Reims Cessna F152, G-BIIJ

AAIB Bulletin No: 12/98 Ref: EW/C98/5/7 Category: 1.3

Aircraft Type and Registration:	Reims Cessna F152, G-BIIJ
No & Type of Engines:	1 Lycoming O-235-N2C piston engine
Year of Manufacture:	1980
Date & Time (UTC):	23 May 1998 at approximately 1115 hrs
Location:	Tryfan Mountain, N Wales
Type of Flight:	Private
Persons on Board:	Crew - 1 - Passengers - 1
Injuries:	Crew - Fatal - Passengers - Fatal
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence with Night Rating
Commander's Age:	34 years
Commander's Flying Experience:	86 hours (all on type) Last 90 days - 20 hours Last 28 days - 6 hours
Information Source:	AAIB Field Investigation

History of the flight

The pilot and his passenger arrived at Leicester Airport on the morning of the accident to prepare for a planned flight to Blackpool; they planned to attend a friend's stag night at Blackpool before returning to Leicester the next day. Prior to departure, the pilot refuelled G-BIIJ with 38.79 litres of fuel (10.25 US gallons) and also asked the Deputy Chief Flying Instructor (DCFI) of the Aero Club to authorise him for his flight to Blackpool. In accordance with the club procedures, the DCFI confirmed that the pilot had flown within the last 28 days and was medically current. He also checked the Metform 215 with him; the general weather was forecast to be good but the DCFI advised the pilot to look out for isolated low cloud on the coast. The pilot was then authorised for his flight. Additionally, some time during this period, another instructor contacted Leeds Weather

Centre and obtained the 0720 hrs weather actuals (METARs) and the Terminal Aerodrome Forecasts (TAFs) for Manchester, Leeds Bradford, and Blackpool Airports; he passed this information to the pilot. At the time, the weather at Leicester was good.

The pilot and his passenger took-off from Leicester in G-BIIJ at 0925 hrs. Shortly afterwards, at 0929 hrs the pilot contacted East Midlands Approach Control on frequency 119.650 MHz. He informed the controller that he was overhead Leicester at 2,000 feet on the QNH of 1024 mb, en-route to Blackpool and requested a Flight Information Service and an area transit. The controller replied that there was no known traffic to affect G-BIIJ. He also advised the pilot that the QNH was 1023 Mb, asked him to report passing the M1 northwestbound and warned him that there appeared to be some low lying cloud around the Uttoxeter way; the pilot acknowledged this message and correctly read back the QNH. Then, at 0949 hrs the pilot requested a descent to 1,500 feet to stay VMC and two minutes later for a further descent to 1,000 feet to stay VMC. The controller approved this request at the pilot's discretion and advised him that the minimum safe sector altitude was 2,500 feet; the pilot acknowledged this message. Then, at 0953 hrs the controller asked the pilot if he was managing to maintain VMC and the pilot replied in the affirmative. No further transmissions were made by the pilot on this frequency. At 1007 hrs, the controller transmitted to see if the aircraft was still on frequency but received no reply.

At 1008 hrs, the pilot called Manchester Approach Control on frequency 119.400 MHz. He informed the controller that he was at 1,000 feet on 1023 mb, en-route to Blackpool from Leicester, heading 310°, requested a Flight Information Service and area transit, and added that he needed to stay VMC. The controller acknowledged this message and asked the pilot if he intended to fly up the 'Low Level Route'. When the pilot confirmed this, the controller replied "golf india juliet transit the low level route not above one two five zero feet the QNH one zero two three millibars flight information service". Then at 1011 hrs, the pilot asked the controller for advice on direction as he was ".....going into IMC". The controller informed the pilot that he had no radar contact on him as he was below the height for radar; he asked him to squawk code 7360 to enable him to identify the aircraft. When the pilot acknowledged this request, the controller also advised him that, at Manchester, the visibility was 5,000 metres in rain and drizzle with the lowest cloud at 500 feet and overcast at 800 feet. Then, when the controller had established secondary radar contact with G-BIIJ, he advised the pilot that the minimum safe altitude in his area was 2,600 feet on 1023 mb. Once the pilot acknowledged this message, the controller asked him "do you intend to turn away to remain victor mike charlie or do you intend to climb" to which the pilot replied "we intend to climb". Then, at 1016 hrs the controller called G-BIIJ to ask him "do you wish to proceed to your destination or divert"; the pilot replied that he would like to proceed to destination as it was ".....going to be as bad going back again". One minute later, the pilot called Manchester for confirmation that he was still on course. With the controller also controlling other aircraft, there was a short delay and some clarification required before the controller informed the pilot of G-BIIJ that he was tracking 295°. At the end of this exchange, the controller also advised the pilot that if he had any doubt about proceeding to his destination, he should divert and avoid the worst of the weather. The pilot acknowledged this message and asked for the best way to divert and avoid the weather. The controller transmitted that he did not know what the weather was like behind G-BIIJ but that the Manchester and Liverpool area was not good and he would suggest staying south of that area. After a pause, the pilot called that he was turning onto 270°. Shortly afterwards, at 1020 hrs the controller asked G-BIIJ for his altitude; the pilot replied that he was at 2,900 feet. Then, at

1026 hrs the controller attempted to call G-BIIJ but received no reply. However, another pilot on the frequency confirmed to the controller that G-BIIJ was hearing the transmissions. Using this other pilot as an airborne relay, the controller established that G-BIIJ intended to fly to the coast and also transmitted the aircraft's latest position as "thirty two miles southwest of Manchester or eight miles northwest of Shawbury"; this position was correctly acknowledged by G-BIIJ at 1029 hrs and the pilot also confirmed that he was going onto his next frequency. No other transmissions were heard from G-BIIJ on the Manchester frequency.

With G-BIIJ still showing on radar but with no altitude information, the controller was concerned when the aircraft continued heading to the west and alerted his watch manager. Over the next 45 minutes, the aircraft was tracked on radar while various controllers attempted unsuccessfully to establish if the pilot was in contact with any other ATC agency; these included London FIR, Blackpool, Liverpool, Caernarfon, Mona, Valley and Shawbury. Additionally, the ATC Watch Manager contacted the DCFI at Leicester Aero Club to advise him of the situation and to establish the pilot's qualifications and experience. The Distress and Diversion (D&D) organisation were also contacted and informed of the situation. D&D attempted to contact the aircraft on the emergency frequency of 121.5 MHz but had no replies. Then, after radar contact was lost at approximately 1115 hrs, D&D assumed control of the incident and about 30 minutes later, advised Manchester that the aircraft had crashed.

Various climbers were on the mountains close to where the aircraft crashed and there were many ear witnesses to the last few seconds of flight. All the witnesses commented that the visibility was very poor and most heard the aircraft flying below them; they were at altitudes of approximately 2,300 feet amsl. A few commented that the engine note faltered prior to impact and two thought that the engine note increased just before impact. However, most considered that the engine note was constant up to the time they heard the noise of the crash. Following the sound of the crash, the area was searched and eventually the wreckage was sighted. One of the searchers was a medical doctor and he was able to confirm that the occupants were dead. Thereafter, the emergency services were alerted and a RAF SAR helicopter located the crash site. The Ogwen Valley Mountain Rescue Team then deployed to the site where they secured the wreckage; additionally, that evening the RAF Stafford Mountain Rescue Team assumed responsibility for the site and guarded the wreckage overnight.

Engineering investigation

The aircraft had crashed at an altitude of 2,540 feet amsl on the east side of the south peak of Tryfan; the mountain peaks at an altitude of 3,008 feet amsl; a picture of the crash site, taken from the air, is included as Figure 1. The aircraft had struck a small ledge amongst vertical rocks, burying its engine. The wing and cockpit had been destroyed, and the tail remained attached only by control cables, Heading at impact was 325_(M) and the aircraft appeared to have been flying straight and level at a speed of between 60 to 80 kt with flaps up. The remains of the propeller showed that it had been under significant power at the time.

Although both fuel tanks had ruptured, personnel who were first at the scene reported that fuel was seen dripping from the wings and that a smell of fuel pervaded the accident site. The extent of the damage to the cockpit precluded the extraction of useful information from navigation equipment and instruments.

Weather information

When the pilot and the DCFI referred to the weather during the morning, they used the UK Low Level Forecast Metform 215; this was valid between 0600 hrs and 1200 hrs on 23 May 1998. The pilot's intended route was within Zone 1 of the chart and the forecast was as follows:

> Generally, 20 km visibility with 6/8 to 8/8 stratocumulus base 2,500 feet amsl and tops 5,000 feet amsl; occasionally south east of hills, 30 km with 1/8 to 4/8 stratocumulus base 4,000 feet amsl and tops 5,000 feet amsl; occasionally mainly in the west, 8 km with drizzle and 3/8 to 6/8 stratus base 1,000 feet amsl and tops 1,500 feet amsl, and 8/8 stratocumulus base 1,500 feet amsl and tops 5,000 feet amsl; occasionally over the sea and western areas and isolated land areas until 1000 hrs, 2,000 metres with mist and drizzle and 6/8 to 8/8 stratus and stratocumulus base 400 feet amsl and tops 5,000 feet amsl.

There was little change in the forecast up to 1800 hrs.

When the pilot spoke to another flying instructor some time prior to departure and advised him where he intended to fly, the instructor obtained the Meteorological Actual Report (METAR) and Terminal Aerodrome Forecast (TAF) from the Leeds Weather Centre for each of Blackpool, Manchester and Leeds Bradford.

The TAFs timed at 0600 hrs were as follows:

> Manchester from 0700 to 1600 hrs, 320°/10 kt, 10 km or more, broken cloud at 2,000 feet agl with a temporary condition between 0700 and 1000 hrs of 5,000 metres in drizzle with broken cloud at 800 feet agl.

Blackpool from 0700 to 1600 hrs, 330°/13 kt, 10 km or more, scattered cloud at 1,000 feet agl and broken cloud at 2,000 feet agl with a temporary condition between 0700 and 1200 hrs of 8,000 metres and broken cloud at 1,500 feet agl; there was a further temporary condition between 0700 and 1000 hrs of 4,000 metres in drizzle and broken cloud at 800 feet agl.

Leeds Bradford from 0700 to 1600 hrs, more than 10 km with scattered cloud at 2,000 feet agl and broken cloud at 3,500 feet agl.

However, the METARs were as follows:

Manchester at 0720 hrs, 320°/08 kt with 5,000 metres in drizzle and few cloud at 500 feet agl, broken cloud at 700 feet agl and overcast at 1,000 feet agl.

Blackpool at 0720 hrs, 320°/11 kt with 4,000 metres and few cloud at 300 feet agl, scattered cloud at 500 feet agl and broken cloud at 1,200 feet agl.

Leeds Bradford at 0720 hrs, 280°/07 kt with more than 10 km and few cloud at 3,500 ft agl.

An aftercast obtained from The Meteorological Office at Bracknell showed a moist northwesterly airstream established over north west England at 1000 hrs on 23 May 1998. There was occasional drizzle with a visibility of 10 km deteriorating in the northwestwards to 5,000 metres; cloud was scattered/broken base 1,200 feet amsl and broken base 3,000 to 4,000 feet amsl soon becoming northwestwards few/scattered base 800 feet amsl and broken base 2,000 feet amsl.

An experienced instructor was flying from Tatenhill Airfield with his student during the time G-BIIJ was airborne and heard the pilot of G-BIIJ on the radio; Tatenhill is close to a track from Leicester to the Low Level Route between Manchester and Liverpool. Subsequently, the instructor stated that the weather was much worse than forecast for the area; he noted that the cloud base at Tatenhill was between 400 and 600 feet agl with the tops estimated at 5,000 feet agl.

A group of walkers on the mountain near to the crash site who heard the impact had received a weather forecast at 1000 hrs on 22 May 1998 from the Cardiff Weather Centre; this forecast broken cloud with sunny spells for 23 May 1998. On the day of the accident, they estimated that the cloud base in the area of the accident was about 2,000 feet amsl with light rain.

Operational information

Subsequent to the accident, a radar recording was obtained, based on the transponder setting allocated by Manchester, which indicated intermittently that G-BIIJ followed a relatively straight track from the last position advised by the Manchester controller (8 miles northwest of Shawbury) at 1029 hrs to a point close to the crash site at 1112 hrs; there was no indication of aircraft altitude. The maximum elevation figure, indicating the highest feature and shown on the aeronautical map for the immediate area in which the crash occurred, was 3,800 feet amsl.

The pilot had planned to fly through the Manchester Low Level Route which would have given him almost a direct track from Leicester to Blackpool. This Low Level Route is established to allow aeroplanes or helicopters to transit through the Manchester Control Zone without individual ATC clearances subject to the following restrictions: they remain clear of cloud and in sight of the ground; maximum altitude of 1,250 feet on Manchester QNH; minimum flight visibility of 4 km. From the remains of maps and flight logs recovered from the wreckage, the pilot had carefully planned his flight with headings and timings annotated on his map. There was no indication of any planning for an alternate route or diversion information but the severity of the impact could have destroyed evidence of this.

During the morning of the accident flight, the pilot had received forecast and actual weather about his destination but he had not contacted Blackpool ATC prior to his departure to advise them of his expected arrival time or to confirm the latest weather.

The pilot had conducted all the training for his Private Pilot's Licence (PPL) at the Leicestershire Aero Club. Throughout his course, his regular Flying Instructor considered that he was very conscientious and an able pilot; he was always well prepared for his lessons. The Deputy Chief Flying Instructor (DCFI), who conducted the General Flight Test on the pilot at the completion of his PPL course, also considered him an above average student with a conscientious attitude to his flying.

The pilot who flew G-BIIJ on the flight prior to the accident flight confirmed that the aircraft appeared fully serviceable. He flew it on 22 May 98 for four separate flights and stated that it was refuelled to full before his last two flights which then lasted a total of 1 hour 45 minutes. Based on

the normal fuel consumption of G-BIIJ, the amount of fuel uplifted on the morning of the accident would have resulted in the aircraft being full of fuel prior to departure on the accident flight. Full fuel would give a total endurance of approximately five hours.

Medical information

Post Mortem examination of the pilot revealed no evidence of any disease which may have caused or contributed to the accident. However, toxicology examination revealed the presence of Cannabis and Amphetamine in both the pilot and passenger. The level of Amphetamine in both occupants suggested recent ingestion of a moderate dose. The level of Cannabis in the pilot coupled with the presence of Nicotine and Carbon Monoxide was such as to suggest recent smoking, perhaps within the last 24 hours.

Article 57(2) of the Air Navigation Order (ANO) states that: 'A person shall not, when acting as a member of the crew of any aircraft or being carried in any aircraft for the purpose of so acting, be under the influence of drink or a drug to such an extent as to impair his capacity so to act.'

The Aviation Pathology Report included the following information on the possible effects from using Cannabis and Amphetamines:

> "Pilot performance can be impaired for as long as 24 hours after smoking a moderate social dose of Marijuana and the user may be unaware of the drug's effects. Marijuana impairs those mental activities requiring conscious thought such as retention of information and reasoning. Flying an aircraft under difficult conditions is a task which is limited by the memory's capacity to process and respond to the information. The introduction of a drug, such as Marijuana, that impairs or disrupts this capacity reduces the pilot's performance. The effect of low to moderate social doses of Marijuana may produce significant impairment for as long as 24 hours and the effects are more profound when difficult tasks are attempted.
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> Amphetamine is a central nervous system stimulant and leads to insomnia, restlessness, irritability and excitability, nervousness, euphoria and sometimes dizziness. Amphetamines have many other effects but these are the most important central nervous system effects. It is unlikely that the presence of Amphetamines would impair the pilot's ability to fly the aircraft properly. However, the euphoria that is sometimes induced by the Amphetamines may have been such to make him over-confident in a difficult situation."

No firm conclusion can be reached about whether the presence of the drugs in the pilot contravened Article 57(2) of the ANO or whether they had a bearing on the accident. However, the medical views detailed above should be considered during the following discussion of the accident.

Discussion of accident

Evidence indicates that the pilot was conscientious in his attitude to his flying and was an able pilot. He was well thought of at the Aero Club and had retained a good level of flying currency following the successful completion of his PPL course and subsequent night rating. The planning for his flight to Blackpool was thorough apart from possibly his omission to consider alternatives if he could not follow the planned route.

On the morning of the flight, the weather at Leicester looked good and examination of the UK Low Level Forecast by the pilot and the DCFI indicated that the flight could be completed as planned. However, a close examination of the actual weather at his destination airfield and others along the route would have raised some doubts about the accuracy of the forecast and whether the flight should have been attempted. Unfortunately, the instructor who obtained the actual forecasts was involved in preparation for another flight and did not specifically check if the weather was suitable. Furthermore, the accident pilot, as the holder of a PPL, had the final responsibility to confirm that the flight could be completed successfully. Additionally, if the pilot had informed ATC at his destination airfield of his estimated arrival time this would also have given him the opportunity to confirm the actual weather.

Once airborne and on track, the pilot should have been aware that the weather was worse than forecast. On East Midlands Approach Control, he was advised by the controller of adverse weather close to his intended track. Thereafter, the pilot requested a descent on two separate occasions in order to remain VMC. These events should have raised doubts in the pilot's mind about whether he should continue with his planned flight. At this stage, the most sensible option would have been to curtail the flight and return to Leicester. However, he continued on his planned flight and contacted Manchester Approach Control to transit the Low Level Route. Soon after this he was apparently having difficulty maintaining his track as he then requested navigation assistance because "...we're going into IMC". At this stage, the Manchester controller informed him of the poor weather at Manchester and suggested that he stay south of that area. As soon as the aircraft was located on radar the controller advised the pilot that the minimum safe altitude in that area was 2,600 feet and asked him if he intended to turn away to maintain VMC or to climb; the pilot replied that he intended to climb. By now, the pilot was aware that he would not be able to continue on his planned track to Blackpool. He had three possible alternatives: he could return to Leicester; he could divert to another airfield; or he could continue to Blackpool via an alternative route.

The option to return to Leicester should have been taken much earlier in the flight. However, there are always pressures on pilots to complete the planned flights and in this case the desire to proceed to Blackpool may have been shared by both the pilot and his passenger. Once the pilot had climbed

above the minimum safe altitude, he then expressed his intention to continue on his flight. A return to Leicester at this stage was still an option but would have required the pilot to seek assistance from ATC by declaring an emergency.

A possible option would have been to divert to another airfield. Indeed, the Manchester controller advised the pilot to divert if he was in any doubt about proceeding to his destination. As with the option to return to Leicester, if the pilot had acknowledged his predicament and declared an emergency, he would have received the fullest assistance from ATC.

The advice to divert appears to have been taken as a suggestion that he should divert around the weather while proceeding to his destination. Soon after, full radio contact was lost between G-BIIJ and Manchester. Nevertheless, the pilot had been advised of his geographical position by the controller and the pilot confirmed his intention of proceeding to and following the coast; although not specifically declared, this would mean following the coast northwards to Blackpool. The aircraft had sufficient fuel to complete such a flight and the pilot was aware of his position through an airborne relay. However, the successful completion of this revised flight required much careful airborne planning. The pilot's qualification and level of experience required him to remain clear of cloud and to navigate by reference to his map and the ground. With the added complication of adverse weather, the pilot would have experienced difficulties in maintaining control of the aircraft while also working out and maintaining an accurate track through an area of high ground. The radar recording indicates that the pilot maintained control of G-BIIJ in that he maintained a constant track but that he did not have an accurate air picture of where he was in relation to the high ground. Furthermore, there is no evidence that he tried to make radio contact with an ATC agency to obtain assistance once he had left the Manchester frequency.

Conclusion

Throughout the flight, the radio recordings indicate that the pilot was using correct terminology and seemed comfortable when using the radio. There is also no evidence that he had any trouble flying the aircraft or that there was any significant unserviceability with G-BIIJ.

While the weather forecast indicated that the flight could have been completed as planned, the actual weather was unsuitable. This should have been apparent prior to flight when a more comprehensive check would have revealed the discrepancy between the forecast and the actual conditions. Nevertheless at this stage, inexperience, a desire to get to the destination and the good weather at Leicester may all have contributed to a feeling of well being. However, once airborne the actual conditions would have quickly become apparent. At that stage, the decisions taken by the pilot were unwise. An early return to Leicester was the best option. By continuing on his flight, the pilot eventually lost that option. Thereafter, the most sensible course of action was to divert. Unfortunately, when advised to divert, the pilot appears to have interpreted this as diverting around

the weather and continuing to his destination. Once he had made this decision, the workload to complete the flight was high.

Inaccurate weather forecasts are not unknown and pilots must be able to react to changing situations. The errors in this accident are primarily concerned with decision making both prior to and during flight. In this case, the desire to get to destination and the pilot's inexperience would have been contributing factors. Nevertheless, the toxicology results of the autopsy also revealed the existence of drugs which may have affected the decision making process. There is no conclusive proof that the effects of these drugs was a contributing factor in this accident but the possibility remains.