

No. 11

Compagnie de Transports Aériens Intercontinentaux, Douglas DC-6B, crashed near Cairo, Egypt, on 20 February 1956. Report released by the Ministry of Communications, Civil Aviation Department, Egypt.

Circumstances

The aircraft was on a scheduled flight from Saigon to Paris, France and had left Karachi for Cairo on 19 February at 1715 hours Greenwich Mean Time with 9 crew and 55 passengers aboard. The flight was routine until 0230 hours (20 February) when the aircraft reported to Cairo Air Traffic Control that it had passed Suez (60 miles east of Cairo) at 0224 at a flight level of 8 500 feet, flying VFR and was descending. At 0240 it reported the Cairo aerodrome in sight and being 15 miles out, was granted an authorization for a VFR approach and at the same time was given the QFE and QNH, 29.42 and 29.73 respectively. Contact was established with Cairo approach and the aircraft requested and received landing instructions on 118.5 megacycles and was asked to call down wind. This message was acknowledged and was the last heard from the flight. Several attempts to contact the aircraft on all available frequencies were made but were unsuccessful. At 0450 hours the wreckage was sighted 18 miles southeast of the aerodrome. Only 6 crew members and 6 passengers survived.

Investigation and Evidence

The investigation disclosed that the captain-in-command, a company DC-6B captain and check pilot, with extensive piloting experience, occupied the right-hand seat during the flight leg between Karachi and Cairo, and the co-pilot, the left-hand seat. The latter was being checked on this flight as a DC-6B trainee-captain by the captain-in-command. Since they had left Saigon where the flight originated both had completed 21-1/2 hours of flying at the time of the accident. A crew change was to be effected at Cairo.

The aircraft struck the ground in a nose down attitude with the landing gear fully extended and locked and the flaps set at 20°. The general direction of the wreckage distribution following impact was about 240° magnetic.

The aircraft was totally destroyed by fire after impact. The probable cause of the fire was the rupturing of the starboard wing following the severe shocks sustained by the landing gear, engines and propellers and transmitted to the wing structure with the result that the petrol content of the latter was sprayed on some broken live electric connections, which initiated the fire that spread quickly over the starboard wing and the fuselage portion aft of the cockpit.

All aircraft fire extinguisher bottles recovered after the accident were found discharged but had little effect on the fire intensity.

Due to the hilly nature of the terrain and the softness of the sand dunes, no vehicles were able to reach the crash site.

All aircraft aids were certified serviceable by the radio officer up to the time of the accident and little radio interference was encountered after Suez.

Investigation did not reveal any structural failure prior to impact and no malfunctioning of the engines was reported to justify their dismantling at the shops.

The captain stated that the flight was uneventful up to Suez and that between Suez and Cairo the aircraft had drifted to the south for some reason. Clearance had been granted for a visual let-down. When he realized that the aircraft was over a dangerous area it was too late to take any corrective action. It seemed to him that there was a very important wind component from the north when all forecasts indicated a southerly component. The radio compass indications were unreliable due to the night effects and to stormy weather. The aircraft ILS indications were unsatisfactory and the glide path was unserviceable and the co-pilot misinterpreted the indications and turned the aircraft towards the left following a false ILS axis. He also testified that a direct approach procedure was adopted and a minimum altitude of

2 000 feet was maintained to intercept the localizer. He said that his estimated time of arrival was 0237 hours and that he saw the aerodrome lights to his right and realized that the aircraft had drifted to the south but not appreciably as it turned out to be later on. He also stated that he gave the co-pilot the order to carry out an ILS procedure when the latter started descending. To the question how he allowed an ILS procedure with a direct approach, he answered that the aircraft was supposed to reach the outer marker locator at an altitude of 2 000 feet. He also testified that it is difficult to recognize the aerodrome by night because it is not isolated and one has to wait a long time before recognizing it.

The co-pilot stated that the aircraft's position relative to Suez was fixed visually and at the time was about 3 nautical miles to the south of Suez, flying at 8 500 feet. He testified that Cairo ATC authorized the aircraft to descend from that altitude according to the visual flight rules. The aircraft heading at that moment was 280 degrees magnetic and that heading was maintained to intercept the ILS localizer. He stated that the pilot-in-command estimated to reach the outer marker at 0237 hours. Cairo approach cleared the aircraft to descend VFR for runway 230 and transmitted the QNH and QFE and he adjusted his altimeter setting to the QFE. He stated that the pilot-in-command and himself thought that they were going to overshoot so they decided to put the aircraft into the landing configuration at 4 500 feet altitude. The ILS localizer needle was to the right, so he assumed a new heading of 300° to intercept as quickly as possible the axis of the ILS. When the needle moved slowly towards the centre of the instrument dial, he assumed the heading of 230° corresponding to the ILS axis. One radio compass was on the range and the other on the outer compass locator, but both of them, he stated, were giving rather incorrect indications and the needles were pointing near the zero position. Now the aircraft's altitude was 2 000 feet, corresponding to the altitude at the beginning of the ILS procedure. As the glide path was unserviceable, he maintained the altitude of 2 000 feet with an engine boost of 31" Hg, waiting to reach the outer marker. A few moments later the accident occurred. When asked whether he was able to determine his distance from the aerodrome and his altitude when the indication of the ILS

localizer was central, he said that he was at that time too busy watching his instruments and that his altitude was 4 000 feet.

The procedure agreed upon for the approach consisted of a direct approach to the outer marker. The first visual contact with the aerodrome was at an altitude of 4 500 feet. Both the pilot-in-command and the co-pilot thought they were going to overshoot so they lowered the undercarriage and the flaps to increase the rate of descent while maintaining the same speed. It is conceivable that they based their estimate of the distance from the aerodrome on the assumption made by the captain-in-command that they would arrive over the latter at 0237 and that the aircraft's altitude was regulated accordingly down to 2 000 feet.

If the average rate of descent was 500 ft/min. as stated by the pilot and co-pilot, it would take approximately 8 minutes to reach the altitude of 4 500 feet from a level flight of 8 500 feet so it was probably 0232 when the aircraft reached the altitude of 4 500 feet and had only according to the captain-in-command's assumption 5 more minutes to reach the aerodrome. Actually, if the aircraft had reached the aerodrome, it would have exceeded its estimated time of arrival by 9 minutes. At that moment, according to the statements of the captain and co-pilot, the pointer of the localizer was fully deflected to the right, this indication was taken by the co-pilot that the aircraft was to the left of the axis of the localizer, so he took the heading of 300° to intercept as quickly as possible the ILS axis. The pointer returned slowly to the centre. Taking into consideration the aircraft's position, that indication could not correspond to a normal functioning of the instrument, but the co-pilot who was on the controls considered the instrument indication as intercepting the localizer and took the heading of 230° corresponding with the QFU of the runway.

That was contrary to safe navigation because during the above manoeuvres the aircraft was all the time descending until it reached an altitude of 2 000 feet, which is 1 500 feet below the minimum safe flight altitude for the sector (3 500 feet); and as the approach was carried out from the beginning according to the visual flight rules, all flying below the safe altitude should have been done exclusively by visual means and

the instruments should have been used just as an aid to fix the aircraft's position in relation to the aerodrome.

Moreover, the captain testified that at the end of the left turn, he became aware of the red flag showing on the ILS dial, which emphasized to him the fact that the co-pilot's interpretation of the instrument indication was erroneous and it should have been his duty to order the co-pilot to stop descending at once, but apparently he was too slow to take any corrective action before the aircraft hit the ground.

The ILS approach procedure for Cairo International Aerodrome requires aircraft to make an initial approach over the ILS outer marker maintaining 2 000 feet until over the outer marker outbound. The aircraft will then proceed outbound for at least 2 minutes descending to 1 700 feet and maintain this altitude until below the glide path. A procedure turn will then be made to the north of the localizer course maintaining 1 700 feet. This altitude will be maintained until intercepting the glide path inbound and then descent will be made on the glide path.

In the event of a missed or baulked approach, aircraft should immediately climb to 2 000 feet outbound on the back course of the localizer and return to the outer marker at 2 000 feet or as directed by Cairo Approach Control; but although the initial intention of the flight for the landing consisted of a direct approach to the marker, this intention was abandoned in favour of a hasty decision to try and intercept the localizer axis as quickly as possible.

The co-pilot testified that the aircraft hit the ground tangentially and in a straight and level attitude. This is in contradiction with the facts gathered at the scene of the accident that the first point of impact was with the nosewheel and that the aircraft ran for about 6 metres on the nosewheel. On the other hand, if the aircraft was flying straight and level before the accident and no sudden failure had occurred it could not possibly clear a hill 250 metres before and 40 feet higher than the first point of impact.

The approximate rate of descent was determined from the following co-ordinates:

aircraft speed at time of impact	125 knots
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distance flown after clearing hill	250 metres or 0.15 miles
height of hill	40 feet
rate of descent	550 ft/min.

which corresponds approximately with the rate of descent mentioned by the pilot-in-command in his statements and is a normal rate for approach with the flaps extended 20°.

Although the pilot and co-pilot testified that before the accident the aircraft was maintaining an altitude of 2 000 feet for a direct approach to the outer marker, the aircraft hit the ground at an altitude of 1 360 feet approximately. This discrepancy between the above two figures was thought at the beginning to be due to a faulty QFE setting. Both altimeters were recovered from the wreckage and examined. One of the altimeters showed on the sub-scale a setting of 29.42, corresponding to a correct QFE as transmitted from the tower. This was the co-pilot's altimeter. The other altimeter setting, set to the QNH as testified, could not be determined due to the excessive damage caused by the fire on the scale. On the other hand, the remote possibility of the static system becoming suddenly blocked in such a way as to affect both precision altimeters was explored. If this happened the obstruction should form an air tight plug to be of any real effect, and the instrument casings should also be air tight. In that case the altimeters would indicate the higher altitude at a lower level (precisely the altitude at which the static lines became blocked). But this would have affected at the same time the airspeed indicators and the other instruments fed from the same static sources; but the airspeed indicator seemed to function normally up to the time of the accident and there were no complaints as to unserviceability.

The fact that both pilot and co-pilot do not recall any altitude below 2 000 feet might be due to the fact that during a short period before the accident they were too busy looking outside the aircraft to identify the runway lights.

It is also noteworthy to mention that the co-pilot was using Cairo Aerodrome ILS for the first time and, therefore, was not sufficiently acquainted with it and in such a case was in need of a severe monitoring on the part of the pilot-in-command.

The weather forecast indicated mainly westerly winds with moderate strength having a very slight south component. The actual weather at the time of the accident agreed with the forecast but the winds were lighter and some medium clouds covering half the sky at 1 200 - 3 000 metres developed over Cairo Aerodrome.

Probable Cause

The accident was due to the failure of the pilot-in-command to monitor the co-pilot during a direct approach procedure and the reliance of the latter on his instruments exclusively to fix his position relative to the runway at an altitude below the minimum safe altitude.

The factor of crew member fatigue cannot be ruled out.

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