US-LTA Corporation - Model 138S blimp

Peter Lobner, 24 August 2021

1. Introduction

The US-LTA (US Lighter Than Air) Corporation Model 138S airship was a non-rigid, single engine blimp that was developed in the late 1980s. The original owners of US-LTA sold the business in 1988 to a Canadian, Ray Olma. Work on FAA airworthiness certification was undertaken during 1989 - 90 and the FAA issued Type Certificate AS2NM on 24 July 1990. Two Model 138S blimps were built, tail numbers N25BP (1986) and N832US (1993).

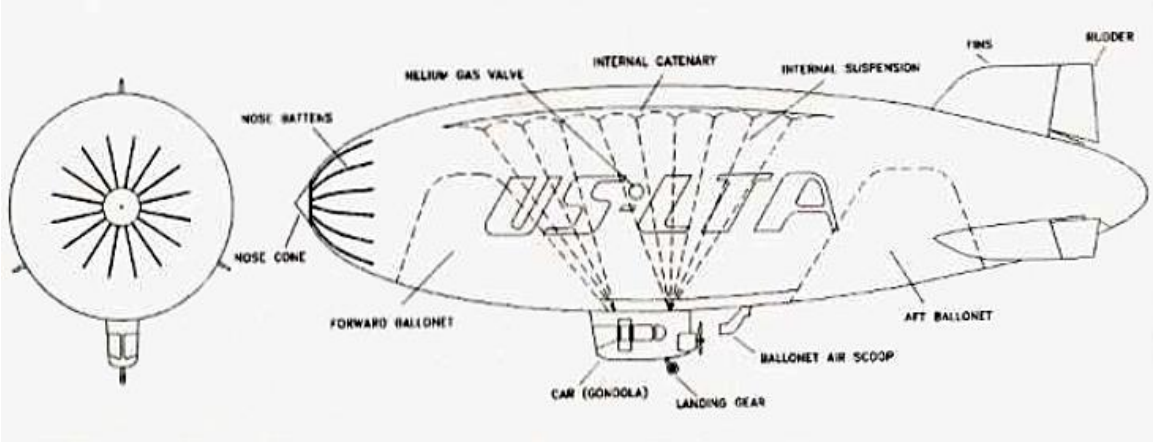
In May 2009, US-LTA Corp put up for sale their FAA Type Certificate for the Model 138S blimp, with all engineering documents and many spare parts. The asking price was $500,000. Since then, the Type Certificate has passed through a series of owners, including Science Applications International Corporation (SAIC) and Leidos, Inc. Since 12 June 2018, Type Certificate AS2NM has been owned by Airship do Brasil.

The first production 138S in use as an advertising blimp.
Source: US-LTA

2. Model 138S design

This non-rigid airship consists of three major components, a helium filled envelope, rigid tail surfaces, and a control car (gondola). The envelope is made of a coated fabric with two air ballonets. An internal catenary system supports the gondola with its attached single engine. This airship is readily recognizable by its inverted “Y” configuration tail, similar to that on the Zeppelin NT. The airship is controlled with a single stick via a hydraulically-actuated control system.

The gondola was designed to accommodate 6 people in two compartments, a 2-seat pilot’s compartment and a 4-seat passenger / cargo compartment that can be configured to meet mission needs. There is about 147 ft^3 (4.16 m^3) available for cargo. Maximum payload, including fuel, crew, passengers and mission equipment is 3,000 lb (1,361 kg). The weight available for mission equipment depends on many factors, but can be in the range from 1,200 to 1,900 lb (544 to 862 kg).



Model 138S general arrangement. Source: US-LTA, Hamley (1994)

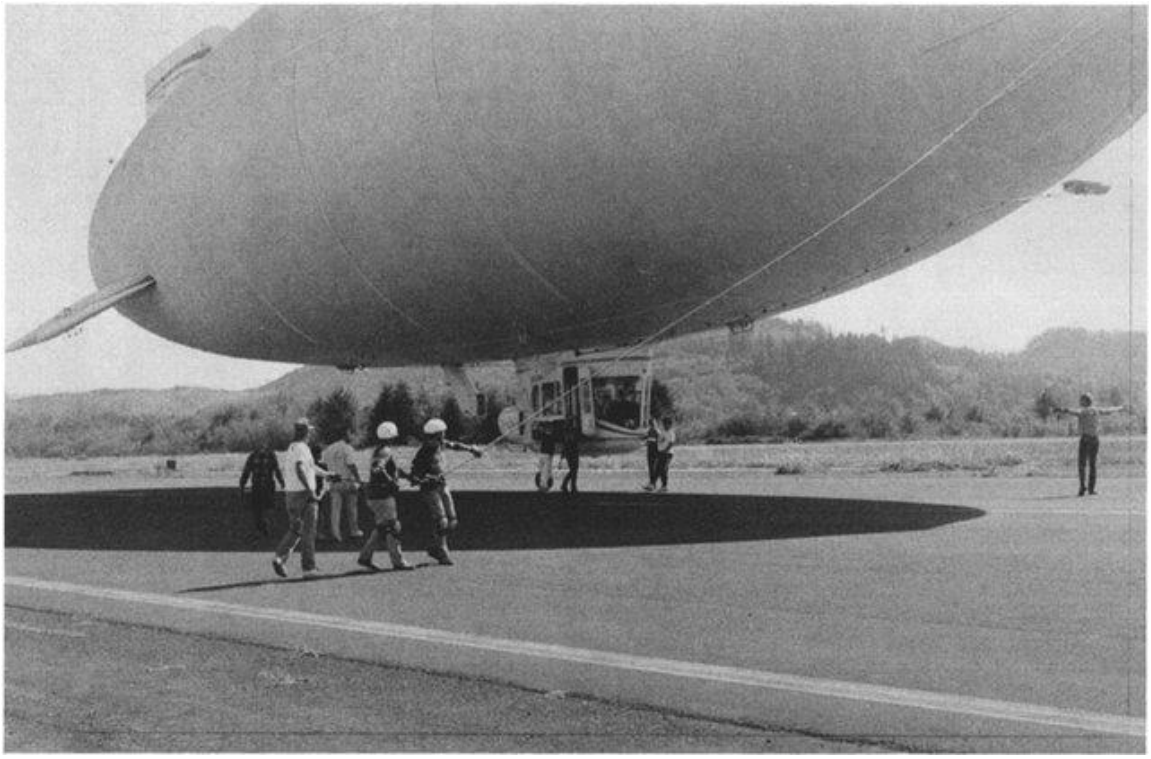
The 138S airship can fly with full control at 15 mph (24 kph) airspeed and has a top airspeed of 54 mph (87 kph). During missions with the airship trimmed for neutral buoyancy, the airship can hover over a target area or remain stationary in an air mass.

A suitable takeoff and landing site is a flat area, preferably asphalt, concrete or short grass, at least a 1,000 ft (300 m) in diameter.

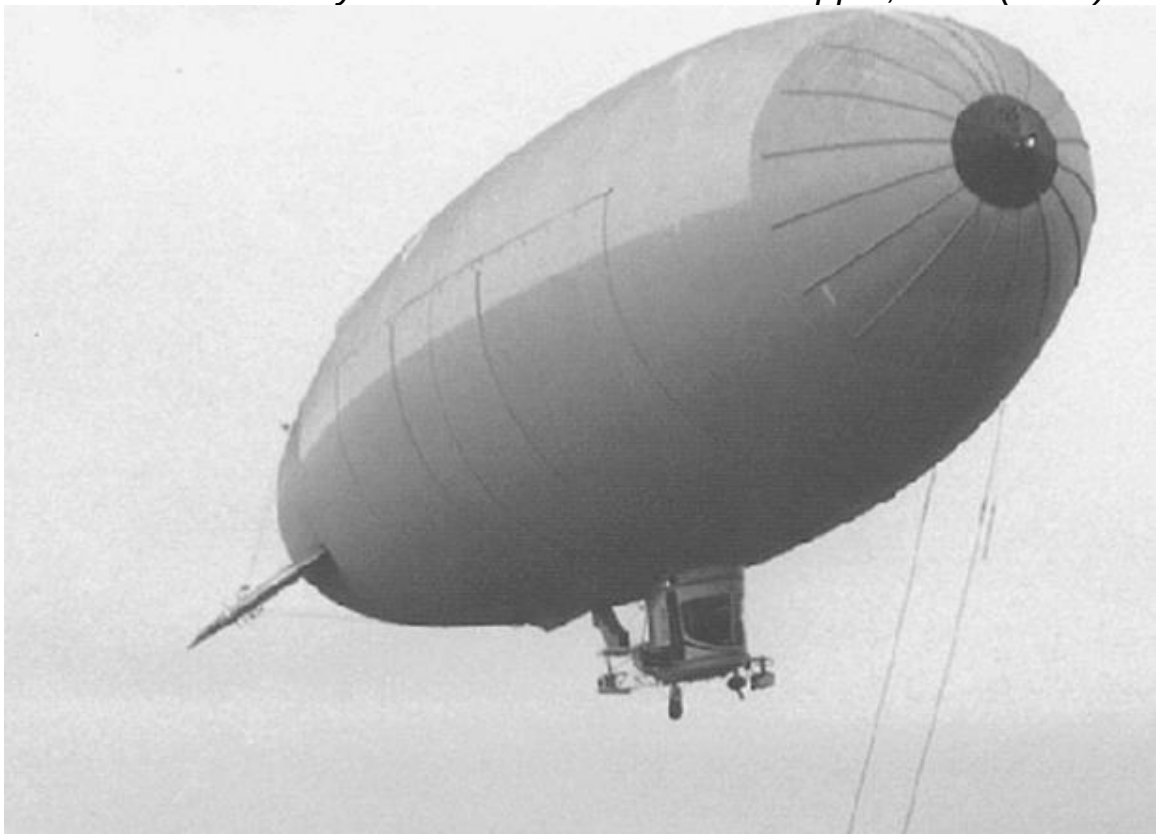
General characteristics of the Model 138S

Parameter	Model 138S
Length, overall	160 ft (48.8 m)
Diameter	41 ft (12.5 m)
Envelope volume	138,000 ft^3 (3,908 m^3)
Max / min pressure	2.8 / 1.1 inch (71 / 28 mm) H_2O
Propulsion	• One AVCO Lycoming IO-540-K2A5 engine @ 300 hp (224 kW) driving a 78 inch (2 m) Hartzell propeller. • Mounted at the back of the gondola in a “pusher” configuration
Weight, max	8,900 lb (4,037 kg)
Payload, max	3,000 lb (1,361 kg)
Max static heaviness	400 lb (181 kg)
Max static lightness	200 lb (90.7 kg)
Accommodations	Pilot + 5 passengers
Speed, max	54 mph (87 kph)
Speed, gusty conditions	40 mph (64 kph)
Speed, minimum	15 mph (24 kph)
Operating altitude, max	9,000 ft (2,743 m)
Range	400 miles (640 km)
Endurance	5 to 20 hours, depending on mission profile

The first production 138S in use as an advertising blimp for Pizza Hut. Source: Advanced Hybrid Aircraft



Model 138S ready to launch. Source: W.A. Hoppel, et al. (1994)



Model 138S in flight with antennas mounted on the gondola for a research project. Source: D.E. Weissman (2002)

3. Crash landing on a building

In an intriguing post entitled “Airship Landings on Buildings,” Bill Welker provided the following description of the 1993 crash landing of the US-LTA Model 138S “Bigfoot” advertising blimp on an apartment building in New Your City:

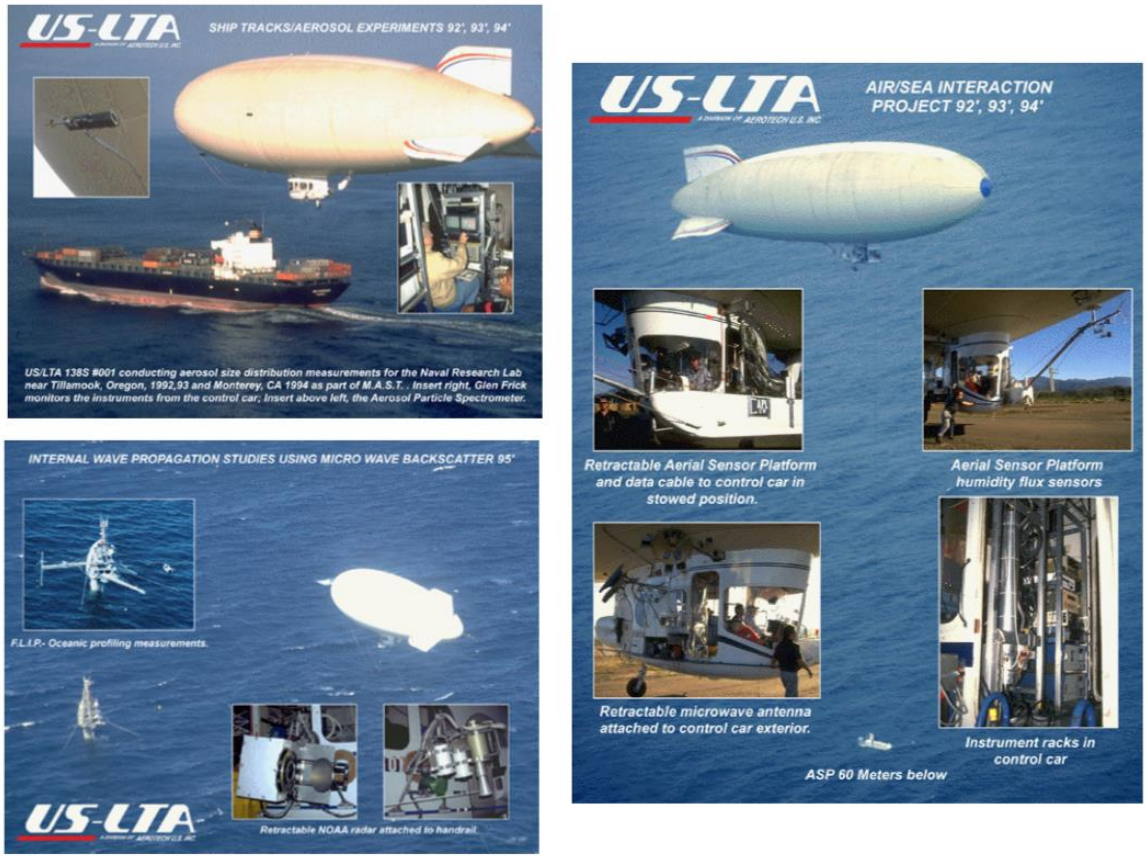
> “On July 4, 1993, the Pizza Hut "Bigfoot" advertising blimp ran into trouble in New York City and crashed onto the roof of a Manhattan apartment building. The Bigfoot Blimp was a US LTA 138S non-rigid painted with the Bigfoot pizza logo and carried a large fiber-optic digital display on the side of the envelope. Apparently, some rigging near the tail broke loose, perhaps a cable, and slashed the side of the envelope, releasing helium. As the envelope lost volume, control of the blimp was lost and the crew attempted to throw out anything they could to lighten the load and slow the uncontrolled descent. The location of the crash was the Midwest Court Apartments, 410 W. 53rd, Manhattan.”

The NY Times reported that the pilot and co-pilot were rescued from the smashed gondola and hospitalized with minor injuries. There were no injuries to people on the ground, although there was a reports of a car being damaged by a dropped sand bag. The blimp’s fuel tank, containing about 100 gallons of gasoline, did not rupture.

The Bigfoot Blimp - collapsed on a New York apartment building. Source: Associated Press by Justin Sutcliffe (1993)

4. Oceanographic research applications

The Model 138S airship was employed by scientists from the Applied Physics Laboratory at the University of Washington and from the Naval Research Laboratory (NRL) in Washington, D.C. to investigate various atmospheric and oceanographic phenomena.



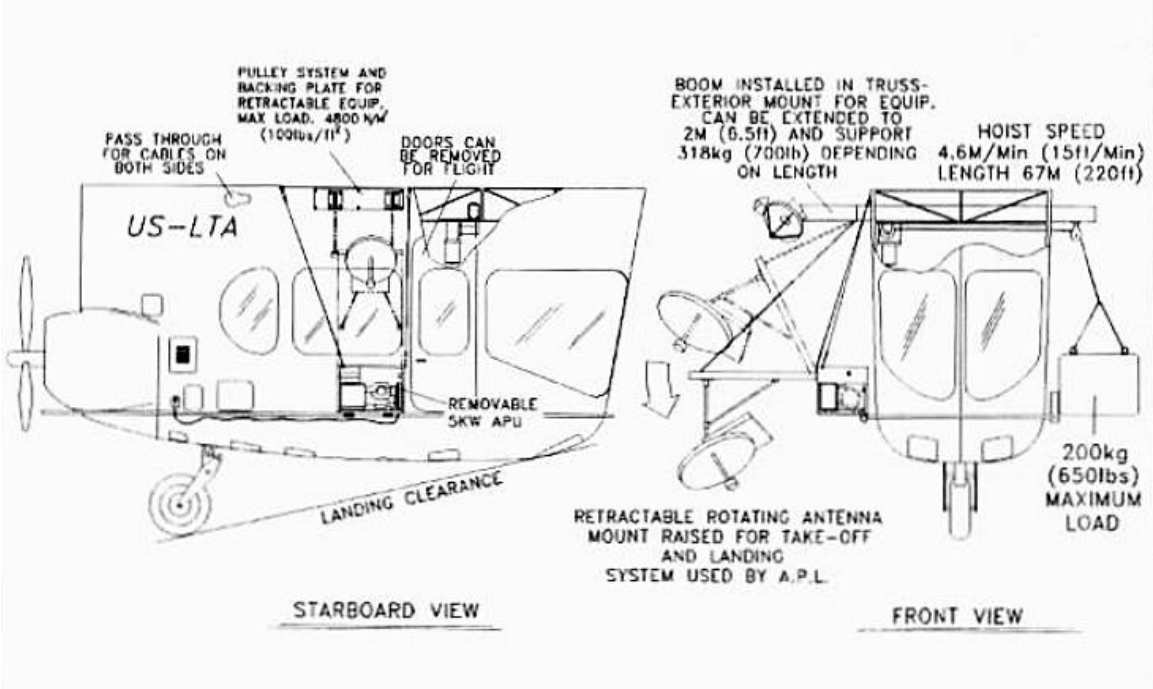
US-LTA posters summarizing some of the research projects the employed the Model 138S. Source: US-LTA via Eric Faure (2004)

Eric Faure provides a summary of this research in his paper, “The scientific use of airships: history, results and perspectives” (“*L’utilisation scientifique des dirigeables - historique, bilan et perspectives*"). Faure reported :

> “This machine, the envelope of which is 3,900 m^3, turned out to be an excellent aerial platform, very stable, being able to do almost hovering, whose great autonomy made it possible to collect a large number of measurements on vertical and horizontal transects (from an altitude of 30 m to 3,000 m). The payload of

around 1,500 kg can accommodate a large amount of scientific equipment as well as two to four researchers. Here is a list of missions, provided by the American manufacturer US-LTA Corporation, that these airships can fulfill:”

- Airborne gravity measurements
- Mesoscale oceanographic phenomena
- Langrangian trajectory measurement (applied to estimate residual currents considering several tidal constituents)
- Propagation studies in acoustics
- Calibration of ground based remote sensors and orbital sensors
- Atmospheric wind shear measurements
- Boundary layer inversion studies of turbulence, profiles and cloud/radiation properties
- Atmospheric internal boundary layer at coastal zones
- Whitecap coverage vs. wind shear stress
- Turbulent humidity exchange measurements
- Vertical gas chemistry measurements
- Iceberg tracking

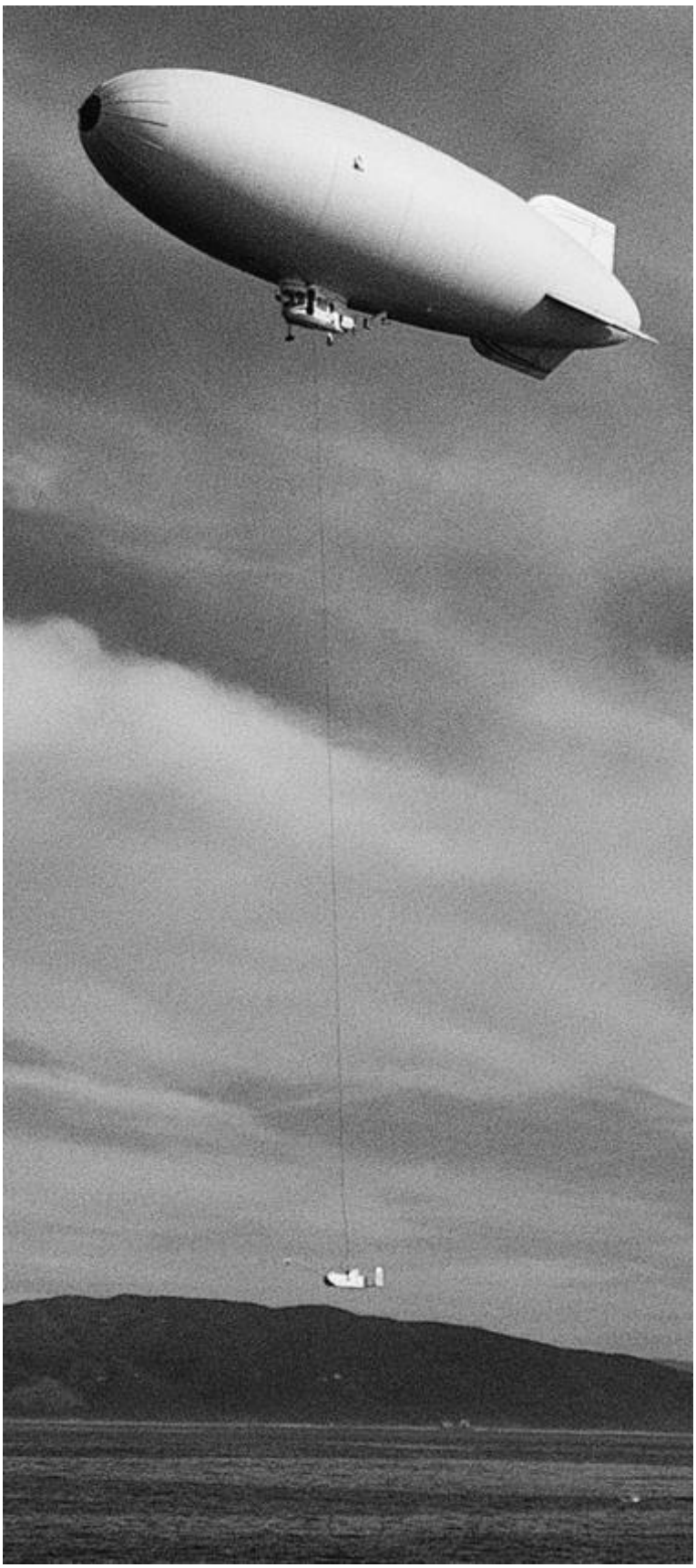


Model 138S gondola equipped with starboard-side external sensors and port side electric hoist and deployable payload platform. Source: US-LTA, Hamley (1994)

An external 120 VAC generator and an electric hoist system were developed for use by researchers. A boom attached on the port side of the gondola was used to rigidly attach equipment or, with the hoist, to deploy and retrieve payload packages weighing up to 650 Ibs (300 kg). The deployed payload packages were suspended 200 ft (61 m) beneath the airship, where they are not influenced by the slow-moving airship.

Gondola closeup showing the configuration for an NRL project, with antennas mounted starboard side and a deployable meteorological platform stowed on the port side. Source: Eric Faure (2004)

Gondola closeup showing some of the antennas mounted for a research project. Source: D.E. Weissman (2002)



The US-LTA Model 138S airship with the Naval Research Laboratory meteorological platform suspended 200 ft (61 m) below it to measure microwave backscatter from surface waves. Source: W.J. Plant (1998)

Above: Deployed meteorological platform viewed from the 138S airship. Source: Screenshots from US-LTA video (1992)

See the US-LTA video of June 1992 research flights with the deployed meteorological platform, “US-LTA Airship w Navy Sensor Platform,” (4:50 minutes) at the following link: https://www.youtube.com/watch?v=uhh2ILWBN48

Source: US-LTA via AirshipWorld Blog (13 May 2009)

5. For more information

Type certificate

- FAA Type Certificate Data Sheet No. AS2NM,” Federal Aviation Administration, 24 July 1990, SCRIBD: https://www.scribd.com/document/15373918/As2nm-US-LTA138S-Type-Certificate
- “Airship Type Certificate and more for Sale,” AirshipWorld Blog, 13 May 2009: http://airshipworld.blogspot.com/2009/05/airship-type-certificate-and-more-for.html
- “FAA Type Certificate Data Sheet No. AS2NM,” Revision 4, Federal Aviation Administration, 12 June 2018: https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/MainFrame?OpenFrameSet

Crash

- Bill Welker, “Airship Landings on Buildings,” Then & Now: https://welweb.org/ThenandNow/BuildingLandings.html
- Robert McFadden, “Blimp Crash-Lands on Roof of a Building in Manhattan,” NY Times via The Lighter-Than-Air-Society, 5 July 1993: http://www.blimpinfo.com/wp-content/uploads/2012/01/Blimp-Crash-Lands-on-Roof-of-a-Building-in-Manhattan.pdf
- John Goldman, “Blimp Crashes in N.Y. on Midtown Building : Aviation: Crew of 2 is rescued from smashed gondola and treated for minor injuries. Some residents shaken,” LA Times, 5 July 1993: https://www.latimes.com/archives/la-xpm-1993-07-05-mn-10254-story.html
- Video, “1993 Big Foot Pizza blimp crash in Manhattan,” (3:24 minutes), STATter911, 4 July 2009: https://www.youtube.com/watch?v=qvR72iPEkls

Scientific applications

- Micah Hamley, "US LTA 138S Airship as an Airborne Research Platform,” US-LTA, Presented at the First International Airborne Remote Sensing Conference and Exhibition, Strassbourg, France, 11-15 September, 1994: https://studylib.net/doc/7547507/us-lta-138s-airship-as-an-airborne
- Eric Faure, “L’utilisation scientifique des dirigeables : historique, bilan et perspectives - Exemples d’applications lors de missions naturalistes: inventaire de la biodiversité dans la canopée de forêts tropicales et études océanographiques,” (in French), Laboratoire Systématique Evolutive, 2004: http://www.dirigibili-archimede.it/docs/Faure[1].pdf
- W.A. Hoppel, et al, “Marine boundary layer measurements of new particle formation and the effects nonprecipitating clouds have on aerosol size distribution,” Journal of Geophysical Research Atmospheres, 991(7):14443-14460, DOI: 10.1029/94JD00797, July 1994: https://www.researchgate.net/publication/252129970_Marine_boundary_layer_measurements_of_new_particle_formation_and

_the_effects_nonprecipitating_clouds_have_on_aerosol_size_distribution

- W.J. Plant, “Measurements of the Marine Boundary Layer from an Airship,” Journal of Atmospheric and Oceanic Technology, Volume 15, Issue 6, pp. 1433 – 1458, 1 December 1998: https://journals.ametsoc.org/view/journals/atot/15/6/1520-0426_1998_015_1433_motmbl_2_0_co_2.xml
- D.E. Weissman, et al., “Comparison of Scatterometer and Radiometer Wind Vector Measurements,” Journal of Atmospheric and Oceanic Technology, Volume 19, Issue 1, pp. 100 – 113, 1 January 2002: https://journals.ametsoc.org/view/journals/atot/19/1/1520-0426_2002_019_0100_cosarw_2_0_co_2.xml