

ACCIDENTS INVESTIGATION BRANCH  
Department of Trade and Industry

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Jodel DR250 Series 160 G-AVIV  
Report on the accident at  
Carnedd Dafydd, near Bethesda,  
North Wales on 22 August 1969

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**List of Civil Aircraft Accident Reports issued by AIB in 1971**

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7/71	Jodel DR250 Series 160 G-AVIV at Carnedd Dafydd, N. Wales, August 1969	June 1971

Department of Trade and Industry  
Accidents Investigation Branch  
Shell Mex House  
Strand  
London WC2

12 May 1971

*The Rt. Honourable John Davies MP*  
*Secretary of State for Trade and Industry*

Sir,

I have the honour to submit the report on the circumstances of the accident to Jodel DR250 Series 160, G-AVIV which occurred at Carnedd Dafydd, Nr Bethesda, North Wales, on 22 August 1969.

I have the honour to be

Sir,

Your obedient Servant

V A M Hunt  
*Chief Inspector of Accidents*

**Accidents Investigation Branch**

**Civil Accident Report No. EW/C 324/01**

*Aircraft:* Jodel DR250 Series 160, G-AVIV  
*Engine:* Lycoming O-320-D2A  
*Registered Owner:* H R Yardley  
*Operator:* Staverton Flying School Ltd  
*Pilot:* Mr J R West — Killed  
*Passenger:* One — Killed  
*Place of Accident:* Carnedd Dafydd, Nr Bethesda, North Wales  
*Date and Time:* 22 August 1969; time unknown, probably just before 1850 hrs.

All times in this report are GMT

**Summary**

The pilot intended flying at 2,500 feet under visual flight rules (VFR) from Birmingham to Dublin, following a route to the north of Snowdonia and clear of the mountains. The period of validity of the route weather forecast he obtained earlier in the afternoon lapsed before the aircraft took off. Subsequently it was found that there had been a deterioration over the mountain area where the aircraft crashed. In computing a course to steer the pilot omitted to apply a 10° correction for magnetic variation and, as a result, the aircraft diverged to the south of the intended track, flew into deteriorating weather conditions including severe turbulence and crashed into a mountain ridge 900 feet above the planned flight altitude killing both occupants. There was no fire.

# 1. Investigation

## 1.1 History of the flight

The pilot, a member of the Staverton Flying School, hired the aircraft from the school for a period of two days with the intention of flying to Ireland with a passenger in connection with their employer's business. The original intention, evident from a detailed navigation flight plan recovered from the wreckage, had been to clear customs at either Staverton or Bristol Airports and fly to Cork. It was established that the pilot spent some time the previous evening preparing his flight plan; however, on the day of the accident he changed his programme and this was confirmed by two further navigational flight plans made out on a single log form which was also recovered from the wreckage. One flight plan showed that on the day of the accident the pilot flew from Staverton to Bristol during the morning and returned to Staverton in the early afternoon. The other flight plan was in respect of the intended flight from Birmingham to Dublin, during the course of which the aircraft crashed. No details of the flight from Staverton to Birmingham were recorded in the pilot's navigation log, but these were obtained from Air Traffic Control (ATC) logs at Staverton and Bristol.

A reconstruction of the pilot's revised itinerary showed that on the day of the accident he landed at Staverton at 1316 hrs on returning from Bristol. Later in the afternoon he obtained a weather forecast by telephone from the meteorological office in Gloucester for the route Staverton to Birmingham thence to Dublin via Liverpool and Valley (Anglesey) for the period 1600 hrs to 1730 hrs. At 1511 hrs he booked out of Staverton for Bristol by radio telephony (R/T); he landed at Bristol at 1532 hrs, and at 1600 hrs he took off for Birmingham after booking out from Bristol on R/T. At 1620 hrs whilst passing overhead Staverton, the pilot advised ATC he was over-flying and was en route for Birmingham. After landing at Birmingham at 1646 hrs the aircraft was refuelled and customs clearance for Ireland obtained. The customs officer confirmed that the pilot spent a considerable time completing the necessary clearance formalities, after which he was seen to prepare his navigational flight plan. No additional weather information was obtained by the pilot from Birmingham Airport meteorological office.

The navigational flight plan showed an intention to fly from Birmingham to Dublin, passing over Hawarden and Holyhead en route. Unlike the other flight plans recovered from the wreckage this particular plan showed that the pilot had omitted to note down and apply magnetic variation to the calculated headings he would steer; this would have resulted in a 10° error to the south of his intended track, particularly when flying between Hawarden and Holyhead.

The pilot filed a flight plan with Birmingham ATC for a visual flight rules (VFR) flight at 2,500 feet, giving an endurance of 3 hours and an estimated

time of arrival (ETA) in Dublin of 1942 hrs. The aircraft took off at 1752 hrs and during the flight to Hawarden radio communication was established with Preston flight information region (FIR) and routine messages were exchanged. Shortly before over-flying Hawarden the pilot changed to Hawarden's radio frequency and obtained the altimeter settings (QNH) for the Holyhead and Barnsley altimeter setting regions; these were 1007 and 1006 millibars respectively. As the pilot indicated that he was flying at 3,000 feet Hawarden ATC advised him not to fly above 2,500 feet (his planned flight altitude) because of the proximity of controlled air space (airways Amber 25 and Blue 1). The pilot said he would descend to 2,500 feet and confirmed that his route from Hawarden to Dublin would be via Holyhead; at 1829 hrs he informed Hawarden he was passing overhead and he then changed back to Preston FIR frequency. At 1832 hrs he informed Preston his ETA at Holyhead was 1905 hrs, the FIR boundary at 1924 hrs and Dublin at 1940 hrs; he added that he was flying at 2,500 feet on the Holyhead QNH. The next and last transmission from G-AVIV was just after 1849 hrs when the pilot informed Preston "We've just experienced severe turbulence. Would like radar assistance if possible please - Over". Preston replied immediately asking for the aircraft's approximate position but there was no reply nor was any radar contact observed.

On being advised by Preston ATC at 1854 hrs the RAF alerted search and rescue aircraft and at 1941 hrs, one minute after the aircraft's ETA, Dublin ATC reported, then later confirmed, they had no radio or radar contact with the aircraft. At 1955 hrs Preston ATC centre instituted an "alert phase" followed by a "distress phase". At about 1225 hrs the following day, the aircraft was found by a climber at 3,400 feet above mean sea level on Carnedd Dafydd mountain; it had flown into a ridge a few feet below the summit. Both occupants, who were secured with seat belts before the impact were thrown clear but received fatal injuries. There had been no fire.

## 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passenger</i>	<i>Other</i>
Fatal	1	1	—
Non-fatal	—	—	—
None	—	—	—

## 1.3 Damage to aircraft

Destroyed.

## 1.4 Other damage

None.

## 1.5 Crew information

The pilot, Mr John Richard West, aged 36, was the holder of a valid private pilot's licence endorsed for Group 'A' landplanes with both night and instrument meteorological condition (IMC) ratings. He also held a valid restricted radiotelephony operator's licence and had been assessed fit at a medical examination on 24 November 1967. His total flying experience amounted to 560 hours, of which 92 hours were in Jodel aircraft.

Records and flight plans from some of Mr West's previous flights show that he was normally very meticulous and thorough in his preparations. In the majority of the previous flights he had used a different and more detailed flight log form for his navigation flight planning.

His flying log book shows that he had made one previous flight to Dublin, via Hawarden on 17 May 1969. On that occasion, because of warm front conditions in the area, he had flown the same aircraft in IMC following a route further to the north and partly over the sea from Hawarden via the Skerries marine beacon. He had returned the same day flying in visual meteorological conditions (VMC) apparently direct from Dublin to the south of Snowdonia and into Staverton.

#### 1.6 Aircraft information

The aircraft, a low wing four-seater monoplane of wood construction, was manufactured by Centre Est Aeronautique in France in April 1967, and registered in the name of its present owner. At the time of the accident it had a valid certificate of airworthiness in the passenger transport category and had been maintained in accordance with an approved maintenance schedule. A certificate of maintenance issued on 7 August 1969 was current. It was equipped with a full blind flying panel, communication radio and radio-navigation facilities. The weight and centre of gravity were within the prescribed limits and on take-off from Birmingham there was sufficient fuel on board for approximately three hours' flying. The aircraft and engine had flown for 882 hours, 175 of which had been since the renewal of the certificate of airworthiness in April 1969; no serious or recurring defects had been recorded during this period.

#### 1.7 Meteorological information

Because the weather was bad there were no witnesses in the area to report on the immediate weather conditions but the log of the Mountain School at Capel Curig, four miles east of the accident site, shows that at about the time of the accident there were high gusty winds with heavy rain showers and some hail in the area.

The weather forecast given to Mr West by the Meteorological Office at Gloucester before he left Staverton for the route Staverton to Birmingham and Dublin, via Liverpool and Valley, for the period 1600 to 1730 hrs on 22 August 1969 was:

Situation:	Unstable NNW airstream over the route, with minor troughs running SSE in it. One such trough expected through Valley by 1630 hrs.
Winds at 2,000 feet:	330° 25 knots backing gradually to 290° 25 knots, becoming 350° 30 knots behind trough.
Cloud:	4/8 cumulus base 2,500 feet tops 6,000 feet; occasional tops 12,000 feet in showers, isolated 6/8 cumulo nimbus base 2,000 feet in heavy showers. 4/8 to 6/8 stratocumulus base 4,500 feet tops 6,000 feet.

**Visibility:** Over 10 kilometres, but 4 to 8 kilometres in showers.

**Weather:** Showers, occasionally heavy.

Severe turbulence in association with large cumulus or cumulo nimbus cloud.

A weather appreciation subsequently prepared by the Meteorological Office, Bracknell, for the area within five nautical miles of the accident site between 1700 and 1900 hrs include the following pertinent information:

**Situation:** An unstable NW airstream covered the British Isles and a trough in the airstream passed over North Wales at about 1700 hrs and reached Birmingham about 1900 hrs. There was a marked increase in shower activity near and behind the trough.

**Winds:** Near sea level 330° 20 knots with gusts 30/35 knots.

2,000 feet 330° 25/30 knots  
Temperature plus 7°C

3,000 feet 330° 25/30 knots  
Temperature plus 4°C

4,000 feet 320° 25/30 knots  
Temperature plus 2°C

Gusts up to 40/45 knots were possible between 2,000 and 5,000 feet.

**Cloud:** 5/8 to 7/8 cumulus and cumulo nimbus base 1,500 to 2,000 feet, but in showers 8/8 at times covering the mountains especially windward slopes. Tops 13,000 feet occasionally up to 18,000 and 20,000 feet.

**Surface Visibility:** Reduced to 3 to 6 kilometres in heavier showers and below 800 metres in hill fog, otherwise 10 to 20 kilometres or above outside showers.

**Weather:** Rather frequent squally showers. The showers were probably heavy at times over the mountains, possibly with hail and accompanied by large patches of hill fog.

**Turbulence:** Moderate but severe at times near cumulo nimbus clouds and especially near and to the lee of hills and mountain peaks.



## **1.8 Aids to navigation**

The aircraft was equipped with a multi-channel VHF communication radio, VHF omni-directional range (VOR) and medium frequency automatic direction finding (ADF). Also carried were ICAO and RAF aeronautical (topographical) charts, scale 1:500,000. Tracks from Staverton to Dublin via Birmingham, Hawarden and Valley were drawn on a smaller scale radio navigation chart; also found in the wreckage were an International Aeradio (IAL) Flight Guide and a radio navigation chart showing inbound and outbound routes for Dublin. Radio navigation charts do not display topographic details or relief. The navigation log form used by the pilot for planning and in-flight observations did not contain a column for recording the magnetic variation; the columns for tracks and headings were annotated in degrees magnetic.

Apart from map reading the navigational aids available on the route from Hawarden to Dublin include medium frequency non-directional beacons (NDB) at Hawarden and Dublin; there is also a marine NDB at Skerries (near Holyhead) which transmits at 6-minute intervals; the aircraft's ADF set was apparently tuned to the Dublin NDB facility but reception, hence tracking information, was unlikely to have been reliable or accurate at that range and altitude. The aircraft's VOR receiver was tuned to the Wallasey VOR beacon but because of its offset position relative to the aircraft's track this facility would only provide some measure of progress or distance travelled away from Hawarden with no track guidance between Hawarden and Holyhead. VHF direction finder (VDF) installations were available at Hawarden and Valley; these facilities provide bearing information to or from the station concerned on communication frequencies which were available to the pilot. No calls for assistance or requests for bearing information were received by Valley or Hawarden, the aircraft's communication set was tuned to Preston FIR frequency.

No pre-crash failure of the radio or navigational equipment was revealed during the inspection of wreckage and all continuously operating ground navigation facilities referred to above were serviceable and operating.

## **1.9 Communications**

Transcripts of the R/T communications indicate that all communications between the aircraft and the ATC at Preston, Hawarden and Birmingham were satisfactory until the pilot failed to reply to Preston after he had asked for radar assistance.

## **1.10 Aerodrome and ground facilities**

Not applicable.

## **1.11 Flight recorder**

No recorder required to be fitted.

### **1.12 Wreckage**

Examination at the scene of the accident showed that the aircraft had flown into rocky terrain in a straight and level attitude about 3,400 feet above mean sea level near the summit of a mountain. The aircraft was heading 300° magnetic when it struck the ground; it then bounced and broke up over a distance of about 125 feet.

On inspection the pattern of damage indicated that the aircraft had been in powered flight with the flaps retracted when the accident occurred. The damage sustained by the underside of the engine cowling and fuselage suggested a low ground speed with a considerable downwards component at the moment of impact. Fuel was leaking from the three tanks damaged during the accident. The ignition switches and electrical fuel pump were selected to the 'ON' position, the fuel control was 'ON' and mixture set to 'RICH'. The altimeter was damaged and its sub scale was found set to 1007 millibars. The airspeed indicator (ASI), calibrated in both knots and mph, was registering 85 mph. The ADF was tuned to a frequency of 326 MHz and its relative bearing indicator was showing 290°. The VOR receiver was tuned to 114.1 MHz and its indicator was set at 330°. The VHF radio was found tuned to 126.8 MHz. No pre-crash malfunction or failure in the airframe, engine or equipment came to light during the examination.

### **1.13 Fire**

No fire occurred.

### **1.14 Survival aspect**

The wreckage of the aircraft was not located until about 16 hours after it was reported missing. Survivability was difficult to assess; the pilot probably would not have sustained the lethal spine injury he suffered had he been restrained by a shoulder harness. The environment into which both men were thrown, ie. a rocky mountain top, made the possibility of survival extremely unlikely.

### **1.15 Tests and research**

None.

## 2. Analysis and Conclusions

### 2.1 Analysis

After preparing a detailed navigation plan during the evening preceding the accident for a flight from Bristol or Staverton to Cork, the pilot changed his itinerary and decided to fly to Dublin via Birmingham. Before leaving Bristol he obtained a route forecast for the flight to Dublin from Birmingham, valid for the period 1600 hrs to 1730 hrs. He landed at Birmingham at 1646 hrs, cleared customs, filed a VFR flight plan to Dublin and took off for Dublin at 1752 hrs without obtaining an updated route forecast. There is reason to believe that the pilot was attempting to make up lost time and, as a result, did not plan the flight from Birmingham with the precision for which he was known. The flight plan recovered from the wreckage showed he had omitted to apply magnetic variation to his intended tracks via Hawarden and Holyhead; this could have resulted in the aircraft being steered to port of the intended track unless corrective measures, based on position-fixing by map reading or other means such as VDF bearings, were taken. The aircraft passed overhead Hawarden without apparently having gone too far astray during this section of the flight from Birmingham but any error in course computation might well have gone unnoticed if the aircraft had been "homed" on to the Hawarden NDB without critical reference to the track made good.

Had the pilot checked the current en route weather before leaving Birmingham it appears unlikely that the Gloucester forecast would have been significantly amended. It would have been expected that the mountains in North Wales would have been cloud covered. One station in the area was reporting shower activity throughout the period. Had he been aware of this he might have been influenced to change his route further to the north thus keeping well clear of the mountains. However, had he maintained his planned route from Hawarden to Holyhead, which was just to the north of the mountains, the weather conditions, although adverse, would not have been so severe as to have precluded safe visual navigation by altering course out to sea around the disturbance or flying below it.

Most accidents of this nature are caused by more than one factor affecting human performance and judgement, the absence of any one of which would make the accident less likely. In this case the important ingredients were: a change in itinerary which in turn resulted in a less than meticulous navigational flight plan; en route weather conditions; and finally, an apparently undetected navigational track error which was probably due to failure to apply a 10° westerly magnetic variation to the calculated true course to steer. Failure to apply this correction may have been contributed to by haste or some other distraction whilst on the ground at Birmingham; it may also have been partly due to the navigation log format which had no separate column for noting magnetic variation. Nevertheless the pilot had noted the appropriate

variation for his preceding flights which were recorded on the same log sheet as the subject flight.

The overall circumstances indicate that the aircraft flew into deteriorating weather which prevented the pilot from obtaining a positive ground position fix shortly after over-flying Hawarden. Once the aircraft flew into the area of turbulence in the lee of the mountains, control would have been difficult and the pilot's problem would have been further complicated in having to resort to instrument flight and radio navigational aids. Since no pre-crash failure of the radio or navigation equipment was revealed during the inspection of the wreckage it can only be assumed that the pilot was unaware of the deviation from his intended track; no attempt was made to obtain a back-bearing from Hawarden VDF which would have indicated such a deviation. The evidence strongly suggests that during the last ten minutes of flight the pilot was forced to resort to instruments due to rapidly deteriorating conditions when approaching the mountains, but that the height at which the aircraft was being flown was insufficient to allow for a navigational error or permit safe terrain clearance in the turbulent conditions.

## 2.2 Conclusions

### (a) Findings

- (i) The pilot was properly licensed;
- (ii) the aircraft was correctly loaded and it had been properly maintained;
- (iii) there was no pre-crash failure of the aircraft, its engine or equipment;
- (iv) the pilot calculated the correct true course for the route to be followed but omitted to apply a  $10^{\circ}$  correction for magnetic variation; in consequence the aircraft followed a diverging track south of that intended;
- (v) weather conditions in the mountains were such that navigation by map reading alone would have been difficult and in the later stages of the flight almost impossible;
- (vi) the weather conditions encountered were more severe than anticipated by the pilot.

### (b) Cause

The accident resulted from an undetected deviation from the intended track into high ground and weather conditions which precluded safe visual flight. Failure to apply magnetic variation to the computed course to steer was a contributory factor.

R C WARREN  
*Inspector of Accidents*

Accidents Investigation Branch  
Department of Trade and Industry  
12 May 1971

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