

No. 44

Great Lakes Carbon Corporation, Douglas A-26-C, crashed following structural failure resulting from a mid-air explosion near Union City, Oklahoma, on 3 October 1955.
Civil Aeronautics Board (USA) Accident Investigation Report
File No. 2-0058 released 29 February 1956.

Circumstances

The aircraft departed Bridgeport, Connecticut, for California at 1245 hours Central Standard Time carrying two crew members. Two stops were then made at White Plains, N. Y. and at La Guardia Field where 2 passengers boarded the aircraft. At 1346 the flight left La Guardia for Tulsa, Oklahoma, under Visual Flight Rules and no flight plan was filed. At Tulsa the aircraft was refuelled with 906 gallons of gasoline which filled to capacity both main tanks, the nose tank and the rear fuselage tank. After the pilots were briefed by the Tulsa U.S. Weather Bureau Office, an Instrument Flight Rules flight plan was filed with the Air Route Traffic Centre. At 2114 Oklahoma City Airway Communications Station received a call from the flight on 126.7 mcs. requesting cancellation of the IFR flight plan and asking for a landing clearance at Oklahoma City. The flight was given the special 2100 weather as 10 000 feet overcast, sky partially obscured, fog, visibility 1-1/2 miles, and was advised to contact RAPCON (Radar Approach Control) on 119.3 mcs. for a clearance to land as IFR conditions prevailed. The crew advised that it desired clearance for Will Rogers Field. This was the last radio contact with the aircraft. It crashed at 2117 hours 2-3/8 miles northwest of Union City, Oklahoma, and 23 miles west of Will Rogers Field, Oklahoma City. Two explosions were heard in the air prior to the crash and portions of the empennage and fuselage were found along the last 3 miles of the flight path. There were no survivors.

Investigation and Evidence

Witnesses several miles north of the crash site, who observed the aircraft several hundred feet above the ground, describe two distinct flashes in its descent to the ground. They also mention a light rain at the time but no lightning.

Examination of the wreckage and ground marks indicated that the aircraft, minus the aft fuselage and tail assembly, had dived to the ground, in an inverted attitude at nose-down

angle of approximately 45 degrees on a southeasterly heading.

Disintegration in flight was indicated by numerous segments of the fuselage shell and portions of the horizontal stabilizer skin being found back along the flight path as far as three miles from the main wreckage. The main portion of the empennage was found three-eighths of a mile from the main wreckage. All of the scattered portions of fuselage structure were from the area aft of the cabin rear bulkhead.

Examination of these parts gave evidence of internal explosive forces that had blown the skin outward or off and distorted the structure of all empennage components except the rudder and the elevators. There were no indications of heat damage or fatigue in the aft fuselage wreckage which could have resulted in failure under loads less than design. There was no compression buckling of the skin and stringers, characteristics of failures due to overload. However, there were numerous indications of the aft fuselage shell having disintegrated because of excessive tensile stresses throughout the entire shell acting both longitudinally and peripherally at the same time. The fuselage disintegrated along rivet seams, which are areas of least tensile strength, evidencing a practically uniform internal pressure throughout the aft portion of the fuselage. The aircraft was not equipped for cabin pressurization.

No evidence was disclosed to suggest failure or malfunctioning of the engines or propellers prior to impact.

Examination revealed scorched edges at the torn holes in the rudder fabric. Blistered paint was likewise noted at the trailing edge of the left elevator. The source of this flame damage was not associated with the ground fire.

Destruction of the aircraft forward of the cabin aft bulkhead by ground fire was

extensive. Major components, including wings, flaps, ailerons, nose and cockpit areas, controls, instruments, fuel tanks, landing gear, nacelles, etc., were all accounted for in the area adjacent to the point of impact. Examination disclosed that the wing flaps and the landing gear were in the retracted position at the time of impact.

Only the following instrument readings were obtainable: Omni Bearing Selector 232 degrees; Radio Magnetic Indicator - double pointer 240 degrees, single pointer (ADF) 198 degrees; Zero Reader Selector 240 degrees; C2 Gyro Compass 246 degrees.

A 125-gallon fuel tank and radio rack were installed in the aft fuselage without a vapor seal separating the two units. The severe fire damage after ground impact precluded a determination of the condition of the fuel system components prior to the accident. The aft fuselage fuel tank vent line was found with its end fittings failed from excessive tension. The Tulsa fuel attendant stated the tank was not overfilled at the time of servicing.

In the tail section of the fuselage, aft of the rear cabin bulkhead, in addition to the 125-gallon fuel tank, there was installed the following electrical equipment: (2) ARN-7 compass; (2) loop antenna; (1) MN5 3B marker receiver; (1) ARN5A glide path receiver; (1) RTA-1B command unit; (1) A-12 gyrosyn repeater amplifier; (2) Collins 51R, (2) Collins 17L-2VHF transmitter; (2) inverters; (1) isolation amplifier; (1) R-89B glide path and (1) BC733D localizer.

The most recent airframe 100-hour inspection was dated 8 September 1955, and the aircraft had flown 14 hours since that time. This inspection covered the security of the interior equipment, such as tank, radio, all lines, cables, and A-12 servos of the empennage and tail compartment. The last line inspection, at La Guardia on 3 October 1955 revealed no discrepancies.

After the accident a flight check of the ground navigational facilities involved in an approach to Oklahoma City disclosed normal operation of all units.

The aircraft had been modified for passenger carrying and was then certificated by the Civil Aeronautics Administration in the limited category which prohibits the carrying of passengers for hire. The work included the following item: No. 15. Installed Army type 125-gallon fuel tank in aft section of fuselage (original installation).

According to records of the Great Lakes Carbon Corporation Aviation Department, all Air Force Technical Orders for the A-26 had been received and compliance had been accomplished.

Facts determined by investigation disclosed that the tail surfaces and fuselage aft of the bulkhead at the rear end of the cabin separated from the airplane in flight.

The manner in which the skin bulged outward and separated from the horizontal stabilizers and bulged outward on the fin could result only from very high internal pressures. It is apparent that the pressures which caused the disintegration built up suddenly and that they originated in the aft fuselage. Only an explosion within the aft fuselage could cause a sudden pressure increase of this nature.

Explosions from concentrated sources, such as sticks of dynamite or containers of TNT, produce severe shattering and fragmentation close to the source of explosion with decreasing fragmentation as distance from the source increases. This type of explosion also leaves soot-like deposits on the structure shattered. Neither of these characteristics was present in this case. Instead, the fuselage disintegration indicated a practically uniform pressure such as is caused by the ignition of an air-gasoline mixture which is much slower than the detonation of high explosives. In addition, this latter type of explosion does not leave deposits on the structure. The Board, therefore, concludes that fumes caused by leaking fuel were ignited by operation of electrical equipment installed in the aft fuselage.

The scorched fabric and blistered paint on the tail control surfaces appear to have been caused by momentary burning of fuel which spurted out of the aft fuselage tank after the first explosion disrupted the fuel lines. This fuel drenched the tail surfaces while the tail assembly was still attached to the main part of the aircraft by means of control cables. This same fuel was probably ignited by sparks from disrupted wires of the electrical equipment in the aft fuselage which could well account for the second explosion described by ground witnesses.

The nature of the accident and the fact that all communications from the flight were routine and conducted in a normal tone of voice

indicate that the pilots were unaware of an immediate emergency. The reason for discontinuing the flight to California and the decision to land at Oklahoma City could not be determined.

As a result of the investigation the Board recommended to the Civil Aeronautics Administration that all owners and operators of A-26-B and A-26-C aircraft be immediately advised of the possible fire and explosion hazards inherent in similar installations and that corrective action be taken immediately. Accordingly, the following notification was forwarded to all Aviation Safety District Offices, and to all owners of this model aircraft: "Investigation recent A-26 accident indicates possible fire and explosion hazard in rear fuselage area. For all

A-26-B and A-26-C aircraft having rear fuselage tank installed in same compartment with electrical components liable to sparking the following restriction is mandatory until further notice: Rear fuselage fuel tank shall be drained, purged, and marked to prohibit use. Place cockpit fuel controls and filler cap for information pilot and servicing personnel." This notice was followed by AD 55-26-1 which specifies modifications for reactivation of the rear fuselage tank.

Probable Cause

The probable cause of this accident was the loss of the aircraft's empennage as a result of an inflight fuel explosion in the aft section of the fuselage.

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