**No: 11/92** **Ref: EW/G92/7/3** **Category: 1c**

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| **Aircraft Type and Registration:** | Piper PA-34-200T Seneca II, G-BPAD |
| **No & Type of Engines:** | 2 Continental TSIO-360EB piston engines |
| **Year of Manufacture:** | 1978 |
| **Date & Time (UTC):** | 15 July 1992 at 1450 hrs |
| **Location:** | Saddle Hill, Croasdale Fell, Bowland, Lancashire |
| **Type of Flight:** | Private |
| **Persons on Board:** | Crew - 1 Passengers - None |
| **Injuries:** | Crew - Fatal Passengers - N/A |
| **Nature of Damage:** | Aircraft destroyed |
| **Commander's Licence:** | Basic Commercial Pilot's Licence with IMC Rating |
| **Commander's Age:** | 59 years |
| **Commander's Flying Experience:** | 1177 hours (of which 18 were on type) |
| **Information Source:** | AAIB Field Investigation |

The pilot had flown earlier in the day from Liverpool Airport, where he was based as a part-time flying instructor, to Leeds/Bradford Airport in order to be examined for his instructor's rating on twin engined aircraft. For the return journey, he had declared his intention to fly VFR from Leeds/Bradford to Liverpool, via the Pole Hill VOR and the visual reporting point at Kirkby (Fig 1), and this was confirmed by the map and flight log subsequently recovered from the aircraft. He was cleared for this route and took off at 1425 hrs, climbing initially on the runway heading of 320° to an altitude "not above 2,000 feet". At 1426 hrs he was re-cleared to climb to "not above 3,400 feet" and turn left to Pole Hill, which he reported crossing at 1436 hrs. His required track from Pole Hill to Kirkby was 245°(M) and at 1439 hrs he reported to Liverpool ATC Approach Control that he had about five minutes to run to Kirkby and was told to rejoin at Kirkby "VFR, not above 1,500 feet QNH". This was the last recorded communication with the aircraft.

At about 1450 hrs the attention of a gamekeeper and an estate worker on Croasdale Fell was attracted by the sound of engines and they momentarily glimpsed a twin-engined aircraft, through a gap in the low cloud present, flying low down. They remarked that it would need to climb to clear the nearby hills and a few seconds later they heard it crash. The engine noise had remained constant until ceasing

at impact. One witness went to phone the emergency services and then guided them to the scene, while the other attempted to locate the aircraft, but was hampered by fog on the hills.

The aircraft crashed on Saddle Hill, part of Croasdale Fell in the Forest of Bowland, 21 nm northwest (327°M) of Pole Hill, at 1,398 feet amsl. At the crash position it had thus deviated nearly 90° from the required and planned track from Pole Hill.

In view of this deviation and, as the closest VOR was Pole Hill and one VOR receiver in the aircraft was found selected to that beacon, it was recommended that the CAA check the VOR signal integrity. As a result, the VOR was temporarily switched off and then a re-calibration conducted, which included specific checks with the test aircraft positioned on both the 245° and 325° Radials at 2,000 feet amsl. The beacon was found to be completely within its required tolerances. Local area radio emissions were also checked and none was found to be capable of interfering with the Pole Hill VOR signals. Anomalies peculiar to the type of receivers in the aircraft were also researched and, again, nothing relevant was uncovered. In all, there remains no reason to suspect that false VOR indications had any part to play in the deviation from the required track.

The Post Mortem examination revealed fatal injuries entirely consistent with rapid deceleration and, although the pilot had been wearing a safety harness, the impact was not survivable. Therapeutic amounts of paracetamol were found and these may have been taken to alleviate pain from a 'frozen shoulder' which, itself, may have been symptomatic of further disease. It therefore seems likely that the pilot was not at the peak of fitness for the flight, but there is no way to determine whether this had any influence on the way in which it was conducted.

Records indicated that the aircraft (Serial No 7870431) had flown 1,824 hours since new at the time of the accident, had a Certificate of Airworthiness in the Transport Category (Passenger) and had been maintained in accordance with the CAA Light Aircraft Maintenance Schedule. It was fitted with twin VOR/Communication (NAV/COM) radios, DME, ADF, transponder and a non-slaved directional gyro indicator (DGI).

G-BPAD impacted rising ground 388 ft below the local summit at 1,786 feet amsl. The local terrain had a maximum upslope of 15° in a direction of 320°M, equivalent to a slope along the aircraft's track of around 10° up. The ground was of thick, medium density peat overlying sandstone and covered with heather. Initial impact caused severe damage to the forward fuselage and both wing/fuselage attachments, and detachment of all three landing gear legs and both propellers. The main part of the wreckage then travelled 40 metres, mostly airborne, before impacting the ground again and coming to rest erect, with the left wing structurally detached and the right wing almost so. There was no fire. After on-site examination, the wreckage was removed to an AAIB hangar at Farnborough for more detailed investigation.

Examination of the wreckage and the accident site showed that the aircraft had crashed while tracking 353°M and descending at around 5° relative to the horizontal. It had been approximately level in pitch, yawed slightly left and banked 10-15° right. The evidence was clear that at impact all three landing gear legs had been in the fully extended position. Flap position could not reliably be determined. Propeller blade ground marks and blade features indicated that engine power had been symmetrical, with both engines at a relatively low power condition. With the assumption of a rotation speed for the constant speed propellers in the normal range 2200-2300 RPM, the marks indicated an aircraft ground speed at impact of 100-106 kt, and the site and wreckage characteristics were consistent with this speed range.

The left wing fuel tanks held a considerable quantity of fuel; fuel system damage would have drained the right wing tanks after the accident and these were found almost empty. Analysis of samples showed that the fuel met specification requirements.

The last known QNH received by the pilot was 1016, from Liverpool Approach ATC which he had read back as 1017 and not been corrected. Main and standby altimeter subscales were not significantly different from the correct setting at 1017 and 1018 mb respectively.

NAV/COM 1 and 2 were found selected on and tuned, respectively, to Pole Hill and Wallasey VOR radio navigation beacons, and to Liverpool Approach and Liverpool Tower Air Traffic Control frequencies. The omni bearing selectors on the No 1 and 2 VOR indicators were found at 180° and 225° respectively. The DME was found selected to Wallasey VOR, and the ADF to Leeds/Bradford NDB. The transponder was found selected off. The radio navigation equipment components escaped gross damage; functional testing of NAV/COM 1 and 2 radios, the two VOR converter units, the two VOR indicators and the DME found that sensitivities and accuracies were within required limits and revealed no evidence of malfunction. The overall bearing error for each VOR system was less than 4°.

Two pilots who had hired the aircraft from a previous owner some months before the accident reported having experienced problems with the plastic trim on the face of the instrument panel having interfered with the DGI setting knob. On releasing the knob after having pushed it in to manually synchronise the DGI card with the magnetic compass indication the knob had on occasion remained depressed for a period, with the card thus disconnected from the gyro gimbal mechanism, before subsequently springing out under the effects of vibration and re-engaging the gimbal mechanism, possibly on an incorrect heading. After the panel disruption that occurred in the crash, it could not be established whether such a condition could have pertained during the accident flight. With this possible exception, the investigation revealed no evidence of failure or malfunction of the aircraft or its equipment that had contributed to the accident.

The weather at the time of the accident was deteriorating as a warm front, stretching across the country from southeast to northwest some 20 nm south of the planned route, moved slowly northeastwards. An aftercast gives the clouds as "Scattered stratocumulus base 2,000 to 2,500 feet .... (with) .... local broken stratus between 500 and 1,000 feet". The witnesses local to the accident site stated that it was raining with very low cloud covering the hill tops.

A radar recording, made by the ATC at the British Aerospace airfield at Warton, showed the aircraft travelling both towards and away from Pole Hill, on a somewhat erratic course and at a ground speed some 50 kt slower than that at which the aircraft normally cruised. The wind at 2,000 feet was 180°/10 kt, nearly at right angles to his intended track. When the aircraft passed within about one nautical mile north of Pole Hill, it set course on approximately the correct track for Kirkby but, after about two minutes, it turned northwest up the Calder valley towards Burnley, then into the Ribble valley at Clitheroe and from there turned northeast up that valley before disappearing from radar at around 1446 hrs, seven nautical miles southeast of the accident site.

## G-BPAD TRACK FROM PRIMARY RADAR

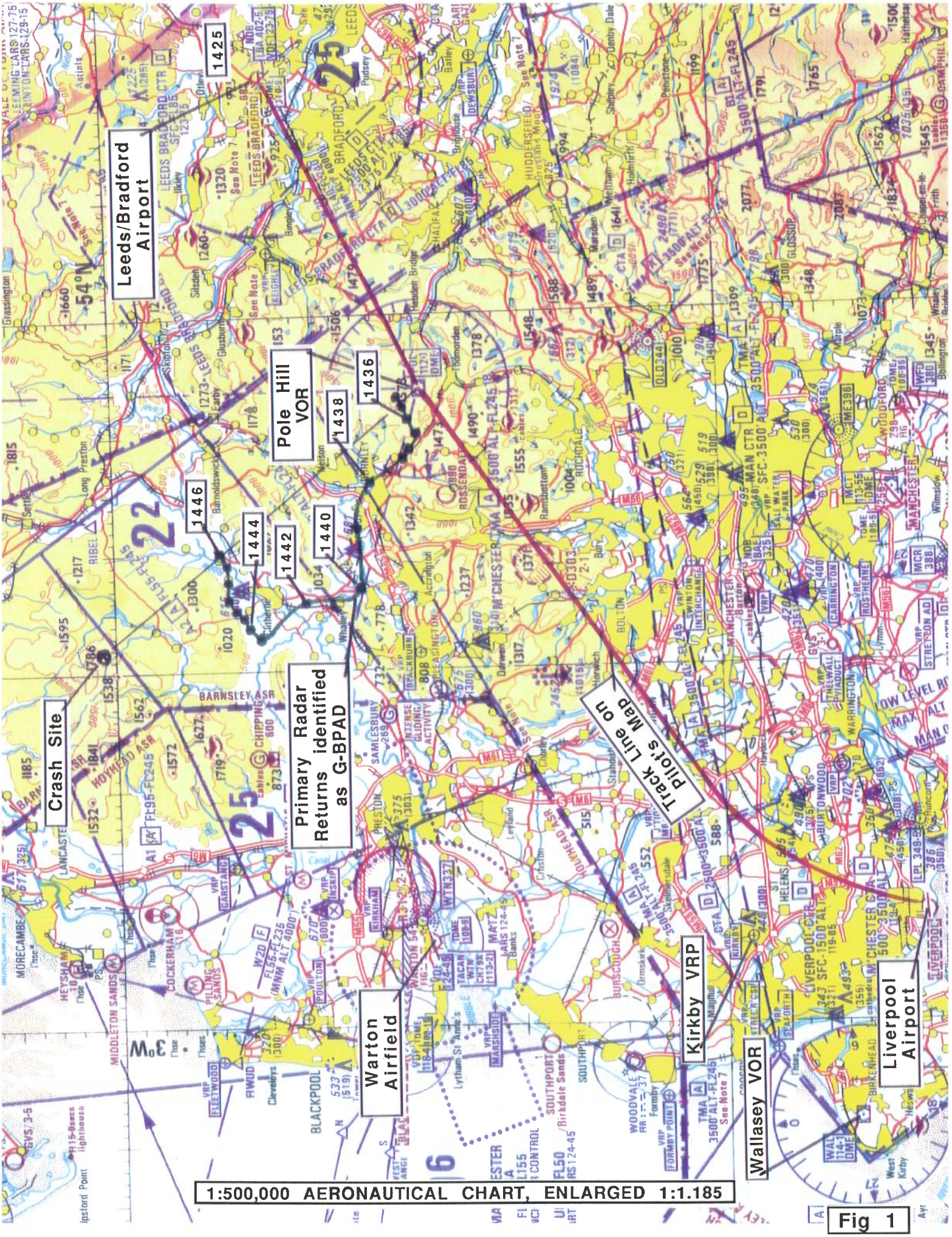


Fig 1