

Airborne Industries – tethered aerostats & parachute training balloons

Peter Lobner, 19 June 2023

1. Introduction

Airborne Industries is a privately-owned UK firm that originally manufactured and produced barrage balloons during WW II under the



name of Leabridge Engineering. In the 1960s, the firm reorganized as Airborne Industries and, since the 1990s, has been based in Southend-On-Sea, Essex, UK. The firm's website is here: <https://www.airborne-industries.ltd.uk>

Today, Airborne Industries is a subsidiary of Icarus Training Systems Limited, a specialist in the design and manufacture of technical inflatable products for training aviation and military personnel. Airborne Industries offers modern, custom-designed, tethered helium aerostats (helium kite balloons) in three general size ranges:

- **Tactical Aerostats:** Rapid response units measuring between 9 to 15 meters (29.5 to 49.2 ft) in length.
- **Operational Aerostats:** Larger mobile units measuring between 19 to 22 meters (62.3 to 72.2 ft) in length.
- **Strategic Aerostats:** The largest range measuring from 23 meters (75.5 ft) in length and up.

Since the 1970s, Airborne Industries has manufactured Paratroop Training Balloons, which are 28 to 30 meter (91.9 to 98.4 ft) long tethered helium kite balloons that look much like traditional barrage balloons, but are used for introducing paratroop trainees to the basics of static line jumping, before they make their first jump from an airplane.

Airborne Industries also supported development of the Luffships SkyLifter lenticular airship prototype and manufactured the gas envelope for the prototype. The team also aided in early flight tests of a tethered SkyLifter.

2. Tactical Aerostats

Airborne Industries' tactical range of custom tethered aerostats are 9 to 15 meters (21.5 to 49.2 ft) in length, with gas envelope volumes ranging from 100 to 210 m³ (3,531 to 7,416 ft³). These aerostats are designed to carry payloads of up to 50 kg (110 lb), to altitudes up to 305 meters (1,000 ft) above mean sea level (AMSL), on missions lasting 7 days.

The tether attaches to a bridle suspended beneath the gas envelope. Loads from the tether are distributed into the gas envelope via a system of external suspension cables attached between the bridle and reinforced points along the lower flanks of both sides of the gas envelope. The tether also provides electric power and a fiber optic data link for aerostat and mission systems.

A typical tactical aerostat payload is a lightweight electro-optical / infrared (EO/IR) day/night camera with object tracking and geolocation capabilities. This range of tethered aerostats commonly is used for border, large event and site security monitoring. Tactical aerostats can be quickly and easily transported to a chosen location and set up by a ground crew of four in 1 to 2 hours.



An Airborne Industries 15-meter (210 m³) tactical aerostat on its mobile ground handling system. Source: Airborne Industries



*An Airborne Industries 15-meter (210 m³) tactical aerostat in flight.
Source: Airborne Industries*

3. Operational Aerostats

Airborne Industries' operational range of custom-built tethered aerostats measure between 19 to 22 m (62.3 to 72.2 ft) in length, with gas envelope volumes between 400 to 650 m³ (14,126 to 22,955 ft³). These aerostats are designed to carry payloads of more than 100 kg (220 lb), to altitudes of more than 305 meters (1,000 ft) above mean sea level (AMSL), on missions lasting 7 days.

This range of aerostats has a significantly greater payload capacity than tactical aerostats and can be designed to operate at higher altitudes. The payload can be attached to the gas envelope or suspended beneath the envelope.

Operational aerostats can be transported to a chosen location and set up by a ground crew of four in 3 to 4 hours.



An Airborne Industries 19-meter (400 m³) operational aerostat in flight with a suspended payload. Source: Airborne Industries

4. Strategic aerostats

These are Airborne Industries' largest custom tethered aerostat systems, which measures upwards from 23 meters (75.5 ft) in length and envelope volume from 850 m³ (30,017 ft³).

A current product in the strategic aerostat range is Airborne Industries' 850 Persistent Ground Surveillance System, which can carry multiple payloads totaling 300 kg (661 lb) and operate at altitudes up to 610 meters (2,000 ft) above mean sea level (AMSL) on missions lasting up to 7 days. Like other Airborne Industries aerostats, the power / fiber optic tether attaches to a bridle suspended below the aerostat. Loads from the tether are transferred via the bridle into the gas envelope via external suspension cables attached to reinforced points along the lower flanks of both sides of the gas envelope.



An Airborne Industries 850 strategic aerostat on its mobile Ground Handling System. Multiple payload modules are attached along the bottom centerline of the gas envelope. Source: Airborne Industries

Airborne Industries' strategic aerostat systems are intended for monitoring a wide area around its base of operation. This range of aerostats can operate on long duration missions, carrying multiple payloads mounted along the bottom centerline of the gas envelope.



*An Airborne Industries 850 strategic aerostat on its Ground Handling System.
Source: Airborne Industries*

Payloads can be tailored for the specific mission, and may include radar, an EO/IR turret, and a broad range of listening, locating and jamming devices.



*An Airborne Industries 850 strategic aerostat equipped with multiple payload modules installed along the reinforced bottom centerline of the gas envelope.
Source: Screenshot from Airborne Industries video*

Payloads that have been tested on the 850 Persistent Ground Surveillance System include the Blighter B400 radar systems with two antennas on a 360° rotating platform, a Wescam MX-15 EO/IR camera turret, and a CRFS RFEye electronic surveillance system with listening, locating and jamming devices.



(Left) EO/IR turret and rotating radar antennas. (Right) Listening device antenna. Source: Screenshots from Airborne Industries video

The mobile Ground Handling System (GHS) enables this aerostat to set up or taken down in 4 to 5 hours and operated by a ground crew of five persons, including payload specialist and operator.



View of the mobile Ground Handling System from an 850 Persistent Ground Surveillance System. Source: Screenshot from Airborne Industries video.

Airborne Industries reports that they successfully deployed an 850 Persistent Ground Surveillance System during an exercise in

February 2017 conducted by the Prince Sultan Advanced Technology Research Institute (PSATRI) and the scientific arm of the Armed Forces of Saudi Arabia, at the Sultan Air Base in Al-Kharj, Saudi Arabia.

5. Parachute Training Balloons

Aerostat Industries has been manufacturing helium kite balloons for introductory static line parachute training for more than 40 years. These are Aerostat Industries' most successful aerostat products and they are in regular use at the Belgian Parachute Training School in Schaffen as well as in training programs for Thai and Korean special forces.

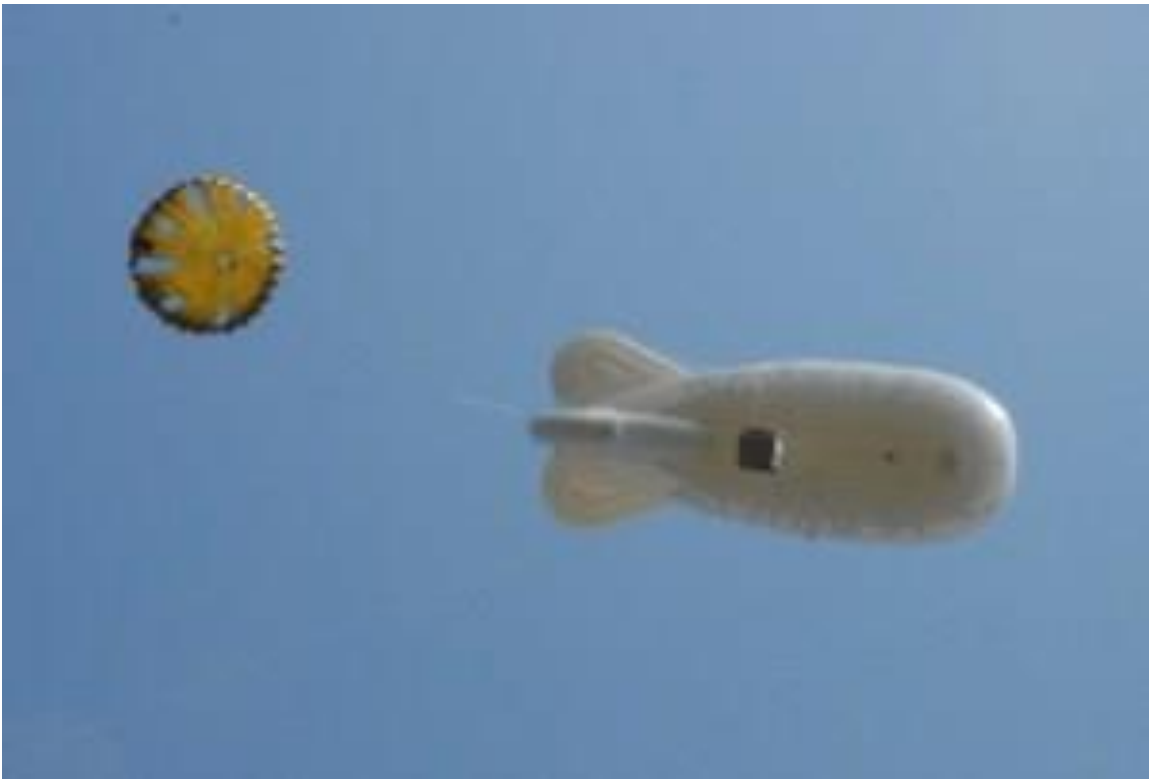
Parachute training balloons are 28 to 30 meter (91.9 to 98.4 ft) long tethered aerostats with envelope volumes ranging from 1,500 to 1,750 m³ (52,972 to 61,801 ft³). The tether is a single cable that attaches to a bridle under the gas envelope and to a winch on a mobile ground handling system.



*Parachute training balloon on the ground, ready for flight.
Source: Airborne Industries*

The balloon gondola (an open basket) is suspended under the gas envelope and typically carries a jumpmaster and three fully-equipped soldiers. Jumps are conducted from an altitude of 305 m (1,000 feet) above ground level (AGL) at wind speeds up to 16 knots. Three jump cycles can be conducted per hour, enabling up to 6,000 jump cycles (18,000 jumps) per year. The tether cable is replaced after 3,000 jump cycles. The operating life of a parachute training balloon is 2 to 3 years.

Operating experience has demonstrated that the parachute training balloons are much more cost-effective than similar introductory parachute training conducted from helicopters (i.e., UH-60 or CH-47) or cargo aircraft (i.e., CN-235M or C-130).



Parachute training balloon viewed from below as one trainee descends under parachute. Source: Airborne Industries

These balloons are fitted with a transponder that automatically activates if the balloon escapes its tether and reaches a height of 2,500 feet (762 m), thus alerting local air traffic control of its presence.

A parachute training balloon can be deployed to a new site and prepared for operation in 3 to 4 hours with a ground crew of six persons. When not in use, an inflated balloon operating at a fixed site can be stored in its own hangar, and then brought out when needed. There is a crosswind limit of 12 knots for moving a balloon into or out of its hangar.



Parachute training balloon hangar at the Belgian Parachute Training School in Schaffen Source: Airborne Industries

6. For more information

- “Airborne Industries Persistent Ground Surveillance Systems,” Airborne Industries press release: <https://www.airborne-industries.ltd.uk/persistent-ground-surveillance-systems/>

Videos

- “Airborne Industries 850 Persistent Ground Surveillance Systems,” (3.20 min), posted by Airborne Industries, 27 July 2017: <https://www.youtube.com/watch?v=j3s60yIVakQ>
- “Airborne Industries discuss Aerostats,” (12.25 min), posted by Border Security Report, 26 March 2021: <https://www.youtube.com/watch?v=FM4o0h8cUv8>

- “Nieuwe ballon in Schaffen (New parachute training balloon at Schaffen),” (0.37 min), posted by Belgian Defence, 8 November 2016: <https://www.youtube.com/watch?v=vinGQmF034>

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