Location	Lanseria, Gauteng Province
Aerodrome Status	Licensed
Aerodrome GPS coordinates	GPS S 26°01'14.58" E 027° 49'28.27"
Aerodrome Elevation	4461 ft
Runway Headings	07/25
Dimensions of Runway Used	3047m x 47m
Heading of Runway Used	07
Surface of Runway Used	Asphalt
Approach Facilities	Runway lights, PAPI, DVOR / DME, ILS
Tower Radio Frequency	124.00 MHz
Approach Radio Frequency	124.5 MHz

1.10.2. Air Traffic Control Information

Separation standards refer to the minimum distance or time apart that aircraft operating in controlled airspace such as FALA, which is a Class C airspace, must be kept. These are outlined in the SACAA Manual of Standards and Procedures and ICAO Doc 4444- PANS-ATM. Air traffic services and ATCO use the same document to safely manage air traffic.

ATCOs must keep aircraft separated vertically or horizontally. When the separation between two or more aircraft is less than the minimum prescribed, there is a loss of separation.

1.11. Flight Recorders

1.11.1. The ZS-ASN aircraft was not fitted with a cockpit voice recorder (CVR) or a flight data recorder (FDR), and neither was required by regulation to be fitted to these aircraft types. The ZS-ZWF aircraft was fitted with a cockpit voice recorder (CVR) and a flight data recorder (FDR) as required by regulation. Both recorders were not downloaded, only the ATC recordings were used during this investigation.

1.12. Wreckage and Impact Information

1.12.1. Not applicable.

1.13. Medical and Pathological Information

1.13.1. Not applicable.

1.14. Fire

1.14.1. Not applicable.

1.15. Survival Aspects

1.15.1. This serious incident was considered survivable as there was no damage to either aircraft.

1.16. Tests and Research

1.16.1ICAO Doc 4444 – Procedures for Air Navigation Services, Air Traffic Management defines an AIRPROX as such;

"Aircraft proximity (AIRPROX). A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. An aircraft proximity is classified as follows:

A-Risk of collision. The risk classification of an aircraft proximity in which serious risk of collision has existed.

B-Safety not assured. The risk classification of an aircraft proximity in which the safety of the aircraft may have been compromised.

C-No risk of collision. The risk classification of an aircraft proximity in which no risk of collision has existed. Risk not determined.

D-The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination."

The ZS-ASN and ZS-ZWF aircraft were involved in an AIRPROX while being positioned for approach at FALA on the same runway (Runway 07). This caused both aircraft to receive TCAS RA warnings which they complied with.

1.16.2 The AIRPROX occurred in FALA airspace which is a Class C airspace. The SACAA Standards and Procedures Manual, Section 6, Separation Methods and Minima Chapter 1 states that "*Standard vertical or horizontal separation shall be provided, unless otherwise specified, IFR flights and VFR flights in Class C airspace.*

ZS-ASN (DC3) was flown in visual flight rules (VFR) and ZS-ZWF (B738) was flown in instrument flight rules (IFR) at the time of the AIRPROX.

1.16.3 According to the ICAO 4444 Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM), AIRPROX risk classification is assigned on the basis only of actual risk, not potential risk. This means that only the residual risk after any avoidance action is considered.

ICAO 4444 PANS-ATM AIRPROX risk classification	UKAB Collision Risk descriptor and guideline word picture
Category A **Risk of Collision**: aircraft proximity in which serious risk of collision has existed.	**Providence – serious risk of collision**. Situations where separation was reduced to the bare minimum and/or which only stopped short of an actual collision because providence played a major part in events. The pilots were either unaware of the other aircraft or did not/could not make any inputs in time to materially improve matters.
Category B **Safety not assured**: aircraft proximity in which the safety of the aircraft may have been compromised.	**Safety much reduced/safety not assured – risk of collision.** Situations where aircraft proximity resulted in safety margins being much reduced below the norm through either chance, misjudgement or inaction; or where emergency avoiding action that materially increased separation and averted a likely collision was only taken at the last minute.
Category C **No risk of collision**: aircraft proximity in which no risk of collision has existed or risk was averted.	**Safety degraded – no risk of collision**. Situations where safety was degraded but either fortuitous circumstances or early enough sighting, information or action allowed one or both of the pilots to either simply monitor the situation or take timely and effective avoiding action to prevent the aircraft from coming into close proximity.
Category D **Risk not determined**: aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.	**Non-assessable – insufficient, inconclusive or irresolvable information**. Situations where insufficient information was available to determine the risk involved, or inconclusive/conflicting evidence precluded such determination.
Category E[3] **Non-proximate**: a sighting report of another aircraft where there was no risk of collision and no degradation of safety.	**Normal safety standards and parameters – no risk of collision**. Situations that met the criteria for reporting but where, after analysis, the occurrence was assessed to be benign and where normal procedures, safety standards and parameters were considered to have pertained.

According to the classification of AIRPROX by ICAO Doc 4444, this serious incident is classified as "*Class A – Risk of collision*". There was late detection of the conflict by the ATCO. Both aircraft received TCAS RA which resolved the conflict, as well as the ATCO instructions.

1.16.4 According to the ICAO Doc 4444 – Air Traffic Management (16th Edition) & ICAO Annex 11 Air Traffic Services (15th Edition), pilots shall always read back the following information to the ATCO:

4.5.7.5 READBACK OF CLEARANCES

4.5.7.5.1 The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances and instructions which are transmitted by voice. The following items shall always be read back:

a) ATC route clearances,

b) clearances and instructions to enter, land on, take off from, hold short of, cross, taxi and backtrack on any runway, and

c) runway-in-use, altimeter settings, SSR codes, level instructions, heading and ***speed instructions*** *and, whether issued by the controller or contained in automatic terminal information service (ATIS) broadcasts, transition levels.*

4.5.7.5.1.1 Other clearances or instructions, including conditional clearances, shall be read back, or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

4.5.7.5.2 ***The controller shall listen to the readback to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the readback.***

The ATCO cleared ZS-ZWF for visual approach for RWY 07 at a QNH of 1021, as well as instructed the pilot to report at 5nm final approach and reduce to minimum safe approach speed. The pilot read back the instructions but did not read back the speed restriction. The ATCO did not verify that the pilot acknowledges the speed restriction.

1.17. Organisational and Management Information

Fly Jetstream:

1.17.1. The ZS-ASN aircraft flight was conducted under the provisions of Part 135 of the South African CAR 2011 as amended.

1.17.2. The operator had an Air Operating Certificate (AOC) AOC number: CAA/N830D, certificate number: FO 15425 which was issued by the SACAA (Regulator) on 27 September 2019 with the expiry date of 30 September 2022.

1.17.3. The ZS-ASN aircraft was maintained by the aircraft maintenance organisation (AMO), licensed by the Regulator, with an AMO number 1135. The AMO certificate was issued on 22 July 2021 with an expiry date of 31 August 2022.

Comair:

1.17.4. The flight by the ZS-ZWF aircraft was conducted under the provisions of Part 121 of the South African CAR 2011 as amended.

1.17.5. The operator of ZS-ZWF was issued an AOC number: CAA/N067D Certificate number: FO 15116 on 3 May 2021 with an expiry date of 30 April 2022.

1.17.6. The ZS-ZWF aircraft was maintained by the AMO, licensed by the Regulator, with certificate number AMO 0001. The AMO certificate was issued on 27 October 2021 with an expiry date of 31 October 2022.

1.18. Additional Information

1.18.1. The SACAA Standards and Procedures Manual Section 3, Part 6 describes essential local traffic information for the control of arriving aircraft:

Essential Local Traffic Information
Information on essential local traffic shall be issued in a timely manner, either directly or through the unit providing approach control service when, in the judgment of the aerodrome controller, such information is necessary in the interests of safety, or when requested by aircraft.
Essential local traffic shall be considered to consist of any aircraft, vehicle or personnel on or near the manoeuvring area or traffic operating in the vicinity of the aerodrome, which may constitute a hazard to the aircraft concerned. Essential local traffic shall be described so as to be easily identified."

The ZS-ASN aircraft requested a simulated RNAV/GNSS approach for RWY 07. The ATCO approved the request and cleared the aircraft to route to position LA1N1, below FALA Terminal Control Area (TMA) at an altitude of 6400ft on a QNH of 1021. The ZS-ZWF contacted FALA ATC and requested a right visual approach for RWY 07. The ATCO asked ZS-ZWF to report their (position) radial DME LIV crossing, which was radial 215 and 14 DME. After about 20 seconds, the ATCO cleared ZS-ZWF for right visual approach RWY 07 at a QNH of 1021 as well as instructed them to report at 5nm final approach and reduce to the minimum safe approach speed. The pilot read back the instruction but did not read back the speed restriction. The ATCO did not verify that the pilot acknowledges the speed restriction, nor did he give essential local traffic information about ZS-ASN that was ahead of them. This caused ZS-ZWF (B738) to close the gap behind ZS-ASN (DC3) on final approach.

1.18.2 The SACAA Standards and Procedures Manual, Section 6, Chapter 1 Para 5.1 states that:

"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 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"

The ZS-ZWF aircraft, being a faster aircraft, caught up with ZS-ASN at approximately 7.17nm from the threshold of Runway 07. The ATC instructed ZS-ASN (DC3) to break off the approach and orbit to the left and re-join the late left downwind RWY 07 without giving a reason or traffic information about ZS-ZWF. The ZS-ASN aircraft found this confusing as they were getting ready to call at 6nm final approach as previously instructed. They asked for confirmation on the north bound turn, and downwind reporting. The ATCO affirmed "turn left now, continue routing north" again without stating the reason or giving traffic information about ZS-ZWF (B738), this delayed ZS-ASN's action to turn as they were not aware of the urgency of the instruction until they received a TCAS RA.

The ATCO only saw the conflict when the air situation display turned red (see figure 2 above) and only then did he intervene to rectify the reduced separation.

1.18.3 SACAA Standards and Procedures Manual Section 6 Separation Methods and Minima Chapter 4 Reduced Separation states:

4.1 Standard separation may be reduced when authorised by the Civil Aviation Authority and published in the station standing instruction manual.

4.2 In the vicinity of aerodromes, the standard separation minima may be reduced if:

a) Adequate separation can be provided by the aerodrome controller when each aircraft is continuously visible to this controller,

b) Each aircraft is continuously visible to flight crews of the other aircraft concerned and the pilots thereof report that they can maintain their own separation,

c) In the case of one aircraft following another, the flight crew of the succeeding aircraft reports that the other aircraft is in sight and separation can be maintained.

The ZS-ZWF (B738) aircraft was not informed about the other aircraft prior to the reduced separation. They only reported ZS-ASN in sight when it was breaking off the approach.

1.18.4 According to the SACAA Standards and Procedures Manual Section 6 Chapter 1 Separation Methods and Minima, separation of aircraft is divided into the following types:

Paragraph *7:* Types of Separation

7.1 Separation is divided into the following types:

a) Vertical

b) Horizontal

I. Lateral

II. Longitudinal

III. ATS Surveillance System

Chapter 2 Vertical Separation Paragraph 1: Vertical Separation

1.2 Vertical Separation Minima

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

a) ***1 000 ft up to FL 290 between all aircraft****,*

b) 1 000 ft between FL290 and FL410 between RVSM approved Aircraft only,

c) 2 000 ft between FL 290 and FL410 between non-RVSM approved aircraft and any other aircraft

The ZS-ASN and ZS-ZWF aircraft were involved in an AIRPROX during an approach for Runway 07 at FALA. The ZS-ZWF ended up behind ZS-ASN. The ZS-ZWF, being a faster aircraft, caught up with the ZS-ASN at approximately 7.17nm from the threshold of Runway 07, resulting in a 500ft vertical loss of separation and 68.7m lateral separation. The ZS-ZWF was above the ZS-ASN and both aircraft were on final approach for RWY 07.

1.18.*5* Human Factors (Source: International Civil Aviation Organisation Circular 241/AN145 Human factors digest number 8);

Human Factors in Air Traffic Control

Chapter 5 of the circular:
The human element-specific attributes discuss attributes of stress, boredom, fatigue, confidence and complacency. In error prevention it states:
Human beings are fallible, and air traffic controllers remain fallible and subject to error no matter how experienced and proficient they have become. While every effort should be made to prevent human error, it is not sensible predicate the safety of the ATC system on the assumption that every human error can be prevented. Some errors will occur, and the system must remain safe when they do, by being designed to be error tolerant.
In this incident the system was error tolerant.

The ATCO detected the conflict late and tried to resolve it but did not give traffic information. Both aircraft received a TCAS RA and complied with it.

1.19. Useful or Effective Investigation Techniques

1.19.1. None.

2. ANALYSIS

2.1. General

From the available evidence, the following analysis was made with respect to this incident. This shall not be read as apportioning blame or liability to any organisation or individual.

2.2. Analysis

2.2.1. The ZS-ASN aircraft was inbound from the GFA and requested to carry out the RNAV GNSS approach and circuits, the ATCO agreed and told them to report 6nm on final approach for RWY 07. Two (2) minutes and 28 seconds later, the scheduled aircraft ZS-ZWF inbound to FALA from FALE contacted FALA ATC and requested a visual approach. The ZS-ZWF aircraft was cleared for the visual approach for landing on RWY 07 and was advised to report 5nm final approach and reduce to minimum safe approach speed. The pilot of ZS-ZWF omitted the read back "to reduce to minimum safe approach speed" – the intention by the ATCO was to maintain separation between the two aircraft; also, the ATCO omitted to ask for a read back from the pilot. The ATCO did not ask the pilot if he acknowledges the restriction and if he would comply. After clearing ZS-ZWF for the visual approach, the ATCO did not inform ZS-ASN to change the clearance to make space for ZS-ZWF. There was no traffic information shared to either aircraft as required by SACAA Standards and Procedures Manual Section 3, Part 6 (see 1.18.1).

Whilst both aircraft were on final approach for RWY 07, ZS-ZWF speed was 210kts and ZS-ASN speed was 130kts. At the point when the aircraft separation was 500ft vertical and 68.7m lateral, the ATCO received an airspace reduction warning on the ASD Toolbar. He instructed the ZS-ASN aircraft to break off to the left and route north without giving traffic information about the faster aircraft behind it. This resulted in the pilot of ZS-ASN delaying carrying out the instruction as he was not aware of the urgency of the instruction. He then broke off to the left after the ATCO instructed him for the second time. The ATCO did not share traffic information according to the SACAA Standards and Procedures Manual, Section 6, Chapter 1 Para 5.1 (see 1.18.2).

2.2.2. The ATCO instructed ZS-ZWF to continue with the approach and informed them about ZS-ASN. The ZS-ZWF pilot told the ATCO that they have the traffic in sight. At the time the ATCO received airspace reduction, both aircraft received TCAS RA warnings after the ATCO had advised ZS-ASN to break off the approach (ZS-ASN was at 6300 feet and was alerted by RA to descend, whilst ZS-ZWF was at 6800 feet and was alerted by RA to climb); both aircraft complied with the RA resolution and the ATCO instructions which resolved the conflict effectively. The ZS-ZWF aircraft told the ATCO that they were advised by the RA to climb, and they were now on the descend.

2.2.3. At the time leading to the incident, there were 12 aircraft under the ATCO's jurisdiction which might have subsequently affected the ATCO's planning and workload with the incident aircraft. According to the ATC recordings, there was a mixture of traffic activity with some aircraft joining the circuit training, some departing, whilst other traffic was over flying. Between transmissions, the ATCO did not seem to have a break to compose himself, which could have contributed to him not identifying a developing reduction in separation. If the ATCO had passed traffic information to ZS-ZWF about ZS-ASN earlier, he could have instructed them to maintain their own separation. The ZS-ZWF aircraft would have reduced speed to maintain separation, and if unable to, they would have advised the ATCO and he would give them a new instruction.

2.2.4. Both aircraft were on converging tracks. It is estimated that there was a risk of collision between the aircraft as the crew of ZS-ZWF was not aware of ZS-ASN. No traffic information was shared with ZS-ZWF. The ZS-ASN aircraft was instructed to reposition to make space

for the faster aircraft. The aircraft could not monitor the movements of each other and their separation.

2.2.5. The investigation established that the ATCO gave two aircraft a visual to the same runway but never warned them of each other's position. The faster aircraft (B738) caught up with the slower aircraft (DC3), which resulted in reduced aerodrome separation.

3. CONCLUSION

3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this incident. These shall not be read as apportioning blame or liability to any organisation or individual.

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

- **Findings —** are statements of all significant conditions, events, or circumstances in this incident. The findings are significant steps in this incident sequence, but they are not always causal or indicate deficiencies.
- **Causes —** are actions, omissions, events, conditions, or a combination thereof, which led to this incident.
- **Contributing factors —** are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the incident occurring, or would have mitigated the severity of the consequences of the incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

3.2. Findings

3.2.1 The ZS-ASN pilot was initially issued an ATPL on 30 March 1994. The pilot completed his revalidation on 9 April 2021 and was issued a licence with an expiry date of 30 June 2022. The pilot was issued a Class 1 aviation medical certificate on 3 September 2021 with an expiry date of 30 September 2022.

3.2.2 The ZS-ASN co-pilot was initially issued an ATPL on 4 May 2017. The pilot conducted his revalidation on 9 April 2021 and was issued a licence with an expiry date of 30 June 2022. The pilot was issued a Class 1 aviation medical certificate on 4 August 2021 with an expiry date of 31 August 2022.

3.2.3 The ZS-ZWF pilot was initially issued an ATPL on 14 August 1997. The pilot conducted his revalidation on 15 December 2021 with an expiry date of 31 May 2022. The pilot was issued a Class 1 aviation medical certificate on 3 November 2021 with an expiry date of 30 November 2022.

3.2.4 The ZS-ZWF co-pilot was initially issued an ATPL on 12 May 2011. The pilot conducted his revalidation on 1 October 2021 with an expiry date of 30 June 2022. The pilot was

issued a Class 1 aviation medical certificate on 3 September 2021 with an expiry date of 28 February 2022.

3.2.5 The ZS-ASN aircraft was issued a Certificate of Airworthiness on 25 February 2008 with an expiry date of 28 February 2022. The aircraft was issued a Certificate of Registration on 15 February 2008. The aircraft was also issued a Certificate of Release to Service on 28 June 2021 with an expiry date of 27 June 2022 or at 46 077 airframe hours, whichever occurs first.

3.2.6 The last mandatory periodic inspection (MPI) carried out on the ZS-ASN aircraft was on 31 January 2022 at 45 961.1 airframe hours. The aircraft had accumulated an additional 5.8 airframe hours in operation since the last MPI.

3.2.7 The flight was conducted under the provisions of Part 141 of the CAR 2011 as amended.

3.2.8 The aircraft was maintained by an AMO that was licensed by the Regulator.

3.2.9 The ZS-ZWF aircraft was issued a Certificate of Airworthiness on 16 October 2016 with an expiry date of 31 October 2022. The aircraft was issued a Certificate of Registration on 12 October 2015. The aircraft was issued a Certificate of Release to Service on 10 December 2021 with an expiry date of 25 November 2022 or at 17 806 airframe hours, whichever occurs first.

3.2.10 The last MPI was carried out on 28 June 2021 at 15 385.28 airframe hours. The aircraft had accumulated an additional 492.1 airframe hours in operation since the last MPI.

3.2.11 The flight was conducted under the provisions of Part 121 of the CAR 2011 as amended.

3.2.12 The aircraft was maintained by an AMO that was licensed by the Regulator.

3.2.13 The ATCO was initially issued an Aerodrome Control Rating on 14 March 2008. The ATCO completed his proficiency for Approach Procedural at FALA on 23 December 2021 with an expiry date of 22 December 2022. He validated his FALA rating in January 2018, was involved in a Runway incursion on 23 February 2018, an AIRPROX on 7 February 2020, and another Runway incursion on 15 October 2021 prior to this serious incident.

3.2.14 Fine weather conditions prevailed at the time of the serious incident. Weather had no bearing on the serious incident.

3.2.15 The ZS-ASN (DC3) aircraft was cleared for simulated GNSS approach and to report 6nm on final approach for RWY 07. The ZS-ZWF (B738) aircraft was cleared for visual approach on RWY 07 and to report 5nm final approach. These are two contradicting report points for aircraft that are on the same path.

3.2.16 The pilot of ZS-ZWF omitted the read back “to reduce to minimum safe approach speed”. The ATCO did not ask the pilot if he acknowledges the restriction and if he would comply. The pilot and the ATCO did not comply with ICAO Doc 4444 – Air Traffic Management (16th Edition) and ICAO Annex 11 – Air Traffic Services (15th Edition) (see 1.16.4).

3.2.17 The ATCO did not advise ZS-ASN about the faster traffic behind them, he amended their clearance to make space for ZS-ZWF.

3.2.18 Whilst approximately 7.17nm on final approach for RWY 07, the ASD Toolbar flashed a red warning indicating that ZS-ZWF was closing the gap, which resulted in a 500ft vertical loss of separation and 68.7m lateral separation. That is when the ATCO issued a re-joining clearance instruction.

3.2.19 Both aircraft received TCAS RA warnings (ZS-ASN was at 6300 feet and was alerted by the RA to descend, whilst ZS-ZWF was at 6800 feet and was alerted by TCAS RA to ascend); both aircraft complied with the TCAS RA and ATCO's instructions.

3.2.20 The reduced separation was caused by the ATCO clearing ZS-ZWF for right visual approach RWY 07 before instructing ZS-ASN to reposition to make space for ZS-ZWF. This resulted in the faster aircraft (ZS-ZWF) closing the gap on the slower aircraft (ZS-ASN).

3.2.21 The pilot did not read back to "reduce to a minimum safe approach speed". The ATCO did not ask the pilot to acknowledge the instruction.

3.2.22 The aircraft could not monitor the movements of each other and their separation as they were not told about each other's position. According to the classification of aircraft proximity by the *ICAO Doc 4444*, this serious incident is classified as "*Class A – Risk of collision - aircraft proximity in which risk of collision has existed.*

3.3. Probable Cause/s

3.3.1. The ATCO gave two aircraft a visual to the same runway but did not warn them of each other's proximity. The faster aircraft (B738) caught up with the slower aircraft (DC3) which resulted in the reduced aerodrome separation.

3.4. Contributory Factor/s

3.4.1 Poor situational awareness: late conflict detection.

3.4.2 Instruction given to ZS-ASN (DC3) was late and provided without a reason and/or traffic information.

3.4.3 The ATC cleared ZS-ZWF for visual approach as requested and instructed them what to do next. The ATCO did not pick up that the pilot did not read back all given instructions.

3.4.4 The frequency was busy, there were 12 aircraft under the ATC's jurisdiction at the time of the incident.

4. SAFETY RECOMMENDATIONS

4.1. General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

4.2. Safety Action taken by Air Navigation Service Provider

4.2.1 After this serious incident, the ANSP did the following:

- The unit scheduled a safety discussion session to create awareness of safety events and to share lessons learnt.

- The ATCO was briefed on planning and prioritisation.

4.3. Safety Action taken by FAEL Air Traffic Control Office:

4.3.1. The ATCO was given Critical Incident Stress Management (CISM) support.

5. APPENDICES

5.1 None.

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa