Department of Trade

ACCIDENTS INVESTIGATION BRANCH

Beechcraft 95 - B55 (Baron) G - AZUJ Report on the accident at Birmingham Airport, England, on 29 November 1975

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No.	*Short title*	*Date of Publication*
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Department of Trade
Accidents Investigation Branch
Shell Mex House
Strand
London WC2R ODP

23 December 1976

The Rt Honourable Edmund Dell MP
Secretary of State for Trade

Sir,

I have the honour to submit the report by Mr G C Wilkinson, an Inspector of Accidents, on the circumstances of the accident to Beechcraft 95 – B55 (Baron), G-AZUJ which occurred at Birmingham Airport, England on 29 November 1975.

I have the honour to be
Sir
Your obedient Servant

W H Tench
Chief Inspector of Accidents

Accidents Investigation Branch
Aircraft Accident Report No. 18/76
(EW/C548)

Operator:		Mr E F Allchin
Aircraft:	*Type:*	Beechcraft 95 – B55 (Baron)
	Nationality:	British
	Registration:	G-AZUJ
Place of Accident:		Birmingham Airport, England 52° 27′N 01° 44′W
Date and Time:		29 November 1975 at 2105 hrs All times in this report are GMT

Synopsis

The accident was notified to the United Kingdom Department of Trade on 29 November 1975 by London Air Traffic Control Centre (LATCC). The investigation was carried out by the Accidents Investigation Branch of the Department of Trade with assistance from the Federal German Republic and Belgian authorities. There was no accredited representation. Operations, engineering and human factors groups were established under the investigator in charge.

The accident occurred when the aircraft returned at night to its home base after an international private flight and the pilot attempted to make a landing in fog. Three unsuccessful approaches were made using the Instrument Landing System (ILS) but on each occasion the pilot made an overshoot. After initiation of the third overshoot the aircraft lost height and struck the ground 670 feet to the right of the runway and 4,800 feet beyond the threshold. The aircraft caught fire and was destroyed. All four occupants were killed.

The report concludes that the reason for the loss of height could not be determined but in the light of the handling pilot's medical history it is considered possible that he became incapacitated and that the other pilot was unable to maintain control of the aircraft.

1. Factual Information

1.1 History of the flight

The aircraft, with four occupants on board, was making a combined business and private flight to Stuttgart, Germany from its home base at Birmingham. It was a Company owned aircraft and was operated by the firm's Managing Director who was an experienced pilot but who had been declared medically unfit to exercise the privileges of his pilot's licence approximately one year before the accident occurred. He was seated in the aircraft's front left hand seat on the accident flight and is believed to have been handling the aircraft himself, and is referred to in this report as the handling pilot. A friend, who was a qualified flying instructor, was sitting alongside him in the front right hand seat. The two passengers occupied the remaining seats in the rear of the cabin.

The aircraft left Birmingham on 26 November 1975 for a direct flight to Stuttgart and remained there until 29 November 1975. It departed Stuttgart at 1506 hrs and arrived in Ostend, Belgium at 1734 hrs. During the turn round a weather briefing for the flight to Birmingham was obtained from the meteorological office and the aircraft was refuelled to full tanks. The handling pilot filed an Instrument Flight Rules (IFR) flight plan to Birmingham requesting a route via Clacton and then airways R1 and A2 to Daventry at flight level (FL)60. After completing the details on the flight plan form he handed it to the other pilot who signed it as pilot-in-command of the flight. He is therefore referred to in this report as the pilot-in-command.

The aircraft departed Ostend at 1925 hrs and was cleared to climb to FL80. This cruising level was maintained for the rest of the flight which was apparently uneventful. The aircraft was advised by London Air Traffic Control at 1943 hrs that the visibility at Birmingham Airport was 800 metres in fog.

When the aircraft was in the vicinity of the Daventry very high-frequency omni-directional beacon (VOR) it was cleared by London Air Traffic Control to call Birmingham Approach on frequency 120.5 MHz. When contact was established, the Birmingham controller passed the following aerodrome weather report: 'surface wind calm; visibility 100 metres in fog; sky obscured; temperature zero; runway visual range (RVR) for Runway 33, 300 metres'. This message was acknowledged by the handling pilot who replied: 'Okay we'll have a look'. The controller then instructed the aircraft to steer 290°(M) for radar vectoring to the Instrument Landing System (ILS) for Runway 33 and cleared it to descend to 3,000 feet on the Birmingham QNH of 1001 millibars.

At 2033 hrs the handling pilot reported that the aircraft was established on the localiser. The controller's radar screen indicated that the aircraft's range was 11½ miles and the controller cleared it for further descent on the ILS. During the approach the controller confirmed that the RVR was still 300 metres, cleared the aircraft to land and issued instructions in the event of the necessity to carry out an overshoot.

The controller informed the pilot when the aircraft's range was 1½ miles from touchdown, at 1 mile and finally at ½ mile. Almost immediately after this last call the pilot reported that he was overshooting. When asked about his intentions the handling pilot replied, 'We'll turn and have another go'. He was then instructed to climb to 2,000 feet and turn right onto heading 120°(M). During the subsequent conversation with the controller the handling pilot reported that they had just seen the aerodrome lights on the approach but that it had been too late when they came into view.

The aircraft was repositioned by radar onto the localiser at a range of about 8 miles and cleared for a second approach. The pilot was informed by the controller that the Category 2 lighting had been switched on to provide assistance. On this approach no range information was passed to the aircraft. After the landing clearance had been acknowledged the handling pilot reported on RTF 'we didn't make it that time'. When asked to repeat his message the pilot replied 'I'll have another go'. Once again overshoot instructions were issued to the aircraft to climb straight ahead to 2,500 feet on the Birmingham QNH, 1001 millibars.The handling pilot repeated that it was intended to make another approach and asked whether there was any advantage in making a radar descent to Runway 15. When told that radar terminated at 2 miles on that runway he asked whether Coventry Aerodrome was open. He was told that the East Midlands Aerodrome was open. He replied that they would make another attempt to land at Birmingham and was again vectored by radar on to the localiser for Runway 33.

The aircraft commenced its third ILS approach and was cleared to land. On this approach range information was passed at 2 miles and again at 1 mile. The 2 mile check was acknowledged by the handling pilot but there was no reply to the second transmission. The aerodrome controller, who had been monitoring the aircraft's movements, reported on the intercom to the radar controller that he had heard the aircraft fly past the control tower although he had not been able to see it and that it had overshot again. The radar controller once more passed overshoot instructions to the aircraft but received no reply to either this or his further repeated transmissions. He noticed that the aircraft had not reappeared on his radar screen after passing through the overhead position. He informed the aerodrome controller and as a result emergency action was initiated and the fire and rescue service were informed of a probable aircraft crash.

Although there were strong indications that the aircraft had crashed there was no way of establishing where this had occurred because of the weather conditions. It was assumed that the accident had probably occurred near to the upwind end of Runway 33 and consequently the fire service started their search by making a broad sweep along the runway itself. They were considerably hampered by the fog and having reached the end of the runway without seeing anything retraced their path and broadened their search. On the return journey the crew of one of the fire vehicles saw the glow of a fire through the fog. The wreckage of the aircraft was found just outside the aerodrome perimeter fence and the fire services commenced their task of extinguishing the fierce fire which enveloped it. The aircraft had struck the base of some medium sized trees which were growing in a hedge and had come to rest in a field. The four occupants of the aircraft died as a result of the accident.

A witness in an observation hut alongside the threshold to Runway 33 had seen the aircraft briefly through the fog as it made its second approach to land. It had passed low directly over the hut which was to the left of the runway. This witness again saw the aircraft on its third approach and this time it appeared to be flying over the runway threshold at a height of about 50–100 feet. The aircraft continued its flight and disappeared into the fog without attempting to land. The commencement of this overshoot was also seen by two other witnesses who were positioned close to the observation hut.

The accident occurred at night in fog on the north side of Runway 33 at Birmingham Airport, 52° 27'N 01° 44'W, at 2105 hrs on 29 November 1975.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	2	2	–
Serious	–	–	–
Minor/none	–	–	

1.3 Damage to aircraft

The aircraft was destroyed.

1.4 Other damage

A medium sized tree was destroyed.

1.5 Personnel information

1.5.1 The pilot who occupied the front left hand seat on the aircraft was Managing Director of the Company which owned the aircraft and he was responsible for its operations. He did not hold a valid pilot's licence at the time of the accident although he is believed to have been handling the aircraft on the accident flight.

1.5.2 *Pilot-in-command*

Age	52 years.
Licence	Private Pilot's Licence (PPL) valid until 8 June 1976.
Ratings	Aircraft groups A and B. Instructor's rating valid until 20 September 1976. Instrument Meteorological Conditions (IMC) rating valid until 7 April 1976. Night rating. Certificate of experience valid until 11 January 1976.
Flying experience	The Pilot's current log book was not recovered. His flying experience was estimated to be over 4,000 hours. It is not known how many flying hours he had completed in Beech Baron aircraft.
Medical certificate	Last medical on 25 September 1975, certificate valid until 30 September 1976.
Foreign Licences	United States private pilot's licence for single and multi-engine land planes issued on 7 May 1974 on the basis of a valid UK Private Pilot's Licence.

He had been a flying instructor for most of his flying career and at the time of the accident was Chief Flying Instructor of a local Birmingham flying club.

1.5.3 Handling pilot

Age:	61 years.
Licence:	Private Pilot's Licence with IMC and night ratings but not valid as he did not have a current medical certificate.
Flying experience:	
Total pilot hours:	2,469.
Total hours on type:	In command – 426. Co-pilot – 28.
Medical certificate:	The pilot was declared medically unfit in November 1974.
Foreign licence:	US private pilot's licence for single and multi-engine landplanes and including an instrument rating. This licence was first issued on 21 January 1974 on the basis of the pilot holding a valid UK pilot's licence. The instrument rating was added on 15 February 1974.

This pilot was issued with a PPL in June 1956 and the licence was renewed on 27 September 1971 for a further 5 year period. The licence was endorsed for group A and B landplanes. The IMC rating was first issued on 21 November 1968 and was valid at the time of the accident.

The handling pilot was responsible for the operation of the aircraft which was acquired by his Company in July 1972. He used it for both business and private purposes and made fairly frequent flights in it to the Continent. The flight to Stuttgart was one which he had made several times previously. As far as can be ascertained he was the only person to operate the aircraft and he always flew it himself, occupying the front left hand seat and handling both the navigational work and the radio communications. He apparently only rarely allowed any other pilot who accompanied him to handle the aircraft's controls.

He suffered a coronary thrombosis in February 1974. Immediately upon his return to the United Kingdom from a visit to the USA during which he undertook an instrument flying course, he spent 19 days in hospital, part of it under intensive care treatment. There is no record that he reported his illness to the CAA Medical Branch.

According to his flying log book he returned to flying on 14 April 1974 when he carried out a refamiliarisation flight in G-AZUJ with a flying instructor. Between that date and the end of October 1974 he logged 70 hours pilot-in-command time in G-AZUJ including several flights to the Continent. The remarks column in his flying log book indicates that he was accompanied by another pilot on most of these flights.

On 31 October 1974 his previous coronary illness came to light when he underwent a routine examination for the renewal of his medical certificate. He was declared unfit. His PPL therefore became invalid as a pilot is not entitled to perform any of the functions to which his licence relates unless it includes a valid medical certificate. It is the practice in the UK, following ICAO recommendations, that a medical certificate is withheld for a period of 2 years from any pilot who suffers from heart disease. This precautionary action is based on statistical evidence indicating that a second heart attack, should it occur, is most likely to happen within this period after which the chances of a recurrence of an attack begins to diminish.

The pilot was unwilling to accept the action taken by the CAA Medical Branch in refusing to issue him with a medical certificate. He had had no recurrence of the symptoms of heart disease, had been declared clinically in good condition by a doctor and felt well himself and believed that he was capable of flying an aeroplane. He repeatedly tried to persuade the CAA's doctors to reconsider their opinion and issue him with a medical certificate. He sought confirmation from the CAA that whilst he was making his appeal, he could still fly provided that an instructor accompanied him on board the aircraft. He was told that in the opinion of the CAA Medical Branch he was not fit to fly at all for the time being. He underwent medical examinations in February, July, August and October 1975 but was informed that his condition was such that he could not be issued with a medical certificate. He was also told that he was 2 stones above the recommended weight for his height and was advised to reduce weight.

According to a second flying log book which the pilot started after being declared unfit, he continued active flying and in the period between 29 November 1974 and 30 April 1975 he logged 51 flying hours as pilot-in-command including several flights to the Continent. These entries are omitted from his original flying log book. Both log books, however, show evidence of flying in the period from May to November 1975. According to the original flying log book he recorded 50 hours P2 flying time in G-AZUJ. These included several flights to the Continent and his original flying log book indicates that on all except two of these flights, the pilot-in-command of the aircraft was the same person who signed the flight plan as the pilot-in-command of the accident flight. The second flying log book indicates that in this period he flew 58 hours and that 48 hours of these were logged as pilot-in-command.

The pilot suffered from shortness of breath at times and an oxygen bottle was fitted onto the back of the front right hand seat for his use in flight. He was also under treatment for gout at the time of the accident.

People who had flown with this pilot reported that he was in the habit of wearing gloves when he flew.

1.6 Aircraft information

1.6.1 Details of aircraft

Type	Beechcraft 95-B55 Baron
Date of manufacture:	1972
Certificate of airworthiness:	General Purpose Category Valid until 7 February 1976
Maintenance:	The aircraft had been maintained in accordance with the appropriate maintenance schedule
Total airframe hours:	503
Maximum Authorised Landing Weight:	5,100 lb
Weight at time of accident:	4,783 lb (estimated)
Centre of gravity limits:	at 4,783 lb; between 77.9 and 86.0 inches aft of the datum

Centre of gravity at time of accident:	81.97 inches aft of datum (estimated)
Fuel on board at time of accident:	73 imperial gallons (estimated)
Type of fuel:	Avgas 100L

1.6.2 Description and equipment

The Beechcraft Baron is a twin engined, six seat, low wing monoplane. G-AZUJ was fitted with dual flying controls with one full set of blind flying instruments positioned on the left side of the aircraft. The only flying instrument to be provided on the right hand side of the instrument panel was a second pressure altimeter. The aircraft was equipped with an automatic pilot which had the capability for ILS localiser and glide slope coupling and which also had a 'go-around' facility. The radio equipment comprised two VHF combined communications and navigational radios, an ADF receiver, DME and transponder equipment. The pilot's radio navigational instruments were fitted on the main flying instrument panel on the left hand side of the aircraft.

Although the aircraft was normally a six seater only four seats were fitted on the accident flight, the rear two seats in the cabin having been removed. A 22 cubic feet portable oxygen bottle was mounted on the back of the front right hand seat.

1.7 Meteorological information

A slack westerly airstream covered the route from Ostend to Birmingham at the time of the accident. There was no cloud over England but fog formed extensively during the evening and the visibility decreased to 100–400 metres in those areas covered by fog. The surface wind was light and variable.

An aftercast prepared by the meteorological office for the period covering the accident showed that the visibility in the vicinity of Birmingham Airport was between 100 and 400 metres with patches of freezing fog. The depth of the fog was estimated to be about 300 feet.

The following information for Birmingham Airport was given to the pilots by the meteorological office at Ostend before their departure.

Birmingham forecast 1900–0400 hrs:

Surface wind	Calm
Visibility	4,000 metres
Gradually 2000–2300 hrs	600 metres freezing fog
intermittently 2100–0400 hrs	200 metres

Birmingham observation 1750 hrs:

Surface wind	200 degrees 05 knots
Visibility	5,000 metres gradually becoming 3,000 metres
Cloud	1 okta alto-cumulus 10,000 feet
Temperature	0° C
Dew point	Minus 01° C

The following observations were made at Birmingham Airport:

2050 hrs	
Surface wind	190 degrees (T) 02 knots
Visibility	100 metres fog, sky obscured
Temperature	plus 01° C
2110 hrs	
Surface wind	170 degrees (T) 02 knots
Visibility	100 metres fog, sky obscured
Temperature	plus 01° C

The following RVR values were recorded for Runway 33 at Birmingham Airport:

1950 hrs	900 metres
1952 hrs	700 metres
1954 hrs	600 metres
1956 hrs	450 metres
2000 hrs	300 metres
2030 hrs	300 metres

The weather at East Midlands Airport during the relevant period was:

1950 hrs	
Wind	200 degrees 05 knots
Visibility	3,000 metres, smoke
2050 hrs	
Wind	Calm
Visibility	3,000 metres, smoke

The accident occurred at night with the sky obscured by fog.

1.8 Aids to navigation

Birmingham Airport was equipped with surveillance radar and a very high frequency direction finding (VDF) facility. An Instrument Landing System (ILS) with a 3° glide slope was installed on Runway 33. A co-located outer marker (OM) and a non-directional beacon (NDB) were situated 4 nm from the threshold of Runway 33 and another NDB, was located 4 nm beyond the upwind end of the runway. All these radio navigational aids were switched on and serviceable at the time of the accident. The ILS equipment was both ground and flight tested after the accident and found to be working satisfactorily.

1.9 Communications

Normal two-way communications were maintained between the aircraft and Air Traffic Control throughout the flight. All the transmissions from the aircraft to Birmingham Approach Control on frequency 120.5 MHz were identified as being in the voice of the handling pilot who was seated in the front left hand seat.

1.10 Aerodrome information

Runway 33 at Birmingham Airport was 7,400 feet long and 150 feet wide although the landing distance was reduced to 7,000 feet by a displaced threshold. The runway was equipped with high intensity white and low intensity red approach lights; high intensity threshold lights and high intensity runway lights. Additional lighting was provided to meet the standard required for Category 2 landings. All these lights were switched on and were serviceable at the time of the accident although the Category 2 lighting was only switched on after the aircraft had passed the outer marker inbound on each approach. Visual Approach Slope Indicators (VASIS) were positioned each side of the runway referenced to a 3^{o} glide slope angle and these were also switched on and serviceable.

RVR values were calculated from information on the number of runway lights which were visible to an observer who was positioned near the runway threshold.

1.11 Flight recorders

Not required and not fitted.

1.12 Wreckage and impact information

The aircraft struck the ground at the base of some medium sized trees which were part of a hedge which ran in an approximate NE/SW direction. The accident site was just outside the aerodrome boundary fence in a position 670 feet to the right of the centre line of Runway 33 and 4,800 feet upwind of the runway threshold. The aircraft's heading on impact with the trees was approximately 360^{o}(M) and the terrain in the area was essentially flat. The aircraft's attitude was estimated to be 5^{o}–10^{o} right wing down. The evidence indicated that the aircraft was descending at an angle of between 5^{o} and 10^{o} and its speed was calculated to be approximately 130 knots.

The impact with the trees caused severe damage to the aircraft and the structure began to disintegrate as it travelled forward. The main cabin wreckage came to rest inverted about 240 feet from the initial impact point and was badly damaged by fire. All four occupants were thrown out of the wreckage and three of them were still retained in their seats by the seat belts when found. It was possible from this evidence to identify where each occupant was sitting in the aircraft and thus establish that the unlicensed pilot whose firm owned the aircraft was in the front left hand seat while the other pilot, who had signed the flight plan as 'pilot-in-command' was sitting in the front right hand seat.

Examination of the wreckage indicated that both the undercarriage and the flaps were fully retracted on initial impact. There was no evidence of pre-crash failure or malfunction in the control runs and no evidence of damage to the control surfaces. The elevator trim was in a mid position at the time of impact. There was evidence that the bulbs in the rotating beacon were illuminated at the time of impact indicating that electric power on the aircraft was available from the main bus-bar at the time. Damage sustained by the propellor blades together with impact marks on the ground and trees indicated that both engines were under considerable power when the accident happened.

The port control wheel was found intact. The left hand grip of the starboard control wheel was broken off in a forward direction with a slight twisting to the right which was consistent with hand loading being applied at the time of impact. The moving cross-member linking the two control wheels to the aileron torque tube and elevator push-pull rod in the centre of the instrument panel, had failed in a manner indicating forward loading of the starboard wheel.

The fire destroyed much of the evidence of the flight instruments and the auto pilot. The sub-scale on the starboard altimeter was set to 990 millibars which was the Birmingham QFE setting.

1.13 Medical and pathological information

A full autopsy examination was carried out on three of the occupants of the aircraft and a limited examination was made on the fourth body which was burnt in the fire. All the occupants died from multiple injuries sustained at initial impact. The toxicological examination was essentially negative.

The examination of the body of the pilot who occupied the front left hand seat (the handling pilot) in the aircraft revealed evidence of pre-existing coronary disease which was consistent with the illness from which he suffered in February 1974. There was no macroscopic or microscopic evidence of recent pathological changes or thrombosis and there was some evidence that the pilot was alive at the time of the initial impact. Although the pilot was under medical care and a great quantity of drugs and other medicants were found in the wreckage, the drug screening on the body was entirely negative.

The hands of both pilots were examined. The most significant injuries were to the left hand of the pilot-in-command which were consistent with the pilot holding the control wheel firmly at the time of the initial impact. The hands of the other pilot showed only minor injuries. This latter pilot was wearing gloves at the time of the accident.

1.14 Fire

A very severe fire broke out in the wreckage of the aircraft. The fire services were hampered by fog when searching for the wreckage but finally located it just outside the aerodrome boundary fence. They were unable to drive their vehicles direct to the scene from their position because of the presence of a small ditch just inside the fence. Rather than make a detour in the fog to get nearer the fire they decided to run their hoses across the field to the wreckage through a gap which was cut in the fence.

One emergency tender, two major foam tenders and one minor water foam tender from the aerodrome fire service attended the fire. One major tender and one water tender were used to extinquish the fire using 150 gallons of FP7C foam compound and 2,500 gallons of water. Seven fire appliances included a control unit and four ambulances from outside sources also attended the scene of the accident.

1.15 Survival aspects

The accident was non survivable.

1.16 Tests and research

Nil.

1.17 Additional information

Nil

1.18 New investigation techniques

None.

2. Analysis

2.1 General

The aircraft made an apparently uneventful flight from Ostend to Birmingham but then made three unsuccessful attempts to land in thick fog. The accident occurred while it was carrying out an overshoot after completing the third approach. An examination of the wreckage revealed no evidence of failure or malfunction which could have had a bearing on the cause of the accident. The damage sustained by both propellers indicated that they were rotating under considerable power when the aircraft struck the trees. Each front seat was occupied by a pilot; it was therefore first necessary to determine which of the two pilots was responsible for handling the aircraft.

As the aircraft's left hand instrument panel contained the one set of blind flying and radio navigational instruments a pilot flying the aircraft would normally occupy the left hand seat. The only flight instrument provided on the right hand side was a pressure altimeter and a pilot flying the aircraft from this seat would need to refer across to the opposite panel for his speed, attitude,heading and radio navigational information. It would be very difficult for him to fly the aircraft accurately on instruments alone.

The front left hand seat of the aircraft was occupied by a pilot who no longer held a valid licence because he had been declared medically unfit approximately one year before the accident. He was, however, Managing Director of the firm which owned the aircraft and was responsible for its operations. Following his recovery from a heart attack he returned to active flying but appears to have been usually accompanied by other pilots whose duties were presumably to take control should he become incapacitated. It was apparent that he very rarely let any other pilot handle the controls or assist him with the navigation or radio communications. Entries in the aircraft's log books and his own flying log books showed that the loss of his medical certificate had not prevented him from continuing to fly the aircraft himself. It is therefore entirely consistent with his usual behaviour patterns that he should have occupied the left seat and be flying the aircraft on the flight from Ostend.

Other circumstantial evidence supported this conclusion. The voice on the aircraft's radio while it was in communication with the Birmingham controller was identified as belonging to the pilot in the left hand seat. The RTF transcript showed that he told the controller 'I'll have another go' when asked after the second overshoot for his intentions. He was also wearing gloves when the accident happened and was known to be in the habit of wearing them when he was handling tne controls. It was therefore concluded that the aircraft was being flown from the left hand seat while the attempts to land were being made.

2.2 The circumstances of the accident

The pilots were informed of the poor visibility at Birmingham on first contact with the controller thus the crew had adequate warning of the adverse conditions. It was not imperative for them to land at Birmingham as there were other aerodromes available which enjoyed better weather conditions and the aircraft was not short of fuel. The handling pilot, however, decided 'to have a look'. It may be that he did not realise how bad the conditions were and that the runway would not come into sight unless a very low approach was made. He did not divert after the first unsuccessful approach and it is difficult to understand why he persisted in his attempts to land unless he thought that, having seen some lights on the first approach, he would be more lucky during a later attempt. There is always a strong compulsion to land at one's planned destination; however under the existing weather conditions it would have been prudent to divert rather than make repeated attempts to land in conditions that precluded operations by airline aircraft.

The aircraft made a very low approach on its third attempt to land and was about 50–100 feet above the ground when it crossed the runway threshold. The landing was not completed, however, and it may be that either the aircraft was not aligned with the runway or that the pilot did not see the lights early or clearly enough to orientate himself for the landing. The fact that the undercarriage and flaps were fully retracted when the aircraft struck the ground confirmed that the attempt to land had been discontinued and that another overshoot was being initiated.

When the aircraft was last seen it was flying above the runway and there were no indications at that time that anything abnormal had occurred. After disappearing from view in the fog, however, it made a gentle turn to the right and lost height. Its attitude on impact indicated that it was descending at a fairly shallow angle. There was no evidence that the aircraft's failure to climb was caused by loss of engine power or that it had been involved in any violent manoeuvre such as a steep turn or a stall after it had been lost from sight.

The injuries to the left hand of the pilot in the right front seat indicated that he was holding the control wheel when the accident occurred. It is concluded, therefore, that he had recognised the development of a situation which endangered the safety of the aircraft and attempted to take over control. He was, in the event, unable to prevent it from striking the ground either because the situation had developed too far or because of difficulties in controlling the aircraft by reference to flying instruments positioned on the opposite side of the aircraft.

It has not been possible to determine the reason why the pilot-in-command took over control from the handling pilot. Possibilities include loss of concentration by the handling pilot which can follow prolonged periods of intensive instrument flying or lack of altitude awareness because of distraction. One possibility which must be considered seriously is that the handling pilot became incapacitated. He would have been feeling tired at the end of a long day's flying and trying to land in such difficult conditions would have caused considerable mental and physical strain. These conditions are commonly associated with the development of the symptoms of coronary heart disease and the handling pilot would have been particularly susceptible to a further heart attack because of his physical condition. It is possible that he became incapacitated with severe pain or collapsed and that the pilot in the right seat was unable to control the aircraft subsequently. Unfortunately this condition when followed shortly by death rarely leaves any evidence by which it can be identified and therefore its existence cannot be established.

It is concluded, therefore, that while there is insufficient evidence to determine whether the handling pilot suffered a heart attack during the third overshoot, his medical history and physical condition was such that there is a strong possibility that he became incapacitated and that the aircraft lost height and struck the ground before the other pilot could establish control.

2.3 Medical aspects

The CAA witholds a medical certificate from a pilot who has suffered a coronary attack in the first place as a precautionary measure to protect both him and his passengers from the consequences of incapacitation in the air. A person who has suffered a heart attack is at greater risk from a further attack than the normal person and the 2 year waiting period which is imposed from the time the disease becomes apparent before the re-issue of a licence is considered is based on statistical evidence that any recurrence of coronary illness is most likely to occur within this period. Occasionally a pilot may be issued with a 'safety pilot' endorsement if the Authority thinks this is justified. The re-issue of a medical certificate is not automatic but depends on the subsequent fitness of the pilot concerned. The handling pilot underwent several medical examinations in his efforts to be declared fit but failed to satisfy the CAA's doctors that his condition had improved sufficiently for them to consider re-issuing him with a medical certificate before the 2 year period was up.

In addition to his heart condition he was over 2 stones above the recommended weight for his height and he had been advised to reduce his weight accordingly.

The handling pilot recognised the advantages of being able to use the aircraft for business trips at his own convenience and also at short notice in order to conduct business with his firm's clients. He regarded flying as one of the major interests in his life and spent a great deal of time with the aircraft. It was therefore a great disappointment to him to be declared medically unfit because of his coronary illness. He did not accept the seriousness of his illness and the possible consequences of another heart attack because he felt fit after his recovery and apparently had suffered no recurrence of any of the symptoms of coronary heart disease. He was told by one of the doctors who examined him that he was clinically in good condition and he therefore considered the action taken by the CAA's medical branch to be both unjustified and unnecessary. He made repeated and strenuous efforts to persuade the authorities either to reverse their decision or to add a 'safety pilot' endorsement to his licence so that he could continue to fly. He was told that his condition did not warrant an early return of his medical certificate and was advised that in his own interest he should not fly at all until his condition had greatly improved.

The entries in his flying log books show that he continued to fly the aircraft after the withdrawal of his medical certificate. He does, however, appear to have accepted the wisdom of carrying a safety pilot when he flew. The purpose of carrying a safety pilot is to ensure that there is someone who can take control should the handling pilot become incapacitated. There are situations, however, where the second pilot can be only partially effective and this applies particularly to aircraft like G-AZUJ which are not equipped with a full complement of blind flying instruments on the right hand side. It would be very difficult for the safety pilot to monitor the progress of an instrument approach, for example, or to fly the aircraft after taking control in a critical situation such as an overshoot. Flights in instrument conditions, therefore, place a considerable responsibility on the safety pilot.

In view of the handling pilot's medical history it is considered that he should not have been handling the controls of the aircraft.

2.4 Crew considerations

There is sometimes doubt about who is the commander of an aircraft which is engaged in private flying when 2 experienced pilots are on board. It is normally assumed that the pilot in the left hand seat is in command because he is flying the aircraft. In the case of the accident flight the pilot in the left hand seat, as Managing Director of the firm which owned the aircraft, was responsible for its operation and because he made the decisions about how and when it was to be used he would normally be considered as its commander. When his medical certificate was withdrawn his pilot's licences became invalid and he could no longer exercise the privileges of his licences and therefore in a legal sense could no longer be the commander of the aircraft. He appears, however, to have regarded those pilots who were invited to accompany him as safety pilots only, who were not expected to play an active role in the aircraft's operations. In effect he retained, in practical terms, the role of commander of the aircraft.

The pilot in the right seat was the only person who was qualified to act as commander of the aircraft and he did in fact sign the flight plan for the flight as 'pilot-in-command'. However, a pilot cannot become a commander as a result of a licence irregularity on the part of the other pilot which he may know nothing about. As an old acquaintance, the pilot in the right seat must have known of the other's previous illness but as he knew that the other pilot was still actively flying he may not have known that his medical certificate had been withheld. However in practical terms he could not exert authority over the other pilot once the aircraft was airborne if he should disagree with any decision, such as attempting to land at Birmingham in fog. As a flying instructor he would normally expect any student pilot to accept his authority and decisions but on this occasion he was flying

with a pilot who was experienced and was the operator of the aircraft. He could therefore only act in a passive role unless his position had been clearly defined before take-off.

There was no evidence to indicate what private agreement about the flight was made between the two pilots. Any pilot who is asked to accompany another pilot on a flight should ensure that he understands the circumstances fully and, if he is to become the nominal commander of the aircraft, that he is in a position to exert his authority over the conduct of the flight and can handle the aircraft satisfactorily from the seat that he occupies.

As part of the flight from Ostend to Birmingham was flown in controlled airspace it would have been necessary for the commander of the aircraft to hold an Instrument Rating. Neither of the two pilots was so qualified.

2.5 Weather aspects

The pilots were warned of the weather conditions at Birmingham long before they reached the aerodrome. It is sometimes difficult for pilots who haven't experienced low visibility on an approach to realise how badly their vision is affected. When the RVR is as low as 300 metres it is not possible to see the approach or runway lights until seconds before touchdown. To attempt a landing in these conditions, therefore, the aircraft has to be flown to a very low altitude and be in exactly the right position as it approaches the runway. This requires very accurate flying especially in the last stages of the approach when the ILS localiser and glide slope beams are very narrow. The risks involved if the aircraft is not correctly positioned would not normally make an approach in this sort of weather acceptable except in an emergency. The prudent course, therefore, would have been to divert to the nearby East Midlands Airport without even attempting an approach at Birmingham.

There is always a strong compulsion to try and land at ones planned destination especially when it is the home base and there is the tiresome business of travelling back from the diversion aerodrome. The temptation to start an approach in order to see what the conditions are like may lead to unnecessary risks being taken. The pilot engaged in public transport flying may not commence an approach if the visibility is below his company's operating minimum. No such prohibition exists for private flights. It is patently absurd to allow private flights to operate when airlines are prohibited from doing so. One feature of a laid-down visibility minimum is that the decision is taken away from the pilot and he is not required to make a personal judgement. It would seem desirable, therefore, for recommended aerodrome operating weather minima, applicable to non-public transport flights, to be established at all aerodromes where it is practicable to do so.

3. Conclusions

(a) *Findings*

(i) The aircraft had been maintained in accordance with the approved maintenance schedule and its documentation was in order.

(ii) The centre of gravity of the aircraft was within the prescribed limits.

(iii) The aircraft had sufficient fuel on board for a further 3 hours flying.

(iv) No evidence was found of a failure or malfunction in the aircraft which could have had a bearing on the cause of the accident.

(v) On the third approach to land the aircraft flew over the region of the runway threshold at a height of approximately 50–100 feet but a landing was not completed and the aircraft started an overshoot.

(vi) During the overshoot the aircraft lost height in a gradual descent and struck the ground.

(vii) The pilot in the left hand seat was flying the aircraft during the attempts to land, he was effectively in control of the flight and was also carrying out all the radio communications.

(viii) The pilot in the right hand seat was holding the control wheel at the time of impact.

(ix) Neither pilot was qualified to conduct the flight under the circumstances prevailing.

(x) The pilot in the left hand seat suffered a myocardial infarct in February 1974 but did not disclose this to the medical authorities until October 1974 as a result of which his medical certificate was not re-issued.

(xi) The pilot in the left hand seat continued to fly his aircraft after his medical certificate was withheld but was usually accompanied by other pilots when he flew.

(b) *Cause*

The accident resulted from the aircraft losing height while carrying out an overshoot in conditions of poor visibility. The reason for the height loss could not be determined but in view of the handling pilot's medical history it is possible that he became incapacitated and the second pilot was unable to maintain control of the aircraft.

4. Safety Recommendations

It is recommended that:

4.1 Consideration be given to the publication of recommended aerodrome operating minima for non-public transport flights at all aerodromes in the United Kingdom where it is reasonably practicable to do so.

G C Wilkinson
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Department of Trade

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