Piper PA-31-350, G-BMBC

AAIB Bulletin No: 1/2001

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Aircraft Type and Registration:	Piper PA-31-350, G-BMBC
No & Type of Engines:	2 Lycoming TIO-540-J2BD piston engines
Year of Manufacture:	1979
Date & Time (UTC):	14 June 2000 at 0950 hrs
Location:	In the Mersey Estuary west of Runway 09 threshold at Liverpool Airport
Type of Flight:	Public Transport
Persons on Board:	Crew - 1 - Passengers - 4
Injuries:	Crew - 1 (Fatal) - Passengers - 4 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	58 years
Commander's Flying Experience:	Estimated in excess of 18,000 hours Last 90 days - N/K Last 28 days - N/K
Information Source:	AAIB Field Investigation

Synopsis

The aircraft, operated by an Air Operator's Certificate holder, was engaged on an air ambulance operation from Ronaldsway in the Isle of Man to Liverpool. Having flown under VFR on a direct track to the Seaforth dock area of Liverpool the pilot flew by visual reference along the northern coast of the Mersey Estuary to carry out a visual approach to Runway 09 at Liverpool. During the turn on to the final approach, when approximately 0.8 nm from the threshold and 0.38 nm south of the extended centreline, the aircraft flew into the sea and disappeared.

The investigation concluded that the pilot lost control of the aircraft at a late stage of the approach due either to disorientation, distraction, incapacitation, or a combination of these conditions. Two safety recommendations are made; one calling for a review of the medical requirements for certain classes of licence, and one calling for a review of the circumstances in which a second pilot is required.

History of the flight

On the morning of the accident the handling agent telephoned Liverpool to obtain prior permission for the flight. He also filed a flight plan and collected that day's weather forecast. The flight plan notified of a Visual Flight Rules (VFR) air ambulance flight, with four persons on board, departing Ronaldsway at 0900 hrs, flying at 3,000 feet with a True Air Speed (TAS) of 180 kt with an estimated time en-route of 30 minutes and with a fuel endurance of 3 hours.

Having completed his part of the flight preparation the handling agent drove to the hotel to collect the pilot. He stated that the pilot, who remarked that he had retired early the preceding night, appeared normal and that he looked refreshed.

The pilot studied the weather information and, on arrival at the aircraft, carried out his pre-flight checks and completed the technical log and load sheet. A copy of the technical log was handed to the handling agent. The load sheet was retained on board the aircraft. There was no record of the aircraft having been refuelled at Ronaldsway, but it is estimated that the fuel remaining was more than sufficient for the return flight to Liverpool, including the necessary reserves.

At approximately 0905 hrs, later than planned, the ambulance arrived carrying a stretcher patient, his wife, a nurse and a medical student. The patient, who was loaded into the aircraft by the ambulance crew, was followed by the remaining three passengers. Hand baggage carried by the patient's wife was taken by the pilot and loaded into the nose baggage locker before he too boarded the aircraft and closed the door. The pilot then contacted the Ronaldsway tower controller using the callsign 'GOLF BRAVO MIKE BRAVO CHARLIE' ('BC') and was given taxi clearance at 0914:14 hrs. At 0916:30 hrs the controller instructed the pilot to 'lineup' and transmitted that the zone clearance was 'VFR SQUAWK 4561'. At 0918 hrs the pilot was 'cleared for take off'. The handling agent observed the aircraft as it departed. He stated that the taxiing and take off all appeared normal.

At 0919:39 hrs a similar type of aircraft (G-CITY) was flying on the same route to Liverpool and was cleared for take off. This aircraft departed with the accident aircraft insight ahead.

Three minutes after departure, at 0921 hrs, the pilot of 'BC' was transferred to the Ronaldsway approach control frequency. After initial contact the approach controller transmitted 'BRAVO CHARLIE CONTINUE VFR WHAT ALTITUDE ARE YOU CLIMBING TO?'. The pilot replied 'CONTINUE VFR (and I'm climbing to)1,500 FEET'. Moments later the pilot of 'G-CITY' checked in on the frequency stating that he still had preceding aircraft ('BC') in sight. At 0931 hrs the pilot of 'G-CITY' transmitted that he was MID CHANNEL CHANGING TO LIVERPOOL 119.85 MHz. The controller approved the change and instructed him to SQUAWK 7000. The pilot of 'BC' transmitted that he too would squawk 7000 and transfer to Liverpool.

The pilot of 'BC' was the first to make contact with Liverpool Approach. At 0939:30 hrs, having reminded the Liverpool controller that this was an air ambulance flight, he transmitted G-BMBC, A PA31 INBOUND FROM RONALDSWAY VFR 1,500 FEET; HAVE (airport information) JULIET; 27 MILES TO RUN AND REQUEST SPECIAL VFR CLEARANCE VIA SEAFORTH. The Liverpool approach controller replied bravo charlie ROGER REPORT AT SEAFORTH YOUR CLEARANCE IN THE ZONE WILL BE SPECIAL VFR NOT ABOVE 1,500 FEET ON THE QNH OF 1020; LANDING (Runway) 27; THE QFE 1017 MILLIBARS AND INFORMATION JULIETT IS CURRENT, HAVE YOU AN ESTIMATE FOR SEAFORTH?. The pilot replied that he was estimating Seaforth at 0947 hrs. At 0942:30 hrs the following aircraft (G-

CITY) was asked for his position and informed that 'BC' was about 2 to 3 miles ahead heading for Seaforth. The pilot of G-CITY was then instructed to fly at 2,500 feet and confirm that he required radar vectors for an ILS approach to Runway 27. The pilot of 'BC' was asked to report at Seaforth and confirm that the aircraft was still at 1,500 feet. At 0945:30 hrs the pilot reported at Seaforth and was instructed by the controller to ROUTE DOWN THE RIVER TO THE NORTH AIRFIELD (a disued airfield adjacent to the main airport) REPORT FIELD (the main airport) IN SIGHT. The pilot then asked if it was possible to join right base (for Runway 27). The controller advised that he would update the situation once the pilot had called at the north airfield or had the airport in sight. A few minutes later the controller made a general broadcast on the approach frequency updating the weather information for Liverpool. He transmitted ...VISIBILITY 3,000 METRES; WE HAVE FEW (clouds) AT 500 (feet), BROKEN (clouds) AT 1,000 (feet) AND OVERCAST AT 1,800 FEET.

Thirty seconds later, at 0948:30 hrs, the approach controller transmitted to 'BC' that the surface wind was 130º less than 5 kt and that a straight in approach for Runway 09 was available. The pilot confirmed that he would make an approach to Runway 09. The tower controller was informed by the approach controller, via intercom, that 'BC' would land on Runway 09. As a consequence the tower controller switched the approach lights on for Runway 09. The approach controller then asked the pilot to advise when he had the airfield in sight and gave the QFE as 1018 mb. At 0948:50 hrs the approach controller informed the tower controller that 'BC' had 2 miles to run. The tower controller confirmed that the aircraft was cleared to land. At 0949 hrs the approach controller relayed the clearance to the pilot of 'BC' and passed the wind as easterly less than 5 kt and again asked if he would advise when he had the airfield in sight. The pilot replied that he was cleared to land. The controller asked again DO YOU HAVE THE FIELD?. The pilot replied ON LEFT BASE AT THIS TIME. The controller repeated ROGER I HAVE BEEN ASKING YOU TO ADVISE FIELD IN SIGHT CONTACT THE TOWER 118.1 MHz. The pilot changed to the tower frequency and at 0949:30 hrs transmitted TOWER G-BMBC TURNING FINAL. The tower controller confirmed that 'BC' was cleared to land and that the surface wind for Runway 09 was light and variable. The pilot replied CLEARED TO LAND 09 BRAVO CHARLIE. This was the last transmission received from the pilot.

At 0950:30 hrs the tower controller asked the pilot of 'BC' to confirm his current position. He received no reply and, at 0951:50 hrs, having received no reply to subsequent attempts to contact the aircraft, the tower controller activated the crash alarm.

An instructor and student pilot, who had been carrying out a hover training exercise in a Robinson R22 helicopter near to the threshold of Runway 09, were requested to proceed to the area by the tower controller. They flew over the gantry supporting the approach lights (which were illuminated) for Runway 09 and after a few moments spotted some wreckage in the sea. The helicopter hovered above the wreckage that consisted of a pair of landing gear wheels, a small window, some personal items and pieces of paper surrounded by an oil slick. There was no sign of survivors. The R22 helicopter remained on station until replaced by the police helicopter that is based at the airfield. As he departed the scene the R22 pilot noticed the arrival of the first inshore lifeboat.

Previous flights

On the day before the accident, the pilot arrived at Blackpool Airfield at approximately 0900 hrs to carry out general company duties and prepare the aircraft for an air ambulance flight that afternoon. The flight was to be operated on behalf of the Isle of Man Department of Health and Social Security (DHSS). The Island's DHSS had been using an aircraft supplied and operated by a local Isle of Man based operator but on this occasion their aircraft was in for maintenance and thus they had to sub-charter the aircraft from Blackpool.

The aircraft was refuelled with 393 litres of 100LL aviation gasoline (AVGAS), filling the fuel tanks to full. Flight plans were filed for the positioning flight from Blackpool to Ronaldsway and the return air ambulance flight from Ronaldsway to Liverpool. At Liverpool a further 158 litres was uplifted to give a total of 600 litres, and 90 litres were used on the flight to Ronaldsway leaving 510 litres for the accident.

The pilot departed from Blackpool alone at 1417 hrs and arrived at Ronaldsway at 1444 hrs. He departed on the air ambulance flight for Liverpool at 1502 hrs with a stretcher patient, doctor and nurse on board. While he waited at Liverpool for the doctor and nurse to return from the nearby hospital he made a routine telephone call to the handling agent. After the aircraft's departure the agent had been informed by the Isle of Man DHSS that a further air ambulance flight was required for the following day. The pilot was informed of this and confirmed he could also operate that flight, deciding to stay overnight on the Island. That day's flight returned with the doctor and nurse to Ronaldsway arriving at 1711 hrs. The handling agent met the aircraft and transported the doctor and nurse back to their workplace. He returned to the airfield and drove the pilot to a nearby hotel for the night.

Radar information

The radar at St Annes, south of Blackpool, recorded the progress of the flight from the Isle of Man until its descent into Liverpool Airport. The aircraft's height was also recorded from the height encoding transmissions received from the aircraft. The recording showed a direct track from Ronaldsway to the Seaforth Docks area of Liverpool then a track that followed Mersey Entry/Exit Lane towards Runway 09 at Liverpool Airport (see Figure 1).

The altitude recorded showed the aircraft maintaining an altitude of 1,500 feet between 0923:23 hrs to 0933:25 hrs with a brief reduction in altitude to 1,300 feet between 0935:04 hrs and 0935:47 hrs. The calculated ground speed of the aircraft, averaged over 5 scans of the radar, showed during this period a speed of generally 160 kt increasing to 165 kt before returning to 155 kt. At 0946:33 hrs and for the next 1 minute and 35 seconds the aircraft commenced a gradual descent to 800 feet. Its ground speed was generally 165 kt reducing to 155 kt. The recorded altitude then remained constant at 800 feet with a ground-speed of 160 kt for a further 31 seconds when, at 0948:46 hrs, recorded altitude showed a gradual descent to the last recorded reading of 300 feet. During this final descent the ground speed reduced gradually to 136 kt. As the pilot transmitted he was turning onto finals for Runway 09 the recorded data showed an altitude of 300 feet and a ground speed of 136 kt.

The radar at St Annes did not observe the aircraft's position during the final seconds before impact and the radar at Liverpool, situated close to the impact position, had no recording facility. The approach controller however watched his radar screen after he handed over control of the aircraft to the tower controller. He recollected, with reasonable accuracy, the track followed by the aircraft as it turned onto the final approach and stated that that the aircraft overshot the extended runway centreline to the south and was on an intercept heading of less than 090° and on short finals when it disappeared.

Meteorological aspects

A weather observation was conducted after the accident at 0952 hrs. The weather recorded at Liverpool Airport was: surface wind 110°/04 kt, visibility 3,000 metres in slight drizzle; few clouds at 500 feet, broken at 1,000 feet, overcast at 1,800 feet. The temperature and dewpoint were 11°C,

the QNH was 1020 mb with a QFE of 1017 mb. The pilot of the R22 helicopter, hovering low near to the floating wreckage, estimated the visibility at the time as between 3,000 to 5,000 metres in light drizzle. He also reported that he could see the arriving police helicopter as it approached him when it was by holding point 'Delta' close to the threshold of the runway. The pilot of G-CITY, the other aircraft inbound to Liverpool from Ronaldsway, stated that until he climbed into cloud at 2,500 at the half way point at Liverpool, the visibility was such that he had good contact with the surface.

The accident site

The aircraft had crashed in the estuary of the River Mersey in the area of Eastham Sands on the approach to Runway 09 at Liverpool Airport. At the time of the accident the tide was nearly at high water giving a water depth of approximately 8 metres. At low tide the wreckage of the aircraft was found on Eastham Sands in a position approximately 0.8 nm from the touchdown point of Runway 09 and 0.38 nm to the south of the extended centreline.

Examination of the wreckage on the sandbar showed that the aircraft had broken into five major pieces as a result of the impact with the surface of the water. These were the fuselage, both wings and the two engines complete with their propellers. This was consistent with a water impact. Damage to the fuselage and wings indicated that the aircraft first impacted the water with the left wing tip whilst it was in a left turn, slowly descending and flying at a speed of approximately 120 to 130 kt. It was not possible to determine with any confidence the aircraft's heading at initial impact but the electrically powered aircraft heading indicator, mounted in the cockpit, had frozen on a heading of 065°. After the initial impact by the left wing tip the aircraft yawed rapidly causing severe disruption to the forward fuselage and the break-up of the aircraft. The aircraft's landing gear was extended but the wing flaps were found retracted. Inspection of the fuel tanks revealed a quantity of fuel onboard.

Wreckage examination

A detailed examination of the flying control systems did not reveal any pre-impact failures, restrictions or disconnections. Examination of the cockpit instrumentation and system selections revealed that all the navigation aids were selected 'ON'. The Automatic Direction Finder was switched on and tuned to 346 KHz, but this is not associated with any NDB in the vicinity of Liverpool. Nav 1 was selected on to the ILS frequency (111.75 MHz) which was radiating for Runway 27. Nav 2 was selected on to the Wallasey VOR on a radial of 162° from the beacon with the beam bar central. None of the electrical circuit breakers had tripped, the pilot's altimeter had been correctly set for the flight and the flying control trim systems were set at positions consistent with the aircraft's speed. The wing flap selector and cockpit flap position indicator were at the flap fully 'up' position, the engine fuel boost pumps were selected 'off', the engine cowl flaps were closed, the landing light selected 'off' and the fuel systems selected to the inboard tanks. The positions of the engine controls at the time of impact could not be determined due to the disruption caused by the separation of the engines and wings from the fuselage. Examination at the manufacturer's approved overhaul organisation revealed that there were no mechanical failures within either engine and that both propellers were rotating under power and that the blades were at or very close to their fine pitch position at impact.

Company operations manual

The company operations manual includes guidelines referring to two types of ambulance flights; Intensive Care Transport (ICT) and Ambulance Taxi Transport (ATT). ICT is defined as the air transport of patients with a medical condition normally requiring intensive care at the hospital of destination. These flights require a doctor to be onboard. ATT flights include all other types of

flight, when a doctor may or may not be carried depending on the circumstances, including simple escort flights.

Liverpool airport

The airport is situated on the north bank of the Mersey estuary 6.5 nm south-east of the city. Navigation aids include radar, a Non Directional Beacon (NDB) with a protected range of 25 nm, Instrument Landing System (ILS) and Distance Measuring Equipment (DME). The airfield has one runway orientated 090°/270° with an asphalt surface 2,286 metres in length and 46 metres wide. The landing distance available for Runway 09 is 2,225 metres. The radar, NDB, DME and ILS, which was radiating on Runway 27, were all serviceable at the time of the accident.

The lighting for an approach to Runway 09 consists of high intensity centreline lights with 5 cross bars. These lights extend 914 metres from the threshold and are installed on a gantry construction that extends into the Mersey estuary. The threshold is lit with high intensity green lights and green wingbars. The runway has high intensity bi-directional white edge lights spaced at 61 metres with a low intensity onmi-directional component as well as high intensity bi-directional colour coded centreline lights with red end lights and red wingbars. Visual approach slope guidance is provide by Precision Approach Path Indicators (PAPIs) installed to the left of the runway and set to an approach angle of 3°. All the lights were checked after the accident and found to be serviceable.

Extract from UK AIP for Liverpool Airport

4. Special Aerodrome Procedures Flights within the local circuit area of aerodromes within the zone or within access lanes of sectors serving these aerodromes may be made subject to the conditions below.

a. Liverpool - Air Traffic Rules for Liverpool CTR

During the notified hours of watch of Liverpool Air Traffic Control, the rules require that a pilot wishing to fly within the Control Zone must, unless otherwise authorised, comply with the following procedures:

i **CALL** the appropriate Unit on the frequency giving details of the aircraft's position, level and proposed track;

ii **OBTAIN CLEARANCE** from Liverpool ATC for the flight;

iii **LISTEN OUT** on the appropriate frequency;

iv **OBEY** all instructions from Liverpool ATC

b. Local Flying Area and Neston Lane

Within a local flying area of 1.5 nm radius centered on the aerodrome (position 532001N 0025100W), and within an entry/exit lane, width 1 nm, centre-line Liverpool Airport-Neston (532001N 0025100W - 531730N 0030336W) from the boundary of the local flying area to the west boundary of the Control Zone, flights without compliance with IFR requirements may take place subject to the following conditions:

i Aircraft to remain below cloud and in sight of the ground or water;

ii maximum altitude: 1,500 ft, Liverpool QNH;

iii minimum flight visibility: 3 km;

iv prior clearance to be obtained from Liverpool ATC.

c. Mersey Entry/Exit Lane

The local flying area is linked via the River Mersey to Seaforth Docks by means of an entry/exit lane, 1 nm in width, aligned on a centre-line joining positions 531927N 0025345W - 532300N 0025940W - 532741 0030205W ('Seaforth'). Flights may take place without compliance with IFR requirements subject to the following conditions

i Aircraft to remain below cloud and in sight of the ground or water;

ii maximum altitude: 1,500 ft, Liverpool QNH;

iii minimum flight visibility: 3 km;

iv prior clearance to be obtained from Liverpool ATC

5. VFR and Special VFR Flights

a Clearance may be requested for Special VFR flight within the Liverpool CTR and will be given whenever the traffic situation permits. Special VFR flights are subject to the general conditions laid down in ENR 1.2.

Note: Pilots holding a Private Pilot's Licence (Aeroplanes) are reminded of the flight visibility requirements for Special VFR flight laid down in Schedule 8 part B of the Air Navigation (No2) Order 1995.

b Aircraft may be given radar vectoring whilst within the CTR if, due to the traffic situation, ATC considers it necessary. Pilots are reminded that it is their responsibility when operating on a Special VFR Clearance to remain at all times clear of cloud and in sight of the surface and in flight conditions which will enable them to determine their flight path and ensure that they comply with the relevant low flying restriction of Rule 5 of the Rules of the Air. Pilots must inform the radar controller if compliance with these requirements entails a change of heading or level.

c Pilots are reminded that a Special VFR clearance applies only to flight within the CTR and does not extend to flight within the surrounding airspace.

d Special VFR flight may be subject to delay when they cannot be fitted readily into the traffic flow;

e In order to reduce conflict with IFR flights, Special VFR arriving/departing flights will normally be cleared not above a specified altitude and to route via a published Visual Reference Point.

f Special VFR clearances will not be issued to fixed wing aircraft departing from Liverpool if the reported weather conditions are; visibility 1,800 m or less, or the cloud ceiling is less than 600 feet.

g VFR clearance in the Control Zone will be given for flights operating in VMC. Routeing instructions and/or altitude restrictions may be specified in order to integrate VFR flights with other traffic. Pilots are reminded of the requirement to remain VMC at all times and to comply with the relevant parts of the Low Flying Rules and must advise ATC if at any time they are unable to comply with the clearance instructions issued.

Aircraft standard operating procedures

A normal visual circuit (two engines operating) is flown downwind with the landing gear selected down, the flaps selected to approach with the speed reducing to 115 kt. Abeam the threshold the manifold pressure is reduced to 20" MP and a slow descent initiated maintaining 115 kt. On base leg the speed is reduced further to 110 kt. On finals, full flap is selected and speed is reduced to 100 kt. The threshold is normally crossed at a speed of approximately 85 kt to 90 kt. At some stage prior to commencing the approach the propeller pitch is selected to maximum RPM, the mixtures fully rich and the fuel pumps and landing light selected 'on'.

Medical aspects

Certificate to maintain the validity of their licence. Certificates issued to pilots over the age of 40 years may be renewed every six months following examination by an Authorised Medical Examiner (AME). Additionally, pilots over the age of 50 years require an Electrocardiogram (ECG) to be taken as part of their 6 monthly medical examination. The pilot of the accident flight had an ECG, had been declared fit and issued with a Class I Medical Certificate by an AME on 4 May 2000.

The bodies of the pilot and the passengers were subject to post mortem examination. The results of these examinations revealed that they had all died as a result of 'drowning with multiple injuries'. Post mortem examination of the pilot further revealed evidence of enlargement of the left side of the heart and focal moderate to severe coronary artery atherosclerosis. The pathologist's report stated that, although the significance of this finding was uncertain, this degree of heart disease was potentially sufficient to cause sudden cardiac problems, including abnormal heart rhythms, chest pains and collapse.

Analysis

The progress of the flight from Ronaldsway until turning finals for Runway 09 at Liverpool was routine and without incident. Recorded radar information showed that the track was flown without deviation and generally at a consistent altitude. RT transmissions from the pilot did not reveal any abnormalities either from their content or his vocal expression. Examination of the aircraft did not reveal any pre-impact abnormalities within the structure, systems, controls or engines. The aircraft struck the sea in an attitude consistent with a controlled descent towards the runway and at the angle of bank expected for an aircraft regaining the runway centreline, but at a speed higher than for a normal approach.

In attempting to understand why the aircraft apparently flew into the sea, whilst generally under control and close to the approach lights and threshold of the runway, the following factors are relevant:

1 Situational awareness

The pilot may not initially have been visual with the airfield or runway and was using his local knowledge to position the aircraft for the final approach. The approach appears to have been hurried in that the aircraft was not in the configuration expected for an aircraft in that position on short finals carrying out a normal approach. The aircraft was some 20 to 30 kt faster than normal and had overshot the runway centreline before adopting a heading to regain the correct approach track from the south. Although the landing gear was selected down the normal selections of fuel booster pumps and landing lights had not been carried out, the flaps had not been selected and, furthermore, the pilot had never transmitted to ATC that he was 'visual with the field'.

2 Disorientation

The pilot may have become disorientated during the finals turn and inadvertently descended into the sea. The flight was operated as a Special VFR flight within the Liverpool Control Zone. The special aerodrome procedures for Special VFR require pilots to remain clear of cloud, in sight of the surface, and in flight conditions which will enable them to determine their flight path. Weather observations taken at Liverpool showed that visibility in the airport vicinity was reduced in drizzle to 3,000 metres. The tide was at or about high water at the time of the accident, thus the reduced visibility brought about by drizzle combined with the homogeneous surface of the water may have reduced the visual cues.

3 Distraction

Some unknown event or activity within the aircraft may have distracted the pilot such that he inadvertently allowed the aircraft to descend below the visual glide slope and make contact with the surface of the sea. Manoeuvering at a height of less than 300 feet in marginal VMC would have required the pilot's total concentration.

4 Incapacitation

The pilot's heart disease, discovered at post mortem examination, was potentially sufficient to cause sudden cardiac problems, including abnormal heart rhythms, chest pains and collapse.

Safety recommendations Recommendation 2000-49

It is possible that some incapacitation of the pilot, arising from his heart condition, contributed to the accident. He had undergone an aviation medical examination, including an ECG, some six weeks previously and yet no abnormalities had been detected and a Class I Medical Certificate had been issued by the AME.

The difficulty of predicting an occurrence of physical incapacitation at routine medical examinations is well recognised. The scope of the examination is limited to non-invasive procedures without which certain physiological abnormalities or deterioration may not be revealed. Nevertheless such instances do from time to time occur and it is inevitably questioned why the incapacitating condition could not have been detected prior to flight.

It is therefore recommended that, the Medical Sub-Committee of the Joint Aviation Authorities (JAA) should review the medical requirements for a certificate issued to pilots who are likely operate single pilot public transport flights. The review should include a statistical analysis of those accidents and incidents, which may have resulted from pilot incapacitation, and should determine

whether the current medical surveillance is appropriate. The review should also take into account any increased risk of medical incapacitation associated with a pilot's age.

Recommendation 2000-50

The transfer of patients by Air Ambulance under Intensive Care Transport (ICT) or Air Taxi Transport (ATT), where payment is made, falls within the category of public transport. The Air Navigation Order makes no provisions for discriminating between types of passengers on public transport flights. Furthermore, such flights are operated in accordance with the terms of an Air Operator's Certificate, the holder of which has demonstrated competence to undertake flights for the purpose of public transport in accordance with all applicable regulations.

The Air Navigation Order states the minimum crew required for public transport flights. Whilst the majority of public transport flights require an operating crew of two pilots, the aircraft involved in this accident was legally only required to have a single pilot. In the light of this accident, in which the pilot was either disorientated, distracted or incapacitated (or a combination of all three), the presence of a co-pilot on the flight could have averted the accident.

It is therefore recommended that the CAA, in conjunction with the JAA, review the circumstances in which the carriage of a second pilot is required for public transport flights.