# National Transportation Safety Board Washington, DC 20594

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#### **Brief of Accident**

### Adopted 01/24/2005

LAX01FA071

File No. 17180 01/09/2001 Oakland, CA Aircraft Reg No. N819AC Time (Local): 13:30 PST Make/Model: Worldwide Aeros / 40B Fatal Serious Minor/None Engine Make/Model: Teledyne Continental / IO-240-B Crew 0 2 0 Aircraft Damage: Substantial Pass 0 0 0 Number of Engines: 1

Operating Certificate(s): None
Type of Flight Operation: Instructional

Reg. Flight Conducted Under: Part 91: General Aviation

Last Depart, Point: Same as Accident/Incident Location

Destination: Local Flight
Airport Proximity: Off Airport/Airstrip

Condition of Light: Day

Weather Info Src: Weather Observation Facility

Basic Weather: Visual Conditions Lowest Ceiling: 5500 Ft. AGL, Overcast

Visibility: 10.00 SM Wind Dir/Speed: 150 / 015 Kts

Temperature (°C): 11 Precip/Obscuration:

Pilot-in-Command

Age: 46

Flight Instructor; Commercial; Multi-engine Land; Multi-engine Sea; Single-engine Land; Single-engine Sea; Airship; Glider; Helicopter

Instrument Ratings
Airplane

Certificate(s)/Rating(s)

Flight Time (Hours)

Total All Aircraft: 8400 Last 90 Days: 282 Total Make/Model: 93 Total Instrument Time: 159

During an instructional flight in rain showers, the airship became uncontrollable due to an out-of-balance (trim/pressure) envelope condition and collided with the ground and multiple obstacles during a landing attempt. While inbound to the airport for landing in high winds and moderate rain the crew decided they could not do a "normal 'weigh-off'" to determine the weight and trim because they were heavy with rain, had no ballast to drop, and could only estimate their trim by visually checking the ballonet volume. The certified flight instructor (CFI) then got out of his seat to read the ballonet numbers and found that they had "6-7 in the rear and the front was flat." The crew then adjusted the levels by dumping from the front ballonet and pumping air into the aft and then noted they were even, around "3 each." The instructor then suggested that they leave the aft pump on and lock off the front valves to hold the trim While setting up for the approach, the nose dropped. The pilot attributed this to the gusty weather conditions that condition. prevailed at the time. He simultaneously noted that the Hull Pressure Indicator (HPI) was low and switched the fan blower to the ON position to add air to the front ballonet. He indicated that the rear ballonet was in the AUTO position. The nose recovered and then dropped again. The pilot again noted the hull pressure indicator (HPI) reading was low. He recovered using the same procedure as before, and the nose dropped a third time. The instructor checked the air pressure system and saw that the rear ballonet valve was open, but the light on the annunciator panel indicated that the valve should have been closed (subsequent investigation showed that system was designed such that the annunciator light showed the switch position, not the actual valve position). Both pilots visually confirmed that at least one of the aft valves was open and would not respond to air valve control inputs. The instructor attempted to manually close the valve, with no response. Observations of the ground crew confirmed that the aft ballonet valves were open. On the first attempt to land, the airship was too high and came in too fast. The instructor aborted the landing then set up for a second approach, and due to

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the low nose condition, he added more power and placed the joystick (flight control system) to the full aft position to raise the nose. The instructor stated that he needed full aft on the joystick to keep the nose up, and any movement forward resulted in an immediate drop of the nose. He realized the flight controls were malfunctioning, but due to the low altitude, high airspeed, deteriorating weather, and the need to get the airship on the ground, he did not have time to accomplish the complete emergency procedure for a flight control malfunction. The airship landed very hard at a fast forward airspeed and with a very heavy nose. The landing gear collapsed and the gondola dug into the ground. The airship then skidded across an adjacent taxiway and struck a parked airplane. Both pilots jumped out on opposite sides of the gondola and pulled the emergency envelope deflation ripcords but the deflation panels did not open. The airship took off, unmanned, and reached a peak altitude of 1,600 feet above ground level (agl). The airship traveled for about 4 miles in a northeast direction and struck a marina where the envelope became draped over sailboats and a restaurant. The FAA approved flight manual was reviewed. It contained no specific emergency procedure for a stuck ballonet valve condition; however, in the emergency procedures section under "Pressure Related Emergencies" the text said that with a high pressure indication the pilot should check that the helium release valves and air valves are in the UNLOCKED position. The approved flight manual did not address added weight to the airship due to environmental conditions (rain). Placement of the forward ballonet was not symmetrical in relation to the rear ballonet as required by the design requirements of 14 CFR Part 21.17b. The forward ballonet also had a greater capacity than the rear ballonet. The conditions of the aft ballonet valves in the OPEN position and the fan for the forward ballonet in the ON position, allowed the forward ballonet to become fully inflated, which caused an out-of-trim/unequal hull pressure condition. The airship design with a more forward ballonet placement exacerbated the severity of the nose heavy condition after the valve failures induced the pressure/trim imbalance. A review of the airship design certification revealed that it had been certificated without consideration to advertising banners being draped over the rapid envelope deflation emergency ripcords, or to the effects of rain on the banners. The emergency ripcord deflation system was never tested on the airship in various environmental conditions, only on a mock-up in a hangar. Due to structural damage sustained in the impact sequence the airship systems could not be tested as installed on the airship. However, each individual system was functionally tested with no malfunctions noted. There was no Minimum Equipment List (MEL) for the airship and if a component was inoperative, the airship was considered to be in an un-airworthy condition. The dual ballonet level cockpit indicator had been taped over and marked "IN-OP" before this flight.

## Brief of Accident (Continued)

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Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: APPROACH

## **Findings**

(C) BLIMP/AIRSHIP, GAS/AIR PRESSURE/FLIGHT CONTROL SYS - JAMMED

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Occurrence #2: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: APPROACH

#### **Findings**

- 2. WARNING SYSTEM(OTHER) INOPERATIVE
- 3. (F) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT INTENTIONAL FLIGHTCREW
- 4. (F) BLIMP/AIRSHIP, ENVELOPE/HULL OUT OF BALANCE
- 5. (F) ACFT/EQUIP, INADEQUATE DESIGN MANUFACTURER
- 6. (F) INADEQUATE CERTIFICATION/APPROVAL, AIRCRAFT FAA(ORGANIZATION)
- 7. (F) INSTRUCTIONS, WRITTEN/VERBAL NOT ISSUED MANUFACTURER
- 8. (F) CONDITION(S)/STEP(S) NOT LISTED MANUFACTURER
- 9. (F) EMERGENCY PROCEDURE MISJUDGED PILOT IN COMMAND

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Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

#### Findings

- 10. TERRAIN CONDITION GROUND
- 11. OBJECT AIRCRAFT PARKED/STANDING
- 12. OBJECT BUILDING(NONRESIDENTIAL)

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.

the rear air relief valves stuck in an open position for an undetermined reason. A factor in the accident was the design and placement of the forward ballonet envelope contrary to certification requirements, which exacerbated the out of trim condition resulting from the stuck air relief valve. Other factors were the absence of an appropriate emergency procedure for flight in an out of trim/unequal hull pressure condition, the pilot's misdiagnosis of the emergency condition, and his failure to activate (unlock) the helium release valves. FAA certification of the design when certain elements did not meet regulatory requirements and the decision by the crew to fly the airship with an inoperative ballonet indicators were also factors.