

No. 18

Skyways Coach Air Ltd., DC-3, G-AMWX accident at Mers-les-Bains (Somme), France, on 17 December 1965. Report, not dated, issued by the French Secretariat of State for Transport. Released by the Board of Trade, United Kingdom as C.A.P. 289

1.- Investigation1.1 History of the flight

Flight 316 was a scheduled international flight from Beauvais, France to Gatwick,* England. It took off from runway 23 at Beauvais at 1948 hours GMT. At 2009 hours it contacted London Airways reporting over Abbeville, with an estimated time of arrival at the Paris/London FIR boundary of 2020 hours. At 2030 hours at the request of London Airways the aircraft reported 2036 as its estimated time of arrival at Lydd, whereas taking the wind into account it should have been 2040 hours. In fact the aircraft reported over Lydd at 2040 hours and, on the basis of the radar observations of London Airport which followed the aircraft from 2036 hours onwards, the aircraft probably flew over this point at 2041 hours or 2042 hours. At 2040 hours the aircraft reported its estimated time of arrival at Mayfield as 2058 hours, a dead reckoning calculation which this time allowed for the wind. At 2040 hours London Airways asked the flight to confirm its estimated time of arrival at Mayfield. It was when the co-pilot began the VHF transmission to reply to this query that he first noticed that his transmitter was not working, then that the No. 2 VHF, the ILS receiver, the radio compasses, the starboard generator and the two inverters had also failed. The aircraft lighting, however, was still working. The pilot-in-command handed over the controls to the co-pilot and went to inspect the main electrical panel. As he did not have the necessary tools, he was unable to remove the main radio fuse in order to inspect it. He checked the circuit breakers on the radio electrical panel and found that they were in the normal position. He also noted that the inverters were no longer working. On returning to his seat he asked the co-pilot to make the same checks. The co-pilot changed some fuses but he also was unable to remove the main fuse which he found was very hot. As he had no means of radio communication or navigation, the pilot-in-command considered that he could not continue on his route to Gatwick without incurring a collision risk and, more particularly, that it would be dangerous for him to try to descend to within visual reference of the ground, in view of the cloud bases of 120 to 200 m in the meteorological forecasts. He therefore decided to turn on to a southerly heading in order to descend below cloud over the sea and then to determine his position by identifying a town on the south coast of England. At 2053 hours, London Radar observed the left-hand turn of approximately 90° made by the aircraft. According to the pilot-in-command, the aircraft maintained a magnetic heading of 200° for 15 minutes, which corresponds to a true track of 171°. At about 2108 hours the aircraft, which was then about 20 miles from the English coast south of Hastings, went on to an easterly heading and came down to 2 000 ft using the Beauvais QNH (1 012 mbs). After flying for 5 minutes on this heading, the pilot-in-command was still without any visual contact with the ground and he returned to a southerly heading, considering that the cloud base over France would be appreciably higher than over England. He came down to 1 000 ft and finally saw the lights of a ship and then the lights of a town (Le Tréport) which he failed to

* The terminal airport on this service is normally Lypne, but because of the unsatisfactory conditions at Lypne aerodrome, the aircraft was flying to Gatwick on that particular day.

identify. The aircraft arrived in the vicinity of Le Tréport at 2140 hours (See Fig. 18-1). After flying over the town a number of times the crew fired Very lights but saw no response on the ground, although local authorities and members of the aero club went to En-Mers/Le Tréport airport and illuminated the landing strip with car headlights. During this time the pilot-in-command saw a beach lit up by the lights of a promenade and suitably orientated for a landing, taking into account the direction of the wind at the time. The pilot-in-command then decided that unless he could determine his position with certainty and therefore be able to reach Beauvais in absolute safety, it was preferable to attempt an emergency landing on such a beach rather than run the risk of landing, short of fuel, in the open in the French countryside without any visual reference to the ground and with the danger of colliding with some unknown obstruction. After having flown up and down the coast, in an attempt to determine his position, he finally decided to land when the starboard engine showed signs of fuel failure. He immediately switched the starboard engine on to the port main tank, which contained about 20 gallons more than the starboard main tank. He made his last circuit at about 500 ft, with the landing lights on and the undercarriage up, and came in to land on a WSW heading in the area lit up by the promenade lighting, as near as possible to the shore. The landing was relatively soft, although at the end of the run the port wing tip struck a concrete groyne. The accident occurred at 2240 hours GMT. The location of the beach was 50°04'N 01°23'E.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal			
Non-fatal			
None	3	29	

1.3 Damage to aircraft

The aircraft did not appear to have been extensively damaged during the precautionary landing. At low tide the crew went back to the aircraft and recovered part of the radio equipment. The aircraft was completely destroyed when the tide came in again and its wreckage was swept away by the sea.

1.4 Other damage

There was no other damage.

1.5 Crew information

The pilot-in-command, aged 54, held an airline transport pilot's licence valid until 8 September 1968. His medical examination was valid until 8 March 1966. He had flown a total of 12 548 hours including 1 597 at night, of which approximately 4 000 hours were flown on DC-3 aircraft including 26 hours during the two previous months and 4 hours during the previous 48 hours.

The co-pilot, aged 39, held a commercial pilot's licence valid until 1 April 1969. His last medical examination was valid until 29 March 1966. He held a pilot-in-command rating for PA. 28 and a co-pilot's rating on Dakota C-47 aircraft. He had flown a

total of 1 820 hours including 360 hours at night, of which 250 hours were flown on DC-3 aircraft, including 42 hours during the two previous months and 9 hours during the previous 48 hours.

Also aboard was an air hostess.

1.6 Aircraft information

The aircraft had a certificate of airworthiness dated 29 April 1959. Its last airworthiness inspection was on 14 May 1965. It was classified in category V until 18 May 1966. The aircraft had flown a total of 12 815 hours, including 14 hours since the latest Check 1 (100 hours) on 13 December 1965.

The weight of the aircraft on take-off from Beauvais was approximately 11 762 kg slightly under the maximum weight of 11 880 kg authorized by the French regulations. The centre of gravity position was within the prescribed limits.

The type of fuel being used was not stated in the report. The quantity of fuel on board at take-off was estimated to have been approximately 1 090 litres, giving an endurance of approximately 3 hours 15 minutes.

1.7 Meteorological information

The forecasts supplied to the crew at Beauvais indicated a uniform cloud cover of 8/8 stratus and stratocumulus over the whole of the route, with base at between 200 and 400 m near Beauvais coming down to between 100 and 200 m in the London area, and a visibility of 4 to 10 km, decreasing in places to 2 to 4 km.

The forecasts valid for the period from 1900 hours to 0400 hours on the following day, for the terminal and alternate aerodromes, were as follows:

Gatwick.- Visibility: 10 km; 6/8 stratus at 240 m, 8/8 stratocumulus at 600 m;

possibly reducing to: Visibility: 3 km; 6/8 stratus at 120 m
8/8 stratocumulus at 120 m; rain and drizzle.

London.- (EGLL) - Visibility: 10 km; 4/8 stratus at 150/200 m 8/8 stratocumulus at 300 m; rain and drizzle.

The pilot-in-command estimated that he came down through cloud over the English Channel at an altitude of 150 m (500 ft) and mentioned that he encountered strong turbulence during the greater part of the flight.

The winds forecast by Beauvais station were as follows:

- 260°, 40 to 50 kt, at 1 500 m

- 260°, 50 to 55 kt, at 3 000 m

Shortly after the subject flight, the following observations were made for the altitude of the flight: 50 kt, 260° over the Channel; 55 kt, 260°, over England.

From analysis of the aircraft's flight path, on the basis of the known data, 50 kt and 255° have been accepted as the most probable values for the wind.

1.8 Aids to navigation

The aircraft was equipped with 2 radio compasses, an ILS and marker beacon receiver and VOR.

1.9 Communications

Communications were normal until 2040 hours, at which time the power supply for the radio equipment failed.

1.10 Aerodrome and ground facilities

Not relevant to this accident.

1.11 Flight recorders

Not mentioned in the report.

1.12 Wreckage

Not relevant to this accident (see 1.3).

1.13 Fire

There was no fire.

1.14 Survival aspects

The passengers had prepared for the forced landing and fastened their safety belts, on the instructions of the air hostess. Passengers and crew were able to leave the aircraft by the door or the emergency exit and wade back to the shore as the water was less than 1 m deep.

1.15 Tests and research

None mentioned in the report.

2.- Analysis and Conclusions

2.1 Analysis

The aircraft left Beauvais with a flight plan which included some errors. In addition, from examination of the estimated times of arrival transmitted to London Airways, it would appear that the crew, on a routine flight of short duration which should not, a priori, have raised any special navigational problem, did not make its dead reckoning calculations very carefully. At the time of the radio equipment failure, the flight over Lydd gave the aircraft an accurate fix, but the crew did not have precise knowledge of the wind or in any event did not make strict allowance for it in the course of the flight.

Without any means of radio communication or radio navigation, the pilot-in-command considered that even though the London Radar might be able to keep other aircraft away from his track, he could not make a descent through cloud and a visual approach to his aerodrome of destination without incurring serious risk, in view of the very low cloud bases forecast over England.

He therefore wisely decided to turn back and descend through cloud over the sea* with the hope that he would be able to determine his position from a point on either the English or the French coast and to continue in visual flight to the most suitable aerodrome.

It was however to be expected from then on that the cloud base and visibility conditions would make it difficult to determine the aircraft's position by visual reference to the ground. It was therefore essential to carry out extremely accurate dead reckoning and in addition to choose from the outset a route which would lead the aircraft to an easily identifiable reference point.**

However the two pilots being absorbed in their attempts to remedy the equipment failure under conditions aggravated by strong turbulence, did not apparently pay sufficient attention to this aspect of the situation.

Subsequently, after the descent through clouds over the Channel and after some hesitation evidenced by his changes of route, the pilot-in-command decided to try and return to Beauvais where he hoped to find acceptable meteorological conditions, rather than to enter the London area where the cloud base was lower and the air traffic greater in volume. This decision seems to have been a reasonable one.

The crew failed to identify the towns flown over along the French coast (Dieppe, Le Touquet) because the visibility was poor and the towns were seen from an unusual angle.

The only means available to the crew for determining their position was that of identifying the marine lights whose characteristics were shown - however not very clearly - on a large chart included in the aircraft documents. This means was not used.

Not knowing his exact position the pilot-in-command considered that the risks of a landing on a beach whose outline he could see were less than those of a forced landing in an area where the lie of the land and the obstructions were unknown. This decision was a wise one.

The initial cause of the accident was obviously the total failure of all the radio communication and navigation equipment.

* This decision was not in accordance with the rule of the air contained in paragraph 3.5.5.2 of Annex 2 to the International Convention, according to which an aircraft in instrument meteorological conditions should proceed according to the current flight plan. But this procedure can rarely be applied and if a rule is to be formulated to cover the case in question it would be more valuable if it were drafted in a more detailed and realistic form.

** In this respect le Touquet would appear to have been a sensible choice. The aerodrome was easily identifiable by reason of its geographical position and the lighting would probably have been promptly switched on if an aircraft obviously in difficulties had flown over.

The exact nature of the failure was not ascertained as the aircraft was destroyed by the sea before it could be examined. The main electrical panel remained on board and examination of those parts of the radio equipment which were recovered revealed no abnormality.

According to the pilots, one of the generators was working and there was still aircraft lighting. The fact that the crew was able to make prolonged use of the landing lights shows that the power supply was quite considerable.

The co-pilot also stated that he had tried unsuccessfully to change the fuses protecting some of the equipment and that the main fuse for the whole of the radio equipment was very hot.

In the subject aircraft the whole of the radio equipment is supplied from a single bus bar with a fuse rated at 60 amps. The failure of this fuse could therefore explain the total failure of the radio equipment.

Examination of the maintenance records revealed that in the twelve months preceding the accident the fuse had blown on three separate occasions.

In addition, investigations carried out in the United Kingdom have shown that the marking of a large proportion of the DC-3 60 amp fuses was not correct and that a fuse rated for an intermittent maximum peak load of 60 amps might be mistaken for a fuse rated for 60 amps continuous load.

The maximum power requirement for the aircraft installation, during cruising flight, was approximately 55 amps, covered by the fuse in question.

The failure occurred when the co-pilot started the VHF transmission, i.e. when the power required reached a relative maximum.

Under these conditions, the failure of the main supply fuse may be regarded as the almost certain cause of the failure of the radio equipment.

The crew had not received any special instructions regarding the rectification of any failure of the equipment and did not have or could not find the necessary tools for replacing the fuse.

Furthermore, in the prevailing difficult situation, neither of the two pilots could be absent from the cockpit for any length of time.

2.2 Conclusions

(a) Findings

The crew members held the appropriate licences and ratings and had passed the regulation checks. They had not exceeded the normal flight time limitations.

The aircraft was airworthy and had been maintained in accordance with the regulations. Examination of the maintenance documents revealed that in the twelve months preceding the accident a fuse had blown on three separate occasions.

Examination of those parts of the radio equipment which were recovered revealed no abnormality.

The initial cause of the accident was the total failure of all the radio communication and navigation equipment presumably because of a failure of the fuse covering the whole of the radio equipment.

After the radio equipment had failed in the vicinity of Lydd the aircraft turned back and came down below cloud over the English Channel. The aircraft followed the French coastline but was unable to determine its position.

When the fuel was nearly exhausted, it made a precautionary wheels-up landing on the beach at Mers-les-Bains.

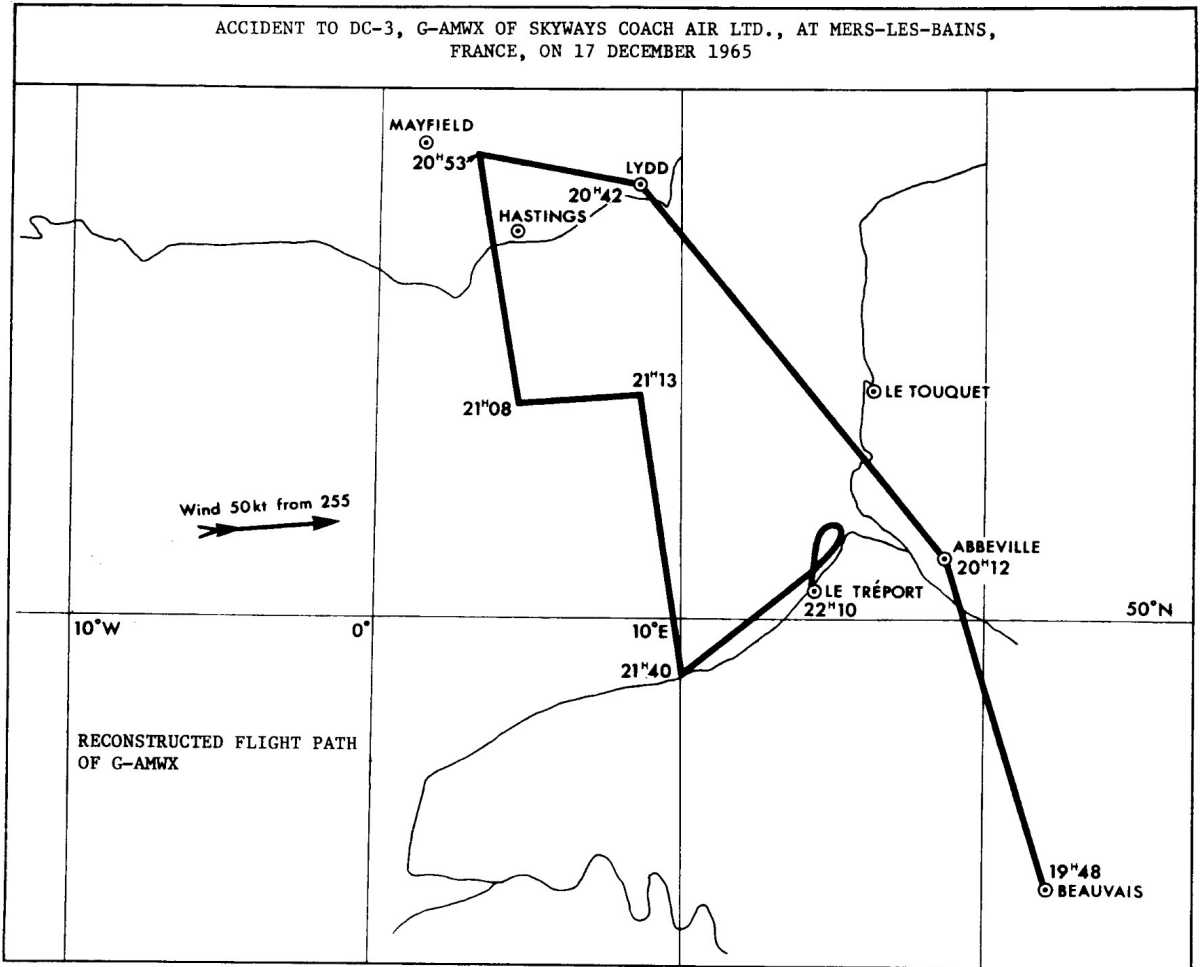
(b) Cause or
Probable cause(s)

The accident was due to the following causes:

- (a) The design of the aircraft's electrical installation in which no provision was made to prevent the total interruption of radio communication and radio navigation in the event of a failure at the level of the single main supply fuse.
- (b) The failure of the main supply fuse probably of insufficient rating and the fact that the crew was not able to rectify the failure.
- (c) The inadequate attention paid by the crew to its dead reckoning navigation, both before and after the radio failure.

3.- Recommendations

None were contained in the report.



B.O.T. (C.A. Dept.) C.Ops 10.D.O. Drg.No. 5024 13/7/67

Fig. 18-1