

No: 9/89

Ref: EW/C1106

Category: 2b

**Aircraft Type
and Registration:**

Bolkow 105D, G-BGKJ

No & Type of Engines:

2 Allison 250 - C20 turbo-shaft engines

Year of Manufacture:

1974

Date and Time (UTC):

25 April 1989 at 1432 hrs

Location:

Near Scatsta Aerodrome, Shetland Isles

Type of Flight:

Aerial Work (Oil Pollution Survey)

Persons on Board:

Crew - 1

Passengers - 1

Injuries:

Crew - None

Passengers - None

Nature of Damage:

Damage to forward part of tailboom. Almost total immersion in seawater.

Commander's Licence:

Airline Transport Pilot's Licence (Helicopters)

Commander's Age:

43 years

**Commander's Total
Flying Experience:**

5,817 hours (of which 1539 were on type)

Information Source:

AAIB Field Investigation

The aircraft was operated under contract to the Sullom Voe Harbour Authority, Shetland. One of its tasks was to make reconnaissance flights over the area controlled by the Authority, in order to monitor oil pollution from the many tankers using the Sullom Voe oil terminal. On such flights the left pilot's seat was occupied by an Oil Pollution Control Safety Officer. Operations were conducted from a helicopter pad adjacent to the Harbour Authority office at Sella Ness. The flights were normally made under VFR, and radio calls to air traffic control at the nearby airfield of Scatsta were made as a courtesy, or when assistance was required.

An aftercast, prepared at the Meteorological Office in Bracknell, indicated that a cold, unstable, northerly airstream persisted over Shetland during the period of the accident flight. There were occasional moderate showers of rain mixed with snow, the visibility falling to 500 metres in the heavier showers. The freezing level was 1300 feet and the surface temperature was 3°C, falling to near zero in snow showers. The temperature at 2000 feet was minus 2°C and the wind was 010°/19 kt. The Meteorological Office in Sella Ness reported that the average sea temperature was 8°C and that there was a northerly swell of height 1 metre and period 5 to 6 seconds.

The helicopter departed at about 1345 hrs and carried out an oil pollution reconnaissance flight to the

northwest. At 1415 hrs the commander called Scatsta Tower and was passed the weather, which was surface wind 030°/15 kt, visibility 5000 metres in rain, cloud base 1000 feet and temperature 3°C. As there appeared to be extensive low cloud between his position, north of Esha Ness lighthouse and his base at Sella Ness he elected to carry out an NDB approach to runway 24 at Scatsta, intending to break right for the helicopter pad, which was about half a mile to the northeast of the runway threshold. At 1422 hrs the controller advised that it had started to snow and decided to monitor the approach on radar.

Shortly after 1422 hrs and just prior to entering cloud at 2500 feet, 7 nm on a bearing of 300° from the 'SS' NDB, the commander carried out the initial approach checks and switched on the engine anti-ice system. He noted an increase in the turbine outlet temperature on both engines. On entering the cloud he encountered sleet which appeared to turn to water as it made contact with the windscreen. A visual check of the airframe showed no signs of ice accretion and the outside air temperature (OAT) gauge was reported to have read 1°C. Although he could not see the OAT gauge, the observer's report of the inflight conditions was similar to that of the commander. At 1425 hrs the controller advised that the heaviest weather returns, on the radar, were on the 24 approach at 2½ to 3 nm. The aircraft passed the beacon at 1426 hrs, descended to 2000 feet, carried out a righthand positioning turn and overflew the beacon at 1429 hrs to commence the outbound leg. Once established outbound it descended to 1700 feet. The commander noted that the inflight conditions were the same as previously reported. After 1 minute 40 seconds he turned right and established on the inbound track of 243°.

At 1431 hrs the controller advised that the range from touchdown was 5½ nm. Shortly after this transmission, the commander heard a dull thud and the aircraft yawed to the left. He noticed the number one engine N2 decrease, heard the associated audio warning and saw the central panel RPM warning light. As the N2 passed 60% the aircraft again yawed to the left and the number two engine N2 decreased. The collective lever was lowered immediately. The call "Mayday, Mayday, Mayday. Golf Kilo Juliet double engine failure" was recorded at 1431:47.3 hrs.

Autorotation was established at 75 kt, and the aircraft was turned onto a heading of 020°, the last known surface wind direction. The commander glanced away from his instruments, momentarily, to select the float inflation switch. When he did not hear the floats inflate he looked down and saw that he had inadvertently selected fuel jettison. Both guarded switches were on the same centre panel, separated only by the windscreen wiper switch. Leaving the fuel jettison selected, he then successfully inflated the floats. At 150 feet the surface of the sea was visible but there was no forward vision. The flare was started at 50 feet on the radar altimeter, and the landing was cushioned by the use of collective pitch. Although the landing did not feel heavy, the commander noted that there was some forward speed and the right front and both rear float bags became partially detached. Shortly after 1432 hrs the commander informed Scatsta Air Traffic Control that they were on the water and were vacating the aircraft. He then carried out the shutdown checks, deselected the fuel jettison, and initiated the evacuation. The aircraft had taken up a marked list to the rear right.

The observer opened the left hand door and stepped out onto the skid. He undid the liferaft retaining strap but, while trying to free it from its stowage, he lost his footing and fell into the sea. The commander then unstowed the liferaft, inflated it and climbed aboard. Having helped the observer

aboard he then re-entered the aircraft and transferred the majority of the loose equipment to the liferaft. It was decided to remain attached to the aircraft, the knife being made readily available to cut the lanyard if necessary. The ADELTA beacon had been automatically activated and the commander activated his personal locator beacon. It was decided not to raise the canopy as the sleet shower, which was present during the initial phase of the ditching, had abated and the visibility had improved considerably.

The Duty Air Traffic Controller pressed the crash alarm on receipt of the Mayday call and initiated the aerodrome emergency procedures. The Aerodrome Fire Service, received the approximate ditching position and set off for the nearest point onshore. It was reported that the visibility enroute was, at times, 100 metres in heavy snow showers and, on arrival at Toft pier, at about 1442 hrs, it was about 500 metres in snow showers. Over the next few minutes this improved and the helicopter was sighted approximately 1000 metres from the shore.

At 1448 hrs the captain of the vehicle ferry Geira, which plies between the island of Yell and the mainland, noticed a contact on the ships radar which was identified visually as a helicopter on the water. He altered course towards it and, shortly afterwards, took the two survivors on board.

At 1449 hrs the Coastguard search and rescue(SAR) helicopter took-off from Sumburgh, having been scrambled at 1445 hrs. At 1450 hrs a pilot launch departed from Sella Ness and was alongside the now partially submerged aircraft at 1502 hrs. Lines were secured and the tow was commenced at 1510 hrs. At 1511 hrs the SAR helicopter arrived on the scene and, at 1514 hrs, the two survivors were winched from the ferry, using the double lift technique, and were taken to Lerwick where, at 1521 hrs, they were transferred to an ambulance and taken to the local hospital. By 1530 hrs the crew of the pilot launch had secured the wreckage to Toft pier. The SAR helicopter returned to Sumburgh where it landed at 1550 hrs

An initial examination of the aircraft was performed after it had been recovered to Scatsta airfield. The aircraft was substantially intact but the rear of the main fuselage had buckled around the tail boom attachment in a way that indicated that the boom had been strained downwards. The attachments of three of the four skid mounted flotation bags had failed, only the forward left bag remaining attached and fully inflated. It was also noted that the fuel jettison valve was still open and there was no fuel remaining in the main tank. There was, however, still some fuel in the supply tank, and samples were drawn from there and other points on the fuel systems of both engines. This sampling showed there to be fuel all through the systems and operation of the engine starters showed that both engines were able to turn smoothly and that fuel was being delivered in a correct spray pattern to both engines. Analysis of the samples showed the fuel from all locations to be of the correct specification, having some salt water contamination in the tank sample. An attempt to test the airframe fuel system booster pumps showed only two were still capable of operating. Further investigation at the operator's base showed that all pumps had severe corrosion on their motors and damage to capacitors as a result of salt water intrusion into the motor case.

The engines were removed and taken for specialist strip examination. This revealed no evidence of any

failure or malfunction which could have caused either to shut down in flight. It was noted that the first stage compressor rotor of the right engine showed some slight evidence of blade deformation, but insufficient to have caused the engine to malfunction.

The OAT gauge was recovered, apparently undamaged, although it had been broken out of its mounting in the transparency during recovery. Calibration of the OAT gauge showed that it displayed a temperature of about 2°C lower than actual but because the pointer was some distance above the dial face it was possible to get parallax errors of about 5°C. Three new OAT gauges of the same type were calibrated in the same way. Two of these displayed errors of the same magnitude, but not always in the same sense as the gauge from KJ and had similar potential parallax errors for the same reason.