ACCIDENT INVESTIGATION BUREAU

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AIB INTERIM REPORT

Accident to Beechcraft 1900D Registration 5N-JAH at Bushi Village in Obanlinku Local Government Area of Cross River state, Nigeria on 15th March, 2008.

Registered Owner and Operator:	Wings Aviation Limited
Aircraft Type and Model:	Beechcraft 1900D
Registration:	5N – JAH
Manufacturer's Serial No.	UE - 322
Year of Manufacture:	1998
Location:	Bushi Village in Cross River State
Date and Time:	15 March, 2008 at 0839 UTC All times in this report are UTC (Local Time equivalent to UTC +1)
Injuries to person:	Crew – 2 (Fatal) Passenger – 1 (Fatal)

Photograph showing Beechcraft 1900D 5N – JAH before accident

Personnel Information:

Captain:	Male, age 60 years
Licence:	Airline Transport Pilot Licence
Aircraft Rating:	Beechcraft 1900D, Beechcraft 2000, B727, BAC 1 – 11
Instrument Rating:	Valid 31/07/08
Licence Proficiency Check:	16/12/07
Operational proficiency Check:	05/11/07
Medical Certificate:	30/06/08
Flying Experience	**Hours**
Total flying:	9730
On Type:	852
Last 90 days:	57: 26
Last 28 days:	46:16
Last 24 hrs:	Nil
First Officer:	Male age 36 years
Licence:	Commercial Pilot Licence
Aircraft Rating:	BE 1900D
Instrument Rating:	Valid 12/07/08
Licence Proficieny Check:	16/12/07

Operational Proficiency Check: 02/02/08	
Medical Certificate:	August, 2008
Flying Experience:	**Hours**
Total flying:	444.7
On Type:	204
Last 90 days:	88:15
Last 28 days:	37:45
Last 24 hrs:	Nil
Passengers on Board	
Pax:	Female age 24 years
Employed as:	Marketing Executive
Date Joined:	16th August, 2007

Meteorological Information

The OBUDU meteorological office gave the following terminal landing forecast at 0700 hours

Surface Wind (S/W):	Calm
Visibility (Vis):	8Km
Cloud (CLD):	Few 300m Broken (BKN) 9000m
Weather (WX) :	BR
QNH:	1012 HPA
Temperature (Temp):	25˚C

The Investigation

The Beech 1900D was reported missing on 15th march, 2008 on a filed flight plan from Lagos – POTGO – Enugu direct to Bebi airstrip and the Accident Investigation Bureau (AIB) was notified same day. The aircraft departed Lagos at 0636 hrs. It was expected to arrive at Bebi airstrip at 0825hrs. The crew deviated from their initial flight plan estimating IKROP 0806 hrs. The aircraft contacted Port Harcourt, Enugu and Bebi control tower before contact was finally lost. The crew experienced navigation problem enroute Bebi, received several terrain warnings from EGPWS and subsequently crashed with the three (3) persons on board fatally injured. Several attempts to locate the aircraft wreckage proved abortive until

30th August, 2008 when hunters found the wreckage in a mountainous valley of Bushi village in Obanlinku local government area of Cross River state. AIB participated in the search and rescue (SAR) as an observer in accordance with ICAO Annex 12 (search and rescue manual). Accident Investigation commenced on 3rd September, 2008.

History of Flight

The aircraft B1900D, call sign TWD 8300 on 15th March 2008 filed a flight plan with Air Traffic Services (ATS) reporting office at Murtala Muhammed Airport (MMA) Lagos for departure to Bebi airstrip, OBUDU routing Lagos (LAG) – POTGO - Enugu (ENG) direct to Bebi.

The Aircraft departed MMA at 0636 hours climbing to twenty five thousand feet, FL250 above mean sea level (AMSL) estimating POTGO at 0736 hours and Bebi at 0821 hours. It was transferred to Port Harcourt at 0745 hours and released to Enugu at 0756 hours descending to eleven thousand feet (FL110) AMSL at 0805 hours while passing sixteen thousand feet (FL160) AMSL requested for further descent and was cleared by Enugu tower to descend to five thousand feet (FL050) AMSL. The aircraft deviated from the filed flight plan route, and flew through the airway (UA609) direct to IKROP when it was to have turned left from the airway at POTGO for Enugu and direct to Bebi in OBUDU. The crew was confused at IKROP in navigating to Bebi, they made several input into GPS of the OBUDU position but results were not the same. The crew after several “Terrain” and “pull up” warnings which were not responded to, flew into terrain and crashed.

Wreckage and impact information

The wreckage was contained within a sizeable area in a wooded valley with several trees typical of a thick forest. The main parts of the aircraft i.e fuselage, engines, landing gears, tail section were found. The main fuselage and wings suffered severe fire damage. The trees served as breakers and helped in confining the break - ups though it was a high speed impact.

Part of the main wreckage

Burnt fuselage of the wreckage

Wreckage showing section of the tail of the aircraft

Fire

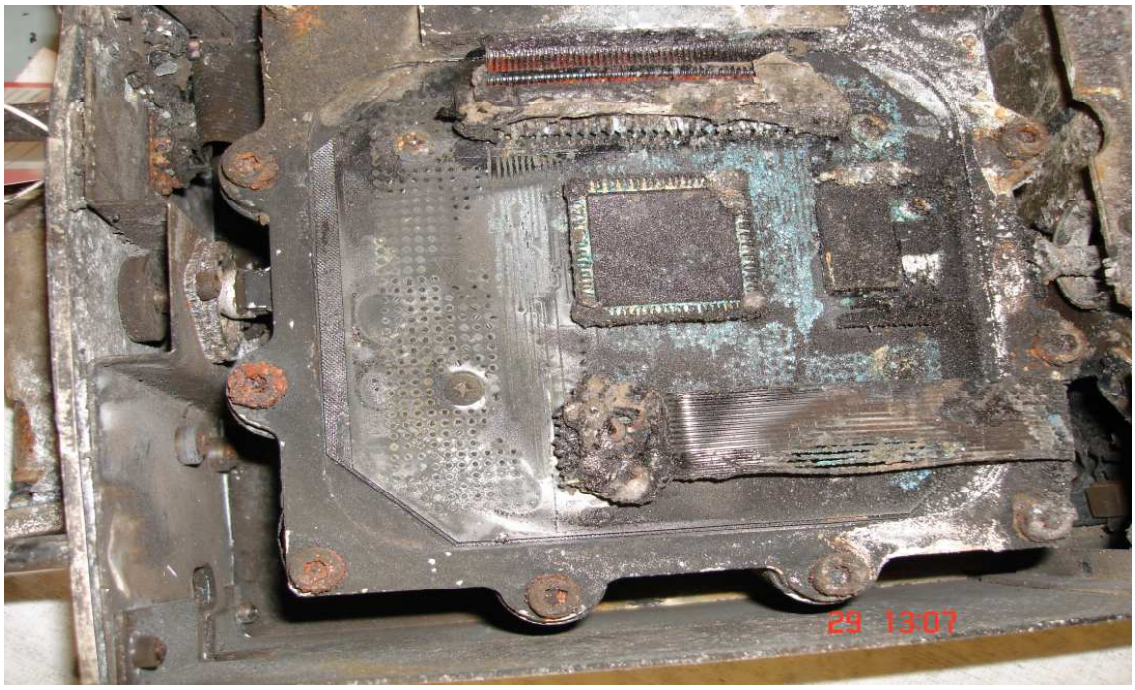
Post crash fire was evident at the wreckage site. The fuselage and wings were severely burnt and charred. Most of the trees around the main wreckage had their branches broken and effects of fire damage were seen extensively on many trees. Shortly before the aircraft crashed, it had a fuel endurance of three and half hours signifying there were several gallons of fuel on board the aircraft before the accident.

Survival aspects

The last moment of the flight saw the aircraft fly into terrain at a high speed of about 150 knots, this impact led to the disintegration of the aircraft. Because of the large fuel quantity on board the aircraft, there was post crash fire which led to extensive fire on the fuselage, wings and even the surrounding trees. The fire also led to the collapse of the aircraft floor beam and one of the flight crew's remains was found strapped to his seat. The non detection of the crash site immediately coupled with the difficult, mountainous and inaccessible terrain of the crash site made the survival chance of the occupants very remote. The SAR was launched with the dispatching of NEMA helicopter at not more than two hours after the aircraft was declared missing but the helicopter could not pick up the signal from the beech 1900D 406 MHZ emergency locator transmitter. The crash site was eventually discovered by the local hunters 6 months after the crash by which time none of the survivors from the accident could still remain alive.

Flight Recorders

The aircraft was fitted with a solid – state cockpit voice recorder (CVR) of 35 minutes duration and a Fairchild solid – state flight data recorder (FDR) both of which were successfully downloaded by the Air Accident Investigation Branch (AAIB), United Kingdom. The recorders exhibited impact and severe fire damage. Data could not be extracted from units in normal manner. The crash protected memory were removed from the damaged accident box and transferred to a surrogate units in order to download the data. The FDR contained many hours of recorded data of which the event flight was the last data with a recording duration of 120 minutes. The three plots in this report contained data which illustrate the event flight on the 15th march, 2008. Flight recorders parameters revealed that all engine and flight control inputs were functioning normally up till the moment the aircraft impacted terrain.



Cockpit voice recorder

Flight data recorder

Event Flight

The recordings from CVR and FDR have been amalgamated to present the information in a chronological order. The aircraft took off from Lagos at 0636 hours, climbed to FL 250. FDR plot indicated that engine and flight control parameters were all normal. The analysis of the last 30.5 minutes of the incident flight is as follows:

At 10 minutes 38 seconds into last leg of the flight, the crew experienced disparity in the GPS distance to OBUDU from IKROP. The co – pilot instrument read 27 miles to OBUDU from IKROP while captain instrument was reading 62 miles to OBUDU. This was the onset of the crew navigational problem. Henceforth, they were preoccupied with imputing and authenticating the right co- ordinates of OBUDU. At 22 minutes 55 seconds, the crew managed to input a mutually accepted coordinates for OBUDU.

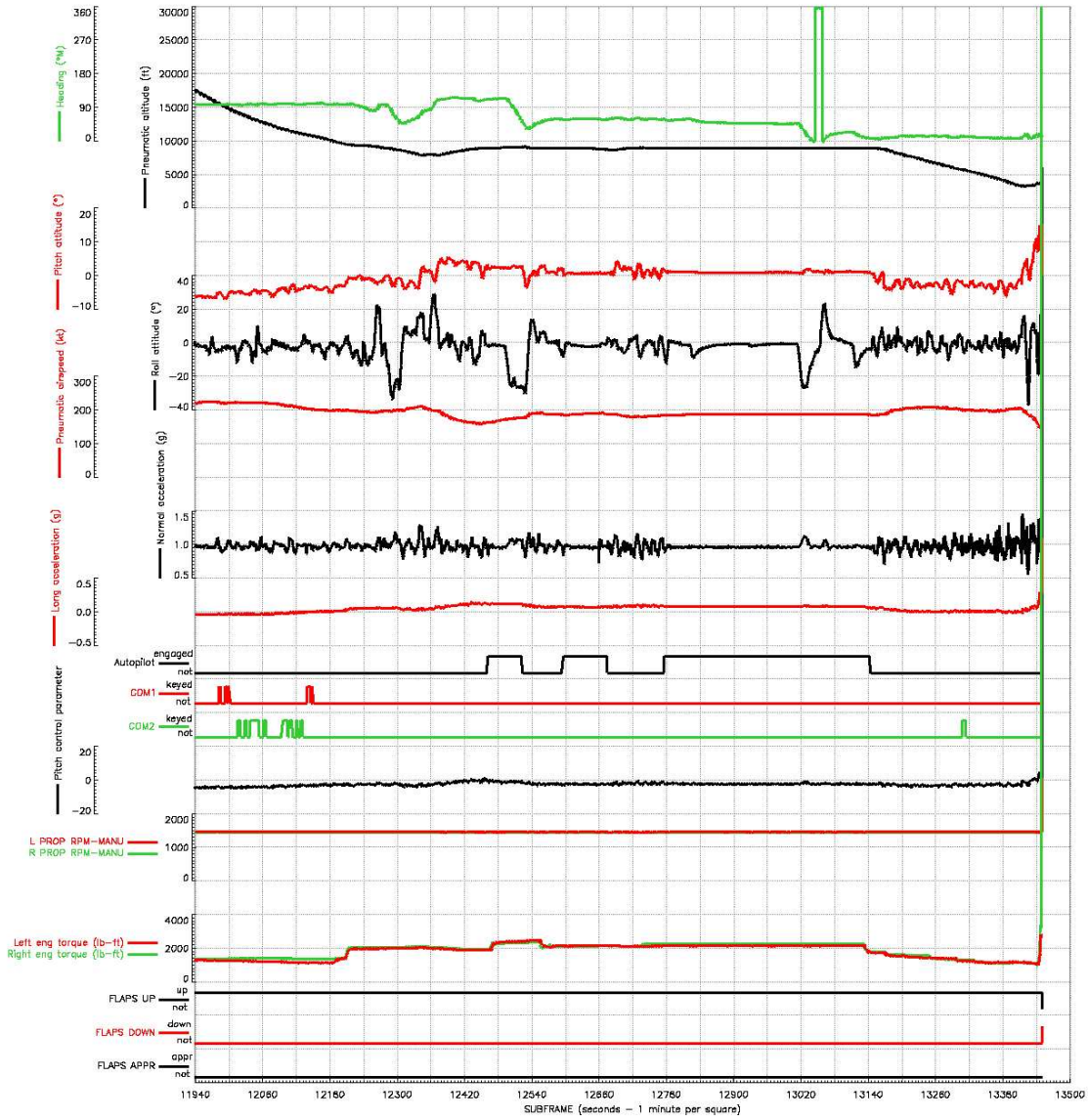
At 25 minutes, 22 seconds the crew descended further from

9, 000 ft to 3, 500ft. "We have to go down further".

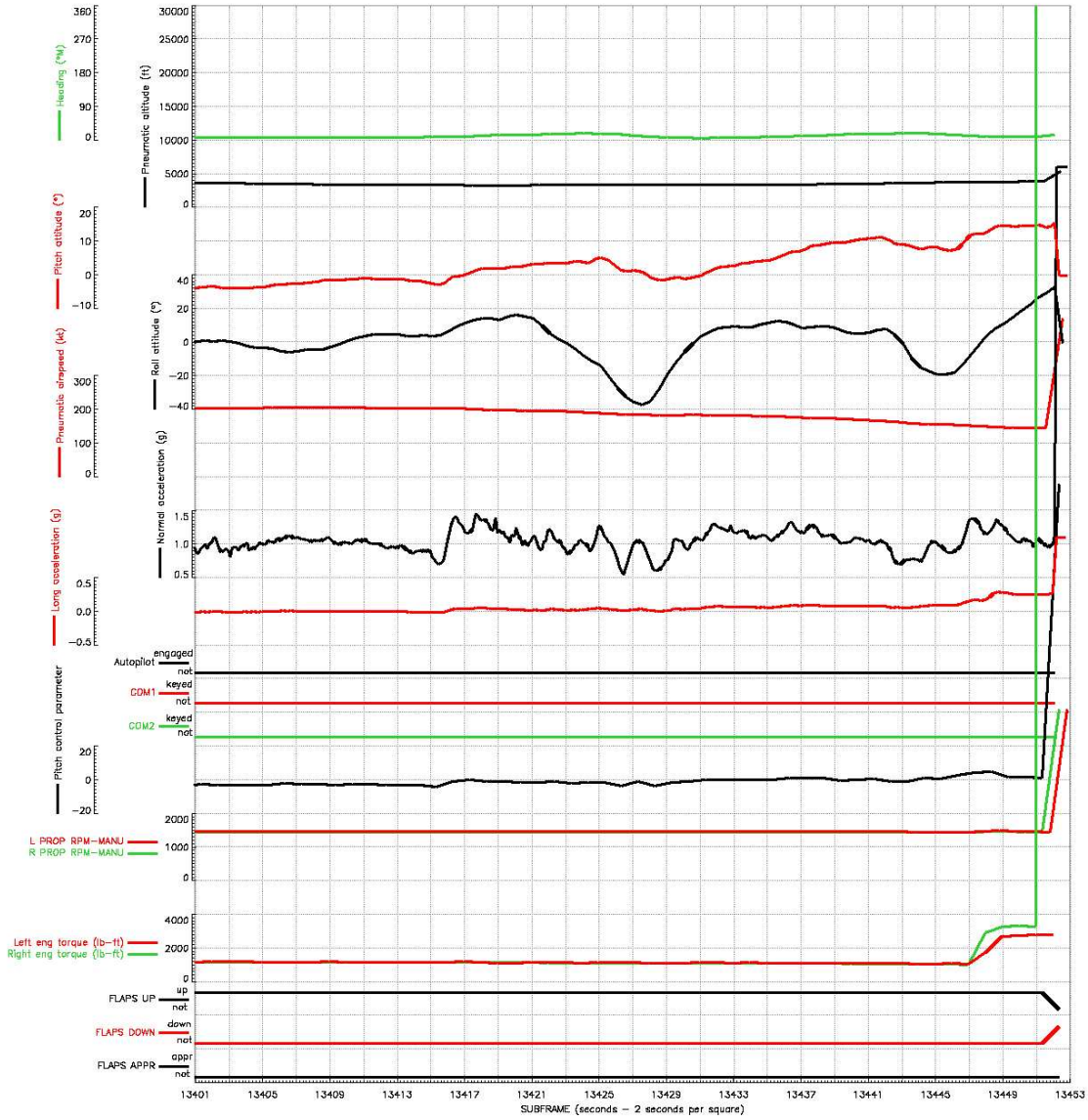
At 26 minutes 55 seconds, the crew was still looking out for the ground and landmarks.

28 minutes, 24 seconds, approach checklist was read and completed at 28 minutes 46 seconds.

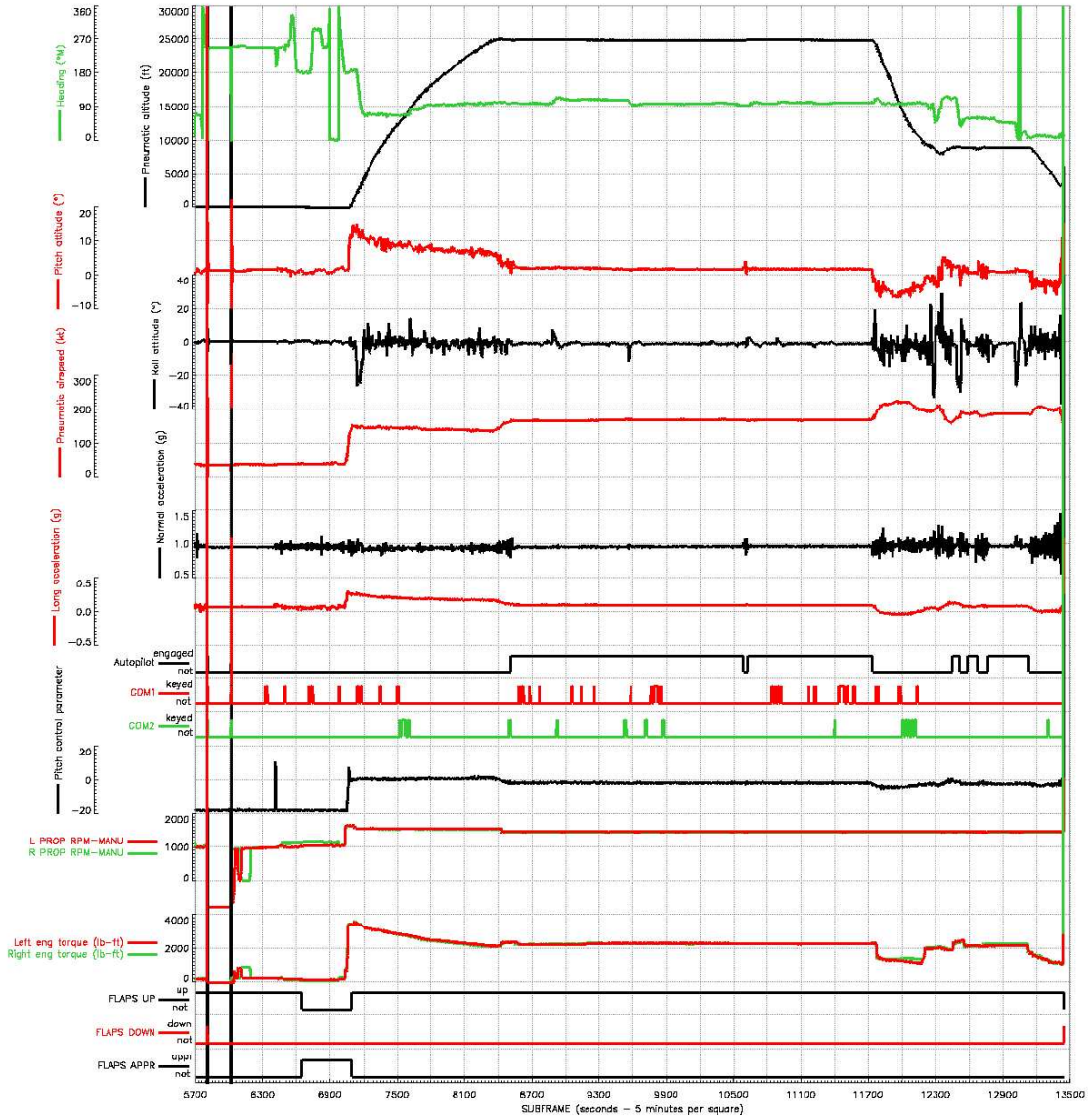
29 minutes 42 seconds, the first terrain proximity warning came from the EGPWS followed by multiple EGPWS warning at 29 minutes 51 seconds and continuous EGPWS warning at 30 minutes 7 seconds and finally at 30 minutes 13 seconds the captain shouted ‘shit’ while the copilot shouted ‘climb’. The aircraft impacted terrain at 30 minutes 18 seconds after 60 seconds of EGPWS persistent warning. See the FDR plots below.



FDR Plot


Heading (°M)
Pitch attitude (°)
Pneumatic airspeed (kt)
Long acceleration (g)
Pitch control parameter
Pneumatic altitude (ft)
Roll attitude (°)
Normal acceleration (g)
Autopilot
engaged
not
COM1
keyed
not
COM2
keyed
not
L PROP RPM-MANU
R PROP RPM-MANU
Left eng torque (lb-ft)
Right eng torque (lb-ft)
FLAPS UP
up
not
FLAPS DOWN
down
not
FLAPS APPR
appr
not
13401
13405
13409
13413
13417
13421
13425
13429
13433
13437
13441
13445
13449
13453
SUBFRAME (seconds - 2 seconds per square)

FDR Plot



FDR Plot

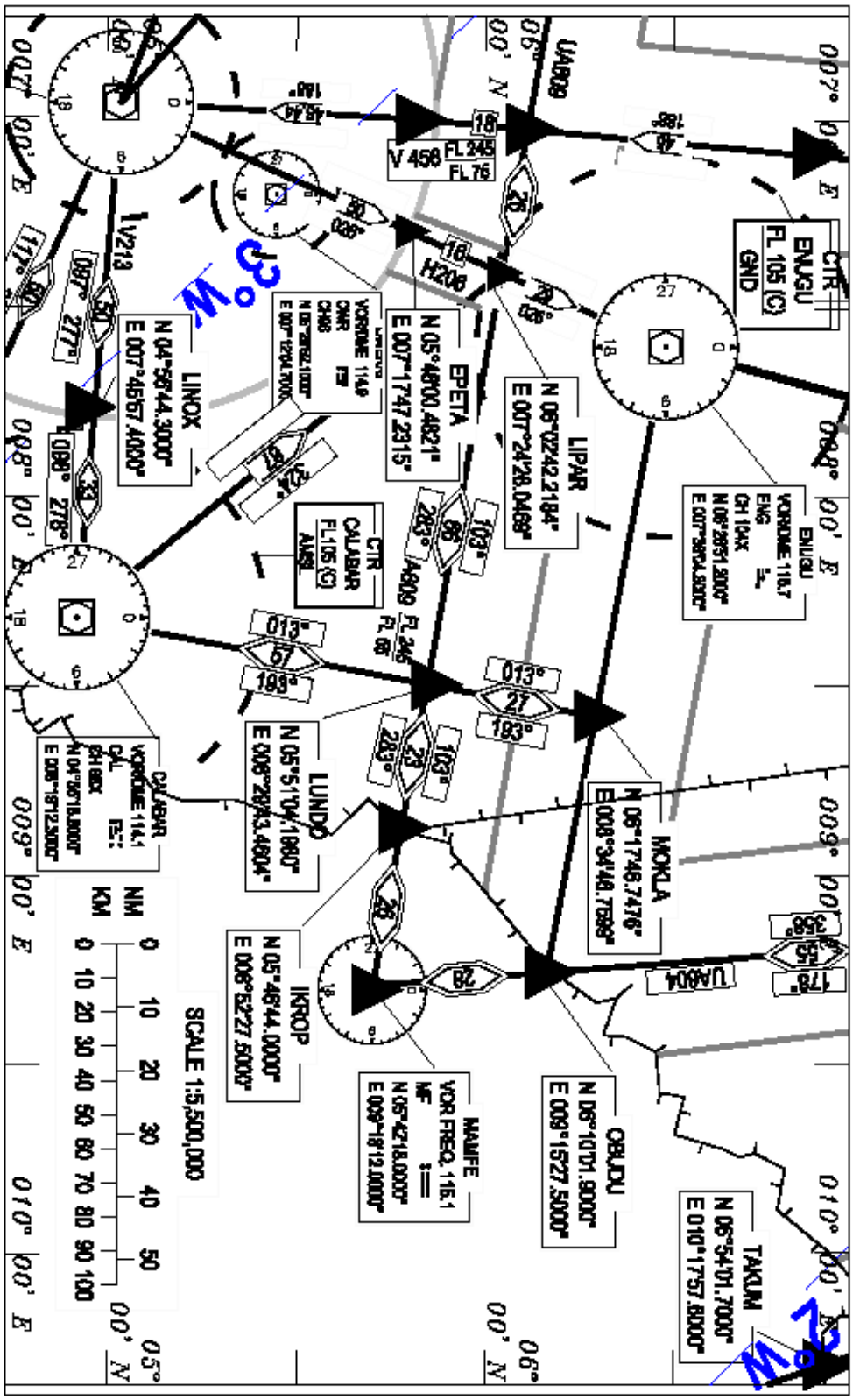
Conduct of Flight

The pre-flight planning by crew of the TWD 8300 was duly filed with ATS reporting office at Murtala Muhammed Airport, indicating routes to be flown as, "Lagos (LAG) via Airways (UA609) to POTGO direct Enugu (ENG) and direct to OBUDU" but the aircraft did not follow the route, instead flew the airway estimated IKROP at 0806 hrs. It maintained twenty-five thousand feet (FL250) before commencement of descent to eleven thousand feet as cleared by Port Harcourt tower. At 0756 hrs, the aircraft contacted Enugu Tower, estimated IKROP at 0806 hrs and OBUDU at 0809 hrs, TWD 8300 checked abeam Enugu at 0745 hrs with four hours endurance. At 0805 hrs, it requested for further descent and was cleared by Enugu to 5000ft AMSL (FL050) to report again rejoining. From the estimate given for IKROP at 0806 hrs meant it was one minute to IKROP and twenty minutes away from abeam Enugu which was out of Enugu control airspace. Enugu airspace lateral limit is 30NM from reference point

052802N, 0073332E and from ground level to 10,500ft (FL105). From FDR analysis, it descended to 8000ft AMSL (FL080) and climbed back to 9000ft (FL090) within 80 seconds. The aircraft maintained 9000ft for another 720 seconds, again descended to 3500ft within 240 seconds. This time the EGPWS came on warning them of terrain and to pull up. By the time the crew reacted, the aircraft flew into terrain at 4, 200ft.

EXTRACT OF AERONAUTICAL INFORMATION PUBLICATION SHOWING ROUTE MAP TO OBUDU

FIG A



Human Factor

Crew Resource Management

Crew resource management (CRM) training is intended to reinforce the fact that both pilots should be closely involved with the conduct of a flight regardless of rank and who is the pilot flying (PF). One of the main tools of CRM is the existence of, and adherence to standard operating procedure (SOP). Effective CRM should enable a crew to manage routine and non – routine circumstances and also to overcome a situation where one pilot for whatever reason has lost situational awareness. This is achieved by task sharing and team work. The crew deviated from the filed flight plan and attempted navigating to OBUDU from the south. The crew was not situationally aware and did not refer to the appropriate charts to establish minimum safe altitude (MSA).

Flight Plan / Navigation

The deviation from the filed flight plan led the crew into the navigation problem they encountered. This in turn increased the crew workload, they became disoriented and consumed with the effort to resolve and input the correct coordinates for OBUDU.

Low Altitude Descent in Visual Flight Rule (VFR)

The crew commenced descent from 9,000ft to 3,500ft using VFR situation when they were unable to establish ground contact. Approach checklist was completed while still looking out for ground reference.

Findings

1. The aircraft was serviceable from available records.
2. The captain was qualified to fly the aircraft.
3. The co – pilot was also qualified to fly the aircraft
4. The flight departed as per the filed flight plan
5. The crew deviated from the filed flight plan route
6. During the flight the crew displayed lack of situational awareness
7. The flight crew experienced navigational problem which distracted their attention during the flight.
8. There was no approved approach procedure into Bebi airstrip.
9. Unlicenced ‘radio operator’ was providing flight information services at Bebi airstrip.
10. The airstrip lies under very busy airways (UA 604) from Europe to South Africa in a difficult, mountainous terrain.

11. Bebi airstrip is equipped with one improvised Land Rover fire vehicle without water reservoir.

12. Enugu tower descended the aircraft to 5000ft AMSL (FL050) outside its control airspace not considering that the aircraft was not flying the filed flight plan route.

13. A minimum safe altitude (MSA) of 11,200ft was published by Jeppersen chart owing to the topography of the area.

14. During the Search and Rescue operation, the SAR aircraft installed with infra – red camera capability for detecting the wreckage came in seven days after SAR had commenced and it was found that infra – red camera on board was unserviceable.

15. The meteorological equipment in Bebi airstrip were inadequate and the few available ones were not calibrated.

16. The aircraft documentation was in order and there were no outstanding defects recorded in the technical log.

17. The commander did not promptly initiate terrain avoidance action when the EGPWS sounded “Terrain!” “Terrain!!” “Pull up!!!”

18. The captain had a total of 852 hours on aircraft type while the co – pilot had 204 hours on type.

The investigation identified the following causal factors:

1. Lack of situational awareness which led to a controlled flight into terrain.
2. The inability of the crew to identify their position while navigating to their planned destination.

The investigation identified the following contributory factors:

1. The flight crew’s deviation from initial filed flight plan to Bebi.
2. Poor cockpit resource management (CRM).
3. Crew’s inability to respond promptly to several EGPWS warnings.
4. The ATC at Enugu could not notice deviation of the aircraft from the initial filed flight plan route and also descended the aircraft to 5, 000ft outside Enugu control airspace without considering the minimum safe altitude of 11,200ft as specified in Jeppersen chart of the area.

The AIB has made two interim safety recommendations.

Safety Recommendations

1. The Civil Aviation Authority (NCAA) should ensure that there is an approved and published approach procedure for flying into Bebi airstrip.

2. The Civil Aviation Authority (NCAA) should ensure that crews meet the Crew Resource Management (CRM) training requirement for safe flight operations.

Further work

- All samples of human remains collected from the accident site have been sent to South Africa for Deoxyribonucleic acid (DNA) analysis. Result of the DNA is being awaited.
- The investigation still ongoing.