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Final Report No. 1908 by the Aircraft Accident Investigation Bureau

concerning the serious incident (airprox)

between SWR 74PE, AVRO 146-RJ100, HB-IXR

and HB-OYI, Piper PA28

on 05.01.2004

Lugano

Bundeshaus Nord, CH-3003 Berne

Final Report

This report has been prepared solely for the purpose of accident/incident prevention. The legal assessment of accident/incident causes and circumstances is no concern of the incident investigation (Art. 24 of the Air Navigation Law). The masculine form is used in this report regardless of gender for reasons of data protection.

Place/date/time	Departure runway 19, Lugano, 05.01.2004, 17:18 UTC
Aircraft	SWR 74PE, AVRO 146-RJ100, HB-IXR, Swiss Int. Air Lines Zurich (LSZH) – Lugano (LSZA) HB-OYI, Piper PA28, AVILÙ SA Lugano (LSZA) – Lugano (LSZA)

Crews	SWR 74PE	CMDR
		FO
	HB-OYI	Flying instructor
		Trainee pilot

ATC unit	Lugano control tower
Air traffic controllers	Aerodrome controller

Airspace	D
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1. History

On the evening of 5 January 2004, at 17:12 UTC, a Swiss AVRO 146-RJ100 coming from Zurich, flight number SWR 74PE, began an instrument approach to Lugano-Agno airport. When this aircraft first made contact, the responsible air traffic controller (ATCO) in the Lugano control tower asked about the type of approach it wanted. The copilot (FO - first officer), acting as pilot non flying (PNF) throughout the flight, then answered *"...requested whole approach...rwy 19"* (see Annex 1). After a further radio conversation between the flight crew and the ATCO, the latter cleared SWR 74PE for a *"LOC/DME approach 01, circling to land 19"* and requested the aircraft to report PINIK inbound.

At 17:13:46 UTC, the Piper PA28 HB-OYI from the locally-based AVILÙ flying school reported that it was ready for departure at holding point OSCAR. On the basis of a "circuits in NVFR conditions" flight notification, the ATCO knew that the crew of this aircraft wanted to fly circuits as part of night flying training (VFR by night). He immediately cleared it to back track rwy 19. Shortly afterwards SWR 74PE reported "PINIK inbound", on which it received an instruction to report break off for downwind.

At 17:16:16 UTC, HB-OYI, aligned on runway 19, reported that it was ready for take-off. The ATCO cleared it for take-off from runway 19 and issued it with traffic information concerning the approaching SWR 74PE. In the process, the ATCO had to ask for confirmation from HB-OYI concerning reception of the traffic information, as this had not been forthcoming up to that point. At 17:16:58 UTC, the ATCO also issued traffic information to SWP 74PE concerning the Piper, which was taking off. This traffic information was never confirmed by the Swiss crew, nor was confirmation requested by the ATCO.

Subsequently there were further radio conversations between the ATCO and the two aircraft which were converging on opposing headings. In these, the flying instructor on board HB-OYI asked about the altitude of the opposing SWR 74PE at 17:17:19 UTC. By means of a request for the circuit altitude, the ATCO determined at 17:17:39 UTC that it was 2600 ft/QNH. During these radio conversations, SWR 74PE was already at 2600 ft/QNH according to DFDR data.

The flying instructor in HB-OYI then informed him that they would be following the AVILÙ school circuit (school aerodrome circuit rwy 19) at 2000 ft (See Annex 3). After confirmation by the ATCO, HB-OYI requested permission to continue flying in the direction of reporting point WHISKEY to avoid possible wake turbulence. This change in heading led to HB-OYI flying in a more pronounced westerly direction than would have been envisaged according to the AVILÙ school circuit.

During the critical phase, the two aircraft closed to about 0.8 NM on opposite headings before SWR 74PE initiated the break-off. They finally flew past each other with a small lateral separation. The altitude difference between the two aircraft was about 600 ft. According to the flight data recorder (DFDR), SWR 74PE was following an approach procedure which had entered into force on 1 January 2004.

This procedure was conceded to the airline by the Federal Office for Civil Aviation (FOCA). Among other things, it differed from the night circling rwy 19 approach procedure published in the AIP (see Annex 2) in terms of a later break-off (1 NM instead of 2.5 NM ILU DME) and a lower circuit altitude (2610 ft instead of 3600 ft).

As the Swiss flight crew later stated, they had not heard the ATCO's traffic information concerning HB-OYI. Nor had they noticed the dangerous convergence of HB-OYI.

The different circling procedure for runway 19 applied by SWR 74PE was not known in detail to air traffic control at the time of the incident.

This different circling procedure for runway 19, together with relevant approach charts, was handed over personally to the manager of Lugano air traffic control on 6 January 2004 by Skyguide's Chief of Operations.

Chronology of the modification to approach procedures by the Federal Office for Civil Aviation (FOCA) in Lugano from 22 August 2003 to beginning of January 2004:

- The AVILÙ school circuit was approved on 26 August 1999 by the Lugano aerodrome manager and was known to air traffic control. These school circuits are published only on the premises of the AVILÙ flying school.
- On 22 August 2003, the FOCA issued a media release according to which the approach and departure procedures published and implemented up to that time for Lugano deviated from the international standards. As immediate measures, the FOCA decreed an increase in the minimum visibility values and envisaged a change to the PAPI glide angle.
- In this connection, the FOCA also stated that in accordance with the regulations of the International Civil Aviation Organisation (ICAO), the valid IGS (instrument guidance system)¹ rwy 01 approach procedure Lugano must be designated and published as a steep approach procedure. In addition, aircraft must possess a corresponding certification. These regulations were not complied with.
- On 2 October 2003, the FOCA decreed a change in the operating regulations for Lugano-Agno airport, with validity from 1 November 2003.
- At the same time the FOCA issued transitional arrangements up to the end of October 2005, according to which individual provisions of the new operating regulations may be applied in a less restrictive form. The essential changes compared with the previous situation concerned the change to the PAPI glide angle for runway 01 to 6° (from the previous 4.17°) and greatly increased minimum visibility values (e.g. to 3100 m from the previous 1500 m for IGS approaches to runway 01).
- In the course of October 2003, the runway 01 PAPI display was converted so that the system could be set alternately both to 6.00° and to 4.17°. This conversion was accompanied by a prolonged and intense disagreement between the FOCA, air traffic control and the Lugano airport authority, which related to the issue of who was competent and responsible for converting the PAPI from 4.17° to 6.00° and vice versa. In addition it was an open question as to which setting was the basic PAPI setting and for which operators a changeover was to be implemented.

¹ Precision approach with ILS components

The uncertainties concerning these issues had not yet been clarified at the time of the serious incident.

- On 31 October 2003, on an intervention by Swiss, the FOCA issued exceptional approval, limited from 1 November 2003 to 31 December 2003, according to which a different approach procedure for IGS approaches to runway 01 was conceded to Swiss International Air Lines exclusively. It essentially contained a return to a PAPI glide angle of 4.17° and an increased minimum visibility of 4000 m. This procedure was accessible only to Swiss and was not published more widely.
- On 22 December 2003, on an intervention by Swiss, the FOCA approved a circling procedure for runway 19 which differed from the procedure previously published in the AIP for runway 19. This procedure applied only to Swiss International Air Lines and to one other airline operator. It was valid from 1 January 2004.
- The FOCA approval of the above-mentioned procedure, valid from 1 January 2004 and for the attention of the two airline operators, was forwarded by e-mail on 22 December 2003 by the head of regional and military aerodromes to the skyguide head of operations. It should be noted that these arrangement were not accompanied by any chart material.
- The substantial changes in this procedure compared with the previous circling 19 procedure concerned:
 - Break-off to the east for the downwind 19 only at 1 NM ILU DME (instead of the previous 2.5 NM ILU DME).
 - Circuit altitude of 2610 ft (instead of the previous 3500 ft or 3600 ft night circling respectively).
 - A further downwind, which runs approximately 500 to 800 m east of the standard circuit and a short base, which runs about 1500 m south of the standard circuit.
- In a Notam valid from 9 January 2004, the following change was published: "RWY 01 change PAPI 6.00° to PAPI 4.17°, for auth opr PAPI 6° avbl on req"

Weather according to skyguide:

LSZA 1650 36002 CAVOK 02/M00 Q1015 NOSIG

LSZA 1720 36002 CAVOK 01/M00 Q1015 NOSIG

ATIS Information ROMEO (1648 – 1719 UTC) according to skyguide:

Lugano information ROMEO, runway in use 19, IFR landing runway 01, met report 1650 360 2 knots CAVOK temperature 2 dew point minus 1 QNH 1015 nosig TL 85

2. Analysis

The basis of this serious incident lies in the fact that the two flight crews were applying VFR and IFR procedures respectively which were not published and with which the air traffic controller was only partially acquainted.

2.1 Aerodrome traffic control by air traffic control

It is the task of air traffic control (ATC) to issue traffic information to the aircraft concerned in the aerodrome traffic circuit. ATC must also ensure that the flight crews have understood this information. This means that they must confirm that they have and are able to maintain visual contact with each other, or the ATCO has the aircraft concerned permanently in sight.

A prerequisite for ATC to perform its task is that the ATCO must know which procedures flight crews are applying.

The available radar bright display could not provide ATC with any support, because no radar coverage existed for the altitude at which this serious incident occurred.

On 5 January 2004, according to the statement by the manager of Lugano air navigation services, ATC had only unofficial and incomplete knowledge of the procedures flown by Swiss.

Up to this date, on changing shifts, ATCOs had informed each other verbally that the Swiss procedures had changed since the beginning of January 2004, without the ATCOs having any precise knowledge up to that date or even having received any instructions.

The above-mentioned prerequisites for ATC, i.e. having knowledge of the applied procedures and issuing complete traffic information, were not met in the present case. On the one hand it was not clear to the ATCO involved that the approaching SWR 74PE would follow a flight path at 2610 ft which envisaged break-off only at 1 NM ILU DME. According to his statement, he expected that the Swiss aircraft would initiate break-off at 2.5 NM ILU DME in accordance with the procedure published in the AIP and would maintain an altitude of 3600 ft/QNH (see Annex 2). He based his separation arrangements on this expectation. On the other hand the ATCO had not ensured that both aircraft had understood the necessary traffic information. The flight crew of SWR 74PE had not confirmed the traffic information transmitted to them. The ATCO stated: *"... during the period of the airprox continuous visual contact did not exist with HB-OYI"*.

2.2 The flight crew of SWR 74PE

According to his statement, the CMDR of SWR 74PE had been informed by e-mail by the Fleet Chief about the new approach procedures in Lugano, valid from 1 January 2004, only at the beginning of January 2004. The attached chart material consisted of poor-quality black and white copies. Original approach charts from the route manual had apparently not yet been made available. Afterwards, he immediately studied these documents and then, on 5 January 2004, after a series of free days, commenced his duty with the scheduled flight under investigation. With regard to this flight he also had to check the new procedure, so before the flight he had informed his copilot that he would be flying the complete IFR approach procedure.

Prior to this serious incident, a lot had had to be improvised since about the end of August 2003. In each case, he had added to and amended the existing old Lido approach charts with handwritten corrections, because no up-to-date chart material had been available.

According to information from the AVRO RJ Fleet Chief, a so-called OCR bulletin was published on 31 December 2003 in which, among other things, it was noted that the

approach charts for the new procedure could be obtained from Flight Despatch in Zurich.

The copilot of SWR 74PE stated that Swiss International Air Lines had not informed him officially of the approach procedure in force since the beginning of January 2004. Purely by chance, 1-2 days before this flight, he had become aware of the procedure changes in Lugano when on duty with a different CMDR. That CMDR had informally provided him with a copy of the approach chart, which he used for preparation.

According to the analysis of the DFDR, the flight crew of SWR 74PE had accurately flown the circling procedure which was applicable to them. They were entitled to rely on the fact that ATC had knowledge of the approach procedures applicable to them and was applying appropriate separation arrangements.

2.3 The flight crew of HB-OYI

The flying instructor on board HB-OYI was the manager of the AVILÙ flying school. Previously, until October 2003, he had flown as an MD80 CMDR with Swiss International Air Lines. He stated that had noticed the landing lights of the approaching SWR 74PE after he had received traffic information from the ATCO. The approaching aircraft had come very close, which is why he requested its altitude. He then instructed his trainee to change his heading, direction WHISKEY.

According to the voice transcript, the request from HB-OYI to ATC for permission to take avoiding action direction WHISKEY occurred at about the same time as the message from SWR 74PE “..74PE breaking off”.

2.4 The role of the Federal Office for Civil Aviation (FOCA) as the supervisory authority

The available correspondence between officials of the FOCA, skyguide, representatives of Lugano airport and Swiss International Air Lines shows that between the end of August 2003 and the beginning of January 2004 there had on the one hand been widely differing concepts concerning the future configuration of the IFR approach procedures for Lugano and on the other hand the FOCA fulfilled its management role, devolving upon it by virtue of its duty as the supervisory authority, only inadequately. In the final analysis, this situation had prevented all those involved from being informed in good time and from receiving satisfactory documentation about the new approach procedures.

3. Conclusions

3.1 Findings

- The serious incident took place at night. Both aircraft were flying in Class D controlled airspace.
- SWR 74PE was flying under instrument flight rules (IFR). HB-OYI was conducting a visual flight at night in the Lugano aerodrome zone.
- Both aircraft were in uninterrupted radio contact with the responsible Lugano aerodrome controller.

- The AVILÙ school circuit was not published in the AIP, but it was known to ATC and the Lugano airport authority.
- The available radar bright display could not provide ATC with any support, because no radar coverage existed for the altitude at which this incident occurred.
- The different circling procedure for runway 19 applied by SWR 74PE was not known in detail to air traffic control at the time of the incident. It was valid from 1 January 2004.
- This different procedure, together with relevant approach charts, was not handed over personally to the manager of Lugano air traffic control until some days afterwards, on 6 January 2004, by his superior, the Chief of Operations of the air traffic control company.
- According to the analysis of the DFDR, the flight crew of SWR 74PE had accurately flown the circling procedure which was applicable to them.
- Together with the take-off clearance, the responsible ATCO issued traffic information to HB-OYI at 17:16:20 UTC concerning the approaching SWR 74PE. HB-OYI confirmed receipt of this traffic information only when requested to do so by the ATCO. At the time take-off clearance was issued to HB-OYI, SWR 74PE was about 3.1 NM from ILU DME.
- At 17:16:58 UTC, the ATCO also issued traffic information to SWP 74PE concerning HB-OYI, which was taking off. The flight crew did not confirm this traffic information; nor did the ATCO request confirmation. At this time SWR 74PE was about 1.9 NM from ILU DME; HB-OYI had just taken off and was on departure from runway 19.
- According to the statements of the Swiss flight crew, they had not heard the ATCO's traffic information regarding HB-OYI. Nor had they noticed the dangerous approach of HB-OYI.
- According to the statements of the ATCO responsible, he did not have continuous visual contact with HB-OYI for the duration of the airprox.
- According to the statements of the pilots of HB-OYI, they took avoiding action in a westerly direction in order to avoid SWR 74PE which was approaching on an opposing heading and so as not to be affected by wake turbulence from this aircraft.
- According to the voice transcript, the request from HB-OYI to ATC for permission to take avoiding action direction WHISKEY occurred at about the same time as the message from SWR 74PE "...74PE breaking off". At this time, according to the DFDR, the Swiss aircraft was already just under one mile to the east of the threshold of runway 19. Congestion on the frequency had made an earlier notification of the break-off by the Swiss flight crew impossible.
- Both flight crews and the competent air traffic controller were in possession of the licences necessary to exercise their activities.
- The flight crew of HB-OYI, still on the Lugano control tower frequency, communicated their intention to submit an ATIR; which they subsequently did.

3.2 Cause

The incident is attributable to the fact that the air traffic controller's planning and handling of aerodrome traffic was based on incorrect assumptions, because he was not aware of the procedures being applied by the flight crews, as they had not been made available to him.

The fact that the communication concerning traffic information was characterised by a number of shortcomings contributed to the incident.

4. Safety Recommendation

Definition and publication of generally binding procedures for Lugano

The following safety recommendation has already been submitted by the AAIB to the Federal Office for Civil Aviation with the interim report dated 13 March 2004:

Safety recommendation No. 379

The Federal Office for Civil Aviation shall immediately define and publish IFR and VFR procedures which are to be applied uniformly by all airline operators. These procedures shall be published in the AIP.

Prior to publication, ATC should be informed in good time, so that they have sufficient time to implement changes in procedures and also to provide training, if necessary.

Measures taken

According to a letter to the AAIB dated 17.08.2006, the FOCA has implemented the safety recommendation:

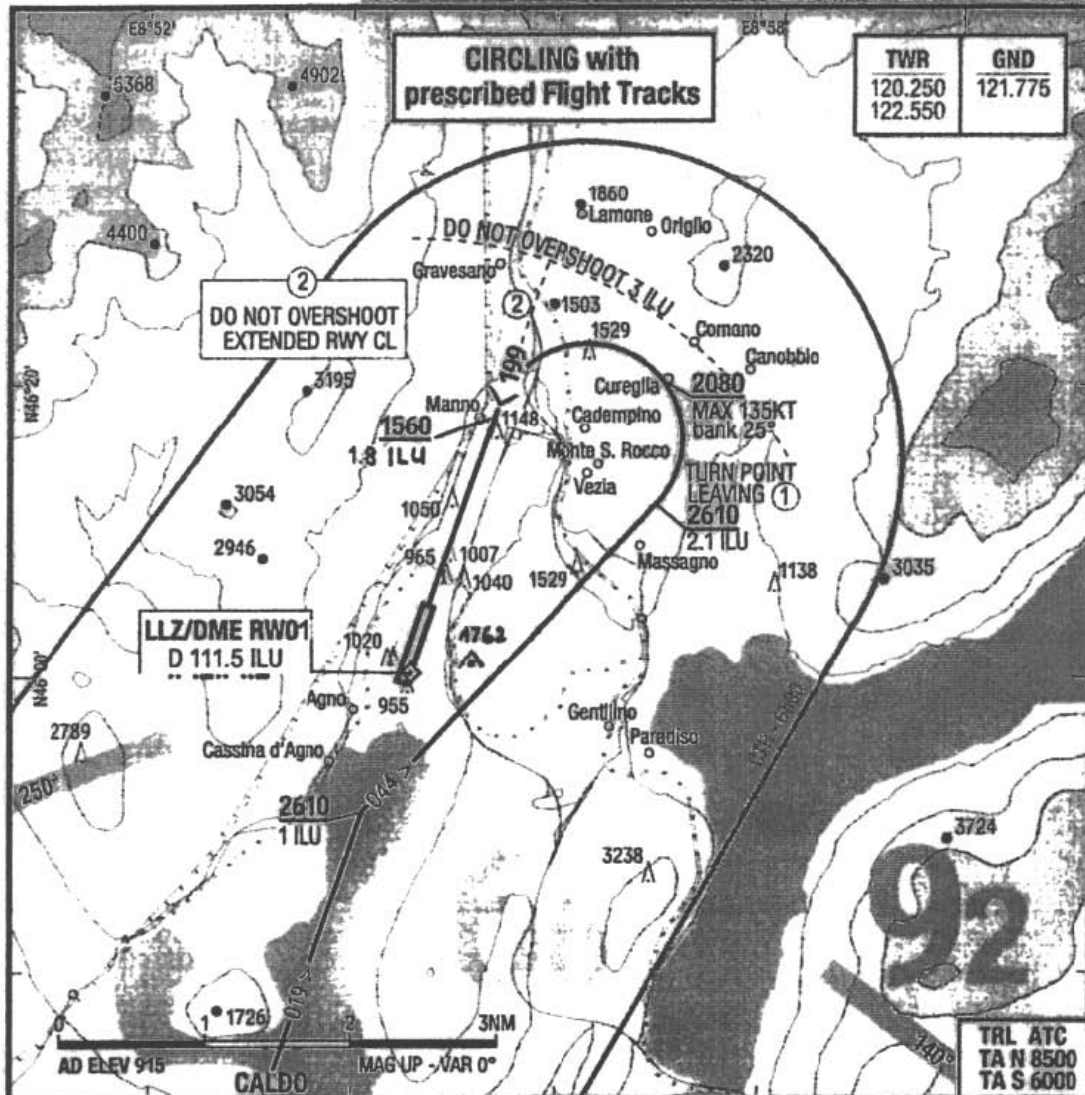
The IFR and VFR procedures which are currently being applied are all published in the AIP. The orderly and timely publication of the VFR and IFR procedures approved by the FOCA is currently being ensured by appropriate and clearly defined internal FOCA processes. This also guarantees that ATC is informed in good time of the changes in procedures which affect them and has sufficient time, if necessary, to train its personnel.

Berne, 18 August 2006

Aircraft Accident Investigation Bureau

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Approach chart used by the crew of SWR74PE



VISUAL

<p>1) Start turn and descent at 2.1 ILU Fly turn with MAX 135KT / 25° bank</p> <p>Descent angle 4.17° (Gradient 7.3%)</p> <table border="1"> <tr> <td>Gnd speed - KT</td> <td>110</td> <td>120</td> <td>130</td> <td>140</td> <td>150</td> </tr> <tr> <td>444ft per NM</td> <td>814</td> <td>888</td> <td>962</td> <td>1036</td> <td>1110</td> </tr> </table> <p>Configuration / speed to be arranged as to reach landing configuration when starting inbound turn.</p>	Gnd speed - KT	110	120	130	140	150	444ft per NM	814	888	962	1036	1110	<p>NIGHT CIRCLING RWY 19 - CONDITIONS</p> <p>APT: PAPI working, railroad beacon working</p> <p>MET: VIS 5km, no heavy precipitation, visual contact to the villages of Comano, Lamone and Gravesano</p>
	Gnd speed - KT	110	120	130	140	150							
444ft per NM	814	888	962	1036	1110								
	<p>MISSED APPROACH DURING CIRCLING 19</p> <p>A. Before break-off point: Fly standard MISAP for LLZ/DME APCH</p> <p>B. After break-off point: Complete circling 19 Proceed to PINIK climbing to 6000</p>												

19					Circling 1)
B	Rt - m/Km R				1700 - 3.1v 2610 2)
1) MAX 135 KT				2) no clouds below MDA	

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Changes: New

EFF 01-JAN-2004

29-DEC-2003

AIP SWITZERLAND

CIRCLING
APPROACH
CHART

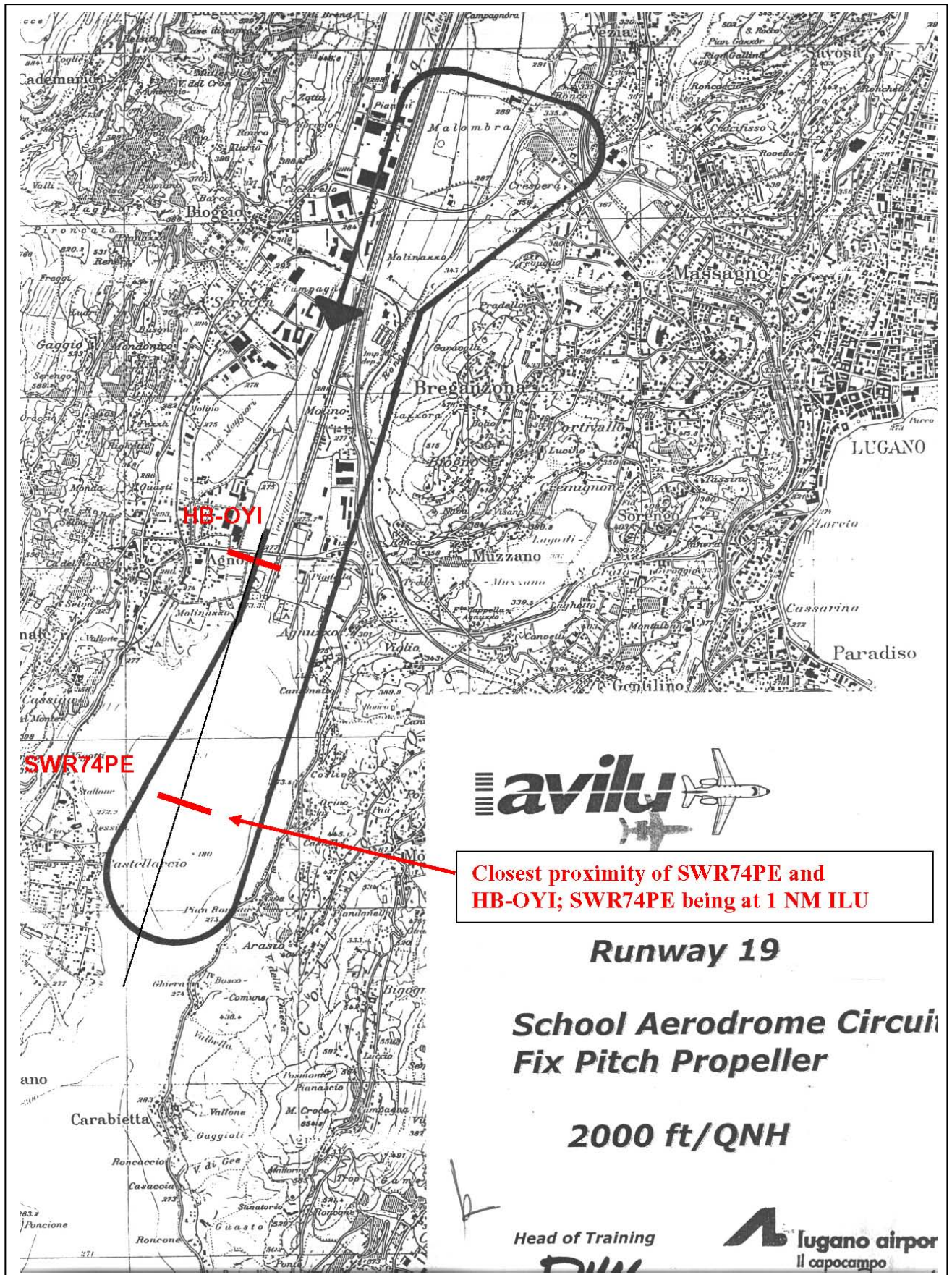
ELEV 915 ft

MILANO ARR	126.750	126.300
MILANO INFO	124.925	
LUGANO TWR	120.250	122.550

LSZA AD 2.24.10 - 5

LUGANO
NIGHT CIRCLING
RWY 19





Closest proximity of SWR74PE and HB-OYI; SWR74PE being at 1 NM ILU

Runway 19

**School Aerodrome Circuit
Fix Pitch Propeller**

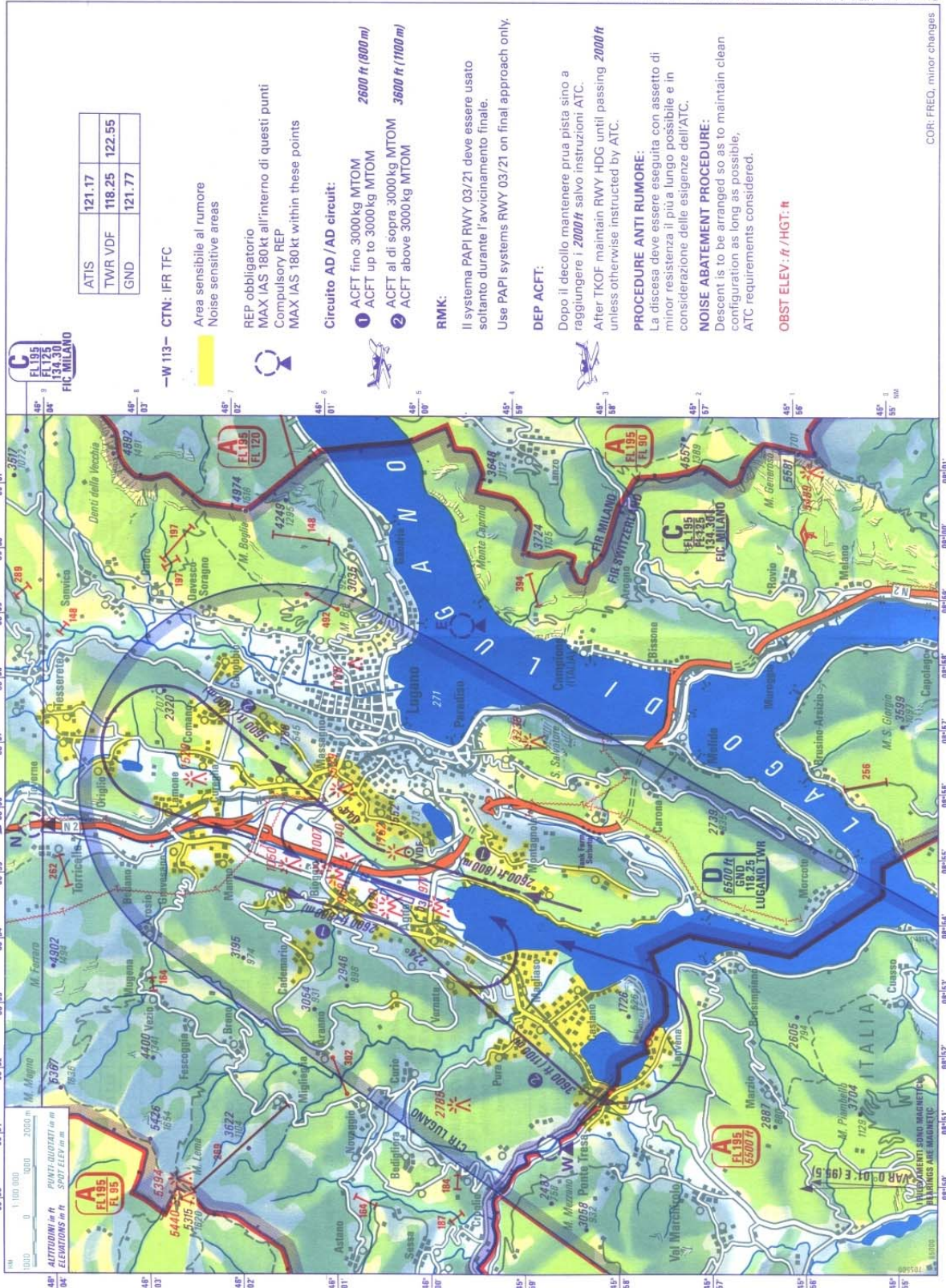
2000 ft/QNH

Head of Training

Lugano airport
Il capocampo

CARTA D'AVVICINAMENTO A VISTA-OACI
VISUAL APPROACH CHART-ICAO

LUGANO
LSZA



08/95 SEP 14

UFFICIO FEDERALE DELL'AVIAZIONE CIVILE, 3003 BERNA

LSZA VAC 14

COR: FRED, minor changes

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date Agno, 19 December 2005

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subject **AIR PROX between SWR74PE and HBOYI**

**Transcript of radiotelephony-communications
from tape-records (second)**

Aerodrome concerned:	Lugano-Agno Airport
Designation of ATS unit:	Skyguide Lugano, TWR/APP
Frequencies:	120.25 (Tower) T
Involved aircrafts	SWR74PE (RJ1H) IFR S HBOYI (P28A) VFR O
Period covered by attached extract:	05.01.04 17:11:55 – 17:20:10 UTC

WX LSZA 1650 36002 CAVOK 02/M00 Q1015 NOSIG
LSZA 1720 36002 CAVOK 01/M00 Q1015 NOSIG

Name and position of official in charge of transcription service:

Michele Montanari,
Chief of Air Navigation Services
unit Lugano-Agno

S	17:11:56	Lugano buongiorno SWISS 74 PE direct to CALDO descending to 6000 ft information R		
T	17:12:03	SWISS 74 PE Lugano TWR buonasera report requested approach		
S	17:12:09	ehm...requested <i>whole</i> approach.....RWY 19	<i>whole</i> is what the ATCO understood	between approach and rwy 19 it could be a <i>towards</i>
T	17:12:14	you request a LOC DME approach, confirm		
S	17:12:17	affirm		
T	17:12:19	roger, cleared LOC DME approach 01 circling to land 19, report PINIK inbound established		
S	17:12:28	... LOC DME RWY 01 with circling 19, report PINIK inbound 74 PE		before LOC DME is covered by a noise
O	17:13:46	HYI holding O ready for departure		
T	17:13:53	HYI back track RWY 19		
O	17:13:55	back track 10 HYI		
S	17:14:22	74 PE PINIK inbound		
T	17:14:25	PE report breaking off for DWD		
T	17:14:27	roger		
O	17:16:16	HYI line up and ready for departure		
T	17:16:20	HYI traffic jumbolino on final 01 breaking off soon for DWD 19, wind calm RWY 19 cleared for take off		
O	17:16:29	cleared for take off, HYI		
T	17:16:34	HYI did you copy about traffic		
O	17:16:37	affirm		
T	17:16:58	SWR PE traffic piper 28 taking off 19 to join DWD at 2600 ft		
O	17:17:14	TWR from YI		
T	17:17:17	go		
O	17:17:19	what the ... altitude of the jumbolino	it could be <i>frequent</i>	instructor's voice
T	17:17:22	SWR PE actual altitude		
T	17:17:30	SWR PE how do you read		after a pause

S	17:17:32	go ahead		
T	17:17:34	your circuit altitude		
S	17:17:39	2 6 hundred 74 PE		
T	17:17:41	roger		
T	17:17:44	HYI did you copy		
O	17:17:46	HYI we make school circuit 2000 ft		
T	17:17:49	roger		
O	17:18:14	HYI request to proceed WHISKEY		
T	17:18:18	HYI approved		
O	17:18:21 avoid wake turbulence unreadable	
S	17:18:23	74 PE breaking off		
T	17:18:26	PE wind calm RWY 19 cleared to land		
S	17:18:31	cleared to land 19 PE		
O	17:20:00	HYI WHISKEY request to join DWD 19 2600		
T	17:20:06	HYI join DWD number 2 number 1 on base		
O	17:20:10	we'll look out, join DWD 19 HYI		