No. 21

Indian Airlines Corporation Vickers-Armstrong Viscount VT-DIO accident near Patti, India on 11 September 1963. Report released by the Ministry of Civil Aviation of India on 30 September 1964

1. Investigation

1.1 History of the flight

On 10 September 1963, Viscount aircraft VT-DIO was on a scheduled domestic flight, operating the Night Air Mail Service on the route Madras/Nagpur/Delhi. It took off from Madras at 2240 hours Indian standard time and the flight to Nagpur was uneventful. The aircraft took off from Nagpur with another crew at 0237 hours on 11 September. Communications difficulties were encountered commencing at 0258 hours; the last message known to be sent by the aircraft was at 0336 hours; at that time VT-DIO was flying normally at an altitude of 16 500 ft, the sky was clear and the estimated time of arrival to the Delhi Control boundary was given as 0405. There was enough fuel in the aircraft to maintain flight until 0950 hours. At approximately 0400 hours, the aircraft crashed in a field near village Patti, 15 miles from Agra. The impact resulted in immediate explosion and fire, all aboard being killed.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	5	13	
Non fatal			
None			

1.3 Damage to aircraft

The aircraft was completely destroyed.

1.4 Other damage

None reported.

1.5 Crew Information

Both the pilot-in-command and the co-pilot had considerable flying experience and held valid licences. The pilot-in-command has passed the regular six-monthly medical examination on 29 August 1963, although the Medical Board had advised him to reduce his weight. The co-pilot was also physically fit.*

* Note from the Secretariat: Detailed information regarding the age, flying experience of the pilots and qualifications of the radio operator were contained in Appendices to the report. These Appendices were not attached to the report received by the Secretariat.

1.6 Aircraft information

The aircraft had a valid certificate of airworthiness, its last overhaul was carried out on 6 August 1963.

A normal pre-flight check had been carried out at Madras before departure and the aircraft was found airworthy. At Nagpur the aircraft was refuelled with 3 200 l of fuel and had enough fuel to fly until 0950 hours. A through-flight inspection was also carried out, although this had no bearing on the accident, it was found that it had been carried out rather hurriedly and was certified by somebody who was not properly entitled to do so.

The all-up weight of the aircraft was within the permissible limit.

1.7 Meteorological information

A route weather forecast was provided to the pilot-in-command just before taking off from Nagpur. Weather conditions throughout the journey from Nagpur to the crash site were in every aspect favourable. The sky was clear, visibility was good, there were no high winds and the atmosphere was free from turbulence and icing.

1.8 Aids to navigation

Not relevant.

1.9 Communications

At 0258 hours the aircraft established communications with New Delhi/Palam to report its position, however, communication difficulties were experienced and the position report was not received by Palam. Subsequent calls made by Palam were not replied by the aircraft. At 0336 hours the aircraft established communication with Bombay/Santa Cruz, passed its position report and requested that it be relayed immediately to Santa Cruz. This was not done until 0436 hours. This was the last message of the aircraft.

1.10 Aerodrome and ground facilities

Not relevant.

1.11 Flight recorders

Not mentioned in the report.

1.12 Wreckage

Most of the wreckage lay inside or just outside a huge crater. The rest of the wreckage was scattered fan-wise around the crater within a radius of about 100 yds.

1.13 Fire

Explosion and fire occurred upon impact, completely destroying the aircraft and burning the bodies of those on board beyond recognition.

1.14 Survival aspects

Not applicable.

1.15 Tests and research

The entire wreckage was transported to New Delhi, laid out in a hangar and carefully examined. Engineers from Rolls Royce and Dowty Rotols Ltd. examined the engines and the propellers. The flame tubes of the engines were sent to the Rolls Royce laboratories for a special hardness test, in order to determine their temperature at time of impact. These tests revealed that the temperature of the tubes at the time of crumpling were comprised between 600°C and slightly over 700°C. There were also evidence of high speed rotation particularly in the bending of the turbine blades and compressor rotator guide vanes against the direction of normal rotation. It was therefore concluded that the four engines were operating at the time of impact.

The eight fuel booster pumps and two fuel gauges were sent at the Aircraft Laboratories, British Aircraft Corporation, Weybridge. It was determined that both booster pumps of No. 1 engine and one booster pump of No. 4 engine were operating at the time of impact and that one booster pump of No. 3 engine was not operating. No conclusions were reached concerning the other four pumps. No useful conclusions were reached, on the fuel carried by the aircraft at the time of impact from the fuel contents gauges.

The Bendix Airspeed Indicator was also sent to Weybridge. Radiograph of this instrument indicated that the relative positions of the quadrant and cog corresponded to a rotation of the pointer to an indicated speed between 120 and 180 kt.

2. Analysis and conclusions

2.1 Analysis

The last message sent by the aircraft was a position report at 0336 hours, there was nothing to indicate any difficulties, sky was reported as clear and the aircraft was flying at 16 500 ft. Witnesses' statements indicated that some 6 miles before the crash site, the aircraft appeared to be flying normally, but that soon afterwards, it descended steeply and crashed. The aircraft struck the ground almost vertically, slightly on its back and with the right wing low. The flaps, nose-wheel and main undercarriage were in the retracted position. The engines were operating and the pitch angle of the propellers was between 48° and 51° at the time of impact. Although the radiograph of the airspeed indicator indicated a speed between 120 and 180 kt it was believed that the aircraft's speed was more of the order of 250 to 330 kt at impact. Several hypothesis were considered in an attempt to discover the probable cause(s) of this accident.

No evidences were found to substantiate any of the following hypothesis:

- structural failure, explosion or fire;
- malfunction of flying controls;
- engines or propellers malfunctioning or failures;
- fuel contamination or shortage;
- icing;
- sudden incapacitation of the pilot-in-command;
- sudden decompression of cabin;
- severe turbulence from wing-tip vortices of another aircraft.

The only two hypothesis which were considered as a possible explanation of this accident are discussed hereunder:

Malfunctioning of the auto-pilot

Numerous malfunctioning of the Viscount auto-pilot had been reported in the past. Between 1 January 1960 and 30 August 1963 as many as 129 auto-pilot snags were reported on the subject aircraft. However, they were not of a serious nature and never lead to a loss of control of the aircraft.

The only serious auto-pilot malfunctioning which involved a partial loss of control and a loss of about 4 000 ft of altitude, occurred on 22 August 1963 on another aircraft. However, this incident occurred during a descent through clouds with the auto-pilot engaged and was considered to be partly due to pilot error.

In the present case the aircraft was flying on a steady course, at an altitude of 16 500 ft and it was concluded that under these circumstances no mishandling of the auto-pilot could have occurred.

Failure of the electrical system

In case of a complete DC and AC failure (or even of a partial AC failure) the vital flight instruments, radio and auto-pilot would fail. The crew would be confronted with a very difficult situation, especially during a dark night. The aircraft would tend to fly in accordance with the trim setting existing at the time the auto-pilot stop functioning. This might further disorientate the pilot who will fly by that time only from sensations.

Evidences were found that the AC supply to both artificial horizons and the omnibearing indicator had been cut off at some stage prior to impact. This could infer either that the pilot had deliberately turned off those instruments or the failure of the AC current. It was believed that the second inference was more probable than the first one, especially in view of the fact that no radiotelegraphy or radiotelephony messages were received from the aircraft between 0336 hours and 0400 hours, the time of the accident.

2.2 Conclusions

Findings

The aircraft held a valid certificate of airworthiness.

The aircraft loading was within permissible limits.

The members of the crew held valid licences.

The navigational equipment on board the aircraft was adequate for the flight.

The quantity of fuel carried by the aircraft was adequate.

The weather at the time of the accident was calm and free from turbulence.

The pilot sent the usual departure message after becoming airborne and an hour later, at 0340 hours, transmitted another message giving his position.