# Aviation Investigation Final Report

| | | | |
|---|---|---|---|
| **Location:** | Merced, California | **Accident Number:** | WPR10LA306 |
| **Date & Time:** | June 18, 2010, 18:30 Local | **Registration:** | N1606B |
| **Aircraft:** | Luscombe 11A | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Aircraft structural failure | **Injuries:** | 1 None |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot reported that during cruise flight several minutes after departure he felt both the control yoke and airframe shake violently. The pilot looked out of his window toward the tail section and observed the elevator trim tab fluttering up and down with no corresponding movement to the trim wheel inside the cockpit. The pilot reduced engine power to slow the airplane and regain aircraft control. The airplane began to descend despite full aft elevator pressure. Realizing that he did not have elevator control, the pilot manually manipulated the throttle for pitch control and contacted air traffic control to report his situation. During the descent to a road, the left wing struck a heavy advertising sign and a fence post. After exiting the airplane, the pilot inspected the trim tab and stated that it had failed outboard of the trim cable control horn bracket attachment. He also reported that the upper bolt for the elevator control cable bellcrank to the elevator torque tube attachment bracket was missing. Further examination of the airframe revealed that bolts from the upper attachment and the aft attachment for the elevator control cable bellcrank to elevator torque tube attachment were missing. Damage to the airframe in the tail section included, on the right side torque tube, rub marks on the leading edge with corresponding damage to the adjacent airframe skin, and left side torque tube rub marks on the trailing edge with damage to the rudder skin behind it. What likely occurred was that the elevator attachment bolts on the elevator control cable bellcrank backed out, which then initiated flutter at the elevator, which transferred to the trim tab causing it to fail in overload. Maintenance records indicated that the applicable Airworthiness Directive for the inspection of the trim tab horn attachment was accomplished in December 1949. The airplane had flown 7 hours since its last annual inspection 6 months prior to the accident.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot’s inability to maintain airplane control during cruise flight due to the failure of the elevator trim tab as a result of missing hardware for the elevator control cable bellcrank to elevator torque tube attachment bracket.

## Findings

| | |
|---|---|
| **Aircraft** | Elevator misc structure - Failure |
| **Aircraft** | Attach fittings (flt controls) - Failure |

# Factual Information

## History of Flight

| | |
|---|---|
| **Enroute-cruise** | Aircraft structural failure (Defining event) |
| **Emergency descent** | Loss of control in flight |
| **Emergency descent** | Collision with terr/obj (non-CFIT) |

On June 18, 2010, about 1830 Pacific daylight time, a Luscombe 11A, N1606B, attempted to make an emergency landing on highway 99 near Merced, California, following a flight control issue. During the descent, the left wing was damaged after it struck a heavy advertising sign and fence pole. The pilot/owner operated the airplane under the provisions of Title 14 Code of Federal Regulations Part 91, as a local area flight. The commercial pilot, the sole occupant, was not injured. The airplane sustained substantial damage. Visual meteorological conditions prevailed for the flight that departed from Visalia Municipal Airport (VIS), Visalia, California. No flight plan had been filed for the flight that was destined for the Nut Tree Airport (VCB), Vacaville, California.

In the pilot's written report (National Transportation Safety Board (NTSB) pilot/operator aircraft accident/incident form 6120.1), he reported that his first leg of the flight originated from Whiteman Airport (WHP), Los Angeles, California. Prior to takeoff, he conducted a thorough preflight and run-up, and reported that everything was normal. The pilot departed WHP and had an uneventful flight and landing at VIS. Prior to departing from VIS, the pilot refueled the airplane, and conducted a walk around of the airplane to check for any discrepancies that may have occurred during his flight from WHP to VIS.

The pilot reported that the departure from VIS to VCB was normal. Several minutes into the flight, the pilot experienced "violent shaking" in the control yoke that shook the entire airplane. Attempting to determine the cause of the shaking, the pilot looked out of the pilot's side window and observed the trim tab "fluttering" violently up and down. The pilot then looked at the trim wheel in the cockpit and saw that it did not show corresponding movement. The pilot reduced power to slow the airplane; despite the pilot's full aft elevator pressure, the airplane began to descend. The pilot then realized he did not have elevator control, and started to control the airplane's pitch angle by manually manipulating the throttle; increasing and decreasing the power setting. The pilot further stated that once he had partial control of the airplane he attempted to contact air traffic control and use his global position system (GPS), but his avionics were flashing on and off, and he began to smell something akin to electrical burning.

The pilot initiated a forced landing onto a road. During the descent, the tire of the left main landing gear bounced off a moving truck, and the airplane floated over an orchard adjacent to a highway. The airplane continued to descend; during landing the left wing struck a heavy

advertising sign, followed by a fence post. The airplane turned towards the left, touched down and porpoised twice, striking the propeller on the ground both times. On the second propeller strike, the airplane's left main landing gear separated from the fuselage, and the airplane slid on its cowling until coming to a rest.

In the pilot's report he also stated that the trim tab had failed outboard of the trim tab control horn bracket attachment. The upper bolt of the elevator control cable bellcrank to the elevator torque tube attachment bracket was missing.

In the pilot report recommendation section on how the accident could have been prevented, the pilot said to reinvestigate Service Bulletin (AD) 49-40-01, which addressed the Luscombe elevator trim tabs with respect to metal fatigue.

Post-accident examination by an NTSB investigator and a Federal Aviation Administration (FAA) inspector revealed that the inboard tip of the elevator trim tab had separated from the trim tab but remained attached to the operating arm. The bolt hole where the operating arm is attached to the trim tab piece was elongated. Investigators further notated damage to the inboard hinge of the elevator. The elevator torque tube is not a continuous piece; each part fits onto its respective side of the elevator bellcrank. The attachment flange is triangular and both sides are clamped together with three bolts. The forward edge of the right side attachment flange was bent aft. The NTSB investigator did not see a bolt in the upper attachment point or a bolt in the aft attachment point. The upper part of the elevator torque tube rotated aft. The right side of the torque tube had rub marks on the leading edge with corresponding damage on the adjacent airframe skin, with no damage to the rudder skin that is aft of it. The left side torque tube had rub marks on the tailing edge with corresponding damage to the rudder skin behind it, which was buckled. The two bolt holes showed no elongation or other damage.

The FAA inspector further reported that the pilot informed him that he observed arcing marks on the battery leads and on the inside top of the battery case.

According to the airplane's airframe AD compliance record, it was recorded that on December 1, 1949, the airplane had complied with AD 49-40-01. According to the airframe maintenance logbook, the most recent annual inspection was on January 11, 2010, which stated that the airplane was inspected and determined to be in an airworthy condition at the time of the inspection. The pilot reported that the airplane had flown 7 hours since the annual inspection.

## Pilot Information

| | | | |
|---|---|---|---|
| **Certificate:** | Commercial | **Age:** | 40,Male |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 1 Without waivers/limitations | **Last FAA Medical Exam:** | April 19, 2010 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | April 30, 2010 |
| **Flight Time:** | 5580 hours (Total, all aircraft), 36 hours (Total, this make and model), 5486 hours (Pilot In Command, all aircraft), 317 hours (Last 90 days, all aircraft), 97 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

| | | | |
|---|---|---|---|
| **Aircraft Make:** | Luscombe | **Registration:** | N1606B |
| **Model/Series:** | 11A | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 11-112 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | January 11, 2010 Annual | **Certified Max Gross Wt.:** | 2280 lbs |
| **Time Since Last Inspection:** | 7 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 1541 Hrs as of last inspection | **Engine Manufacturer:** | Continental |
| **ELT:** | Installed, activated, did not aid in locating accident | **Engine Model/Series:** | E-185-10 |
| **Registered Owner:** | On file | **Rated Power:** | 185 Horsepower |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

| | | | |
|---|---|---|---|
| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Dawn |
| **Observation Facility, Elevation:** | HJO,240 ft msl | **Distance from Accident Site:** | |
| **Observation Time:** | 18:53 Local | **Direction from Accident Site:** | |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 18 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 320° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.82 inches Hg | **Temperature/Dew Point:** | 29°C / 4°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Visalia, CA (VIS ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Vacaville, CA (VCB ) | **Type of Clearance:** | None |
| **Departure Time:** | 18:00 Local | **Type of Airspace:** | |

## Wreckage and Impact Information

| | | | |
|---|---|---|---|
| **Crew Injuries:** | 1 None | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 None | **Latitude, Longitude:** | 37.383335,-120.650001 |

## Administrative Information

| | |
|---|---|
| **Investigator In Charge (IIC):** | Cornejo, Tealeye |
| **Additional Participating Persons:** | John Jensen; Federal Aviation Administration; Fresno, CA |
| **Original Publish Date:** | June 27, 2011 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=76419 |