

*Mr. Charles L...*

OFFICE AIRCRAFT ACCIDENT RECORDS  
SAFETY DIVISION

PRELIMINARY ACCIDENT INVESTIGATION REPORT

TRANSCONTINENTAL AND WESTERN AIR, INC.,  
GANLER, NEWFOUNDLAND, MARCH 11, 1947

March 14, 1947

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Transcontinental & Western Air's Lockheed Model 049 Constellation, NC-90714, sustained minor damage as a result of the loss of the astrodome in flight at 0035 GMT\*, while en route to Santa Maria, Azores, from Gander, Newfoundland. Navigator George H. Hart was blown through the astrodome opening and fell into the ocean from the cruising altitude of 19,000 feet.

NC-90814, hereinafter referred to as Aircraft E14, departed Gander, Newfoundland, at 2203, March 10, 1947, en route to Santa Maria, Azores. The aircraft climbed to 19,000 feet at which altitude it was able to cruise above all clouds. Shortly after midnight, Navigator Hart took his position at the astrodome for the purpose of making a celestial fix. In order to complete such fixes, it was necessary for the navigator to stand on a stool approximately 3 feet high with his head and hands in the astrodome. At approximately 0035, March 11th, the crew and passengers heard a loud report followed by a roaring rush of air. Inspection of the crew compartment by the flight crew revealed a failure of the plexiglas astrodome and it was apparent that Mr. Hart had been carried through the resulting opening during the severe rush of air as the fuselage became depressurized. Immediately thereafter, the captain descended to 10,000 feet and notified Gander that the aircraft was returning to that station. The flight arrived at Gander at 0402.

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\* All times referred to herein are Greenwich Mean Time and based on the 24-hour clock.

As soon as a temporary repair had been accomplished at Denver, the aircraft was flown to the company maintenance base at New Castle, Delaware, arriving at that airport at approximately 1800, March 11, 1947. Immediately thereafter, an inspection of the aircraft was initiated for the purpose of determining the nature of the failure.

Inspection of the astrodome mount and the remaining plexiglas indicated that approximately half the circumference of the break bore signs of severe crazing while the remaining half was a clean rupture. It was developed in the subsequent investigation that the materials used by the company both for bonding and for cleaning of the plexiglas may have a deleterious effect on the plexiglas and would probably result in crazing. This astrodome was constructed of 3/16" plexiglas and it was determined that the manufacturers of this component had not designed this model astrodome for use on pressurized aircraft.

The door from the galley to the crew compartment was completely demolished and was torn from its attachments to the bulkhead. The left hand side of the bulkhead was damaged approximately one-half the distance from the floor and there was a clean break in the bulkhead from the door post to the side of the fuselage. The door and supporting bulkhead from the galley to the cabin were damaged to a lesser extent. However, both were permanently deformed. The radio antenna, which passes over the approximate center of the astrodome opening, was missing.

Investigation revealed that the indicated airspeed at the time of the loss of the astrodome was 200 mph at a cruising altitude of 19,000 feet. The outside air temperature was  $-13^{\circ}\text{F}$ . The temperature inside the fuselage was  $61^{\circ}\text{F}$ , with the cabin pressure supercharged to correspond to an altitude of 8,400 feet. The pressure differential was approximately 8.2" of mercury.

Discussions entertained by the Safety Bureau, subsequent to the accident, revealed that this astrodome had been installed on January 17, 1947. On February 13, 1947, the astrodome was reset as a result of a previous notation on the crew maintenance forms indicating a leakage under pressurization. Following this operation, no further evidence of leaking was noted. At the time of the failure, this dome had an operational service of 239 hours.

A study of the procedures for fitting a new astrodome into the mounting of the Model 049 indicates that a considerable amount of force is required to be exerted during installation. Representatives of the manufacturers of this astrodome testified that the poorly designed mounting necessitated excessive strain being placed on the plexiglas during installation and that the improper bonding material further weakened the plexiglas due to harmful chemical and physical effects.

As a result of this investigation, temporary precautionary measures were taken by the Civil Aeronautics Administration to insure the safety of navigation personnel and the aircraft. Pre-flight inspection of the astrodome is required before each flight. Safety harnesses are to be used by navigators when taking sights in the astrodome under pressurized conditions. A standby safety plate is required in the aircraft for use in the event of astrodome failure.

The Safety Bureau is informed that Lockheed is presently procuring a new astrodome constructed of material of 1/2" thickness with an improved mounting and that these recently designed astrodomes will be available to all operators for installation in Model 049 aircraft in the near future.