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Schweizerische Unfalluntersuchungsstelle SUST
Service d'enquête suisse sur les accidents SESA
Servizio d'inchiesta svizzero sugli infortuni SISI
Swiss Accident Investigation Board SAIB

Aviation Division

Final Report No. 2185 of the Swiss Accident Investigation Board SAIB

concerning the serious incident
(AIRPROX)

involving the Cessna Citation C550B
aircraft, registration CS-DHI, callsign NJE
262Q

and the Cap 10B aircraft, registration
HB-SBE

on 30 August 2011 in the Sion CTR, in the
immediate vicinity of the airport

General information on this report

This report contains the Swiss Accident Investigation Board's (SAIB) conclusions on the circumstances and causes of this serious incident.

In accordance with Art. 3.1 of the 10th edition, applicable from 18 November 2010, of Annex 13 of the Convention on International Civil Aviation (ICAO) of 7 December 1944 and Article 24 of the Federal Air Navigation Act, the sole purpose of the investigation of an aircraft accident or serious incident is to prevent accidents or serious incidents. The legal assessment of accident/incident causes and circumstances is expressly no concern of the accident investigation. It is therefore not the purpose of this report to determine blame or clarify questions of liability.

If this report is used for purposes other than accident prevention, this may give rise to erroneous interpretations.

The definitive version of this report is the original in the French language.

All times in this report, unless otherwise indicated, are stated in local time (LT). At the time of the incident, Central European Summer Time (CEST) applied as local time in Switzerland. The relation between LT, CEST and UTC is: $LT = CEST = UTC + 2 \text{ hours}$.

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Final report

Summary

Aircraft 1

Owner	NetJets Transportes Aéreos, SA, Lisbon, Portugal
Operator	NetJets Transportes Aéreos, SA, Lisbon, Portugal
Manufacturer	Cessna Aircraft Company, Wichita, Kansas, USA
Aircraft type	Citation C550B
Country of registration	Portugal
Registration	CS-DHI
Flight number	NJE 262Q
Callsign	Fraction two six two quebec
Flight rules	IFR
Type of operation	Commercial
Departure point	Sion, LSGS
Destination point	Nice, LFMN

Aircraft 2

Owner	Private
Operator	Private
Manufacturer	Constructions Aéronautiques de Bourgogne
Aircraft type	Mudry CAP 10B
Country of registration	Switzerland
Registration	HB-SBE
Callsign	Hotel Bravo Sierra Bravo Echo
Flight rules	VFR
Type of operation	Training
Departure point	Sion, LSGS
Destination point	Sion, LSGS
Location of the serious incident	Sion CTR, over the extended centreline of runway 25
Date and time	30 August 2011, 12:22 UTC
ATS unit	Sion aerodrome control
Airspace	Class D
Maximum convergence	0.5 NM lateral separation at the same altitude
Prescribed minimum separation	No prescribed IFR/VFR separation, mandatory traffic information
Airprox category of the serious incident	ICAO - category A - high risk of collision

Investigation

The serious incident occurred on 30 August 2011 at 12:22 UTC. It was notified on 2 September 2011 at 11:17 UTC. The federal Aircraft Accident Investigation Bureau (AAIB) opened an investigation on 3 November 2011 at 14:08 UTC.

The AAIB reported the incident to the Portuguese authority, GPIAA / Lisbon - Portugal, which nominated an accredited representative.

The airspace in which the serious incident took place is located in Switzerland.

The investigation report is published by the Swiss Accident Investigation Board (SAIB).

Synopsis

On 30 August 2011, a Cessna C550B type aircraft, registration CS-DHI, on a commercial IFR flight from Sion to Nice, took off from runway 25, following a high-performance departure route.

Approximately 30 seconds later, a CAP 10B, an aerobatic aircraft on a VFR flight, registration HB-SBE, completed its movements over Sion airport and reported that it was descending to land. Before turning left, to cross the valley and reach the beginning of the runway 25 downwind leg, it headed away from the airport in the direction of Martigny.

When HB-SBE was initiating the first left turn, one of the pilots noticed the Cessna 550B which was on a trajectory at right angles to its own, climbing from left to right. The Cessna received an RA (resolution advisory) on its TCAS and continued to climb according to its departure route.

According to the TCAS and radar records, at the closest point of approach the lateral separation was 0.5 NM with the aircraft at the same altitude. At the crossing of the trajectories, the IFR aircraft was 500 ft higher than the VFR aircraft.

Cause

The serious incident is attributable to a dangerous convergence between a VFR aircraft flying onto the downwind leg in descent after an aerobatic programme, and an IFR aircraft which was taking off.

Factors which played a part in the serious incident:

- Non-application of the procedure governing aerobatic flights in the CTR with regard to IFR traffic.
- No traffic information was issued.

Safety recommendations

None

Structure of the airspace

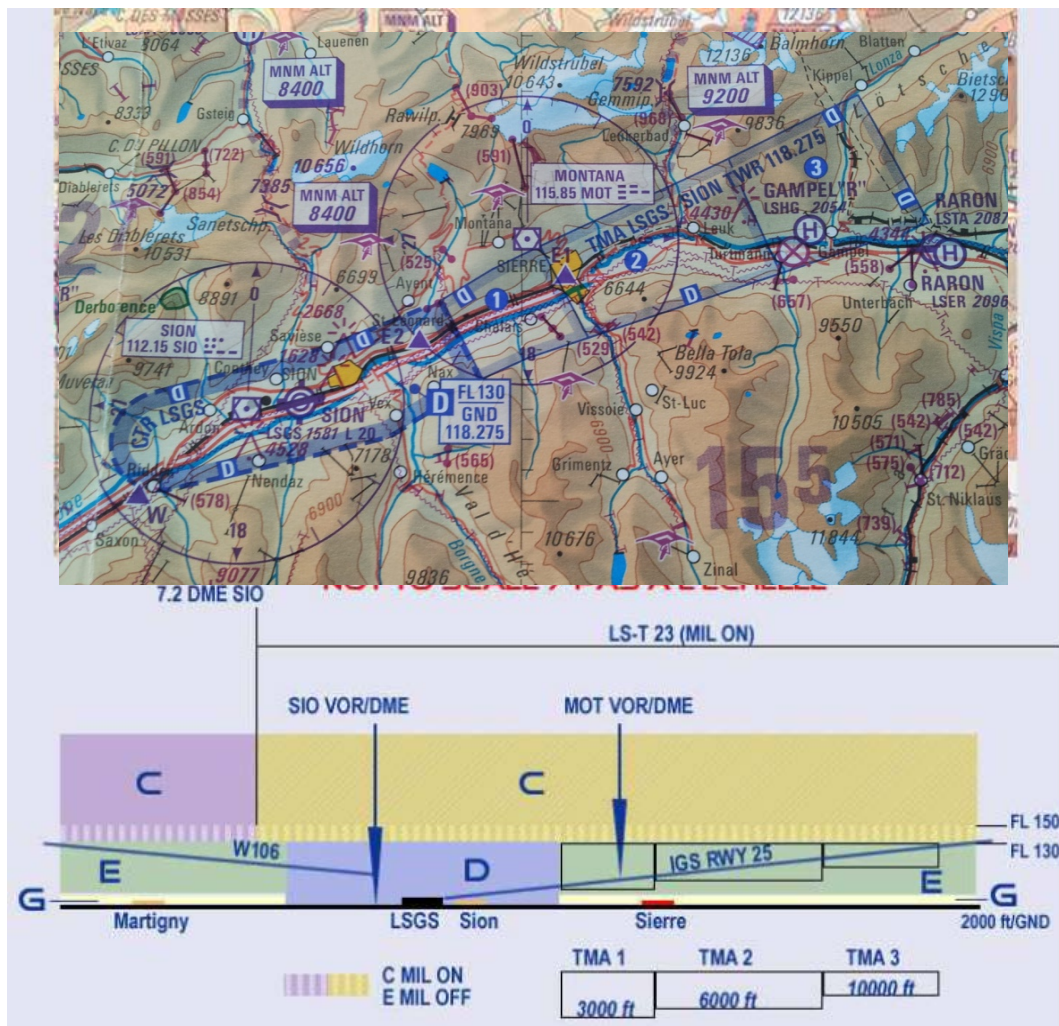


Figure 2: Sion CTR and TMA (Class C or E between FL130 and FL150 according military activity)

1.1.2 Working environment



Figure 3: View west, from the side of the end of runway 25, from the control tower

The 3 workstations in the control tower

- ADC Aerodrome control;
- GND Ground control;
- COOR / APP Coordinator / Approach / MIL INFO are organised according to the diagram below.

Diagram:

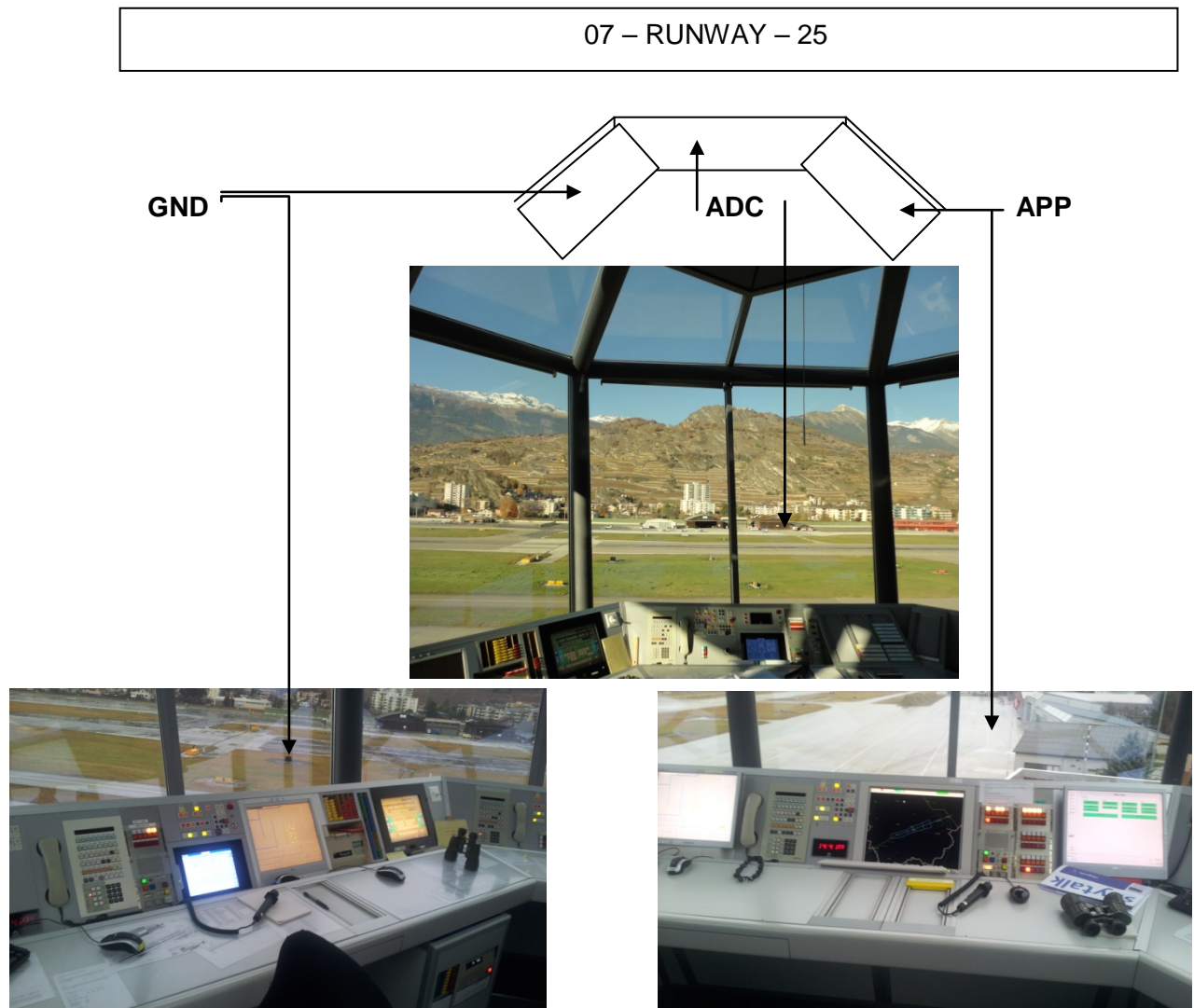


Figure 4: Views from the workstations

1.1.3 “Bright Display” technical equipment

Sion Tower has two "bright display" radar image repeaters. These are located to the right of the ADC position and in front of the APP Coordinator / Approach / MIL INFO operator.

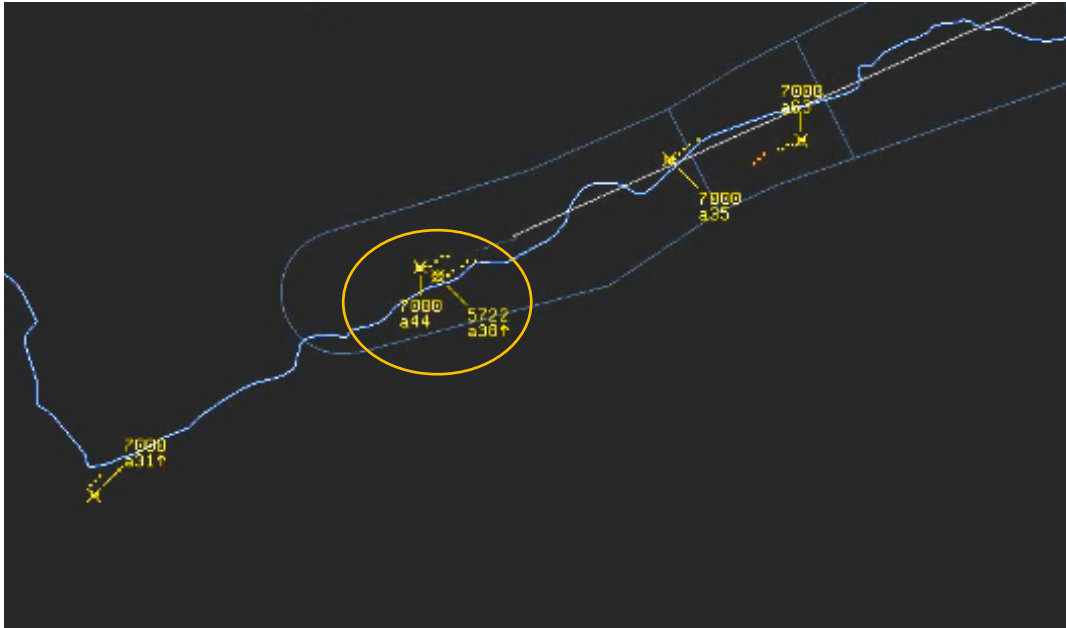


Figure 5: Image from the backup R2D2 Sion, radar data for 30 August 2011

1.1.4 History of the serious incident

On 30 August 2011, a CAP 10B aircraft, registration HB-SBE, was preparing to make a local flight as part of a training course for an aerobatics instructor. Onboard were an instructor, who occupied the left seat, and a trainee instructor sitting in the right seat. The latter was performing the function of pilot flying (PF) and was in charge of radiotelephone communications.

The training envisaged a first phase which would take place in the airspace between Saxon and Martigny, i.e. to the south-west of Sion airport, within an altitude envelope between 5000 and 7000 ft. The second phase would take place over the airport.

At 11:46:03 UTC, the CAP 10B left the GND frequency and reported on the TWR frequency that it was ready to take off. Clearance was issued shortly afterwards.

At 12:06:39 UTC, a Cessna C550B, registration CS-DHI, operating under the callsign NJE 262Q, requested start up on the GND frequency for an IFR flight bound for Nice.

At 12:14:52 UTC, the CAP 10B HB-SBE reported to the TWR that it had completed its training in the Saxon region and requested to return over the terrain to carry out aerobatic exercises between 5000 and 7000 ft. This request was temporarily denied because of a Hornet (F-18) which was in the aerodrome circuit. The pilot of the CAP 10B replied, stating his intention to hold over the Saxon region and added that the duration of the aerobatic exercises over the airport would be of the order of 5 minutes.

At 12:15:46 UTC, TWR cleared the CAP 10B to head for the airport, maintaining 7000 ft.

At 12:17:24 UTC, NJE 262Q was transferred to the TWR frequency, on which it reported that it was ready for take-off in the Alfa position.

At 12:17:42 UTC, the CAP 10B reported that it was approaching the field, ready for its aerobatic manoeuvres, and was cleared to carry out aerobatics between 5000 and 7000 ft. It was requested to call back once its programme had been completed.

At 12:18:09 UTC, TWR cleared flight NJE 262Q to line up on runway 25.

At 12:19:57 UTC, TWR cleared NJE 262Q to take off on runway 25 and requested it to call back when 7 NM from the Sion VOR, at a maximum altitude of 11,000 ft, owing to military activity. No traffic information was issued to the crew of the Cessna.

At 12:20:40 UTC, the CAP 10B reported that it had completed its aerobatic exercises and was in the descent phase for a landing, specifying that it would proceed via the downwind leg. The TWR requested it to call back when on the downwind leg, without referring to the traffic which had taken off. HB-SBE continued its descent initially towards Martigny, remaining north of the runway centre line, before initiating a first turn to the left to cross it and reach the beginning of the runway 25 downwind leg. During this manoeuvre, the crew thought they saw traffic taking off and decided to resume their route in the direction of Martigny in order to confirm the possible presence of this traffic. Not observing any aircraft, they began to turn left to join the downwind leg. Once the turn had been completed, they noticed the Citation 550B ahead of them, climbing from left to right, at a distance they estimated of approximately 200 metres.

At 12:21:55 UTC, Sion TWR asked HB-SBE for its position. The latter stated it was descending to join the downwind leg. The TWR controller requested the pilot of the CAP 10B to confirm that it was not attempting to pass above the Cessna.

At 12:22:07 UTC, HB-SBE replied to the TWR "*Underflying Cessna*"

At 12:22:52 UTC, NJE 262Q reported that it had received a TCAS RA (resolution advisory) warning "*.... we just received a TCAS RA, approximately three minutes after take-off...???? about one and a half* "

At 12:23:01 UTC, Sion TWR confirmed to it that there was traffic crossing to join the downwind leg.

At 12:24:44 UTC, HB-SBE reported that it was on final for runway 25 and received clearance to land.

At 12:25:54 UTC, HB-SBE after landing and before clearing the runway, confirmed that they had the Cessna Citation in sight.

1.1.5 Location of the serious incident

Position	Sion CTR, over the extended centreline of runway 25
Date and time	30 August 2011, 12:22 UTC
Lighting conditions	Daylight Azimut 199°, Elevation 51°
Altitude or flight level	4500 ft

1.2 Personnel information

1.2.1 Crew of aircraft CS-DHI / NJE 262Q

1.2.1.1 Commander

1.2.1.1.1 Training

Person Swedish citizen, born 1975

Licence	ATPL(A) (Airline Transport Pilot Licence Aeroplane) according to Joint Aviation Requirements (JAR), first issued by the Swedish Transport Agency on 5 May 2008 and valid till 5 May 2013
Type rating	C500 / 550 / 560 valid till 31 March 2012 SE Piston land valid till 31 March 2012
Ratings	Instrument flight (IR, ME, SP) valid till 31 March 2012 Instructor FI (A) valid till 31 August 2012 English Level 6, unlimited validity.
Last aptitude test	Line check on 3 January 2011 Simulator check on 31 March 2011
Medical certificate	Class 1 & 2, without restrictions Valid from 10 August 2011 to 17 August 2012 and 17 August 2016 respectively
Last medical examination	10 August 2011
1.2.1.1.2 Flying experience	
Total hours	4803 hours
of which on the type involved	651 hours
Number of approaches to Sion	9
1.2.1.1.3 Duty times and rest times	
Start of duty in the 48 hours before the serious incident	27 August 2011: no flight duty 28 August 2011: 13:00 UTC 29 August 2011: 06:15 UTC 30 August 2011: 04:50 UTC
End of duty in the 48 hours before the serious incident	28 August 2011: 17:30 UTC 29 August 2011: 09:15 UTC + ferry flight to London
Rest period in the 48 hours before the serious incident	12:45 hours from 28 to 29 August 2011 Estimated at more than 12 hours between 29 and 30 August 2011
Flight duty time at the time of the serious incident	07:32 hours
1.2.1.2 Copilot	
1.2.1.2.1 Training	
Person	French citizen, born 1966
Licence	ATPL(A) (Airline Transport Pilot Licence Aeroplane) according to Joint Aviation Requirements (JAR), first issued by the Direction générale de l'aviation civile – France on 24 January 2007 and valid till 7 April 2016

	Type rating	C500 / 550 / 560 valid till 31 March 2012
	Ratings	Instrument flight (IR, ME) extended on 24 March 2011 and valid till 31 March 2012 English VFR/IFR, valid till 30 June 2014
	Last aptitude test	Line check on 5 January 2011, simulator check on 23 March 2011
	Medical certificate	Class 1 & 2, without restrictions Valid from 15 October 2010 to 31 October 2011 and 31 October 2012 respectively
	Last medical examination	15 October 2010
1.2.1.2.2	Flying experience	
	Total hours	6440 h
	of which on the type involved	348 h
	Number of approaches to Sion	3
1.2.1.2.3	Duty times and rest times	
	Start of duty in the 48 hours before the serious incident	27 August 2011: no flight duty 28 August 2011: 13:00 UTC 29 August 2011: 06:15 UTC 30 August 2011: 04:50 UTC
	End of duty in the 48 hours before the serious incident	28 August 2011 17:30 UTC 29 August 2011 09:15 UTC + ferry flight to London
	Rest period in the 48 hours before the serious incident	12:45 hours from 28 to 29 August 2011 Estimated at more than 12 hours between 29 and 30 August 2011
	Flight duty time at the time of the serious incident	07:32 hours
1.2.2	Crew of aircraft HB-SBE	
1.2.2.1	Instructor	
1.2.2.1.1	Training	
	Person	Swiss citizen, born 1970
	Licence	ATPL(A) (Airline Transport Pilot Licence Aeroplane) according to Joint Aviation Requirements (JAR), first issued by the Federal Office of Civil Aviation (FOCA) on 22 August 2000 and valid till 4 October 2016
	Type rating	A330 (COPI) valid till 20 March 2012; A340 (COPI) valid till 20 September 2012; MEP (land) valid till 14 January 2012 and SEP (land) valid till 7 June 2012
	Ratings	Instrument flight (IR), category III approaches,

		valid till 20 March 2012
		English Level 6, unlimited validity
	Instructor ratings	CRI(A) ACR, MPLI(A) and IRI(A) valid till 24 April 2013
	Medical certificate	Class 1 & 2, without restrictions Valid till 24 November 2011 and 24 November 2012 respectively
	Last medical examination	16 November 2010
1.2.2.1.2	Flying experience	
	Total hours	10,930 hours
	As flight instructor	402 hours
	of which on the type involved	112 hours
	During the last 90 days	114 hours
	of which on the type involved	12 hours
1.2.2.1.3	Duty times and rest times	
	Start of duty in the 48 hours before the serious incident	28 August 2011: no flight duty 29 August 2011 to 2 September FOCA aerobatic course with 5 flights of approximately 35 minutes per day
	Rest period in the 48 hours before the serious incident	28 August 2011 free day More than 12 hours between 29 August and 30 August 2011
	Flight duty time at the time of the serious incident	Estimated at 2:20h, 4 th flight of the day
1.2.2.2	Trainee instructor	
1.2.2.2.1	Training	
	Person	Swiss citizen, born 1950
	Licence	CPL(A) (Commercial Pilot Licence Aeroplane) according to Joint Aviation Requirements (JAR), first issued by the Federal Office of Civil Aviation (FOCA) on 25 March 1974 and valid till 6 September 2016
	Type rating	Pilatus PC7 and SEP (land) valid till 18 May 2012 and SEP (sea) valid till 6 June 2013
	Instructor ratings	FII(A) and FI(A) ACR valid till 18 May 2014 English Level 4, valid till 18 May 2014
	Medical certificate	Class 2 (PPL) shall have available corrective lenses Valid from 2 May 2011 to 25 May 2012

	Last medical examination	2 May 2011
1.2.2.2.2	Flying experience	
	Total hours	Approx. 8,000 hours
	of which on the type involved	11 hours
1.2.2.2.3	Duty times and rest times	
	Start of duty in the 48 hours before the serious incident	28 August 2011: no flight duty 29 August 2011 to 2 September FOCA aerobatic course with 5 flights of approximately 35 minutes per day
	Rest period in the 48 hours before the serious incident	28 August 2011 free day More than 12 hours between 29 August and 30 August 2011
	Flight duty time at the time of the serious incident	Estimated at 1:00h, 2 nd flight of the day
1.2.3	Air traffic controllers	
1.2.3.1	Air traffic controller 1	
	Function	Ground controller (GND)
	Person	Swiss citizen, born 1965
	Duty days before the day of the incident	1 day
	Licence	Air Traffic Controller Licence on the basis of Directive 2006/23 of the European Community, first issued by the Federal Office of Civil Aviation (FOCA) on 1 December 1990 and valid till 14 December 2011
	Ratings	Unit endorsement TWR / APC / SRA / PAR Location LSGS, LSAS Ratings: Aerodrome Control Instruments - ADI, Approach Control Surveillance - APS Rating Endorsements: Precision Approach Radar - PAR, Radar - RAD (ADI + APS), Surveillance Radar Approach - SRA, Tower Control - TWR License endorsement: OJTI (On the Job Training Instructor) valid until 14 December 2011 English Level 5, valid until 8 April 2017
	Medical certificate	European Class 3 Medical Certificate for Air Traffic Controllers, valid until 14 December 2012; VML, shall wear multifocal lenses

1.2.3.2	Air traffic controller 2	
	Function	Tower controller (ADC)
	Person	Swiss citizen, born 1959
	Duty days before the day of the incident	3 days
	Licence	Air Traffic Controller Licence on the basis of Directive 2006/23 of the European Community, first issued by the Federal Office of Civil Aviation (FOCA) on 11 December 1990 and valid till 14 December 2011
	Ratings	Unit endorsement TWR / APC / SRA / PAR Location LSGS, LSAS Ratings: ADI, APS Rating Endorsements: PAR, RAD (ADI), RAD (APS), SRA, TWR License endorsement: OJTI, EXM valid until 14 December 2011 English Level 5, valid until 28 April 2014
	Medical certificate	European Class 3 Medical Certificate for Air Traffic Controllers, valid until 14 December 2012; VNL, shall have available corrective lenses
1.2.3.3	Air traffic controller 3	
	Function	Approach coordinator (COR/APP/MIL INFO)
	Person	Swiss citizen, born 1956
	Duty days before the day of the incident	1 day
	Licence	Air Traffic Controller Licence on the basis of Directive 2006/23 of the European Community, first issued by the Federal Office of Civil Aviation (FOCA) on 11 December 1990 and valid till 14 October 2011
	Ratings	Unit endorsement TWR / APC / SRA / PAR Location LSGS, LSAS Ratings: ADI, APS Rating Endorsements: PAR, RAD (ADI), RAD (APS) SRA, TWR English Level 4, valid until 18 April 2014
	Medical certificate	European Class 3 Medical Certificate for Air Traffic Controllers, valid until 14 October 2012, VML, shall wear multifocal lenses

1.3 Aircraft information

1.3.1 Aircraft 1

Registration	CS-DHI
Aircraft type	Cessna Citation, C550B
Characteristics	Twin jet
Manufacturer	Cessna Aircraft Co, Wichita, Kansas, USA
Year of manufacture	2003
Serial no.	550-1048
Owner	NetJets Transportes Aéreos, SA, Portugal
Operator	NetJets Transportes Aéreos, SA, Portugal
Equipment	TCAS II



1.3.2 Aircraft 2

Registration	HB-SBE
Aircraft type	CAP 10B
Characteristics	Single engine low wing
Category	Utility, aerobatic
Manufacturer	Constructions aéronautiques de Bourgogne
Year of manufacture	2006
Serial no.	316
Owner	Private
Operator	Private
Equipment	VFR



1.4 Meteorological information

1.4.1 General

The information contained in sections 1.4.2 ff. was provided by MeteoSwiss. The original text is in German.

1.4.2 Meteorological information available to the crew before the flight

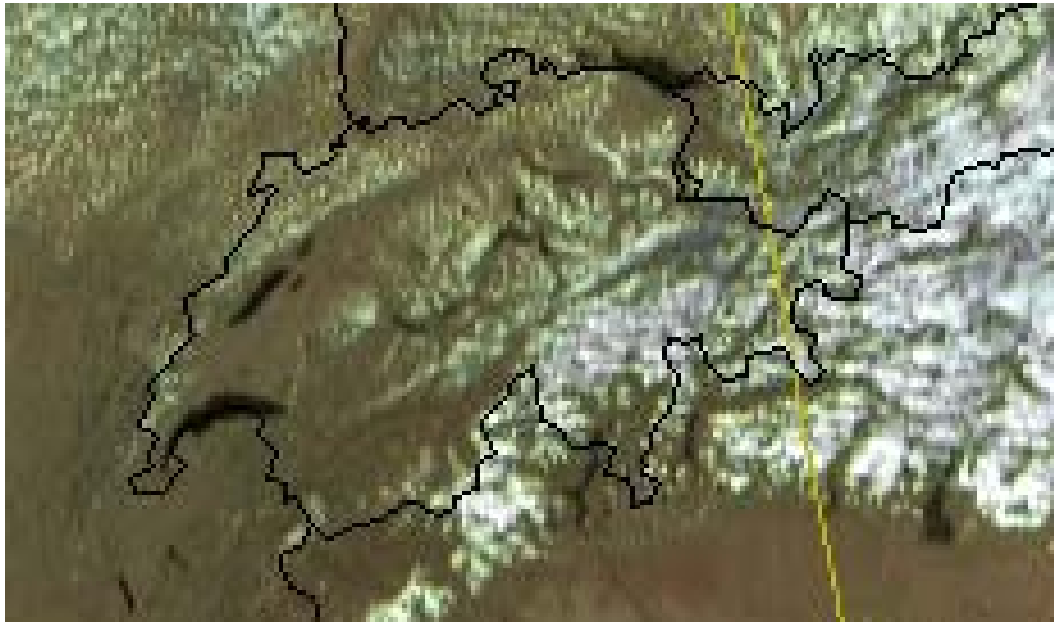


Figure 6: Satellite image at 12:00 UTC on 30 August 2011

1.4.3 General meteorological situation

Translation of the MeteoSwiss report.

A flat anticyclonic area centred over the northern part of France determined the pressure field. The Valais was on the southern edge of this anticyclone. Thus the Payerne radio probe, at the time of its ascent half-way through the day, indicated winds at altitude from the south-west to west.

Weather in Sion and its surroundings

Summer weather prevailed in the Sion CTR with 1-2/8 cumulus along the ridges. The cloud base was approximately 10,000 feet above aerodrome level, corresponding to approximately 3530 m AMSL.

The wind was from the south-west to west sector and was averaging 9 knots. The variation in wind direction indicates that a valley wind typical for Sion was developing.

From 12:50 UTC onward no significant change was observed. The wind was more or less consistently from a west south-westerly direction, with an average speed of 12 to 16 knots. This is typical for a summer valley wind.

1.4.4 Meteorological situation at the time of the incident

The following information concerning the weather conditions at the time of the incident are based on spatial and temporal interpolation of the observations made at several weather stations.

At the beginning of the afternoon sunny, warm weather prevailed with active thermals in the region. The valley wind was building up and its direction was consolidating in the half-hour following the incident.

Weather/cloud	1-2/8 CU
Visibility	Over 10 km according to METAR 25 km according to SYNOP

Wind	240° at 9 kt, variable between 200° and 270°
Temperature / dewpoint	23°C / 10°C
Atmospheric pressure	QNH 1012 hPa

1.4.5 Astronomical information

Natural lighting conditions	Early afternoon
Position of the sun	Azimuth: 199° Elevation: 51°

1.4.6 Aerodrome meteorological information

The aerodrome observation (METAR) at 11:50 UTC was as follows:

METAR LSGS 301150z 25007KT 200V300 9999 FEW100 23/10 Q1013 NOSIG=

In clear text this means:

30 August at 11:50 UTC

Wind	From 250° at 7 kt, variable between 200° and 300°
Meteorological visibility	Over 10 km
Cloud	1-2/8 at 10,000 ft AAL
Temperature	23 °C
Dewpoint	10 °C
Atmospheric pressure	1013 hPa, pressure reduced to sea level, calculated using the ICAO standard atmosphere values.
Forecasts	No significant changes.

1.4.7 Forecasts

At the time of the serious incident, the following aerodrome forecast (terminal aerodrome forecast – TAF) was valid:

TAF LSGS 301125z 3012/3021 24010KT 9999 FEW060 BECMG 3012/3015 24015G25KT BECMG 3018/3021 VRB03KT

In clear text this means:

On 30 August 2011 at 11:25 UTC the following meteorological forecast, for 12:00 UTC to 21:00 UTC, was reported for Sion aerodrome:

Wind	From 240° at 10 kt
Meteorological visibility	Over 10 km
Cloud	1-2/8 at 6,000 ft AAL
Temperature	Not specified
Conditional forecasts	on 30 August between 12:00 and 15:00 UTC wind from 240° at 15 kt gusting to 25 kt and between 18:00 UTC and 21:00 UTC wind variable at 3 kt.

1.5 Aids to navigation

The air navigation aids at Sion airport are the Montana (MOT) and Sion (SIO) omni-directional beacons fitted with distance measuring equipment (DVOR/DME). They had no influence on the serious incident.

According to ATMM LSGG section 3 RADAR EQUIPMENT, the radar display (SSR) of the environs of Sion airport consists of a PC with a screen. It allows the following functions:

- control of IFR civilian aircraft on the IGS approach up to the interception of the localiser.
- monitoring of autonomous IGS (instrument guidance system) approaches.
- monitoring of the surrounding traffic (secondary radar)

1.6 Communications

Communications between Sion Tower and the two aircraft involved in this serious incident took place in English and without difficulty. At no time did a statement have to be repeated. Transmission and reception quality was good. This was confirmed by listening to the recordings. According to the statements of the air traffic controllers, the volume of traffic was heavy at the time of the serious incident.

1.7 TCAS alerts

1.7.1 TCAS data

NJE 262Q received a corrective RA of the type “*maintain vertical speed, maintain*” to maintain its rate of climb.

The data recorded in the TCAS system of NJE 262Q is as follows:

'MAINTAIN VERTICAL SPEED; MAINTAIN'

Own Aircraft:

Altitude: 4531 ft. Sensitivity: 4

Altitude Rate: 47 ft./min. Climb/Inc. Climb Inhib: N/N

Rad. Alt.: Not credible Hobbs/clock: 0.2 hrs/776.1 secs

Intruder (Mode S Address 0x4b2fa6):

Altitude: 4505 ft. Range: 0.5 nmi

Alt. Rate: 2700 ft./min. Rng Rate: -78 knots

Bearing: 67 degrees Equipage: 1

RA Information: TA Occurred

ARA = 00000000100000, RAC = 0000, RAI = 0

Crossing: N, Multi. Threat: N

'ADJUST VERTICAL SPEED, ADJUST'

Own Aircraft:

Altitude: 4945 ft. Sensitivity: 4

Altitude Rate: 43 ft./min. Climb/Inc. Climb Inhib: N/N

Rad. Alt.: Not credible Hobbs/clock: 0.2 hrs/785.9 secs

Intruder (Mode S Address 0x4b2fa6):

Altitude: 4433 ft. Range: 0.1 nmi

Alt. Rate: 2580 ft./min. Rng Rate: -163 knots

Bearing: 65 degrees Equipage: 1

RA Information: TA Occurred

ARA = 000000000000001, RAC = 0000, RAI = 0

Crossing: N, Multi. Threat: N

'CLEAR OF CONFLICT'

Own Aircraft:

Altitude: 5189 ft. Sensitivity: 4

Altitude Rate: 37 ft./min. Climb/Inc. Climb Inhib: N/N

Rad. Alt.: Not credible Hobbs/clock: 0.2 hrs/792.1 secs

Intruder (Mode S Address 0x4b2fa6):

Altitude: 4217 ft. Range: 0.4 nmi

Alt. Rate: 4140 ft./min. Rng Rate: 151 knots

Bearing: 178 degrees Equipage: 1

1.8 Aerodrome information

1.8.1 General

Sion airport, mixed use, is located in the Rhone valley in south-west Switzerland.

1.8.2 Runway

One hard runway 07/25, dimensions 2000 x 40 m, the reference elevation of which is 1511 ft AMSL and the geographical position 46°13'09"N, 007°19'37"E.

Take-off run available (TORA)

Runway 07: 2000 m, runway 25: 2000 m

1.9 High-performance IFR departure routes

AIP CH: LSGS AD High Performance SID RWY25 and Ref Jeppesen chart 10-3 E dated 11 November 2011 LSGS/ SIR – see Annex 1

The standardised high-performance departure routes on take-off from Sion airport require a high rate of climb. Flight NJE 262Q was cleared on departure route ROCCA 1U.

1.10 Organisational and management information

The air traffic - VFR, IFR military or civil - on and in the vicinity of Sion airport is managed by the Skyguide units.

The Swiss AIP does not prescribe any minimum separation between VFR and IFR traffic in a Class D CTR, but does require traffic information to be issued.

The regulations relating to aerobatics applied at Sion refer to document ATMM II - LSMS published by Skyguide and to the application directives contained in the airport's operating regulations.

1.10.1 Aerobatics flights – CTR

(Excerpt from ATMM II- LSMS / Tower section 4, para. 3.5)

"Aerobatic flight activities are suspended when:

- The departing CIV IFR aircraft is ready for take-off.*
- Arriving MIL IFR aircraft approach starts descent*
- An arriving CIV IFR passes MAPt or performs a visual approach over the airfield."*

1.10.2 Use of radar in aerodrome control towers

(Excerpt from ATMM II LSMS - SECTION 8, par. 3.1.2 OPERATION AND USE)

- Control of CIV IFR aircraft on IGS approach until LOC interception.*

- *Surveillance of autonomous IGS approaches*
- *Overview of surrounding traffic (secondary radar)*

1.10.3 Essential local traffic information

(Excerpt from ATMM Switzerland, Aerodrome control section 9, GAT procedures, art. 4.7)

"Due to the restrictive space on and around manoeuvring areas and restricted view from the flight deck it is essential that traffic information be issued to aircraft to assist with collision avoidance.

Transmit, without delay, information on known essential local traffic to departing and arriving aircraft.

Describe essential local traffic in a clear, concise and complete manner so as to facilitate recognition.

Note: Essential local traffic consists 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."

1.10.4 Aerobatics

(Excerpt from the application directives of the operating regulations for Sion airport dated 22.9.2005)

"Reference REP Art.4.2 2

All aerobatic flights within the CTR and the TMA must be authorised by the management.

By agreement with (Skyguide) air traffic control, the management lays down the flight conditions, taking particular account of traffic and noise.

Gliders and powered aircraft perform aerobatics on an axis parallel to the runways. They must be conducted in airspace above the airport, between the thresholds of the artificial runway on the one hand, and the railway track and the motorway on the other, and at a minimum height of 1640 ft/ground (500 m).

Holders of an FOCA authorisation may perform aerobatics within the limits of their authorisation."

2 Analysis

2.1 Technical aspects

The investigation did not reveal any technical defect which might have played a part in the incident. The quality of the radar image repeater available to Sion TWR does not make it possible to accurately monitor the movement of traffic in the immediate vicinity of the airport.

2.2 Human and operational factors

2.2.1 Air traffic control

The recording of the radio conversations indicates that the take-off clearance issued to flight NJE 262Q took place approximately 30 seconds before HB-SBE reported that its aerobatic programme had been concluded. This practice does not comply with the directives of ATMM II Sion which specify, *inter alia*, that any aerobatics programme over the site must be suspended when a civil IFR aircraft reports that it is ready for take-off.

The Tower controller was unaware of the exact position of HB-SBE at the time he cleared NJE 262Q to take off from runway 25. Given the volume of traffic and a wish to perform well, it is likely that the controller felt that the presence of HB-SBE was not impeding the departure of the IFR traffic. This may explain the fact that no traffic information was issued to those involved in this incident.

By reporting the conclusion of the aerobatic program, HB-SBE probably alerted the controller to the potential danger. Subsequently, and when the controller was concerned about the position of HB-SBE, the dangerous convergence had already taken place.

This particular configuration involving IFR traffic on take-off and a VFR aircraft performing an aerobatics programme in the aerobatics sector of the airport requires increased attention from air traffic control.

2.2.2 HB-SBE crew

When HB-SBE concluded its flight programme, it reported this to the Tower controller, stating that it was in the descent phase to join the downwind leg for a landing. However, the pilot of HB-SBE did not act precisely according to the information he transmitted to the Tower, since he initially headed towards Martigny before initiating a left turn to join the downwind leg, the manoeuvre during which the dangerous convergence occurred.

Evidently, the pilots of HB-SBE did not pay attention to the radiotelephone conversations transmitted on the Tower frequency, because had that been the case they would have paid special attention to the traffic in this sector, in particular NJE 262Q, which 30 seconds earlier had received clearance to take off from runway 25.

The indirect route of aircraft HB-SBE to join the downwind leg for runway 25, when its pilot had reported his intention to land, was different from the report which in the controller's mind implied a direct crossing of the take-off axis. According to the crew's statements, this extension of their trajectory in the direction of Martigny was intended to lose altitude before joining the downwind leg. Subsequently, the crew of the CAP 10B delayed their turn onto the downwind leg in order to confirm the presence of the traffic on take-off which they thought they had seen.

2.2.3 Crew of flight NJE 262Q

When they received take-off clearance, the crew of NJE 262Q was reminded of the altitude restrictions based on the DME distances, without any traffic information being issued to them. Indeed, they were unaware of the presence of the aerobatic aircraft HB-SBE in the CTR. The PF pilot reacted correctly when the RA was triggered by maintaining his rate of climb, as indicated by the TCAS.

2.2.4 High-performance IFR departure routes

The high-performance SIDs (standard instrument departures) on take-off from Sion airport require a high rate of climb because of the altitude constraints over relatively short distances. In fact, during the initial climb, the aircraft's attitude restricts visibility and observation of the airspace. Most of the time, the surrounding traffic is visible only via the TCAS, provided that aircraft are correspondingly equipped.

2.2.5 Procedures

Aerobatic flights had been duly announced and approved as per the Sion airport directives.

The limitations according to the ATMM II-LSMS, section 4 TOWER, para. 3.5 Aerobatic flights - CTR, specify, among other things, that aerobatic activities should be suspended when a CIV IFR aircraft is ready for take-off. This serious incident demonstrates the importance of the application of this procedure and of the issuing of traffic information.

3 Conclusions

3.1 Findings

3.1.1 Technical aspects

- The aircraft NJE 262Q and HB-SBE were licensed for IFR and VFR traffic respectively.
- The investigation did not reveal any technical defect which could have contributed to or caused the incident.

3.1.2 Operational aspects

- Traffic was continuous at the time of the serious incident.
- The occupancy of the ADC frequency was high

3.1.3 Air traffic controllers

- The documents provided indicated that the controllers were in possession of an adequate licence.
- There is no indication that their state of health was affected at the time of the incident.
- No traffic information was issued to the aircraft involved.
- The take-off clearance issued to the IFR aircraft occurred even though the Cap 10 was continuing its aerobatic programme.
- The three workstations GND Ground control (Ground), ADC Aerodrome control (Tower) and COOR/APP Coordinator / Approach / MIL INFO (Coordinator / Approach) were occupied.

3.1.4 Crews

- The documents provided indicated that the pilots were in possession of an adequate licence and a valid medical certificate.
- There is no indication that their state of health was affected at the time of the incident.
- The reaction of the crew of NJE 262Q to the TCAS RA alert was consistent with the procedures in force.

3.1.5 History of the serious incident

- At 12:17:42 UTC, HB-SBE left its first exercise sector and was given clearance to perform aerobatics between 5000 and 7000 ft in the CTR.
- At 12:18:12 UTC, Sion TWR cleared flight NJE 262Q to line up on runway 25.
- At 12:19:57 UTC Sion TWR cleared NJE 262Q for take-off; the pilot then confirmed this.
- At 12:20:40 UTC HB-SBE reported that it had concluded its aerobatic program and initiated its descent in the direction of Martigny, remaining to the north of the runway centre line.

- At 12:21:55 UTC Sion TWR requested HB-SBE for its position; the latter confirmed that it was descending, in the process of joining the downwind leg.
- At 12:22:07 UTC HB-SBE replied to the TWR that it was passing below the Cessna.
- The separation between the two aircraft was minimal and according to the TCAS and radar records represented a distance of 0.5 NM at the same altitude. At the time the aircraft trajectories crossed, the climbing IFR aircraft was 500 ft higher than the VFR aircraft.

3.1.6 General conditions

- A procedure limiting aerobatic activity on departure of a CIV IFR aircraft exists (see para 1.10.1).
- The Sion airport operating regulations require management approval for aerobatic flights within the CTR and TMA.

3.1.7 Environmental aspect

- The weather had no influence on the serious incident.

3.2 Cause

The serious incident is attributable to a dangerous convergence between a VFR aircraft flying onto the downwind leg, in descent after concluding an aerobatic programme, and an IFR aircraft which was taking off.

Factors which played a part in the serious incident:

- Non-application of the procedure governing aerobatic flights in the CTR with regard to IFR traffic.
- No traffic information was issued.

Payerne, 16 May 2013

Swiss Accident Investigation Board

This final report was approved by the management of the Swiss Accident Investigation Board SAIB (Art. 3 para. 4g of the Ordinance on the Organisation of the Swiss Accident Investigation Board of 23 March 2011).

Berne, 25 June 2013

Jeppesen 10-3E SID ROCCA ; Sion RWY 25

