No. 15

Trans Mediterranean Airways, DC-4 Skymaster, OD-AEC accident at Brindisi, Italy on 9 July 1962. Report released by the Directorate of Civil Aviation, Italy

1. Historical

1.1 Circumstances

The aircraft departed Beirut at 1425 hours GMT on 8 July as non-scheduled international cargo flight MV 103 to Brindisi, Frankfurt and London. It reached London at 0815 on 9 July. The return flight, MV 104, left London at 1202 hours, the same day, for Beirut via the same stops. It was carrying two crews, each made up of a pilot-in-command, a co-pilot and a radio officer. The crew, which had flown the aircraft from Beirut to London, was resting in the cargo compartment during the return trip. There were no passengers. The aircraft reached Brindisi at 2030 hours and, after refuelling, it took off from runway 05 at 2141 hours. The take-off was normal up to the time of lift-off, however the aircraft did not gain height as expected. After reaching a height of 60 m it began to descend gradually, in a slightly banked to port attitude, and struck the sea about 2 250 m from the end of the runway, 4° left of the extended runway centre line. Fire broke out. The accident occurred at approximately 2142 hours.

1.2 Damage to the aircraft

The aircraft was destroyed.

1.3 Injuries to persons

All 3 operating crew and the 3 crew resting in the cargo compartment were killed in the accident.

2. Facts ascertained by the Inquiry

2.1 Aircraft information

The aircraft's Certificate of Airworthiness was valid until 8 March 1963. The last maintenance was carried out on the aircraft in Beirut on 30 June 1962, and a certificate was issued to show it was in satisfactory condition. No technical defects concerning the aircraft were reported at Brindisi.

At take-off the aircraft's weight and centre of gravity were 32 319 kg (slightly below the permitted maximum) and 22.5% respectively i.e. within the prescribed limits.

2.2 Crew information

The pilot-in-command, age 45, was a highly experienced pilot and had flown over 15 000 hours. He had flown 5 000 hours on DC-4's. He held South African and Lebanese airline transport pilot licences with ratings for various aircraft types including the DC-4. He passed his last proficiency check for instrument flight on 29 May 1962.

The co-pilot, age 27, had a co-pilot rating for DC-4's and an instrument rating. He had flown 2 700 hours. When joining Trans Mediterranean Airways he underwent a medical examination in May 1962 and was pronounced fit for flight duties. However, he did not report back for a checkup 30 days later as instructed. At the time of the accident he was not properly qualified medically, but no errors in the handling of the aircraft came to light during the investigation which could be specifically attributed to insufficient physical control.

The radio operator, age 29, was properly qualified and had about 3 000 hours of flight time to his credit.

2.3 Weather information

At the time and site of the accident there was no wind, the temperature was 21° C and the dew point was 19°. Visibility in flight was reported by the pilot of another aircraft, which was landing at the time of the accident, as being somewhat reduced owing to the onset of darkness and the moon, which was in the sundown phase. He could not see the line of the horizon out to sea and had to fly by the use of instruments.

2.4 Navigational Aids

Aids available on the flight were ILS, VOR and radio compass.

The aircraft was fitted with the following:

2 HF sets	2 VOR - ILS
1 Loran	2 ADF receivers
1 radio altimeter	1 Collins glide path receiver
3 VHF Collins transmitter/ receivers	1 marker beacon

2.5 Communications

Prior to take-off from Brindisi and up until the time of the accident at 2142 hours, radio messages were exchanged between the aircraft and the Brindisi Tower. They were in the correct phraseology and were tape recorded.

2.6 Aerodrome Installations

The aircraft took off from runway 05/23 which is equipped with white runway lights and green threshold lights. The length of runway 05, which is normally 1 940 m, is reduced to 1 890 at night, the threshold lights having been moved in 50 m from the end of the runway.

2.7 Fire

It could not be determined whether or not fire broke out aboard the aircraft prior to impact. Most eye witnesses said there was no sign of fire. An intense fire developed upon impact with the water and was fed by fuel spilt when the tanks burst. The fire completely engulfed the aircraft while it remained afloat.

The aircraft's fire fighting equipment was not used.

The fire fighting equipment on the ground reached the aircraft as quickly as possible but did not arrive until about three quarters of an hour after the accident occurred. The equipment had little effect as the fire was in an advanced stage.

2.8 Wreckage

The wreckage was located on the sea bed, at a depth of approximately 55 m, about 2 250 m from the end of runway 05, slightly left of the extended runway centre line at an angle of about 90° to it.

No marks were found on the ground beyond the end of the runway.

Engines Nos. 1 and 2, the four propellers and the outer part of the left wing were found away from the main wreckage, however, the relative distances of these parts were such that separation in flight was excluded.

3. Comments, findings and recommendations

3.1 Discussion of the evidence and conclusions

At the time of impact the undercarriage was retracted and locked, and the flaps were at a normal setting for take-off.

Following wreckage examination it was believed that, most likely, the aircraft struck the water with its engines functioning. The throttle controls were all found in the full throttle position and therefore it did not appear that the crew had taken steps to stop or throttle back the engines. However, both port engines may have been damaged prior to impact which might have resulted in a loss of power. The technical examination of the engines showed that the front bearing of No. 1 engine had begun to seize up, and the inlet valve on cylinder No. 8 of No. 2 engine was broken. This latter type of failure produces combustion in the exhaust pipe which may cause a fire through flame-back.

The position of the rudder trim tab, which was fully extended to port, suggested a pronounced extension of the rudder to starboard and that the aircraft had been subjected to a strong tendency to yaw to port, which could only have been caused by lack of power in one or both of the port engines.

Tests on the engines eliminated the possibility of overspeeding and loss of the propellers in flight.

The Lebanese regulations regarding flight time limitations (Decree No. 17183, dated 12/9/57) state that a crew may carry out a maximum of 13 hours' flight in a 24-hour period and has the right to a number of hours of rest equal to the hours flown in the preceding 24 hours, provided that the period of actual rest is not less than 8 hours after completion of the maximum permitted flight time.

However, where a crew is unable to have a complete period of rest, it may perform one or more additional trips for an aggregate time not exceeding the 13 hours, provided that the outstanding hours of rest are added to the hours of rest accruing after these flights. Rest may not, however, be accumulated in excess of two periods. The maximum flight time (13 hours) may be extended to 18 when an extra pilot-in-command is carried. The regulations do not establish how many hours of duty the crew should have in a 24-hour period, nor does the decree envisage rest on board the aircraft. Rest times at stops are considered hours of duty.

The crew that was flying the aircraft on the return trip from London to Beirut had been aboard since 1425 hours on 8 July 1962. However, that crew had not been on duty during the first part of the flight from Beirut to London, and the aircraft was equipped with bunks for the use of the crew. The pilot-in-command had spent 20:38 hours in flight plus a total of 10:39 hours on the ground during refuelling and transit stops which came to a total of 31:17 hours on duty. He may, therefore, have been tired at the time of the accident. If the Brindisi-Beirut portion of the trip (approximately 6:30 hours) had been completed the crew would have been on duty nearly 40 hours in all and would have been aboard the aircraft for about 27 of these.

3.2 Probable cause

The accident was probably caused by a loss of power on No. 1 and 2 engines following take-off, which resulted in a gradual loss of height. The probable slow psycho-physical reaction of the crew, due to fatigue, may have prevented perception of the danger and the timely execution of manoeuvres to prevent the accident, or minimize its consequences.

3.3 Recommendations

As a result of this accident it was recommended that:

1) ICAO should formulate a common Standard for all Contracting States governing the relationship to be observed between periods of flight duty and rest for crews;

2) rest should be taken on the ground.

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