		NTSB ID: LAX01FA071		Aircraft Registration Number: N819AC	
		Occurrence Date: 01/09/2001		Most Critical Injury: Minor	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Oakland	State CA	Zip Code 94601	Local Time 1330	Time Zone PST	
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility: 4			
Aircraft Information Summary					
Aircraft Manufacturer Worldwide Aeros		Model/Series 40B		Type of Aircraft Blimp	
Revenue Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
HISTORY OF FLIGHT					
<p>On January 9, 2001, at 1330 Pacific standard time, a Worldwide Aeros 40B airship, N819AC, encountered aircraft (flight) control problems while attempting to land at the Metropolitan Oakland International Airport (OAK), Oakland, California. The airship landed hard, skidded across a taxiway, and struck a parked airplane. After the pilots abandoned the airship, it became airborne and flew about four (4) miles northwest of the airport, where it collided with a sailboat and restaurant. Airship USA, Inc., operated the airship under the provisions of 14 CFR Part 91 as an instructional flight. The airship sustained substantial damage. The certified flight instructor (CFI), and commercial pilot, both with airship ratings, received minor injuries. Visual meteorological conditions prevailed for the flight, and no flight plan had been filed. The flight departed OAK about 2 hours prior to the accident.</p>					
<p>According to the flight crew, the airship was readied for flight, then departed about 1130 for a flight to provide touch-and-go takeoffs and landings, and flight experience for the less experienced pilot. On board the airship were two commercially rated pilots; the pilot who occupied the right seat possessed a current sign off in this model airship and acted as the certified flight instructor (CFI) giving flight instruction to the second pilot seated in the left seat. The second pilot, in the left seat, was attempting to gain the necessary experience towards a sign off.</p>					
<p>After departure, the pilots requested touch-and-go takeoffs and landings with OAK Air Traffic Control (ATC) Tower (north controller). The controller informed the flight crew that they were too busy to handle their request. The flight crew then departed the area and flew toward the Golden Gate Bridge to conduct air work. However, due to inclement weather, they returned to OAK to conduct touch-and-go takeoffs and landings.</p>					
<p>About 8 miles from the airport they encountered a light misting rain. Both pilots noted that the fuel gage (LED) indicator on the annunciator panel had a red indication, and the digital display read OPEN. After a few seconds the LED indicator returned to a normal reading. The pilot receiving instruction and seated in the left seat (the pilot flying - PF) stated they were not worried because it appeared that it was an indicator error, and because they had visually verified full fuel tanks during the preflight inspection. The rain increased in intensity to a moderate rainfall as the airship approached the airport.</p>					
<p>According to the CFI's written statement, about the same time as the fuel gauge LED light turned "red," they increased the power to increase their ground speed as they were flying into 15- to 20-knot winds. He and the PF discussed that they would 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 estimate their trim by visually checking the ballonet volume. The CFI then got out of his seat to read the ballonet numbers and reported to the PF that they had "6-7 in the rear and the front was flat."</p>					
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The CFI reported that they "pumped and dumped aft 2 sequences." He then visually checked the ballonets again, and noted they were even, around "3 each." He then suggested that they pump aft on the way to land and lock off the front valves to hold the trim condition.

In the pilot flying (PF) written statement he indicated that they had elected to "lock off" the forward ballonet for landing, thus maintaining the same amount of air in the forward ballonet throughout the landing. While setting up for the approach, the nose dropped. The PF attributed this to the gusty weather conditions that 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 PF again noted the HPI reading was low. He recovered using the same procedure as before, and the nose dropped a third time. He informed the CFI that the flight control of the airship did not feel normal. The CFI checked the air pressure system and saw that the rear ballonet valve was open, but the gauge on the annunciator panel indicated that the valve should have been closed. Both pilots visually confirmed that at least one of the aft valves was open and would not respond to air valve control inputs. The CFI attempted to manually close the valve, with no response.

At this point the CFI and PF switched seats so that the CFI had the flight controls and was seated in the left seat. The PF then sat in the right seat and radioed the ground crew that they were having difficulty controlling the airship and were coming into land.

On the first attempt to land, the CFI stated that the airship was too high and came in too fast. The CFI aborted the landing due to the airspeed, excessive height above the ground, and the close proximity to the ground crew. He set up for a second approach, and due to 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 CFI stated that he had full aft position on the joystick, and any movement forward resulted in an immediate drop of the nose. He felt, at the time, 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 flight crew reported a very hard landing at fast forward airspeed and 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. At this point both pilots jumped out on opposite sides of the gondola. The CFI pulled the emergency ripcord on his side of the envelope but it failed to open the emergency deflation panel. The pilot receiving instruction initially ran away from the airship because the airship was traveling in his direction. He returned to the airship and unsuccessfully attempted to pull the emergency ripcord; however, he was pulled off of his feet and he let the emergency ripcord go. Both pilots reported an inability of the emergency deflation panels to operate in the wet environment.

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.

According to the ground crew, the airship took off, departed the airfield, and was not expected to return for several hours. The crew left the airport for lunch. During lunch the crew chief received a call from the radio watch (crewman left behind to monitor radio communications from the flight crew) that the airship was returning to the field due to weather, but the ground crew could take their time returning to the field. About 5 minutes later the crew chief received another call from the radio watch indicating that the airship wanted the ground crew back to the field as soon as possible to assist with the landing. The crew chief stated that the airship attempted to land on runway 15 and "turn into the crew (a common procedure)." However, the airship was too high and fast. The crew chief could see that the pressure was "very low on the ship due to the way the

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banners [were] fluttering loosely and the envelope was reacting to the wind." As the airship circled overhead, the crew chief noticed that it "looked like the aft ballonnet valves were open." On the first attempt to land, as the airship turned onto the downwind leg, it "suddenly dove down dramatically but recovered at the last minute." The crew chief observed that all four ruddervators were in the "up position." That indicated to him that the nose was "extremely heavy which would explain the aft valves" in the open position, and the "pressure problems" the pilot was referring to.

The crew chief stated that the PF radioed to say they had a very serious situation and could not maintain pressure. The PF indicated that the landing would be "very fast" and that they could only make one approach. On the accident landing, as the airship turned to final, it descended in a stair-step pattern for runway 15. The airship landed "very hard" and away from the ground crew, about 400 yards. The airplane bounced two times before staying on the ground. The nose sunk in the soft dirt, and the airship started to drag/slide across the ground. The airship continued dragging across the ground until it hit the parked Navy P-3 Orion.

The crew chief stated that he next saw the pilot jump out of the gondola and attempt to pull the "helium 'rip lines'." He indicated that the emergency ripcords are the "last defense in avoiding loss of the ship and is an emergency deflation system to prevent the ship from free ballooning, or floating off unmanned." The airship started to float away with the pilots holding onto the emergency ripcords, the pilots let go, and the airship departed the airport environment unmanned. Some of the ground crew went to the accident site, while others stayed with the flight crew to make sure they were okay.

PILOT INFORMATION

A review of Federal Aviation Administration (FAA) airman records revealed that the right seat pilot held a commercial certificate with ratings for airplane single engine, multiengine land and sea, helicopter, glider, and airship. The pilot also held an instrument airplane rating, as well as, a flight instructor certificate with a rating for single engine airplane.

A review of the FAA medical records revealed that the pilot held a second-class medical issued on March 9, 2000, with a limitation "must wear corrective lenses."

According to the CFI's written report (NTSB Form 6120.1/2), he had a total flight time of 8,400 hours; 3,400 total hours in airships, and 92.9 hours in the accident airship make and model.

A review of FAA airman records revealed that the left seat pilot held a commercial certificate with an airship rating.


A review of the FAA medical records revealed that the pilot held a second-class medical issued on July 12, 2000, with no limitations or waivers.

According to the left seat pilot's written report (NTSB Form 6120.1/2), he had a total flight time of 4,000 hours, all in airships, with 9 hours in the accident airship make and model.

AIRCRAFT INFORMATION

A review of the FAA approved flight manual (AFM), revealed no emergency procedures for a stuck ballonnet valve condition. However, in the emergency procedures section under "Pressure Related Emergencies" it stated that with a high/low pressure indication, the pilot should check and make sure the helium release and air valves are in the UNLOCKED position.

According to the AFM, the airship was equipped with a dual ballonnet level indicator located on the instrument console. The dual ballonnet level indicator was used to check the ballonnet level. The

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indicator was used to provide the flight crew with trim/hull pressure condition information. Section 7 entitled "Envelope pressure system" of the AFM states that the pressure system is responsible for the increase of super pressure, decrease of super pressure, and static trim control of the airship. The pressure system is "essential in maintaining the envelope pressure and airship trim." Helium relief valves were installed to decrease the internal pressure of the envelope. The system also included an air-to-helium valve system in each ballonnet in the event of an emergency. The purpose for the air-to-helium valve was to provide emergency air from the ballonnet to the envelope to increase the internal pressure.

There was no Minimum Equipment List (MEL) for the airship. If a component was inoperative, the airship was considered to be in an un-airworthy flight condition. The rapid envelope deflation, with the associated ripcords, was for on-ground emergency deflation only.

Airship Certification

The airship was issued type certificate S00007LA, on June 21, 2000, by the FAA. The Los Angeles Aircraft Certification Office conducted the FAA required oversight of the design, construction, and testing of the airship and individual components. The airship certification basis was in compliance with 14 CFR Part 21.17b. According to the Type Certificate Data Sheet (TCDS), the airship met airworthiness requirements by complying with the provisions of the Airship Design Criteria (ADC), FAA P-8112-2, and the current changes.

The ADC describes the acceptable means for type certification and provides the acceptable requirements for the type certification of conventional, near-equilibrium, non-rigid airships. The ADC contains subjects that cover flight, structure, design and construction, and power plant requirements for new model airships. Section 4.43, Envelope Design, covers the requirements for the envelope pressure requirements, fabric, suspension, design loads, ballonets, rapid deflation, internal/external suspension systems, and anti wrinkling of the nose. In particular, section 4.43 (e) states, "Ballonets must be designed, and installed such that their center of displacement must coincide longitudinally with the center of buoyancy of the envelope. The ballonnet system must be designed so that the static trim capabilities of the system about the center of buoyancy of the airship are equally divided between the fore and aft ballonets. The effective trim capabilities of the ballonets must be maintained approximately equal between the limits of 0 to 100 percent ballonnet fullness. Sufficient means must be provided to prevent trapping of air when partially deflated." Section 4.43 (g) states, in part, "A means must be provided to permit emergency deflation of the envelope on the ground during emergency evacuation of the occupants."


In section 4.16, Trim systems of the ADC, (a) states "trim systems include ballonets, trim tabs on aerodynamic control surfaces, or any other system which directly affects the long-term, in-flight, attitude of the airship. Proper precautions must be taken to prevent inadvertent, improper, or abrupt trim operation." (b) "When ballonets are used for trimming, the pilot must be capable of determining when they are completely empty and completely full."

WRECKAGE INFORMATION

The airship was located draped over a marina, sailboats, and a restaurant partially inflated. The envelope was torn extensively on its right side and the gondola and power plant exhibited extensive damage from impact. The airship was partially disassembled at the marina and examined at a warehouse complex.

TESTING AND RESEARCH

An examination of the airship systems was conducted on March 13-14, 2001, at Plain Parts, Pleasant Grove, California. Due to structural damage and the disassembly at the accident site, the airship systems could not be tested as installed on the airship. It was noted that the dual ballonnet level

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indicator had been taped off and marked "IN-OP." The flight control ruddervators tested individually and were found operational. The following components were individually functionally tested with no malfunctions noted:

The forward and aft Nos. 1 and 2 air relief valves

The forward and aft blowers

All of the air valve annunciators

The left and right helium valve and annunciators

The forward air-to-helium bottle functionally

The left and right helium bottles


The electrical system


The rip panels were removed from the structure and passed the rip panel test.

All systems tested passed their respective individual systems test. No further testing was done to the airship structure or airship components.

The airship certification records were examined for the processes and procedures used by the manufacturer and overseen by the FAA to gain type certification of the accident airship. Safety Board investigators found that the emergency deflation systems were tested during airship construction but not during actual flight tests, banner operations, nor rain with the envelope/banners wet. The ballonet design was reviewed. The flight manual listed the center of buoyancy as envelope station (ES) 755.63, the forward ballonet located about ES 245 had a maximum volume capability of 13,843 cubic feet; the aft ballonet located about ES 1050 had a maximum volume capability of 12,713 cubic feet. The flight manual was reviewed for emergency procedures that would apply to the out-of-trim condition caused by two stuck air relief valves. No specific emergency procedure was found.

The flight manual further did not contain guidance for weight and balance from rain or flight in heavy rain conditions. The maintenance instructions did contain information about weight increase in light, moderate, heavy, and monsoon rain intensities.

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Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Oakland International Airport	OAK	10 Ft. MSL	NA		
Runway Surface Type: Asphalt					
Runway Surface Condition: Wet					
Approach/Arrival Flown: NONE					
VFR Approach/Landing: Forced Landing; Traffic Pattern					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Worldwide Aeros		40B		A40B-17	
Airworthiness Certificate(s): Normal					
Landing Gear Type:					
Amateur Built Acft? No	Number of Seats: 5	Certified Max Gross Wt.	5975 LBS	Number of Engines: 1	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Reciprocating	Teledyne Continental	IO-240-B	125 HP		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Annual		Hours	Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?/Type No	ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
Airship USA Inc.		1055 E. Tropicana, Ste 270			
		City	State	Zip Code	
		Las Vegas	NV	89119	
Operator of Aircraft		Street Address			
Airship USA Inc.		1055 E. Tropicana, Ste 270			
		City	State	Zip Code	
		Las Vegas	NV	89119	
Operator Does Business As:			Operator Designator Code:		
- Type of U.S. Certificate(s) Held: None					
Air Carrier Operating Certificate(s):					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 91: General Aviation					
Type of Flight Operation Conducted: Instructional					

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First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 46
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Sex: M	Seat Occupied: Left	Occupational Pilot? Civilian Pilot	Certificate Number: On File
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Certificate(s): Flight Instructor; Commercial

Airplane Rating(s): Multi-engine Land; Multi-engine Sea; Single-engine Land; Single-engine Sea

Rotorcraft/Glider/LTA: Airship; Glider; Helicopter

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Single-engine

Current Biennial Flight Review? 03/2000

Medical Cert.: Class 2	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 03/2000
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	8400	93	40000	250	310	59	100	100	15	3400
Pilot In Command(PIC)	6720	66	3800	240	300	50		50	5	3000
Instructor	388	61	53		80					335
Instruction Received										
Last 90 Days	282	93	189		44			1		93
Last 30 Days	68	66	3		27					66
Last 24 Hours	2	2								2

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: None

Departure Point Same as Accident/Incident Location	State	Airport Identifier OAK	Departure Time 1130	Time Zone PST
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Destination Local Flight	State	Airport Identifier OAK	
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Type of Clearance: VFR

Type of Airspace: Class C

Weather Information

Source of Wx Information:


Flight Service Station

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Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
OAK	1353	PST	6 Ft. MSL	4 NM	90 Deg. Mag.
Sky/Lowest Cloud Condition: Clear			Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Overcast		5500 Ft. AGL		Visibility: 10 SM	Altimeter: 29.97 "Hg
Temperature: 11 °C	Dew Point: 8 °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 150		Wind Speed: 15		Wind Gusts:	
Visibility (RVR): Ft.		Visibility (RVV) SM			
Precip and/or Obscuration:					

Accident Information		
Aircraft Damage: Substantial	Aircraft Fire: None	Aircraft Explosion: None

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot			1		1
Second Pilot			1		1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -			2		2
Other Ground					
- GRAND TOTAL -			2		2

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Administrative Information

Investigator-In-Charge (IIC)

Tealeye C. Cornejo

Additional Persons Participating in This Accident/Incident Investigation:

Glenn Gathright
Federal Aviation Administration
Alameda, CA

Igor Pasternak
Worldwide Aeros Corporation
Tarzana, CA

Bill McClaren
Airship USA Inc.
Las Vegas, NV