

Sikorsky S61N, G-BIMU

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Aircraft Type and Registration:	Sikorsky S61N, G-BIMU
No & Type of Engines:	2 General Electric CT58-140-2 turboshaft engines
Year of Manufacture:	1974
Date & Time (UTC):	24 August 1997 at 1450 hrs
Location:	Stac Pollaidh, West Scotland
Type of Flight:	Search and Rescue
Persons on Board:	Crew - 3 - Passengers - None
Injuries:	Crew - 2 Minor - Passengers - N/A
Nature of Damage:	Tip damage to main rotor blades and shock loading to power train
Commander's Licence:	Airline Transport Pilot's Licence (Helicopters) with Instrument and Instructor Ratings
Commander's Age:	49 years
Commander's Flying Experience:	8,140 hours (of which 4,945 were on type) Last 90 days - 83 hours Last 28 days - 28 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and operator's investigation report

The crew, comprising two pilots, a winch operator and winchman, was well rested prior to the start of a 24 hour standby Search and Rescue (SAR) duty that began at 1200 hrs. At 1314 hrs the crew was advised by Stornoway Coastguard of two injured climbers on Stac Pollaidh. At 1330 hrs, with the tasking confirmed by the Coastguard, the helicopter departed from Stornoway. Whilst en-route, fuel was jettisoned down to a fuel state of 2,700 lb, in order to improve hover performance. The crew arrived on the scene 20 minutes later and sighted climbers waving from the area of rock face on the south-west corner of Stac Pollaidh. The weather at the time was CAVOK, temperature +13°C with a wind of 250°/10 kt and some slight turbulence.

The two injured climbers were separated vertically by approximately 75 feet. The winchman was lowered to an area below the lower casualty (casualty 'A') to assess the situation while the helicopter moved away from the area in order to reduce the noise levels at the rescue site. Information relayed by radio from the winchman revealed that casualty 'A' was suffering from a head injury whilst the upper casualty (casualty 'B') was in an extremely serious condition. The commander, however, decided to rescue the casualty 'A' first to avoid the effects of downwash from a recovery of casualty 'B'. The helicopter was manoeuvred into position and the winchman and casualty 'A' (in a strop) were 'double lifted' into the helicopter. This casualty was transferred into the care of the police who were waiting at the Stac Pollaidh car park.

The helicopter then manoeuvred into position for recovery of the casualty 'B' who, along with another climber, was attached to a small ledge by ropes and karabiners. A cautious approach was flown to try and achieve an overhead position. Because of the proximity of the cliff face, the helicopter had to climb 70 to 80 feet above the casualty to achieve adequate clearance. A weighted 'hi-line' was lowered to the climbers on the ledge, followed by the winchman, who attached himself to the belay before unhooking from the winch cable. The helicopter was again flown clear to reduce the noise and downwash.

After 20 to 25 minutes the winchman signalled with a flare (his hand held radio had become unserviceable) for the helicopter to return. As it approached, the winchman indicated that he wanted to carry out a double lift as the casualty's condition was deteriorating. The commander, who was the handling pilot, manoeuvred the helicopter to what he and the winch operator believed to be the same hovering position, using the same reference points as for the previous hover. The winchman, positioned on the rock face, had difficulty getting hold of the 'hi-line' as it seemed to be forced away from him by the downwash. As the helicopter manoeuvred there was 'what seemed like an explosion' and then it rolled suddenly to the right. The commander corrected by applying rapid left cyclic pitch and lowered the collective control to clear the area. He reported that there was an immediate imbalance of the blades causing 'severe vibration of phenomenal magnitude'. It became almost impossible for him to see the instruments and there were large undemanding cyclic control movements in sympathy with the major vibration.

The commander immediately entered autorotation to land on the closest suitable area south-west of Stac Pollaidh. His intention was to carry out a 'zero speed' touchdown as he was concerned about subsequent failures as power was applied. The helicopter was flared and power was applied to cushion the landing. The already severe vibration however increased to 'unbelievable proportions' and the commander carried out an immediate touchdown onto an area of peat some 800 metres west and about 1,000 feet below the rock face. The main landing gear sank into the surface with the helicopter coming to rest in a nose up attitude and rolled to the right. The co-pilot immediately 'stopcocked' both engines and the commander applied the rotor brake. The commander, co-pilot and winch operator vacated the helicopter with minor bruising injuries.

The rescue was completed by an RAF Sea King helicopter launched from RAF Lossiemouth.

Flight recorder

The helicopter was fitted with a Combined Voice and Flight Data Recorder (CVFDR). The 60 minute voice recorder included most of the flight. Audio data on the blade strike was indistinct but the subsequent crew actions were conducted under considerable stress, including high vibration levels. Flight data recordings indicated normal operation of the helicopter up to the time of the blade strike. Attempts at double integration of the recorded 'g' parameters could not produce sufficient

accuracy to permit a comparison plot of the original hovering position with the final one. In any case the differences were likely to have been very small.

Discussion

Rock falls on Stac Pollaidh are a common occurrence and it is possible that a rock, dislodged from the surface, entered the rotor disc causing rotor blade damage and the subsequent imbalance. Eye witness reports however suggest that a tip strike on the rock face is the more likely explanation for the damage to all five rotor blade tips. Visual inspection of the blade tips revealed horizontal witness marks with little damage to the upper or lower blade surfaces.

The nature of an SAR operation often involves some exposure to hazards if the life-saving task is to be completed. Margins for error become small and this accident was the unfortunate result of an earnest and well conducted effort to retrieve a seriously injured climber.

Follow-up action

Following initial investigation of the accident by the helicopter operating company, a Flight Safety Circular was issued to all SAR units re-iterating the importance of maintaining adequate clearance from obstructions such as cliffs, rock faces, loose rock formations and ships etc. In addition all SAR units were reminded of the requirement (detailed in the Operations Manual, Search and Rescue section) for appropriate weights to be attached to the lower end of the 'hi-line', when operating close to cliffs, in order to reduce the downwash effects on vertical plumb of the line. The availability of any devices or systems that would assist crews in judging clearances of rotor tips from obstacles is being researched.