No. 47

Iranian Airways DC-3 crashed near Mehrabad Airport during a training flight on 30 June 1953

Circumstances

The aircraft, engaged on a co-pilot's check in instrument flying and one engine flying, took off from Mehrabad Airport at 0909 LT with a Captain acting as check pilot, four co-pilots under test and a flight engineer. Difficulties were met in feathering and unfeathering during the first flight and the aircraft returned to the apron for advice. The aircraft took off again at 1048 LT for further checks.

At approximately 1129 LT and at 6 700 feet the port propeller was feathered. A few minutes later the port propeller overspeeded when the Captain tried to unfeather it and, despite repeated efforts, the crew did not succeed in unfeathering or refeathering it and it continued to windmill at about 2100 RPM.

Height could not be maintained and the aircraft crash landed in open country 1 500 metres short of Runway 11 at Mehrabad Airport. The aircraft was wrecked causing serious injuries to three occupants and minor injuries to the other three.

Investigation and Evidence

The aircraft took off from Runway 29 at 0909 LT, 30 June. A co-pilot, who was being tested, was in the left pilot seat, and the Captain was in the right-hand seat. The flight engineer, (aircraft maintenance engineer (Class II) no flight engineer licence) and at least one of the three remaining co-pilots were standing immediately behind the pilots' seats during the greater part of the flights, until the accident occurred. When approximately 1 500 feet above the runway, the blind flying curtains were drawn in front of the co-pilot, and he was instructed to fly on instruments and to continue climbing on a heading of 180 degrees. Having reached 8 000 feet, he was told to fly level for about 5 minutes on a heading of 240 degrees, and then again on a heading of 180 degrees, after which he did a rate one turn to the right through 260 degrees. He was then required to give the heading to steer in order to return to Mehrabad and his ETA there. The blind flying curtains were then pulled back when he was over the airport.

Similar tests in mental dead-reckoning were given later on to the other co-pilots and following the test in instrument flying and mental dead-reckoning, it was the Captain's intention to give each co-pilot a handling test of the aircraft with one engine stopped. In the case of the first co-pilot tested, the Captain attempted to feather the left engine but apparently did not know the correct procedure to follow because most of the witnesses agreed that he did not touch the left propeller pitch lever before pressing the feathering switch. Neither did he put the mixture control into the "idle cut off" position afterwards. The flight engineer then told the Captain that he had not followed the correct procedure, and reset the throttle and mixture controls of the left engine. He then instructed the Captain to press the feathering switch, but still the left-hand propeller did not feather, apparently because the pitch control had not been adjusted.

By that time the aircraft was losing height at about 500 feet per minute, because the power on the right-hand engine had not been increased to compensate for the windmilling propeller on the left. The Captain then tried to unfeather the left propeller and again seemed to follow the incorrect procedure so that the left propeller started to overspeed. This was corrected by throttling back the left engine, but the left propeller was still windmilling. Power was eventually increased on the right engine by the co-pilot, who then carried out a single engine landing on Runway 29. By the time the aeroplane had landed, it appeared that the manifold pressure on the left engine was normal and apparently the left propeller feathered and unfeathered properly when tested shortly after landing. Nevertheless, as a precaution, the Captain taxied in and asked the Company Chief Engineer to carry out a further check. The left propeller was feathered and unfeathered twice without difficulty and the correct procedure to be followed explained to both the Captain and Flight Engineer.

The aircraft took off on Runway 29 for the second flight at 1018 LT with the second co-pilot in the left seat. He was required by the Captain to carry out the same exercise in mental dead-reckoning as previously completed by the first co-pilot. The aircraft was heading south at an altitude of 8 500 feet when the Captain throttled back the right engine. According to the evidence, the Captain pulled back the left mixture control and the left propeller pitch control. Seeing this and not thinking, or perhaps forgetting, that the right engine had been throttled back, the co-pilot switched off the left engine and did not realize for a short time that neither engine had any power. However, the co-pilot quickly switched on the left engine and the Flight Engineer pushed forward the left propeller and left mixture levers, so that power was restored on that side. The Captain then feathered the right engine, which functioned normally and the co-pilot adjusted the trim. By that time the aircraft had lost 700 feet, the indicated airspeed being 120 MPH, and was flying towards Mehrabad. The Captain started to unfeather the right engine, but the Flight Engineer sensing that it was going to overspeed, asked if he could take over the engine controls. He reported that he was successful in unfeathering the right engine but according to the co-pilot, the right engine did not pick up again until several minutes afterwards, apparently continuing to windmill at about 2500 RPM until the aircraft landed on Runway 29 at 1053 LT. The Captain then checked the feathering and unfeathering of the right propeller and apparently it worked normally.

The third co-pilot then took his place in the left pilot seat and took off on Runway 29 at 1103 LT and completed the same test in instrument flying and mental dead-reckoning as previously carried out by the two other co-pilots. With the aircraft still heading 270 degrees, the Captain throttled back the left engine and pulled back the left propeller pitch lever. The Flight Engineer pulled back the mixture control and the Captain pushed the left feathering button and the left propeller feathered normally.

At this time (estimated to be 1129 LT) the aeroplane was approximately 2-1/2 miles north-west of the Aeroclub aerodrome and approximately 3-1/2 miles west of the threshold of Runway 11; the altitude at the end of the feathering operation was 6 700 feet. After about half a minute, still flying on a heading of 270 degrees, IAS 120 MPH the Captain attempted to unfeather the left propeller. He put the left throttle about one-quarter forward and moved the left mixture control to auto-lean. The Flight Engineer then switched on the left engine and pulled out the left feathering switch. The left engine overspeeded and apparently made a high screaming noise. The Flight Engineer then pulled back the left propeller pitch lever which was about three-quarters forward, and eased back the left throttle and pressed the left feathering button. The noise of the left propeller decreased but it still appeared to be overspeeding. Assuming that no more height had been lost since feathering, the altitude could not have been more than 6 700 feet at that time (between 1129 LT and 1130 LT).

As soon as the left engine had overspeeded, the Captain took over the controls and started a turn to the right at about rate one, with the intention of landing on Runway 11. He noticed that the aircraft was losing height very rapidly and said he opened up the right engine to 2400 RPM and manifold pressure 40 inches, but that this did not seem to check the abnormal rate of descent. This has been estimated at approximately 1 000 feet per minute during the turn and the approach to Runway 11. The Captain and co-pilot both reported that they did not feel any unusual pressure on the rudder controls. However, the co-pilot said that he did not think that the rate of descent became unusually steep until about two minutes after the left engine overspeeded just as if the right engine suddenly lost power at that time. He maintained that he made an adjustment to the rudder trim to the right when the left engine revs. were reduced immediately after overspeeding, and about two minutes later he adjusted the rudder trim to the left, the setting being at about normal after this second adjustment. This was not confirmed by the Captain who said that he put the rudder trim to zero himself, immediately after he took over control from the co-pilot at the time the left propeller started overspeeding.

During the turn to the right, the Captain said he was sure that he did not touch any of the engine controls because his full concentration was needed to fly the aircraft. Apparently the Flight Engineer was carrying out the necessary adjustments to the engine controls and was acting under his orders. He urged the Flight Engineer to try to do something with the left engine as the left propeller was still windmilling at about 2100 RPM, but the Flight Engineer said he was unable to feather or unfeather it, and that he finally closed the left engine throttle and mixture control completely and switched off the left engine. This was done at a time estimated to have been 1131. (The left mixture control was found in the auto-rich position immediately after the accident, during the initial examination of the wreckage.) As the aeroplane completed its right-hand turn, still losing height very rapidly, it seems that all the occupants were convinced that they would be unable to reach Runway 11. This was about 1130-1/2 and approximately two minutes before the crash. The Captain said that he carried out a quick visual check of the engine controls and noticed the right throttle fully open, the right

mixture control in the normal position, 40 inches of manifold pressure and RPM 2100. According to the co-pilot who was still watching the altimeter closely, the altitude was 5 800 feet when the turn was completed and the heading approximately 110 degrees, i.e. towards Runway 11.

The Captain told the Tower that he would be unable to make it and would crash and then throttled back the right engine when he was about 10 or 20 metres above the ground. This must have been about 20 or 25 seconds before the aeroplane came to rest. He said that the landing direction seemed clear and he did not notice the ghanats ahead. The Flight Engineer then turned off the petrol selector to the right engine, switched off the ignition and cut the master switch and those of the generator and battery. The aircraft landed with its wheels and flaps up, It maintained a straight heading until it struck a six-foot ghanat.

Recommendations

In spite of this unfortunate accident, Iranian Airways should be urged to continue its programme of pilot training.

The Company's pilots-in-command and co-pilots, including the Captain when he is again fit for flying duties, should be tested, by a well qualified and experienced DC-3 check pilot, particularly in emergency procedures. This is an urgent requirement and should be done as soon as possible. A copy of the check pilot's report should be passed to the Department General of Civil Aviation.

The duties of each member of the flight crew should be clearly defined in the Company's Operating Manual and continuing training and drill should be carried out in these duties.

Iranian Airways Company should take the necessary steps to keep adequate records of aeroplane accessories.

Facilities should be provided by the Department General of Civil Aviation for the examining and licensing of flight engineers and suitably qualified engineers of Iranian Airways Company, should be given an early opportunity to be examined for the issue of flight engineers' licences.

The procedure for sending the latest meteorological data to the air traffic controller in the Tower, should be improved and cognizance taken of Recommendation No. 1 of the ICAO Meteorological Division made at its third session (Paris, March 1950).

The attention of the appropriate authorities should be drawn to the fact that no drugs were available at the Pahlevi Hospital on 30 June, to ease the pain of the injured members of the crew. If remedial measures cannot be taken by those authorities, a stock of suitable drugs should be kept at Mehrabad Airport.

Probable Cause

The Investigation Committee finds that the probable cause of the accident was that, with the left propeller windmilling, the right propeller did not develop sufficient thrust to enable an emergency landing to be carried out on Runway 11 at Mehrabad Airport.

The Committee has concluded that this was caused by mishandling of the controls by one or more of the flight crew members since the Committee has not found any evidence of malfunctioning of the right engine or of its propeller.