



**HELLENIC REPUBLIC
MINISTRY OF INFRASTRUCTURE AND TRANSPORT**

**AIR ACCIDENT INVESTIGATION
AND AVIATION SAFETY BOARD
(AAIASB)**



**ACCIDENT INVESTIGATION REPORT
AIRCRAFT PIPER CHEYENNE PA 31T
SX-AVC
AT THESSALONIKI INTERNATIONAL AIRPORT “MACEDONIA”
ON AUGUST 14, 2013**

ACCIDENT INVESTIGATION REPORT
03 / 2021

**Accident of Aircraft Piper Cheyenne PA 31T with registration SX-AVC
on August 14, 2013 at Thessaloniki International Airport “Macedonia”**

**This accident investigation was carried out by the Air Accident Investigation
and Aviation Safety Board according to:**

- **Annex 13 of the Chicago Convention**
- **EU regulation (EU) 996/2010**
- **Law 2912/2001**

*“According to Annex 13 of the Chicago Convention of the International Civil Aviation, EU
Regulation 996/2010 and Law 2912/2001, Accidents and Incidents Investigation is not
intended to attribute blame or liability. The sole purpose of this investigation and the findings
is to prevent accidents and incidents.*

*Therefore, the use of this report for any purpose other than to prevent future accidents and
incidents could lead to misinterpretations.”*

Members of the Air Accident Investigation and Aviation Safety Board

Chairman

Ioannis Kondylis

Ret. Airline Captain, Investigator

Members

Vice Chairman Akrivos Tsolakis

Ret. Airline Captain, Investigator

Grigorios Flessas

Ret. Airline Captain

Christos Valaris

Ret. A. F. Brigadier General

Charalampos Tzonos-Komilis

Airline Captain, Investigator

Secretary: K. Katsoulakis

Table of Contents

Table of Contents	3
TITLE	5
SYNOPSIS	5
1. FACTUAL INFORMATIONS	7
1.1 History of Flight	7
1.2 Injuries to persons.....	9
1.3 Damages to the aircraft	9
1.4 Other damages	9
1.5 Personnel information	9
1.6 Aircraft Information.....	10
1.7 Meteorological information.....	11
1.8 Aids to navigation	12
1.9 Communications	12
1.10 Aerodrome information.....	12
1.11 Flight recorders.....	12
1.12 Wreckage and impact information.....	12
1.13 Medical and pathological information	12
1.14 Fire	12
1.15 Survival aspects.....	13
1.16 Tests and Research	13
1.17 Organizational and Management Information	13
1.18 Additional information.....	13
2. ANALYSIS	15
3. CONCLUSIONS	15

3.1	Findings.....	15
3.2	Cause(s).....	16
4.	SAFETY RECOMMENDATIONS.....	16
5.	APPENDICES.....	18

TITLE

OPERATOR	:	3 D S.A.
OWNER	:	3 D S.A.
MANUFACTURER	:	PIPER AIRCRAFT INC.
A/C TYPE	:	PIPER CHEYENNE PA 31T
COUNTRY of MANUFACTURE	:	USA
NATIONALITY	:	GREEK
A/C REGISTRATION	:	SX-VAC
LOCATION of ACCIDENT	:	Thessaloniki International Airport LGTS
DATE and TIME	:	August 14, 2013 at 08h 18' 33'' UTC
Note	:	All Times are UTC. Summertime LT = UTC + 3

SYNOPSIS

On August 14, 2013, the PIPER Cheyenne PA 31T aircraft was on a training flight. After take-off, the aircraft proceeded west of the airport to conduct Hail Suppression training program. On the way back, the crew asked permission from Thessaloniki Airport Control Tower to perform, as part of the training, some Touch and Go landings. In the fourth approach for touch and go, on final approach for runway 34, around 6 NM, being number two for landing, following the preceding A320, the SX-AVC appeared to land at the beginning of runway 34 and after take-off and a few feet airborne, made a sharp manoeuvre to the left and crashed to the left of the runway at the intersection with the runway 10/28. The flight crew exited the aircraft from the emergency exit without injuries.

The National and International Authorities were informed with AAIASB 1166 document on 16-08-2013.

INTENTIONALLY LEFT BLANK

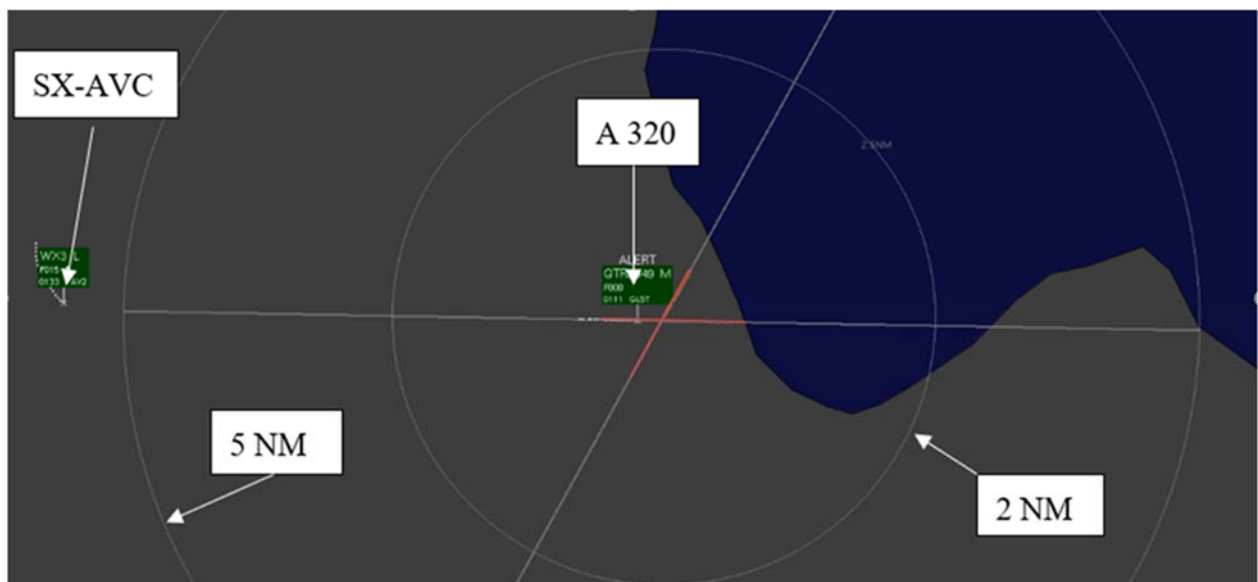
1. FACTUAL INFORMATIONS

1.1 History of Flight

The SX-AVC aircraft performs Hail Suppression flights on behalf of EL.G.A. (Hellenic Agricultural Insurance Organization).

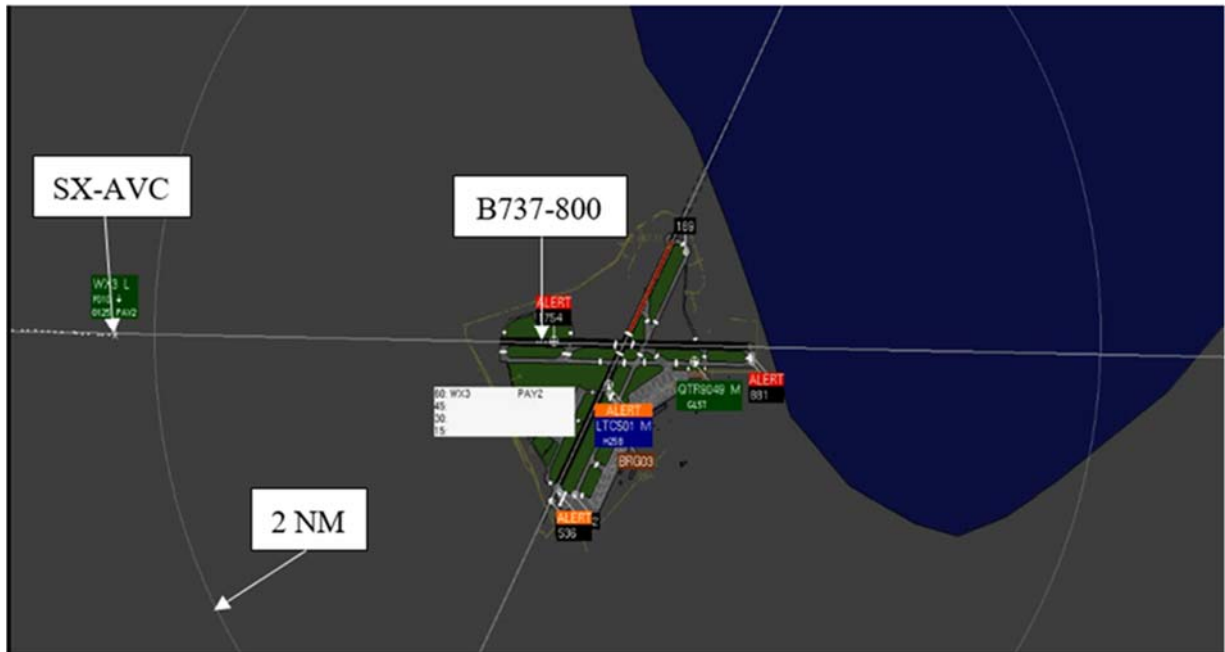
On 14/08/2013 a flight plan was submitted for a training IFR flight, for the flight Area A, above Giannitsa 31 NM NW of LGTS. The aircraft took off at 07:19 UTC.

On the way back to Thessaloniki airport the Captain requested and received permission to perform a few touch and go as part of the training process. After the third touch and go, the aircraft entered the left downwind leg of runway 34 and was asked by the Airport Control Tower to extend the downwind leg to follow, as number two for approach, an Airbus A320. The SX-AVC entered the final leg of runway 34 about 6 nautical miles from the landed A320 and the runway threshold.



Radar Capture 1: Landing A320 and distance from SX-AVC.

After the A320 had evacuated the runway, a B737-800 was cleared for take-off from runway 34. At that time, the SX-AVC was at 2.5 NM and 1 minute and 12 seconds from the runway threshold (Time separation was calculated with approach speed: Stalling speed of 88 kts x 1.3 = Vref 114.4 kts + 10 kts = **V approach speed = 125 NM / hr**).



Radar Capture 2: Take off B737-800 and distance from SX-AVC.

At lift off of B737-800, the SX-AVC was 1.5 NM and 43 seconds from the runway 34 threshold and was cleared for touch and go at 08h17'49" UTC without any warning to the flight crew of the light aircraft about wake turbulence from the departing transport category airplane.



Radar Capture 3: B737-800 lift off and distance from SX-AVC.

From testimonies of ATC, SX-AVC appeared to perform a smooth approach and landed at the beginning of runway 34 and then took off normally. At a height of a few feet, the aircraft made a sharp left bank manoeuvre resulting in a crash at 08h18'40", outside off the runway, near the intersection of runways 34/16 and 10/28.

The Airport Fire Service (RFF) was immediately activated and at the same time an order was given to detain all arriving and departing aircrafts.

At 08h22'22 " UTC, it is reported by the ATC that the two pilots had evacuated the aircraft and were taken, precautionary, to the airport Doctor's Office.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Deaths	0	0	0
Serious	0	0	0
Minor/None	0/2	0/0	0
Total	2	0	0

1.3 Damages to the aircraft

The aircraft suffered extensive damage and was declared as a total loss.

1.4 Other damages

No damage or injuries to third parties.

1.5 Personnel information

1.5.1 Commander

License/Number	ATPL FAA 2292228
Licence validity certificate	Certificate of Recognition in 1998 until 30-09-2013
Medical Certificate valid until	21-03-2014
Total Hrs	10.375,6 hrs.
Hrs as Pilot in Command	10.225,6 hrs.
Instrument flying Hrs	2.075,6 hrs.
Multy Engine Hrs	7.175,6 hrs.

1.5.2 First Officer

License/Number	GR 002861
Licence validity	Until 27-04-2016
Medical Certificate valid until	03-10-2013
Total Hrs	1.000,5 hrs.
Hrs as Pilot in Command	370,0 hrs.
Multy Engine Hrs	500,5 hrs.
Instrument Flight hrs	420,5 hrs.

1.6 Aircraft Information



Photo 1: The Piper PA-31T Cheyenne SX-AVC.

1.6.1 General Aircraft information

The Piper PA-31T Cheyenne is a turboprop evolution of the previous PA-31P.

1.6.2 General characteristics

- **Crew:** 2
- **Capacity:** 4–6 passengers
- **Length:** 34 ft 8 in (10.57 m)
- **Wingspan:** 42 ft 8¹/₄ in (13.011 m) (over tip tanks)
- **Height:** 12 ft 9 in (3.89 m)
- **Wing area:** 229 sq ft (21.3 m²)
- **Aerofoil:** NACA 63₂-415 at root, 63A212 at tip
- **Empty weight:** 4,870 lb (2,209 kg)
- **Max take-off weight:** 9,000 lb (4,082 kg)
- **Fuel capacity:** 382 US gal (318 imp gal; 1,450 L) usable fuel
- **Powerplant:** 2 × Pratt & Whitney Canada PT6A-28 turboprops, 620 shp (460 kW) each
- **Propellers:** 3-bladed Hartzell HC-BTN-3B constant-speed propellers, 7 ft 9 in (2.36 m) diameter

1.6.3 Performance

- **Maximum speed:** 326 mph (525 km/h, 283 knots) at 11,000 ft (3,400 m)
- **Cruise speed:** 244 mph (393 km/h, 212 knots) at 25,000 ft (7,600 m) (econ. cruise)
- **Stall speed:** 88 mph (142 km/h, 76 knots) (landing configuration)
- **Range:** 1,702 mi (2,739 km, 1,479 nm (econ. cruise, 45 min reserves)
- **Service ceiling:** 29,000 ft (8,800 m)
- **Rate of climb:** 2,800 ft/min (14 m/s)
- **Take-off run to 50 ft (15 m):** 1,980 ft (600 m)
- **Landing run from 50 ft (15 m):** 1,860 ft (570 m)

1.6.4 Maintenance data

There were no signs of malfunction before the accident.

1.6.5 Landing Gear system

There were no signs of malfunction before the accident.

1.7 Meteorological information

The meteorological data of 14 August 2013 as received from the Regional Meteorological Center of “Macedonia” (METAR from 07:50 UTC to 08:50 UTC) are presented.

These show that the wind was from 300° / 5 knots, the visibility over 10 km and the runway dry.

There were no significant weather phenomena, which could affect the approach, landing and take-off phase of the aircraft.

METAR: 140750 30005kt CAVOC 27/17 Q1013 NOSIG

METAR: 140820 30006kt CAVOC 28/18 Q1012 NOSIG

METAR: 140850 30006kt CAVOC 28/18 Q1013 NOSIG

1.8 Aids to navigation

Not applicable.

1.9 Communications

No communication difficulties were reported in contact with the Air Traffic Control.

1.10 Aerodrome information

There is no information on any difficulty (AIP in Appendix 5.1).

1.11 Flight recorders

1. The PA-31T Cheyenne SX-AVC has no FDR and CVR.
2. A recording of the tower frequency 118.1 ATC was received.
3. A CD was recorded with A-SMGCS (Advanced-Surface Movement Guidance and Control System).

1.11.1 Written reports

1. Captain's report.
2. ATC report.
3. Air Traffic Management accident investigation report.

1.12 Wreckage and impact information

SX-AVC aircraft sustained total loss (Photos in Appendix 5.2).

1.13 Medical and pathological information

Not applicable.

1.14 Fire

Not applicable

1.15 Survival aspects

With the crash of the SX-AVC, the RFF of the airport was alerted, the siren of the Airport Fire Brigade and the Air Force was immediately activated as there was a risk of ignition of the aircraft and the surrounding area, with a direct impact on the Air Force facilities.

At the same time, an order was given to halt all arriving and departing aircrafts.

The fire trucks responded to the emergency and were informed by the Airport Control Tower about the location of the accident at the intersection of runways 16/34 & 10/28.

The first fire truck arrived immediately at the scene. The rest arrived at the accident site following a follow me car.

The ATC reported from the frequency that the two pilots of SX-AVC evacuated the aircraft on foot.

An ambulance arrived at the scene.

The two pilots were transported, as a precautionary measure, to the airport Doctor's Office.

1.16 Tests and Research

Not applicable.

1.17 Organizational and Management Information

Not applicable.

1.18 Additional information

As mentioned above, SX-AVC as a light aircraft, according to the instructions of ATC, extended the downwind leg in order to follow a leading medium-sized A320 aircraft. According to ATC and recorded by A-SMGCS, the distance between the two aircrafts was 6 NM on final approach for RWY 34.

According to ICAO Doc 4444, the required minimum distance between the two aircrafts, for a medium-sized aircraft and light aircraft is 5 NM, so that there was no risk of the light entering the wake turbulence of the leading medium size aircraft.

In contrary, no consideration, from ATC, was given for the light aircraft performing a touch and go after the departure of a medium-sized to assure at least 2 minutes separation between small aircraft taking off after a medium-sized.

ICAO category	MTOW	FAA category
Light (L)	$MTOW \leq 7.000Kg$	Small
Medium (M)	$7.000kg < MTOW < 136.000kg$	Large
Heavy (H)	$136.000kg \leq MTOW$	Heavy
Super (J)	Airbus A380	Super

Figure 1: ICAO/FAA Aircraft categorization according to their maximum weight.

Leader / Follower	A380-800	HEAVY	MEDIUM	LIGHT
A380-800		6 NM	7 NM	8 NM
HEAVY MTOM ≥ 136 tons		4 NM	5 NM	6 NM
MEDIUM $7 \text{ tons} \leq MTOM < 136 \text{ tons}$				5 NM
LIGHT MTOM < 7 tons				

Figure 2: ICAO Doc 4444. Minimum aircraft separation according to Maximum weight.

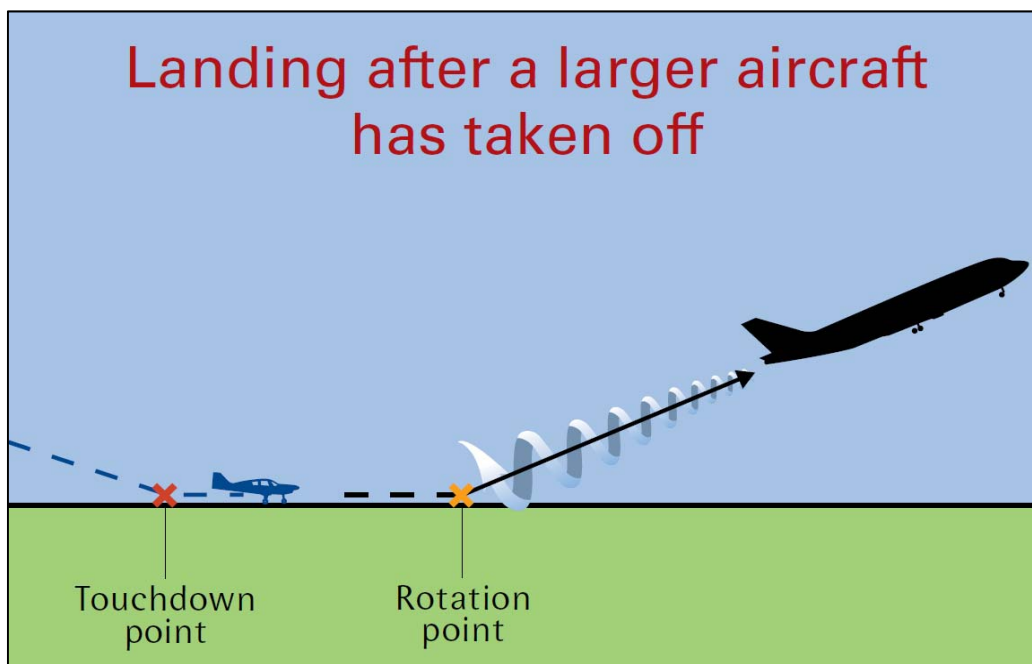


Figure 3: Touchdown point of small aircraft after the take-off of a larger aircraft.

ICAO Doc 4444 provides for a longitudinal separation between incoming aircraft according to their maximum weight. In addition, a temporal or longitudinal separation is provided using radar, between departing aircraft from the same runway.

1. Three minutes or the appropriate radar separation when the take-off is behind a super.
2. Two minutes or the appropriate radar separation when the take-off will be behind a heavy aircraft.
3. Two minutes or the appropriate radar separation when the take-off is behind a medium-sized aircraft (e.g. A320 or B737-800).

2. ANALYSIS

After the third touch and go, SX-AVC entered the left downwind leg of runway 34 to perform the fourth touch and go. He was requested to extend the downwind leg and follow the incoming A320, as number two. The longitudinal separation of the light SX-AVC and the preceding medium size A320 was performed at 6 NM, as required for a medium-sized and light aircraft. After the landing of the A320, a B737-800 was cleared for take-off. At the time of the take-off run of the medium-sized B737-800, the SX-AVC light aircraft was 2.5 NM and 1 minute and 12 seconds from runway 34 threshold. After the lift off of the B737-800, SX-AVC was at a distance of 1.5 NM and 43 seconds to the threshold and received a clearance for touch and go. According to ATC, the SX-AVC landed in the touch down zone and took off. As such a light aircraft took off in less than 2 minutes, from the preceding medium size aircraft, as required for take-off safety separation.

3. CONCLUSIONS

3.1 Findings

1. The SX-AVC aircraft was airworthy.
2. Both pilots had their licences and medical certificates valid.
3. Environmental conditions did not contribute to the accident.
4. No communication malfunction was reported between pilots and ATC.
5. High aviation activity is observed at “Macedonia” International Airport on the day of the accident.
6. It is confirmed that the separation of the A320 and SX-AVC aircraft during their approach and landing, was in accordance with the provisions of ICAO Doc 4444 for medium and small aircraft, thus creating no problems in the approach and landing of the light aircraft.

7. It is confirmed that the separation of the B737-800 and SX-AVC during their take-off, was not in accordance with the required 2 minutes for the start of light take-off after the lift off from the medium-size aircraft.
8. The light aircraft, probably, entered the wake turbulence of the leading medium-sized aircraft, resulting in the loss of control and eventually its crash and its complete destruction.

3.2 Cause(s)

3.2.1 Probable Cause

The most probable cause, of loss of control of the SX-AVC aircraft after its take-off, and its subsequent crash, is its entry in Wake Turbulence caused by the leading B737-800, due to their insufficient separation, according to the provisions of ICAO Doc 4444 of 2 minutes separation, for light aircraft taking-off after the lift off of the leading medium size from the same runway.

Contributing factor to the loss of control, was the light aircraft flight crew's intentional operation of touch & go without proper time separation to a departing transport category medium size airplane.

4. SAFETY RECOMMENDATIONS

***To the Hellenic CAA:** The followings are recommended in order to avoid similar accidents and incidents.*

2021/14: During periods of high aviation activity, it is recommended that the air traffic control review the authorization decision for training flights.

2021/15: In the case of touch and go approval, the separation (time and distance) to aircraft take-offs must be applied.

2021/16: In this case, SX-AVC should have been ordered for a Full Stop Landing due to non-compliance with the time and longitudinal separation restrictions for a safe take-off.

Nea Philadelphia, 17 September 2021

CHAIRMAN

Ioannis Kondylis

MEMBERS

Akrivos Tsolakis

Grigorios Flessas

**Exact Copy
THE SECRETARY**

Christos Valaris

Charalampos Tzonos-Komilis

Kyriakos Katsoulakis

5. APPENDICES

5.1 LGTS AIP

AIP
GREECE

AD 2-LGTS-5
01 MAY 2014

LGTS AD 2.12 RUNWAY PHYSICAL CHARACTERISTICS

Designations RWY NR	TRUE BRG (degrees and minutes)	Dimensions of RWY (M)	Strength (PCN) and surface of RWY and SWY	THR coordinates RWY end coordinates THR geoid undulation	THR elevation and highest elevation of TDZ of precision APP RWY
1	2	3	4	5	6
10	104°	2440 x 50	PCN 40/F/B/X/U ASPH	403119.1N 0225732.6E	THR 2.07 M/ 6.79 FT TDZ: 2.45M/8.04FT
28	284°	2440 x 50	PCN 40/F/B/X/U ASPH	403100.1N 0225913.1E	THR 5.66 M/ 18.56 FT TDZ: NIL
16	166°	2410 x 60	PCN 40/F/B/X/U ASPH	403149.0N 0225803.3E	THR 3.72 M/ 12.20 FT TDZ: 3.72M/12.20FT
34	346°	2410 x 60	PCN 40/F/B/X/U ASPH	403033.0N 0225827.5E	THR 6.83 M/ 22.40 FT TDZ: NIL

Slope of RWY-SWY		SWY dimensions (M)	CWY dimensions (M)	Strip dimensions (M)	OFZ	Remarks
7		8	9	10	11	12
RWY 10	See relevant LGTS AD and AOC charts-ICAO			2560 x 150	NIL	a) RWY 10/28 outer part of shoulders on reduced strength. First 100 M on both sides concrete. b) RWY 10/28 turning cycles on both ends 50 M radius and 5 M shoulders concrete Strip surface:Dirt (both RWYS) c) Portion of RWY 16/34 strip incorporates TWY A.
RWY 28	See relevant LGTS AD and AOC charts-ICAO			2560 x 150	NIL	
RWY 16	See relevant LGTS AD and AOC charts-ICAO			2530 x 300	NIL	
RWY 34	See relevant LGTS AD and AOC charts-ICAO			2530 x 300	NIL	

LGTS AD 2.13 DECLARED DISTANCES

RWY Designator	TORA (M)	TODA (M)	ASDA (M)	LDA (M)	Remarks
1	2	3	4	5	6
10	2380	2380	2380	2440	NIL
28	2440	2440	2440	2440	NIL
16	2410	2410	2410	2410	NIL
34	2410	2410	2410	2410	NIL

LGTS AD 2.14 APPROACH AND RUNWAY LIGHTING

RWY Designator	APCH LGT Type Length Intensity	THR LGT Colour Wingbars	PAPI VASIS Angle Distance from THR (MEHT)	TDZ, LGT Length	RWY Centre-line LGT Length Spacing, Colour Intensity	RWY edge LGT Length Spacing Colour Intensity	RWY End LGT Colour Wingbars	SWY LGT Length Colour	Remarks
1	2	3	4	5	6	7	8	9	10
10	Simple Approach lighting system 300 M LIH	Green No Wingbars	PAPI Left/3,1° (16,0M)	NIL	NIL	White 2400M,60M spacing, LIH	Red No Wingbars	NIL	See also LGTS AD chart-ICAO
28	Precision Approach lighting system Cat I 900 M LIH	Green No Wingbars	PAPI Left/3,07° (15,0M)	NIL	NIL	White 2400M, 60M spacing, LIH	Red No Wingbars	NIL	
16	Precision Approach lighting system, CAT II 600 M LIH	Green No Wingbars	PAPI Right/3°02' (19,3M)	TDZ Lights CAT II White/ 860M	White 1500 M/ Red- White 600 M/ Red 300 M 15M spacing, LIH	White 1800m/Yellow 600m,60m spacing LIH	Red No Wingbars	NIL	
34	Simple Approach lighting system 300 M with a cross bar at 300 M. LIH	Green No Wingbars	PAPI Left/3,78° (27,0M)	NIL	White 1500 M/ Red- White 600 M/ Red 300m 15M spacing, LIH	White 1800m/Yellow 600m, 60m spacing LIH	Red No Wingbars	NIL	

5.2 The aircraft at the accident site



Photo 2: The fuselage and left engine of SX-AVC.



Photo 3: The forward fuselage and right engine.