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Swiss Accident Investigation Board SAIB

Aviation Division

Final Report No. 2200 of the Swiss Accident Investigation Board SAIB

concerning the serious incident (AIRPROX)
involving a PA 34 – 200T aircraft, HB-LMM
and a Beechcraft A23-24 aircraft, HB-ENV
on 22 February 2012
in the Sion TMA

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/incident 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.

Unless otherwise indicated, all times in this report are stated in co-ordinated universal time (UTC). At the time of the serious incident, Central European Time (CET) applied as local time (LT) in Switzerland. The relationship between LT, CET and UTC is: $LT = CET = UTC + 1 \text{ hour}$.

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Final report

Summary

Aircraft 1

Owner	BS Business Aviation AG 4132 MuttENZ, Switzerland
Operator	Flugschule Basel AG Postfach, 4030 Basel, Switzerland
Manufacturer	Piper Aircraft, Inc. 2926 Piper Drive, Vero Beach, Florida, USA
Aircraft type	PA-34 – 200T
Country of registration	Switzerland
Registration	HB-LMM
Flight rules	Instrument flight rules - IFR
Type of operation	Private
Departure point	Basel, LFSB
Destination point	Sion, LSGS

Aircraft 2

Owner	Private
Operator	Private
Manufacturer	Hawker Beechcraft Corporation 10511 East Central, PO Box 85, Wichita, USA
Aircraft type	Beech Musketeer, A23-24
Country of registration	Switzerland
Registration	HB-ENV
Flight rules	Visual flight rules - VFR
Type of operation	Private
Departure point	Sion, LSGS
Destination point	Bressaucourt, LSZQ
Location	In the Sion TMA, east of the approach/departure reference point GRANA
Date and time	22 February 2012, 15:08 UTC
ATS unit	Sion control tower
Airspace	TMA LSGS, Class D
Maximum convergence	Less than 0.2 NM, 50 ft
Minimum prescribed separation	No prescribed separation, mandatory IFR/VFR traffic information
Airprox category of the incident	ICAO – category A – high risk of collision

Investigation

The serious incident occurred on 22 February 2012 at 15:08 UTC in Swiss airspace. It was notified to the Swiss Accident Investigation Board (SAIB) the next day at 11:39 UTC. After gathering information relevant to the case, the SAIB opened an investigation on 7 March 2012 at 16:18 UTC.

This investigation report is published by the SAIB.

Synopsis

The incident occurred in the Sion terminal area (LSGS), 3.4 NM east-north-east of the approach/departure reference point GRANA, to the east of the airport. It was caused by the dangerous crossing between a Beechcraft A23 - 24 which had taken off from Sion and which was crossing the Rhone valley in a northerly direction and a Piper PA-34 established on the final approach segment of IGS RWY 25 (instrument guidance system for runway 25). The Beechcraft was flying under visual flight rules whilst the Piper was following instrument flight rules.

Cause

The serious incident is attributable to the dangerous convergence of two aircraft flying in the Sion terminal area under different VFR and IFR flight rules in VMC conditions.

Factors which played a part in the serious incident:

- implicit control instructions given to the pilot of the aircraft flying under visual flight rules
- absence of VFR routes or exit points guaranteeing spacing from IFR traffic in the Sion CTR and TMA.

Safety recommendation

This report indicated a safety deficit which gave rise to a safety recommendation.

According to the directives of Annex 13 of the ICAO the safety recommendations formulated in this report are addressed to the supervisory authorities of the State concerned. It is up to its authorities to decide what action to take. However all organisations, companies and individuals are invited, in the sense of the safety recommendation, to improve flight safety.

In the ordinance on the investigation of aircraft accidents and serious incidents, the Swiss legislation prescribes the following directives concerning safety recommendations:

“Art. 32 Recommendations concerning safety

Within a period of six months from the publication of the investigation report, the Office informs the Bureau of the measures which have been taken following the safety recommendations formulated in this document or of the reasons for which measures have not been taken.”

1 Factual information

1.1 History of the serious incident

1.1.1 General

The history of the serious incident was established using the statements of the members of flight crews and the air traffic controllers involved in the convergence, the recordings of the radiotelephone communications and the radar data and plots. The latter derive directly from the radar data chain of the Geneva air traffic control centre and are not representative of the visualisation available to the air traffic controllers in the Sion control tower.

The classification of the airspace surrounding Sion airport is shown in figure 1. It is located in a Class D control zone (CTR) which applies up to flight level FL 130. To the east, a Class D Terminal control area (TMA) divided into 3 parts (TMA 1, 2 and 3) can be activated by NOTAM during military activities.

The VFR regional chart for Sion (figure 1) shows, among other things, the limits of the CTR and of the TMA sectors as well as the 3 reporting points W ("Whiskey"), E1 ("Echo one") and E2 ("Echo two"), mandatory only for incoming flights.

At the time of the serious incident, the TMA was active and military air operations were in force. The serious incident took place in sector TMA 2, which extends vertically from 6000 feet or 1000 ft/ground to flight level FL 130.

The Sion control tower air traffic control services consisted of the following three control functions:

- GND Ground control (Ground)
- ADC Aerodrome control (Tower)
- COOR/APP Coordinator/Approach/MIL INFO.

The corresponding workstations are arranged side by side in the control tower.

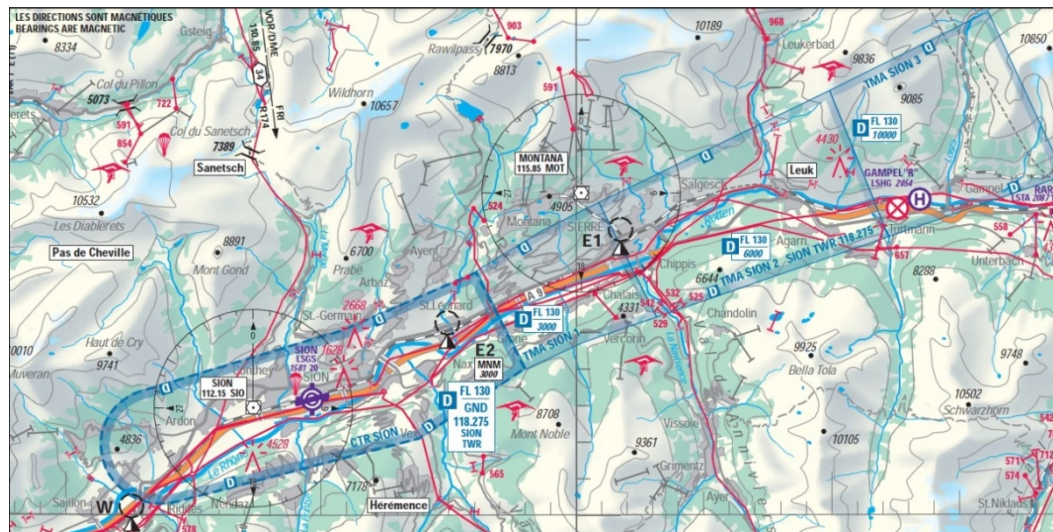


Figure 1: extract from the Sion VFR regional chart

1.1.2 History of the serious incident

On 22 February 2012 at 14:46:37 UTC, at runway 25 holding point Bravo at Sion airport, the pilot of the Beechcraft A23-24 aircraft, registration HB-ENV, reported on the 118.275 MHz control tower frequency that he was ready for departure.

Accompanied by a friend who was also a holder of a private pilot's licence, they were leaving on their return flight destination Bressaucourt aerodrome (LSZQ); the weather was fine, the sky was free from cloud and visibility was greater than 25 km. The controller replied that the pilot should maintain his position owing to the departure of a military aircraft scheduled before him.

At 14:48:49 UTC, HB-ENV was cleared to line up on runway 25, and then approximately 30 seconds later to take off with the instruction "... *call back crossing north of point Whiskey*". The pilot correctly acknowledged the first part of the clearance and added "*I'll call back to climb.*" The controller did not accept this and repeated the requested report; this time the pilot complied; this clearance is in conformity with the filed flight plan which mentioned an exit from the CTR via "Whiskey"; both pilots had initially planned to continue towards Martigny.

Approximately four minutes later, the pilot called back north of point "Whiskey" and requested "*to climb on downwind...twenty-five to reach Loèche.*" The traffic which was being handled at this time by the ADC controller was fairly sustained, particularly because of military air activities. A Piper PA-34 aircraft, registration HB-LMM, was also reported by the military operations centre for an IGS 25 approach in approximately ten minutes.

At 14:53:56 UTC, the ADC controller accepted the request of the pilot of HB-ENV and assigned him a transponder code in order to better locate his aircraft in relation to the military traffic. Given the hesitation already shown by the latter in radiotelephone communications, the controller asked the pilot to call back "near Sierre, Echo one".

In accordance with the day's work programme in the control tower, a handover took place at 15:00 UTC in which the ADC controller was replaced by his colleague who previously occupied the "Ground" control position. The transfer of control took place according to the procedure and the new ADC controller assumed traffic management.

HB-ENV climbed along the left downwind for runway 25 and then its pilot reported to ATC at 15:03:15 UTC that he was positioned at an altitude of 9000 feet passing abeam reporting point E2. The aircraft flew along the south side of the CTR and at this moment it was inside TMA 1.

The radiotelephone communications which followed between the pilot of HB-ENV and the ADC controller reveal an exchange of not very precise information, about both the position of the aircraft and its envisaged route. At 15:03:25 UTC the pilot reported that he had already exited the TMA, which caused the controller to think that he intended to exit it south of the Rhone Valley. The latter expressed this conjecture by the question "*OK, so you are exiting direction south?*" The pilot replied that he was now heading towards Loèche. The controller replied "*OK, so you are still in the TMA, and call me back passing abeam Loèche.*"

At 15:04:15 UTC, the pilot of HB-LMM made contact in English with Sion tower and reported that he was established on IGS 25 at an altitude of 16,300 feet. He was accompanied by an instructor sitting on his right and was carrying out this approach to extend his annual airport IFR qualification. The controller asked him to call back at 10 NM. He assessed the traffic he was handling at this time as of average volume and complexity, including three VFR aircraft which were interacting with this IFR arrival. He monitored them on his radar, being aware, however, that the secondary echoes of aircraft are not rendered very accurately; their progress is often discontinuous and affected by sudden shifts in unexpected directions.

The ADC controller realised shortly afterwards that HB-ENV was converging with HB-LMM and requested its pilot at 15:07:19 UTC to "maintain" south of the valley, issuing the following traffic information: "*PA thirty-four descending on IGS 25, twelve thousand feet descending.*"

The pilot replied that he was at the very centre of the valley, closing on Loèche.

The ADC controller, surprised, first instructed him to remain to the south of the valley, reporting traffic at 2 NM, and then in the aftermath changed his mind and instructed him to continue due north and specifying that the traffic was on his right at twelve thousand feet, descending, at 1.5 NM. Immediately afterwards, he asked the pilot of HB-LMM to beware of crossing traffic ahead, at an altitude of 10,800 feet.

The two occupants of the PA-34 were making their approach and focusing on their flight instruments. On receiving the ADC controller's warning, they immediately looked outside, located the conflicting traffic at their eleven o'clock and the pilot flying made a sudden avoiding left turn to pass behind HB-ENV. At 15:07:53 UTC, the instructor reported to the controller that they had established visual contact with the traffic and that it was very close "*...that was pretty close*". He added "*And with, with other words, it was collision course...*" and that it was thanks to the controller's intervention that they were narrowly able to avoid it. The pilot of HB-ENV reported at 15:08:25 UTC that he had crossed the traffic.

The radar data shows that the distances between HB-ENV and HB-LMM were at their minimum at 15:08:04 UTC; the aircraft passed each other with a horizontal separation of less than 0.2 NM and an altitude difference of 50 ft.

1.1.3 Location of the serious incident

Location	Abeam Loèche, 3.4 NM east-north-east of the approach/departure reference point GRANA
Date and time	22 February 2012; 15:08 UTC
Lighting conditions	Daylight
Coordinates	Azimuth 233°, elevation 18°
Altitude	10,800 ft AMSL

1.1.4 Trajectories of the conflicting aircraft

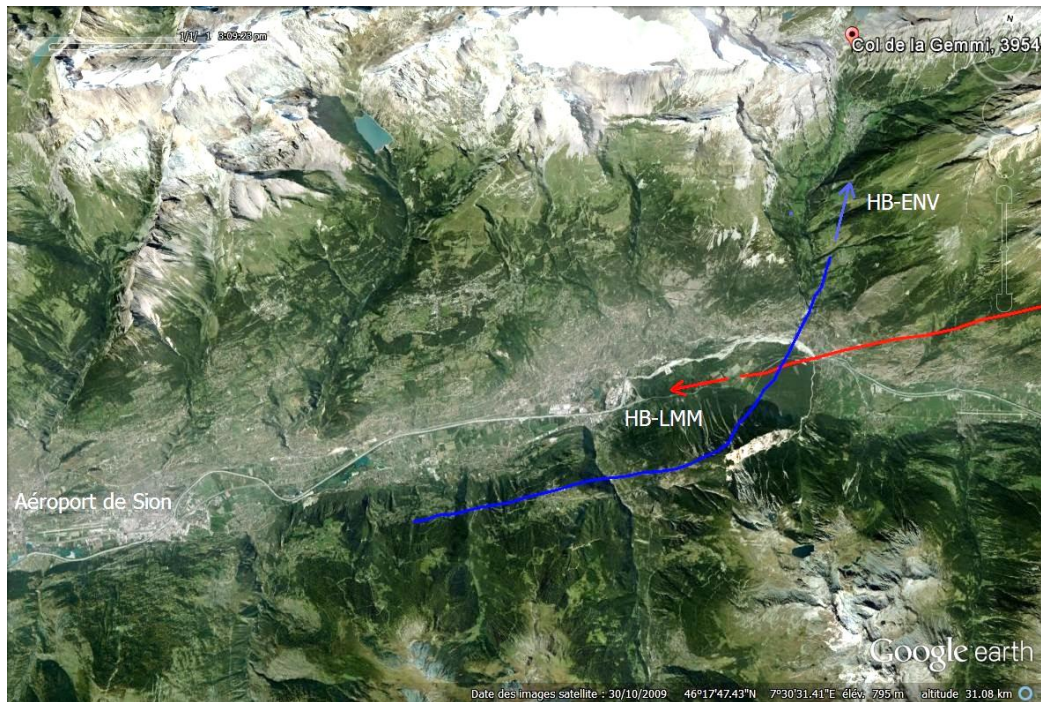


Figure 2: trajectories of HB-LMM and HB-ENV reconstituted on Google Earth

1.1.5 3D Trajectories of the conflicting aircraft

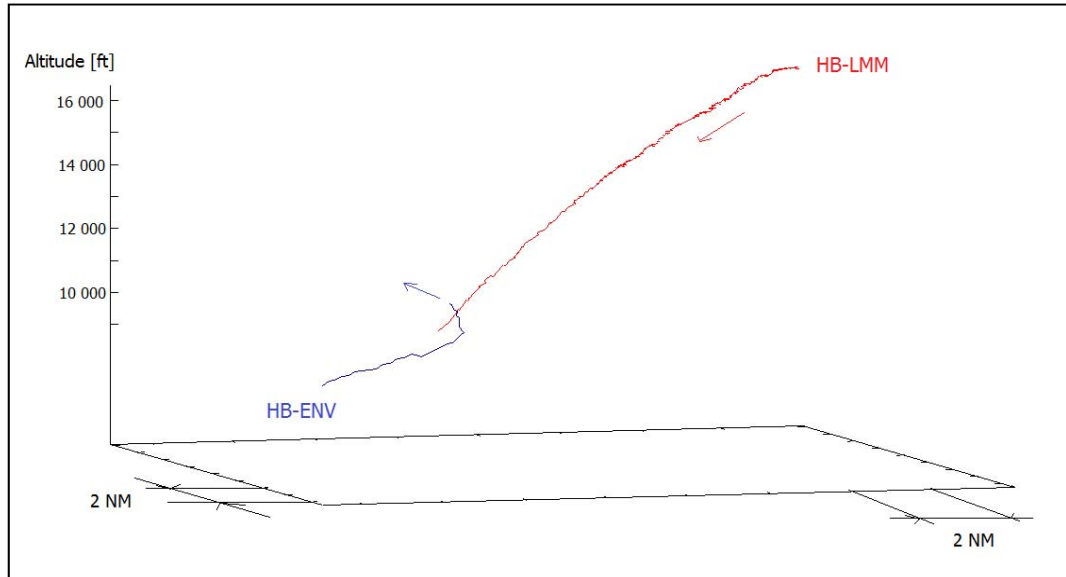


Figure 3: 3D trajectories reconstituted from the radar files

1.2 Personnel information

1.2.1 Crew of aircraft HB-LMM

1.2.1.1 Pilot

1.2.1.1.1 Training

Person	German citizen, born 1959
Licence	Private pilot licence PPL(A) according to Joint Aviation Requirements (JAR), first issued by the German Federal Republic on 25 March 1996 and valid till 17 March 2014
Class ratings	Multi engine piston (MEP land) valid till 13 December 2012 Single engine piston (SEP land) valid till 21 November 2013
Ratings	Instrument rating (IR) valid till 13 December 2012 Radiotelephony in English Language proficiency: English level 4, valid till 6 November 2013.
Medical certificate	Class 2 without restrictions Valid till 3 March 2013
Last medical examination	3 March 2011

1.2.1.1.2 Flying experience

Total hours	1498 hours
Of which on the type involved	1000 hours
During the last 90 days	12:29 hours
Of which on the type involved	12:29 hours
Number of Sion approaches	12 (10 on PA34)

1.2.1.2 Instructor

1.2.1.2.1 Training

Person	Swiss citizen, born 1963
Licence	Airline transport pilot licence aeroplane - (ATPL(A)) according to Joint Aviation Requirements (JAR), first issued by the Federal Office of Civil Aviation (FOCA) on 10 May 1988 and valid till 7 March 2017
Class ratings	Multi engine piston (MEP land) valid till 27 February 2013 Single engine piston (SEP land) valid till 27 February 2014 Towing motorglider (TMG) valid till 17 February

		2014
	Type ratings	A330 (PIC), valid till 18 March 2012
	Ratings	Instrument rating (IR), category III approaches, valid till 18 March 2012 Instrument rating (IR), category I approaches, valid till 18 March 2013 Radiotelephony in English Language proficiency: English level 5, valid till 9 May 2014
	Instructor ratings	Instrument rating instructor (IRI(A)) and flight instructor (FI(A)) valid till 10 February 2015
	Medical certificate	Class 1 & 2 without restrictions Valid till 7 November 2011 and 7 November 2012 respectively
	Last medical examination	23 October 2010
1.2.1.2.2	Flying experience	
	Total hours	20,000 hours
	Of which on the type involved	1200 hours
	Number of Sion approaches	2
1.2.2	Crew of aircraft HB-ENV	
1.2.2.1	Pilot	
1.2.2.1.1	Training	
	Person	Swiss citizen, born 1942
	Licence	Private pilot licence PPL(A) according to Joint Aviation Requirements (JAR), first issued by the Federal Office of Civil Aviation (FOCA) on 16 December 1981 and valid till 24 June 2015
	Class ratings	Single engine piston (SPE land) valid till 7 July 2012
	Ratings	Radiotelephony Language proficiency: French 4, valid till 7 July 2014
	Medical certificate	Class 2, shall wear multifocal lenses. VML valid till 24 April 2013
	Last medical examination	28 March 2012
1.2.2.1.2	Flying experience	
	Total hours	980 hours
	Of which on the type involved	500 hours

	Landings in Sion	Approximately 2 / year
1.2.3	Air traffic controllers	
1.2.3.1	Air traffic controller 1	
	Function	ADC controller
	Person	Swiss citizen, born 1969
	Working days before the day of the incident	2 days
	Licence	Air Traffic Controller Licence based on European Community Directive 2006/23, first issued by the Federal Office of Civil Aviation (FOCA) on 4 April 1995 and valid till 15 April 2012
	Relevant position qualifications	Tower control (TWR); approach (APC); radar surveillance (SRA); precision approach (PAR) for Sion aerodrome (LSGS) in the control region of the whole of Switzerland (LSAS) Radiotelephony in English Language proficiency: English level 4, valid till 7 April 2014
	Medical certificate	European Class 3 Medical Certificate for Air Traffic Controllers, valid till 16 March 2012; no limitations
1.2.3.2	Air traffic controller 2	
	Function	Coordinator controller (COR)
	Person	Swiss citizen, born 1959
	Working days before the day of the incident	1 day
	Licence	Air Traffic Controller Licence based on European Community Directive 2006/23, first issued by the Federal Office of Civil Aviation (FOCA) on 11 December 1990 and valid till 8 September 2012
	Relevant position qualifications	Tower control (TWR); approach (APC); radar surveillance (SRA); precision approach (PAR) for Sion aerodrome (LSGS) in the control region of the whole of Switzerland (LSAS) Radiotelephony in English Language proficiency: English level 4, valid till 15 mars 2014
	Medical certificate	European Class 3 Medical Certificate for Air Traffic Controllers, valid until 29 August 2012; VML, shall wear multifocal lenses

1.3 Aircraft information

1.3.1

Aircraft 1

Registration	HB-LMM
Aircraft type	PA34 – 200T
Characteristics	Twin engine
Manufacturer	Piper Aircraft Inc 2926 Piper Drive Vero Beach Florida 32960 (USA)
Year of manufacture	1981
Serial no.	34-8170029
Owner	Flugschule Basel AG Postfach 4030 Basel Switzerland
Operator	BS Business aviation AG Schlossbergstrasse 1 4132 Muttenz Switzerland
Certification basis	14 CFR FAR Part 23



1.3.2

Aircraft 2

Registration	HB-ENV
Aircraft type	Beech A23-24 Musketeer
Characteristics	Single engine
Manufacturer	Beech Aircraft Corporation Hawker Beechcraft Corporation PO Box 85 Wichita KS 67201-0085 (USA)
Year of manufacture	1966
Serial no.	MA-108
Owner	Private
Operator	Private
Certification basis	CAR 3



1.4 Meteorological information

1.4.1

General

The information presented in sections 1.4.2 to 1.4.6 is taken from the meteorological record which MeteoSwiss drew up at the request of the SAIB for the purposes of the investigation. The original text is in German; the only information selected concerns the general situation, the situation which prevailed in the region of Sion and the meteorological factors which may have had an effect on the history of the incident.

1.4.2 General situation

Switzerland was on the southern flank of an anticyclonic ridge which was passing over Central Europe, extending from the eastern Atlantic to the Black Sea.

1.4.3 Meteorological conditions in the Lower-Valais region

In the Lower Valais, under a cloudless sky a valley wind was blowing close to the ground. In the region of the airport, visibility was approximately 25 kilometres. At the Jungfrauoch this remained greater than or equal to 75 kilometres throughout the day. The photos taken by the Diablerets webcams showed that these conditions also prevailed in the Lower Valais in the late afternoon.

Meteorological situation at the time of the incident

<i>Weather/cloud</i>	<i>No cloud</i>
<i>Visibility</i>	<i>25 km</i>
<i>Wind</i>	<i>260/10 kts</i>
<i>Temperature / dew point</i>	<i>08° / -06°C</i>
<i>Atmospheric pressure</i>	<i>1027 hPa</i>

1.4.4 Astronomical information

Natural lighting conditions	Daylight	
Position of the sun	Azimuth:	233°
	Elevation:	18°

1.4.5 Webcam images



Webcam Les Diablerets, 22 February 2012, 15:03 and 16:03 UTC

1.5 Navigation and landing aids

Sion airport's air navigation aids are the omni-directional beacons Montana (MOT) and Sion (SIO), which are fitted with distance measuring equipment (DVOR/DME).

The landing aid is the IGS 25 instrument guidance system, consisting of the localizer (LLZ) ISI beacon, with an angular width of 6° in relation to the centreline of runway 25, the glide path (GP) system with a slope of 6° and distance measuring equipment (DME).

1.6 Telecommunications

During military aviation activity, the radar alignment of IFR traffic on the IGS 25 instrument approach is carried out by military air traffic control, whose call sign is "SWISS MILITARY RADAR" (130.625 MHz). The "Sion Tower" TWR service

(118.275 MHz) then takes over until landing, after which traffic is transferred to the ground service (GND), with the call sign "Sion Ground" (121.700 MHz).

The incident occurred when the conflicting aircrafts were both being handled by the ADC controller; radiotelephone communications with the pilot of HB-LMM took place in English, and those with the pilot of HB-ENV in French.

1.7 Airport information

1.7.1 General

Sion airport is located in the Rhone Valley in south-western Switzerland. A military base for helicopters and combat aircraft, it is also open to VFR and IFR civil traffic.

Aerodrome reference point: 46°13'09"N/007°19'37E

Elevation: 1581 ft

1.7.2 Runways

One hard runway 07/25, dimensions 2000 x 40 m.

Take-off run available (TORA)

Runway 07: 2000 m, runway 25: 2000 m

Landing distance available (LDA)

Runway 07: 1955 m, runway 25: 1960 m

One grass runway 07/25, dimensions 660 x 30 m

1.8 Onboard recorders

1.8.1 Flight data recorders (FDR)

The regulations do not require onboard flight recorders for the aircraft classes to which HB-LMM and HB-ENV belong; they were not equipped with them.

1.9 Additional information

1.9.1 Arrangements applicable to Class D airspace

In Class D airspace, IFR and VFR flights are permitted and an air traffic control service is provided for all flights. Separation is ensured between IFR flights. The latter receive traffic information relating to VFR flights. VFR flights receive traffic information relating to all other flights and may obtain suggestions for avoidance manoeuvres on request.

1.9.2 Collision avoidance

Reference: ICAO RULES OF THE AIR – ANNEX 2, chapter 3.2 Avoidance of collisions

NOTE: it is important that vigilance for the purpose of detecting potential collisions be not relaxed on board an aircraft in flight, regardless of the type of flight or the class of airspace in which the aircraft is operating, and while operating on the movement area of an aerodrome.

1.9.3 Traffic information

Information provided to a pilot by an air traffic control service to warn them that other aircraft whose presence is known or observed may be near their position or scheduled route, in order to help prevent a collision.

1.9.4 IFR airport ratings

In view of the mountainous environment and the specific characteristics of the IGS 25 instrument guidance system at Sion airport, the IFR approach and departure procedures may only be implemented there by flight crews holding a special authorization issued by the FOCA (AIP Switzerland, section LSGS AD 2.22.1.1). It may be of type A or B; this is dependent on operational considerations, the performance of the aircraft, the natural lighting conditions (day or night) and weather minima for which the pilot must be trained. This rating is extended as long as at least one IFR departure and arrival are made within its 12-month validity period.

At the time of the incident, the pilot of the Piper PA-34 HB-LMM was the holder of a type A rating authorising him to make a daytime IGS 25 approach, subject to radar alignment provided by air traffic control, with a minimum descent altitude (MDA) of 8000 ft, at least 8 km visibility and a ceiling of 6500 ft.

1.9.5 Operation and use of radar in Sion control tower

The Sion control tower is equipped with a radar screen proving an image from a single secondary radar whose source is a military IFF (Identification Friend/Foe) antenna located on the site of the airport. It is used for the control of CIV IFR aircraft until LOC interception, to determine the distances of IFR arrivals from the runway threshold and as a means of monitoring traffic.

Reference: ATMM II LSMS - SECTION 8, para. 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)*

1.9.6 Safety net

The workstations in Sion control tower are not equipped with a short-term conflict alert (STCA).

The radar plots originating from the Geneva skyguide technical service show that the incident involving HB-LMM and HB-ENV activated an alarm at 15:07:18 UTC.

1.9.7 Onboard collision-avoidance systems

The regulations do not require onboard collision warning systems for the aircraft classes to which HB-LMM and HB-ENV belong; they were not equipped with TCAS (Traffic Alert/Collision Avoidance System) or TAS (Traffic Advisory System).

1.9.8 Statements

1.9.8.1 ADC controllers

The ADC controller on duty before the incident said he had completed a normal handover procedure to the colleague who replaced him, communicating all information to him. He remained with him until the moment when the latter accepted the traffic which was being handed over.

The ADC controller on duty at the time of the incident stated: "*...the VFR traffic crossing Sion TMA normally remains to the south when flying along the valley. To cross it in a northerly direction, clearance is required. Depending on the traffic, it is accepted or delayed...*".

With regard to HB-ENV, the controller stated: *"I expected the VFR traffic to follow the valley and not to turn north crossing the IGS centreline."*

He stated that the radar console at the ADC workstation was an "inaccurate" tool, whose "blips" often made "jumps".

1.9.8.2 COOR/APP (Coordinator/Approach) controller

The coordinator stated that many pilots did not seem to know what airspace they were flying in. He thinks that many work situations are ambiguous and that the working tools available to controllers are very rudimentary.

1.9.8.3 Pilot Instructor on aircraft HB-LMM

The instructor on board HB-LMM stated that when the pilot flying made visual contact with the conflicting traffic, he integrated its trajectory and immediately carried out an avoidance manoeuvre to the left.

« Um zu präzisieren: Wir waren auf den IFR Anflug konzentriert. Wurden durch den Tower auf den Trafic aufmerksam gemacht und haben ein „aggressives Ausweichmanöver“ eingeleitet. »

1.9.8.4 Pilot of aircraft HB-ENV

The pilot of aircraft HB-ENV usually flies out of Bressaucourt aerodrome and comes to Sion twice a year on average.

At the time of the flight involved in the incident, he originally wanted to depart from Sion via point W and then climb towards Martigny. The proposal of his passenger to go over the Gemmi pass led him to ask the ADC controller to climb on the downwind leg, remaining to the south of the valley.

The pilot stated that he had at no time heard the IFR traffic and therefore was not aware of its presence. If that had been the case, he would not have crossed the valley.

He said that he thought that the controller could see him on his radar, since he had assigned him a transponder code. He therefore had to be aware that he was crossing the valley.

1.9.9 Information available to VFR pilots

The VFR procedures in force at Sion are laid down in the VFR manual for Switzerland. For departing traffic, no mention is made therein regarding any particular route or a request to the control tower for a clearance to cross the TMA.

Internet sites for the attention of VFR pilots provide information on the procedures to be followed on departure from Sion airport. They do not, however, constitute an official data source and sometimes mention practices which may be perceived as procedures. For example, it is stated: *"After departure leave the CTR and fly straight along the valley and report "Abeam W" or "Abeam E1". Do not confuse E1 with E2. E2 (village of St-Léonard) is closer to the airport than E1 (Town of Sierre)."*

1.9.10 NOTAM

On the day of the incident the following NOTAM concerning the TMA was in force. Sections D and E indicate that all the sectors of the TMA were active.

B0150/12 NOTAMN

Q)LSAS/QATCA/IV/NBO/AE/030/130/4618N00739E009

A)LSGS B)1202060630 C)1203301505

D)FEB 06-10 13-17 20-24 27-MAR 02 05-09 12-16 20-23 0630-1105

1215-1605, 26-30 0530-1005 1115-1505

E) SION TEMPO MIL TMA ALL SECT ACT.

2 Analysis

2.1 Technical aspects

The investigation did not reveal any technical defect which might have contributed to the serious incident.

2.2 Operational aspects

2.2.1 Air traffic control aspects

The provisions applicable to the Class D airspace in which the incident occurred constitute the reference basis for the analysis of the air traffic control aspects. They stipulate that the controller must give information to pilots of IFR and VFR flights concerning other aircraft which may represent a collision risk. To do this, the controller must either know very accurately the positions of the aircraft he is handling (radar environment) or ensure that these are at given points, at given times (non-radar environment).

Given that the dimensions of a TMA are larger than the range of eyesight, only a reliable radar display satisfies the first case. The Sion tower radar equipment is designed for this purpose, but according to the controllers involved in the incident it is of inadequate quality to assure its surveillance function. Even though it enabled the ADC controller to become belatedly aware of the dangerous convergence of aircraft HB-LMM and HB-ENV, it is surprising that some of the traffic information issued to pilots is based on such a system.

In the second case, accurate knowledge of the position of aircraft at given times is related to traffic management which must be based on clear clearances, precise position reports as well as on a structure of VFR departure and arrival routes which constantly guarantees spacing from IFR flights. After 15:00 UTC, the time at which functions were switched in the tower, the ADC controller's instructions to the pilot of aircraft HB-ENV were given on the basis of a control strategy which assumed that the latter would remain in the south of the Rhone valley; however, it was already in contradiction with the instruction to call back "near *Sierre Echo One*", issued by the previous ADC controller. This bias is reinforced by the clearance "OK, so you are still inside the TMA, and call me back abeam *Loèche*", given in response to the pilot who reported that he was heading towards *Loèche*. However, this information did include the indication that HB-ENV would converge on the centreline of IGS 25. Finally, the implicit nature of these control instructions is confirmed by the statement of the ADC controller.

It is conceivable that this assumption was based on a VFR flight practice which has developed among some users of Sion airport. However, flying to the right of a valley and calling back abeam a point taking into account this fact does not constitute a documented VFR flight technique. In terms of air traffic control tactics, the same applies to the implicit control instructions generated by such habits. It is probable that at the time of the incident the complexity of the traffic made up of high-performance military aircraft, VFR and IFR flights for which the controller must apply different rules each time, represented a considerable workload. Recourse to implicit flight instructions may therefore have been a quick solution. To ensure that the pilot of HB-ENV followed the desired route within a TMA, the limits of which he might not have been fully aware of, an explicit instruction mentioning staying to the south of the valley and calling back to cross it in a northerly direction would have been appropriate.

The Sion VFR regional chart shows three reporting points, which are mandatory only for incoming flights. Point E1 ("Echo one") towards which aircraft HB-ENV was directed and E2 ("Echo two") abeam which its pilot reported his position, on

the IGS approach centreline. The traffic management using these points has the risk of causing VFR flights and IFR arrivals to converge and of increasing the workload of the controller, who must then maintain enhanced surveillance of the traffic. VFR routes for entering and exiting TMA/CTR establishing geographical spacing of VFR and IFR traffic would facilitate the control operations.

2.2.2 Flight management aspects

2.2.2.1 Aircraft HB-ENV

The route followed by the pilot of aircraft HB-ENV is consistent with the provisions applicable to Class D airspace and the clearances given to him by the ADC controller. A degree of hesitation is noticeable in his radio exchanges, particularly in relation to the doubt about his position in the TMA. It was probably caused by the difficulties which VFR pilots often experience in accurately orientating themselves in relation to airspace such as the Sion TMA. On average, the pilot landed only twice a year in Sion.

Taking into account the rules in force in Class D airspace, from the moment the pilot had communicated his intention to fly towards Loèche to the ADC, he was free to do so in the absence of any instruction to the contrary. The recordings of the radiotelephone communications and the radar data reveal that he gave this information at 15:03:32 UTC and that he nevertheless continued to follow the South of the valley during three minutes before crossing it. It is then understandable that, seeing the aircraft HB-ENV pursuing its trajectory, the ADC controller consolidated the idea that the pilot didn't planned to turn left. If furthermore the latter had specified that he intended to continue towards the Gemmi pass, it is likely that this additional information would have drawn the ADC controller's attention to his intention to cross the valley.

The radar plots show that during his turn, the aircraft HB-ENV took the direction towards Loèche-les-Bains; it presents about twenty degrees of difference with regard to that of Loèche, nevertheless both converge to the IGS approach centreline.

2.2.2.2 Aircraft HB-LMM

The pilot flying was busy making his IFR approach, under the supervision of the instructor. The crew realized the presence of the VFR traffic due to the traffic information issued by the controller, what allowed them to initiate an avoidance manoeuvre.(see annexe 2)

3 Conclusions

3.1 Findings

3.1.1 General framework

- The Sion VFR regional chart shows reporting points, which are mandatory only for incoming flights.
- At the time of the incident, the TMA was active in Class D and military air operations were in progress.
- The Sion control tower air traffic services consisted of the three functions GND Ground control (Ground), ADC Aerodrome control (Tower) and COOR/APP Coordinator/Approach/MIL INFO (Coordinator / Approach).
- The incident occurred in Sion TMA, 3.4 NM east-north-east of the approach/departure reference point GRANA, to the east of the airport.
- The incident occurred in a cloudless sky with visibility in excess of 25 km.

3.1.2 Technical aspects

- The workstations in the Sion control tower are not equipped with a short-term conflict alert (STCA).
- The aircraft HB-LMM and HB-ENV were not equipped with TCAS or TAS.

3.1.3 Operational aspects

3.1.3.1 Air traffic control

- The air traffic controllers on duty in the Sion control tower at the time of the incident were in possession of appropriate licences.
- The ADC controller on duty at the time of the incident stated that the traffic he was handling was of average volume and complexity.
- The ADC controller on duty at the time of the incident stated that the radar console at the ADC workstation was an "inaccurate" tool, whose "blips" often made "jumps".
- For VFR traffic departing Sion airport, no mention is made in the Swiss VFR manual concerning any particular routing or a request to the control tower for clearance to cross the TMA.

3.1.3.2 Pilots

- The pilots of aircraft HB-LMM and HB-ENV were in possession of appropriate licences.
- The pilot flying of aircraft HB-LMM made visual contact with aircraft HB-ENV, integrated its trajectory and initiated an immediate avoidance manoeuvre to the left.
- The instructor in aircraft HB-LMM reported to the ADC controller: "it was collision course" and thanks to the controller's intervention they were able to narrowly avoid aircraft HB-ENV.

3.1.4 History of the serious incident

- The incident occurred while the conflicting aircraft were both being handled by the ADC controller.

- The ADC controller gave the pilots of aircraft HB-LMM and HB-ENV traffic information concerning their convergence.
- Following the ADC controller's warning, the pilot flying of aircraft HB-LMM executed an immediate avoidance manoeuvre to the left in order to pass behind HB-ENV.
- The radar data shows that the distances between HB-ENV and HB-LMM were at their minimum at 15:08:04 UTC; the aircraft passed each other with a horizontal separation of less than 0.2 NM and an altitude difference of 50 feet.

3.2 Causes

The serious incident is attributable to the dangerous convergence of two aircraft flying in the Sion terminal area under different VFR and IFR flight rules in VMC conditions.

Factors which played a part in the serious incident:

- implicit control instructions given to the pilot of the aircraft flying under visual flight rules
- absence of VFR routes or exit points guaranteeing spacing from IFR traffic in the Sion CTR and TMA.

4 Safety recommendations and measures taken after the serious incident

According to the directives of Annex 13 of the ICAO the safety recommendations formulated in this report are addressed to the supervisory authorities of the State concerned. It is up to its authorities to decide what action to take. However all organisations, companies and individuals are invited, in the sense of the safety recommendation, to improve flight safety.

In the ordinance on the investigation of aircraft accidents and serious incidents, the Swiss legislation prescribes the following directives concerning safety recommendations:

“Art. 32 Recommendations concerning safety

Within a period of six months from the publication of the investigation report, the Office informs the Bureau of the measures which have been taken following the safety recommendations formulated in this document or of the reasons for which measures have not been taken.”

4.1 Safety recommendations

4.1.1 Safety deficit

In the Sion terminal area (TMA), a dangerous convergence occurred between a Beechcraft A23-24 which was crossing the Rhone valley in a northerly direction and a Piper PA-34 established on the final approach segment of IGS RWY 25. The Beechcraft was flying in VMC conditions under visual flight rules whilst the Piper was following instrument flight rules in VMC conditions.

The VFR regional chart for Sion airport did not show a VFR route or exit points from the TMA/CTR establishing geographical spacing of VFR and IFR traffic. It included three reporting points, mandatory only for incoming flights.

4.1.2 Safety recommendation no. 478

The Federal Office of Civil Aviation should require the Sion airport VFR regional chart to show VFR routes or entry and exit points from the TMA/CTR VFR establishing segregation of VFR and IFR traffic.

4.2 Measures taken after the serious incident

No measures taken to date.

Skyguide by letter of September 10th, 2013 expresses:

Skyguide, in association with the airport of Sion, is preparing a modification of the VFR chart VAC taking into account the recommendation to establish VFR routes.

Payerne, 9 December 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, 30 January 2014

Annexes

Annexe 1: Extract from compendium VFR – RAC 1-1

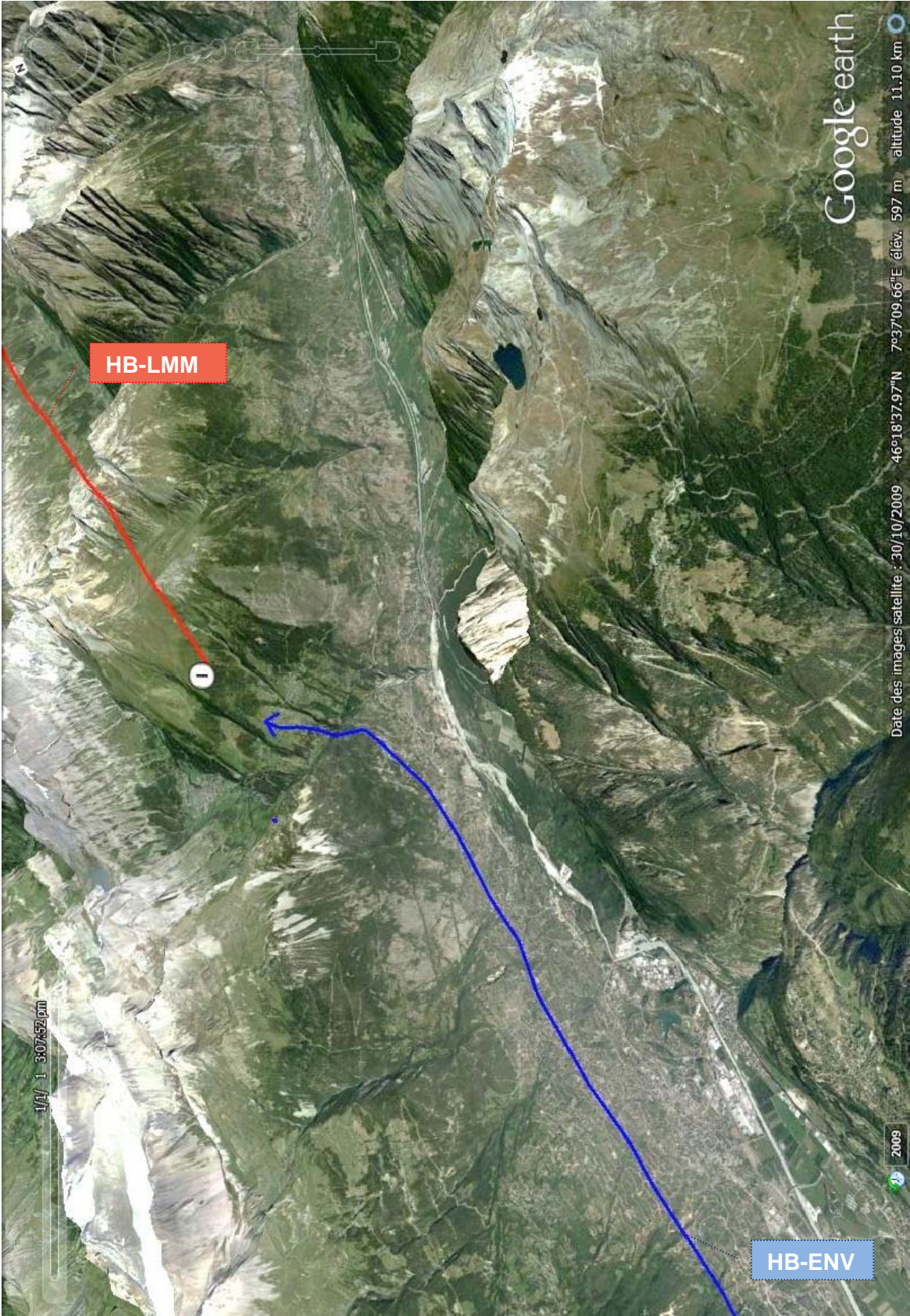
Class D – Controlled airspace

The arrangements applicable to Class D airspace are given below:

	VFR
Separation ensured	No
Services provided	Traffic information between IFR/VFR and VFR/VFR (and suggestion for avoidance manoeuvres on request)
VMC minima	At FL 100 and above: Visibility 8 km Distance from cloud: horizontal 1500 m Vertical 1000 ft Below FL 100: Visibility 5 km Distance from cloud: horizontal 1500 m Vertical 1000 ft
Airspeed limit	250 kt IAS below FL 100
Radiocommunications	Continuous both directions
ATC clearance	Necessary

Class D airspace includes the Sion TMA (MIL TEMPO)

Annexe 2: Positions of the aircraft at the time of the traffic information to HB-LMM



I: time of the traffic information at 15:07:52 UTC