REPUBLIC OF KENYA

MINISTRY OF TRANSPORT AND INFRASTRUCTURE

DEPARTMENT OF AIR ACCIDENT INVESTIGATION

ACCIDENT REPORT 5Y-UVP 22.08.2012

P.O. Box 52692- 00200 Nairobi
Telephone: 254-20-2729200 Fax: 254-20-273732

MINISTRY OF TRANSPORT AND INFRASTRUCTURE

AIR ACCIDENT INVESTIGATION DEPARTMENT

PRELIMINARY REPORT

OPERATOR:	Mombasa Air Safari
AIRCRAFT TYPE/ MANUFACTURER:	Let 410 UVP-E9/ Let A.S.Kunovice
YEAR OF MANUFACTURE:	1995
AIRCRAFT REGISTRATION:	5Y-UVP
AIRCRAFT SERIAL NUMBER:	912627
DATE OF REGISTRATION:	19 July 1999
TYPE OF ENGINE:	2 Walter M601E
DATE OF OCCURRENCE:	22 August 2012
TIME OF OCCURRENCE:	0920
LOCATION OF OCCURRENCE:	Ngerende Airstrip, Masai Mara
TYPE OF FLIGHT:	Commercial
NUMBER OF PERSONS ON BOARD:	Crew - 2; Passengers - 11
INJURIES:	4 fatal; 3 serious; 6 minor
NATURE OF DAMAGE:	Substantial
CATEGORY OF OCCURRENCE:	Accident
NAME OF PIC:	Edward Mwinzi Kithoi
PIC'S FLYING EXPERIENCE:	~ 9,800 hours

All times given in this report are Coordinated Universal Time (UTC)
East African Local Time is UTC plus 3 hours.

figure 1.1 accident site with the wreckage of 5Y-UVP

Synopsis

The office of the Chief Inspector of Air Accidents was notified of an accident that had occurred at Ngerende Airstrip in Masai Mara on the 22nd Aug 2012 at 0920. The Chief Inspector was notified at 1000 on 22nd Aug 2012. Two inspectors of air accidents were dispatched on 24th Aug 2012 to the site of the accident for preliminary and on-site investigations.

The preliminary investigations revealed that the aircraft had taken-off from Moi International Airport Mombasa (HKMO), with an intended flight plan to Ukunda, then Amboseli Airstrip, then proceed to Ngerende Airstrip, Mara North, Olkiombo (HKOK), Mara North, Ukunda Airport (HKUK) and finally return to Moi International Airport, Mombasa. After the first leg to Amboseli Airstrip, It landed at Ngerende airstrip at 0911 disembarking 6 passengers. The aircraft then took off from Ngerende airstrip with 13 souls on board, 2 crew and 11 passengers, after a short stopover. Takeoff time was noted as 0917. No new passengers, cargo or refueling was done at Ngerende airstrip. The next destination was Mara North airstrip. Shortly after takeoff, witnesses reported seeing it veer to the left and it collided with the ground shortly afterwards.

Search and Rescue (SAR) was initiated immediately and the aircraft wreckage was located about 310 meters from the end of RWY 28. The SAR took about 05 minutes.

First responders reported the front/cockpit was completely destroyed. The passenger cabin had sustained severe damage.

The crew members sustained fatal injuries. Two passengers also sustained fatal injuries, with three passengers sustaining serious injuries. The other six passengers sustained minor injuries. The survivors were evacuated to Nairobi for medical assistance. The site was secured by armed Mara Conservancy personnel.

The Aircraft was completely destroyed after it collided with terrain. No fire ensured afterwards.

1. Factual Information

1.1. History of flight

This was a commercial non scheduled flight which was being operated for air transport for local flights. The operator is based in Mombasa and mostly executes passenger flights to the Masai Mara and other game parks and reserves within the Republic of Kenya. On 22nd Aug 2012, the aircraft was scheduled to carry out a flight to the Masai Mara, do several sectors to pick and drop passengers and return to Moi international Airport via Ukunda Airport. The call sign was 5Y-UVP. The last point of departure was Ngerende Airstrip in the Masai Mara at 0917 with intention of onward flight to Mara North airstrip in the Masai Mara.

The flight had earlier left Amboseli Airstrip with two crew, and 17 passengers for Ngerende Airstrip. 6 passengers had disembarked at Ngerende and the remaining 11 passengers were continuing to other destinations. No additional passengers or cargo was picked up from Ngerende airstrip. No refueling was done at the airstrip.

The airfield is an unmanned airfield, with crew executing unmanned airfield communication procedures to execute approach and landings and also during takeoff. There is however a ground time keeper and a fueling bay at the airfield. Due to terrain and prevailing winds at the time of the flight, Runway 28 was in use. The crew was using unmanned airfield procedures and after the drop-off of 6 passengers, the aircraft lined up runway 28 and proceeded with the take off run.

Ground staff at the airstrip reported a normal takeoff run and rotation. During the initial climb, the ground staff still had the aircraft in sight and reported to have seen the aircraft veer sharply to the left and then disappear behind terrain. Shortly afterwards, a loud sound was heard followed by dust in the air. Emergency SAR was initiated with the airport and hotel staff rushing to the accident site.

The location of the accident was about 310 meters from the threshold of Runway 10, offset 30° to the left of the extended center line Runway 28.

GPS coordinates (figure 1.2) 01.084189° S, 35.1781127° E, Ngerende airstrip.

The accident occurred at 0917 UTC on 22nd Aug 2012, during daytime.

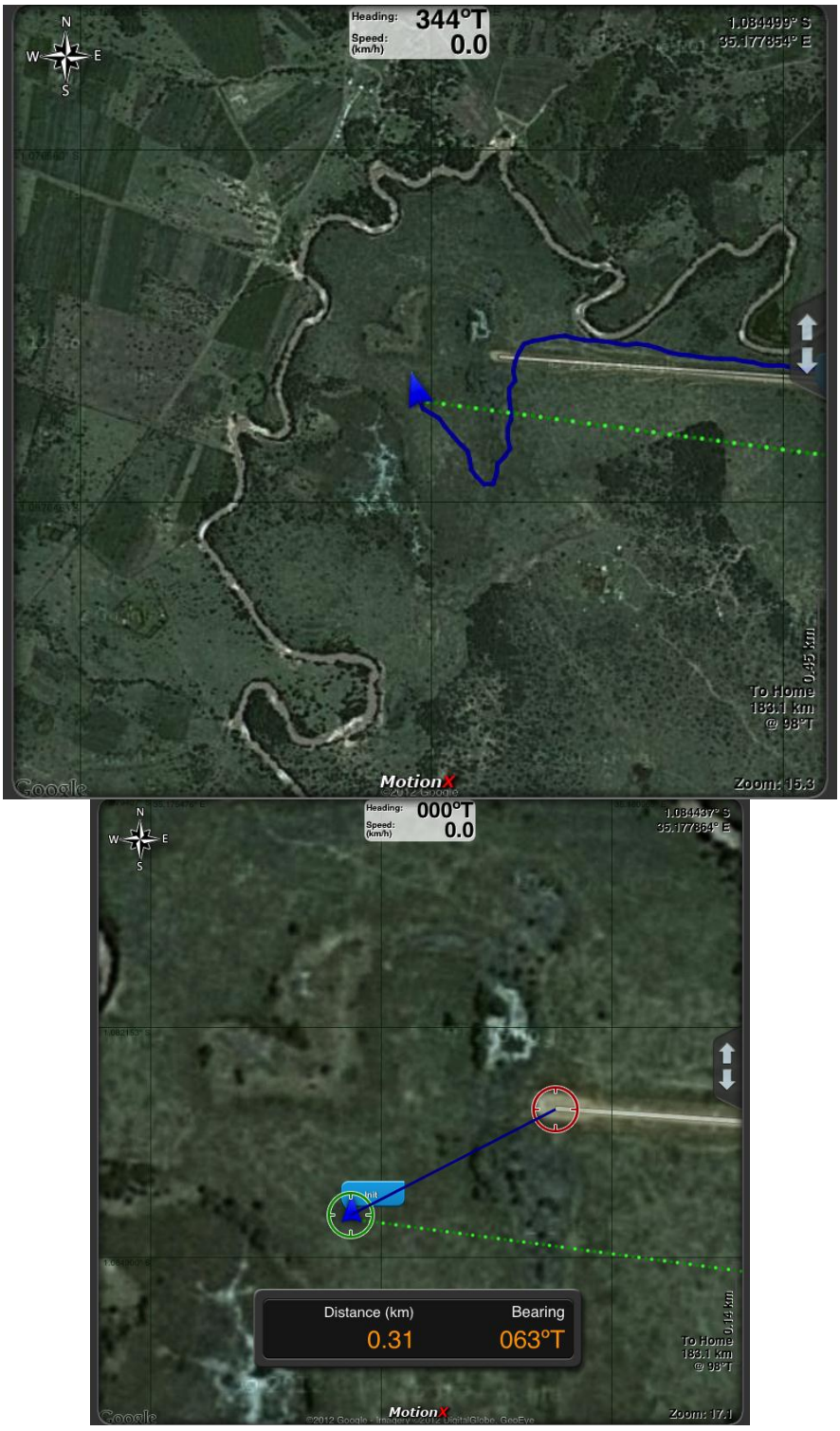


figure 1.2 : Accident site distance and location on google maps

1.2. Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	**2**[1]	**2**[2]	**0**
Serious	0	3	0
Minor/None	0	6	0

1.3. Damage to the Aircraft

The aircraft was destroyed after collision with terrain.

1.3.1. Nature of Damage 5Y-UVP

1.3.1.1. Engines/Wings

Both engines detached from their wing mounts and located at varying distances from their attachment points. Engine 2 was located below the starboard (right) wing, whereas Engine 1 was located about 3 meters from main fuselage (reference point on main fuselage will be taken as the nose landing gear (NLG)).

Both wings were attached to fuselage, with the starboard extensively damaged.

[1] Kenyan nationality
[2] German nationality

1.3.1.2. Fuselage

The fuselage was broken into three parts that can broadly be defined as cockpit, mid-section and tail section.

- Nose section up to frame # 7 was completely destroyed.
- Frame # 7 to # 12 fuselage substantially destroyed with considerable deformation.
- Frame # 12 and # 14 are reinforced frames on which main landing gear (MLG) and wings are attached to the fuselage. These frames were more or less intact with slight deformation.
- Separation of mid-section and tail section occurred at frame # 14 which is aft of wings.
- Frame # 14 to # 23, fuselage remained mostly intact.
- Frame # 23 to end of tail section, fuselage was substantially deformed.
- Vertical fin, rudder and stabilizer were displaced as a unit but did not break away from main fuselage. They assumed position parallel to the ground surface with the rudder section making contact with the ground.

1.3.1.3. Undercarriage (Landing Gear)

The main undercarriage was extended and remained intact, no apparent damage. Tires were still inflated.

Nose Gear undercarriage was facing upwards, possibly as a result of the crash dynamics. Tire still inflated.

1.4. Other Damage

The surrounding bushes were destroyed by the collision and oil spillage.

1.5. Personnel Information

1.5.1. Captain

The captain was a 59 year old male, holding an Airline Transport Pilot License number YK-2136-AL (ATPL). At the time of the accident, the license was valid till 06th Sep 2012. He was also holding a current class one medical certificate, which had been done 05 Mar 2012. The Medical was due to expire at the same time as the ATPL. (Appendix 1)

He also had a valid certificate for a flight radio telephony operator license. (Appendix 2)

He had a rating in Landplanes class, with type ratings of LET 410 UVP-E9 and LET 410 UVP-E20. He was also rated to fly a Fokker 27 in his license.

Rating	**Hours on type**	**Currency on type**
LET 410 UVP-E9	7,480	August 2012
LET 410 UVP –E20	1,150	July 2012
Fokker 27	1,235	2011

His English LPR level 5 was due to expire in 2015.

1.5.2. First Officer

The first officer was 24 year old male, holding a Commercial Pilot License number YK-6851-CL. At the time of the accident, the license was valid till 02 July 2013. He was also holding a current class one medical certificate, which had been done 02 July 2012. The Medical was due to expire at the same time as the CPL. (Appendix 3)

He also had a valid certificate for a flight radiotelephony operator license. (Appendix 4)

He had a rating in Landplanes class, with type ratings of Cessna 152, Cessna 172, Piper PA 34, Beech 55 in Group 1 and LET 410 UVP-E9 in Group 2.

Rating	**Hours on type**	**Currency on type**
LET 410 UVP-E9	312	20.08.2012

His English LPR level 5 was due to expire in 2018.

1.6. Aircraft Information

The aircraft had a valid certificate of airworthiness which had been renewed on 07th Aug 2012 and valid from 09th Aug 2012 till 08th Aug 2013.

The last scheduled Inspection was a P-1 check completed on 17th Aug 2012.

Type of fuel used was Jet A1.

1.7. Meteorological Information

The flight was to be conducted under VFR. The weather at the airfield was reported as CAVOK with calm winds.

The flight was being carried out at during the daytime.

1.8. Aids to Navigation

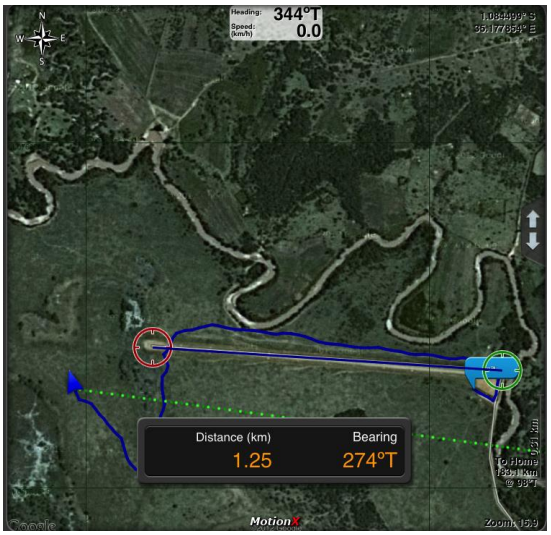
The Airstrip is not equipped with any Aids to navigation.

1.9. Communications

The Crew was not in communication with any Air Traffic Service.

1.10. Aerodrome information

The Ngerende Airstrip is an unmanned airstrip, with a murram (loose surface) runway. The runway length is approximately 1250 metres. The airfield is also equipped with a windsock. No Landing or other navigation aids present at the time of the accident.



1.11. Flight Recorders

A flight data recorder (FDR) serial number *50858*, and a voice data recorder (CVR) serial number *N-20076*, were fitted at the time of the accident. **Figure 1.11.1**

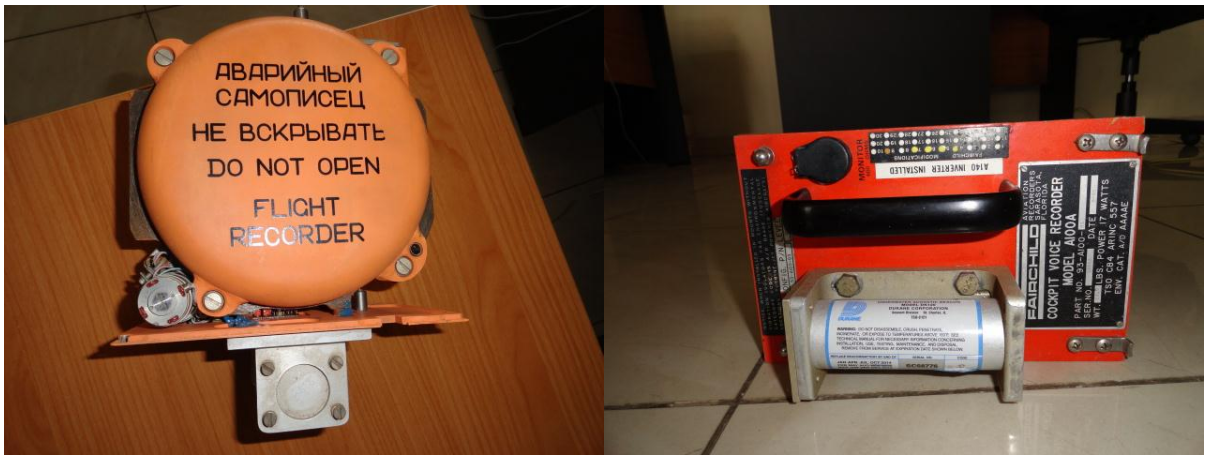


Fig 1.11.1: Flight data recorder & cockpit voice recorder recovered from the 5Y-UVP

1.12. Wreckage and Impact Information

The site of the accident was a field with low vegetation, adjacent to the airstrip. The main wreckage was located about 310 metres from the threshold of runway 28. The wreckage spread was relatively small, with all major components within a 10-20 metre radius of the main wreckage

1.13. Medical and Pathological information

The postmortem report for the captain (Appendix 5) shows that the cause of death was due to fatal injuries sustained after the crash. It was shown that the Captain sustained severe head and chest injuries, with immediate cause of death being cardiorespiratory failure.

The first officer's postmortem was not done due to religious restrictions.

The two deceased passengers' postmortem reports are expected from Germany with the help of their Air Accident investigations agency (BFU).

1.14. Fire

There was no post crash fire.

1.15. Survival Aspects

Search and Rescue was initiated immediately after the crash was witnessed by the ground staff. It took the rescue team about seven (7) minutes to get to the crash site.

The cockpit was completely destroyed in the crash, with the crew in the cockpit suffering fatal injuries. The whole cockpit was wrecked, with seats and the seatbelts being ripped off, and the whole cockpit being destroyed.

The passengers sitting in the front section of the passenger cabin sustained fatal injuries as the forward potion of the passenger cabin was also completely destroyed. The seats in that section were also completely destroyed.

The aft of the passenger cabin sustained minor damage, with the seats and seatbelts mostly remaining intact. The passengers seated in that section sustained minor injuries.

The survivors were evacuated to Nairobi for medical assistance after first aid.

1.16. Test and Research

1.16.1. Engines

Both engines were shipped to the manufacturer's facility (GE Aviation Czech) in Prague, Czech Republic. Engine strip inspection was conducted between 25th February and 1st March, 2013 with AAID participation (see attached report).

1.16.2. Propeller assembly

The LH engine propeller assembly was shipped to the manufacturer's facility (GE Aviation Czech) in Prague, Czech Republic. Propeller strip inspection was conducted on 2nd May, 2013 under the supervision of an accredited representative from the Czech accident investigation agency (see attached report).

1.16.3. Fuel control unit

The fuel control unit was disassembled at the manufacturer's facility (Jihostroj) in Velesin, Czech Republic. FCU disassembly and inspection was conducted on 28th February, 2013 with AAID participation (see attached report)

1.16.4. Suspected contaminant analysis

AAID requested for the suspected contaminant to be shipped back to Kenya. The parcel arrived in the country on 9th June, 2013 and is in AAID custody. It was expected that the samples would be sent to the Government chemist for analysis but that was not done due to logistical challenges. However, GE had retained a small quantity of the contaminant on which they were able to perform a chemical analysis. The report is herein attached.

The engines remained in the custody of the Operator and Insurance up until they were shipped out, due to lack of storage facility at the Air Accident Investigations Department. The FDR and CVR were downloaded and analysed (see attached report).

1.17. Organisation and Management information

Mombasa Air Safari is a KCAA registered Aircraft operator Certificate (AOC) holder that operates charter flights from their base at Moi international Airport (MIA), Mombasa, Kenya. Maintenance for their fleet was mainly performed at Benair Engineering; a KCAA registered Approved Maintenance Organization (AMO) also based at MIA. Their fleet at the time of the accident, excluding the accident aircraft, comprised of two Cessna 208, two Let 410 and one DeHavilland DC3 aircraft. MAS' organizational structure is presented in the appendix.

1.18. Additional information

The crew had worked in MAS for only about a month at the time of the accident.
MAS had been the subject of a routine AOC renewal inspection conducted by KCAA on 4th and 5th July, 2012. Some of the findings noted were:
"No record of any quality audits carried out on MAS operations"
"All pilots have not undergone route/line checks since 2010"
"All pilots are not current on their operational proficiency checks (OPCs), base training and base checking has not been conducted since 2010"

On 20th July 2012, MAS responded to the inspection findings vide a Corrective Action Plan that stated in part (in response to the three above noted findings):
"The quality manager is developing a quality audit schedule to be implemented from 1st August 2012"
"…We (MAS) have with immediate effect grounded all our pilots until they complete the necessary route/line checks. To this end we have employed the services of Capt. Edward Kithoi (he would eventually be the PIC in the fateful accident) and (another pilot) to conduct the route/line checks on all our pilots within two weeks from 5th July, 2012"
"…We (MAS) have with immediate effect grounded all our pilots until they complete the necessary recurrent training and checking. To this end we have employed the services of Capt. Edward Kithoi (he would eventually be the PIC in the fateful accident) and

(another pilot) to conduct the recurrence training and base checks on all our pilots within two weeks from 5th July, 2012"

It is unclear to what degree these corrective actions had been implemented at the time of the accident since it occurred barely a month and a half after the KCAA inspection.

It was reported that there was a technical delay on the morning of 22nd August, 2012. AAID has not established the authenticity of these reports; neither has it been able to determine the nature of the delay, if indeed there was one.

1.19. Useful or Effective investigation Techniques

No useful or effective techniques were used during the investigation.

2. Analysis

2.1. FDR and CVR

The FDR of the aircraft LET-410 during the flight on August 22, 2012 was not serviceable and did not record any data pertinent to the accident flight. A copy of the FDR data was made and presented to AAID.

The CVR of the aircraft LET-410 during the flight on August 22, 2012 was not serviceable and did not record any data pertinent to the accident flight. The magnetic recording tape was severed and the drive unit assembly was also not serviceable. A copy of the CVR data was done and presented to AAID.

The EGPWS unit was inspected and it was found to be badly damaged and the data readout can't be conducted before repair on the unit is carried out. Assistance of NTSB/Honeywell is recommended

The GPS Garmin 155, CVR control panel can't contain any information useful for the investigation.

The full report is contained in Appendix

2.2. Engine and propeller strip

Both LH and RH engines displayed impact damage.
The FCU from LH engine had signs of contamination, in particular the fuel metering needle.
Analysis of this suspected contaminant to determine its composition and possible origin was performed. The full report is contained in the Appendix.
Strip inspection on LH propeller suggests that the propeller blades were in feather at the time of impact. It further suggests that the propeller was rotating at low speed and presumably under low power at the time of impact.
The full report is contained in Appendix

3. Conclusions

- LH engine was most probably not developing power at the time of impact
- LH engine propeller was most probably in feather at the time of impact
- Both CVR and FDR were unserviceable at the time of the accident
- AAID was unable to determine origin of contaminant found in LH engine FCU
- Sufficient oversight was not exercised over the Operator
- High turnover of the Operator's staff

4. Recommendations

i. KCAA to enforce the provisions of Kenya Civil Aviation Instruments and Equipment Regulations, specifically Part VI, regulation 36 and 37 and related sections
ii. KCAA to consider inclusion of the aforementioned provisions in certificate of airworthiness inspection checklists
iii. KCAA ascertain that aircraft in MAS are maintained in accordance with applicable laws, including but not limited to verification that facilities (AMOs) that carry our maintenance on MAS aircraft are duly approved.
iv. Enhance training on single engine operation for twin engine aircraft, VMC roll procedures and other emergencies
v. KCAA to establish an inspection program for aircraft fuel
vi. KCAA to draw the attention of MAS and the industry at large to the provisions of ICAO Annex 6 – Operation of Aircraft, Chapter 6 dealing with the discontinuation of magnetic tape FDR/CVR

Appendices

1. Captain's ATP License
2. Captain's flight radio telephony operator license
3. First officer's CPL
4. First officer's flight radio telephony operator license
5. Post mortem report
6. Air Accident Investigation Department (AAID) sketch of accident site
7. FDR and CVR readout report
8. Engine strip report(includes FCU inspection report)
9. Propeller strip report
10. Suspected contaminant analysis report

Chief Investigator
Martyn Lunani