SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Occurrence Investigation** Form Number: CA 12-12b

AIRCRAFT INCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		CA18/3/2/0799	
Aircraft Registration	ZS-SJS & ZS-OAO	**Date of Incident**	27 July 2010			**Time of Incident**	0910Z
Type of Aircraft	B737 - 800 & B737 - 400		**Type of Operation**			Air Transport	
Pilot-in-command Licence Type (ZS-SJS)		ATPL	**Age**	53	**Licence Valid**		Yes
Pilot-in-command Licence Type (ZS-OAO)		ATPL	**Age**	42	**Licence Valid**		Yes
Pilot-in-command Flying Experience (ZS-SJS)		Total Flying Hours	17746.0		Hours on Type		4530.0
Pilot-in-command Flying Experience (ZS-OAO)		Total Flying Hours	unknown		Hours on Type		unknown
Last point of departure	ZS-SJS - OR Tambo International Airport (FAJS) ZS-OAO - Cape Town International Airport (FACT)						
Next point of intended landing	ZS-SJS - Cape Town International Airport (FACT) ZS-OAO - OR Tambo International Airport (FAJS)						
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)							
Runway 21R at O R Tambo International Airport (FAJS)							
Meteorological Information	Wind direction: 120˚, Wind speed: 11 kts, Temperature: 16˚C, Dew point: 13˚C, Visibility: > 10 000 m, Cloud base: COVAK.						
Number of people on board	ZS-SJS = 2+4+124 ZS-OAO = 2+4+117	**No. of people injured**	0	**No. of people killed**	0		

Synopsis

On 27 July 2010, SAA327 was taxiing on taxiway “alpha” when clearance was given by FAJS ATC to take off on Runway 21R. The aircraft entered the active runway at intersection “November” and lined up on the centre line ready for the takeoff.

CAW102 flew in from FACT and landed at FAJS on Runway 21L. The aircraft was in contact with Tower East from being handed over on final approach and remained in contact after landing where taxi instructions were issued. Taxi instructions were given to use taxiways “Tango, Yankee and Lima” to the holding point of Runway 21R. Further instructions were given to cross the runway by Tower West controller. The aircraft then taxied to the parking bay “Alpha #2”.

At the time that SAA327 started the takeoff roll off Runway 21R, CAW102 aircraft crossed the same runway, which could have contributed in a runway incursion incident. The Tower West controllers realised that an error had occurred and instructed the SAA327 aircraft to abort the takeoff. The takeoff was aborted as instructed and the aircraft exited the runway into taxiway “Echo”.

The two aircraft did not sustain damage and the occupants did not sustain any injury.

Probable Cause

Rejected takeoff due to runway incursion.

Contributory Factor
Error caused by ATC when giving instructions to one aircraft to cross the active runway after takeoff clearance was given to another aircraft, using the same runway.

IARC Date		Release Date	

AIRCRAFT INCIDENT REPORT

Name of Owner/Operator : South African Airways (Pty) Ltd
Manufacturer : The Boeing Company
Model : B 737 - 800
Nationality : South African
Registration Marks : ZS-SJS
Place : O R Tambo International (FAJS)
Date : 27 July 2010
Time : 0910Z

Name of Owner/Operator : Comair Limited
Manufacturer : The Boeing Company
Model : B 737 – 400S
Nationality : South African
Registration Marks : ZS-OAO
Place : O R Tambo International (FAJS)
Date : 27 July 2010
Time : 0910Z

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 given without prejudice to the rights of the CAA, which are reserved.

ABBREVIATIONS IN THE REPORT:

AOC : Air Operating Certificate
ATC : Air Traffic Controller
ATS : Air Traffic Services
ATNS : Air Traffic and Navigation Services
AD : Aerodrome
APP : Approach
SACAA : South African Civil Aviation Authority
SAA : South African Airways
CAR : Civil Aviation Regulation
CoA : Certificate of Airworthiness
C of R : Certificate of Registration
ATPL : Airline Transport Pilot's Licence

F/O	: First Officer
PIC	: Pilot in Command
CVR	: Cockpit Voice Recorder
DFDR	: Digital Flight Data Recorder
IFR	: Instrument Flight Rule
AMO	: Aircraft Maintenance Organisation
ILS	: Instrument Landing System
DME	: Distance Measuring Equipment
SOP	: Standard Operating Procedures
ACSA	: Airport Company of South Africa
FACT	: Cape Town International Airport
FAJS	: OR Tambo International Airport
FAWB	: Wonderboom Aerodrome
Ft	: Feet
Kts	: Knots
METAR	: Meteorological Aeronautical Report
MHz	: Megahertz
VHF	: Very High Frequency
KIAS	: Knots Indicated Air Speed
CAW	: Comair

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 The aircraft SAA327 was scheduled for a domestic flight, departing from O R Tambo International Airport (FAJS) to Cape Town International Airport (FACT) on 27 July 2010. The aircraft was pushed back from the “Charlie #3” parking bay at approximately 0855Z. The flight crew were given clearance by Tower West controller to use “November” intersection and enter Runway 21R for takeoff. FAJS ATC - Tower West transmitted on VHF frequency 118.1 MHz, giving takeoff clearance to the aircraft. The flight crew then entered the runway and started the takeoff roll. When the aircraft reached approximately 80 knots indicated airspeed (IAS), the flight crew were given urgent instructions by Tower West controller to cancel the takeoff due to other aircraft crossing Runway 21R on taxiway “Lima”. There was the threat of a collision between the two aircraft. The flight crew acted immediately and reported to ATC that they were stopping. ATC apologised and instructed the flight crew to vacate the runway right into taxiway “Echo”, “Alpha” and hold short at “November” to take off again from Runway 21R. The flight crew complied with Tower West controller’s instructions and taxied back to Runway 21R. The aircraft lined up on the runway centre line and cleared for takeoff. However, the flight crew was requested to be given time (approximately 30 sec), stating that “We just want to make sure we′ve got everything sorted”. SAA327 then finally took off during the second attempt from Runway 21R and flew to FACT.

1.1.2 The aircraft CAW102 was flown from Cape Town International Airport (FACT) on a scheduled domestic flight to O R Tambo International Airport (FAJS) on 27 July 2010. On arrival the aircraft was cleared by Tower East controller to land on Runway 21L. After the landing the aircraft was taxied to the holding point of RWY 21R at Lima and handed over to Tower West. The flight crew were then cleared to taxi via taxiway "Lima" to cross Runway 21R. At the holding point of Runway 21R, at Lima the flight crew found that the stop bars were switched on. The flight crew reported to Tower West that the stop bars were still switched on. Once the stop bars were switched off, the aircraft started to cross the runway at lima. This was also the time when the flight crew heard over the radio that SAA327 should cancel the takeoff. SAA327 and CAW102 sustained no damage during the incident and no occupants were injured.

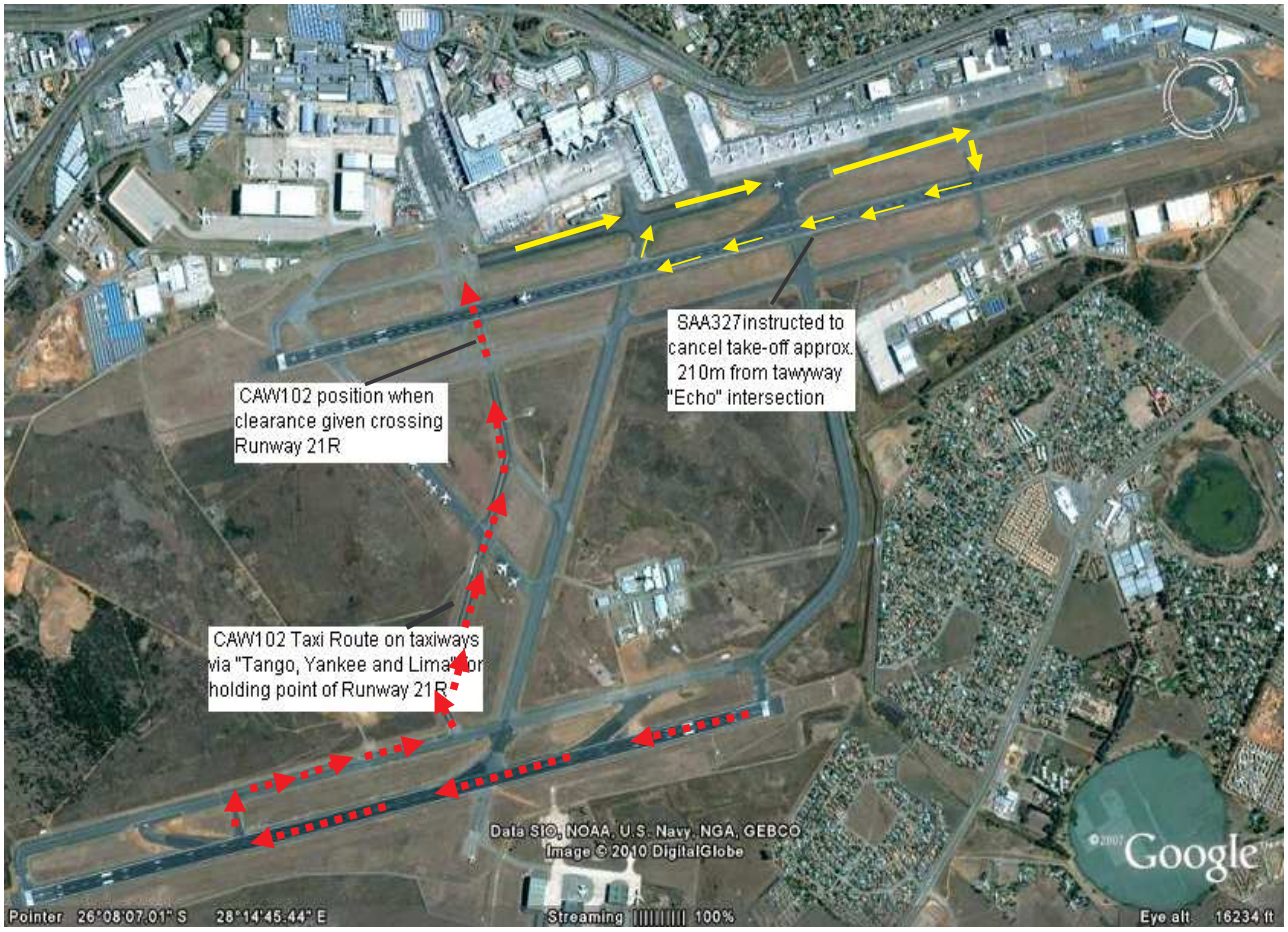

Figure 1, shows the path that SAA327 and CAW102 travelled, leading up to the incident.

1.2 Injuries to Persons

SAA327 Aircraft

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	2	4	124	-

CAW102 Aircraft

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	2	4	117	-

1.3 Damage to Aircraft

1.3.1 None.

1.4 Other Damage

1.4.1 None.

1.5 Personnel Information

SAA327 flight crew members:

Captain

Nationality	South African	Gender	Male	Age	53
Licence Number	027xx	Licence Type	ATPL		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Flight Test - Multi & Single Engine Piston, Instrument, Night Ratings				
Medical Expiry Date	30 September 2010				
Restrictions	Corrective Lenses				
Previous Accidents	None				

Flying Experience:

Total Hours	17746.0
Total Past 90 Days	104.0
Total on Type Past 90 Days	104.0
Total on Type	4530.0

First Officer (F/O)

Nationality	South African	Gender	Male	Age	27
Licence Number	027xx	Licence Type	ATPL		
Licence valid	Yes	Type Endorsed			
Ratings	Instructor – Grade 3, Night, MNPS/RVSM, Flight Test – Multi & Single Engine Piston, Instrument Ratings				
Medical Expiry Date	31 May 2011				
Restrictions	None.				
Previous Accidents	None.				

Flying Experience:

Total Hours	5805.0
Total Past 90 Days	154.0
Total on Type Past 90 Days	154.0
Total on Type	2164.0

1.5.1 The Captain of SAA327 had completed training on B737-800 and the aircraft type rating was endorsed on the licence on 30 October 2002.

1.5.2 The First Officer of SAA327 had completed training on B737-800 and the aircraft type rating was endorsed on the licence on 31 July 2006.

CAW102 flight crew members:

Captain

Nationality	South African	Gender	Male	Age	42
Licence Number	027	Licence Type	ATPL		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Test Pilot – Class 2, Night, Flight Test - Multi & Single Engine Piston, Instrument Ratings				
Medical Expiry Date	30 November 2010				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	unknown
Total Past 90 Days	unknown
Total on Type Past 90 Days	unknown
Total on Type	unknown

First Officer

Nationality	South African	Gender	Male	Age	35
Licence Number	Xxxxxxxxxxx	Licence Type	ATPL		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instructor – Grade 2, Night, Flight Test – Multi & Single Engine Piston, Instrument Ratings				
Medical Expiry Date	31 July 2011				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	±10700.00
Total Past 90 Days	±329.9
Total on Type Past 90 Days	±329.9
Total on Type	±2000.00

1.5.3 The Captain of CAW102 completed his training on the B737– 400 and the aircraft type rating was endorsed on the licence on 31 July 2006.

1.5.4 The First Officer of CAW102 completed training on B737– 400 and the aircraft type rating was endorsed on the licence on 20 June 2008.

1.5.5 *Cabin Crew Members:* The cabin crew of both aircraft were qualified, experienced and appropriately rated on the aircraft. The cabin crew performances were professional on the day. There was no proof of any anomalies identified with their duties.

1.5.6 The flight and cabin crew members flight duty time were reviewed and found to be in accordance with applicable regulations.

1.5.7 Air Traffic Controllers (ATC):

Instructor at time of incident

Nationality	South African			Gender	Male		Age	29	
Licence Number	027			Licence Type			Air Traffic Controller		
Medical Expiry Date	31 March 2012			Licence Issue Date			07 August 2006		
Language Issue	15 August 2007			Language Level			6		
Validated Ratings									
Ratings	AD	Unit	FAJS	Position	AD	LastProf 03/09/2009		Expiry Date 02/09/2010	
Instructor Ratings									
Ratings	AD	Unit	FAJS	Position	AD	Grade	2	Examiner	No

1.5.8 The instructor received initial ATC training in the South African Air Force (SAAF). While employed in the SAAF, he held the following positions:

(i) Sector Surveillance Officer
(ii) OJTI Training Officer
(iii) Tower/Ground Controller.

1.5.9 The SAAF deployed him on several military operations. The duration of his employment with the SAAF was six years uninterrupted service. The instructor resigned from the SAAF in 2005 and started new employment with ATNS. The position which he held at ATNS was Principal Tower Controller at FAJS ATC Unit.

1.5.10 The employers (SAAF and ATNS) were requested to give incident and safety events history information about the instructor. There was no incident history found relevant to the instructor's duties.

Student: The student was a qualified aerodrome controller who was receiving dual training for validation at FAJS.

Nationality	South African			Gender	Male		Age	34	
Licence Number	xxxxxxxxxxxxx			Licence Type		Air Traffic Controller			
Medical Expiry Date	30 November 2012			Licence Issue Date		15 August 2003			
Language Issue	09 November 2007			Language Level		6			
Validated Ratings									
Ratings	AD	Unit	FAWB	Position	AD	LastProf 20/04/2010	Expiry Date 19/04/2011		
	APP				APP	LastProf 20/04/2010	Expiry Date 19/04/2011		
Instructor Ratings									
Ratings	AD	Unit	FAWB	Position	AD	Grade	1	Examiner	Yes
	APP				APP				

1.5.11 The student received his initial ATC training in the South African Air Force (SAAF). While employed in the SAAF, he was an Air Traffic Services Assistant and Ground Movement Controller. After seven years on the job he was appointed as a Senior Operations Clerk at SAAF Command Post. The student resigned from the SAAF and he was employed by ATNS in October 2002.

1.5.12 The student previously held the following positions in ATNS:

(i) Officer in Charge Wonderboom - FAWB Air Traffic Services Unit (Operational Aerodrome and Approach Procedural Senior ATC)
(ii) Pool Manager (Regional Airports Approach Procedural, Operational Aerodrome and Approach Procedural Senior ATC).

1.5.13 The student was transferred from Wonderboom Aerodrome (FAWB) and started validation training at O R Tambo International Aerodrome (FAJS) in May 2009. He was undergoing on-the-job training instruction (OJTI) when the incident occurred. According to the ATC training log, the student started the validation training (practical) at FAJS on 19 July 2010. The student brought forward 15 hours of training time which he completed on previous shifts. The student logged an additional 5 hours and had a grand total of 20 hours of training time written on the training log.

1.5.14 The training records of the student were reviewed with the objective to establish his progress in terms of runway crossings. The assessment between 19 July 2010 to 27 July 2010 was reviewed, which stated the following:

(i) Training Assessment and Grading – The numbers 1 to 3 are used as a reflection of the student's performance at the current level of expertise. The numbers represents (1 = very poor performance, 2 = average performance and 3 = above average performance – excellent performance).

(ii) According to the assessments, the student scored a grade of 1 = very poor performance for both Tower West Control – runway crossing procedures and Ground Control – pre-planning of crossing of runways.

(iii) Comments made by the training instructor were the following ***"Student to get a sequence for rotation of strips, crossing cards, stopbars co-ordination etc."***

1.5.15 During the training process, the student was involved in two incidents on 15 February 2010 and 01 March 2010. The incidents occurred during an Approach Control training which is unrelated to the Tower Control training. However, this information was deemed necessary in the investigation. ATNS conducted an investigation into the Approach Control training incidents and the Preliminary Investigation Reports stated the following:

(i) Three aircraft (FDR305, CAW409 and REJ768) were involved. The proximity of the aircraft was of such a nature that when the STCA sounded, the standard separation could not be retained. The student instructed the one aircraft to climb to FL 130 below another aircraft who was maintaining FL 140 before separation had been established with FDR305.

(ii) Two aircraft (ZS-PBR and EXY765) were involved. The student instructed ZS-PBR to descend to 8000 feet and EXY765 to climb to FL 100 before separation had been established between the two aircraft.

1.5.16 ATNS was still in the process of finalising the investigations into the above incidents when the runway incursion occurred. The time when the report was finalised, information was received indicating that the APP training was suspended and a decision was made to allow the student to validate on Tower Control first.

1.5.17 *Duty Time:* The instructor and student returned back to work, after having been away from work the previous day (off duty). The rest period of the instructor was ± 32 hours and of the student ± 39 hours since they had last signed off duty on 25 July 2010. The ATNS attendance register showed that the instructor and student had started their shifts from 05:30 to 12:30 on the day. Both controllers had worked in the tower for 3.16 hours and took a 30-minute break. The two returned to their positions in Tower West at 0846Z. After 20 minutes at 0906Z the incident occurred. Both controllers were immediately released from their duties after the incident occurred. Other ATC personnel who were about to start the next shift arrived, and hand-over took place at 1008Z.

1.6 Aircraft Information

Airframe: SAA327 Aircraft

Type	B737- 800	
Serial No.	32632	
Manufacturer	The Boeing Company	
Date of Manufacture	2002	
Total Airframe Hours (At time of Incident)	19484.34	
Last Phase Inspection "Check – A" (Date & Hours)	07 June 2010	19119.31
Hours since Last Phase Inspection	365.01	
C of A (Original Issue Date) (Expiry Date)	06 September 2010 05 September 2011	
C of R (Issue Date) (Present owner)	17 September 2009 South African Airways (Pty) Ltd	
Operating Categories	Standard Part 121	

1.6.1 There was no report of a defect or malfunction experienced with the aircraft during the incident. The aircraft was in a serviceable condition.

Engine #1:

Type	CFM 56 – 7B27		
Serial No.	PP888178		
Hours since New	19632.51	Cycles since New	14108.0
Hours since Overhaul	unknown	Cycles since Overhaul	unknown

Engine #2:

Type	CFM 56 – 7B27		
Serial No.	PP891204		
Hours since New	19484.34	Cycles since New	14100.0
Hours since Overhaul	unknown	Cycles since Overhaul	unknown

CAW102 Aircraft

Type	B737 – 400	
Serial No.	24163	
Manufacturer	The Boeing Company	
Date of Manufacture	1989	
Total Airframe Hours (At time of Incident)	45 747.0	
Last Phase Inspection – Check A (Date & Hours)	19 July 2010	45686.0
Hours since Last Phase Inspection	61.0	
C of A (Issue Date)	09 July 2008	
C of R (Issue Date) (Present owner)	18 June 2008	
Operating Categories	Standard Part 121	

1.6.2 There was no report of a defect or malfunction experienced with the aircraft during the incident. The aircraft was in a serviceable condition.

Engine #1:

Type	CFM 563 C1 – 7B27		
Serial No.	PP725249		
Hours since New	35 705.0	Cycles since New	30 285
Hours since Overhaul	unknown	Cycles since Overhaul	unknown

Engine #2:

Type	CFM 563 C1 – 7B27		
Serial No.	PP727112		
Hours since New	42 801.0	Cycles since New	24 418
Hours since Overhaul	unknown	Cycles since Overhaul	unknown

1.7 Meteorological Information

1.7.1 The ATNS submitted a weather report which was obtained from the South African Weather Services. According to the weather report, the surface analysis at the time or close to the time of the incident was as identified in the column below:

Wind direction	210˚	Wind speed	11 kts	Visibility	> 10 000m
Temperature	16˚C	Cloud cover	CAVOK	Cloud base	CAVOK
Dew point	13˚C				

1.8 Aids to Navigation

1.8.1 The following radio navigation and landing aids were available at FAJS:

(i) Non-directional radio beacon (NDB) - JB: frequency 360 kHz.
(ii) Very high frequency omni directional radio range (VOR) - JSV: frequency 115.2 MHz
(iii) Distance measuring equipment (DME) – JSV: frequencies 1186 MHz.
(iv) Runway 03L - Instrument landing system (ILS) LOC: frequency 110.3 MHz.
(v) Runway 03L - Instrument landing system (ILS) LOC: frequency 110.3 MHz.
(vi) Runway 03L - Instrument landing system (ILS) GP CATII: frequency 335 MHz.
(vii) Runway 03R - Instrument landing system (ILS) LOC: frequency 109.1 MHz.
(viii) Runway 03R - Instrument landing system (ILS) GP CATII: frequency 331.4 MHz.
(ix) Runway 21L - Instrument landing system (ILS) LOC: frequency 109.9 MHz.
(x) Runway 21L - Instrument landing system (ILS) GP CATII: frequency 333.8 MHz.
(xi) Runway centrelines and identification markings.

1.8.2 The above identified navigation and landing aids were serviceable and in operation 24 hours a day.

1.8.3 The aircraft navigational equipment of both aircraft was as per the approved minimum equipment list (MEL). The flight crew did not report that any defect or malfunction was experienced with the aircraft navigation equipment. The aircraft navigational equipment was in a serviceable condition.

1.9 Communications

1.9.1 *ATNS Communication Facilities:* The communication facilities at FAJS were Tower West (118.1 MHz), Tower East (118.6 MHz) and Ground Control (121.9 MHz). According to the Aeronautical Information Publication (AIP), the identified communication facilities were available as follows:

(i) Tower West: Daily from 0400 to 1900.
(ii) Tower East: Week days from 0500 to 1700 and weekends from 0700 to 1600/1700.
(iii) Ground Control: Arriving aircraft to pass registration and prior arranged parking bay from Apron Office on first contact.

1.9.2 No anomaly was identified with the aerodrome communication equipment. The communication equipment was in a serviceable condition.

1.9.3 Aircraft *Communication Equipment:* Both aircraft had VHF radio communication equipment. The radio communication equipment fitted was as per the approved Minimum Equipment List (MEL). There was no report of any defect or malfunction experienced with the radio communication equipment. The radio communication equipment was in a serviceable condition.

1.9.4 *ATNS Audio Transcript:*

(i) Frequency 118.1~~9~~ MHz - communication between Tower West and SAA327.

Time	Station	Tex of Transmission
09:01:48	SAA327	Tower West Good Morning, It's SAA327, Ready.
09:04:52	**ATC**	**SAA327, Good Day, RWY21R, November, Cleared Takeoff, Surface Wind is 210 degrees 10kts, BYE… BYE.**
09:04:59	**SAA327**	**RWY21R from November, Cleared for Takeoff, SAA327, BYE…BYE.**
09:06:59	**ATC**	**SAA3…SAA32….SAA327, Cancel the Takeoff, Clearance please traffic is crossing on Lima.**
09:07:08	**SAA327**	**We are stopping, SAA327.**
09:07:10	ATC	Thanks a lot, you can vacate right onto Echo, right onto Alpha again, hold short 21R, November.
09:07:14	SAA327	Right Echo, Alpha, hold short 21R November, SAA327.
09:07:25	SAA327	Tower say again those taxi instructions for SAA327.
09:07:26		….Inaudible…
09:07:28	ATC	Right onto Echo, Right Alpha, Hold short of November.
09:07:32	SAA327	Right Echo, Alpha, hold short of November, SAA327.
09:09:04	ATC	SAA327, November, Line up and wait RWY21R.
09:09:09	SAA327	November, Line up and wait 21R, SAA327.

09:10:04	ATC	SAA327, humblest apologies about that Sir, November 21R, cleared for takeoff, the surface wind 190 degrees 13kts, have a safe flight.
09:10:12	SAA327	Sure, no problem uh, cleared for takeoff RWY21R November, We just want to hold for about 30 seconds, We just want to make sure we've got everything sorted.
09:10:20	ATC	Sure, you can report ready to roll Sir.
09:10:22	SAA327	WILCO
09:11:45	SAA327	SAA327 is ready.
09:44:48	ATC	Thank you SAA327, the wind check 120 degrees 11kts, cleared takeoff 21R November, apologies once again, have a safe flight.
09:11:55	SAA327	RWY21R, November cleared for takeoff and apology accepted, No problem, SAA327, BYE…BYE.

(ii)Frequency 118.9 MHz - communication between Tower West and CAW102.

09:05:43	CAW102	Johannesburg Tower Good Morning CAW102.
09:05:49	ATC	CAW102, Good Day, Standby.
09:05:53	CAW102	Standby.
09:06:05	ATC	CAW102 cross RWY21R, right Alpha, F for the bay.
09:06:11	**CAW102**	**Cross 21R, right Alpha, F for the bay CAW102.**
09:07:37	ATC	And CAW102 continue F for the bay, monitor 121.9
09:07:42	CAW102	F for the bay, monitor 121.9 CAW102.

(i) Frequency 118.9 MHz - communication between Tower West and JAI 241

09:05:27	JAI241	Tower Good Morning JAI 241.
09:05:30	ATC	JAI 241, Good day listen out for departure.
09:05:34	JAI 241	Say again for JAI 241.
09:06:36	ATC	JAI 241, Hold short of RWY21R.
09:06:39	JAI 241	Hold short RWY 21R, JAI 241.
09:06:49	**JAI 241**	**JAI 241 is ready for departure.**

1.10 Aerodrome Information

Aerodrome Location	O R Tambo International Airport (FAJS)	
Aerodrome Co-ordinates	S26˚0802 E028˚1434	
Aerodrome Elevation	5558 feet	
Runway Designations	03L/21R	03R/21L
Runway Dimensions	4418 x 60	3400 x 60
Runway Used	21R (SAA 327) and 21L (CAW102)	
Runway Surface	ASPH	
Approach Facilities	VOR, NDB, ILS, Radar, PAPI and lighting.	

1.10.1 The aerodrome information included in the column above is from the Aeronautical Information Publication (AIP).

1.10.2 SAA327 was given early takeoff clearance to depart from FAJS. The aircraft taxied from the parking bay on the western side of the aerodrome, heading towards the "November" taxiway intersection for RWY21R. The aircraft taxied a distance of approximately 2200 metres before reaching the runway.

1.10.3 CAW102 landed on RWY21L on the eastern side of the aerodrome. The aircraft then exited the runway heading in the westerly direction using "Tango, Yankee and Lima" taxiways to the holding point of RWY21R. The intention of the flight crew was to cross the runway. The total distance which the aircraft taxied from the runway was approximately 2868 metres before reaching the holding point.

1.10.4 The daily statistics of air traffic volume shows that a total number of 611 aircraft were departing, landing and overflying FAJS. The number of aircraft in the air traffic was counted between 2:00 to 23:59 UTC on the day.

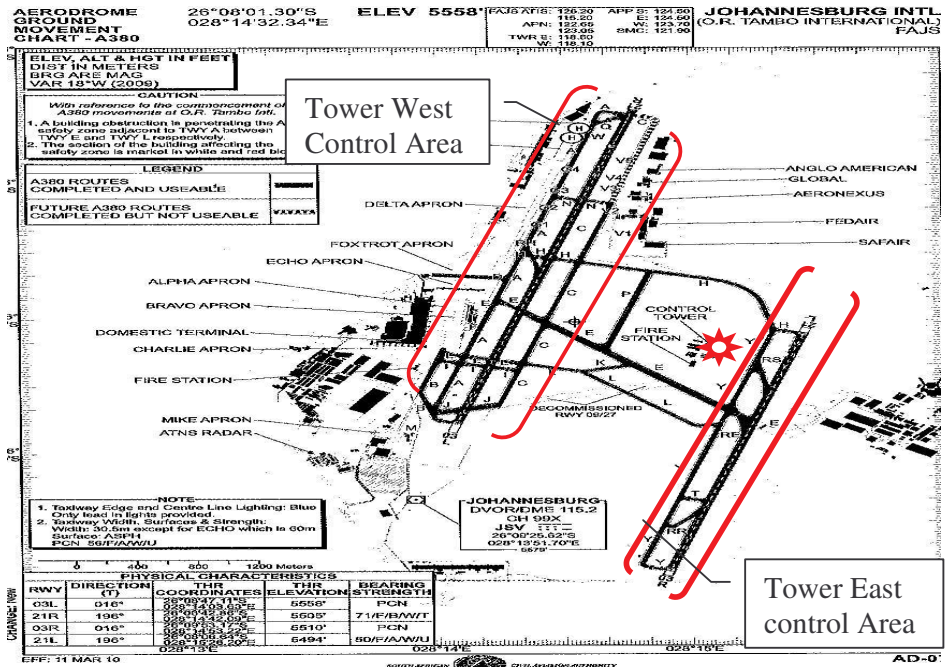

Figure 2, shows aerodrome plate of FAJS.

1.10.5 The FAJS Airport management relies upon ATNS to provide air traffic control (ATC) services to the aircraft operating at FAJS. The facilities (tower) used by ATNS was located on the eastern side of the aerodrome between the runways.

1.10.6 *ATC Coordination*: The FAJS ATC Controlled Zone (CTR) was divided into two sectors along the extended line of taxiway "Charlie" which is north-bound to a point on the FAWK CTR and south to a point on the FAJS CTR. ATNS was controlling the air traffic simultaneously on the parallel runways. In order to facilitate the process, the air traffic was controlled by means of coordination between the control sectors or positions within the tower/unit.

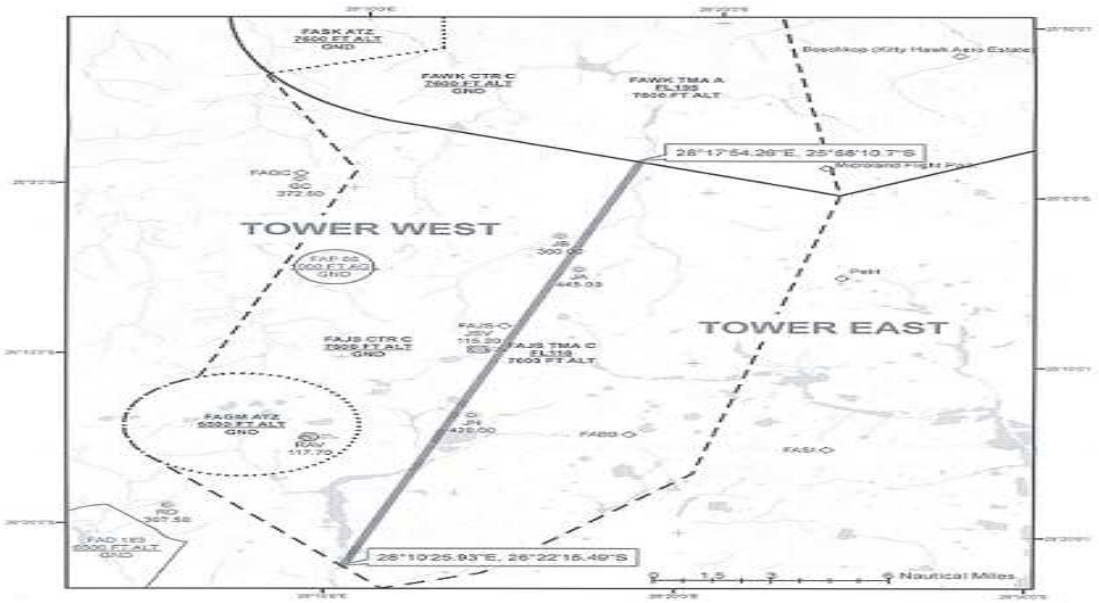

Figure 3, showing controlled zone (CTR) divided into two sectors.

1.10.7 The coordination procedures was as follows:

(i) Tower East transmitted to the aircraft on VHF frequency 118.6 MHz. The controller that was on duty at the tower east work station was facing towards the easterly direction of the aerodrome and looking at RWY 03R/21L. Tower East was responsible for the aircraft landing on Runway 03R/21L and departing from Runway 03R/21L, including those on final approach or on a departure path from the time of handing over to or by radar control. Their responsibility extends to the manoeuvring area between Runway 03R/21L and 03L/21R, up to the holding points for Runway 03L/21R.

Figure 4, shows work station identified as being tower east.

(ii) Tower West transmitted to the aircraft on VHF frequency 118.1 MHz. The two controllers (instructor and student) that were on duty at the tower west work station were facing towards the westerly direction of the aerodrome. The identified controllers were responsible for the air traffic landing at Runway 03L/21R and departing from Runway 03L/21R, including the portion of the final approach and departure path from the time when the aircraft is handed over to or by radar control. They were also responsible for the departing traffic at holding points and aircraft crossing Runway 03L/21R.

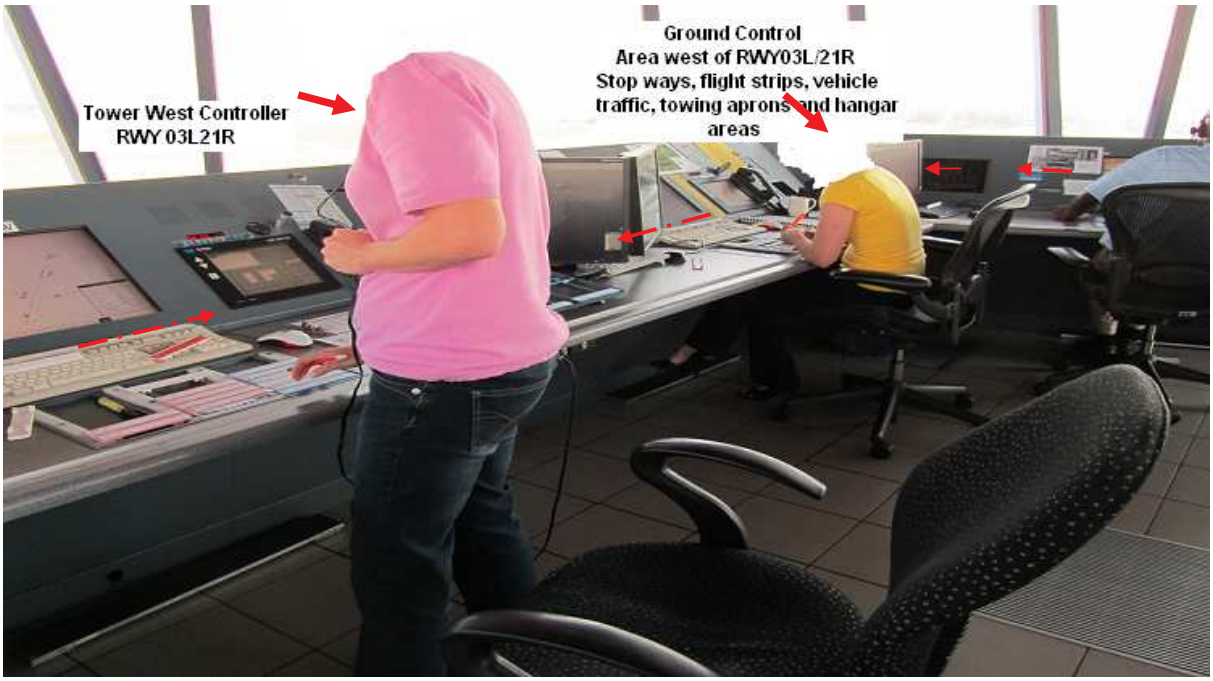

Figure 5, shows different work stations inside the tower.

Figure 6, shows work station identified as being tower west.

(iii) Ground Movement Control was also operating within the tower on the day. The ground controller work station was facing towards the western side of the aerodrome. According FAJS SSI, the ground control was responsible for the portion of the manoeuvring area to the west of Runway 03L/21R; the stop ways, flight strips, motor vehicle traffic, aircraft under tow and own power, including the aprons and hangars areas. However, controllers are reminded that aprons do not fall within the definition “manoeuvring area”. The ATC will provide information and advisory services to aircraft in the aprons based on known traffic.

1.11 Flight Recorders

1.11.1 The Flight Recorders installed on the aircraft were the following:

(i) South African Airways (SAA) aircraft: The Flight Data Recorder (FDR) that was installed in the aircraft was a Plessey type, Part No. 980-4700-042 Serial No. SSEDR10566 and the Cockpit Voice Recorder (CVR) were Part No. 980-6022-001, Serial No. CVR12007102.

(ii) Comair Limited aircraft: The Flight Data Recorder (FDR) that was installed in the aircraft was a Plessey type.

(iii) Both CVR and FDR were in a serviceable condition.

1.11.2 The flight recorders (FDR and CVR) were not downloaded during the investigation. The tower recordings and transcripts obtained from ATNS provided sufficient information.

1.11.3 Immediately after the incident had occurred, the ATC was requested to impound the RPS and Eurocate tapes.

1.11.4 The ASMGCS (Advanced Surface Movement Guidance and Control System) was installed in the tower. The ASMGCS was not commission at the time of the incident, however, the ASMGCS derived information was used in the investigation. The information of the ASMGCS was used because of the advantage it has in giving an objective overview of the aircraft movements on the ground at FAJS. Tower West controller could view the images on the ASMGCS:

(i) When SAA327 first made contact with ATC - Tower West; the flight crew were cleared for takeoff even though the aircraft still had to taxi approximately 1400 m before entering Runway 21R.

(ii) CAW102 was handed over to ATC - Tower West approximately 44 sec after SAA327 was cleared for the takeoff. Tower West instructed the flight crew of CAW102 to stand by approximately 22 sec later. Approximately 1.06 sec after the SAA327 aircraft had been cleared for takeoff, the CAW102 aircraft was then cleared to cross RWY 21R. 23 Seconds after the crossing instruction was given, CAW102 transmitted to ATC – Tower West about the stopbars not being switched off. The ASMGCS system recording also showed that the stopbar was still selected and was indicating a red light. After the CAW102 transmitted, the ATC – Tower West deselected the stopbar showing green. At the time when the stopbar was deselected, SAA327 entered taxiway “November” and crossed the holding point (see figure).

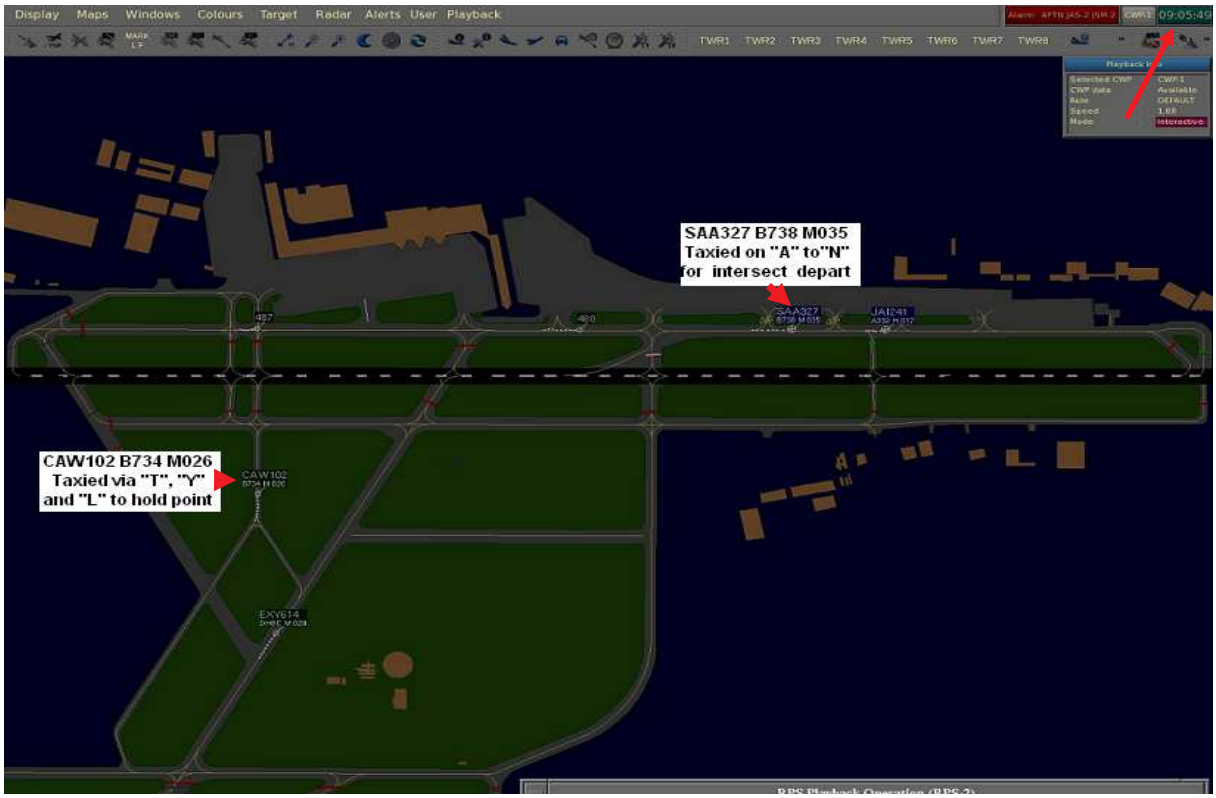

Figure 7, shows ASMGCS image of SAA327 and CAW102.

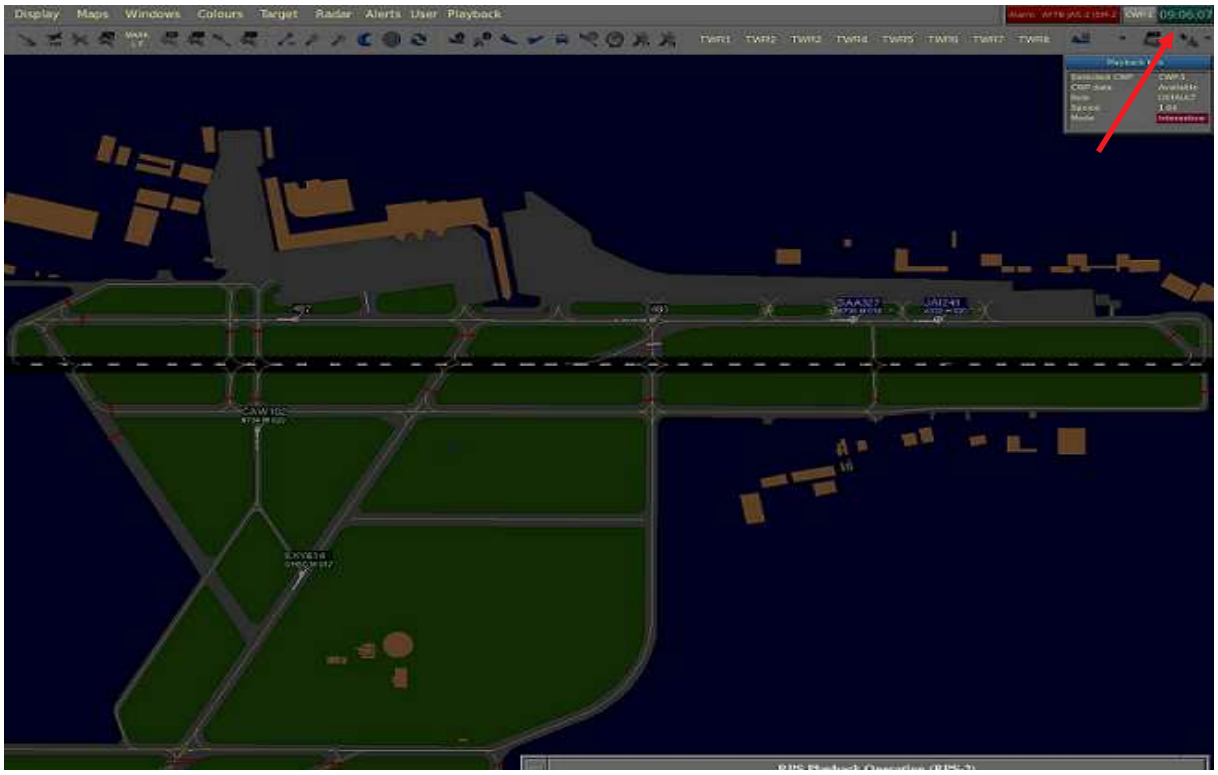

Figure 8, shows ASMGCS image of SAA327 and CAW102.

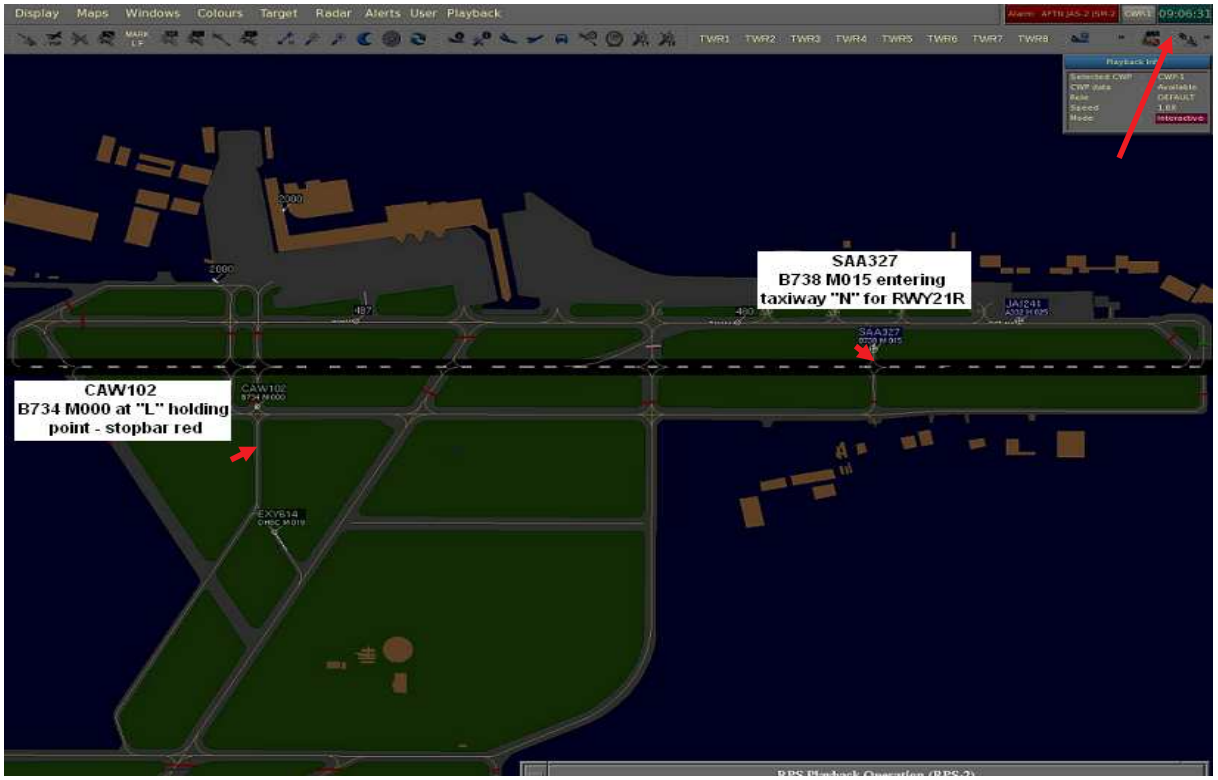

Figure 9, shows ASMGCS image of SAA327 and CAW102.

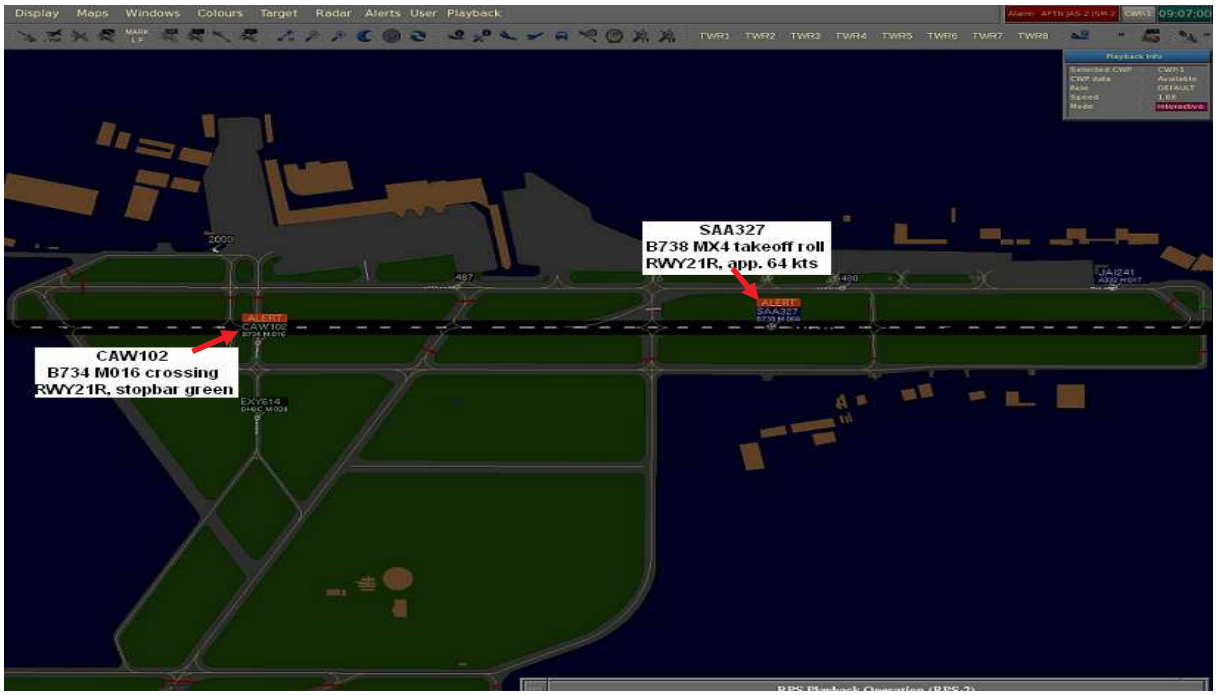

Figure 10, shows ASMGCS image of SAA 327 and CAW 102.

(iii) There were two aircraft (JAI 241 and SAA547) that taxied in front of SAA 327. The crew of JAI 241 transmitted to ATC at 09:05:27. The Tower West controller instructed the crew to hold short of RWY21R. The aircraft taxied to the end of the runway and held short at the holding point. The crew transmitted again to ATC at 09:06:49, indicating that they were ready for departure. Immediately after ATC had received the transmission of JAI 241, they were reminded that SAA 327 was already on the runway and taking off.

(iv) According to the ASMGCS system, SAA 327 was still on taxiway "A" approximately 1445 metres to go to "N" intersection, when the crew transmitted to ATC at 09:01:48. There was no further communication between the SAA327 and ATC – Tower West. After the aircraft entered RWY21R, the crew immediately commenced with takeoff roll at 09:06:44. During the takeoff roll after the aircraft had passed taxiway "H" (approximately 1000 m down the runway) which was 15 sec at 09:06:59, ATC instructed that takeoff should be cancelled.

(v) CAW102 was still on taxiway "L" approximately 470 metres from the holding point of RWY21R, when the crew transmitted to ATC – Tower West at 09:05:43. The ATC responded to the call after 0.07 sec at 09:05:49 when the aircraft was approximately 307 metres from the holding point and informed the crew to standby. When the aircraft was approximately 200 metres from the holding point, ATC cleared them to cross RWY21R at 09:06:05. The aircraft came to a stop approximately 0.05 sec at the stopbar before crossing over RWY21R at 09:07:00. At the time when the aircraft was given clearance to cross RWY21R, it was approximately 1min 6sec after SAA 327 had been given takeoff clearance.

(vi) At the time of the incident, the takeoff roll speed of SAA327 was 64 kts, reaching 101 kts. CAW102 had increased its taxi speed to 22 kts at the time.

1.12 Wreckage and Impact Information

1.12.1 None.

1.13 Medical and Pathological Information

1.13.1 None.

1.14 Fire

1.14.1 None.

1.15 Survival Aspects

1.15.1 The incident was considered to be survivable. There was no damage caused to the aircraft. The occupants of the aircraft did not sustain any injury.

1.15.2 There were no anomalies identified with the aerodrome rescue and fire-fighting (ARFF) activities. ATC indicated that they did not activate the crash alarm, as it was not necessary. Hence the ARFF did dispatch to attend to the incident. The action of ATC in this regard was found to be not incompliance with SSI 4.5.4, Page 34 which states: *"When any aircraft abort take-off the ARFF will be activated".*

1.15.3 Due to the nature of the incident, where the aircraft was still intact and no injury sustained and/or damage caused, there was no need to conduct an emergency evacuation from the aircraft. The occupants disembarked from the aircraft normally.

1.16 Tests and Research

1.16.1 Statistical information about air traffic volumes which were handled in an hourly interval by the ATC as recorded on the day was obtained in the course of the investigation. The information, highlighted in green as follows, was that the Tower West controllers worked in shifts between 05:30 to 12:30 on the day of the incident.

1.16.2 The information in the column shows that from 05:00 to 12:30 the air traffic ranged from 28 to 43 total flight arrivals and departures from O R Tambo International Airport (FAJS). A total quantity of 146 arrivals, 137 departures and 20 overflights were recorded. The total volume on the day during the shift was 303 aircraft.

1.16.3 The Tower East controllers were responsible for the aircraft that landed on Runway 03R/21L. The Tower West controllers were responsible for the aircraft departing and landing on Runway 03L/21R. According to ATNS Tower Logs it shows that 18 aircraft landed on 03L/21R during the period 05:00 to 11:00. See below ATNS daily statistic.

Hour	Local	Arrival	Departure	Overflight	Total
00:00 - 00:59	0	0	1	0	1
01:00 - 01:59	0	0	1	0	1
02:00 - 02:59	0	3	3	0	6
03:00 - 03:59	0	3	8	0	11
04:00 - 04:59	0	7	22	0	29
05:00 - 05:59	0	18	10	0	28
06:00 - 06:59	0	22	12	0	34
07:00 - 07:59	0	21	19	2	42
08:00 - 08:59	0	17	22	1	40
09:00 - 09:59	0	17	22	4	43
10:00 - 10:59	0	17	17	6	40
11:00 - 11:59	0	13	21	5	39
12:00 - 12:59	2	21	14	2	39
13:00 - 13:59	0	21	21	1	43
14:00 - 14:59	0	24	22	0	46
15:00 - 15:59	0	23	13	1	37
16:00 - 16:59	0	15	19	0	34
17:00 - 17:59	0	18	14	0	32
18:00 - 18:59	0	15	14	0	29
19:00 - 19:59	0	8	4	0	12
20:00 - 20:59	0	4	4	0	8
21:00 - 21:59	0	6	0	0	6
22:00 - 22:59	0	0	6	0	6
23:00 - 23:59	0	1	4	0	5
Daily Totals:	2	294	293	22	611

Figure 7, shows FAJS daily statistics for 27 July 2010.

1.17 Organisational and Management Information

1.17.1 Both operators had valid Air Service licences and a Part 121, Air Operating Certificates (AOC). The two aircraft (SAA 327 and CAW 102) were authorised for utilization.

1.17.2 The Standard Operating Procedures (SOP) of the operators were reviewed during the investigation. The aim was to determine if the flight crew had complied with company operation's requirements. On completion of the review it was concluded that the SOPs were complied with.

1.17.3 FAJS was managed by the Airports Company of South Africa (ACSA). The aerodrome was issued with a valid Category 9, Aerodrome Licence on 30 July 2010. The licence was valid until 31 July 2011. There were no anomalies identified with the aerodrome management.

1.17.4 The Air Traffic and Navigation Services (ATNS) was responsible for controlling the air traffic at FAJS. They had a renewal audit on 20 July 2010. During the audit it was determined that the Air Traffic Services Unit (ATSU) complied with the minimum requirements of aerodrome, approach, approach radar, area radar and flight information services as per CAR Part 172. The ATSU was then issued with an ATSU Approval with the expiry date of 31 July 2011.

1.17.5 The ATNS safety office conducted an internal investigation into the runway incursion occurrence. A Preliminary Report was compiled and submitted to the SACAA. The preliminary report stated the following:

(a) "All environment conditions were within the limits of a safe working environment. At the time of the incident the traffic volumes were within reason. The work environment did not have any significant negative effect on the ATC controllers' performances.

(b) Tower West controllers were working a shift one as per roster and had returned from a 30 minute break at 0846Z.

(c) The probable cause of the incident determined to be as a result of Tower West controller giving an early departure clearance to SAA327 and CAW102 to cross the Runway 21R.

(d) The time that the error was detected, the situation was resolved satisfactorily and traffic information correctly passed.

(e) Tower West had two individuals (Instructor and Student). The Instructor awareness of student actions was identified as a factor."

1.17.6 The preliminary report of ATNS included some safety recommendations, which were the following:

(i) "Standards check/OJTI check to the Instructor on first operational shift.

(ii) Counselling sessions to both controllers on the following – clearance issued long in advance of action (e,g. early take-off), situational awareness and OJTI functions."

1.17.7 The incident was reported to the SACAA on 27 July 2010. The incident was not investigated until 29 July 2010 when the SACAA decided to appoint the investigator in charge (IIC). The decision was taken after the Operator of SAA 327 had made enquiries into the progress of the investigation. The SACAA AIID management was responsible for the delay. The following occurred:

(i) ATNS reported the incident to SACAA through the usual means, which was the MOTSETTA reporting system. The AIID was not monitoring the MOTSETTA system and the incident was not detected.

(ii) The Operators reported the incident to AIID management by means of email communication. No action was taken until the operator started making enquiries into the matter. Only then did they decide that an investigation should be conducted to determine the probable cause of the incident.

(iii) The result of the delay was that the aircraft continued to operate. The flight recorders were not removed for downloading, hence relevant information was no longer available at the time when the investigation commenced.

1.17.8 There was evidence found of similar incidents. The indication was that the AIID did not conduct an investigation. ATNS often conducted their own internal investigations after such occurrences, hence the SACAA and AIID have no statistical information of aerodrome occurrences which eventually interfered with operation of the aircraft. As a result there is no trend monitoring of runway incursion incidents to establish the risk factor regarding the aerodrome operations.

1.18 Additional Information

1.18.1 *The radio procedures indicate the following:* Standard ATC phraseology, including read back of clearances and the use of full call sign, must be used at all times. Where these clearances involve level or height changes, arrival, departure, take-off, landing, or taxi clearances including instructions for holding of a runway, then the PF will confirm with the PM. If there is any doubt as to the contents of a clearance or ATC transmission, ATC must be asked to clarify the transmission.

1.18.2 According to ATC Station Standard Instructions, due to the traffic density and specialized complexity of the FAJS Tower environment, prior Tower rating with suitable experience and demonstrated performance skills are required before training at FAJS Tower can commence/be considered. This can only be wavered in exceptional cases. The trainee controllers are reminded that it is not the function of the instructor to teach them the basic procedures taught by ATA. The instructor should not find any trainee seeking knowledge in the basic principles of Air Traffic Control. The trainees bear the onus of ensuring that they are familiar with the relevant principles and that they have familiarized themselves with the contents of the Station Standard Instructions. Trainees cannot expect to perform satisfactorily if they fail to do the necessary studying of all aspects of Air Traffic Control. It is the trainee's responsibility to do the required reading.

1.18.3 *Communication while crossing on taxiway 'LIMA':* All liaisons between sectors are to be done in ENGLISH. Traffic crossing any active Runway is required to be in contact with the relevant Tower position that has jurisdiction of that Runway, i.e. traffic crossing RWY03L will be in contact with Tower West on 118,1 MHz and traffic crossing RWY03R will be in contact with Tower East on 118,6MHz during published HOD. Outside the published HOD of Tower East, control of both Runways will revert to the single Tower position, which will be known as Tower. The jurisdiction of both Runways will now be the responsibility of this single controller and all crossing on either Runway will be requested on 118,1MHz.

1.18.4 When RWY21 is in use and traffic crosses on taxiway 'Lima', they will be instructed by Tower West to hold short of taxiway 'Bravo' and therefore have right of way over traffic taxiing northbound on taxiway 'Alpha'. Ground Control is to ensure any traffic taxiing on 'Alpha' northbound is instructed to hold short of intersection 'Lima' and further taxi must be liaised with Tower West. This liaison need not be conducted via the intercom. Alternately the Ground controller can request with Tower East that all inbound traffic be taken to taxiway 'India' for crossing in which case they will be crossed and held short of taxiway 'Bravo' for further taxi clearance from GMC. Any traffic northbound on 'Alpha' will then be held short of taxiway India by GMC to ensure separation with crossing traffic. Transfer of control and communication will only take place once the crossing traffic is clear of RWY21R.

1.18.5 According to Aeronautical Information Publication (AIP), the Surface Movement Guidance and Control System and Markings section – eg:e FAJS AD 2.9 – 6 dated 2/09 – 15 April 09, item 8, the following is required:

(i) The current layout and operations at FAJS result in aircraft positioning for take-off or parking, having to cross an active runway. In order to prevent excessive flight deck workload and R/T congestions the Aerodrome (Tower) frequency, instructions to cross runways, will be issued by Ground Movement Control (GMC) who will obtain authorisation from Aerodrome Control. It is therefore imperative that pilots fully understand and appropriately acknowledge runway crossing instructions.

1.18.6 Operation of the stop bars: According to the information in Annexure 14 of the International Civil Aviation Organisation (ICAO), there is the risk of runway incursion in all visibility or weather conditions. The installation of stop bars at runway holding positions can form part of effective runway incursion preventative measures. The stop bars consist of lights spaced across the taxiway, showing red in the intended direction of approach to the intersection or runway holding position. The stop bars are normally controlled manually or automatically by ATC.

1.18.7 According to Aeronautical Information Publication (AIP), under Surface Movement Guidance and Control System and Markings section, the information about stop bars at FAJS is as follows:

(i) There are stop bars on all runway and taxiway intersections. No crossing of red stop bar lights will be allowed unless specifically approved by ATC and accompanied by a leader vehicle.

1.18.8 According to ATNS Station Standard Instructions (SSI), the operation of the stop bar is as follows:

(i) The stop bars must be operated on a 24/7 basis. The controller affecting the crossing clearance is also responsible for the operation of the relevant stop bar. Controllers are to ensure that all stop bars are correctly activated prior to clearances being issued.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 In order to reduce radio congestion and consequences resulting from pilot and/or ATC errors, ATNS split the tower activities into more positions (Tower East, Tower West and Ground Control etc.). Tower West was responsible for controlling the traffic/movements on the western side of the aerodrome, especially those aircraft that were taxiing toward and taking off from Runway 21R. Tower East was responsible for controlling the aircraft on the eastern side of the aerodrome, especially those that landed on Runway 03R/21L up to the holding point "Lima" of Runway 21R. The Ground Controller's responsibility was the portion of manoeuvring area on the western side of the aerodrome.

2.2 The aircraft SAA 327 (taking off) and CAW 102 (landing) were controlled by two separate ATC controllers. SAA 327 was controlled by Tower West and CAW 102 by Tower East. CAW 102 was then handed over to Tower West prior to crossing RWY 21R. Both aircraft was then under the control of Tower West. But there were other aircraft too, which ~~was~~were taxiing behind SAA 327 and CAW 102, controlled by Tower West. The communication was transmitted on VHF radio frequency 118.1MHz (Tower West), 118.6 MHz (Tower East) and 124.6 MHz (Ground Control). There was no report of a defect or malfunction experienced with the radio communication equipment installed inside the tower. The communication equipment was in a serviceable condition.

2.3 SAA 327 (Boeing 737 – 800) was pushed back from the "Charlie #3" parking bay and taxied in a northerly direction to takeoff from RWY 21R. The aircraft was scheduled on a domestic air transportation flight from FAJS to FACT. There were 130 occupants on board the aircraft at the time. There was no report of any defects or malfunction experienced prior to the incident. The aircraft was in a serviceable condition on the day.

2.4 CAW 102 (Boeing 737 – 400) flew in on a scheduled domestic air transportation flight from FACT to FAJS. There were 123 occupants on board the aircraft at the time. There was no report of a defect or malfunction experienced with the aircraft. The aircraft was in a serviceable condition on the day. After the aircraft had landed on RWY 21L, it exited the runway and taxied via taxiways "Tango, Yankee and Lima" heading to the holding point of Lima RWY 21R. The flight crew's intention was to cross RWY 21R.

2.5 At 09:01:48 UTC, SAA 327 transmitted to ATC and reported that they were ready. At

09:04:52 UTC, ATC – Tower West transmitted to the aircraft and cleared them to takeoff from RWY 21R. The position of the aircraft was approximately 1445 metres away from the “November” intersection where the aircraft was to commence with its takeoff roll. The aircraft took approximately 2 min7 sec before reaching RWY 21R. Immediately when the aircraft entered the runway, the flight crew started with the takeoff roll as they were cleared to do so.

2.6 At 09:05:43 UTC, CAW 102 transmitted to ATC. At 09:06:05 UTC, Tower West cleared them to cross RWY 21R. The aircraft was approximately 200 metres from the holding point “Lima” at the time. The aircraft took approximately 1min 43 sec before reaching the holding point. When the aircraft arrived at the holding point, the flight crew found that the stop bars’ “red lights” were switched on, which was an indication that RWY 21R was not safe to cross. The flight crew first reminded ATC of the situation regarding the stop bars. They refused to cross the runway until the stop bars’ “red light” was switched off. ATC realised that they did not turn off the stopbars when issuing the crossing clearance and then turned off the stopbars after being challenged by the crew of CAW102.. Only then did the aircraft started to taxi forward and cross the runway.

2.7 At the time when SAA 327 entered the runway, the flight crew did not expect that other traffic would use the active runway until after the takeoff. SAA 327 then commenced with its takeoff roll as normal. The evidence shows that the flight crew of SAA 327 did not pay attention to the radio broadcast between ATC and CAW 102. They would have heard that ATC was giving clearance to CAW 102 to cross the active runway. The flight crew did say that they saw the CAW 102 aircraft standing at the holding point of RWY 21R. Their impression of the situation was that the aircraft was probably waiting for them to takeoff. Hence, they made the decision to commence with takeoff roll.

2.8 The flight crew of CAW 102 stated that they were aware of the takeoff clearance being given to SAA 327, but they were not sure if SAA 327 was aware of their intention to cross the runway. The flight crew did not say anything to ATC about their concern regarding being cleared to cross the runway, while the other aircraft was cleared to takeoff from the same runway. Based on these facts evidently both SAA 327 and CAW 102 flight crews were confirmation biased that ATC had the situation under control.

2.9 The sequence of events show that Tower West controllers were not in control of the situation. The situational awareness, which is their ability to keep track of the prioritised significant events and conditions in the environment of the subject, did not allow them to immediately detect the error. It is the opinion of the investigator that the reason could be because of their behaviour displayed in the tower, which was complacency and over-confident. The result was inattention which is probably due to the undemanding environment as seen by the workload at the time. There was no threat of anything going wrong, which heightened a false sense of security within them. By the time that the threat of runway incursion was detected, it was almost too late because both aircraft were already on course to a collision on the runway.

2.10 The controllers became alert of the situation unfolding, only after the flight crew of JAI 241 reported that they were ready to depart from RWY 21R. The aircraft JAI 241 was taxiing in front of SAA 327. The flight crew of JAI 412 transmitted to Tower West after SAA 327 was cleared to takeoff, which could have been easily construed that they

were behind SAA 327. This is the reason why it was important for the controllers to manage the strip cards. JAI 241was the only aircraft to have use full length and not an intersection for departure during the shift and crucial timing of their call could have aided the controller in identifying his error as he looked past the intersection toward full length and identified that SAA 327 was departing while CAW 102 was crossing. In the end, it was determined that their call helped the controllers to again focus and eventually identify the threat of the runway incursion.

2.11 The consequence and danger was that CAW 102 crossed the runway using taxiway "Lima" which intersects with the active RWY 21R. SAA 327 was essentially on a collision course with CAW 102, if takeoff was not cancelled. Due to the distance between taxiways "Lima" and "November" the flight crew of CAW 102 could not see what SAA 327 was doing. During the takeoff roll, Tower West realised their error and the threat of having a runway incursion. SAA 327's takeoff roll speed was between 80 to 90 knots indicated airspeed at the time. It was still below $V_{1\ (decision\ speed)}$ and the flight crew could safely abort the takeoff. A disaster was imminent, that of having the two aircraft colliding, probably with the result of having a considerable number of occupants fatally or seriously injured.

2.12 The flight crew and flight attendants had valid licences with type rating endorsed on it. They had valid medical certificates with no waivers. All the crew members were in good physical health and had no medical complications which could have prevented them from flying the aircraft on the day. Their duty time was reviewed and no anomaly was identified.

2.13 All the controllers that were on duty in the tower on that day had received appropriate training, were adequately experienced and had valid licences and ratings to perform the required duties. Tower West was under dual control due to-on-the job training instruction (OJTI) taking place. The student was already a qualified individual with extensive practical air traffic control exposure and experience. The student had first worked at FAWB, which was much smaller in size and less demanding than FAJS. The training he had received was to convert him to FAJS operations station standards. He had only accumulated 20 hours of training time when the incident occurred.

2.14 The evidence shows that the student had been involved in other incidents during the Approach Control OJT training process. The employer (ATNS) was still in the process of investigating the incidents to determine the causes, when the runway incursion incident under discussion occurred. According to the training log, the evidence shows that the instructors grading of the student's performance during the Tower Control training that he was not performing satisfactorily. The instructors had identified the problem to be the inability of the student to do the following; "***sequence for rotation of strips, crossing cards, and stop bars co-ordination,"*** which were identified in the investigation as factors that contributed to the incident. It is the opinion of the investigator that the student was having a problem adapting to the ATC operational requirements of FAJS. During the few weeks when he was doing practical training in the tower, week after week the same result of poor performance was noted. The student was not improving on the identified items until the incident occurred.

2.15 An apology was made to the flight crews of SAA 327 and CAW 102 after the incident. The controllers were acknowledging that they had committed an error which was

identified as a “mistake”. It was life threatening and could have been a very costly mistake if it had not been detected early.

3. CONCLUSION

3.1 Findings

3.1.1 SAA327 and CAW 102 were scheduled on a domestic commercial flights between FAJS and FACT.

3.1.2 SAA 327 had 130 occupants and CAW 102 had 123 occupants on board the aircraft.

3.1.3 There was no report that any defect or malfunction was experienced with both aircraft. The aircraft were in a serviceable condition.

3.1.4 Both flight crews of SAA327 had valid Airline Transport Pilot’s Licences (ATPL) and the B737- 800 type rating was endorsed on their licences. The crew had valid Aviation Medical Certificates with no waivers.

3.1.5 Both flight deck crews of CAW102 had valid Airline Transport Pilot’s Licences (ATPL) and the aircraft type rating was endorsed on their licences. The crew had valid Aviation Medical Certificates with no waivers.

3.1.6 The flight attendants on duty on board both SAA327 and CAW102 had valid Flight Attendants Licences. The aircraft type rating was endorsed on their licences.

3.1.7 None of the occupants carried on board either SAA327 or CAW102 aircraft sustained any injuries in the incident.

3.1.8 SAA 327 received early takeoff clearance at 09:04:59 UCT. The aircraft was still taxiing on taxiway “A” approximately 1445 metres from “N” intersection which was the location where takeoff commenced.

3.1.9 CAW 102 received early crossing instructions at 09:06:11 UTC. The aircraft was still taxiing on taxiway “L” approximately 200 metres from the holding point of RWY 21R.

3.1.10 When CAW 102 arrived at the holding point of RWY 21R, the aircraft came to a stop due to stopbars that were switched on; the “red light illuminating,” which was an indication that the runway was not safe to cross.

3.1.11 The flight crew of CAW 102 had to remind ATC - Tower West of the stopbars issue. Only after this “reminder” did ATC realise to switch off the stopbars before the aircraft crossed over.

3.1.12 SAA 327 commenced with takeoff on RWY 21R, reaching takeoff roll speed of approximately 101 kts, (having gone 1000 metres down the runway) when suddenly

being informed by ATC – Tower West to cancel the takeoff at 09:06:59 UTC as a result of CAW 102 crossing the runway on taxiway "L". A runway incursion incident was avoided through this action.

3.1.14 CAW 102 crossed RWY 21R, while SAA 327 cancelled the takeoff safely. Neither of the aircraft sustained any damage during the incident.

3.1.15 The ATC controller's workload was assessed as low with normal complexity.

3.1.15 During the investigation process it was found that the South African Weather Services Report indicated that the surface analysis of the meteorological conditions at the time or close to the time of the incident such as temperature, dew point, surface wind, cloud cover and visibility was satisfactory (CAVOK).

3.1.18 The ATC – Tower West was not in accordance with the requirements of "aborted takeoffs" procedures in terms of Station Standard Instructions (SSI), Part 4, Section (4.5.4) when deciding not to activate the crash alarm and inform the fire station.

3.2 Probable Cause/s

3.2.1 Rejected takeoff due to runway incursion.

Contributory Factors

3.2.2 Error caused by ATC when giving instructions to one aircraft whilst taxiing to cross the active runway, after takeoff clearance was given to another aircraft using the same runway.

3.2.3 Early takeoff clearance given to SAA 327, while still taxiing on taxiway "A" to RWY 21R holding point.

3.2.4 Early crossing instruction given to CAW 102, while still taxiing on taxiway "L" to RWY 21R holding point.

3.2.5 The situational awareness (ability to keep track of the prioritised significant events and conditions in the environment of the subject) did not allow the ATC – Tower West to immediately detect the error.

3.2.6 The ATC – Tower West controllers (instructor and student) became complacent due to a sense of security, over-confidence and a perceived absence of threat resulting in inattention, due to the undemanding environment on the day.

4. SAFETY RECOMMENDATIONS

4.1 It is recommended that the Director of Civil Aviation (DCA) through the relevant department/division develop a requirement that ATNS should institute mandatory, recurrent, proficiency training related to reducing runway incursions for all controllers in high-fidelity tower simulators.

4.2 It is recommended that the Director of Civil Aviation (DCA) through the relevant department/division develop a requirement that Airlines/Operators and ATNS should increase training on runway crossing instructions and/or procedures.

4.3 It is recommended that the Director of Civil Aviation (DCA) through the relevant department/division develop a requirement that ATNS should develop (if not already existing) or amend the current Station Standard Instructions (SSI) to include an Air Traffic Control Resource Management (ATCRM) programme for aerodromes where co-ordination between two or more sectors exists.

4.4 It is recommended that the Director of Civil Aviation (DCA) through the relevant department/division develop a requirement that ATNS should change their procedures to give guidance to controllers regarding the minimum time interval/estimated distances from the runway holding point where takeoff and crossing clearances may be issued. This recommendation may reduce the chance of this type of incident happening again, where aircraft should not be cleared too early.

4.5 It is recommended that the Director of Civil Aviation (DCA) through the relevant department/division should define standard data requirements and standard data analysis methodologies for reports of events that may be classified as runway incursions in the Republic.

5. APPENDICES

5.1 Appendix A: Copy of OCC Logs
5.2 Appendix B: Copy of Transcript

Compiled by:

..... Date: ……..
For: Director of Civil Aviation

Investigator-in-charge : …… Date: ……..

Co-Investigator : …… Date: ……..

Appendices A:

ATNS Occurrence Log Entry

ATNS – FAJS TOWER OCCURRENCE LOG

DATE: 27-07-2010 Tuesday

TIME	ITEM	INITIALS	OPERATIONAL COMMENTS
0000	1	KB	RNX 7119 HAS BEEN TAKEN TO SAR
0219	RWY	KB	RWY 03L/21R Inspected, open & SERV
0402	Test	NIC	Crash alarms tested + serv.
0416	Insp	NIC	RWY 03R/21L insp + serv.
0445	RABBIT CLEAN UP	KB	Rwy 03R, clear & serviceable (Rose 1)
0458	RWY CHANGE	KB	Rwy 21 IN-USE.
0910	RWY INC	CE/NK	SAA327 CLEARED FOR TAKEOFF RWY 20R
			CAL 203 CLEARED TO CROSS RWY 21R
		KB	SAA327 DEP CLEARANCE CANCELLED AFTER
			TAKEOFF ROLL WAS COMMENCED. INC PROCED
			PM TWR INFORMED.
1124	STRIP PRINTER	RK	AS PART OF THE CONSOLE UPGRADE PROJECT THE
			STRIP PRINTER AT CLD WILL BE REMOVED TEMPORARILY
			NIGHT DURING THE DAYLIGHT.
1210	RWY INSP	RK	Rwy 03R/21L completed. Clear & serviceable
1235	RWY	A.K.	RWY 03L/21R INSPECTED + SERVICEABLE
1350	STOPBARS	RK	ON NOVEMBER FAULTY, 2 LIGHTS REMAINS
			ILLUMINATED, ELECTRICIANS ADVISED VIA TECH
			SUPPORT.
1416	SAA338	GF	SAA338 request a reposition final 21L.
			700 high on approach. Inbnd filed Launc
			Safe Out 1425
1600	ALARMS	A.K.	CRASH ALARMS TESTED ALL 3 WORK.
1703	STOPBAR	L.H	INTERSECTION NOVEMBER STOPBAR LIGHTS
			ALL SERVICEABL.
1850	TWR	GVG	TOWER & GND COMBINED
2040	RWY	GVG	RWY21R/03L OPENS SERVICEABLE.
2110	RWY	GVG	RWY 21L/03R CLOSED FOR MAINTENANCE.

Appendices B:

SECTION 4 APPENDIX O

ATS AUDIO TRANSCRIPT FORMAT

Transcript of 118,1Mhz voice recordings on Js Tower West, *(Date – 27/07/2010)* regarding Safety Event involving CAW102 and SAA327.

- The transcript was made by C.N. Searle from the ATS recording. The recording is of operational frequency 118,1MHz;
- Times in HH:MM:ss UTC;
- Source may be either of the following: **RTF**, Intercom, ATS DS, **composite;**
- Station refers to any aircraft, ATC position or vehicle making the transmission;
- Text of transmission is the contents of the transmission for that specific time;
- For easy reading letters in the phonetic alphabet should be transcribed as uppercase italic letters only, even though the full word is used on the RT;
- Comments are for the investigator when analysing the context of the transmissions.

Time	Source	Station	Text of transmission	Comments
08:55:43		ATC	SAA062 LINE UP AND WAIT RWY21R N	
08:55:47		SAA062	LINE UP AND WAIT RWY21R N, SAA062	
08:55:59		ATC	BOT203 CROSS RWY21R E FOR THE BAY	
08:56:04		BOT203	CROSS 21R E FOR THE BAY, BOT203	
08:56:52		ATC	BOT203 MONITOR GROUND 121,9 BYE BYE	
08:56:55		BOT203	MONITOR GROUND 121 9, BYE BYE, BOT203	
08:56:58		ATC	SAA062, RWY21R, N, CLEARED TAKE OFF, SURFACE WIND IS 210 DEGREES 10KTS, BYE BYE	
08:57:05		SAA062	CLEARED FOR TAKE OFF 21R FROM N,SAA062, BYE BYE	
08:57:23		ATC	BEU862, LINE UP AND WAIT RWY21R N	
08:57:27		BEU862	LINE UP AND WAIT RWY 21R N BEU862 AND JUST FOR YOUR INFORMATION WE NEED A MINUTE AND A HALF PLEASE	
08:57:36		ATC	COPIED BEU862	
08:58:13		ATC	BEU862 WHEN READY CLEARED TAKE OFF RWY21R, SURFACE WIND IS 210 DEGREES 8 KTS, BYE BYE	
08:58:20		BEU862	THANK YOU, WHEN READY CLEARED FOR TAKE OFF RWY21R, PLEASANT DAY	
08:59:39		ATC	HGS CONFIRM HELICOPTER TYPE	
08:59:43		ZSHGS	GARBLED	
09:00:36		ATC	HGS WATERKLOOF 124,1 BYE BYE	

Time	Source	Station	Text of transmission	Comments
????		ZSHGS	CANNOT HEAR HGS TRANSMISSION	
09:01:01		SAA547	TOWER WEST GOOD MORNING SAA547, READY WHEN REACHING	
09:01:04		ATC	SAA547, GOOD DAY, LINE UP AND WAIT RWY21R N	
09:01:09		SAA547	LINE UP AND WAIT 21R, N, SAA547	
09:01:33		ATC	SAA547, RWY21R N, CLEARED TAKE OFF, SURFACE WIND IS 210 DEGRESS 12KTS, BYE BYE	
09:01:39		SAA547	CLEARED FOR TAKE OFF RWY21R N, SAA547	* SA 547 CLD FOR T/O
09:01:48		SAA327	TOWER WEST GOOD MORNING, IT'S SAA327, READY	
09:04:52		ATC	SAA327, GOOD DAY, RWY21R N CLEARED TAKE OFF, SURFACE WIND IS 210 DEGRESS 10KTS, BYE BYE	* SA 327 CLD FOR T/O (3
09:04:59		SAA327	RWY21R FROM N, CLEARED FOR TAKE OFF, SAA327, BYE BYE	
09:05:20		FKZ001	TOWER GOOD MORNING FKZ001, READY IN TURN	
09:05:27		JAI241	TOWER GOOD MORNING JAI241	
09:05:30		ATC	JAI241 GOOD DAY, LISTEN OUT FOR DEPARTURE	
09:05:34		JAI241	SAY AGAIN FOR JAI241	
09:05:36		ATC	JAI241 HOLD SHORT RWY21R	
09:05:39		JAI241	HOLD SHORT RWY21R, JAI241	
09:05:43		CAW102	JOHANNEBSURG TOWER GOOD MORNING CAW102	
09:05:49		ATC	CAW102, GOOD DAY, STANDBY	
09:05:53		CAW102	STANDBY	
09:05:55		FKZ001	TOWER GOOD MORNING FKZ001	
09:06:05		ATC	CAW102 CROSS RWY21R, RIGHT A, F FOR THE BAY	
09:06:11		CAW102	CROSS 21R, RIGHT A, F FOR THE BAY CAW102	
09:06:16		EXY614	TOWER, MORNING EXY614	
09:06:20		ATC	EXY614, GOOD DAY, STANDBY	
09:06:22		EXY614	STANDBY	
09:06:24		FKZ001	TOWER GOOD MORNING FKZ001	
09:06:28		ATC	STANDBY	
09:06:34		ATC	FKZ001, GOOD DAY, HOLD SHORT RWY21R	
09:06:38		FKZ001	HOLD SHORT 21R AND N ON REQUEST FKZ001	
09:06:43		ATC	FKZ001	
09:06:49		JAI241	JAI241 IS READY FOR DEPARTURE	

Time	Source	Station	Text of transmission	Comments
09:06:59		ATC	SAA3...SAA32.....SAA327 CANCEL THE TAKE OFF CLEARANCE PLEASE TRAFFIC IS CROSSING ON L	* 1-5' AFTER T/O 6
09:07:08		SAA327	WE ARE STOPPING SAA327	
09:07:10		ATC	THANKS A LOT, YOU CAN VACATE RIGHT ONTO E, RIGHT ONTO A AGAIN, HOLD SHORT 21R, N	
09:07:14		SAA327	RIGHT E, A, HOLD SHORT 21R N, SAA327	
09:07:25		SAA327	TOWER, SAY AGAIN THOSE TAXI INSTRUCTIONS FOR SAA327	
09:07:26			....INAUDIBLE....	
09:07:28		ATC	RIGHT ONTO E, RIGHT A, HOLD SHORT OF N	
09:07:32		SAA327	RIGHT E, A, HOLD SHORT OF N SAA327	
09:07:37		ATC	AND CAW102, CONTINUE F FOR THE BAY, MONITOR 121 9	
09:07:42		CAW102	F FOR THE BAY, MONITOR 121 9, CAW102	
09:07:46		????	WHO'S IN POO NOW?	
09:07:51		ATC	EXY614 CROSS RWY03L ON L, HOLD SHORT OF B	
09:07:54		EXY614	CROSS 03L ON L, HOLD SHORT B, EXY614	
09:07:59		JAI241	JAI241 IS READY FOR DEPARTURE	
09:08:02		ATC	FKZ001 LINE UP AND WAIT RWY21R, N	
09:08:05		FKZ001	LINE UP AND WAIT RWY21R ON N, FKZ001	
09:08:08		ATC	JAI241 LINE UP AND WAIT RWY21R	
09:08:11		JAI241	LINE UP AND WAIT RWY21R JAI241	
09:08:27		ATC	EXY614 CONTACT GROUND 121,9 SHORT OF B	
09:08:30		EXY614	121 9 BYE BYE, EXY614	
09:08:47		ATC	FKZ001 RWY21R N, CLEARED FOR TAKE OFF, SURFACE WIND 230 DEGREES 11KTS	
09:08:52		FKZ001	CLEARED TAKE OFF 21R, FKZ001, THANK YOU, BYE	
09:09:04		ATC	SAA327 N LINE UP AND WAIT RWY21R	
09:09:09		SAA327	N LINE UP AND WAIT 21R SAA327	
09:09:32		CAW291	TOWER MORNING CAW291 IS READY	
09:09:35		ATC	CAW291 GOOD DAY, HOLD SHORT RWY21R	
09:09:38		CAW291	HOLD SHORT 21R, CAW291	
09:09:42		ATC	JAI241 AIRCRAFT WILL BE DEPARTING AHEAD OFF N	
09:09:44		JAI241	COPIED SIR WE ARE HOLDING RWY21R JAI241	
09:09:47		ATC	THANK YOU	

Time	Source	Station	Text of transmission	Comments
09:10:04		ATC	SAA327, HUMBLEST APPOLOGIES ABOUT THAT SIR, N 21R CLEARED FOR TAKE OFF, THE SURFACE WIND 190 DEGRESS 13 KTS, HAVE A SAFE FLIGHT	
09:10:12		SAA327	SURE, NO PROBLEM UH, CLEARED FOR TAKE OFF RWY21R N, WE JUST WANT TO HOLD FOR ABOUT 30 SECONDS, WE JUST WANT TO MAKE SURE WE'VE GOT EVERYTHING SORTED	
09:10:20		ATC	SURE, YOU CAN REPORT READY TO ROLL SIR	
09:10:22		SAA327	WILCO	
09:11:45		SAA327	SAA327 IS READY	
09:44:48		ATC	THANK YOU SAA327, THE WIND CHECK 120 DEGREES 11KTS, CLEARED TAKE OFF 21R N, APPOLOGIES ONCE AGAIN, HAVE A SAFE FLIGHT	
09:11:55		SAA327	RWY21R, N CLEARED FOR TAKE OFF,AND APPOLOGY ACCEPTED, NO PROBLEM, SAA327, BYE BYE	
09:12:00		ATC	CHEERS	
09:12:26		CAW241	TOWER GOOD DAY, CAW241 READY	
09:12:30		ATC	CAW241 GOOD DAY, LISTEN OUT FOR DEPARTURE	
09:12:32		CAW241	LISTENING OUT, CAW241	
09:12:40		SAA040	JOBURG TOWER, A VERY GOOD MORNING TO YOU, SAA040 READY IN TURN	
09:12:46		ATC	CAW241 GOOD DAY, HOLD SHORT RWY21R	
09:12:50		CAW241	HOLD SHORT RWY21R, CAW241	
19:13:34		ATC	JAI241, RWY21R FULL LENGTH, CLEARED TAKE OFF, SURFACE WIND 210 DEGREES 10KTS, BYE BYE	
09:13:49		JAI241	RWY21R, CLEARED FOR TAKE OFF JAI241, GOOD BYE	
09:13:53		SAA040	JOBURG TOWER, A VERY GOOD MORNING TO YOU, SAA040 READY IN TURN	
09:13:56		ATC	SAA040, GOOD DAY, LISTEN OUT FOR DEPARTURE	
09:14:00		SAA040	LISTENING OUT, 040	
09:14:03		ATC	CAW291, LINE UP AND WAIT, RWY 21R	
09:14:05		CAW291	LINE UP AND WAIT 21R, CAW291	

Riette Knowles
Pool Manager: JHB Tower