

CIVIL AERONAUTICS BOARD
ACCIDENT INVESTIGATION REPORT

Adopted: April 27, 1948

Released: April 29, 1948

PIPER J-3, NEAR FORT LAUDERDALE, FLORIDA, MAY 26, 1947

A structural failure of the left front lower lift strut fitting in flight near Fort Lauderdale, Florida, about 1441*, May 26, 1947, resulted in destruction of NC-88624, a Piper J-3-C-65 aircraft, and fatal injuries to Pilot George C. Hastings of Fort Lauderdale, Florida, and to John R. Hartwell, Civil Aeronautics Administration Inspector. Pilot Hastings, age 27, a former Army pilot, held a currently effective commercial rating, issued on the basis of his military flying experience. He had flown approximately 1,034 hours, of which approximately 1,000 hours had been in military aircraft. Inspector Hartwell, age 36, also held a currently effective commercial rating, and he had logged approximately 4,500 hours in various types of aircraft. He had been employed as a Civil Aeronautics Inspector since June 4, 1946.

On the afternoon of May 26, 1947, Pilot Hastings and Inspector Hartwell took off in NC-88624 from Broward Airport, Fort Lauderdale, Florida, at 1410. Hastings occupied the front seat and Hartwell the rear. Hastings was completing a "G.I." Instructor's Course with Broward Aviation, Inc., and the purpose of the flight was to examine him in the execution of a series of aerial maneuvers required by Civil Air Regulations for a flight instructor's rating. Both pilots were equipped with standard seat type parachutes.

1 times referred to herein are Eastern Standard and based on the 24-hour clock.

Weather conditions were reported as high scattered clouds, with scattered to broken at 3,000 feet, wind southeast 12 miles per hour, scattered showers, mostly in the west. From the investigation, it appears that the weather conditions did not contribute to the accident.

Nothing was heard from the flight until a Mr. Richard Cheston, a local resident, discovered the wreckage of the aircraft approximately 3 miles west-southwest of the airport. The crash had occurred on a flat, sparsely settled grazing land, ideal for emergency landing use. The wreckage lay alongside of and against a small unoccupied building, commonly used as a pylon for the practice of figure 8 maneuvers by the pilots flying from Broward Airport. The body of Pilot Hastings was still within the cockpit wreckage, and the body of Inspector Hartwell was found approximately 5 feet outward and ahead of the right door opening. Pilot Hastings' parachute was found unopened and the ripcord unpulled. Inspector Hartwell's pilot chute was fully opened and the parachute partially pulled out; this condition, however, could have very easily occurred upon impact. Pilot Hastings' watch was jammed on impact and the time recorded was 11:11. Thus, from all the evidence available, it would appear that the duration of the flight was approximately 31 minutes.

Examination of the wreckage by Civil Aeronautics Board Investigators indicated that the aircraft was in an inverted diving attitude when it struck the ground. There was no evidence found to indicate power plant or control cable failure. Although the force of the impact practically destroyed the aircraft, inspection of the structure revealed that the left wing, at the time of impact, was partially free from the aircraft. This conclusion was

premised on the fact that the butt ends of both front and rear left wing spars were driven vertically into the ground alongside the fuselage to a depth of approximately 29 inches, the front spar butt striking at a point approximately 3 feet outward from its normal position. Thus, it appears that the left wing was trailing on impact. This is further substantiated by the fact that the left wing tip bow was outwardly undamaged and indicated no contact, and that the wing was accordioned throughout from the butt outward to the tip. The left front spar was pulled out of its fuselage fitting by upward and backward movement. The adjustable clevis eyebolt with the threaded insert remained attached to the fuselage fitting.

The various parts of the structure in question, namely, the lower end of the left front lift strut and fitting, with the attaching adjustable eyebolt were shipped to Washington for study. For comparison, a lower lift strut fitting assembly cross-section was obtained from a similar aircraft so that the detail design could be observed. On close examination of the lift strut fitting removed from this aircraft it was noted that the threaded insert (a)* at the outer clevis end had almost no weld material (e) connecting it to the strut end or to the two half-sleeves (b) which are inserted in the end of the strut and welded directly to the strut. The threaded insert normally has a shoulder at the inner end (d) which rests against and is welded to the end of the split sleeve, as can be seen from the specimen of a similar aircraft. The split sleeve containing the threaded insert is placed in the

* Letters in parenthesis refer to marked parts of the lift strut fitting assembly contained in attached diagram.

strut with the shoulder end of the threaded insert inside the strut. In this way, any tension load is carried in the shoulder of the threaded insert bearing against the end of the split sleeve, which, in turn, is carried through the weld material connecting the sides of the split sleeve to the strut.

In this particular case, however, the threaded insert at the inner end was found minus the shoulder, which is the reason that the adjustable clevis bolt (c) with the threaded insert pulled out of the split sleeve. It is apparent, on close examination of this end under the binocular microscope, that a shoulder had at one time been machined on the threaded insert and had failed because of fatigue. The fatigue started at diametrically opposite ends of the diameter on the outside and worked its way inward toward the thread. The characteristic clam-shell markings of fatigue failure are very plainly indicated. There are, also, deposits of the weld material on the ends of the split sleeve which connected the sleeve to the shoulder of the threaded insert, which, again, indicates that the shoulder was on at one time. The shoulder end of the threaded insert has no fillet between the shoulder and the barrel. This sharp change of the section is very prone to fatigue failure, due to heavy stress concentration at this point.

This aircraft was approximately one year and three months old and had been flown a total of 566 hours, of which 59 hours had been accumulated since the last overhaul. On May 7, 1947, due to major damage incurred by a windstorm, repairs were accomplished on the aircraft which included the installation of new wing lift struts. Since the lower left front lift strut fitting was involved in this accident, a thorough inspection was made

of the repair records and history of the aircraft. Although the records disclosed that the lift struts had been salvaged from a similar aircraft and subsequently installed on NC-88624, there was nothing found to indicate that these struts at the time of installation were not in an airworthy condition. In fact, a certificated mechanic who made the installation stated that he personally inspected the struts and fittings prior to and after the work was completed, and that such repairs were accomplished in accordance with Civil Air Manual No. 18. He stated, furthermore, that on May 8, he personally flight tested the aircraft after it was recertificated as airworthy, such test consisting of spins and stalls in addition to normal flight.

This aircraft was flown by a student pilot for one hour immediately preceding the fatal flight. During this period he practiced landings and take-offs, steep banks and stalls. He reported the aircraft as performing satisfactorily. The aircraft was serviced with gasoline and oil prior to Pilot Hastings' flight.

Upon the basis of all the available evidence, the Board finds that the probable cause of the accident was the failure of the wing as a result of fatigue failure at the shoulder end of the threaded insert of the lower fitting in the left front lift strut.

BY THE CIVIL AERONAUTICS BOARD:

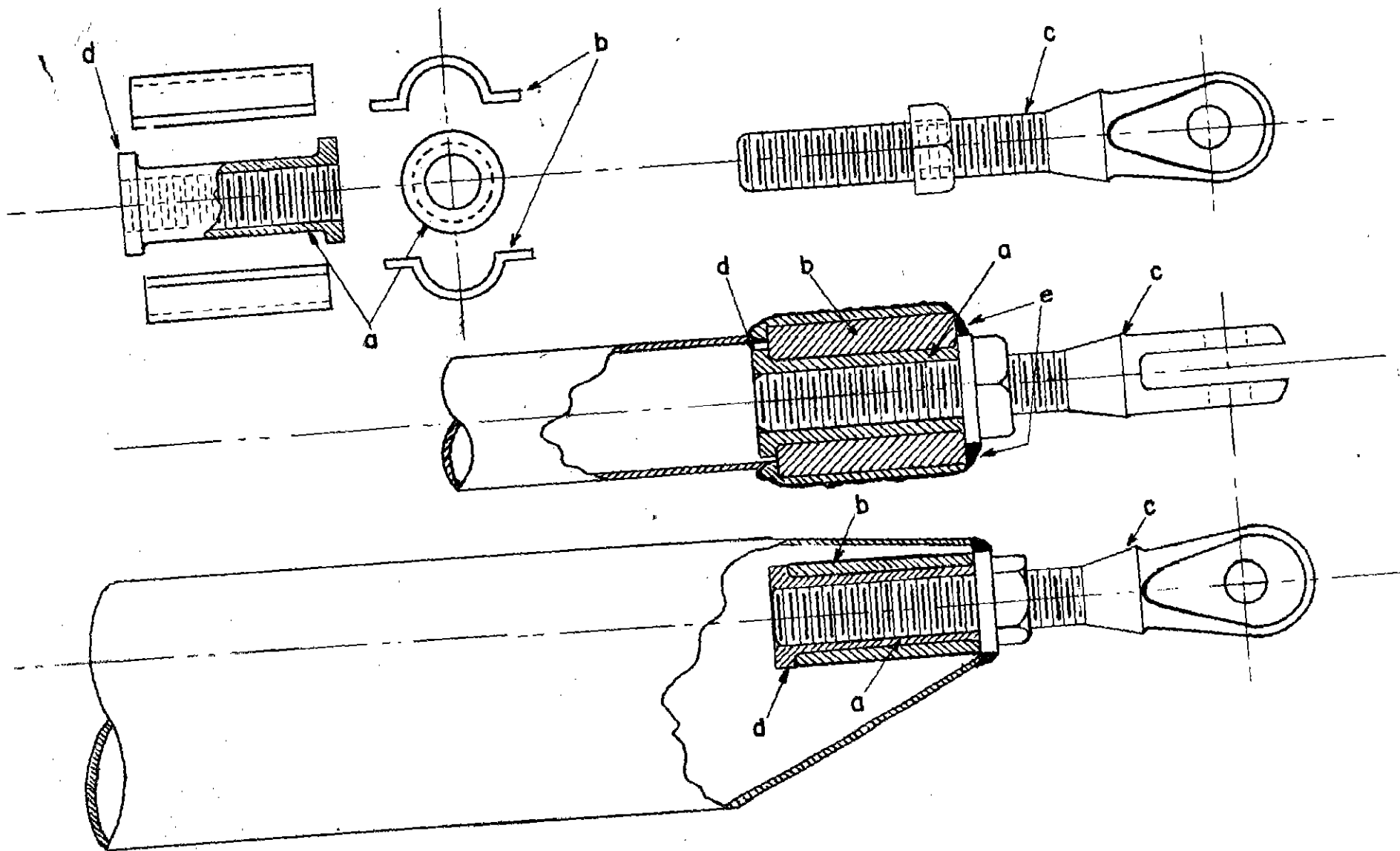
/s/ JOSEPH J. O'CONNELL, Jr.

/s/ HARLLEE BRANCH

/s/ JOSH LEE

/s/ HAROLD A. JONES

Ryan, Vice Chairman, did not take part in the decision.



LOWER LIFT STRUT FITTING ASSEMBLY