

tail was that of a snow- or ice-jammed rudder tab producing an abrupt left turn by suddenly breaking loose during flight. Although Capt. Marsh testified that he encountered no difficulty with the rudder control system and that neither rudder pedal forces nor displacement were unusual, it was decided, nevertheless, to investigate this possibility.

All components and parts of the rudder tab, tab control system, and related structure were examined for evidence of failure or malfunctioning and for indications of unusual deformation that might be associated with a snow-jammed tab. Except for the relatively minor damage in the area sustained in the ground impact and fire, all pertinent parts and components were intact and functioning, and no unusual deformation was noted. The rudder spring tab cartridge was removed and tested for conformity with specifications at the Douglas Aircraft Co. The spring cartridge was properly assembled and the spring itself was within drawing specification. In further support of there being no control failure or malfunction, Capt. Marsh testified that rudder control was available throughout the entire flight, and that he did not experience control abnormalities at any time.

Rudder Tab Tests

Several test flights were made with DC-6 aircraft to evaluate the effect on flight characteristics of a rudder trim tab suddenly released. The last, and most conclusive, was made without the pilot being told of the nature of the test. In this test, unknown to the pilot, several units of left rudder trim were put into the rudder system while the rudder was held in neutral by the copilot's application of opposite rudder. The pilot was then told to uncover his eyes and correct for a deviation to the right. As he started the correction the copilot released the pressure he was applying to the right rudder pedal and the rudder deflected suddenly to produce a sharp left turning action. The aircraft banked and yawed mildly, the heading change was approximately 15 deg. (insignificant as compared to the 120-deg. turn made by N 34954) and the pilot corrected this mild displacement and had the aircraft stabilized on its original heading—all within five seconds. Motion pictures taken of the instrument panel as the aircraft went through the maneuver showed that the turn-and-bank indicator, the gyro horizon, and the C-2 compass all indicated plainly the nature of the maneuver and provided adequate indication upon which to base corrective action.

Examination of the pitot tubes and static vents disclosed that their heating elements were intact and capable of normal operation. Foreign material found in the openings of the two pitot tubes was determined to be pieces of charred wood, some with tree bark attached. A tar-like liquid was discovered in the pitot tubes and system tubing. The quantity of this material was too small to permit a complete analysis, however, it appeared to be the product of destructive distillation of the wood particles which were lodged in the hot pitot tubes. The pitot tubes had not been involved in ground fire.

No obstructions were found in the openings of the static system vents or in the static system tubing.

The remains of three altimeters were recovered. Examination disclosed that they had not been subjected to high impact loads. The positions of these instruments (captain's, copilot's, cabin altitude) when mounted in the aircraft could not be determined. The following barometric scale settings were determined for these instruments: 30.14 in., 30.135 in., and 30.20 in. The altimeter setting given the crew at the time of takeoff was 30.12 in.

No information of value was obtained from examination of the remains of the one rate-of-climb indicator that was recovered.

Both ADF (automatic direction finder) indicators were recovered in a badly burned condition. It could not be determined which one had been installed in the captain's panel and which in the first officer's panel.

The cover glass of one indicator was cracked and smoky. It was removed to permit examination of the azimuth card and pointers. The card was found set at 15 deg. and seized. The dual pointer was seized at 210 deg. The single pointer was slightly movable between two degrees and four degrees.

The cover glass of the other indicator was missing and the markings on its azimuth card were scarcely legible. The card was seized at 0 degrees. The single pointer was missing except for its hub. Portions of the dual pointer remained but the head and tail positions could not be determined. The pointer was seized in position and its approximate indication was either 30 deg. or 210 deg.

Course Indicators Checked

Two Collins Course Indicators were installed in the aircraft. Both were recovered from the wreckage. They had been extensively damaged by fire but exhibited no signs of impact damage. The operating mechanisms of both were seized.

One instrument's readings were: Azimuth ring heading indication 282 deg.; course selection setting 288 deg.; heading selection 19 deg. Readings of the second were: Azimuth ring heading indication 272 deg.; course selection setting 80 deg.; heading selection setting 314 deg. The panel positions (left or right) of these instruments could not be determined by serial numbers; however, the second is believed to have been on the captain's panel, since he testified that he had selected a course setting of 81 deg.

The aircraft was equipped with two Sperry Gyrosyn compass systems. One was a model C-2A Gyrosyn compass on the captain's instrument panel. The other was a model A-12 Gyrosyn compass, a component of the Sperry A-12 Gyropilot. This unit was located in the belly of the fuselage but its heading indication was repeated on the azimuth ring of the Collins Course Indicator located on the first officer's instrument panel.

Two flux valves, located in the tail cone of the aircraft, furnished magnetic heading information to the Gyrosyn compasses. These escaped damage and were found to be well within manufacturing specifications