AIRCRAFT ACCIDENT REPORT
AIB/ AERO/ 2008 /03 /24/F

Accident Investigation Bureau

Report on the Accident to
AERO CONTRACTORS NIGERIA LIMITED
AS 365 N2 Registration 5N-BJF at Bonny Airstrip, Bayelsa State, Nigeria
On 24 March 2008

TABLE OF CONTENT

APPENDICES:

GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

Agl	Above ground level
AIB	Accident Investigation Bureau
C of A	Certificate of Airworthiness
CVR	Cockpit Voice Recorder
FDR	Flight Data Recorder
GSM	Global System for Mobile
IFR	Instrument Flight Rules
LDP	Landing Decision Point
MEL	Minimum Equipment List
NCAA	Nigerian Civil Aviation Authority
NDB	Non Directional Beacon

OEI	One Engine Inoperative
QHN	Airfield Pressure corrected for seat level
SMS	Safety Management System
SRI	Systemic Flight InstructoR
TSN/CSN	Time Since New/Cycles Since New
TSO/CSO	Time Since Overland/Cycles Since Overland
TRE	Type Rating Examiner
TRI	Type Rating Instructor
TDP	Take-off Decision Point
VHF	Very High Frequency
VSI	Vertical Speed Indicator
WX	Weather

Aircraft Accident Report No: **(AERO/2008 /03 /24/F)**

Registered Owner and Operator: Aero Contractors Nigeria Limited, Lagos.

Aircraft Type and Model: AS 365 N2 ARRIEL 1.C

Registration: 5N-BJF

Place of Accident: Bonny, Rivers State.
04° 24' 19.8N latitude
007° 10' 48.3E longitude

Date and Time: 24th of March, 2008 at 0915hrs

(All the times in this report are local times (equivalent to UTC + 1) unless otherwise stated)

Synopsis

The Bureau received notification of the accident on the 24th of March, 2008 in the morning and investigators were promptly dispatched to Port Harcourt on the same day.

The helicopter took off from the Nigeria Air Force (NAF) base Port Harcourt, Rivers State on a training flight to Bonny airstrip on Monday morning, the 24th of March, 2008. At 50 feet, during the demonstration of Class B landing by the training captain for runway 28, the helicopter experienced a sudden drop in height. The helicopter hit the ground nine meters short of the runway. There was no fatality, but damage to the nose wheels, the left main landing gear forward structure and the tail guard.

The investigation identified the following causal and contributory factors:

Causal Factors

i. None adherence to the company policy on flight training.

ii. The crew decision to continue with the training in an adverse weather condition.

Contributory Factor

No standard callout during the training exercise.

Three safety recommendations have been made and the operator's response is in Appendix C.

1.0 FACTUAL INFORMATION

1.1 History of the flight

Daulphin 365, 5N-BJF was flown out of Nigerian Air Force (NAF) base, Port Harcourt on Monday the 24th of March, 2008 on a training flight to Bonny Airstrip.

On arrival in Bonny, training exercise on engine failure in hover before take-off decision point (TDP) and after TDP was performed. The Captain in preparation to demonstrate Class B landing on the runway, turned final two miles from Runway 28. On Short final, he noticed a sudden drop of the helicopter about 50 feet from the ground. The sink rate was unusual and the helicopter hit the ground nine meters short of the runway threshold. The helicopter finally stopped 10 meters on the runway with the nose wheel, left main landing gear forward structure and the tail guard damaged.

The meteorological information available at Bonny Airstrip at the time of the accident:

Wind	-	267 / 07Kts
Visibility	-	5km
Weather	-	Lightening activities
Cloud	-	Overcast at 800ft
QNH	-	1012hpa
Temperature	-	25°c
Humidity	-	86%

The Accident occurred in Bonny at latitude 04° 24' 19.8N, longitude 007° 10' 48.3E, elevation of 14m above mean sea level, at 0915hrs in day light.

1.2 Injuries to Persons:

Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor/None	2	Nil	Nil

1.3 Damage to Aircraft:

Nose wheel collapsed, the left main landing gear forward structure and the tail guard were damaged. The aircraft was substantially damaged.

1.4 Other Damage:

Nil.

1.5 Personnel information:

1.5.1 Training captain:

Age:	49 years
Gender:	Male
Nationality:	Nigerian
Licence No.:	ATPL 2378
Validity:	8th June, 2008
Aircraft Rating:	AS 365/AW 139

Total Flying Hours:	5050 hours as at 24/03/08
Total Command Time:	3722:00 hours
Last Medical (Validity):	8th June, 2008
Last Simulator:	2nd February, 2008
Simulator facility used:	Helism Marignane, France
Simulator Validity:	2nd February, 2009
Last 90 days:	60:00 hours
Last 28 days:	31:30 hours
Last 24 hrs:	1:30 hours

1.5.2 Trainee captain:

Age:	43 years
Gender:	Male
Nationality:	French
Licence No.:	ATPL (H) 190-02
Validity:	30th April, 2008
Aircraft Rating:	AS 365
Total Flying Hrs:	4267:00 hours
Last Medical (Validity):	30th April, 2008
Last Simulator:	20th October, 2007

Simulator Facility used:	Helism, Marignane, France
Simulator Validity:	20th October, 2008
Last 90 days:	88:00 hours
Last 28 days:	75:40 hours
Last 24 hrs:	3:25 hours

1.6 Aircraft Information:

1.6.1 General Information:

Type:	AS 365 N2
Serial No:	6419
Manufacturer:	Eurocopter
Date of Manufacture:	22nd May, 1991
TSN:	6618 hours
CSN:	12066
C of A Validity:	27th July, 2008
Airframe time:	6618 hours
Cycles:	12066

The last 100-hour check was performed on the 22nd of March, 2008 at the total hours of 6616 hours 48 mins. Left hand main landing gear replaced on the 23rd of March, 2008.

1.6.2 **Power Plant No.1: ARRIEL 1C**

Model: ARRIEL 1C2

Serial No: 12074

TSN/CSN: 6381 hours 44 mins /5971

TSO/CSO: 493 hours/497

Last Engine Shop Visit: 17th July, 2007 at 5888 hours 39mins/547Cycle

1.6.3 Power Plant No. 2: ARRIEL 1C

Model: ARRIEL 1C2

Serial No: 12009

TSN/CSN: 11558 hours 27 mins /16772

TSO/CSO: 492 hours/494

Last Engine Shop Visit: 21st March, 2007 at 11065 hours 32mins/16278Cycles

Type of fuel used: Jet A1

1.7 Meteorological Information

1.7.1 The meteorological report available at the time of the accident was as follows:

Wind	-	267 / 07 Kts
Visibility	-	5 km
Weather	-	Lightening activities
Cloud	-	Overcast at 800 feet

QNH	-	1012 hpa
Temperature	-	25°c
Humidity	-	86%
Source	-	Capricorn 2000 weather station

The above was passed to the crew, from the "Capricorn 2000 weather station" available at the station. However there is a target available for visibility and Cloud. The accident happened in day light and in rain.

1.8 Aids to Navigation

The navigational and landing aids available and their status:

NDB	-	unserviceable
VASI	-	unserviceable

1.9 Communications

There was good communication between the helicopter crew and the radio room.

VHF	123.40 Frequency	- Serviceable
VHF	131.80 Frequency	- Port Harcourt Air-work for Monitoring only, serviceable.
Intercoms (Mobil location)		- Serviceable and available
GSM	07034078751	- Available

1.10 Aerodrome Information

The Bonny airstrip has an elevation of 14m above the sea level and a runway length of 765m, with rough runway surface. The helicopter crashed 9m short of threshold of Runway 28, with co-ordinate of 04°24' 19.8N latitude and 007.10° 48.3E longitude.

1.11 Flight Data Recorder and Cockpit Voice Recorder

The flight recorders were recovered in good condition and sent for analysis to UK Air Accident Investigation Branch (UK AAIB) where it was discovered that the CVR had been erased.

Type:	MPFR (Penny & Giles)
Part number:	D51615-102-128
Serial number:	261006-006

1.12 Wreckage and Impact Information

The helicopter impacted the ground with the tail guard and the main landing gear sustained serious damage. The nose wheel collapsed while the left hand main landing gear was damaged. There was damage also to the structure around the nose wheel and the left hand main landing gear (See figures 1.12a, 1.12b and 1.12c).

Fig 1.12a Photograph showing helicopter with damaged nose wheel

Fig.1.12b Photograph showing damaged wheel assembly

Fig. 1.12c Photograph showing bent strut

1.13 Medical and Pathological Information

Nil.

1.14 Fire

There was no fire outbreak.

1.15 Survival Aspect

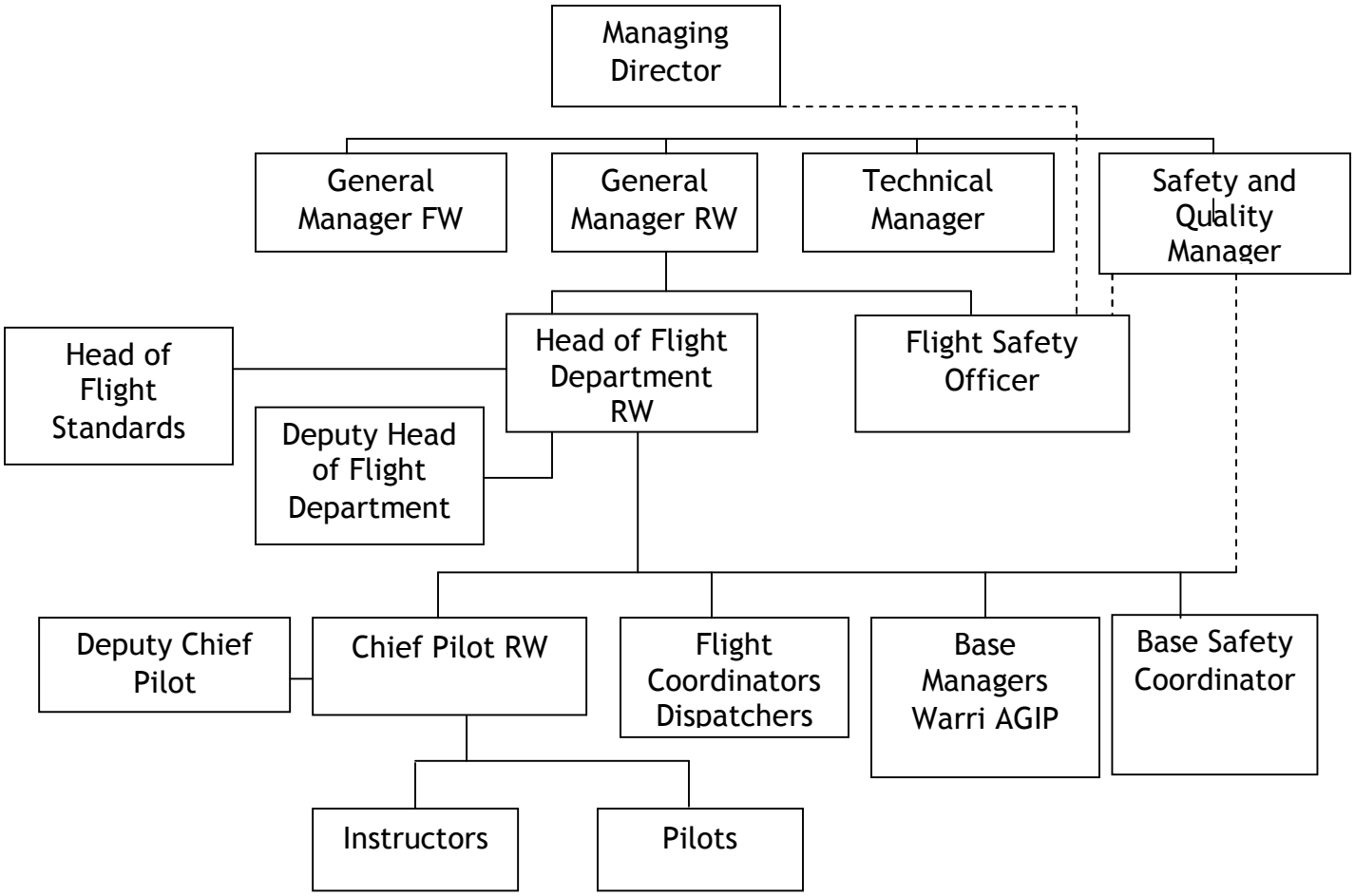
The accident though with damage to undercarriage and nose wheel, was survivable. There was no damage to the cabin area and the crew sustained no injury.

1.16 Test and Research

Nil.

1.17 Organizational and Management Information

1.17.1 *Organizational Structure*



1.17.2 ***Flight Training Procedures General***

(i) "Throughout all in-flight exercises, training pilots are to use common sense and not attempt anything with which they do not feel comfortable." as contained in Aero Contractors policy manual.

(ii) *Review the landing of emergencies, and ensure that the trainee understands proper emergency action and checklist procedures.*

(iii) *During in-aircraft training, items which may be simulated will start with the word "Simulate by". Items which cannot be simulated in the aircraft will start with the words "Discuss, with the emergency checklist."*

Briefings:

There must be a briefing before and after every training and check flight. In-flight, the type rating instructor (TRI) shall brief planned malfunctions and scenarios in advance of practicing them. However, the onset of each practice does not necessarily need to be announced.

1.17.3 Simulation of Malfunctions:

During in-aircraft training when "failing" a major system, (including engines, flight controls, hydraulic systems, and electrical system) announce that it is simulated by stating "Simulated."

1.17.4 Training Staff Classification:

Line Training Captain (LTC)

"Line training captain shall carryout line indoctrination and other speciality training in an operational base".

Type Rating Instructor (TRI)

Type Rating Instructor (TRI) conduct type training, IFR training, base checks and associated administrative function of the base, including auditing and maintaining pilot's "Blue Book" files. They may also carryout all line training captain duties.

Synthetic Flight Instructor (SFI)

Synthetic Flight Instructors have the same duties as Type Rating Instructor but in a simulator rather than an aircraft.

1.17.5 Engine Failure in Flight: Simulating OEI (One Engine Inoperative)

The training pilot shall normally keep one hand on the throttles during practice OEI operations below 500 feet (AGL), however, he shall keep in mind the possibility of needing to take control of the aircraft close to the ground in the event of mishandling by the trainee.

1.17.5.1 Engine Failure in the Hover/Vertical Departures:

During in-aircraft training, no vertical rejects shall be carried out from above 20 feet with one throttle retarded. Rejects from above 20 feet may be practiced with both engines operating normally.

1.17.6 Simulated Failures

Simulated failure of helicopter systems shall only take place under operating conditions which do not jeopardize the safety of flight.

1.17.6.1 Engine Failure Training

Bringing an engine lever or twist-grip to idle during the take-off or landing phases of flight to simulate an engine failure is not authorized during multi-engine training.

(a) When offshore, or

(b) When not in an environment suitable for run-on landing, such as runway.

During such training, the training pilot must ensure a suitable recovery area to and following an engine failure in order to guard against unforeseen eventualities.

1.17.7 Quality of Individual Crew Member

The sum total of the quality of a crew member lie in the ability of that individual to be able to keep together all that makes that individual a crew member. That is, that individual should be trainable, accepts his/her mistakes, be proactive with current trend in the aviation sector, learn to make good decision, have a proper hour log of all his/her flight, be ready to adapt to changes in the aviation sector, be current with various policy of the Safety Management System, (SMS) and be aware of the importance of Crew Resource Management (CRM).

1.17.8 Engine Failure Training Device:

General:

This device allows engine failures to be simulated without exceeding the limitations beyond which the transmission components and engines might be damaged.

It is used to obtain a fuel flow limit which, for a given altitude and temperature, ensures a constant Ng or an almost constant maximum torque.

Description

The training device, which is fitted in the fuel flow control rails includes:

- *an attachment system (1)*
- *an adjustable stop screw (2)*

- *a holding spring (3)*
- *an attachment pin on the fuel flow control lever (4).*

See fig. 1.17.8 below.

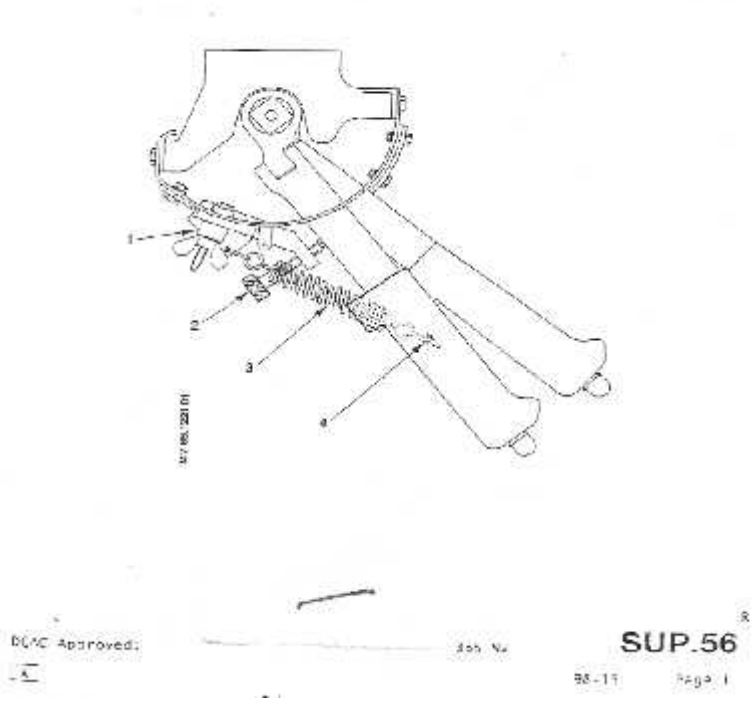


Fig.1.17.8 The device fitted in the fuel flow control.

Limitations

The limitation specified in the basic flight manual and in the supplements used, remain applicable but are completed or modified by the following limitations:

- ***Minimum Flight Crew***

  One pilot in the right-hand seat and one crew member in the left hand seat.

- ***Weight limits:***
  Maximum permissible gross weight 4100 kg (9039 lbs).

1.17.9.1 Adverse and Potential Hazardous Weather:

Thunderstorms:

Flight shall not commence when thunderstorms are in the immediate vicinity. If thunderstorms are encountered en-route and cannot be circumnavigated, the aircraft shall return to the point of departure or land at the nearest suitable area. At destination hold clear if a thunderstorm is overhead or in the approach or missed approach path; monitor fuel and divert if necessary.

Turbulence:

Caution must be exercised when taking off into atmospheric turbulence. Flight into known severe turbulence is prohibited.

Windshield wipers:

Experience has shown that it is good practice to curtail the use of windshield wipers in normal flight, restricting it to lower speeds during take-off and landing. Application of water dispersal product has been shown to be effective in improving flight visibility during flight without use of wipers. Wipers should not be used on dry windows, to avoid damage to both wiper and window.

1.17.10 Cockpit Voice Recorder and Flight Data Recorder

Procedures:

Cockpit voice recorders (CVRs) and flight data recorders (FDRs) will be checked before each day of flight as part of the daily inspection. The OMB and MEL for the applicable type will give procedures and limitation for flight in case of unserviceability.

If an accident or incident occurs, once the aircraft is on the ground and it is not planned to take off again, the crew should pull the cockpit voice recorder and flight data recorder circuit breakers to remove power from the

equipment and thus avoid the inadvertent overwriting of important information.

The power to the cockpit voice recorder and flight data recorder is not to be isolated by the crew at any other time, unless in accordance with instruction in the emergency checklist.

1.17.11 Nigerian Civil Aviation Authority (NCAA)

With reference to NCAR 8.5.1.24;

(a) The PIC shall ensure that whenever an aircraft has flight recorders installed, those recorders are operational checked and operated continuously from the instant-

(1) For a flight data recorder, the aircraft begins its take off roll until it has completed the landing roll, and

(2) For a cockpit voice recorder, the initiation of the pre-start check list until the end of the securing aircraft check list.

(b) The PIC may not permit a flight data recorder or cockpit voice recorder to be disabled, switched off or erased during flight, unless necessary to preserve the data for an accident or serious incident investigation.

(c) In event of an accident or serious incident, the PIC shall act to preserve the recorded data for subsequent investigation upon completion of flight.

(1) The flight recorders shall be deactivated upon completion of flight time following an accident or serious incident.

(2) The flight recorder shall not be reactivated before the Accident Investigation Bureau determines its disposition.

1.18 Additional Information

Nil

1.9 Useful or Effective Investigation Techniques

Nil

2.0 ANALYSIS

2.1 Conduct of Flight

The helicopter completed an instrument check in Port Harcourt International Airport and left for Bonny airstrip to continue with the training flight on Emergency Procedures.

The procedures included *Engine failure in hover, engine failure at take off before TDP, engine failure at take-off after TDP, engine failure at landing after LDP*, using the Bonny airstrip for a running landing. The instructor stated that as he was demonstrating Class B landing on the runway, he noticed the helicopter encountering 'an unusual sink rate'. The pilot affirmed trying to overcome the situation but the helicopter crash landed 9m short of the runway.

The helicopter was serviceable as at the time of the accident. The last Certificate of Airworthiness (C of A) was issued on the 27th of July, 2007.

2.2 Meteorological Information

The weather condition on arrival at Bonny airstrip was:

Wind:	267 / 07 Kts
Visibility:	5km
Weather:	Lightening activities
Cloud:	overcast at 800 feet
QNH:	1012hpa
Temperature:	25°C
Humidity:	86%

The above weather was relayed to the crew.

On arrival in Bonny, there was overcast at 800 feet and lightening activities as relayed. The pilot should have either waited or looked for a suitable training location. The decision to go ahead to carry out emergency procedures in an environment with lightening activities and rain was not in accordance with the training manual.

2.3 Extracts from Aero Contractor Operations Manual

The company policies pertinent to this accident were not adhered to by the crew in the flight training procedures as quoted; *"Throughout all in-flight exercises Training Pilots, are to use common sense and not attempt anything with which they do not feel comfortable."*
The Aero contractor has various policies specifically tailored to guide their pilots during training.

The policies of simulated failures *"simulated failures of helicopter systems shall only take place under operating conditions which do not jeopardize the safety of flight."*

The policy on Engine failure during training.

> *"Bringing an engine lever or twist-grip to idle during the take-off or landing phases at flight to simulate an engine failure is not authorized during multi-engine training*".
>
> (a) When off-shore or
>
> (b) When not in an environment suitable for run-on landing, such as runway.

Decision-making is also entrenched in the company policy document and is clearly stated in the organization policy. With all these tools made available to the crew, these should have guided the pilots in their judgment and

decision making. Adhering to the strict ethics of the policies will enhance safety and reduce accident/incident in the organization.

During training, the Captain is always designated as the aircraft commander. The aircraft commander's rules are clearly defined in the Operations Manual, Part A, Chapter 1.2.8. The allocation of duties in the event of an emergency is clearly defined in the Operations Manual, Part B Chapter 2.4.3 referred to as Appendix A.

The Operations Manual Part D Chapters 1.4.5.1 through 1.4.5.3 clearly defines levels for B, C and D training programmes referred to as "Initial and upgrade training" in Appendix 'B'.

The windshield wiper was in operation during the flight, according to the Trainee Captain. This was an indication of rain which was captured in the CVR playback. There was rain and the Training Captain still continued with the training/demonstration of Class B. This decision was not in line with the organizational policies.

2.4 Personnel

2.4.1 Training Captain

The Training Captain had problem in collating his flight hours. Total flying hours do not reduce; rather they increase or remain stagnant either for lack of flying or retirement from flying duties.

For example, from the NCAA personnel file, in 2001 the Captain had total flying hours of 5390:15 hours while in 2008 had 5050:00 hours.

The following table shows the Training captain flying hours log. (Extracts from NCAA personnel file)

Date	Hours	Document Page	
30-06-92	2615:25	NCAA Personnel File	
13-01-93	3051:55		
19-07-93	3298:50		
14-01-94	3615:50		
19-07-94	4102:45		
09-12-94	4106:45		
1995	-		No flying duties
1996	-		
1997	-		
1998	-		
1999	-		
Date	**Hours**	**Document Page**	
10-02-2000	4174:00		
* 07-06-2000	3704:40*		
12-12-2000	3907:40*	217	
17-04-2001	5156:05	223	

Between 12-12-2000 and 17-04-2001, the captain logged 1148:20 hrs which averaged 312 hrs per month and 10.57 hours per day.

Date	Hours	Document Page
10-10-2001	5390:15	232
*09-03-2002	4789:15*	239
*23-09-2002	5138:50*	247
*17-03-2003	2338:50	252
*19-01-2004	2796:50	276
26-07-2004	3219:25	282

** Details/periods where logged hours are inconsistent and ambiguous*

21-01-2005	3505 *	296
15-07-2005	3725*	303
28-01-2006	4026:40*	310
12-07-2006	4325:40*	315
15-01-2007	4488:25*	323
11-07-2007	4629:20*	338
02-01-2008	4989:55*	344
24-03-2008	5050:00*	

2.4.2 Trainee Captain

The Trainee was relatively new in the country. He applied for validation of his foreign licence in August 2006. The total flying hours he came in with was 3859 hours. In less than two years he also had problems in collating his flying hours.

Date	Hours	Document Page
14-08-06	3859	3
20-06-07	4632:35	43
*31-10-07	4179:10*	56
*24-03-08	4267	

**Details/periods where logged hours were inconsistent and ambiguous*

2.5 Cockpit Voice Recorder/Flight Data Recorder.

The CVR and FDR were sent to the United Kingdom Air Accident Investigation Branch (UK AAIB) for analysis and it was discovered that the tape was erased. AAIB sent the tape to the Equipment Manufacturers for further analysis. The detailed analyses of the recorders are described in 2.7 through 2.7.3.

The AIB investigators confirmed from the CVR that the pilot flying was the Training Captain. It was also observed that there was no proper call-out during the simulated engine out training exercises.

2.6 COMPANY RESPONSE TO CVR ERASURE

Aero Contractors as an operator does not support such acts as erasing transcript from a cockpit voice recorder. However, UK AAIB and the manufacturers Penny and Giles (UK) assisted AIB in the recovery of the audio and data recordings of the MPFR necessary for the Bureau investigation.

Below is the detailed Report from PENNY & GILES, in collaboration with UK AAIB on the MPFR Readout and Data Recovery:

2.7 Accident overview

During a simulated one engine failure, the helicopter undershot the runway and suffered a hard landing. Substantial to severe damage was reported to the nose and left main landing gear. No injuries were reported

Replay overview

The AAIB agreed to assist in the recovery of the audio and data recordings of the MPFR that would enable the progress of the Nigerian investigation.

Penny and Giles software was used to download the unit in the normal fashion, first at the AAIB and subsequently also at the Penny and Giles facility.

Recorded audio

The audio that was recovered using the normal download procedure was of 15 minutes and 45 seconds duration, none of which covered any flight activity. This was shorter than the expected 30 minute recording. Subsequent investigation at the manufacturers facility indicated that the unit had been erased at the end of the flight. However, the erased portion was recovered and supplied to the IIC.

Recorded data

The data was successfully downloaded. A dataframe layout document was supplied by the IIC. The results of converting the downloaded data into engineering units in accordance with this document are provided below.

The decode document provided covered the EUC2237000-11 but the document does not cover the N3 variant of the SA365. Further investigation showed that the aircraft was an N2 variant. The N2 decode of EUC223700-11 was applied to the download but many parameters were not providing reasonable results. The following is a table of parameters that appear reasonable, followed by a table of parameters that appear corrupt. Parameters omitted have not been checked. Note that confidence in the accuracy of the decode is not very high given the number of anomalies.

2.7.1

PARAMETER	Analogue Digital	NOTES
Radio Altitude	A	Scaling appears to match barometric altitude, data is over a reasonable range.
Barometric altitude	D	Scaling appears to match radio altitude, data is over a reasonable range.
Engine torques	A	Given a maximum torque value of 50%, ie both added together give percentage torque of the gearbox, the behaviour appears to match the basic description of the events.
Engine NF	A	Oscillate (invalid) pre engine start and post accident. Remain near 100% during the manoeuvres.
Accelerations	A	Normal acceleration varies around 1g and increases during initial climb. Lateral and Longitudinal accelerations vary around approximately zero and appear reasonable.
Indicated airspeed	D	Invalid during low speed as expected and a maximum steady cruise of 150 kt (which is high but plausible). Quite possibly this is incorrectly factored so treat values with care.
Time/Date	A	Consistent with understanding of event time frames.
Cyclic longitudinal pitch	A	Appears reasonable in shape, hard to assess absolute values.
Cyclic lateral pitch	A	In roughly the right range. Hard to assess absolute values.
Barometric speed	D	Once corrected to 2's compliment instead of 1's compliment, this provides a parameter that correlates with the baro altitude rates of change.

Reasonable parameters

2.7.2

PARAMETER	Analogue Digital	NOTES
Collective pitch position	A	Data appears to indicate reverse of expected behaviour. Possible wiring issue on the aircraft sensor.
Engine Nr	A	Appears factor of two out.
Engine Ng	A	Appears as though high order bits have been pushed down and the rest has been lost.
Main gearbox pressure/temperature	A	No reasonable values.
Main rotor Nr	A	Shape appears reasonable but values are in the wrong range.
Heading	A	Always various around min or max, never in between. Corrupt input.
Pitch and roll	A	Appears as though the source is not connected.
Main gear box oil pressure/temperature	A	Appears as though sources are grounded or not connected.
T4 from the engines	A	Appears not connected
Present position lat/long, ground speed, wind parameters	D GNS-X, NADIR or RNAV2	Invalid

Unreasonable parameters

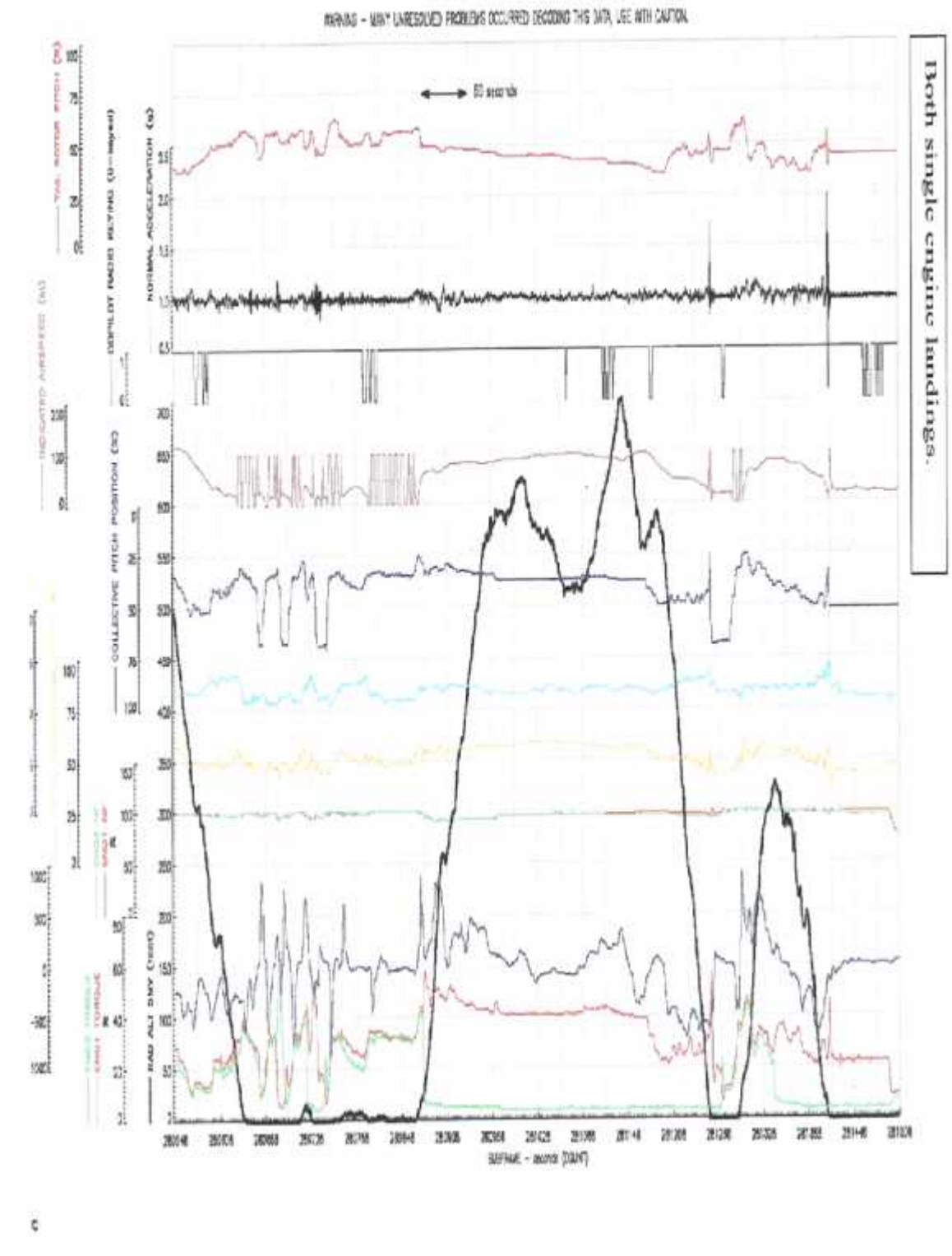
No engine, oil, hydraulic or autopilot warnings appear to have been active. The rotor brake was not active. The gear does not show as down even when on the ground prior to the accident. A more detailed understanding of the particular autopilot is required in order to interpret the autopilot discretes and appropriateness of modes.

The DME distances were invalid but may not have been tuned. Localizer and Glideslope parameters showed activity that may be correct during other recorded periods but were not relevant to this investigation.

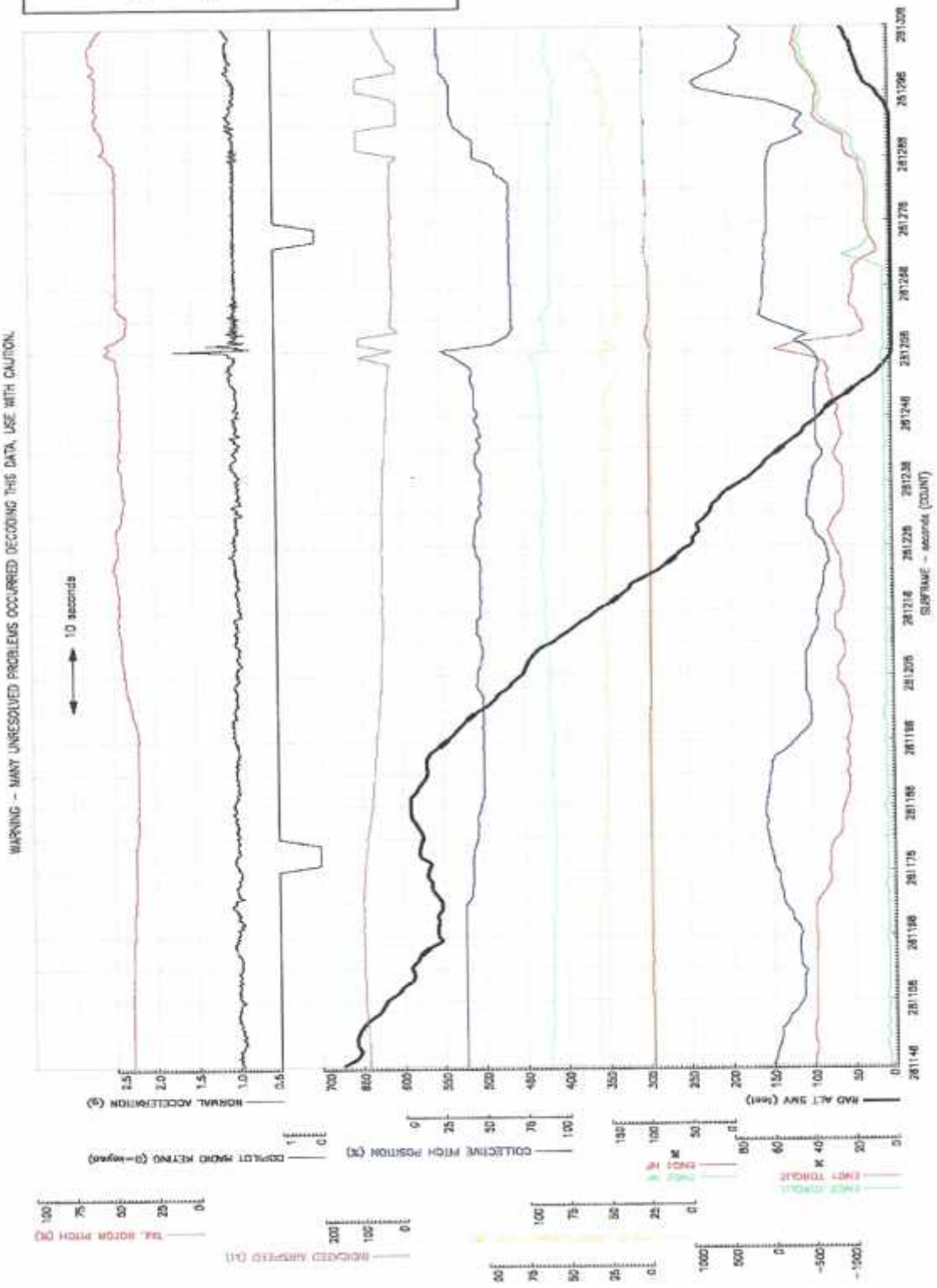
The recorded configuration word indicates that the VOR and DME interfacing was A429, the navigation interface was GNS-X A429 and the autopilot installed was CDV 155.

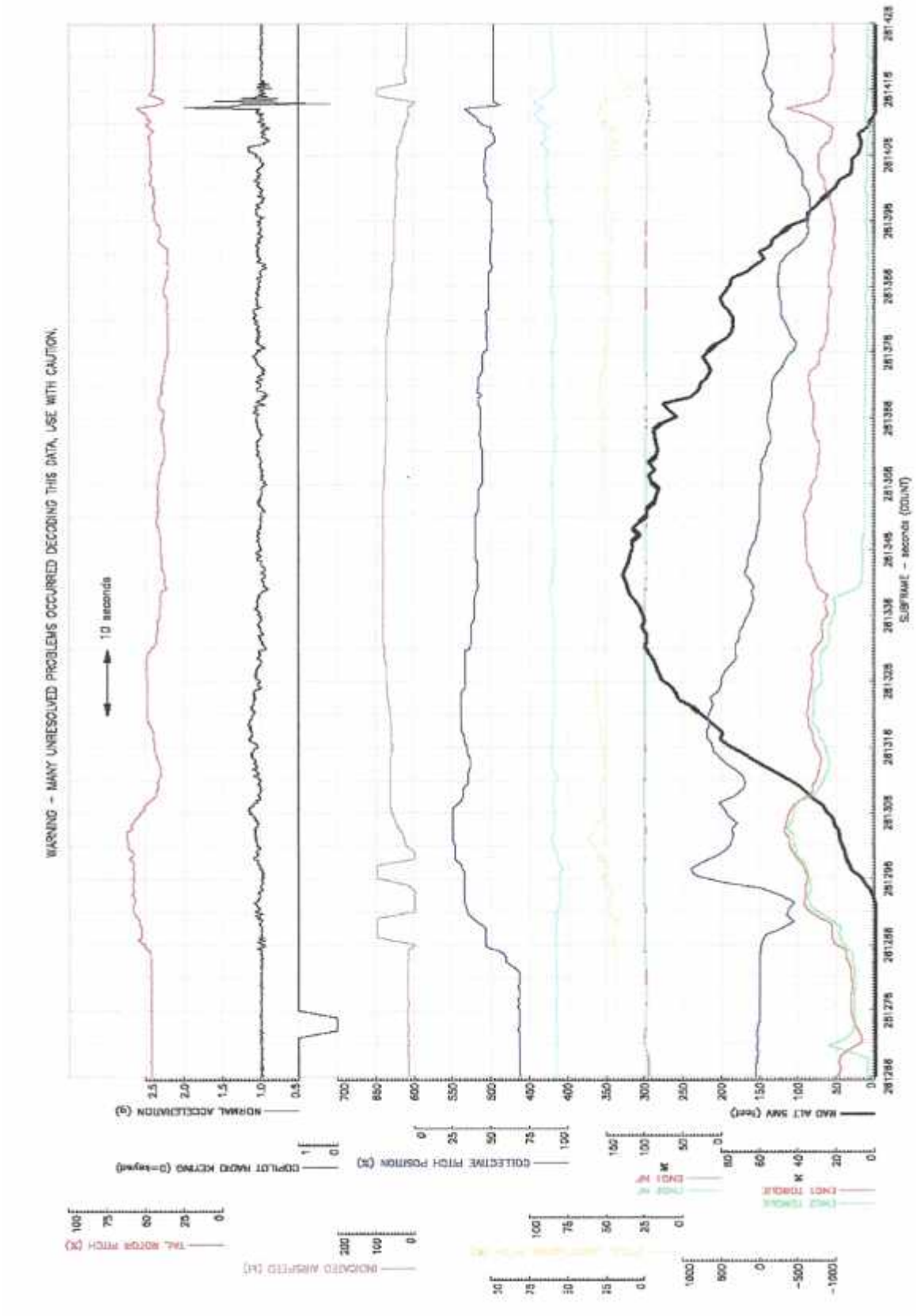
The graphs attached show the event as best as possible given the parameter issues. Better quality print outs can be done.

It is recommended that work is carried out on the aircraft to establish the cause of the parameter problems and resolve the decode anomalies.


WARNING - MANY UNRESOLVED PROBLEMS OCCURRED DECODING THIS DATA, USE WITH CAUTION
NORMAL ACCELERATION (G)
COLLECTIVE PITCH POSITION (%)
RAD ALT DNV (feet)
Both single engine landings.

First single engine landing.




WARNING - MANY UNRESOLVED PROBLEMS OCCURRED DECODING THIS DATA, USE WITH CAUTION.
10 seconds
NORMAL ACCELERATION (g)
COLLECTIVE PITCH POSITION (%)
RAD ALT SNV (feet)
SUBFRAME - seconds (COUNT)

2.7.3 Data Analysis

From the above readout, it could be concluded that the cockpit voice recorder was deliberately erased after the accident and recorded a 15 minutes of no action period, this is a violation of NCAR 8.5.1.24. However, the manufacturer was able to recover the erased portion.

The tampering of the recorders made it almost impossible to decode the unit. During the course of the investigation, it was confirmed that the aircraft was an SA 365 N2 with registration of 5N-BJF. The N2 decode of EUC 223700-11 was applied to the download but many parameters were not providing reasonable results due to the condition of the FDR/CVR unit. There were parameters omitted due to the state of the unit. The manufacturer opined that confidence in the accuracy of the decoded parameter is not very high given the number of anomalies.

3.0 CONCLUSION

3.1 Findings

3.1.1 The helicopter had valid Certificate of Airworthiness.

3.1.2 The weather was not conducive for training.

3.1.3 The windshield wiper was in operation before the accident.

3.1.4 The Training Captain was the pilot flying the helicopter during the accident.

3.1.5 The crew did not adhere to Aero Contractors policies on training.

3.1.6 The radio man in Bonny airstrip was not a trained controller.

3.1.7 No landing aids were serviceable at Bonny Airstrip at the time of the accident.

3.1.8 The Fire and Safety Service in Bonny airstrip was not on standby at the time of the accident.

3.1.9 From the radio room, the radio operators could only see 180^0 of the airfield.

3.1.10 There was no adequate briefing before the *"one engine out"* procedure was carried out.

3.1.11 It was found that the Cockpit Voice Recorder was erased.

3.1.12 The two pilots were not consistent with their flying hour log.

3.1.13 There was extensive damage to the nose, left hand main landing gear forward structure and the tail guard.

3.2 Causal Factors

i. None adherence to the company policy on flight training.

ii. The crew decision to continue with the training in an adverse weather condition.

3.3 Contributory Factor

No standard callout during the training exercise.

4.0 SAFETY RECOMMENDATIONS

4.1 Safety Recommendation 2010- 010

Aero Contractors should ensure that flight crew comply with company policies on training program.

4.2 Safety Recommendation 2010 – 011

Nigerian Civil Aviation Authority (NCAA) should ensure that operators comply with NCAR 8.5.1.24 as it relates to erasure of flight recorders data after any accident/incident.

4.3 Safety Recommendation 2010 – 012

NCAA should ensure that the owner/operator of Bonny airstrip provides adequate fire coverage and qualified radio personnel.

APPENDIX "A"

Allocation of duties

Whether in the left or right seat acting as PF or PNF, the commander has final responsibility for the safety of the aircraft and malfunction handling, securing engines, switching off systems, PAN/MAYDAY calls etc. If the PF, the commander should consider whether to have over control, in order to better manage the situation.

The commander must manage the flight not only to deal with the presented emergency but also other risk that might be introduced through distraction and preoccupation.

The commander must determine a plane of subsequent action, consulting with crew and should ensure that the passengers and any cabin crew are briefed as soon as practicable.

There are three phases of action, each one called for by the PF:

"immediate action"	*Immediate memory items*
"Emergency checklist"	*Items read from the emergency checklist*
"Normal checklist"	*Normal checklist items such as before landing checks.*

The PF must decide and call for, each phase when appropriate for the phase of flight. For example, if a fire happens on final approach, it may be wise to conduct before landing checks between the "immediate action" and the "emergency checklist" or it may be better to concentrate on the landing and complete the "emergency checklist" after landing.

The PF must continue to fly the aircraft, maintaining a safe speed, altitude and track, while the PNF administers the emergency.

1. *The pilot recognizing a failure or malfunction calls the event for example "torque split....."*

2. *The PNF identifies and states the displayed warnings and cancel the Master Caution or other Warning lights.*

3. *The PF controls the aircraft to achieve a stable safe flight condition or an immediate landing as appropriate. When the aircraft is in a stable flight, the PF will say "immediate actions". The PNF then starts diagnosing and states the problem to the PF.*

4. *If the kind of emergency requires immediate action, the crew perform the 'immediate action' items, without further command. The PF manipulates the flight controls while the PNF carries out or coordinates, other actions, stating clearly what*

he is doing. So that the PF can monitor the "immediate action" items actions, the PNF must be precise, and methodical.

5. *The PNF states' Immediate Actions completed or No immediate Action.*

6. *The PF calls Emergency checklist and the PNF find the correct page. The PNF then checks to see whether the boxed immediate actions were carried out correctly and carries out the other items using the emergency checklist as a Read and Do list*

7. *The PNF states: Emergency checklist completed.*

8. *The PF calls for the relevant normal checklist, example "Descent checklists"*

Examples with no immediate actions

PNF	*PF*
	"Master caution"
"No 2 oil pressure light on"	*"Immediate action"*
"No immediate action"	*"Emergency Checklist"*
Finds page. Reads indications aloud, confirms that indications are present	
"I confirm oil present – confirmed"	
"2 is single engine flight	*"Yes, reducing speed Vbrod"*

possible?"	
"Confirm engine lever 2"	*"confirmed"*
"3 engine lever 2 down and idle"	
"4 Land as soon as practicable"	*Plan landing/diversion as necessary*
"5 if oil pressure falls to 0- immediate shutdown. The oil pressure appears steady at 15 psi"	
"Emergency checklist completed"	

Example with immediate Actions

PNF	*PF*
"Master caution – main transmission ship light on"	*"Reducing speed to 75"*
	"Immediate actions"
"No grinding, abnormal vibrations or torque increase. Immediate actions completed"	*"Emergency checklist"*
Find page, reads indication aloud, confirms that the indications are present, reads immediate actions(memory items)aloud confirms they are complete	
"1 MGB chip circuit breaker – recycle"	

"2 light out increase speed and continue flight"	*"Increasing speed"*
"3 Land as soon as practicable"	*Plan landing /diversion as necessary*
"Emergency checklist completed"	

APPENDIX 'B'

Initial and upgrade Training

Level B training program

For initial and upgrade training in a level B or better simulator, in addition to the training on the FFS, the following flight training on the helicopter type shall be carried out:

- *interior and exterior preflight checks*
- *ground handling for PIC*
- *hover, normal take off,visual circuit (where possible) and landing*
- *Simulated engine inoperative approach and landing.*
- *Simulated engine failure procedures during take-off and missed approach (at safe altitude and airspeed)*
- *No electronics glidescope approach and*
- *circling (if applicable) and other approaches where the simulator lacks the capability.*

Level C training program

In a Level C or better simulator, if the pilot has at least second-in-command experience on another twin engine transport category helicopter with CHC, or verifiable Line Currency on another twin engine transport category helicopter with another operator in the last two years, he may have zero flight time training provided that he also undergoes, in the level C or better simulator:

- *manoeuvring of the helicopter on the ground,*
- *crosswind-offs and landings to 100% of the published crosswind component,*
- *a visual training program in the flight simulator to ensure VFR flight skills, covering scenarios of dusk and night with variable weather and visibilities. This program shall include*
    - *normal and crosswind take-offs, visual circuits and landings with variable wind, runway illusion and surface conditions,*
    - *engine inoperative approach and landing,*
    - *engine failure procedure during take-off and missed approach;*
    - *no electronic glideslope approach and landing, and*
    - *approaches and landings with flight control failures and abnormalities,*

- *a simulated line flight comprising at least 2 sectors (one as pilot flying and another as pilot not flying).*

Where the pilot demonstrates a satisfactory level of performance in visual manoeuvres, the time specified may be used for any additional training.

Level D training program

In a level D simulator the pilot may have zero flight time training if the following VFR training is carried out in the simulator, including at least 4 hours per crew (2 hours as pilot flying and 2 hours of pilot not flying) to ensure visual flight skills in either day or dust and night with variable weather and visibility scenarios:

- *normal and crosswind take-offs, and visual circuits and landings, with variable wind, runway illusion and surface condition,*
- *engine inoperative approach and landing,*
- *engine failure procedures during takes-off and missed approach,*
- *no visual aids approaches and landing, and*
- *approaches and landings with flight control failure abnormalities;*
- *Simulated line flights of at least 2 sessions (2 sectors as pilot flying and 2 sectors as pilot not flying) are required. Pilot flying duties shall be carried out from the appropriate seat.*

APPENDIX C

RESPONSE TO SAFETY RECOMMENDATIONS

Safety recommendation 2010-010

Aero contractor should ensure that flight crew comply with company policies on training programme.

Response to safety recommendation 2010-010

The company accepted this recommendation and stated as follows:

> *"it was the considered opinion of the internal company investigation board that this was an isolated incident. The training programme is conducted in accordance with the regulations and it complies with the terms and conditions of the AOC. Its purpose is to provide the training requirements for operations personnel so that flying operations will be safe, efficient and of high quality".*