LS-LT15 V1

An Explanation

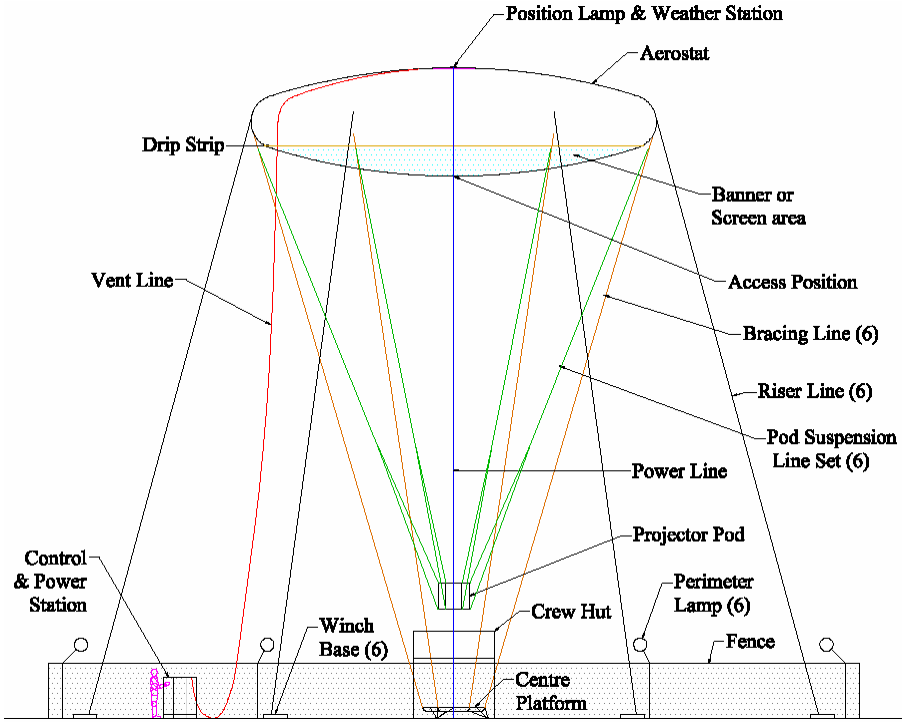
The LS-LT15 V1 is a low captured (tethered) lenticular aerostat with multiple lines for mooring and restraint, allowing ascension under control from the ground to a maximum height of say 20 m for light-show display and projection purposes as a braced static overhead aerial screen. It provides an attraction at events, seen from afar and viewed from the ground, which may be recovered to ground level for safe keeping. As a non-rigid fabric structure, it will be partially air inflated and pressure stabilised to maintain form, but with enough helium for displacement purposes; thus gaining atmospheric buoyancy to counter weight and tension restraint lines – preventing slackening against adverse wind loads.

Projection onto the aerostat's lower surface (a large flat disk area) is undertaken with systems either on a central ground platform or suspended in a pod below (as desired) the latter needing additional helium for increased displacement and thus more buoyancy to carry the extra weight. Naturally, the aerostat also may carry area lighting and other systems (e.g. cameras or electronic devices) for further purposes.

The concept stems from mooring arrangements of similar lenticular aerostats for omni-directional airships (see website below), which use the same ground arrangements – enabling basic concepts to be proven and to use for crew training before attempting free flight. The LS-LT15 V1 thus was arranged as a useful product for just ground use (minimising cost).

It also may be used as a big parasol or rain shelter (i.e. a large floating roof) with say a stage below and can be fitted with a skirt to the ground for further storm protection or to convert it into a covered shelter (like a hangar or marquee) for other purposes.

The LS-LT15 V1 design (illustrated below) has a Ø15 m aerostat to minimise cost, improve utility and maximise effectiveness compared with an earlier prototype arrangement (Vikki) with an 18 m diameter aerostat tested 2010. The smaller design thus incorporates lessons learned to improve overall performance.

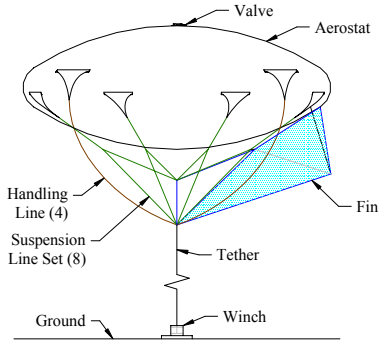


LS-LT15 V1 – For Serial Production

LS-LT18
the prototype
called Vikki

Similar Elevators (tethered aerostats, as shown right) also are possible with a single central tether line as a typical way to hoist a variety of systems to high altitudes for long duration surveillance and data capture over fixed locations, providing cost effective persistent aerial coverage of wide areas. This uses the same ground arrangements, but with an additional central winch.

The V1 version thus is a relatively low height ground-fixed multi-functional arrangement that may be used for various purposes. Naturally,



LS-LT15 V2

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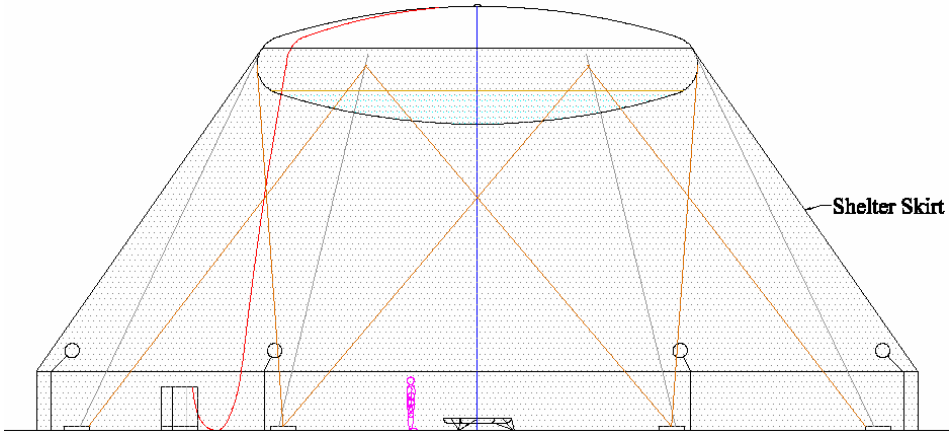
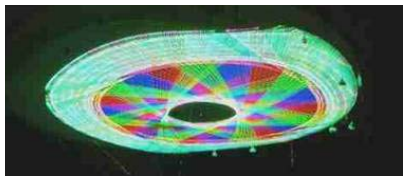
projected light displays will be better in dark surroundings. During the daytime laser displays and lower surface banners for artwork will be possible. However, with a Skirt installed from the aerostat to the fence (as illustrated below) the projection screen then will be shielded from direct sunlight and have additional surfaces for displays to heighten light-show effects.

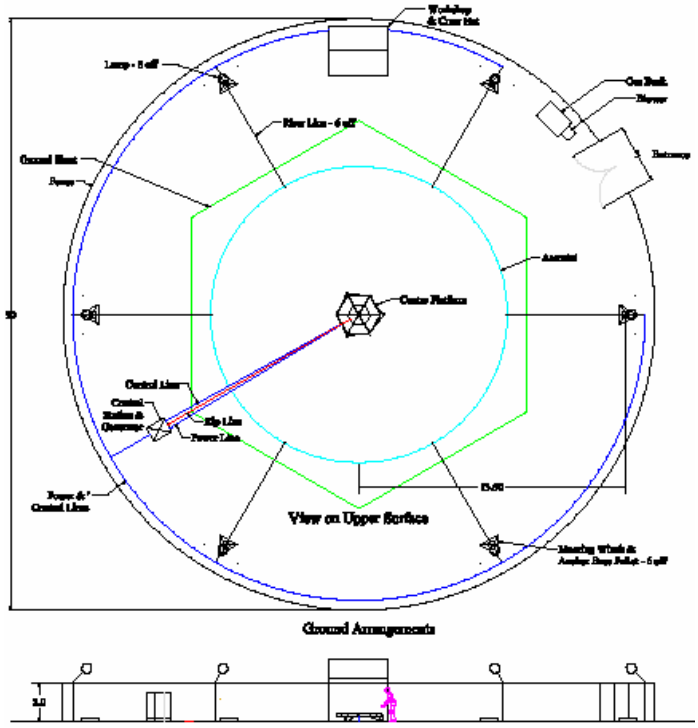




Light-show Projections

Note: An alternative bracing arrangement is adopted here to free the space below, allowing accommodation of large, tall items and their free movement within.

The skirted aerostat thus may be arranged for other purposes as an easily erected/removed large lightweight field deployable shelter to house various things (like a warehouse or hangar) without needing cranes or high-reach facilities; and delivered/taken away in a van – also possible in a transport aircraft. The skirt thus will be like a hanging curtain of similar material providing shelter.

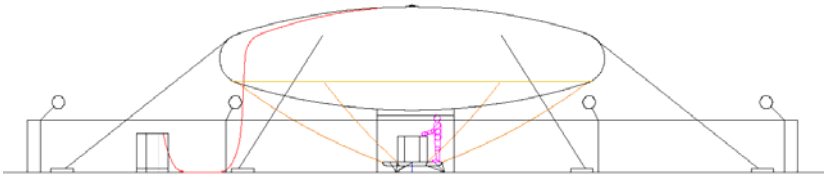


Erection begins and continues at ground level with a small crew (2 people), first installing the winch bases, security fence, control station and electrical system, as illustrated left. After laying a central ground sheet, the aerostat (in its valise) then may be put at the centre, unpacked and laid out, orientated to suit gas fill and restraint lines.

The aerostat then is attached to the winch riser lines, providing uniform adjustable restraint from the outset. After installing aerostat parts (valves, apex systems, etc) inflation follows – undertaken in the open air without further protection. Naturally, this would only be in fair weather (normal) although maybe windy, where the fence reduces wind effects at ground level.

When enough gas (helium) has been introduced the aerostat will float off the ground sheet, which then may be removed and stowed for later use. Gassing continues until the quantity needed to adequately tension the restraint lines has been introduced. Air then is put in to complete the fill process and pressurise the aerostat – making it stiff enough to hold form under load. It's been done before with Vikki in several places over extended periods in various conditions, so is known to work!

The erection process then may be completed, as illustrated below, with the aerostat let up and held at a convenient low height by the winch riser system, installing central parts (the platform and projector pod, etc) and connecting the necessary lines (bracing, pod suspension, vent and electrical power/control). After testing functionality, it then may be launched aloft (given suitable weather to safely do so) when the bracing is fixed to hold position in a similar way to Vikki (pictured below).



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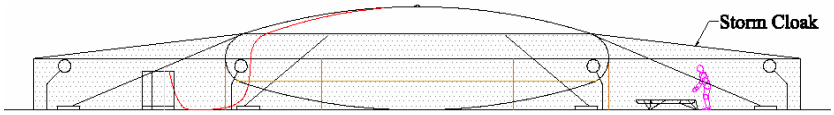
The LS-LT18 (Vikki) Prototype Securely Held Aloft In Private Operation 2010.
NB: It's still operable as a training aid or indoor display, but not intended for outdoor public events.



If a storm is forecast, then the central platform & pod will be moved aside, the ground sheet re-installed and the aerostat winched down to the ground to minimise exposure, as illustrated above. Storm protection then is completed by reducing the height of perimeter lights and other tall installations, followed by installation of a storm cloak (a fabric disk) over the aerostat to prevent wind from flowing beneath it. Like the Shelter Skirt, this is attached to the top of the fence.

The fence, as well as being needed for security of the arrangements, thus is an essential part of the storm protection system – designed to prevent wind passage across the site (so not open, although it may be optically transparent) and to sustain the impact of wind-blown debris, stopping it from hitting the aerostat.

The arrangements are based on known lighter-than-air (LTA) non-rigid principles using soft pressure-stabilised or tensioned structures with ordinary fabric technology methods that work without much risk of harm and are relatively easy/cheap to produce. The lenticular (discus) aerostat form, like a flying saucer, is an interesting shape (fascinating for people) that helps to minimise aerodynamic drag in a regular way, which is omni-directional; so can be held in a fixed position without weather-vane action. As a gas container, the aerostat also has better volumetric efficiency than traditional unidirectional aerostats and, due to vertical axis symmetry, can be made with far fewer different (so standardised) panels – reducing the number of templates (thus also cost and time) needed for design and manufacture.

Thin film photovoltaic solar panels also may be integrated or installed on the aerostat's upper surface (ideal for this) to provide power aloft without an electrical umbilical line from the ground. Naturally, solar panels also may be integrated on the shelter skirt and fence areas facing the sun.

The LS-LT15 V1 arrangements also may be used with drones and model airships to enhance utility and provide further compatible displays in integrated ways with the projected effects, which naturally also includes sound. Indeed, the aerostat is ideal for pop concerts. Drones (perhaps launched from stations atop) and other R/C models with video facilities thus may interact with the projection and sound systems to enable real-time displays of scenes around the event location. Arrangements to charge drone and other R/C models' batteries also would be provided. No doubt, event security would be enhanced by these arrangements enabling the public to enjoy the show without fear from those who would harm them.

It will be seen in the photographs that the prototype was installed and operated successfully within a private Victorian walled garden. Indeed, as a large parasol or shelter facility, the new series version may be installed in other gardens or places with enough flat level space for it (not excessive). Operators thus may setup to offer services with it for both private and public purposes in similar ways to aircraft.

The LS-LT15 V1 therefore is viewed as a marketable facility that, together with a range of extras and special systems, may be packaged and used for various purposes, but that will need trained crew and procedures for safe operation plus finance to bring it all about. People interested to support further development and enable the business may contact us via the details below for further information. Development will be as a collaborative venture with previous players (as for Vikki) and new partners interested to make it successful.

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