No. 16

Darbhanga Aviation DC-3 Aircraft, crashed near Calcutta (Dum Dum) Airport on 30 April 1954. Government of India Report of Inquiry

Circumstances

Darbhanga Aviation's Dakota aircraft engaged on a non-scheduled flight carrying freight, eight passengers and a crew of three, commenced its take-off run from runway 19R at Calcutta (Dum Dum) Airport at 0918 hours on 30 April 1954. During take-off, the air traffic control officer on duty noticed heavy smoke emanating from the port engine and informed the aircraft accordingly.

The aircraft failed to gain normal height by the time it reached the end of the runway and struck trees, 3,330 feet from the end of the runway. Fire broke out on impact and the aircraft was destroyed. The captain and a passenger died in the accident and the remaining two members of the crew and seven passengers were removed to hospital at Calcutta where the co-pilot, the radio officer and one passenger died. The remaining passengers sustained major injuries.

Investigation and Evidence

During the night-stop routine-inspection of the aircraft on 28 April 1954, metal particles were detected in the port engine oil filter. It was, therefore, decided to change the port engine.

The port engine was removed and an overhauled engine was installed in its place. The installation work was commenced at 1230 hours on 29 April 1954 and was completed the next morning. The records of the company, who had overhauled the engine, were examined. There is no apparent reason to believe that there was any defect in the overhaul of the engine. The installation was undertaken by an experienced engineer. Taking into account the time taken in installing the engine and the number of mechanics who assisted the engineer in completing the task, the installation was performed with due care and caution.

Because of the change of the engine, it was necessary to carry out a test flight of the aircraft in order to check its performance. During the test flight no entries of observations appear to have been recorded by the crew. The engineering personnel testified that they were verbally informed by the captain that the test flight was satisfactory. The same two pilots were scheduled to fly the aircraft to Balurghat a little later and it is difficult to believe that they would fail to report to the engineering personnel, had they not been satisfied that the aircraft was airworthy.

After completion of the test flight, the oil filter of the port engine was removed, checked and re-fitted. That engine was given a short run-up and after a run-up of both engines, a Certificate of Safety for Flight was issued in respect of the airframe and the engines of the aircraft, in accordance with the prescribed procedure.

The aircraft had a valid Certificate of Airworthiness and the previous history of the airframe, engines and propellers, as available from the respective log books, does not denote anything abnormal.

The aircraft was made ready for the flight in the usual manner, with sufficient fuel and oil on board.

Although the captain was detailed by Darbhanga Aviation to act as the commander of the aircraft, the co-pilot reported and obtained the necessary briefing for the flight. He signed the clearance form in which he was shown as the captain and was seen to occupy the left hand seat in the aircraft, which is invariably occupied by the commander.

Of the two, the captain detailed for the flight was a far more experienced pilot than the co-pilot. The captain had to his credit over 7,000 hours' flying experience.

The co-pilot, on the other hand, had limited experience. His flying experience amounted to less than 2,500 hours. He was not entitled to act as a commander of scheduled services or night services. He was, however, qualified to act as commander of non-scheduled flights operated during the day. But the Chief Flying Instructor of Bengal Flying Club has testified that "his impression was that the co-pilot had a tendency to be nervous during an emergency". This is borne out indirectly by the fact that he was involved in three previous accidents.

On 30 April 1954 the aircraft started taxiing to runway 19R at 0910 hours. The aircraft was at the holding point for at least five minutes, until a Constellation which had already lined up on the runway took off. Although the period for which the aircraft was at the holding point permitted a run-up to be carried out, there is no direct evidence of its having been done. After the Constellation had taken off, the aircraft lined up with the runway and obtained permission for take-off.

The aircraft commenced its take-off run and just before it became airborne some persons on the ground noticed profuse smoke emanating from the port engine and heard sounds of "misfiring" and "bangs". The length of the take-off run, as estimated by competent witnesses, was normal or slightly longer than normal. The smoke emanating from the port engine was noticed by officers of the Air Traffic Control just after the aircraft was airborne. The aircraft was informed "Profuse smoke from port engine, watch out". The message was repeated on request and acknowledged by the aircraft.

No perceptible change in the flight path was noticed immediately after the message had been passed on to the aircraft and it continued to climb very gradually, during which time the undercarriage was retracted. Had the take-off been discontinued on receipt of the message, the aircraft might in all probability have been able to pull up within the boundary of the aerodrome. When the aircraft had reached the end of the runway, it had failed to gain normal height and was noticed to veer to the left. However, it straightened out and began to climb in a nose-high attitude, in an obvious effort to avoid trees. The starboard wing then dropped and hit the trunk of a cocoanut tree. The aircraft finally came to rest in a clump of mango trees further on, and fire broke out immediately.

With the exception of the starboard wing and sections of the empennage which had been torn off by the impact with the cocoanut tree, all other components were in the immediate vicinity of the main wreckage at a distance of about 470 feet to the left of and almost parallel to the central line of the runway 19R/01L. Most of the aircraft was destroyed by fire, but the rear section of the fuselage was free from extensive damage.

The condition of the wreckage was such that it cannot be ascertained if fire-fighting equipment on board the aircraft was used.

As a result of the accident, both the engines were torn off from their mounts. The starboard engine was not damaged by fire to a great extent, but the port engine was extensively burnt.

An examination of the propellers indicated that the starboard propeller was in constant-speed range towards the fine pitch position. The port propeller was, however, found to have been fully feathered.

The damage on the leading edge of the starboard wing indicated that the aircraft was in a nose-down attitude at the time of the initial impact with the cocoanut tree. The position of the landing gear in the nacelle showed that it was in the fully retracted position. This was confirmed by the examination of the actuating and compensating cylinders. The position of the flaps in the wing and their actuating jack indicated that they were in the 'up' position. The crew compartment had suffered extreme damage due to the crash and the resultant fire, and it was not possible to find any reliable indications of the position of engine controls and flight controls, nor was it possible to obtain instrument readings. The tab on the rudder was towards the left and the elevator tabs were almost neutral. The pipelines and the connections to the accessory section in the

starboard engine did not indicate any sign of damage having occured prior to the crash and fire. In the case of the port engine, however, no such data could be gathered as the entire accessory section had melted away. Both the port and the starboard engines were removed from the scene of the accident for a detailed examination. All the external damage suffered by the starboard engine was consistent with the type of damage that would be caused by such a crash. The engine was stripped and there were no indications whatsoever of any mechanical failure. The accessories including the injector, magnetos and plugs were also tested. No defect other than what could be attributed to fire or impact was detected.

The port engine was stripped. The front row of cylinders was found to have been damaged extensively by fire and impact. All the cylinder barrels and heads, however, could be accounted for by material recovered from the wreckage in a semi-molten condition, excepting No. 12 cylinder barrel and head which could not be traced in the wreckage or in the surrounding area.

The rear row of cylinders was removed with some difficulty and it was found that the pistons in this bank were in position, although Nos. 3, 5 and 11 had partly melted, while the others had been affected by heat in varying degrees. The blower and rear sections were burned beyond recognition. The rear master rod and its bearing showed no indication of seizure. Traces of oil were detected on the master rod bolts. The articulating rods of the rear cylinders were free on their knuckle pins. The master rod and the articulating rods of the front cylinders were found broken near the knuckle pin ends. The extreme end of the front counter-weight of the crankshaft was damaged. All the front cylinder skirts were spread out by mechanical hammering and the front face of the centre crank-case was also damaged.

The damage in the front row of cylinders, outlined in the preceding paragraph, was obviously caused by the rotation of the crankshaft after mechanical breakdown had taken place and before the aircraft hit the ground. It is clear, therefore, that during the take-off, a serious mechanical breakdown must have taken place internally causing a progressive loss of power. This mechanical breakdown manifested itself in heavy smoke which was witnessed by several persons including the air traffic control officer. It is unlikely that the mechanical failure was the result of oil starvation, as evidence of lubrication was detected during the strip examination.

Probable Cause

a) Delay in feathering after failure of the port engine (due to inexperience of the pilot in emergency procedures), which resulted in loss of height;

b) the subsequent attempt to establish a climb with a nose-high attitude (to get over the obstructions), below the recommended single-engine rate of climb speed, with both gear and flaps up, and

c) the progressive loss of air speed which finally resulted in a stall on a cocoanut tree.

Although there is no doubt that the profuse smoke emanating from the port engine was due to the failure of the engine, it was not possible to determine the primary cause of that failure, and the relevant parts of the engine have been sent to the Director of Inspection (Metallurgical), Tatanagar, in order to have it ascertained.

Recommendations

Check for proficiency in instrument flying and emergency procedures should be made a mandatory requirement for the renewal of the licences of even those pilots-in-command who are engaged in non-scheduled passenger air transport services.

Observations

Some other points which call for further recommendations have come out in the course of the evidence and though they do not directly pertain to the cause of this accident are well worth mentioning.

a) It was wrong on the part of the police to have allowed the removal of the bales of cloth from the site of the accident before the arrival of the Inspector of Accidents, especially when a warning against it had been given by the Aerodrome Officer.

b) The police should not have been so careless in the watch as to make a theft of some parts of the aircraft possible.

c) All those rules applicable to the scheduled services which are intended for ensuring the safety of the aircraft should be made applicable also to the non-scheduled services.

d) Cock-pit check-lists and emergency check-lists should be available on board every aircraft engaged in public transport, and their proper use should be ensured.

e) In planning the programme for flights, it should be ensured that flying crew are given adequate rest between flights.

f) The traffic personnel in charge of loading an aircraft should possess the requisite knowledge of correct loading, and

g) It should be considered whether the trees in the direction of the runways of Calcutta (Dum Dum) Airport constitute a potential hazard to aircraft operations.

Search and Rescue Action

The profuse black smoke emanating from the aircraft and the failure of the aircraft to gain normal height by the time it reached the end of the runway led the air traffic control officer on duty to sound the crash siren. In the meantime, the fire foreman had also observed the aircraft flying very low and noticed smoke emanating from the port engine. He jumped into the aerodrome crash-tender and rushed out to assist in case anything happened to the aircraft. By that time the crash siren had been sounded. The aircraft crashed immediately thereafter.

Thus the crash siren was sounded before the crash took place and the crash-tender rushed to the rescue before the crash siren was sounded.

The crash-tender reached the spot immediately and commenced fire-fighting action. The aircraft was burning furiously, but within a short time the fire was brought under control. The fire brigade from the city also arrived there and assisted in extinguishing the fire.

It must be observed that the speed and promptitude with which the officers of the Civil Aviation Department took search and rescue action is commendable.