

No. 28

British European Airways Corporation, Vickers-Armstrongs Viscount, 802, G-AORC, accident nr. Law Farm, Tarbolton, Ayrshire, Scotland, on 28 April 1958. Report No. C. 679-C.A.P. 154, released by the Ministry of Transport and Civil Aviation (UK)

Circumstances

The accident occurred at 2208 hours during an unscheduled flight from London to Prestwick where the aircraft was to pick up passengers for BOAC under a charter arrangement and fly them to London. The aircraft took off at 2042 hours GMT from London Airport, cruised on the Airways at 18 500 ft and then commenced the descent to Prestwick with an initial clearance to 8 500 ft. Within a few minutes the clearance was amended to cross the Prestwick radio beacon at 4 000 ft. The descent appeared to the pilots to be normal until the aircraft struck the ground close to the site of the beacon very shortly after the captain had reported passing 11 000 ft in the holding pattern. The aircraft slid along the ground for 400 yards, and fire broke out in the starboard wing. Of the five crew aboard the aircraft, three were seriously injured.

Investigation and EvidenceCrew Information

The captain held a valid Air Line Transport Pilot's Licence with an Instrument Rating and an endorsement in Group 1 for Viscount aircraft. At the time of the accident he had completed 10 135 hours flying, of which over 9 000 were in command and 766 were on the Viscount Type 802. His records show his instrument flying, drills and procedures to have been of a high standard but there were comments on record that his reaction was somewhat slower than in the majority of airline captains and that he has a tendency to try to do too much. Again from the records it seems that the captain had some difficulty in co-ordinating his duties when on conversion training to the Viscount 802, which has been operated by a crew of two

pilots since its introduction, and he had to be given an extension of the normal training period in consequence.

The first officer also held a valid Air Line Transport Pilot's Licence with an Instrument Rating and an endorsement in Group 1 for Viscount aircraft. At the time of the accident he had flown a total of 5 260 hours of which 544 were on the Viscount Type 802. His records with the Corporation show that his duties as a first officer were usually carried out competently and conscientiously, but there are entries which draw attention to a certain slowness and lack of self-confidence. At the end of his Viscount 802 conversion course, with which he had had some difficulty, it was said that in view of the amount of time and work taken to achieve an acceptable standard, he would require regular practice to maintain that standard.

The Captain's Statement

"The clearance to descend came through just before 2153 and I throttled back to begin a standard descent from 18 500 ft. At 2154, Scottish Airways passed me the 2150 Prestwick weather, which put the cloud base below the critical height shown in the Operations Manual. On hearing this, I gave Airways my intentions. Initial clearance had been to 8 500 ft and this was changed at 2156 to 4 000 ft or above at the Prestwick Beacon (GJR). I called passing New Galloway at 2157, gave an ETA for GJR of 2204 and gave my altitude as 13 000 ft. I do not remember this now, but believe that the altitude given must have been accurate. I was cleared then to Prestwick Approach.

Before calling Prestwick Approach, I gave the first officer instructions for the overshoot should we have to do one.

Before leaving London Airport I had told him that we would not do a monitored approach at Prestwick. I then called the Approach, giving them my intentions, ETA at GJR, and my height as 11 000 ft descending to 4 000 ft. They repeated the 2150 weather and gave me the airfield QFE and QNH, but because I had already had the weather, I only noted the QFE, because it is my own practice to compare QFE on my altimeter with the Zone QNH (not the airfield QNH) on the other. There were then further exchanges between us on the R/T at the end of which (2201-1/2 approx.) there was a short period of silence. I believe that it was during this period that I asked the first officer to get on with the initial checks, and towards the end of the period that I thought of checking one altimeter against the other. I think I said to the first officer 'We may as well check the altimeters now', or words to that effect. As I did so, I set the QFE on mine and added to the first officer 'What's your reading?'. I distinctly remember answering his reply by 'No, not that - what is the difference? It should be about 80 ft.' I was then looking on the let-down sheet for the airfield elevation when Prestwick Director transmitted to me just after 2203 and interrupted me. When I passed my altitude as 'fourteen point five', I believe that I gave it, certainly not by looking at my own altimeter (because it was on QFE), but rather as a result of my exchanges with the first officer a few seconds earlier, together with a glance across at his altimeter, which was still on Zone QNH, and which I remember reading as 14 300 ft. I believe that the first officer replied to my initial question by giving the altitude shown on his altimeter, and I think he probably said '14,500'. I know that as soon as I had got out of the aircraft a few minutes later, I knew what had caused the accident and I put the source of the error at this moment. Prestwick Director's reply of 'You are too high for me at the moment' could have done nothing but confirm the error in my mind, even though I know now that the radar operator was basing his remark only on what I

had just told him. As I was looking at the let-down sheet on my knee to check the 80 ft, the red ADF needle (on GJR) started to go round, and I disengaged the auto-pilot, set the required heading on the Smith's System, put the aircraft into a left turn, and turned the selector to 'Radio Off' to disconnect the ILS from the Smith's System. I called the Approach in the turn, giving an altitude of 12 500 ft, which I can only have read from my own altimeter. As soon as I had reached the heading of 075°, I selected 43% of flap with the intention of increasing the rate of descent. After a one minute leg I turned back to regain the beacon. During this turn I must have sent my last height of 11 000 ft and just after completing the turn, we must have struck the ground, although I do not remember the impact."

The B. E. A. Monitored Approach System

This system was adopted as a "standard procedure" in B. E. A. as from 15 November 1956 "in the interests of safety and efficiency". It was felt that the problem of errors in the control cabin which were due to a lack of effective checking and cross-checking of all vital actions, together with an unsuitable distribution of duties between the two pilots, could best be solved by the Monitored Approach System, using the first officer to fly on instruments from the start of the descent until the captain was ready to take over and land. In this system, the first officer would be free to concentrate on flying the aircraft accurately, whilst the captain monitored and directed his flying, communicated with ATC and was free to control every situation as it arose. By such means the workload would be more evenly distributed between the two pilots, who must in consequence be more efficient individually and as a team, and the strain and fatigue on the captain would be reduced.

It was recognized that the system demanded a high degree of confidence from the captain in the skill and capability of his first officer, together with a high degree of understanding and co-operation between captain and co-pilot to avoid possible

mistakes and also that rigid adherence to correct procedures would be of paramount importance. Having a standard procedure was stressed as being particularly valuable in helping the captain and first officer to work as a team even though they may not have previously flown together.

Although on the subject flight the captain was not manually flying the aircraft because the auto-pilot was engaged, he was controlling the descent and monitoring his instruments. On top of this he was doing all the R/T (the exchanges on which occupied about 4-1/2 minutes of the 12 minutes between the start of the descent and Prestwick Beacon), writing down the weather reports, studying the approach and overshoot procedures, briefing the first officer on a possible overshoot, attending to descent and initial approach drills and checking the altimeters. There seems little doubt that in so doing he overloaded himself to an extent that made possible the mental loss of the descent sequence.

The B. E. A. Monitored Approach System was not being used, although the instructions issued to flying staff suggest that it should have been. In his statement the captain said that he did not use it because he had never met the first officer before and because the first officer said he had not been to Prestwick since the war. He also gave it as his opinion that use of the system would most probably have increased his workload because he would have had the additional duties of reading check lists and tuning beacons.

Although the captain was within his rights in making this decision; nevertheless, it would appear probable that had he used the Monitored Approach System and followed the standard drills and procedures, or had he substituted some other procedure which made full use of his first officer, the altimeter reading error, if made at all, might then have been quickly noticed.

The B. E. A. Operations Manual requires the first officer to carry out all aircraft drills and to repeat each item verbally to the captain as it is completed. Had this been done on this occasion it is difficult to see how the confusion over the altimeter checking mentioned in the captain's statement could have occurred. Furthermore, the airfield elevation for which the captain says he was looking on the Prestwick let-down sheet had just been given to him on R/T as 64 ft, together with the QFE and QNH settings.

Observations

Calculations based on time and rate of descent confirm that when the captain read the altimeter between 2203 and 2204 hrs the aircraft was at 4 500 ft, not at 14 500 as he reported. He, therefore, failed to notice the position of the 10 000-foot pointer as he looked across at the first officer's altimeter. He subsequently perpetuated this initial error when reading his own altimeter at 2 500 and 1 000 ft when he gave his altitude as 12 500 and 11 000 ft respectively.

The captain had calculated the time for commencement of descent on the basis of a rate of 1 500 ft per minute and with the deliberate intention of not being too high on arrival at GJR beacon. He began the descent at the time planned and the descent was made as intended without interruption. Despite these facts, he accepted his height without any misgiving as 12 500 ft when he reached GJR.

The presentation afforded by pressure altimeters having three pointers is not always conducive to rapid and accurate reading especially in regard to the 10 000-foot pointer which can be overlooked or obscured, particularly at night. The possibility of ambiguous presentation with consequent wrong reading has been well known and there is constant endeavour to produce something better. The altimeter fitted in the Viscount 802 was taken to

be a marked improvement on that fitted in the Type 701 in that it made a much clearer distinction between the three pointers.

The fourth item for the descent checks on the B. E. A. Viscount 802 Drill Card reads, "Spill Valves: OPEN as necessary - one at 15 000 ft, second at 8 000 ft." The pressurization spill valve operating switches are normally moved by the co-pilot. As the first officer had apparently opened the first, he must have realized that he had passed 15 000 ft. It is difficult to reconcile this with his recollection that he "was never conscious of being at any precise altitude, but only of descending."

During the descent from New Galloway the first officer seems to have spent too much of the available time trying to tune the PN Beacon. As the main Prestwick Beacon (GJR) had already been tuned satisfactorily on the other ADF set; as GCA was available to monitor their ILS approach; as the Decca Flight Log was working satisfactorily; and as the PN Beacon was only a short-range locator, this continued effort was unnecessary and was undoubtedly detrimental to his vital duties of monitoring the instruments and the R/T conversations.

The first height reported by the aircraft to the Prestwick Approach Controller was 11 000 ft. Because of the normal change of frequency he had not heard the previous call passing 13 000 ft neither did he know at what time the descent had commenced. When therefore the aircraft, some five minutes later, reported itself at 14 500 ft, he at once noticed the discrepancy. Although there was no conflicting traffic, he spoke to the GCA Controller, who was working the aircraft at the time, and asked him to request its altitude. Before the GCA Controller could do so, however, the aircraft reported itself over the GJR Beacon at 12 500 ft. This was received about 90 seconds after the 14 500 ft report and effectively dispelled from the Controller's mind any momentary doubts as to the aircraft's altitude.

Probable Cause

The captain flew the aircraft into the ground during the descent to Prestwick after misreading the altimeter by 10 000 ft. Whilst a somewhat ambiguous presentation of height on the pressure altimeter may have initiated this misreading, a lack of co-operation between the captain and first officer and a lack of alertness on the part of the first officer were the main contributory factors.
