

AIRCRAFT ACCIDENT REPORT**ADOPTED:** May 11, 1961**RELEASED:** May 17, 1961

REVISED AIRCRAFT ACCIDENT REPORT*

REPUBLIC ALOUETTE II HELICOPTER, N 526, IN
THE GULF OF MEXICO NEAR CAMERON,
LOUISIANA, DECEMBER 2, 1958SYNOPSIS

An Alouette II helicopter, N 526, owned and operated by Petroleum Helicopters, Inc., crashed in the Gulf of Mexico approximately 25 miles south-southwest of Cameron, Louisiana, in the early afternoon of December 2, 1958. The pilot and the three passengers received fatal injuries. The aircraft was a total loss from impact damage and subsequent salt water corrosion.

N 526 was used to transport personnel and supplies to various offshore drilling platforms in the Gulf of Mexico under a contract between Petroleum Helicopters, Inc., and the Shell Oil Company. On December 2, four normal flights were completed in accordance with this purpose. During the fifth, about eight minutes after a normal takeoff, the helicopter crashed in the Gulf.

Following an exhaustive search the wreckage was located in the water six miles from its takeoff point and on course for Cameron. The time of the accident was approximately 1320 c. s. t.

Although there is insufficient evidence to determine the probable cause, the available evidence suggests that the accident resulted from an autorotational touchdown under hazardous sea conditions. It appears further that the autorotational descent may have been induced by the inadvertent closing of the emergency fuel shut-off valve or by some indeterminable malfunctioning of the powerplant.

As a result of this investigation the FAA took corrective action by issuing Airworthiness Directives 59-2-3 and 59-5-6 which require a rework of the emergency fuel shutoff lever. These directives also made mandatory several other changes in this model helicopter; none of these latter, however, appear to pertain to the cause of this accident.

Investigation

N 526, an Alouette II helicopter, had been dispatched from Morgan City, Louisiana, to an oil-drilling rig located in the Gulf of Mexico. It departed the Morgan City

* This report is a revision of the Board's report of August 8, 1959, and reflects new evidence adduced since that date.

Heliport at 1135 ^{1/} and arrived at the rig, located in an area known as Block 82, at 1240. The flight was without incident and the aircraft did not require refueling at the rig. This type of offshore flight is customarily flown at 500 feet altitude in accordance with established company practice.

At approximately 1314 the company radio at Cameron received a message from N 526 advising that the flight left the rig at 1312 and was estimating Cameron Heliport at 1345. A call to the flight was made at 1335 by the company radio but was not answered. Another company helicopter, N 5166B, was directed by radio to proceed to Block 82 and check on N 526. After it reported that N 526 was not on the platform at Block 82, it was ordered to take a direct course from Block 82 to Cameron Heliport. After flying this course about five to seven minutes the pilot sighted a large oil slick and two helicopter floats in the water. Closer investigation revealed two persons in lifejackets floating face down. (Lifejackets are customarily worn by passengers and pilots during offshore flights.) The pilot was unable to land because of high swells but hovered over the area directing to the scene a boat whose crew subsequently picked up two bodies and floating helicopter wreckage. The two men, identified as passengers, were examined by a doctor and pronounced dead. Their injuries were multiple and severe, indicating violent impact.

Weather at the time was: Ceiling unlimited; visibility unrestricted except for patches of haze, at least 5 miles of visibility at all times; wind north 5-10 m. p. h.; sea condition 3- to 4-foot swells; Lake Charles barometer 30.16 inches.

Search operations began on December 3, 1958; however, the main wreckage was not located until December 11 when it was found by U. S. Navy minesweepers and divers at a point 25 miles south-southeast of Cameron (lat. 29° 27' N., long. 93° 06' W.) and approximately on course. Bodies of the pilot and third passenger were found with the wreckage. The following day all major components of the helicopter were recovered and taken to the company base at Lafayette, Louisiana.

The shock damper tubes connecting the center fuselage structure and the float assembly cross tubes had failed in compression as though from a hard level landing. Damage to the tail boom and tail rotor was also indicative of a dipping of the tail rotor in the water.

Except for these failures, all other damage appeared to have resulted from a second and much more severe impact with the water while the aircraft was in an inverted attitude. Nearly all damage from this second contact was consistent and indicated that the helicopter was traveling inverted and primarily downward with a slight forward speed and some rotation to the right (as viewed from above).

Relative to the aircraft's normal attitude, the cabin overhead structure, back, and sides were crushed downward, slightly aft, and to the right. The two front seats were broken downward and to the rear. The fuel tank was forced upward and forward and the seams near the top had burst. One main rotor blade sleeve was broken downward and all three blades had overtraveled downward. The top of the engine combustion chamber housing, tailpipe, and sheet metal accessory covers were crushed in by water impact. The horizontal stabilizers were both bent downward and showed severe hydraulic forming on the upper surfaces. The float assemblies were torn from the helicopter and away from the fuselage but were only slightly damaged.

^{1/} All times herein are central standard based on the 24-hour clock.

The entire airframe was studied in an attempt to find preimpact damage, to relate damage patterns, and to separate impact from recovery and handling damage. All functional units were disassembled and carefully examined. No evidence of pre-impact damage to, or failure of, the mechanical and structural components was found during the study of the wreckage. The mechanical linkage in the flight control systems was studied and all failures in the systems were determined to have resulted from impact forces and the breakup of the helicopter. The components of the swashplate bearing assembly (star assembly) were examined for evidence of binding but none was found. No evidence of preimpact mechanical interference or jamming was found on any of the control system components.

On January 17-18, 1959, the star assembly, with its uniball and bearing cones, was operated in a test jig to see if there was any inherent tendency for the unit to bind. This was done because binding had occurred on another star assembly installed on N 526, and had also occurred on other Alouette II helicopters in service. Binding in the unit endangers the control of the helicopter and could conceivably make the helicopter uncontrollable if the binding were severe since it causes the cyclic stick to rotate in a circle at rotor r. p. m. Binding also prevents the pilot from sending an emergency radio message since the microphone button is located on top of the cyclic control stick. No binding tendency was noted in the test run of 10 hours although the test rig closely but not exactly simulated inflight loads on the star assembly. Previous known occurrences of swashplate bearing binding on this model aircraft have left detectable evidence of the malfunction on the uniball assembly. No such evidence was found in this instance.

An examination and teardown of the turbine engine disclosed no indication of an inflight structural failure, operational difficulty, or indication of fire prior to or subsequent to the accident. However, examination indicated that the engine was not developing appreciable power at the final impact.

Damage to the emergency fuel shutoff valve control linkage was such as to indicate the valve was halfway between open and closed at the time of impact. In this position, the fuel flow would be impaired and a power loss would result. The emergency fuel shutoff valve control is located on the cockpit floor between the two pilot seats. It is a lever which is vertical when the valve is open. Rearward motion closes the valve. It is not only readily accessible to the occupant of either pilot seat but is, in fact, so placed as to be readily moved inadvertently. As a result of this accident the manufacturer has modified the control to prevent inadvertent movement of the lever. One of the items of emergency procedure, in the event of a flameout, is to close this fuel valve.

Pilot McCann had nearly 2,400 hours of helicopter pilot flight time, as well as over 1,000 hours of fixed-wing pilot flight time, and had acted in supervisory capacities for Petroleum Helicopters, Inc. He had flown Alouette helicopters 37 hours.

Petroleum Helicopters, Inc., has an extensive background of helicopter operation in various parts of the world. The company was organized in 1949 and pioneered the use of helicopters in the offshore transportation of personnel and material. It operates in excess of 3,000 hours of helicopter time a month and since the start of its operation has transported nearly a million passengers. During the fiscal year of 1958 it operated as many as 46 helicopters and is currently operating 38.

Analysis

A reconstruction of events immediately preceding this accident must necessarily

be based largely on premise for there were no survivors, no witnesses, no radio message indicative of trouble, and no evidence of a malfunction.

The first premise is that the helicopter was cruising at 500 feet which is where it normally should have been. This altitude would have been ample from which to start and execute an autorotational landing from cruising speed. It would not have been high enough to allow restarting the engine in the event of a flameout. For this, some 1,800 feet is required.

The second premise is that the descent from 500 feet was autorotational and dictated by power loss. This could have been caused by inadvertent movement of the emergency fuel shutoff lever, as mentioned under Investigation, or it could have resulted from some indeterminable malfunctioning of the powerplant. However, nothing was found to suggest the latter, as stated.

In either event, an immediate autorotational descent must have been started. The rate of such a descent would have been about 1,500 feet a minute and consequently the time of descent would have been in the order of 20 seconds. The air-speed would have been in the neighborhood of 40 knots. Patches of haze at the surface coupled with a light wind and swells three or four feet high posed an extremely hazardous landing condition. It is entirely possible that initial touchdown may have been on the upslope of a swell with slight forward speed.

Under these conditions impact could well have been hard enough to cause the previously described damage to structural members between fuselage and floats. The failure pattern found in the shock strut tubes is indicative of a level and skipping type of landing prior to the inverted impact. Substantiation of such a hard level landing is evidenced by the failure of the tail boom downward at the forward attach lugs, allowing the tail rotor to strike the water while rotating, which bent the blades inward, causing one to strike and break the upper right tail boom longeron. Damage from water impact along the upper side of the helicopter indicated a severe, inverted, nearly vertical impact with slight forward motion and clockwise rotation (as viewed from above) and could only have followed a fairly large skip or bounce during which the helicopter went on its back.

Conclusions

From the available evidence the Board concludes that a power loss occurred necessitating an autorotational descent and the helicopter first contacted the water hard and while upright and with some forward speed. The tail boom was damaged and the function of the tail rotor was destroyed at this time which was followed by a maneuver resulting in the secondary inverted contact.

As a result of these investigations the FAA issued Airworthiness Directives 59-2-3 and 59-5-6 providing a locking detent for the emergency fuel shutoff lever. It also became apparent that certain other changes should be made to this make and model helicopter. These were: (1) to filter or protect the vent air openings of the lateral trim bungee unit to prevent jamming of the piston by foreign objects, and (2) to prevent binding of the swashplate bearing assembly. Accordingly, the FAA instructed all Regional Administrators, on January 9, 1959, that there must be immediate compliance with the following Republic Aviation Corporation Service Bulletins

Service Bulletin No. 3.45-1 to prevent inadvertent loosening of the lateral trim cylinder cap nut.

Service Bulletin No. 8.10-3 specifying rework of the emergency fuel shut-off lever to prevent accidental closing of the valve during flight.

Service Bulletin No. 732-2 to insure positive and adequate lubrication of the main rotor swashplate assembly.

In addition, the directive requested compliance with Republic Aviation Corporation's instructions for increasing the clearance of the swashplate ball assembly. On March 9, 1959, the FAA issued Airworthiness Directive 59-5-6, superseding AD 59-2-3 (which covered FAA January 9 telegraphic instruction) which required replacement of the swashplate oilite bearings and spacer with redesigned parts.

Probable Cause

The Board determines that there is insufficient evidence on which to base the probable cause of this accident. However, circumstances suggest a power loss with a resulting autorotational descent and an unsuccessful touchdown during hazardous sea conditions.

BY THE CIVIL AERONAUTICS BOARD.

/s/ ALAN S. BOYD
Chairman

/s/ ROBERT T. MURPHY
Vice Chairman

/s/ G. JOSEPH MINETTI
Member

/s/ WHITNEY GILLILLAND
Member

Chan Gurney, Member, did not take part in the adoption of this report.

S U P P L E M E N T A L D A T A

Investigation

The Civil Aeronautics Board was notified of the accident at 1400 c.s.t., December 2, 1958. An investigation was immediately begun in accordance with the provisions of Section 702(a)(2) of the Civil Aeronautics Act of 1938, as amended. Depositions were taken at Lafayette, Louisiana, January 29, 1959.

Owner and Operator

The aircraft was owned and operated by Petroleum Helicopters, Inc., of Lafayette, Louisiana, and was under contract to the Shell Oil Company (Offshore Division). N526 was used to transport personnel and supplies to various offshore oil-drilling sites in the Gulf of Mexico, operated by the Shell Oil Company.

The Aircraft

N526, a Republic Aviation Corporation Alouette II helicopter, serial No. 1139, was manufactured in 1958, and was received by Petroleum Helicopters, Inc., on June 19, 1958. The helicopter had a total time of 410:40 hours with no overhauls. The engine, a Turbomeca Artouse, single shaft gas turbine, serial No. 392, was installed new on N526 on September 11, 1958, and had a total time of 171:50 Hours since manufacture. The three main rotor blades, serial Nos. 911, 915, and 916, were installed on November 8, 1958, and had a total time of 61:30 hours. The two tail rotor blades, serial Nos. 904 and 905, were installed on November 1, 1958, and had a total time of 74:15 hours. The swashplate - #4 - had a total time of 190:05 hours.

Pilot

Robert Elton McCann, age 34, was employed by Petroleum Helicopters, Inc., on April 16, 1956. He held a currently effective airman certificate with commercial pilot and helicopter ratings. His flying hours totaled 3477:30, of which 2352:30 were in helicopters, and 37:00 hours in Alouettes. His last Class II physical examination was passed on April 25, 1958. His helicopter flying time last 30 days was 28:50 hours.