



FEDERAL REPUBLIC OF NIGERIA

*Civil Aircraft Accident Report
No. CIA 119*

FEDERAL MINISTRY OF TRANSPORT AND AVIATION

REPORT ON THE ACCIDENT

TO

ALOUETTE III HELICOPTER REGISTERED 5N-ALD AT MEREN 24 OFF-SHORE
LANDING PAD (JACKET) ON FRIDAY THE 6TH OF DECEMBER, 1985.

AIR REGISTRATION BRANCH XXXXX 21029

3rd February, 1986

The Hon. Minister of Transport & Aviation,
Federal Ministry of Transport Et Aviation,
Joseph Street,
Lagos.

Dear Sir,

Civil Aircraft Accident Report No. CIA 119

I have the honour to submit the report on the circumstances of the accident to the Alouettee III helicopter registered 5N-ALD which occurred at Meren 24 off-shore jacket on Friday the 6th of December, 1985.

Yours faithfully,

K. K. O. SAGOE

CHIEF INSPECTOR OF ACCIDENTS

**Aircraft Accident Investigation Civil
Accident Bulletin No. CIA 119**

Aircraft: Helicopter Alouette I II SA 316B Serial No. 2340
Registration 5N-ALD
Engine: Turbomeca Artouste III B.
Owner
Operator: Aero Contractors Company of Nigeria.
Crew: Aero Contractors Company of Nigeria.
Passengers: Captain H. Forques.
Injuries: Nil.
Place of Accident: Minor to person on platform. Meren 24
Date and Time: (05 deg. 45 min. North, 004 deg. 52

Synopsis:

The Alouette III SA 316B helicopter registered 5N-ALD was positioning on the off-shore helipad which was designated as Meren 24 jacket after a 60 second flight from the main oil platform designated as Meren I.

The helicopter was scheduled to lift four Flopetrol loads on a sling work.

On entering a hover for the touchdown, the collective pitch control was lowered as usual and just at the instant of the right rear wheel making the first contact with the platform, the commander felt that the said wheel was sinking into the platform.

The collective pitch control was immediately raised for a lift off. The helicopter lifted off from its sunk position, but with the right rear wheel now caught in the edges of the displaced platform surface plating, a right turning moment was induced on the helicopter. The helicopter flipped on its right side sustaining an extensive damage.

It is concluded that the accident was caused by the displacement of the loose platform surface plate induced by the side forces transmitted on it as the right rear wheel oleo strut was compressed at an obtuse angle at the point of touchdown.

1.

FACTUAL INFORMATION

1.1 **History of Flight:** The helicopter was on a scheduled operation off-shore of Escravos along the conglomerate of landing platforms employed by Gulf Oil Company of Nigeria in the process of oil production.

The helicopter took off from the main platform designated as Meren 1 at 09:35 local time to Meren Jacket 24 on a 60 second flight.

On Meren Jacket 24 were four Flopetrol loads which the helicopter was scheduled to hoist up on slings.

The helicopter approached Jacket 24 at 0600 Magnetic descending from 200ft and arrived on the Jacket at zero speed. The helicopter was lowered unto the platform heading into the wind.

As the collective pitch control lever was slowly lowered and when almost fully down, the Commander felt that the right rear wheel of the helicopter was sinking into the platform. All the three wheels of the helicopter had now made contact with the platform.

The helicopter tilted to the right and the Commander immediately increased the collective pitch angles of the main rotors for a lift off. The Commander had got the experience of a wheel sinking into the platform once before but then a successful lift-off was achieved.

At this particular touch-down, the Captain was more intent on lifting off as he knew that if the helicopter were allowed to sink and tilt any further the main rotor blades would hit the Flopetrol loads on the landing jacket.

As the lift off was attempted, the helicopter suddenly flipped on its right side. There was no fire.

The accident location was Longitude 004 deg. 52 min. East and Latitude 05 deg. 45 min. North.

The accident occurred at day-time.

1.2 Injuries to persons: A minor fore-arm cut on one of the four Personnel working on Meren 24.

1.3 Damage to Aircraft: The helicopter was most substantially damaged.

1.4 Personnel Information:

Pilot: Male, aged 34 years.
Licence: Commercial Pilot's Licence No. 2692 (Helicopters) which would expire on the 28th of February 1986.

Ratings: Alouettee III and 11 Dolphin
Bell 47, Bell
206 Ecurell AS
355.

Flying Experience: Total Hours 4,046
Total Hours on type; 2.500.

Medicals: Next due on 28/2/86 and E.C.G. valid up to 28/2/87.

Flying hours last 84 days: 94 Hrs day flights (Alouettee III)

Flying hours last 28 days: 56Hrs 35 mins. day flights (Alouette III)

Flying hours last 7 days: 25 Hrs 20 mins. day flights (Alouette III)

Rest period prior to accident: 13Hrs 20 mins.

There was no designated Air Traffic Control in the area, but helicopter movements were monitored from a radio station located at Escravos.

The maintenance of the helicopter was carried out by Aero Contractors Company of Nigeria Ltd. at an ARB approved maintenance workshop located at Warri, Bendel State. The maintenance personnel possessed the appropriate licences.

1.5 Aircraft Information:

The Alouette III helicopter registered 5N-ALD was issued a Certificate of Airworthiness No. 435 on the 9th of October 1985 with a 12 month validity.

The total aircraft flying hours were 4170.10 and the Certificate of Maintenance No. 0351 issued by the maintenance organisation was valid till 4231.30 flying hours.

An 800 hour inspection was carried out at the last maintenance shop visit on the 29th of November 1985.

There were no defects which could have contributed to the accident on the helicopter.

The helicopter had an empty weight of 1342kg and the pilot on board weighed 67kg. 260 litres of fuel was on board at the time of accident. With the above data, the position of the centre of gravity was calculated and found to be within the prescribed limits during the landing phase of the operation.

The type of fuel used was Jet A-1.

1.7 Meteorological Information: There were no formal meteorological data available for the off-shore operations.

Weather estimate at the time of the accident were as follows:

Wind	N.E. 10 - 15kts.
Temperature	28 degrees centigrade
Visibility	2000m
Altitude	50fta.m.s.l

The accident was not weather related and the natural light conditions at the time of the accident was sunlight.

1.8 Aids to Navigation:

All off-shore flights were purely visual.

1.9 Communications:

There was no formal fire traffic control. Take-offs and landings are only monitored by radio for helicopter location trackings.

1.10 Aerodrome Information:

The helicopter landing pads known as platforms and jackets are owned and operated by Gulf Oil Company of Nigeria. The larger platforms like Meren I are equipped with sizeable landing areas, fire fighting equipment, and wind direction indicators. The jackets which are very limited in their total landing area, have no facilities whatsoever.

They are simply projections from the sea, best described as steel structures with flat surfaces just about adequate in area for a helicopter to perch.

1.11 Flight Recorders: Not applicable to the type of helicopter.

1.12 Wreckage and Impact Information: The helicopter had its main rotors shattered and remained intact lying on its right side.

1.13 Medical and Pathological Information: Not applicable.

1.14 Fire: There was no outbreak of fire.

1.15 Survival Aspects: The helicopter was equipped with portable fire extinguishers.

Another helicopter operating from Meren I arrived at the scene of accident within 2 minutes from the time of accident as there was no immediate need to evacuate the persons on the jacket this helicopter was thumbed off.

An OTIS jacket barge arrived at Meren 24 about 40 minutes after the crash and evacuation was commenced.

Communications were maintained for the evacuation by means of a portable radio set.

1.16 Tests and research: Nil

1.17 Additional Information: The landing area on the jacket was constructed with I beams on which 1/4 Inch steel plates are spread.

Three of these steel plates are removable to give access to the working platforms which are a floor below the helicopter landing pads. The three removable plates form the loose access hatches and side movements are prevented by the weight of the hatches resting on 3 inch lip projections of the sustaining edges. The plate to plate 1/4 inch edges also offer a high proportion of the side movement restraint.

1.18 New Investigation Techniques: Nil.

2. Analysis

The landing gear of the Alouette III helicopter consists of three gear units with oleo-pneumatic shock struts.

The two main gear units are attached to the body structure, and the nose gear unit is attached to the front of the cabin. The wheels are mounted on steel axles through bronze bearings fitted in the wheels. As in the nose wheel, each main wheel consists of two pieces assembled by four bolts.

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Due to the turning moments induced by the rotation of the main rotors, the Alouette III helicopter normally touches down with the right rear wheel first. The left rear wheel touches down next and as the collective pitch is further lowered the nose wheel touches down last.

As the weight of the helicopter settles on the rear wheels, the oleo pneumatic shock struts are compressed to absorb the landing shocks. It will be noticed that the shock struts are aligned at an obtuse angle to an axis running through the hubs of the main wheels when viewed from the outboard side of the helicopter. This construction is therefore bound to introduce some side forces on the surface on which the helicopter is landing as the oleo struts are compressed by the weight of the helicopter.

The landing jackets were constructed with I beams spanning horizontally across the more robust vertical members. The flat landing surface consists of flat steel plates of 1/4 inch thickness laid over the horizontal cross beams.

Three access hatches are provided on the flat landing surfaces in order to gain access to the floor below which is the working section of the jacket.

The rectangular jackets are provided with hinged rectangular access hatches but the hexagonal jackets are provided with loose access hatches (see appendix II). The resistance to side forces on the later access hatches results from the weight of these hatches resting on 3 inch lip sustaining edges. A high proportion of side movement restraint would also result from the 1/4 inch plate placement countersink.

Given the combination of side forces which are normally transmitted to the landing surface by the construction of the Alouette III landing gear, and the loose access hatches of the hexagonal jackets it is obvious that the displacement of the loose hatches is one day bound to happen. It was also gathered during the interviews that the pilots were very much aware and had experienced the hatches giving way under them.

The ideal solution to these combination of factors would be to spread the weight of the helicopter over surfaces spanning the hatches and the immovable parts of the landing surface by the use of skids or floats.

Enquiries revealed that the Alouette III helicopter has never been designed to land on skids. It is quite impracticable for a company to request such a design to accommodate this specialized circumstances because the cost of such a design would be prohibitive. The use of floats could be ideal both for the landing jackets and for safety in event of a mishap in an off-shore operation, but on inspecting the size of the floats on the Alouette III it was clear that the very landing jackets would be completely obliterated from the view of the operating pilots. Again, hoisting operations would not be possible as the pilot must be able to watch the movement of the slings which the floats would again cover up.

In order to prevent the recurrence of this accident, careful thought must be applied to adapting the Alouette III to this specific operation and the operational environment must also be altered to meet the needs of the helicopter.

The security of the access hatches must be achieved with immediate effect. It was observed that if the opening and closure of the hatches were carried out on hinges which are firmly welded on the hatches and the adjacent retaining edges, the hinges themselves would then act as restraints against any side movement of the hatches.

It is also possible to make it a policy to land the helicopter with the wheels away from the access hatches. In order to achieve this a mirror arrangement must be devised

whereby the pilot of the helicopter could see the three wheels of the helicopter and at the same time see the portion of the platform flooring on which he is placing the three wheels. This would call for a pin-point landing away from the hatches. It must be realised that a precise operation of this nature would need some training. The pilot must be practised in the ability of scanning the relative position of the helicopter with respect to the whole of the platform and looking on to the mirror arrangement for a precision placement. Consideration must be given to the rather limited size of the whole of the platform itself and the extra difficulty imposed by making the area covered by the hatches yet unuseable. An area on dry land must be provided where this technique is practised and perfected to accommodate the displacement of the helicopter itself by winds and gusts.

In order to facilitate the sighting of the hatches, it is highly recommended that the upper surfaces be painted white or any other colour which is quite distinct from the rest of the platform. In event that one of the hatches is inadvertently left open, the inside surfaces of the hatches should be painted red for easy detection from the air by pilots.

In order to facilitate the estimate of the wind direction, it will be useful to have each jacket equipped with visible flags of not more than 18 inches in height.

It was clear from the interviews carried out with the helicopter operators and the Gulf Oil Company personnel that they are all so engrossed in oil production that subsidiary supportive roles were cast in the shadows. This investigator is yet to understand why a large proportion of officers in these Companies volunteered that the accident was anticipated and yet did very little to prevent its happening. As it is at present, no off-shore heliport is inspected or licenced by the Federal Ministry of Transport and Aviation. It would be worth the while of the Ground Services division and the Flight Inspectorate division of the Ministry to act as an independent second opinion on all off-shore aviation activities by way of approvals and licences.

A pressing pertinent question for the time being is to inquire if the Alouette III helicopter is capable of remaining afloat in event of having to land on these abayauto-rotation since they are not at present operating with floats.

3. Conclusions

3a. Findings

- i) The Commander of the helicopter was properly licensed and sufficiently experienced for the flight.
- ii) The helicopter had been properly maintained and a valid certificate of Airworthiness was in force.
- iii) Examination of the helicopter revealed no evidence of a malfunction or unserviceability that would have contributed to this accident.
- iv) The helicopter's weight and centre of gravity were within the prescribed limits for the landing.
- v) The landing platforms are owned, maintained and operated by the Gulf Oil Company of Nigeria and no formal licences or approvals are issued by the Federal Ministry of Transport and Aviation to cover the Aviation aspect of the use of the off-shore helipads.
- vi) The helicopter flipped on its right side in an attempt to land on Meren 241 landing jacket.
- vii) The accident was not weather related.

- viii) Landing jackets of the type designated as Meren 24 were not equipped with landing or fire fighting facilities.
- ix) The three access hatches on the landing platforms were loose plates lying on edged supports.
- x) Communications and control of helicopter movements were carried out by the use of radio sets located inland at Escravos.
- xi) The Alouette III helicopter and its off-shore operational environment must both be modified to achieve a safe operation.

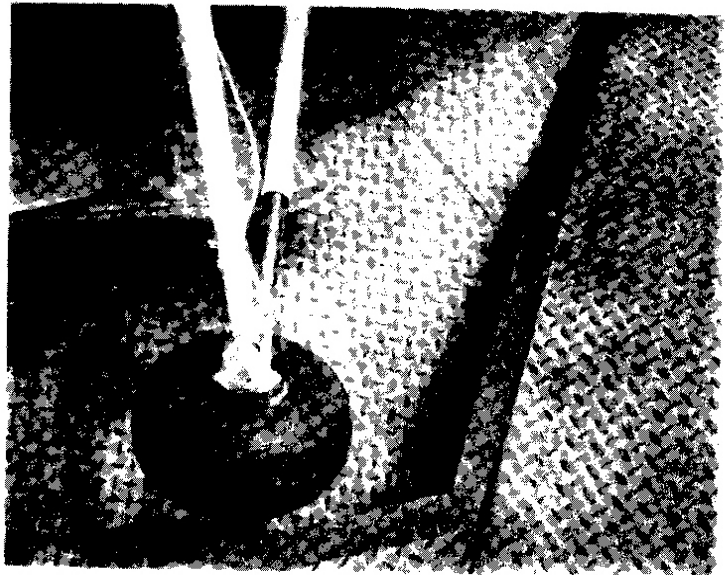
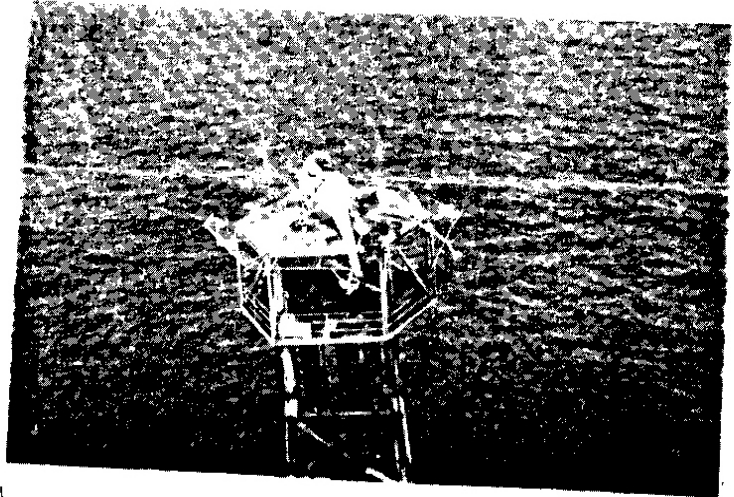
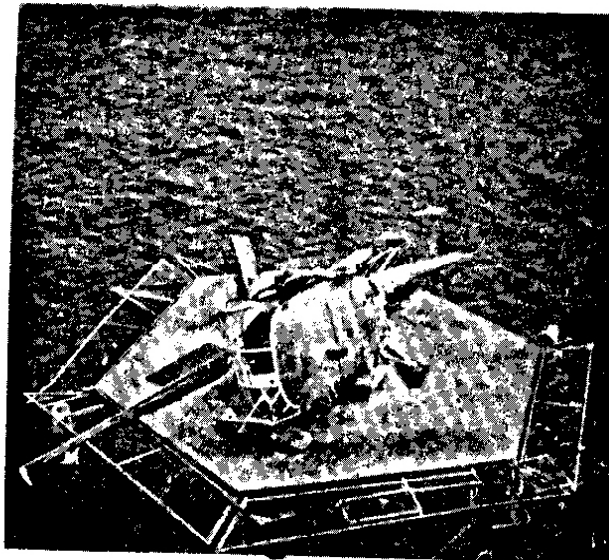
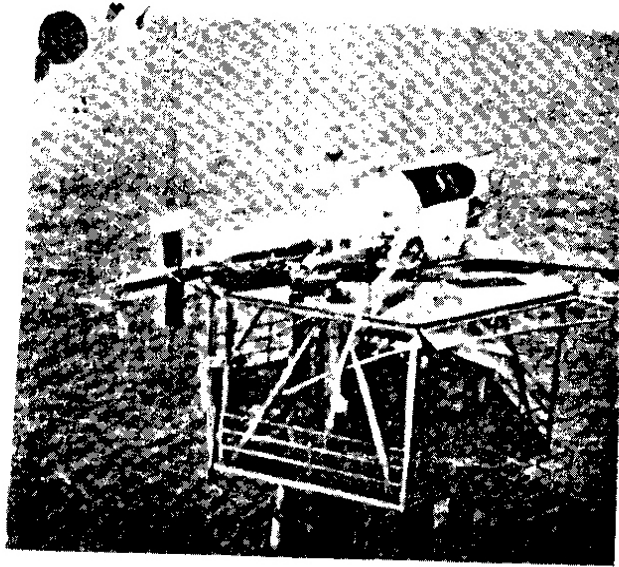
3(b) Probable cause of Accident

The probable cause of the accident was due to the displacement of a loose access hatch due to the side forces transmitted to it by the compression of a the right rear wheel oleo strut as the helicopter was landing.

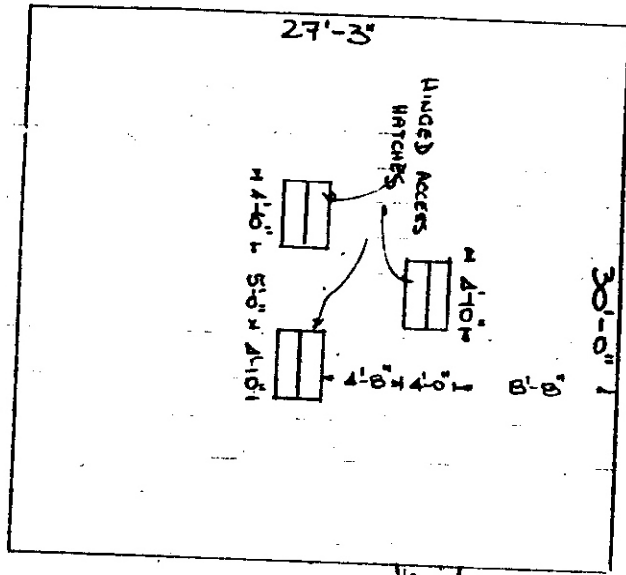
4. Safety Recommendations

1. Off-shore meteorological services should be provided to cover helicopter operations. A forecast station can be located on one of the centrally located heliports e.g. Meren 1.
2. Security of all access hatches on all heliports must be designed either with the use of hinges or retaining locks.
3. In the case of landing the helicopter away from the access hatches, a training area must be marked out on dry land in order that pilots may practise the proportion of scanning required between the relative position of the helicopter and the helipad, and viewing of the helicopter wheels through the mirror arrangement.
4. Each helipad (platforms and jackets) must be provided with a wind direction indicator in the form of flags. The flags should be of not more than 18 inches in height.
5. The top surfaces of access hatches must be painted in a colour quite distinct from the rest of the platform while the inside surfaces of the hatches should be painted red for easy detection from the air by pilots.
6. The Ground Services and Flight Inspectorate divisions of the Federal Ministry of transport and Aviation must carry out annual sampling inspections of all off-shore Aviation activities.
7. The survival aspect of the Alouette 111 helicopter with respect to staying afloat in event of having to land on water must be verified. Consideration must be centred on the helicopter staying afloat with or without the use of floats to enable all persons on board to disembark.

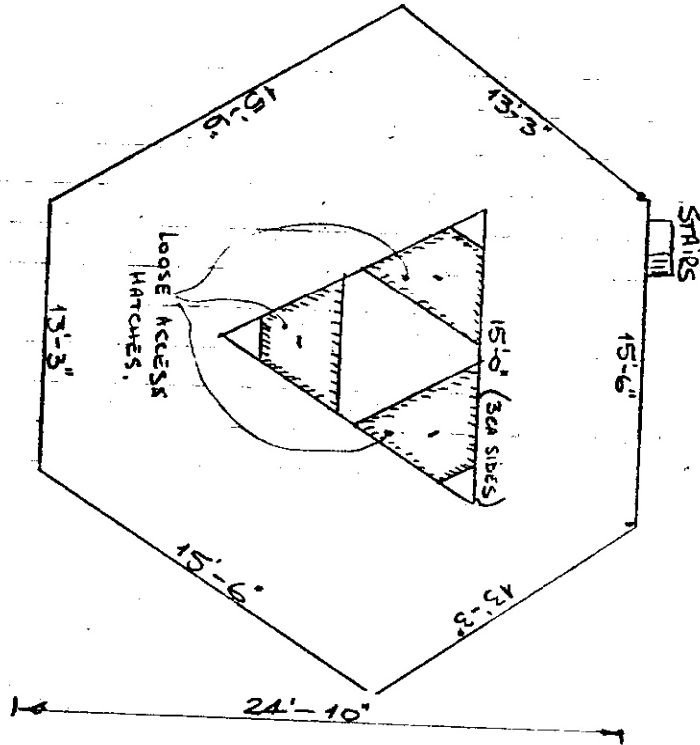
APPENDIX I



APPENDIX II



MEREN 40



MEREN 24

TYPICAL W/HEAD HELIDECKS

