

CIVIL AVIATION ACCIDENT

REPORT NO CIA 171



FEDERAL REPUBLIC OF NIGERIA
MINISTRY OF TRANSPORT AND COMMUNICATIONS
AIR TRANSPORT HEADQUARTERS
14, BROAD STREET-LAGOS



REPORT ON THE ACCIDENT TO THE PMAS
DO-228 201 AIRCRAFT REGISTERED 5N-ARI
AT EKET AIRSTRIP, AKWA IBOM STATE
ON THE 26TH FEBRUARY 1992

FEDERAL MINISTRY OF TRANSPORT AND COMMUNICATIONS
AIR TRANSPORT HEADQUARTERS

ACCIDENT INVESTIGATION BUREAU
..... DEPARTMENT

P.M.B 12744
LAGOS NIGERIA

Telegram: AIR SAFETY, LAGOS
Telephone: 963018
Telex: 26566 ARB NG,
26567 FCAA NIG.

Ref. No.: CIA.171/08/92/86
3rd August, 1992

The Honourable Minister
Federal Ministry of Transport and
Communications,
Air Transport Headquarters,
14, Broad Street
Lagos.

Dear Sir,

CIVIL AIRCRAFT ACCIDENT REPORT NO. CIA 171

I have the honour to submit the report compiled by
Mr. Remi Faminu of this bureau on the circumstances of
the accident, which occurred to the AIEP/PMAS Do-228-201
aircraft registered 5N-ARI at Eket Airstrip, Akwa Ibom
State, on the 26th February 1992.

I have the honour to be sir,

Yours faithfully,



K. K. O. SAGOE,
Deputy Director,
Accident Investigation Bureau.

AIRCRAFT DATA

Type	-	DO-228
Model	-	201
Serial Number	-	8012
Registration	-	5N-ARI
Year of Manufacture	-	1983
Manufacturer	-	Dornier GmbH Post Fach 1420 7990 Friedrichshafen Bodensee Germany
Owner	-	Technology Consultancy Project Management and Air Services P. O. Box 2124 Old Kaduna Airport Kaduna
Operator	-	Owner
C of A Validity	-	16 October 1982
Airframe Time	-	2819 hours 30 minutes
Engines	-	2 Garrett TPE
Model	-	331 - S/E
		<u>No. 1</u> <u>No. 2</u>
Serial No.	-	P-39034 P-39018
Construction Date	-	18 October '82 17 March 1982
Engine Time	-	2656 hrs 20 min 1483 hrs 20 min.
Souls-on-Board	-	12
Date of Accident	-	26 February 1982
Time of Accident	-	0956 hours UTC
Place of Accident	-	End of Runway 19
Location	-	Latitude 04°28' 20" N
	-	Longitude 007°57' 10" E

All times in this report are Universal Coordinated Time (UTC) which are one hour behind the Nigerian local time.

PERSONNEL INFORMATION

Commander	-	Capt. Mohammed S. Badamasi
Age	-	42 years
Nationality	-	Nigerian, Male
Licence	-	ATPL No 1628
Validity	-	6 June 1992
Total Flying Time	-	8002 Hours
Time on Type	-	2075 Hours
Co-pilot	-	Oluyemisi Bamijoko
Age	-	31 years
Nationality	-	Nigerian, Female
Licence	-	CPL No. 2506
Validity	-	4 April 1992
Total Flying Time	-	3504 hours
Time on Type	-	44 hours 20 mins.

1

FACTUAL INFORMATION

1.1

History of the Flight

This was a non-scheduled passenger flight being operated by project Management Air Services Ltd (PMAS) a subsidiary company of Aeronautical Industrial Engineering and Project Management Company Ltd (AIEP) - a non-scheduled air charter company operating from the Old Kaduna Airport.

The flight originated from Lagos on the morning of the accident with 10 passengers and 2 crew members for the destination, Eket, Akwa Ibom State. Departure time from Lagos was 0700 hours UTC with a total all-up-weight of 5980 kilograms (13,156lbs). Before departure, the captain obtained Port Harcourt weather report which, he claimed, had a visibility of 2000 ft, and therefore chose the airport as an alternate airport to Eket airstrip.

Enroute, the captain briefed his co-pilot that the wind was northerly at 2 knots, so invariably, they could use either runway 01 or 19 but he decided to use runway 19. He also briefed that they would descend to the Minimum Descent Altitude (MDA) of 500 ft. and if they could see no-field-in-sight they would carry out a missed approach, maintain the runway heading to 1,500 ft. and they would try another approach for runway 19.

From Lagos, they were cruising at 11,000 ft. and started the descent at about 77 nautical miles from Port Harcourt, which was close to Eket. On clearance to 3000 ft by Port Harcourt Approach Control, the crew called Eket Control who descended them to 3,500 ft. At about 10 nautical miles from Eket the NDB frequency was picked up and the crew informed Eket that they were leaving 3300ft for 1500. When the aircraft came overhead the NDB they shot the approach. On the outbound leg of 195° they turned 45° for a right procedure turn and still maintaining 1500ft. Flap 1 was selected with the speed lever set in the high RPM position.

With the runway inbound on track 105 magnetic, the landing gear was selected in the down position and the aircraft was descended to 500ft. After 90 seconds into the final approach on runway 01, the co-pilot called out "runway-in-sight" but the captain thought the aircraft was high, so he announced he was overshooting, whereas, while giving evidence the co-pilot said she advised the overshoot when the ADF needle swung to life.

Another approach was shot. They came back to the same runway 01 to maintain the MDA and the runway was sighted from about 2 miles out at 400ft height. The co-pilot thought the aeroplane was high, she positively advised a misapproach to which the captain quickly agreed with.

Then another landing attempt was made for runway 19 and at about between 600 - 700ft height above the approach path, the captain instructed his co-pilot "when you see the field, give me flaps 2, I am going to land". As soon as the co-pilot sighted the runway at about 2nm out, she selected flap 2. The captain descended for the field and while they came over the threshold, the speed was between 95 and 98 knots. Height above threshold was 300ft; the co-pilot felt that the aeroplane was high, but she thought that at flap 2 the aircraft was committed to land. This time the First Officer resigned to herself and did not warn the captain though she felt that the aircraft was high.

The captain said that he descended fast from 300ft with the target aim of touching down at about the 6th centre line marking from the threshold and felt the touchdown target was achieved even before the 6th centre-line marking. After the touchdown, he applied the thrust reverser but no effect of the deceleration was felt. He then moved the throttle levers to the maximum reverse position, yet there was no deceleration effect. The next action was to go on the brakes while the aircraft still had the rolling speed of about 80 knots. The captain felt that only the right brakes were effective because the aeroplane skidded to the right; when there was no directional control, the captain said that he then used the opposite rudder for control. The commander was still fighting with the directional control when the aeroplane overran the end of the paved way at about 40 knots with the brakes still applied.

After the evacuation exercise, the co-pilot was hysterically annoyed with her captain because the accident was avoidable. She felt that as a trainee pilot, she had little or no influence over the commander's decision to land. Co-pilot was so aggravated that one of the passengers had to be pacifying her to calm her composure.

1.2

Injuries to Persons

No injury was reported. Though the ten passengers were sent to the Mobil Medical Centre at Eket; the medical report issued by Dr. B.O. Bolasodun indicated that "there were no bruises, no clinical signs of dislocation/fracture. They were well oriented in time and place".

1.3

Damage to Aircraft

The nose wheels were observed to be partially damaged but the gear itself looked apparently unaffected though was buried into the soil.

There was an observable skin buckling on the fuselage top just forward of the left wing leading-edge and also at the fuselage/wing rear attachment point. The bucklings might be indicative of probable fuselage/wing distortion, which might also affect the dihedral angle of the main plane. Also the right hand side of the fuselage had bucklings at the forward section.

One blade of the No. 1 engine propeller was chipped at the tip. The left wing-tip gracefully scraped the ground showing some signs of crack on the composite material. The aircraft might have been totally destroyed.

1.4

Other Damages

No damage to any other property.

1.5

Personnel Information

1.5.1

The commander of the aircraft was captain Mohammed Sheriff Badamasi, a 42 year old Nigerian Male, who holds a Nigerian issued Airline Transport Pilot Licence number 1628, which was issued to him on the 10th May 1992 in Lagos. The captain was last medically examined on the 5th December 1991, his licence is therefore valid until 6th June 1992. The captain's Instrument Rating endorsement is also valid till 2nd July 1993. The type Rating endorsements in the Commander's ATP Licence are Boeing - 737 and Dornier - 228 as pilot in command while he has the endorsement as part II pilot on Fokker - F27, F-28, Boeing 727 and Douglass DC-10. He was, therefore, up-to-date in his flying records and was fully qualified

to take the flight. Captain Badamasi had 2075 hours on type out of 8002 hrs of total flying experience. He was the company's fleet training captain until he resigned the training appointment on the 1st of February 1992.

1.5.2

The co-pilot, Miss Oluyemisi Bamijoko, is a 31 year old Nigerian female, issued with a Nigerian Commercial Pilot Licence numbered 2506 on April 20th 1982. She was medically examined on the 17th May 1991 which she passed before her Commercial Pilot Licence was validated till 4th April 1992. Miss Bamijoko had a current Flying Instructor's Rating and also had current Instrument Rating endorsements in her licence.

The co-pilot joined the employment of AIBP Company Ltd early in December 1991 and started her Do-228 type conversion training on the 18th of that month. She was given her conversion and line base training by the very senior training captains in the Company's Flight Operations Department. At the initial stage of these training, she was recommended to fly for, at least 100 hours on the left seat under supervision of a Training Captain/Instructor. She was, however, qualified to fly as a right seat pilot, the position she was occupying at the time of the accident.

Miss Bamijoko had a total flying Experience of 3504 hours out of which 43 were on type including the conversion training flights. Her licence was endorsed with the type ratings of Cessna 172, Piper PA-23 Embracer EMR-110 Cessna 441 and Dornier - 228 aircraft as part I officer. She was flying as a line trainee pilot under supervision from the right hand seat when the accident occurred. She, too, was qualified to take the flight.

1.6

Aircraft Information

The aircraft DO-228-201, serial numbered 8012 was registered in Nigeria by Technology Consultancy Project Management and Air Services Limited (PMAS) as the current owner when the accident occurred.

The certificate of Airworthiness is valid till 16 October 1992. The date of registration in Nigeria and the name of its first owner were not known because the aircraft file is

not made available to the Accident Investigation Bureau. There was no known defect recorded against the aircraft before taking off on its last voyage and nothing was recorded as malfunctioning during the flight before the crash landing. No component malfunction could be held contributory to this accident.

The aircraft made a total flight time of 2819 hours 30 minutes and the last inspection was the yearly C of A inspection, which was performed on it on the 21st November 1991 at the airframe time of 2708 hours 30 minutes.

The flight originated from Lagos with a total all up weight of 5980.5kg part of which 1545.5kg was Jet A-1 fuel on board. The landing weight was given by the crew to be 5427.5kg. The centre of gravity of the aircraft was within the prescribed limits at the time of the crash.

1.7

Meteorological Information

The aircraft dispatcher at Eket logged "Late take offs due weather". So the 1st take-off from the airstrip was logged at 0734 instead of 0620 on normal days.

However, the following scanty weather information was passed to 5N-ARI when radio contact was established between the aircraft and Eket control:

Wind - From North at 2 kts
Visibility - 1/2 mile (920 metres)

At the time of the aircraft's arrival overhead the aerodrome, wind was generally from the north at the speed of between 6 and 8 knots. Height of cloud above ground was generally at 9,000 metres. The prevailing weather during this time was thick harmattan dust haze which precluded aircraft landing at Calabar and Port Harcourt International Airports around early part of the day.

Port Harcourt Airport with full instrument capabilities was closed to traffic about the time of arrival of 5N-ARI. So also was Calabar Airport. Eket airstrip should have been presumed closed for its proximity to Calabar and Port Harcourt airports.

1.8

Aids to Navigation

The only landing aids available at Eket Airstrip are:

Approach lights	-	Serviceable
Runway Edge Lightings	-	Serviceable
NDB	-	Serviceable
Wind Speed Indicator	-	Unserviceable
Wind Direction Indicator	-	Unserviceable
Aneroid Barometer	-	Serviceable

1.9

Communication

There was good communication between the aircraft and the airstrip tower frequency 131.65 megahertz.

1.10

Aerodrome Information

Eket airstrip is privately owned by Mobil Producing Nigeria. The landing strip is about 1,148 metres (3767ft) by 21 metres (70ft) and is, at the time of the accident, undergoing an extension course to its Southern end (runway 19). The construction work does not in anyway, have bearing on the cause of the accident.

Eket is almost equidistant from Port Harcourt and Calabar, lying about mid point but Southerly between the two major airports (please see appendix 1). The airstrip is just about a couple of nautical miles from the sea. Obviously, whatever weather that affected PHC and CAL must affect Eket.

There are distinct and contrasting white runway edge and centre line markings against the black asphalt surfaced runway. The runway edge marking is also interspersed with edge lights.

The aerodrome has the field elevation of 13 metres (42ft) and the runway surface was dry at the time of the accident. The landing strip is elevated about 3 to 4 feet above the swampy surroundings.

1.11 Flight Recorders

The aircraft is neither equipped with cockpit voice Recorder nor Flight Data Recorder. These equipments are not mandatory for the aircraft's weight category under the Nigerian Civil Aviation Regulations.

1.12 Wreckage and Impact Information

The aircraft remained intact at the final resting place at the end of the runway. Please see the accident trail diagram on appendix 2.

1.13 Medical and Pathological Information

Apparently, everyone walked away unhurt from the landing accident.

1.14 Fire

There was no fire outbreak.

1.15 Survival Aspects

The accident started at the touchdown point and the aircraft was brought to an abrupt halt on the clearway about 60 metres from the end of the paved threshold.

Evacuation was performed without any stampede. A passenger located at the centre emergency exit door attempted to open the door but was unable to, so he was assisted from the outside by the commander of the aircraft. A few passengers then exited via the emergency exit. There was no cabin structural failure but the fuselage airframe structure failed between stations 7384 and 7942.

1.16 Tests and Research

There are no test and research conducted in the course of investigating this accident.

1.17 Additional Information

No additional information.

1.18 Useful or Effective Investigation Techniques

No other investigation technique was employed.

Cockpit Management

Here in the cockpit, we have a well qualified captain as the commander of the aircraft and a well qualified co-pilot though with relatively low time on the type of the aircraft being flown. On the first two instances of missed approach, the co-pilot did participate but reluctantly and snobbishly. One does not have to be in the cockpit to know the kind of attitude that existed between the two pilots. On the third attempt to land, communication had completely broken down and this culminated into this accident.

The precursor to the presence of discord within the cockpit focuses on the management's extra-ordinary instruction that this female co-pilot "to fly at least 100 hours on left seat under supervision of a Training Captain/Instructor". We presume this does not go down well with the company's Senior Training Captain, who happens to be flying this flight. As a valid pointer to this Bureau's assumption, emerges that Captain Badamasi would rather relinquish being a training captain on the Do-228 fleet to have a relatively new female pilot sit on the left hand seat of his aircraft. This assumption was confirmed by the male captain's voluntary resignation on the 1st of February 1992 as the fleet training captain. The two shouldn't have been paired to man a revenue flight on a day when balanced ideas and judicious decisions are paramount to flight safety. The instruction, probably, does not go well with other training captains within the company's flight operation department but no one else was complaining. It also, does not augur well for the company either, since such instruction had not been the normal practice with the other many male-pilots whom the company had trained before, but from the right seat. We do not think that the senior captain on this flight was ready to vacate the left seat for a relatively new female pilot and this refusal did not make the co-pilot to feel happy with her flight commander. This instruction has to be reviewed if it has not been done already.

The Weather Factor

There was, generally, poor visibility in the early part of the day of the accident, owing to light to heavy harmattan haze which precluded most part of the country. Before the aircraft departed Lagos at about 0710 hours UTC that morning, the captain claimed that he obtained Port Harcourt weather to be 2000 feet visibility. One wonders where the captain obtained such information from, when the trend landing forecast for Port Harcourt and Calabar for those hours were 600 metres, 500m and 800m, 900m respectively. He should know that weather at Eket would be equally bad and if not worse. The captain should have delayed the departure till the visibility improved with temperature change over those stations. From here, this Bureau believes that the captain departed Lagos without obtaining the destination weather forecast. Our pilots should be made to appreciate the purpose of enroute and destination weather forecast and they should be made to avail themselves of this piece of information before embarking on their itineraries especially on adverse-weather-conditions.

Weather Minima

The company operates in the transport (passenger) category and is, for this reason, to comply with the Aviation Authority's prescribed weather minima of 800 metres. Port Harcourt and Calabar airfields had visibilities of 800m and 600m respectively one hour before the estimated time of arrival (ETA) at the flight destination - Eket. They also had respectively 500 metres and 900 metres one hour before and one hour after the ETA at the destination. Yet the crew chose Port Harcourt (PHC) as an alternate airport, whereas PHC was closed to traffic due weather, it should have occurred to the crew that they could not land at destination under a VFR landing condition. This vindicates that the flight was not properly planned before departure.

The company's "Basic Operating Manual" establishes a weather minima, which may only be violated in case of emergency.

A reference to this manual by the crew would have indicated the 'go' or 'no go' of this landing if the crew had used the guide. It is the captain's responsibility to assess suitable minima and should have not operated below the authority's prescribed minima. "The copies of FCAA's established state minima, MEL etc" the company claimed, are placed in leather bag placed behind the captain's seat". But the crew would just not use them.

This Bureau then looks into the company's "Basic Operating Manual" (BOM), which some other crew members, including the accident crew, claimed that were not aware as existing. They argued that all that was distributed to them is the "Aircraft Operating Manual", which is a separate entity from any company operating Manual and which cannot be substituted for each other. On the other hand, the company's flight operation department claimed that, because of the voluminousness of the BOM, it was not conducive to carry it in the cockpit in addition to the more important bulk of the "Aircraft Operating Manual" which must always be on board. What the company does instead is to make photocopies of the relative portion of the BOM and keep them in a special portfolio leather bag which holds other flying documents such as C of A, C of R, insurance policy etc. When this bag was recovered from the aircraft after the accident, the contents were other documents but photocopies of the BOM. Another claim of the company is that all relevant extracts of the BOM are given as handouts to the pilots from time to time.

It happens that the company produces the manual but the distribution cannot be truly ascertained. The accident crew, therefore claimed that the company has no minima. Some pilots of the company claimed that there had been occasions when captains had been frowned at by the company because the crew had returned revenue flights to aerodrome of departure due weather and such pilots had taken solace in the fact that, at least, the aircraft had been safely flown back to base and souls had equally been saved rather than have a mishap.

The Federal Civil Aviation Authority (FCAA) should endeavour to stand their stance on seeing that scheduled and non-scheduled operators comply with the "Nigerian Civil Aviation (Air Navigation) Regulation 21 section 2 (1) & (11)".

Impromptu checks should therefore be conducted on flight crew members at the time of passenger boarding to confirm the carrying on flight their copies of Company Operating Manual.

It may never be known why the crew is committed to land despite the poor existing visibility and the two missed approaches that served as their cue to the mishap. It cannot be said that the captain was trying to impress the passengers nor the destination's ground personnel for the feat to be achieved, or maybe the captain's ego was at stake. The crew had good hints in good time and should have abandoned any further attempt to force a landing and more so that there was enough fuel on board to return to base.

An on-board passenger, a managing director of a sea faring company gave account of the landing that "on perhaps the third 'attempt', the plane suddenly banked sharply to the left and almost 'dived' on the ground landing on its left wheel. By the time the right hand wheel touched down we were almost level with the 'edge' of the 'turning circle'". He also gave evidence that he, afterwards, spoke with the co-pilot who told him that there was enough fuel to return to Lagos and the crew knew that Port Harcourt and Calabar airports were closed to traffic. The co-pilot did not regard it safe to land and had advised the captain accordingly.

The captain in an interview, also gave evidence that at about 1000 metres from the threshold the co-pilot sighted the runway and she did not waste time in giving flap 2, so he descended fast from 300 ft and aimed at a target point on the runway.

From his own evidence, it can be inferred that the captain did not sight the field simultaneously with the co-pilot before flap 2 was selected and the aircraft was, instantaneously, committed to land. The aircraft could not have been in the proper pre-threshold profile for landing, at the time when the captain "descended fast" from 300ft if the given height were factual.

The result of the hurried descent OVER THE RUNWAY was that the aircraft touched down on one gear first at a point 742 metres upstream, leaving only 406 metres for the landing roll. The aircraft's touching down on one gear for some distance within the remaining available landing roll distance indicates that the aircraft was not yet firm on the ground for effective deceleration devices to take effect, which further more consumed some of the available 406 metres.

Whereas, under the prevailing loading condition, the prevailing weather factor and the landing configurations of the aeroplane, the aircraft's landing performance calculations required a minimum landing distance of 495 metres to bring the aircraft to a safe halt within the length of the paved way. Noting, of course, that the landing distance given on the performance chart does not take the reverse thrust availability into consideration. But the landing being an unfirm and an abnormal one, the reverse thrust availability could not still hold the aircraft back. 5N-ARI had consumed 60% of the runway length before touching down, the rest of it cannot, in anyway, contain the landing roll of the aeroplane. The overrun was, therefore, inevitable. The landing performance forecasts, at least, 43% of the available runway length for a safe landing as against the 35% which the crew actually made available to themselves.

So, all the maximum reverse thrust, all the braking and all the skiddings were just the resultants of a panic measure, which could not stop the aeroplane successfully, except if the crew had an infinite runway distance ahead of them but which they did not. Hence this accident.

3 CONCLUSIONS

3.1 Findings

- 3.1.1 The commander of the aircraft was properly licensed and current on his flying duties.
- 3.1.2 The co-pilot was also properly trained and licensed; was therefore qualified to take the flight in the right hand seat though had an unusual recommendation to be trained from the left seat.
- 3.1.3 The aircraft was properly maintained and had a valid certificate of Airworthiness. There was also a valid insurance coverage on the aircraft.
- 3.1.4 The aircraft was properly loaded and the centre of gravity was calculated to be within the prescribed range as of the time of the landing.

- 3.1.5 The company has company operating manual which is never distributed to all members of the flight crew.
- 3.1.6 The visibility at the destination aeroplane at the estimated time of arrival was bad.
- 3.1.7 The visibility at the chosen alternate airfield of Port Harcourt was equally bad and was accordingly closed to traffic at the time of aircraft's contact with the Approach Control.
- 3.1.8 Calabar Airport is another closeby airport to the destination and it, also, experienced poor visibility weather condition.
- 3.1.9 The aircraft arrived at Eket Airstrip and made 2 missed approaches due to poor visibility and was dangerously committed to land on the third attempt.
- 3.1.10 The situation at the cockpit portrayed a situation of lack of cooperation between the flight crew members.
- 3.1.11 The aircraft still had enough fuel to return to the aerodrome of departure, but there was split decision in the cockpit and this dictated the catastrophe.
- 3.1.12 The flying pilot misjudged the weather situation and forced a landing, which put the airplane at a point on the runway 406 metres from the end of the paved way.
- 3.1.16 Under the existing loading condition and the landing configuration of the aeroplane, the landing performance calculation required a runway distance of nothing less than 498m for a safe landing.
- 3.1.14 The touchdown point was too short to contain the landing roll; hence the overrun was imminent and no desperate action could prevent it.

3.2

Probable Cause

- 3.2.1 The accident was probably caused by the failure of the crew to accord due considerations and proper planning to the prevailing weather conditions. This resulted in a long landing, which extended into the unsuccessful braking action.
- 3.2.2 The contributory factor to the accident was the emergence of communication breakdown and non display of professional airmanship within the cockpit area. The crux of that discord is the company's recommendation to seat a trainee officer on the left seat for at least 100 flying hours. This decision was not verbally resisted by the senior trainee captain but the aura existed everywhere and this led to the animosity within the cockpit.

4

Safety Recommendations

- 4.1 Pilots should be made to appreciate the purpose of enroute and destination weather forecast and avail themselves with the weather information during the time of their flight planning. Weather factor is becoming a force to reckon with in Nigeria and pilots should respect this fact. FCAA may be influential in achieving this feat.
- 4.2 FCAA is to exert more pressure on scheduled and non-scheduled operators to compile Company Operating Manuals and to distribute them to the users in accordance with Civil Aviation (Air Navigation) Regulations.
- 4.3 The operator must reaffirm that its "trainee captains must train on the left hand seat" or review its recommendation in order to rescind the impression of a double-standard.
- 4.4 The airstrip owner must bring the aerodrome landing and navigation aids to the serviceable condition and the FCAA must increase the monitoring of the aerodrome.

- Appendix 1. Nigerian Aerodrome chart showing the locations and proximity of Eket airstrip to PHC and CAL airports.
- Appendix 2. The 5N-ARI accident trail on the runway.
- Appendix 3. Photographs showing inspectors trying to locate touchdown evidence on the runway.
- Appendix 4. Photographs of 5N-ARI after the accident.
- Appendix 5. Photographs showing how the aeroplane overran the paved way.
- Appendix 6. Photographs showing damages to the aircraft.

