



AIR ACCIDENTS INVESTIGATION
INSTITUTE OF CZECH REPUBLIC
Beranových 130
199 01 PRAHA 99

CZ-09-294

FINAL REPORT

**Investigation into an Air Accident
of a GA-8 Airvan Airplane,
Registration mark G-VANA,
at Jihlava Aerodrome,
on 28 July 2009.**

Prague
February 2011

The report's information, findings and conclusions concerning the aircraft accident or system failures endangering operational safety are solely of informative nature and can only be used as recommendations to prevent similar accidents due to similar causes. The author of the Final report states explicitly that it cannot be used to lay the blame or responsibility for the accident on anyone or to file insurance claims.

Used abbreviations:

°C	- Degree Celsius (unit of temperature)
AAIL	- Air Accidents Investigation Institute of Czech Republic
AFIS	- Aerodrome flight information service
AGL	- Above ground level
AMSL	- Above mean sea level
BKN	- Broken (category of cloud amount: 5-7 oktas)
CAA	- Civil Aviation Authority
CPL (A)	- Commercial Pilot Licence, Aeroplane
CU	- Cumulus
E	- East (cardinal direction)
ft	- Foot (unit of length – 0,3048 m)
hPa	- Hectopascal (unit of Atmospheric pressure)
ICAO	- International Civil Aviation Organization
IR	- Instrument Rating
kg	- Kilogram (base unit of mass)
km	- Kilometre (unit of length)
kt	- Knot (unit of speed – 1,852 km h ⁻¹)
LKHK	- Hradec Králové Aerodrome
LKJI	- Jihlava Aerodrome
LT	- Local Time
LYR	- Layer or layered
m	- Meter (unit of length)
MEP	- Multi-engine piston aeroplanes
MHz	- Megahertz (unit of frequency)
min	- Minute (unit of time)
MTOW	- Maximum take-off weight
N	- North (cardinal direction)

NE	- Northeast (ordinal direction)
NIL	- None
OVC	- Overcast (category of cloud amount: 8 oktas)
PAR	- Dropping of parachutists
PIC	- Pilot in Command
QNH	- Altimeter sub-scale setting to obtain elevation
RWY	- Runway
s	- Second (base unit of time)
SC	- Stratocumulus (type of cloud)
SCT	- Scattered (category of cloud amount: 3-4 oktas)
SEP	- Single-engine piston aeroplanes
SYNOP	- Surface weather observation
THR	- Threshold
UTC	- Co-ordinated Universal Time

A) Introduction

Operator:	Private foreign operator
Aircraft manufacturer and model:	Gippsland Aeronautics Pty Ltd Australia, GA-8 Airvan
Registration Mark:	G-VANA
Place of incident:	Jihlava aerodrome - LKJI
Date:	28.07.2009
Time:	13:35 LT (11:35 UTC, all times are UTC)

B) Synopsis

On 28 July 2009, AAI (the Czech Republic Air Accident Investigation Institute) was notified of an air accident involving a GA-8 Airvan airplane taking off. The wheel of the airplane's left main landing gear ran into the raised side of a road crossing the RWY centre line. The pilot then made a forced landing on the field behind the road. The plane was damaged. No persons were injured.

The cause of the incident was investigated by an AAI commission comprising:

Commission Chairman:	Mr. Viktor HODAŇ
Commission Member:	Mr. Josef PROCHÁZKA

The final report issued:

AIR ACCIDENTS INVESTIGATION INSTITUTE
Beranových 130
199 01 Prague 99, Czech Republic

7 Februar 2011

C) The report includes the following main parts:

1. Factual information
2. Analysis
3. Conclusions
4. Safety recommendation

1. Factual information

1.1 History of flight

It followed from the pilot's testimony, AFIS dispatcher, and other persons present at the LKJI at time of the accident, as well as from evidence found on the accident site, the following information.

1.1.1 Precedent facts

A summer training concentration of the Olymp parachuting club took place at LKJI from 27 to 31 July 2009. A GA-8 airplane registration mark G-VANA had been chosen for paratropping.

One day before the air accident on 27 July 2009, the pilot took over the airplane from the representative of a service organization at LKHK after it had been operated for one hundred hour and undergone maintenance. After refuelling, the pilot had made a ferry flight to LKJI. During the flight the plane experienced normal operational values of speeds, climbing and instantaneous fuel consumption. But in the testimony the pilot pointed out that he had had little prior experience in flying an empty airplane so he might not notice slight anomalies or changes in engine output. After landing at LKJI, the pilot prepared the airplane for paratropping. After making necessary steps, eight parachutists got on the plane to carry out a planned paratropping from a height¹ of 3,000 m. The total take-off weight of the plane did not exceed its MTOW value. Approximately 30 min before sunset the pilot started taxiing on RWY 10. At that time the actual temperature was 20 deg. centigrade, ground wind 5 kt from direction 100°, grassy RWY surface was dry.

The pilot began taking off near the road, several metres ahead of THR RWY 10. The airplane was rather reluctant to accelerate, which the pilot put down to the grassy RWY, from which he did not commonly take off. The plane's unstuck point was approximately at two thirds of RWY and continued acceleration after unstuck with ground effect. After reaching a speed of 65 kt, nearly in front of the RWY end, it began to climb. During the following several minutes the pilot noticed a reduced climbing rate to the paratropp level which made him decide drop four parachutists at a height of 1,200 m. Then he continued climbing with the other parachutists up to the scheduled height. At a height of more than 2,000 m the plane stopped climbing almost completely. At the moment the rate of climb was 100 – 200 ft/min. As the sunset was drawing near, the pilot dropped the rest of the parachutists at a height of 2,000 m.

After landing, the pilot at once phoned the maintenance organization representative and wanted to describe the course of the just accomplished flight to him. The representative told the pilot it had been found out during inspection that engine's exhaust mufflers were distorted, which might have caused the power to be slightly up as compared with values stated in the manual. After they had been replaced the engine power had decreased to the value given by the manufacturer. They agreed that the following day the pilot would make another flight and in case the power would be low, the plane would be returned to the service organization.

¹ All heights are listed above aerodrome level

1.1.2 Course of event

Before the beginning of para operation on 28 July 2009 and taking into account the previous day's experience, the pilot decided to make a flight with a reduced takeoff weight. Therefore he planned to execute the flight with less fuel and fewer parachutists.

The first drop of 7 parachutists should have taken place from a height of 1,200 m in one flight.

Considering the fact it had just stopped raining, the pilot made sure about the runway conditions after the rain. The grass on RWY was damp. Places reserved for taxiing were soaked with standing water and marked with cones.

Total takeoff weight of the plane did not exceeded 1750 kg. The actual temperature being 20 deg. centigrade, the pilot read off, on a diagram in the flight manual, the needed takeoff distance 500 m. Ground wind 5 – 7 kt from direction 300°, QNH was 1018 hPa. The pilot assessed the height of 5/8 cloudiness at 1,500 m, the exact value was not known.

The pre-flight preparation over, the pilot got on the plane with seven parachutists. During taxiing, the parachutists drew the pilot's attention to soaked places, which were not marked, so that he could avoid them. After entering RWY 28, the pilot waited for a few minutes to warm up the engine, checked once more the lift flaps, propeller setting, fuel mixed setting and the fuel pump. On setting the gas full, he relieved brakes and began taking off, feeling again too slow acceleration of the plane. Being approximately one third through RWY at a speed of 45 kt, he relieved the nose wheel and went on accelerating. At a speed of 60 kt, trying to get the plane unstuck, he gave the hand control more pull, awaiting the plane to unstuck, which really happened. He slightly pushed the hand control to reach a speed of 65 kt. The plane was approximately two thirds through RWY. Even at a speed of 65 kt, the plane was not capable of climbing and continued to fly low in the ground effect at this speed. Then the airplane's left main landing gear ran into the raised side of a road, which ran approximately 230 m away from the RWY 28 end. The plane swerved left after the impact. Being aware of not being able to avoid another crash on the ground, the pilot pulled the hand control to prevent the plane from turning over the propeller during the forced landing. The plane landed on the field and came to halt at a distance of 350 m from the RWY 28 end, i.e. 810 m west of LKJI reference point, to the left of RWY centre line. The pilot turned off the running engine, shut the fuel cock and quickly evacuated the airplane.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others (Inhabitants, etc.)
Fatal	0	0	0
Serious	0	0	0
Minor / None	0/1	0/7	0/0

1.3 Damage to aircraft

The plane was damaged as its left main landing gear struck the raised side of the road and subsequently landed on the field.

1.3.1 Airframe

The inspection at the scene of accident showed significant damage to landing gear, bulkheads in place of lower rear part of large sliding door in the left aft fuselage, and pierced lower skin of the left horizontal stabilizer.

1.3.2 Power unit

The engine ran till the plane came to a standstill in the field. Then it was turned off by the pilot. Its external inspection showed no visible damage. No damage to the propeller was found either, except normal operational wear.



Fig. 1 Damaged airplane GA-8 Airvan

1.4 Other damage

No damage was reported.

1.5 Personnel Information

1.5.1 Pilot of aircraft

Age / gender:	28 years / male
Pilot licence:	CPL (A) valid till 09. 06. 2014 rating – SEP land valid till 31.01.2010, MEP land/IR valid till do 31.01.2010, PAR unlimited validity
Medical:	valid till 27.09.2009
General radiotelephone operator's certificate of aeronautical mobile service:	valid till 30.03.2011
Total flying hours:	347:39 do 27.07.2009

Total number of flights: 742 till 27.07.2009
 Flying hours on type GA-8: 33:40 till 27.07.2009
 Total number of flights on type GA-8: 82 till 27.07.2009

Flying experience:

Flying hours	Last 24 hours	Last 30 days	Total
on type GA-8	0:52	17:32	33:40
as PIC on type GA-8	0:52	17:32	32:10
Total flying hours	0:52	17:32	347:39

1.6 Aircraft Information

1.6.1 Information on airframe

GA-8 Airvan is a single-engine all metal high wing monoplane with a fixed tricycle undercarriage. The cabin is designed for 8 seats but can be used in a cargo or parachute version.

Type: GA-8 Airvan
 Registration: G-VANA
 Manufacturer: Gippsland Aeronautics Pty Ltd Australia
 Serial number: GA8-04-046
 Year of manufacture: 2004
 Time since new: 1119:39 h
 Cycles since new: not found out
 Airworthiness Review Certificate: valid till 22. 01. 2010
 Insurance Certificate : valid till 23.08.2009

1.6.2 Power plant

The power unit is a six-cylinder, air cooled Lycoming IQ-540-K-115 driving a two-bladed, constant speed metal propeller Hartzell HC-C2YR-1BF/F8475R.

Engine - model: Lycoming IO-540-K1A5
 Serial number: L-291 71-K1A5
 Year of manufacture: not found out

Propeller - model: Hartzell HC-C2YR – 1BF/F8475R
 Serial number: 096931
 Year of manufacture: not found out

1.6.3 Aircraft operation

The pilot, in conformity to AIP GEN 1.2, reported to the Civil Aviation Authority on aeronautical works being carried out by a foreign operator on the Czech Republic territory. Based on the report, CAA issued a Check Protocol on 10 July 2009 with no comments.

1.6.4 Takeoff distance determination

To determine the takeoff distance, the commission drew on a chart in the aircraft's flight manual Chapter 5 pt. 5.2 p.5-4.

In substituting values to the chart, the takeoff distance equalled 360 m and for the takeoff weight of 1,750 kg the Table showed a safety takeoff speed of more than 69 kt.

1.6.5 Takeoff distance determination over 50 ft high obstacle

To determine the takeoff distance over a 50 ft high obstacle, the commission drew on a chart in the aircraft's flight manual Chapter 5, pt. 5.2, p.5-4.

In substituting values to the chart, the takeoff distance equalled 620 m.

1.6.6 Landing run distance determination

To determine the landing run distance, the commission drew on a chart in the aircraft's flight manual Chapter 5, pt. 5.42 p. 5-10, whereby not meeting condition regarding the flap position and landing speed.

In substituting values to the chart, the landing run distance equalled 160 m.

1.6.7 Aircraft takeoff weight calculation

To calculate the aircraft takeoff weight, the commission drew on data in the aircraft's flight manual and the pilot's statement.

Empty weight	1006.8 kg
Pilot's weight	70.0 kg
Weight of parachutists incl. parachutes	623.0 kg
Fuel weight	51.1 kg
Total weight	1750.9 kg

Maximum takeoff weight is set to 1814 kg.

1.6.8 Repair of airplane

After the accident the airplane was transported to England in September 2009 for repair which was completed on 5 November 2009. Besides repairs and parts replacements listed in the repair report, there is a note in the report to say that the engine did not run at time of the accident, the propeller was free to run, and the engine and propeller were not damaged.

In the engine logbook there was a record stating that the engine was repaired because metal splinters had been found in the oil filter. The repair was finished on 8 January 2010 and the following engine parts were replaced:

- exhaust valves for all the six cylinders
- inlet valves of 4th cylinder
- pistons of 4th and 5th cylinder
- piston rings
- bearing of connecting rod
- front bearing of crank shaft
- bearing of crank shaft
- camshaft

1.7 Meteorological information

1.7.1 Conditions at LKJI

Extract from AFIS LKJI dispatcher's logbook:

QNH 1018 hPa, ground wind 2 – 3 m/s from direction 280° , cloudiness 4/8, visibility 10 km and more.

1.7.2 Weather conditions according to Czech Hydro-Meteorological Office

Based on a Czech Hydro-Meteorological Office estimate, weather conditions at site of the accident were as follows:

Situation :	bland cold front was mowing east slowly across East Bohemia and Highland
Ground wind :	300° – 340° / 06-10 kt
Visibility:	10 km and more
Weather :	Cloudy with rain showers of low intensity
Cloudiness :	SCT / BKN SC, CU 1,500-2,300 ft AGL, BKN / OVC LYR Above 7,000 ft AGL
Turbulence:	Weak mechanical
Height of zero isotherm :	11,000 ft AMSL
Icing :	mild above 11,000 ft AMSL in frontal cloudiness

1.7.3 SYNOP Čáslav report

Extract from SYNOP report by Čáslav Aeronautic Meteorological Station:

Time	Cloudiness	Wind direction / wind speed	Visibility	Cloud / Height of cloud base	Temperature / Dew point
11:00	7/8	340° / 4 kt	15 km	2 CU / 1800 ft	19,5 / 17,1°C
12:00	7/8	310° / 8 kt	15 km	2 CU / 1500 ft	19,7 / 17,7°C

1.8 Aids to navigation

Radio navigational aids were not used. The aerodrome was marked in accordance to L 14 Regulation and visual markings were visible.

1.9 Communications

The pilot was in contact with AFIS dispatcher on frequency 123.5 MHz.

1.10 Aerodrome information

LKJI is Public Domestic Aerodrome. It's location is 4 km NE of Jihlava.

LKJI reference point:

Geographic coordinates:	N 49°25'10,0''
	E 015°38'07,0''
Elevation:	555,0 m

Runways' selected physical characteristics:

Designations RWY	Magnetic bearing	Dimensions of RWY	Surface RWY	Slope of RWY	Obstacle free zone
10	102°	920 m x 160 m	grass	-	NIL
28	282°	920 m x 160 m	grass	-	NIL

The runway was wet because it had rained.

1.11 Flight recorders

The airplane was not equipped with any recording means.

1.12 Wreckage and impact information

The accident took place in the field behind the road no. 352 between villages of Hruškové Dvory and Heroltice. The first trace of the wheel impact was on the raised side of a road crossing the RWY centre line 690 m west of the LKJI reference point. Behind the road past 56 m there were other traces left by the plane having landed on grown corn. Past another 12 m, the main undercarriage left leg and wheel were found. From that place on, the traces turned left, and past 50 m the plane, inclined on the left wing, stopped moving. The tyre of the right main undercarriage was burst; the fork of the nose undercarriage was bent to the right. The skin was distorted in the left lower aft fuselage at large sliding door. The left stabilizer lower skin was pierced. The two propeller blades were not damaged at the accident.



Fig. 2 Situation at scene of the air accident

Accident site position:

Geographic coordinates:	N 49°25'15,0''
	E 015°37'27,7''
Elevation:	553 m

1.13 Medical and pathological information

The Czech Republic police had the pilot breathalysed using Drager no.3, ARWF-0039. The test was negative.

1.14 Fire

NIL

1.15 Survival aspects

Search and rescue were not organized. The Czech Republic police and a fire brigade were called on site of the accident.

1.16 Tests and research

NIL

1.17 Organizational and management information

Conforming to AIP GEN 1.2, CAA was notified of aeronautical works being carried out by a foreign operator's airplane on the Czech Republic territory.

1.18 Additional information

NIL

1.19 Useful or effective investigation techniques

The accident has been investigated according to L 13 National Regulation (Investigation into Air Accidents and Incidents of the Czech Republic) as per recommendation of ICAO (Annex 13).

2. Analysis

2.1 Pilot's experience and health capacity

The pilot had a valid license and rating and was airworthy. His health condition was in no causal connection with the accident.

The pilot had flown 33:40 hours and made 82 flights on this airplane type, taking off mostly from concrete RWYs.

2.2 State of airplane

Prior to the flight, the airplane underwent a 100 hours inspection. A distorted right exhaust muffler was found at inspection. The exhaust muffler was replaced. This fact could not have affected the engine power.

The pilot had not noticed any working anomalies of the engine during the last two days of the plane operation.

In the airframe logbook regarding the repair carried out there is a note stating that the engine was not running at time of the accident and the engine and blades were not damaged. This note is in contradiction with the pilot's statement that he turned off the engine only after the plane had come to a standstill in the field.

On 5 November 2009, repair of the plane was completed and a check flight made. During this flight the engine had reduced power. When visiting the engine, metal splinters were found in the oil filter. Therefore the engine was thoroughly repaired. The repair finished on 8 January 2010.

It may be judged from the list of the replaced parts that technical conditions of the engine aggravated permanently and gradually, which probably caused its lower output.

2.3 Meteorological conditions

Regarding the direction of the ground wind, its component had no effect on the course of the takeoff.

2.4 Execution of flight

The pilot knew from the experience of the previous day that climbing after takeoff was slower and the rate of climb was lower.

Taking into account the runway length and a takeoff run of 360 m as determined from the chart, there was 400 m left on RWY for the pilot to take decision to interrupt taking off in case he was not able to continue takeoff safely. In calculation, the distance to re-land on the runway in the case of an aborted takeoff had been taken into account, too.

The pilot did not abort the takeoff, did not use the rest of the runway to return after he had found out that the plane behaved in a similar way as on the precedent day, and during the takeoff run did not accelerate to reach the speed needed for climbing.

According to the pilot's testimony, during taking off the plane reached a maximum speed of 65 kt. In the flight manual the safety takeoff speed for a takeoff weight of 1750 kg is more than 69 kt for this type of airplane. It follows from the above that the safety takeoff speed was not reached during taking off.

3. Conclusion

3.1 Commission came to the following conclusions.

3.1.1 Pilot

- had valid licence and rating,
- had valid medical,

- was capable to execute the flight,
- tried to continue taking off despite probably not having reached optimum values to make a safety takeoff,
- did not learn from the situation of the previous day of 27 July 2009 and did not interrupt takeoff when there was still a sufficient length of runway left to land.

3.1.2 Airplane

- had valid check of airworthiness review certificate,
- had valid insurance certificate,
- before takeoff its MTOW was not exceeded,
- was damaged during impact.

3.1.3 Engine technical condition

- was very unlikely to reach sufficient output power to make a safety takeoff

3.1.4 Aerodrome

- was serviceable for planned activity.

3.1.5 Wet surface of RWY

- probably made takeoff run a little bit longer.

3.1.6 Meteorological conditions for takeoff,

- Cloud base and visibility had no effect on the air accident,
- Wind direction and wind force had no significant effect on the air accident.

3.2 Causes

The air accident was caused by the fact that the pilot continued taking off even after he found out that the plane had not reached a speed needed for a safety takeoff

4. Safety recommendations

I suggest no safety recommendation.