

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: February 27, 1956

Released: February 29, 1956

GREAT LAKES CARBON CORPORATION, DOUGLAS A-26-C, N 67148
NEAR UNION CITY, OKLAHOMA, OCTOBER 3, 1955

The Accident

At 2117¹/₁ October 3, 1955, a Douglas A-26-C, N 67148, owned and operated by the Great Lakes Carbon Corporation, crashed two miles northwest of Union City, Oklahoma, following structural failure resulting from a midair explosion. All four occupants, Captain Joseph W. Whitney, First Officer John E. McBride, and passengers Mr. and Mrs. George Skakel, Sr., received fatal injuries. The aircraft was destroyed by impact and ground fire.

History of the Flight

On October 3, 1955, a Douglas A-26-C, N 67148, departed its home base, Bridgeport, Connecticut, at 1245 with a crew only, consisting of Captain Joseph W. Whitney and First Officer John E. McBride. A stop was made at White Plains, New York, to pick up a passenger, Mrs. George Skakel, Sr. The flight then proceeded to LaGuardia Field where Mr. George Skakel, Sr., an official of Great Lakes Carbon Corporation, boarded the aircraft.

N 67148 departed LaGuardia at 1346 for Tulsa Oklahoma, under Visual Flight Rules and no flight plan was filed. After landing at Tulsa the aircraft was refueled with 906 gallons of gasoline which filled to capacity both main tanks, the nose tank, and the rear fuselage tank. Both auxiliary tanks were full at the time of refueling. 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 Center specifying the following: Cruising altitude 8,000 feet, Victor Airway 14 to Oklahoma City, Oklahoma, Red Airway 24, Victor Airway 12 proceed direct to Banning, California, Victor Airway 16 to Los Angeles; airspeed 260 knots; time of departure 2038; en route time 5 hours and 15 minutes; alternate - Burbank, California Airport; fuel on board - 7 hours. At the time of departure at 2038 Tulsa had a 9,000-foot ceiling with visibility of 6 miles and light rain.

At 2114 Oklahoma City Airway Communications Station received a call from N 67148 on 126.7 mcs. requesting cancellation of the IFR flight plan and asked for a landing clearance at Oklahoma City. The communicator gave the flight the Oklahoma City special 2100 weather as 10,000 feet overcast, sky partially obscured; fog; visibility 1-1/2 miles. The flight was advised to contact RAPCON (Radar Approach Control) on 119.3 mcs. for a clearance to land as IFR conditions prevailed. The crew was requested to advise which airport clearance was desired for and the reply was, "Will Rogers Field." This was the last radio contact with the flight although subsequent attempts to contact it were made by RAPCON.

1/ ALL times herein are central standard and are based on the 24-hour clock.

At approximately 2117 an aircraft, later identified as N 67148, was observed to crash on a farm 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 three miles of the flight path.

Investigation

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, characteristic 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. It was established that the aft fuselage tank was filled to capacity at the time of departure from Tulsa. 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) MN53B 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.

A study of the aircraft records revealed no pertinent discrepancies. The most recent airframe 100-hour inspection was dated September 8, 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 LaGuardia on October 3, 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.

Aero Trades, Inc., CAA Approved Repair Station No. 115, MacArthur Airport, Ronkonkoma, New York, modified the aircraft for passenger carrying. The aircraft was then certificated by the Civil Aeronautics Administration in the limited category which prohibits the carrying of passengers for hire. Their work, accomplished in accordance with Forms ACA 337 (CAA Repair and Alteration Form) dated April 4, 1951, and April 9, 1951, 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.

Analysis

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. Placard 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.

Findings

On the basis of all available evidence the Board finds that:

1. Both pilots and the aircraft were currently certificated.

2. The load of the aircraft was within gross weight limits and was properly distributed.
3. Weather was not a factor in the accident.
4. There was no evidence to indicate failure or malfunctioning of the engines or propellers.
5. Both a fuel tank and miscellaneous electrical equipment were installed in the aft fuselage.
6. The aft fuselage tank was filled to capacity shortly before the accident.
7. The fuel system components in the aft fuselage were not separated adequately from the electrical equipment by a fume-tight seal.
8. Fumes from gasoline in the aft fuselage pervaded the interior of the horizontal stabilizer and vertical fin.
9. The inflight ignition of the explosive fuel-air mixture and resultant pressure surge in the aft fuselage caused structural failure.
10. Following the accident immediate corrective action was taken by the Civil Aeronautics Board and Civil Aeronautics Administration.

Probable Cause

The Board determines that 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.

BY THE CIVIL AERONAUTICS BOARD:

/s/ ROSS RIZLEY

/s/ JOSEPH P. ADAMS

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

S U P P L E M E N T A L D A T A

Investigation

The Civil Aeronautics Board was notified of this accident at 0700 October 4, 1955. An investigation was immediately started in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended.

Aircraft Operator

The Great Lakes Carbon Corporation, 18 East 48th Street, New York, New York, purchased their first aircraft in 1946. They presently own and operate, in addition to the subject A-26, two Douglas DC-3's and two Cessna 180's. These aircraft, used to transport company personnel to numerous points in the United States, Canada, Mexico, and the Caribbean area flew a total of 10,797 hours from 1946 to 1955.

Flight Personnel

Captain Joseph Warren Whitney, age 34, held a currently effective airline transport pilot certificate with an appropriate rating for the subject aircraft. He was employed as a captain July 26, 1952. Captain Whitney had accumulated approximately 11,500 pilot hours, of which 900 were in A-26 type aircraft. His last physical examination was on September 30, 1955. He passed a captain's and an instrument check on September 29, 1955.

First Officer John E. McBride, age 31, held a currently effective airline transport pilot certificate with appropriate ratings. He was employed temporarily for sixty days in 1953, and permanently by the company on April 1, 1955. Mr. McBride had accumulated approximately 2,544 pilot hours, of which approximately 500 were in the type equipment involved. He passed his last physical examination in April 1955 and his last instrument check on September 29, 1955.

The Aircraft

The Douglas A-26-C (limited), N 67148, bore manufacturer's serial number 29229 and was built in 1945 for the U. S. Air Force. It was purchased by Great Lakes Carbon Corporation July 26, 1950, and modified for passenger carrying in April 1951. Total airframe time as of September 28, 1955, was 2,183 hours with 14 hours since the last 100-hour inspection. The aircraft was equipped with Pratt and Whitney model R-2800-27M1 engines and Hamilton Standard model 23E50 propellers. Time on the engines and propellers since overhaul was 122 hours. Time on the engines since the last 100-hour inspection on August 11, 1955, was 48 hours.