AIR ACCIDENTS INVESTIGATION INSTITUTE

of the Czech Republic

Ref. No. CZ-09-046

FINAL REPORT

Investigation of microlight aircraft accident, type UFM 13 Lambada Registration Mark OK-NUA 09 on 21st March 2009

Prague
December 2009

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.

A) Introduction

Operator:	private, Czech Republic
Aircraft manufacturer and model:	Urban Air company, type UFM 13 Lambada
Registration Mark:	OK-NUA 09
Place of incident:	South village Nákří, Czech Republic
Date and time:	21-st March 2009, 13:20 (all times are UTC)

B) Synopsis

On 21st March 2009 AAII (Czech Republic Air Accident Investigation Institute) was notified of the air accident of a microlight aircraft near the village of Nákří. During the flight the fuselage got broken and the plane crashed. Its two-member crew was not injured as the plane hit the ground but the plane was damaged.
Based on the airplane documentation and through physical comparison of the plane´s main structural parts the commission has found out that the airplane did not match the Type Certificate ULL – 021/98 including supplements as issued by LAA CR (Light Aircraft Association of the Czech Republic) and in spite of that it was marked as UFM-13 Lambada, wing extensions modification UFM 13/15 (further see part 1.6). The airplane was registered under this marking and filed in LAA CR administration as ULLa (microlight category). During the accident further investigation and when elaborating the accident final report, the Commission proceeded as if the event concerned a microlight aircraft mishap and for this reason corresponding terms have been used.

The final report on the incident issued AAII based :
Beranových 130, 199 01 Prague 99, Czech Republic
fax: +420 266 199 234
web site: www.uzpln.cz

The cause of the accident was investigated by an Air Accidents Investigation Institute commission comprising:

Commission chairman:	Mr. Ing. Lubomír Střihavka, AAII
Commission member:	Mr. Milan Pecnik, AAII
	Mr. Ing. Petr Chvojka, LAA CR inspector

C) The report includes the following main parts:

1) Factual information
2) Analysis
3) Conclusions
4) Safety recommendation
5) Annex No.1

Abreviations used:

AAII	-	*Air Accidents Investigation Institute of the Czech Republic*
AGL	-	*above groud level*
AMSL	-	*above mean sea level*
GS	-	*ground speed*
CHMÚ	-	*Czech Hydrometeorological Institute*
LKHS	-	*Hosín aeroport*
LKR	-	*limited airspace*
LAA CR	-	*Light Aircraft Association of the Czech Republic*
MTOM	-	*maximum take-of mass*
ULLa	-	*microlight category*
QFE	-	*Atmospheric Pressure at Aerodrome Elevation*
RWY	-	*runway*
s/n	-	*serial number*

1 Factual information

1.1 History of the flight

The flight history has been established on the pilot´s testimony basis and that of other persons on board. The data have been further specified according to the logger record and secondary radar responder. The flight was executed as a VFR flight without a flight plan.

1.1.1 Flight history according to testimony of both of the microlight pilots

The pilot executed the flight from the LKHS airport westwards in the LKR 8 limited airspace and intended to land back at the airport where he had taken off. There was another person with flying qualification aboard the plane (further referred to as co-pilot). The take-off was performed from RWY 24 at 13:15 h. The aim of the flight was to verify the secondary radar´s work and engine consumption at microlight horizontal flight. After approximately a ten-minute flight the plane reached a height of ca 500 m AGL and continued with a heading of 300° to 315°. At a distance of ca 14 km from the airport at an indicated speed of 190 km/h the elevator control had an abrupt swift oscillation followed by a quick change in aicraft attitude into the “on-back” position. The pilot found out the aft fuselage with tail plane had a strange position with respect to the cabin and started a rescue operation by activating the pyrotechnic rescue system. The co-pilot took an active part in handling the situation by taking over airplane control and trying to stabilize the airplane´s position. This effort had no effect and the plane was falling nosedive. At that moment communication about the hopeless situation took place between the crew. However the pilot told the co-pilot …*we are already on the parachute*…and the crew awaited a ground impact. On hitting the ground, the plane turned over dorsal down. After removing the cabin glass dice, both of the pilots left the plane in a hurry.

As the airplane hit the ground, the crew members did not suffer any injury to require treatment. The tail part of the fuselage got broken and damaged in the impact.

1.1.2 Flight history according to “logger”

Aboard microlight was installed an instrument Filser LX 5000, so called “logger”. This instrument records data (time, route speed, altitude above sea level, position…) from GPS. Therefore in this section the height data were recalculated to AGL and the speed is related to the aircraft movement relatively to the ground (GS).

According to the data recorded, the plane took off at 13:15:11 from RWY 24 LKHS. After one minute and five seconds from the start the plane reached a height of 237 m and a speed of 150 km/h. After another one minute the plane achieved a height of 352 m and a speed of 180 km/h. After another two minutes the height was 403 m and the speed 192 km/h. At 13:20:26 the heading was 319° at 371 m height and 194 km/h speed. Ten seconds after getting these data, the speed jumped down to 0 km/h and the height to 308 m. At 13:21:16 the speed and height values were zero.

It follows from the above data that the flight lasted six minutes and five seconds and the critical event took place at 371 m AGL at 194 km/h GS.

The flydat instrument type TL-3724STD indicated that engine speed had not exceeded 5,300 rpm. The value of vertical speed oscillated +/- 1 m/s across the route sectors.

The secondary radar responder recorded the same values.

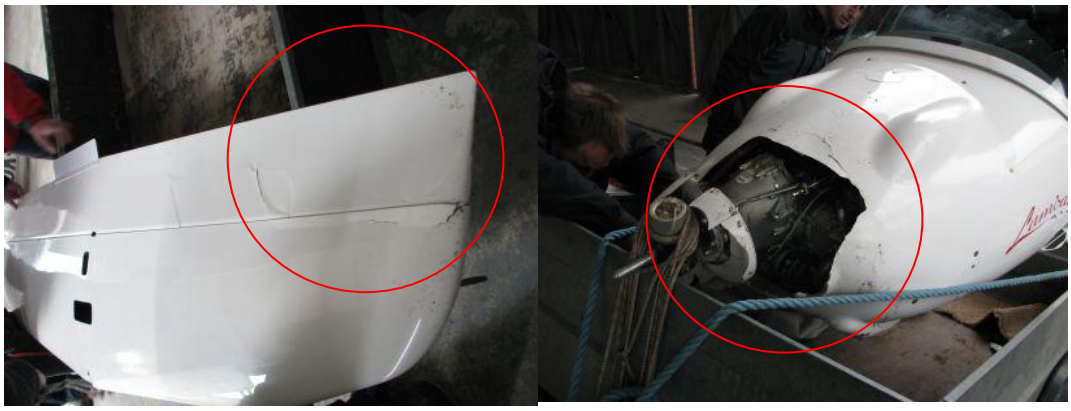
1.2 Injuries to persons

Injuries	Crew	Passengers	Others (inhabitants, etc)
Fatal	0	0	0
Serious	0	0	0
Light/no injury	0/1	0/1	0

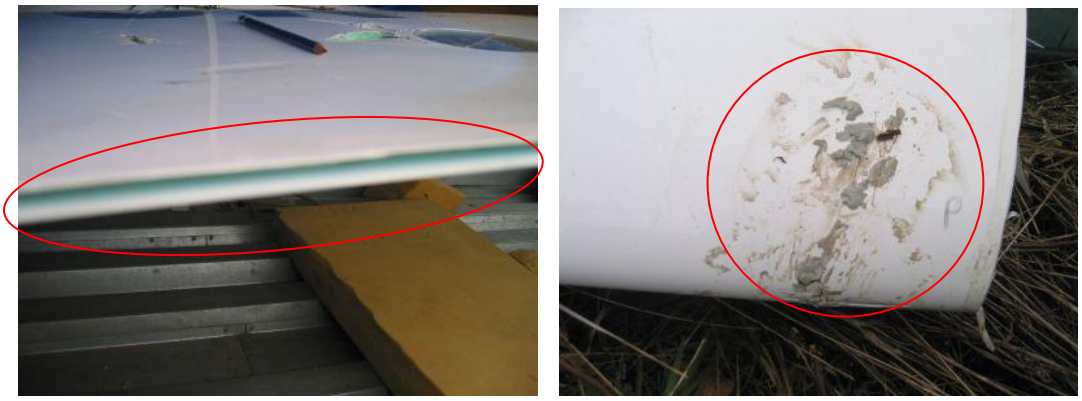
1.3 Damage to microlight

The fuselage got broken in flight in place where it changes to the spindle-shaped tail part. Further, horizontal tail plane and engine cowling were damaged, propeller was destroyed, cabin window and frame got broken and left wing trailing edge was delaminated. There was a crack in the right wing 10 cm from the root, causing lost of cavity tightness of the integral fuel tank.

Damaged of fusselage



Damaged of horizontal tail plane and engine cowling



Damaged of left wing trailing edge and right wing

1.4 Other damage

No other damage.

1.5 Personnel information

Pilot age/sex	42 y. / male
Qualification	pilot - instruktor GLD,TMG
	pilot - instruktor ULLa (microlight)
License validity	valid
Medical certificate	valid, no limits
Number of hours on GLD	2,600
on TMG	200
on microlight	450

Co-pilot age/sex	46 y. / male
Qualification	pilot - instruktor SEP land, MEP land, TMG, FI(TMG) pilot - instruktor ULLa (microlight)
License validity	valid
Medical certificate	valid, no limits
Number of hours on all A/C	2,000

Both of the crew members are experienced pilots. They intended to check the function and correct work of the secondary radar responder and to verify engine consumption in horizontal flight at the highest speed possible as preparation for a later attempt to break record in endurance and time of flight in the TMG category.

1.6 Aircraft information

Microlight category ULLa type UFM 13 Lambada, modification UFM 13/15 is designed for touring and pleasure flying with restriction to non-aerobatic operation. Microlight is a one-engine all composite frameless mid-wing abreast two-seater. The tale-plane is T-shaped design. Fixed undercarriage with a steerable tail skid. Microlight UFM 13/15 modification may be fitted with removable wing extensions. No extensions were used in the flight.
It was found out that the crashed airplane wing had no flaperons, but only wings with ailerons without flaps. This design difference is in contradiction with the ULL – 021/98 Type Certificate and its supplements. This configuration is designed for U.S. market where these airplanes are operated in S-LSA category (light planes with MTOM less than 600 kg.).
Microlight MTOM in basic configuration with a rescue system is 472.5 kg.

Aircraft manufacturer and model:	Urban Air company, type UFM 13/15 Lambada
Registration Mark:	OK-NUA 09
Year of build:	2008
Serial Number:	108/13
Empty weight:	317 kg (check March 10, 2008)

Crew permissible mass with 25 l fuel: 138 kg
SLZ registration document valid till 14 March, 2010 was issued on March 14, 2008.

The microlight was powered by Rotax 912 UL engine, s/n 44008900 and a 162-2-R Varia Prop. Propeller s/n PA 10848716013. On the airplane there was a Galaxy 6/473 Soft B/R Rescue system s/n 3613/08/189/4345. Further, the plane was equipped with a tow device type E85 s/n 159765.
Microlight was maintained conforming to the flight and operation manual. The last maintenance was carried out on November 18, 2008 at total flight hours amounting to 109:30 hours. At the time of the accident A/C had accumulated 194:40 hours of which 122:46 hours in power regime. Number of landing totaled 257 cy. The operator reported the tow device had not been used despite it was installed. The commission recommended to check the tow device by experts.
Before taking off the fuel tanks were filled with 25 l of automobile petrol Natural 95.
MTOM at the time of the take-off was calculated 471.5 kg.

16.1 Microlight design

Microlight was an all composite design. The wing had been strength-tested at VUT Brno (Technical University of Brno, Czech Republic). The tests did not include aeroelasticity trials on the plane structure. In 2008 the Aviation and Space Research Centre of Prague Technical University Faculty of Engineering (FS-ČVUT Ústav letadlové techniky) was requested by the manufacturer to make out a flutter resistance certificate of the tail-plane of microlight type UFM 13. This project has not been finished but some data from measurement have been collected.

The commission used these data and asked for their evaluation and resulting conclusions. The report was amended with values from the crashed microlight. The conclusions are given in Annex no. 1.

Microlight is made mainly from composites using glass or carbon fibers soaked in resin. Some parts are reinforced with polyurethane foam. Written documents on the microlight manufacture s/n 108/13 and physical inspection of the main parts did not indicate presence of fundamental manufacturing defects or failure in manufacturing technology of the plane set by the manufacturer. However, in order to have input values to check the mass characteristics of the elevator, the elevator was cut into segments and it was discovered that the manufacturing technology using manual laying of layers and impregnating the fibers with resin did not guarantee uniform impregnation of layers which leads to non-uniform mass distribution in the airfoil thickness. It was also found that the elevator showed a manufacture-caused shape and size deviation (see Annex no. 1). To have further information relevant to this fact, the commission got from the manufacturer manufacturing documents of previous horizontal stabilizers. The documents show that up to s/n 53/13 solely glass fabric was used, the stabilizer mass being 7.9 kg. From s/n 55/13 to 86/13 a different composite composition was used so that the mass ranged from 6.1 to 6.85 kg. Manufacturing tolerance was 5%. The five per cent tolerance is 0.31 kg as calculated from the average mass of horizontal stabilizers. From 2007 year, s/n 91/13 to 126/13, the assembly unit elevator-stabilizer was weighed separately. The mass of elevators ranged from 2.06 to 2.5 kg, those of stabilizers ranged from 4.07 to 4.95 kg. The mass of the whole horizontal tail unit of the investigated microlight was 6.62. In addition, it was found out that from 2008 and from s/n 107/13 the horizontal tail surfaces were manufactured by another manufacturer. The tolerance set by the manufacturer was again 5%. Horizontal tail units of this series were mounted on both of the crashed airplanes (OK-NUA 09, s/n 108/13 and N17UA, s/n 111/13).

The manufacturer uses for microlight modifications of this type a number of identical assemblies and parts. Design configurations of horizontal and vertical tail surfaces and fuselage are the same for all microlight modifications and S-LSA airplanes. The horizontal tail surface is attached to the fin by two pins secured with a screw. The steering rod is connected with the elevator with a quick-acting coupler and the elevator is attached through five composite hinges. The elevator control rod is made of a thick-walled steel material, which simultaneously works as a mass balance of the longitudinal control. It can be seen in Annex no. 1, that despite this design the assembly is mass-balanced to 85.2%. The static unbalance of 14.8% corresponds to the missing static moment 194 kgm ahead of axis of rotation of the elevator. On the trailing edge the elevator was equipped with a trim tab made of light metal. The manufacturer provided documentation, but the trim tab was missing in the microlight assembly drawing. Microlight is also longitudinally balanced by placing an electric battery of cca 5 kg into the fin of the vertical tail surface.

1.6.2 Microlight registration procedure of LAA CR

On March 10, 2008 a service protocol was filled out in which microlight is identified as UFM-13 Lambada. The notion “lift flaps” was scratched in the test protocol. An microlight registration document was issued on March 14, 2008 under the designation UFM-13 Lambada. A document of insurance payment was added to the registration document and based on that, microlight was filed into the Czech Light Aircraft Association and a technical certificate was issued with a validity till March 14, 2010. Microlight was assigned a registration mark OK-NUA 09.

1.6.3 SLZ operation restriction – flight manual

Microlight had a flight manual issued for UFM-13 type, s/n 108/13. Microlight modification is not specified in the flight manual. The flight manual contains actions including the emergency procedures that are the same as for UFM-13 type with nose undercarriage and wing with flaperons.

The speed limit colour designation on the speed indicator did not correspond to data in the flight manual. V_{NE} was marked at 220 km/h. This value holds for aircraft of S-LSA category.

Colour-codet of max. speed on microlight airspeed indicator Reg.mark OK-NUA 09

Letová příručka pro ultralehký letoun
UFM – 13

2.1 Úvod

Kapitola 2 obsahuje provozní omezení, značení přístrojů a základní štítky nutné pro bezpečný provoz letounu, jeho motoru, standardních systémů a vybavení.

2.2 Letové rychlosti

Omezení letových rychlostí a jejich význam pro provoz jsou uvedeny v následující tabulce :

Rychlost		IAS [km/h]	Význam
V_{NE}	Nepřekročitelná rychlost	200	Nepřekročujte tuto rychlost v žádném případě
V_A	Návrhová obratová rychlost	135	Nad tuto rychlost nepoužívejte plné výchylky kormidel ani nevykonávejte rychlé zásahy do řízení – mohlo by dojít k přetížení letounu
V_{NO}	Maximální konstrukční cestovní rychlost	145	Nepřekračujte tuto rychlost s vyjimkou letu v klidném vzduchu a i tehdy pouze s opatrností
V_{FE}	Max. rychlost při vysunutých klapkách	110	Nepřekračujte tuto rychlost při vysunutých klapkách

Flight manual of Reg.mark. OK-NUA 09

1.7 Meteorological information

Description of the meteorological situation was made out from a report by the Czech Hydro-meteorological Office and the annex to the SYNOP statement of Temelin station.

Report of Hydro-meteorological Office:
Situace: Sláboucí hřeben vysokého tlaku vzduchu.
Přízemní vítr: 340-360/6-12KT
Výškový vítr: 2000FT AGL 260/12KT/+04°C, 5000FT AGL 300/18KT/-02°C
Dohlednost: nad 10 km
Stav počasí: oblačno, beze srážek.
Oblačnost : BKN CU 4000 FT AGL
Turbulence: NIL
Výška nulové izotermy: 3500 FT AMSL
Námraza: NIL

SYNOP statement of Temelin station:
SIVOK - Vypis ze zprav SYNOP stanice 11538 - Temelín
N=celkove pokryti MAX=naraz vetru v prubehu A=automaticka stanice

DDHH	*N VITR/NAR. ST.\KT*	*DOHL. M/KM*	*STAV POCASI*	*OBLACNOST FT AGL*	*TEPL. ST.C*	*R.BOD ST.C*	*MAX MPS*
2111	*7 340*	*8*	*45km*	*7 CU 3900*	*0.7*	*-8.1*	
2112	*7 350*	*12*	*45km*	*7 CU 4000*	*1.5*	*-7.3*	
2113	*4 360*	*4*	*40km*	*4 CU 4100*	*2.2*	*-8.1*	

---------- Zpracovano 30.03.2009 10:31:50 UTC ----------

Meteorological conditions were also described by the pilot of a plane who was carrying out agricurtural activities in the LKR cca 10 to 15 km north of the accident site. The pilot reports the sky was first clear in the middle of morning, then the cloudiness was 6/8 of the sky coverage and at the same time there began a strong turbulence in ground levels up to 50 m AGL. In the afternoon the cloudiness diminished and single cumuli began to appear with strong upward air streams.

1.8 Aids to navigation

NIL

1.9 Communications

When changing into the horizontal flight, the pilot communicated with the ATS Praha Terén.

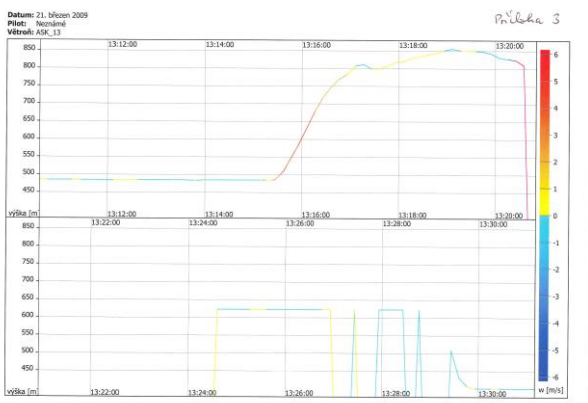
1.10 Aerodrome information

The plane took off from the Hosín domestic public airport and landed in the field near the Village of Nákří using its Rescue parachute system.

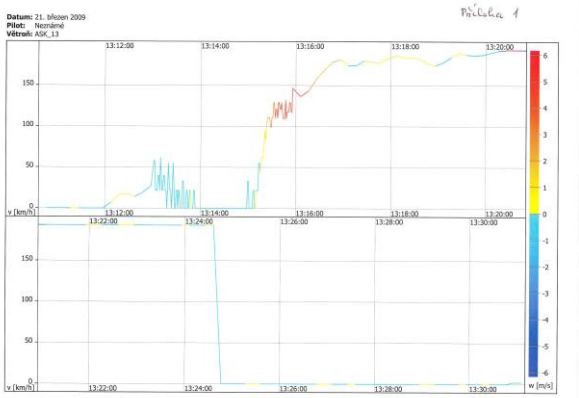
Flight recorders

On board the plane there was a “logger” recorder type FILSER LX 5000 IGC-220 GPS, s/n 01445. The instrument had been disconnected following the electricity cut off as the plane hit the ground. There was no visible damage to the instrument, which made it possible to evaluate the data recorded. The record was evaluated using a computer and a program provided by the operator.

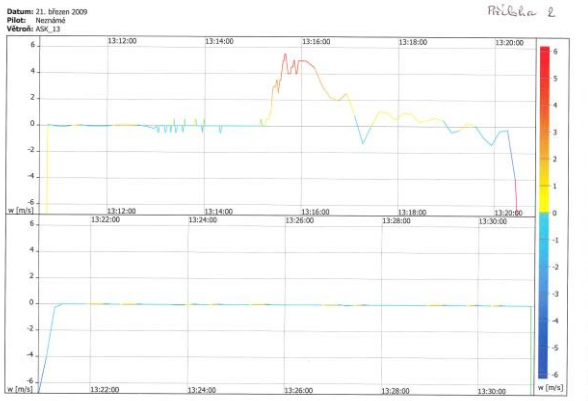
Note. Logger time is set at local time and aircraft identification is ASK 13.



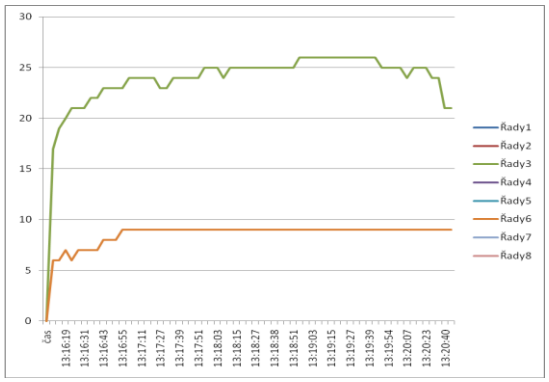
Altitude



Ground speed



Vertical speed



SSR Radar

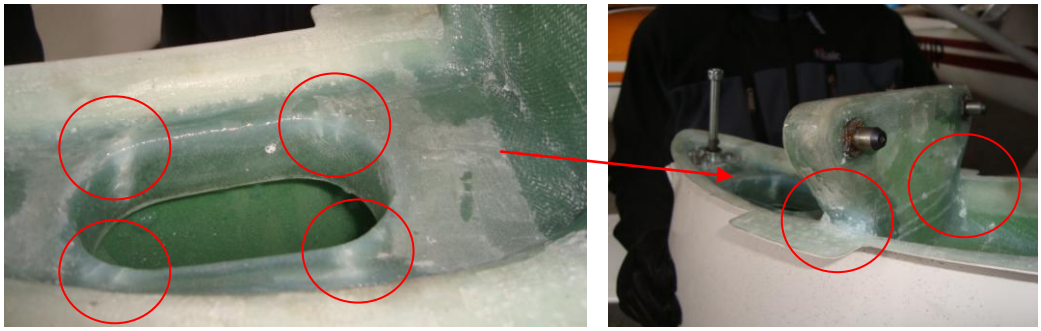
1.12 Description of accident site

The site of the accident was at the southern part of the village of Nákří near town Hluboká nad Vltavou. The accident site coordinates are as follows: N 49° 06´44´´, E 014° 20´12´´ and elevation above see-level is 332 m.
Fallen on the ground, microlight lay on its back. The aft part of the fuselage had been separated, hanging just on the rest of the cables of direction control and accumulator cables. The front part of the fuselage and the port wing´s hinge were damaged by the impact. Fastening belts were unbuckled. The rescue parachute was attached to the fuselage. In the accident surroundings there was free land without obstacles.
About 50 m behind the wreckage there were electricity lines.

On hitting the ground and firemen´s action HZS was turned back

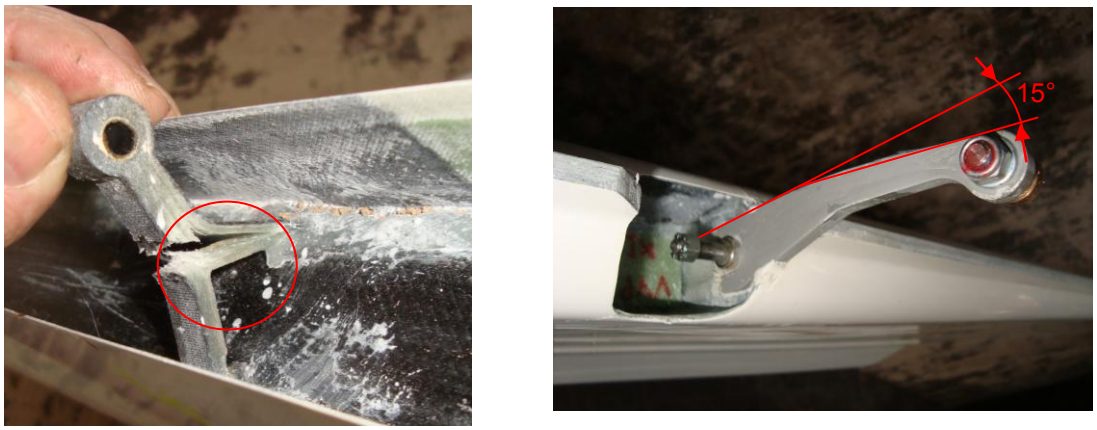
On the port side of fuselage was a crack at an angle of 45 – 50° in radial direction to the fuselage axis. The rest of the elevator control rod, cables and tubes had been deflected to left. The missing part of the body shell 10 x 10 cm large was found around 200 m from the impact spot opposite to the flight direction. After dismantling the elevator it was found out that connection between the elevator bracket and the fin, and the inner fin structure were delaminated.

Damaged of left side fuselage



Damage of connection between the elevator bracket and the fin

After dismantling the elevator it was discovered that three hinges of the elevator were damaged. The connecting lever of the rudder control rod was deflected ca 15° downward.



Damage of hinge and elevator control lever

1.13 Medical and pathological information

Neither of the pilots suffered injury requiring treatment

1.14 Fire

NIL

1.15 Survival aspects

No search has been organized. Rescue service, Police, and Firemen were called out to the accident site by the accident participants.

1.15.1 Rescue parachute system

Microlight was equipped with an emergency system Galaxy 6/473 Soft B/R, s/n 3613-08-189-4345. Analyzing "logger" data it was found out that the system had been activated ca 5-7 s after the fuselage had broken ca 300 m above the ground. The canopy cover of the rescue parachute had been cast slant under the falling airplane. This position confirms the pilots´ testimony they were "head down" after the fuselage had broken. The calculated trajectory needed to stabilize the fall of the plane was 120-150 m. For the last 5-7 m of the downfall the plane was sinking in a stable position with a vertical speed of ca 6 m/s. At rescue system´s activation the activation speed was not exceeded since the parachute canopy tearing seams had not been ripped open. It may be suggested that the aicraft downfall speed at the time of system activation and canopy filling had been reduced to less than 120 km/h.

1.16 Tests and research

The AAII commission ordered to:

- Finish and evaluate background documents certifying the microlight structure flutter resistance from the measurements conducted in 2008 by the Aviation and

Space Research Centre of CVUT Prague, Aircraft Institute of Faculty of Engineering.
- Assess wear of the towing device by Mechanoscopy Laboratory of the Police of Czech Republic.

16.1 Evaluation of SLZ flutter resistance
The flutter calculation results based on experiments of ground frequency tests and a detailed mass analysis of the elevator of the crashed microlight point to the real possibility of the tail plane´s self-excited oscillations. The lowest theoretical (calculated) "flutter" speed at 800 m MSA occurs at a speed of 163 km/h EAS.

Note: Full text of the report on microlight flutter resistance is given in Annex no.1, to this final report only Czech language, but on the end is shortly report on English language.

16.2 Wear assessment of towing device
It follows from the research that the towing device has no trace of wear on its active parts which could be attributed to towing. On the mechanism bottom part facing earth there were numerous scratches, indents and holes caused by crash into a solid obstacle. According to the operator these scratches were due to microlight rear part rubbing the ground when passing the border between grassy and concrete airport surfaces. The operator classified them as "light scratching".

1.17 Organizational and management information

NIL

1.18 Additional information

On June 23, 2009 an accident took place in the US territory (near San Antonio) involving a light aircraft of S-LSA category, type UFM-13 Lambada registration N17UA s/n 111/13 (the accident is registered in NTSB database under CEN09LA379).

Photo of UFM-13 Reg. mark N17UA, air accident in U.S.A.

Taking into account the mishap consequences on the aircraft, both the US and the Czech accidents were most likely identical. Mutual exchange of information on both of

the events has been started immediately. It was agreed that NTSB will await results of microlight flutter resistance calculation and AAII investigation report on the accident in the Czech Republic.

18.1 Microlight manufacturer

Following the accident, negotiations with the manufacturer took place. As a result a binding bulletin no. UFM 13-1/2009 has been issued, in which operation restrictions were set and a check on elevator hinges was ordered. The bulletin has been distributed to foreign operators, too. Since then the operator yielded some information on microlight manufacture, but later stopped communicating. Several attempts to renew contacts were without success. It was found that that the manufacturer passed under a bankruptcy administrator, but contact attempts were again unsuccessful.

1.19 Useful or effective investigation techniques

The incident 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).

As for the accident in the U.S.A, the AAII commission did not check procedures applied to differential flight tests of UFM-13 modification S-LSA. The S-LSA category is not operated in the Czech Republic.

2 Analyses

It follows from the analysis done that the most likely cause of the accident was “flutter”, an aeroelasticity phenomenon, which occurred on the horizontal tail surface bringing about a loss of integrity of the fuselage and in-flight separation of its rear part.

2.1 Effect of microlight construction on flutter

Aeroelasticity phenomena that may develop during the flight are linked with an aircraft structural design. Some technological, design and manufacturing deviations may cause this effect to appear in flight even within operation limits for a given airplane, particularly if a real chance of its appearance is not positively excluded. The revealed fact that the elevator manufacture experienced a non-uniform mass distribution (resin flow, trim tab assembly…), which caused the elevator´s static unbalance, made flutter more likely to take place on this part of horizontal tail surface. From the point of view of the airplane construction, damping of the self-excited oscillation of a composite structure need not necessarily lead to the critical conditions. The aeroelastic phenomena were probably provoked also by the T-shaped empennage design and by interference of the vertical and horizontal surfaces. From the experimental results available it is very unlikely that the fuselage destruction could have been caused solely by one factor. Only a few defects of elevators were revealed during their inspection by the manufacturer. The operator of the microlight with damaged hinges did not know of any similar case of steering vibration. In this connection the manufacturer issued a bulletin UFM 13-2/2009 on how to repair damaged hinges.

2.2 Effect of flight conditions on flutter

From the pilots´ testimony and the “logger” records the fuselage was apparently destroyed in a horizontal and stable flight, which from the point of view of speed was executed near the upper limit of operational restrictions for this type of microlight. The upper limit of the operational restriction was not established unambiguously. Restriction colour markings on the speed indicator and data in the flight manual were different. The effect of meteorological conditions on the flight cannot be assessed unambiguously as the information available was not sufficient. Taking into account the season, the effect of upward thermals cannot be excluded. In the flight manual the manufacturer does not specify in more detail the term “calm air”, on which depend operational restrictions from the point of view of flying speed.

3 Conclusions

- Both of the pilots had required qualification and valid medicals;
- Meteorological conditions met the requirements that apply to VFR;
- Operational restrictions stated in microlight manual were not exceeded;
- Provisions in the flight manual for microlight S/N 108/13 did not correspond to microlight actual state and design;
- Microlight had an airworthiness certificate which was in contradiction with the text of the Type Certificate ULL – 021/98 and supplements issued by Light Aircraft Association on February 22, 1998;
- Microlight had been registered by LAA CR on the basis of wrong assessment of microlight actual state;
- Microlight was not operated above the limit of MTOM;
- Connection with found delamination of elevators´ composite hinges has not been proved;
- Connection with findings on lower part of towing device and its contact with terrain obstacles was not proved;
- The place of the take-off had no effect on the accident.

3.1 Effect of flight conditions on flutter

From the pilots´ testimony and the “logger” records the fuselage was apparently destroyed in a horizontal and stable flight, which from the point of view of speed was executed near the upper limit of operational restrictions for this type of microlight. The upper limit of the operational restriction was not established unambiguously. Restriction colour markings on the speed indicator and data in the flight manual were different. The effect of meteorological conditions on the flight cannot be assessed unambiguously as the information available was not sufficient. Taking into account the season, the effect of upward thermals cannot be excluded. In the flight manual the manufacturer does not specify in more detail the term “calm air”, on which depend operational restrictions from the point of view of flying speed.

4 Safety recommendations

a) The manufacturer of microlight type UFM 13 Lambada, UFM 13/15 modification in collaboration with LAA CR´s chief technician and supervisor will propose a solution for ULLa and S-LSA categories to enhance flutter resistance of the microlight construction within design and operation limits. I recommend toverify this solution by a competent laboratory. After the verification and data evaluation new operational limits should be established.
Note: If the manufacturer cannot find a suitable technical solution, it should be proposed by a supervision body in collaboration with the chief technician of LAA CR.

b) The proposed and verified technical solution should be implemented in all SLZ products of UFM-13 type. By the time the new technical solution is fielded, the operational limits according to the binding UFM 13-1/2009 should be maintained.

c) I recommend that microlight manufacturers should introduce suitable measures to assure the quality of microlight manufacture.

d) LAA CR administration should adopt suitable measures in the system of microlight registration.

e) This final report should be made available to the US aviation authority to revise airworthiness certificates of these aircraft in S-LSA category.

Prague 21^{-st} December 2009

Note : following Annex No. 1