

Aircraft type and registration: Boeing Vertol 234 G-BISO (heavy helicopter — public transport)

Year of manufacture: 1981

Date and time (GMT): 2 May 1984 at 1240 hrs

Location: 8 miles WNW of the Cormorant Alpha Platform, North Sea

Type of flight: Public Transport

Persons on board: Crew — 3 Passengers — 44

Injuries: Crew — Nil Passengers — Nil

Nature of damage: Damage confined to effect of salt water immersion and relatively minor damage sustained during recovery

Commander's Licence: Airline Transport Pilot's Licence (Helicopters)

Commander's Age: 43 years

Commander's total flying experience: 6025 hours (or which 2231 hours were on type)

The aircraft was on a flight from Aberdeen to the Magnus Field and return. After landing on the Polycastle (adjacent to the Magnus Rig) the aircraft refuelled to 8,000 lbs, rotors turning, and embarked a full load of 44 passengers. Take-off at 1220 hrs was standard and the aircraft climbed to 2,500 feet for the return flight. The weather was good with little cloud, 30 kilometres visibility and no turbulence. The aircraft was cruising at 120 knots with the Automatic Flight Control System (AFCS) engaged, the barometric height hold engaged and the Tactical Air Navigation System (TANS) coupled to the NAV mode. The Longitudinal Cyclic Trim (LCT) and Differential Air-Speed Hold (DASH) actuators were in their normal operating positions, the aircraft was flying smoothly and there were no warning captions illuminated.

Approximately 10 minutes after take-off there was a sudden disturbance during which the aircraft pitched slightly nose-down followed by a harsh increase in positive 'g' with a violent upward movement of the whole aircraft and an unidentified annunciator caption with a master caution warning. This was accompanied by an increase in noise and falling rotor rpm. There then followed over a period a series of approximately five similar violent disturbances during which it was possible for the crew to correlate the violent vertical acceleration and rotor rpm variations with No 2 flying control hydraulic system pressure fluctuations. The pressure was seen to drop to approximately 300 psig, accompanied by the associated captions, and then recover to the normal 3000 psig. Rotor rpm was observed as low as 91% and on other occasions at over 108%. While following the check list emergency drills the crew selected OFF No 2 AFCS and noted on two other occasions that the violent disturbance only occurred when the No 1 hydraulic system was selected ON (i.e. the No 2 system switched OFF). Both hydraulic systems were therefore selected ON for the remainder of the flight. During the initial series of disturbances the aircraft IAS was reduced to 70–80 knots and height was reduced to approximately 500 feet. There followed a few minutes of steady flight and the decision was made to divert to Sumburgh. A second series of similar disturbances then occurred during which the handling pilot felt that the amount of control he had over the aircraft was diminishing, particularly in collective pitch. On one occasion a steady application of collective pitch to arrest a rate of descent of 800 feet per minute had no effect on the torque, rotor rpm or the aircraft, and it was as if the collective lever was disconnected. One disturbance followed another so closely that the handling pilot described it as a continuous series of recoveries from unusual attitudes.

It became clear that there was little alternative to a precautionary landing, and a gentle touchdown was achieved in spite of the control difficulties. The landing was made on a calm sea approximately eight miles north west of the Cormorant Alpha Rig at about 1240 hrs. When on the water the collective lever was lowered but the aircraft disturbances continued, although their severity was greatly reduced. The No 2 hydraulic system failed completely after a short time on the water and the disturbances ceased. The crew taxied the aircraft towards the Cormorant Alpha donning their immersion suits and lifejackets in turn.

Some ten minutes after landing it became evident that the aircraft was taking on water and it was decided to evacuate the aircraft. At 1318 hrs approximately, one of the liferafts was launched through the airstair door emergency hatch and the painter secured inside the cabin. However, it was extremely difficult to keep the liferaft close to the escape hatch and only two passengers had boarded before it was too far away. The liferaft was allowed to drift back on the painter until it was alongside the starboard fuel tank.

Passengers then evacuated through the starboard rear exit and walked forward along the fuel tank to enter the liferaft. There were approximately nine passengers in the first liferaft when its painter parted and it drifted away from the aircraft. The second liferaft was launched through the airstair door hatch but only two passengers had boarded this when the painter also parted and that raft also drifted away. The remaining passengers evacuated through the starboard rear hatch into the water and drifted to the stern of the aircraft where rescue craft and helicopters were waiting to pick them up. When all the passengers had gone the cabin attendant followed at approximately 1349 hrs.

The two remaining crew decided to shut down the aircraft. The Auxiliary Power Unit (APU) was started and both Engine Condition Levers (ECLs) moved to STOP, but No 1 engine continued to run and had to be shut down by using the 'T' handles. The pilots evacuated through the airstair door hatch at approximately 1359 hrs and the aircraft capsized some two minutes later. The aircraft remained afloat inverted and was lifted onto a ship on the evening of the accident without extensive recovery damage.

Inspection showed that all fuselage drain plugs were in place, and that hatch and door seals which could have been below the ditched waterline were in good condition, with the exception of cabin rear ramp seals. A number of deficiencies in these seals were noted.

Preliminary investigation has revealed evidence of two separate pre-ditching faults in flying control hydraulic systems. Both were in lower boost actuators, one of which is incorporated in each of the four flying control channels to reduce cockpit control forces. Each actuator consists of two hydraulic servo jacks, acting in tandem, powered by Flying Control Hydraulic Systems 1 and 2 respectively, and full control is provided with either half inoperative. A hydraulic shut-off valve incorporated in the System 1 side of the collective lower boost actuator was found stuck in an incorrect position. Corrosion of Hydraulic System 1 components was a factor in this. Functional tests indicated that this fault would render the System 1 half of this actuator inoperative, while the reported intermittent loss of System 2 pressure would have resulted in intermittent loss of the System 2 half of the actuator. Hydraulic System 2 contents were depleted by leakage from a roll lower boost actuator gland as a result of retaining bolt failure.

The Chief Inspector of Accidents has ordered an Inspector's Investigation into this accident.