ZEPPELIN NT - RESEARCH ON TWO CONTINENTS

M1400 AIRSHIP IN JEOPARDY

www.airship-association.org
EDITORIAL

This issue of AIRSHIP was ready to release for proof-reading when news arrived that the US Air Force had terminated the M1400 airship programme and the airship was ordered to be deflated and stored. Strenuous efforts by the airship’s developer, MAV6, are underway to secure the programme, very probably with a new sponsor.

As we close for press, the airship is reportedly within a couple of months of flying and to cancel it so close to this milestone makes little sense. After so much investment and effort, would not completing, testing and evaluating the airship be the prudent things to do? Let us hope that a new backer can be found for the programme and the M1400 gets to fly and prove what a large airship can do.

I have decided to retain the feature on the later stages of construction of the airship as a record of the largest airship in 55 years, and hope that she will indeed fly. I believe readers will find it of interest.

On a far brighter note, the US Army funded LEMV may well have flown before you receive this issue. Latest reports put the date of the first flight during the second week of June.

We wish the Hybrid Air Vehicles / Northrup Grumman team the very best of luck with this important hybrid airship!

On page 19 we look at the HINDENBURG disaster 75 years on and its effect on the airship industry. It has been mainly authored by one of the leading experts on the disaster, Patrick Russell, with limited input from me. It is the first of an occasional series of articles on historical subjects that directly relate to today’s airship industry.

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AIRSHIP is the quarterly journal of The Airship Association and is sent free to members. Those resident outside the UK receive Airship by air mail.

- Membership of the Airship Association costs £25 annually and is open to anyone interested in airship technology. Reduce membership fees of £15 are available to UK resident students and those over sixty-five years of age.

- Corporate Membership for companies in the airship industry is also available - details from the Hon Secretary.

President The Airship Association: Dr. Bernd Sträter Dipl-Ing
Chairman Peter Ward

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AIRSHIP VENTURES EXPANDS SPECIAL MISSION CAPABILITIES WITH INFRARED AND RADAR

Airship Ventures continues to expand the capabilities of its Zeppelin NT 07 EUREKA.

The company has received FAA certification to carry FLIR Systems infrared Star SAFIRE® 230-HD sensor on the airship following flight tests conducted off the Pacific coast on 23 and 25 January 2012. The flights produced data that indicated immediate benefits to marine based science and maritime surveillance. As an example, the infrared sensors demonstrated the ability for marine researchers, who have frequently used airships to study mammals at the surface, to be able to observe them at various layers just below the surface.

Using medium wave infrared (MWIR), the sensor also provided extended performance range to detect, position and track small boats from a distance. The 9” multi-purpose sensor is optimized for maritime environments and provides maximum sensor range performance in low-light environments.

In addition, Airship Ventures also received FAA approval on 14 March to carry Raymarine Radar on the Zeppelin after completing operational testing on 2 March. Radar adds the ability for the Zeppelin and its special missions partners to collect real-time range, speed and directional information on objects from a distance of up to 48 miles in all directions, covering over 7,000 square miles at a time.

The new radar will also add to the airship’s navigational capabilities with the ability to detect...
PROJECT PEGASOS TESTING - NOVEMBER 2011

TOP: A technician carefully makes his way towards the top instrument platform on 23 November.

ABOVE: A fog warning from the tower at Friedrichshafen Airport on 18 November required the airship to return from a test flight, it entered the hangar at 5 pm.
and map coastlines during periods of heavy fog or at night.

The airborne radar promises immediate benefits for marine-based science, technology and defence organizations. Combining the infrared and radar capabilities opens up missions such as search and rescue, port security, and maritime patrol. The airship’s ability to be persistent and stay in an area for up to ten hours per patrol, a period of time well beyond that of helicopters or fixed wing aircraft, coupled with its stable, smooth flight characteristics, make it an unmatched sensor platform.

In other upcoming roles, plans are being developed to use EUREKA as part of experiments as varied as locating planets orbiting distant stars, and to carry air-quality sensors over Los Angeles and San Francisco. We hope to have details of both these missions in future issues.

HYBRID AIR VEHICLES / NORTHROP GRUMMAN BRIEF ROYAL NAVY

The team developing the LEMV for the US Army have briefed the UK Royal Navy on possible uses of the hybrid airship for surveillance and re-supply runs to aircraft carriers.

The vehicle, or a version thereof, could operate above surface fleets with surveillance equipment to spot threats and spy on enemy movements. A 50 ton payload version of the hybrid airship could be used to carry urgent equipment parts such as engines for Joint Strike Fighters out to ships. The anti-piracy role is also being considered – with the LEMV being able to lower up to 150 commandos along with their fast inflatable boats.

Travelling at over 80 knots, the airship is almost three times faster than surface ships and the Navy’s version could travel for several days without refueling its four gas turbine engines.

A Navy source was quoted in the media as saying “This could be the ideal solution for logistical support for aircraft carriers and ISR (intelligence, surveillance, reconnaissance) for the fleet” and “carrying 50 tons of stores and supplies is more than double the capacity of a Hercules.” The airships are reported to cost £60 million each.

However, the optimistic reports must be tempered by the response of a MoD spokesperson who said: “The MoD recently received briefings on the possible use of airships and specifically Hybrid Air Vehicles for the movement of equipment and stores, but there are currently no plans to buy such equipment.”

WORLDWIDE AEROS CORPORATION CELEBRATE 25 YEARS IN BUSINESS, MOVES INTO NEW FACILITY

Worldwide Aeros has been in business since 1987 when founder Igor Pasternak started producing small advertising aerostats in the Ukraine. Pasternak moved his company and his family to the United States in 1993. During the following years, the company has developed a number of airships with sales around the world. The company claims that it’s SKY DRAGON 40D is the most advanced non-rigid airship in the world.

In addition to the 40D airship the company also builds aerostats of various sizes and undertakes custom design and manufacturing jobs. Unlike most other airship manufactures WW Aeros builds almost the entire airship in-house, including envelopes.

The company is currently focusing its efforts on the AEROSCRAFT, an advanced airship with a hard
outer shell. See the March 2012 issue for more details on this vehicle.

In March the company opened a new 45,000-square-foot engineering facility called the ‘Centre of Innovation’ in Montebello, California to continue design work on the airship.

Representatives Grace F. Napolitano (Democrat - Norwalk), who helped secure $15.5 million in federal funding for the AEROSCRAFT, was in attendance and toured the building.

Aeros currently has 90 employees and said it is looking to hire more engineers and technicians now that the new facility has been opened.

UK GOODYEAR A60+ BEGINS 2012 OPERATIONS

The UK based Goodyear A60+ made its first flight of 2012 on Tuesday 13th March from Cardington where it had overwintered.

The shed exit and first flight generated a considerable amount of interest among local ‘blimp spotters’ who reported the progress of the flight on a number of internet outlets.

Test flights were completed the following day, and the airship left Cardington on Friday 16th overflying the Birmingham and Wolverhampton areas including a fly-by of the Goodyear Headquarters before mooring at Halfpenny Green airfield prior to covering events over the weekend.

The airship has a busy schedule ahead and will be promoting Goodyear’s Road Safety campaign.

A highlight of this year’s operations will be providing aerial television coverage of the Olympic Games in London.

US NAVY MZ-3A AIRSHIP OPERATIONAL AGAIN

Following a last minute reprieve from deflation and storage in February, the MZ-3A made it first flight on the afternoon of 22 March following maintenance and overhaul. The 3.6 hour flight saw the airship undertake testing and training over the New Jersey shore.

The airship has been given a one year lease of life for the U.S. Army in a role that is thought to support training of personnel and testing of equipment and systems, presumably for the LEMV programme. It is hoped that the airship will find further work in support of the upcoming large military airships once its current contract is over.

LOCKHEED MARTIN HYBRID AIRSHIP PROGRAMME

Very little news regarding the Lockheed Martin hybrid airship programme has been released since the announcement in March 2011 that the company had teamed with Aviation Capitol Enterprises of Calgary, Alberta, Canada to develop the cargo version of the airship. However, an outline of the programme can be put together using information from several sources. The development programme calls for three vehicles to be developed:

SkyTug will have a 20 ton payload and a range of up to 1,000 nautical miles at a cruising speed of sixty knots. It will be used to support remote drilling and mining sites, where there is no aviation infrastructure, on flights lasting four to eight hours.

The vehicle is 290 feet long and is expected to fly early in 2013. Two airships are included in the initial contract. It is expected to have an operating cost approximately one-tenth the cost of comparable helicopters.

SkyFreighter will have a 70 ton payload with first flight expected in 2014. Little else is known about this vehicle.

SkyLiner will have a payload of 500 tons and is intended for use on international and transoceanic routes. This vehicle will be ideal to transport cargo such as electronics, vegetables and larger items such as cars. A fleet of several hundred vehicles is
ABOVE: The P-791 air inflated in its hangar at Palmdale, California following its successful test flight programme.

BELOW: A illustration of the SkyTug, the first of the production hybrids will have a 20 ton payload. Note the number of Air Cushion Landing System (ACLS) pads has been reduced from four to three to help improve stability on the ground.
Both the *SkyTug* and the *SkyFreighter* will be powered by diesel engines that vector up and down. Flight experience with the P-791 prototype proved that the side to side swiveling was not required and that rudders provided sufficient steering.

A few additional details about the P-791 prototype have also come to light.

The vehicle first flew on 31 January 2006 at Palmdale, California. It made a total of six flights of about thirty minutes each, staying in the traffic pattern and below 2,000 feet. The flights proceeded as expected and included engine out tests during which the airship flew well. One of the landing pads was torn during a take-off but the airship was able to land without incident.

Company test pilot Eric Hansen made the first two flights and was followed by Bill Francis. The pilots sat side by side in an enclosed gondola with flight engineer Tim Blunck. The vehicle has a top speed of about thirty knots.

The vehicle is equipped with a closed-loop digital flight control system that uses an ultrasonic anemometer pressure sensor to gather data. This system allows the pilot to put a line on a moving map display showing the desired course and the system controls and directs the craft accordingly.

All three of the new airships will have rectangular cargo holds attached underneath the envelope. The flight deck is located at the front of the hold. Each cargo hold will have a roll-on / roll-off capability and will accommodate containers or pallets. The *SkyLiner* cargo box is 300 feet long, fifty feet wide, and thirty feet tall with an upper and lower deck.

### Trinidad Blimp Shipped to USA

The SK600 formerly operated on security duties in Trinidad was deflated, crated and flown back to the United States during the last week of March.

The airship was purchased for US$50,000 by SkyShip Services Inc. The company has taken ownership of the assets of Airship Management Service which includes the type certificates for the entire range of SkyShips.

Five employees from SkyShip Services Inc. deflated the airship and crated it and its ground equipment for shipment to the US. The company has not yet announced its plans for the remaining SkyShips but are understood to be refurbishing the remaining major components in a rented facility at Weeksville, North Carolina.

### Zeppelin NT Used to Hunt Californian Meteorite

Airship Ventures Zeppelin NT *EUREKA* was used by NASA and SETI (Search for Extraterrestrial Intelligence) in the hunt for fragments of the Sutter’s Mill Meteorite in northern California. The large meteorite, which was about the size of a mini-van, fell to earth on the morning of 22 April and was clearly seen in the daylight sky from Las Vegas, NV to Sacramento, CA. The Zeppelin’s participation in the search for fragments of the meteorite was organized and put into action in just two days.

Alex Hall, one of the founders of Airship Ventures, had spoken with NASA scientist Greg Schmidt about the Zeppelin NT and its capabilities while attending a lunar science conference in Berlin in late April. Schmidt emailed Airship Ventures asking if the Zeppelin was available to participate in the search shortly after the meteorite fell and the ship was ready for service, equipped with the newly certified Cineflex HD camera at McClellan Airport, Sacramento on the evening of Tuesday 2 May. The airship flew for five hours on the following day with a crew consisting of three observers with binoculars, two camera operators who filmed and recorded all areas of interest, and one navigator who plotted the exact location of any potential impact sites.

In a phone interview with AIRSHIP, scientist Peter Jenniskens, who was aboard the Zeppelin, reports that they were searching for larger pieces of the meteorite which would be further along the ‘strewn field’ from the location where most ground
searchers are looking for smaller pieces. (The strewn field is the area in which fragments from a meteorite impact the ground when it breaks up in the air.) Calculations have given an area 30km long by 5km wide as the most likely for finding large fragments of the meteor. The Zeppelin flew along the centre of the search path and the three observers visually scanned the area to each side looking for likely impact craters. When an area of interest was spotted, the Zeppelin would fly overhead and close-up images were taken with the camera and its exact location recorded. The cloudy condition on the day helped in the search by eliminating shadows which can be mistaken for impact craters from a distance, however, the very hilly terrain did complicate the search.

Three likely impact craters were identified during the flight, but two of these had been eliminated by ground teams at the time of the interview. Jenniskens reported that the Zeppelin made an “ideal” observation platform, with large windows and very steady flight. He would have liked to have used if for a longer period, but the Zeppelin had to return to already scheduled passenger carrying operations.

Editor's Note: The search for the meteorite fragments provides an excellent demonstration of the capabilities of the Zeppelin NT and airships in general for scientific purposes. The Airship Ventures team is to be congratulated for putting the programme together so quickly. The project has resulted in a lot of positive publicity for airships in general in the US media.

NASA scientists Alan Ehrgott, Mike Koop, and Derek Sears ready to board EUREKA at McClellan Airport.
Zeppelin NT 07 SN02, returned from Japan last year, has commenced a 20 week climate research programme as part of a large project called *Pan-European-Gas-AeroSOI-Climate Interaction Study*, or PEGASOS for short. The programme is funded by the European Commission under its 7th Framework Programme for Research. The campaign will measure the influence of atmospheric chemistry on climate change. The findings will provide a scientifically sound basis for climate protection throughout the EU and will produce measures for improving air quality and limiting the impact of pollution on climate change. PEGASOS involves twenty-six partners from a total of fourteen European countries plus Israel.

The programme is headed by the German research and development organisation Jülich.

This will be the third occasion a Zeppelin NT has been used by scientists for this research, and the first time the programme has taken the airship across Europe to conduct the campaign. The two previous campaigns in 2007 and 2008 mainly took place in the vicinity of Lake Constance, where the research instruments now in use were tested and procedures refined.

The scientists will use three different sets of research instrumentation known as CL5, CL8 and CL9, each weighing more than one tonne. The instruments will be changed during the programme depending on the meteorological conditions and the research being done. Research will include close study of hydroxyl radicals known as ‘reactors’ that are found in the lower levels of the atmosphere close to the ground and are referred to as the ‘detergent of the atmosphere’ due to their effect of degrading most pollutants. They will also study the formation and composition of aerosols and their impact on air quality, and the most photochemical active trace substances such as mono-nitrogen oxides and ozone which degrade the hydroxyl radicals.

Researchers have come across discrepancies in the prevailing theory of the processes involving...
these elements and their recycling and it is hoped that the Zeppelin research flights will provide the information required to answer several unknowns. Some of the questions to be answered are; where do aerosols originate, how do they combine to form larger particles, what chemical and physical impacts do they have on the climate and on air quality and what part do they play in recycling the natural detergent?

The unique flight characteristics of the Zeppelin NT will allow the researchers to observe these processes in action in the important ‘planetary boundary’ of the atmosphere at altitudes up to approximately 2000 metres. It is in this highly reactive region that the fate of most pollutants emitted at the earth’s surface is decided. PEGASOS will be the first extended investigation of this region and will provide the in-depth information necessary to understand the atmospheric processes and to verify model concepts.

The instrumentation for the project arrived at Friedrichshafen on 7 November and each received an ‘EASA Form One’ which clears it for flight. Whenever anything on the equipment is changed or replaced, no matter how small, the form needs to be renewed by an inspector. The equipment was installed and tested during local flights over the following weeks. As to be expected with such a large and complex installation a number of issues were encountered with the equipment and the following weeks were spent making adjustments to both the equipment itself and the handling of data recovered.

Further test flights followed between 7 - 11 May and the Zeppelin embarked on the first phase of the programme on Thursday 17 May following two days of weather delays with a two-week journey to Cabauw in the Netherlands, accompanied by an international team of fifteen scientists and technicians. Once this research period is complete the Zeppelin will return to Friedrichshafen.

For the next five-week phase, beginning in June, the airship will travel east around the Alps to Italy where measurements will be taken in the Po Valley and above the Adriatic Sea in cooperation with Italian researchers. On the return flight to Friedrichshafen, the Zeppelin will take the west route around the Alps via France.
Finally, in April 2013, the atmospheric researchers will set out towards Northern Europe on another two-month mission, heading for Hyytiälä in Finland. Both the mission routes and the measuring locations have been coordinated with existing ground measuring stations. In this way, the researchers can directly compare data from the flight with measurements from ground stations.

Editor’s note: It is encouraging that Zeppelins are now conducting diverse research missions in both Europe and North America, demonstrating their unique capabilities in such roles. We hope to cover many of these research activities in future issues.

Both Friedrichshafen based Zeppelins in operation on 8 May, 2012. Serial number 03 (D-LZZF) is seen approaching for a landing following a passenger flight and Serial number 02 is prepared for a test flight carrying instrumentation for the PEGASOS project. SN02 made two short flights on this date.
The 9th International Airship Convention and Exhibition will be held from Wednesday 20th to Saturday 23rd June 2012 at the Ashford International Hotel, Ashford, Kent which is advantageously located in South Eastern England near the Channel ports. Boasting a very modern station on the Eurostar high-speed railway line to Paris, Brussels and London. The hotel is modern, well-appointed and located just 500 meters from junction 9 on the M20 motorway linking London and Dover.

At the heart of the Convention is the 2-day International conference with 36 papers submitted from 13 countries: Argentina, Canada, China, Ecuador, France, Germany, India, Italy, Mexico, Russia, Spain, UK and the USA.

The submissions are drawn widely from industry, academia and government organisations. Applications considered include flood relief, environmental studies, plant studies, agri-business and forestry, surveillance, mass transport and heavy lift. The types of airships are varied with a number of papers on hybrid airships, solar airships, stratospheric airships, unmanned airships, and traditional airships.

Topic areas covered include current projects and technology, innovation, maintenance, research and development, operations, climate, market, finance, future projects and technology, education/training and history (including lessons learned from patents).

This will be a truly comprehensive conference with something for everyone including the ever present paper on helium. There will be a report on the NASA Cargo Airship Workshops, as well as a presentation by Mr Thomas Brandt Chief Executive of Zeppelin Luftschifftechnik. Scientific studies include hybrid optimum lift, thermal modeling, LTA robotics in uncertain winds, winged aerostat, CFD envelope shapes, pre-stressed beams and struts, buoyancy control, simulation, and testing.

The abstracts were reviewed by a panel of seven judges drawn from industry and academia to achieve the appropriate balance of theory and practice.

The conference is preceded by a welcoming reception sponsored by Cambridge University Press and held at the hotel on the evening of Wednesday 20th followed by the 2-day conference on the Thursday and Friday. A banquet will be held on the Thursday evening sponsored by BOC (part of the Linde Group) and The Lightship Group. The final day of the Convention, Saturday 23rd, will feature a model airship regatta with races and performance competitions for remotely piloted airships from all over Europe. A partner programme has also been organised during the 2-day conference including a visit to Canterbury Cathedral.
The HELIOS SkyBoat is a new design for a small hybrid airship from the State University of Aerospace Technologies at the Moscow Aviation Institute. Information released indicates that the aircraft uses aerostatic and aerodynamic lift in approximately equal degrees. The usual advantages of the hybrid airship are claimed, namely:

- The elimination of ground crew
- Very low take-off and landing speeds (in comparison to aeroplanes) and no stall.
- No need for a runway
- Effective empennage and two engines providing excellent controllability at low speeds
- The location of the engines and crew compartment allow the aircraft to operate from land, water and snow without the requirement to change undercarriage
- The empennage and envelope protect the cabin from noise and vibration

The four seat SkyBoat is proposed as a vehicle for, amongst other roles, fans of travelling including family trips and those who wish to feel the pleasure of flight in safe and comfortable conditions.

**TECHNICAL DATA**

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SENTEL IN THE SKY

An autonomous airship offering long duration, high altitude capabilities

By. William D. Perry

Southwest Research Institute, San Antonio, Texas

Modern wartime intelligence, surveillance and reconnaissance (ISR) are increasingly defined by autonomous systems that can deploy in a dangerous locale without placing a human operator at risk. This does not mean there is zero risk; unmanned vehicles and their vital missions still are vulnerable to enemy attack, hazardous weather conditions and mechanical malfunction.

To minimize this vulnerability, designers of autonomous, unmanned aerial systems seek a stealthy design and the least-threatening operating environment consistent with the mission at hand. For example, high-altitude offers protection from attack and allows a wide view and above-the-

weather operations. Designing a system to be unmanned frees the vehicle from the weight, size and ergonomic considerations associated with carrying a human, plus the sleep and food requirements that limit the duration of manned missions.

All of these qualities have been integrated into an experimental, unmanned aerial system whose appearance recalls a technology that has been out of military use for a half-century. However, this new concept, approach and construction are drastically different from the military blimps of old.

HiSentinel is a staged development project to design a family of high-altitude, long-endurance airships for the U.S. Army Space and Missile Defense Command / Army Forces Strategic Command. Southwest Research Institute (SwRI) engineers provide project management, overall vehicle and system design, flight command and control electronics and operations. Aerostar International, a commercial manufacturer of lighter-than-air vehicles, has designed the high-strength

HiSentinel 80 undergoing tests following inflation with helium.
hull material, manufactured the airship hull and provides test operations support. These autonomous airships can be stored in a shipping container instead of a hangar and launched from a parking lot or an open field rather than an airbase runway. They can be programmed and launched in a matter of hours, yet remain aloft continuously for weeks using solar panels to charge batteries that power the instruments and an electric motor-driven propeller. Low-cost and expendable, HiSentinel airships can provide long-duration tactical platforms for military and homeland security applications including surveillance, communications and sensor payloads.

From an operating altitude 13-15 miles above the Earth, the field of view is a circle 600 miles in diameter, roughly the straight-line distance from Brownsville to New Orleans on the Gulf Coast, or from San Diego almost to El Paso on the U.S.-Mexico border. Such coverage by a single vehicle reduces the number of unmanned aerial vehicles needed on-station during operations. When used as a communications relay platform HiSentinel can significantly boost the range of low-powered, handheld communication devices.

Designed for simplicity

HiSentinel's gas envelope is constructed of a thin, lightweight but strong fabric with an integral plastic gas barrier. It can be folded into a small cube-shaped shipping container but inflates to a length of 200 feet and a diameter of 45.5 feet at altitude.

At launch it ascends as a flaccid balloon. The helium inside expands to fill the structure as the airship ascends and the outside atmospheric pressure decreases. When the airship reaches the predetermined flight altitude, the envelope and tailfins pressurize to form a rigid, aerodynamic shape.

HiSentinel 80 is powered by an electric motor that can propel it at the designed cruise speed of 18 knots (21 miles per hour) or allow it to remain over a stationary point by counteracting the winds aloft. Once a mission is completed, the airship can navigate to a new location or be "parked" in a set location at altitude while waiting for its next mission. As each mission is completed, the airship will remain aloft, waiting for the next assignment. When the flight needs to be ended it will be flown to a convenient recovery location where the flight systems and payload will separate from the expendable hull and return to Earth beneath a parachute or guided parabolic.

A three-segment equipment pod suspended beneath the gas envelope includes a forward segment for batteries and a parachute, an aft segment for communications and flight electronics, and an interchangeable payload segment that accommodates up to 80 pounds of cameras, sensors and communications gear. The vehicle's mass, including payload, is 1,116 lbs. The airship's low cost, minimal need for launch and ground support, and long flight duration enable hourly costs estimated at $1,200, including flight and ground operations, compared to $13,000 per hour for a Global Hawk unmanned aerial vehicle and about $33,000 per hour for a high-altitude manned aircraft such as the U-2.

Development and evaluation

HiSentinel 80 is the third airship of the latest generation of autonomous, high-altitude vehicles developed by the SwRI team since 1996. Three first-generation airships called SOUNDER were built and tested followed by two second-generation airships designated HiSentinels 20 and 50. A flight test of HiSentinel 80 was undertaken in late 2010 to achieve design target altitude, speed and duration; and maintain station-keeping capability. Likewise, the instrument payload will demonstrate
military utility in imaging and communications applications. While some balloons previously have ascended higher with payloads (including some humans) suspended beneath in pressurized gondolas, they could not be steered. Only the SwRI engineering team has operated a steerable airship that can fly in the stratosphere.

Observing and evaluating the airships’ pressurized structures is complicated because HiSentinel airships are launched in a semi-flaccid condition and don’t attain final aerodynamic shape and attitude until they are beyond the reach of most aircraft. Fully inflating this very large and lightweight craft for static testing while tethered outdoors can create hazards including potential structural damage from sudden wind gusts or an accidental puncture of the craft’s thin skin.

The SwRI team addressed the static test problem by inflating the HiSentinel 80 within a large, indoor sports arena: the 65,000-seat ALAMODOME in downtown San Antonio. The pre-flight inflation was carried out with the facility configured for football, affording the greatest possible obstacle-free length, width and height. Inflated with an air-helium mix and tethered with its tail fin hovering just above the artificial grass playing surface, HiSentinel 80 stretched from the end zone at one end of the stadium to the opposite 30-yard line, its aerodynamic-shaped envelope easily fitting beneath the steel scaffolding of the stadium roof.

Future application of HiSentinel

Operational applications of HiSentinel 80 include many of the military communications and ISR missions currently being performed by space-based assets, fixed-wing unmanned aerial vehicles and manned aircraft. Unlike HiSentinel, those other systems are comparatively expensive, require meticulous coordination and cannot remain on-station in a given area of interest continuously for weeks at a time for civilian first-responders; HiSentinel can provide information that is more current, accurate and reliable than is typically available via relayed reports from civilians and law enforcement agencies. It also can provide a means of deploying sensors and emergency communications or data-relay equipment to provide information gathering, communications and networking services in a disaster zone, within hours of an event.

Beyond military and homeland security applications, HiSentinel can assist scientists by monitoring levels of high-altitude green house gases and ozone, reporting real-time stratospheric weather, carrying telescopes and sensors aloft and providing wide-area oceanic, coastal and terrestrial monitoring. It could be used to provide continuous observations of sea and glacial ice cover.

In commercial applications, the airship has the potential to provide communications and networking relays, monitor pipelines and power lines, enhance oilfield system telemetry and control and monitor forest, crops and livestock.

Southwest Research Institute have granted permission to reprint this article from their “Technology Today” magazine, providing an insight into this little known high altitude airship programme. Copyright Southwest Research Institute.
It was the end of one of the most uneventful flights that the HINDENBURG had ever made to the United States. Delayed approximately nine hours by headwinds over the North Atlantic, the huge German passenger airship was preparing to approach its mooring mast at the Naval Air Station at Lakehurst, NJ. Aboard were a half-capacity load of 36 passengers and a larger than normal compliment of 61 crew members, a number of whom were aboard either as observers or as trainees.

The expanded crew roster was mainly in anticipation of an expansion of the Zeppelin Company’s (known in German as the Deutsche Zeppelin-Reederei, or DZR) transoceanic passenger airship operations, which was slated to begin later that summer when the LZ-129 HINDENBURG’s new sister ship, the LZ-130 GRAF ZEPPELIN, would be completed and placed into service. However, with the beginning of the 1937 flight season, all American arrangements for the HINDENBURG’s flights would be handled not by the DZR as in the past, but by a new organization known as the American Zeppelin Transport Company, or AZT. The AZT had been established over the winter as a precursor to a planned joint German-American international passenger airship service which, it was hoped, would eventually result in approximately thirty large rigid airships flying passengers to all points of the globe.

By the early evening of 6 May, 1937, all of the pieces seemed to be falling into place for the most ambitious passenger airship service ever devised.

The state of New Jersey had been plagued all afternoon by a line of particularly nasty spring thunderstorms. The electrically charged atmosphere caused by the storms was such that all of the rubber factories across the state closed early that day out of concern that workers going about their business might generate static sparks that could ignite the factories’ highly flammable stocks of carbon black. The HINDENBURG, meanwhile, flew up and down the Jersey shoreline waiting for the weather to clear over Lakehurst.

Finally, at 6:12 PM, EDT, Lakehurst Commander Charles E. Rosendahl sent a radio message to the HINDENBURG, “Conditions now suitable for landing. Ground crew is ready.” Thunderstorms were still over the air station, but Rosendahl anticipated that they would have passed by the time the HINDENBURG arrived. The airship was over Tuckerton, NJ, approximately 40 miles south of Lakehurst, when the message was received. For the next hour the ship circled around to the west to approach Lakehurst behind the storm front. Commander Rosendahl sent three additional radio messages urging Captain Pruss to bring the ship in for landing while weather conditions remained favorable, finally advising “Conditions definitely improved. Recommend earliest possible landing” at 7:08 PM, just a minute or so before the HINDENBURG came into view over the Lakehurst air station, approaching from the south.
After a high-level pass over the airfield, the HINDENBURG made a wide turn to the west and valved hydrogen from multiple gas cells in order to reduce its altitude. By this point, however, Captain Pruss and his first officer, Captain Albert Sammt, appear to have developed concerns over the landing approach. At approximately 7:10 PM, navigator Eduard Boetius, on duty in the control car’s navigation room, sounded the signal for the crew to take their landing stations. Immediately following this, Captain Sammt called Boetius over to relieve trainee Ludwig Felber at the elevator wheel. The exact reason for this is unknown, but given the fact that it was standard German practice to not relieve trainee elevatormen even during difficult flight conditions, this sudden change of personnel appears to have been rather unusual.

At about this same time, perhaps two or three minutes later, the HINDENBURG began valving hydrogen from its six forward-most gas cells as her engines were slowed and her forward speed reduced to approximately 35 mph. As the airship approached the mooring mast over the course of the next 5-6 minutes, she valved hydrogen from cells 11-16 for a total of 35 seconds and dropped 1100 kg of water ballast from Ring 77 aft. By 7:19 PM, the last time she valved hydrogen, she was moving forward at approximately 15 mph, with Boetius keeping the elevators hard down. The HINDENBURG was out of trim and tail heavy, but Captain Pruss was determined to land her, concerned about the full load of 72 passengers (many of whom were on their way to the coronation of George VI the following week) who were waiting to make the return trip that evening.

At about 7:19 PM, Captain Sammt, who was overseeing the elevators, ballast drops and gas valving during the landing approach, sent word back to the crew’s mess for six men to report to the ship’s bow in a further attempt to bring her into
trim with their body weight. Ludwig Felber, after being relieved at the elevator wheel, had also reported to the bow to help lower the landing lines, and it was subsequently reported that Chief Rigger Ludwig Knorr was also in the bow area at this time (though his landing station was in the axial catwalk, keeping an eye on the gas valves.) So there were now a total of eight extra men in the bow section helping to level the ship.

The HINDENBURG dropped her forward yaw lines at 7:21 PM, and the ground crew took hold of them and began the process of connecting the manila ropes up to the mooring tackle. The ship's persistent tail-heaviness seemed to have been at last temporarily checked, and in the passenger area most people were standing at the two rows of large observation windows, though several went to their cabins to retrieve coats or other belongings from their baggage.

Then, at 7:25 PM, approximately four minutes after the forward ropes were dropped, something went terribly wrong. What that something was is still the subject of debate 75 years later.

In the HINDENBURG’s lower fin, crewman Helmut Lau heard a dull “frwump” sound above and forward of him and, as he later testified through a translator for the official investigation into the disaster:

“I… saw from the starboard side down inside the gas cell a bright reflection on the front bulkhead of cell No. 4. The gas cell was approximately at the line that I have indicated on Exhibit 10. I therefore could see from there to the point that I am indicating. I could see from my position at this point to approximately the position indicated. Here and here I saw no fire at first. I saw it on the front side of cell 4. The bright reflection in the cell was inside. I saw it through the cell. It was at first red and yellow and there was smoke in it. The cell did not burst on the lower side. The cell suddenly disappeared by the heat.”

Numerous witnesses on the ground saw a puff of smoke atop the HINDENBURG’s hull just forward of the upper fin, followed by a fiery red glow inside the ship’s hull. Some witnesses, including American Zeppelin Transport Company executive vice president Willy Von Meister, also later recalled seeing the glow of fire traveling straight down from the top of the ship into the center of the hull prior to seeing the ship light up from the inside. Moments later, as stunned witnesses watched, the entire aft half of the HINDENBURG was suddenly enveloped in a rising ball of flame.

Those aboard the ship felt a heavy push from behind, and it took most of them a few moments to realize that the ship was on fire. Kurt Bauer, standing alongside the keel walkway about halfway between the control car and the bow, felt the jolt and immediately looked above him and saw the glow of fire burning its way forward along the axial catwalk. He then felt the ship begin to tilt aft.

Everything from this point onward happened incredibly quickly. The HINDENBURG buckled in the middle and the aft portion of the ship, having lost its hydrogen, dropped to the ground while the still-buoyant bow section pointed upward, reaching an angle of about 45 degrees. The fire burning its way forward along the axial catwalk burst through
the windows beneath the nose cone just before the tail section hit the ground, and the twelve men in the bow section either hung on for dear life or else flung themselves out of the ship to escape the flames that were now consuming the ship’s bow. Crewmen elsewhere in the ship either waited for the ship to drop closer to the ground so that they could jump safely, or else, if they were stationed further aft they suddenly found themselves on the ground in a tangle of burning wreckage.

Many of the people in the passenger section, caught unaware, went tumbling down the inclined floor and landed in a heap along the back wall of the dining room on the port side and the lounge on the starboard side. Others hung on to posts and railings and waited by the windows for their opportunity to jump.

The forward half of the ship now began to collapse to the ground as flames consumed the remaining gas cells. As the hydraulic landing wheel beneath the control car touched the sandy earth, passengers and crew alike began jumping from the nearest windows. The men in the engine gondolas were by now running to safety, save for those tending the starboard aft engine, which was buried under the burning hull. A few other crewmen stationed in the aft section, mostly those in the lower tail fin, began finding escape routes. Most, however, were trapped by wreckage and unable to escape.

As the passengers and crew in the ship’s forward section began to leap to safety, the control car’s hydraulic landing wheel bounced the framework back into the air perhaps ten or fifteen feet, granting survivors a few extra seconds in which to run out from underneath the ship before it finally settled to earth for the last time. As it did so, it rolled slightly to starboard, causing burning girders and wires to fall in front of the passenger observation windows on that side of the ship. Many who initially escaped from the lounge and

The excitement the passing of the mighty HINDENBURG caused can be seen in this photo of the Zeppelin over Old Haversham, Buckinghamshire, England.
writing room ended up being trapped by this wreckage.

As the HINDENBURG burst into flame over their heads, the Navy and civilian ground crew scattered and ran for their lives. Now, as the ship settled to earth, Chief Boatswain’s Mate Frederick Tobin, nicknamed “Bull” for his bellowing foghorn of a voice, yelled out, “Navy men! STAND FAST!! There are people in there and we have to get them out!!” The ground crew indeed stopped, turned around, and immediately ran back toward the wreck where they, in the words of one witness, “dove into those flames like dogs after rabbits.” Both Navy and civilian ground crew members were responsible for leading quite a number of survivors to safety.

Ultimately, over two thirds of those aboard the HINDENBURG would survive the disaster. In all, 13 passengers, 22 crew members, and one member of the civilian ground crew died as a result of the crash, while 62 of those aboard managed to escape with their lives. Captains Max Pruss and Albert Sammt, though badly burned, survived, as did navigator Eduard Boetius, who leapt from the control car and ran to safety with the ship’s framework collapsing to the ground just behind him. The man whom he had replaced at the elevator wheel, Ludwig Felber, wasn’t so lucky. Standing on the mooring platforms at the tip of the HINDENBURG’s bow, he rode the ship all the way to the ground and was led from the wreck horribly burned. He died in hospital early the next morning. Chief Rigger Ludwig Knorr, also in the bow section at the time of the fire, never made it out of the wreck. Standing not far aft of Knorr, off-duty elevatorman Kurt Bauer, who saw the fire burning above him moments after the ship initially burst into flame, was able to hang through a ventilation hatch and drop from the airship just in time to escape serious injury.

Amazingly, Helmut Lau, who saw the early moments of the fire from his vantage point in the lower tail fin, survived without a scratch.

The results of the subsequent official investigation into the cause of the HINDENBURG fire were inconclusive. No “smoking gun” evidence was discovered that allowed investigators to positively identify the source of the fire, but the most plausible theory was determined to have been electrostatic discharge on the ship’s hull igniting leaking hydrogen. In the years since, a number of alternate theories have been advanced, including claims that the HINDENBURG was sabotaged to a rather elaborate theory identifying the source of ignition as having been the doping compound on the outer cover rather than the hydrogen.

However, most Zeppelin historians continue to believe that the theory that takes into account the broadest range of available evidence is the one that the official investigation cited 75 years ago: that the fire was caused by hydrogen from a leaking gas cell coming into contact with electrostatic discharge atop the ship. The fact that the ship was tail heavy throughout most of its landing approach, that it caught fire a few minutes after the manila landing ropes began to electrically ground the ship, and that the entire aft half of the ship went up in flames almost simultaneously (as opposed to the fire having spread from one spot) all tend to support this theory. The only thing that can be said about the matter with virtual certainty, however, is that the cause of the HINDENBURG fire will in all likelihood continue to be debated for years to come.

Seventy five years after the event, what has been the lasting effect of the HINDENBURG disaster on the airship industry? Has the disaster really been the impediment to progress that some believe, and if so, why?

The HINDENBURG was the first aviation disaster to be captured ‘as it happened’ in the age of the cinema newsreel – the social media of its day. The public were unaccustomed to such traumatic images, especially when played with the tortured radio commentary of Herb Morrison. The effect on the public was significant, and in many ways similar to that of the loss of the space shuttles COLUMBIA and CHALLENGER and the Air France Concorde produced in more recent times, iconic vehicles destroyed in the most violent of ways and with loss of life. Each incident was captured with still pictures and/or newsreel footage which would become infamous around the world.

But why did this disaster apparently spell the end of the rigid airship? After all, TITANIC, the one disaster which is perhaps more famous than that
of the *HINDENBURG*, did not spell the end of passenger carrying liners, and 43 times as many people perished on that ship than were lost on the *HINDENBURG*.

A number of events surrounding, but not directly connected to the disaster, conspired to help seal the fate of the rigid airship. Obviously the Zeppelins had a major flaw, hydrogen. Whether it was asked for or not, helium was unavailable to the Zeppelin Company and so either they used hydrogen, or shut up shop. It was that simple. Following the disaster, helium still did not become available and so the company was unable to eliminate the one major flaw in its aircraft.

The continuing lack of helium ruled out one powerful possibility of limiting the impact of the disaster: continuity. As the TITANIC foundered, other ships were making their way across the Atlantic and there was no interruption of service. If the *HINDENBURG*’s sister ship, the LZ130, could have been brought on line as a helium inflated passenger carrier, the effects of the disaster would probably have been muted. That did not happen and the public never had the opportunity to become comfortable with a ‘safe, helium inflated passenger Zeppelin service’ before war made it impossible.

A second factor was necessity; surface ships provided a vital commercial service plying backwards and forwards across the seas and oceans carrying cargo and people of all classes. The Zeppelin on the other hand provided an exclusive service for those who could afford it, and carried a very limited amount of high value cargo. The Zeppelin service could, and was, eliminated without any impact on international trade. Other than the Zeppelin Company itself wishing to continue operations, there was no pressing commercial need for the expensive services the Zeppelin offered.

And so, despite all of the spectacular achievements of the German Zeppelin in the interwar years, at the start of Second World War the public’s final, lasting, image of the Zeppelin airship was the fiery destruction of the *HINDENBURG*.

Following the war, the focus of industry was to exploit the conflict-driven technological advancements of the last five years, and nowhere was this more true than in the field of aviation. Before the war, the Zeppelin was the only way to fly across the Atlantic Ocean non-stop. After the war this was no longer the case. Aeroplanes were now capable of commercial intercontinental flights, and were faster into the bargain.

Speed and mass transport in an ever shrinking world were the order of the day. Larger and faster fixed-wing aircraft were what was needed, ultimately producing airliners capable of carrying hundreds of everyday people, and supersonic aircraft that could quickly transport the rich and famous across the Atlantic. Throughout this period the Zeppelin (and the airship in general) looked like an slow and outdated mode of transport, and if anyone did float the idea of its large-scale return, the media and naysayers would immediately roll out the footage of the *HINDENBURG* as proof that airships were dangerous. The fact that safe, non-flammable helium would be used to inflate the airships made little difference.

Books, magazines, television and radio in the decades following the war all perpetuated the same impression - that the airship was dangerous, and the *HINDENBURG* proved it!

Military airships did continue to play a meaningful but limited role after the war, the ultimate evolution of which being the ZPG3W of the US Navy. But even these vehicles suffered from a negative ‘old fashioned and outdated’ image and were finally replaced by helicopters and aeroplanes in the early 1960s.

From then until now, airships have been limited to small, non-rigid types used mainly for promotional advertising missions and there is no question that the influence of the *HINDENBURG* disaster played a large role in this situation.

Today we live in a very different world. Speed is no longer the only driving force in transportation; efficiency and environmental responsibility are just as important, and this, combined with modern technologies could open the door for the large airship once again. And today also, three quarters of a century after the event, the influence of the disaster finally appears to be diminishing. Access
to information continues to improve rapidly, allowing individuals to conduct their own research, however limited they may choose to make it, and reach their own conclusions on just about any subject on the planet. No longer do people have to rely so heavily on a limited number of media outlets and their habit of (endlessly) reprinting the same photographs, showing the same footage and reprinting the same stories that, while spectacular, give a biased view of a subject.

Another key factor is the slow but steady development of the industry itself. The more airships are seen in operation, the more people will accept them as part of the modern world. Advertising airships have become more common both in America and the rest of the world and the sight of one in the sky, or on television providing aerial coverage of an event is no longer such a rare event. On its website, American Blimp Company, the most prolific manufacture of non-rigid airships in recent years, states that its airships have flown on every continent except Antarctica. The Zeppelin Company itself has successfully reintroduced their airships and through years of safe operations have done much to prove them to be modern, safe vehicles. It is now possible to ride in a Zeppelin in both Europe and North America. Through these actions the airship is again becoming an accepted part of everyday life in the modern world.

Finally, the images of the disaster, so damaging in the past, have perhaps begun to lose some of their impact. Today mass entertainment is bright, colourful and high definition. Grainy, black and white still images and film footage don’t have the impact that they once did.

For the author at least, the first signs that the spectre of the HINDENBURG does not hold the power it once did came during the CargoLifter programme. Destined to fail for other reasons, this ambitious airship programme did not appear to be plagued by the inclusion of the HINDENBURG in media coverage to the same extent as earlier projects. And more recently, articles about airships of all types appear to focus more generally on the project at hand rather than events of the past.

The HINDENBURG disaster will always be with us; it is part of the public psyche and as we observe the 75th anniversary there are, of course, many articles in the media, some good and some bad. But with the short attention span of today’s media, the coverage will soon be gone. Hopefully, when we observe the centennial of the disaster, we will do so with large airships plying the skies fulfilling a wide variety of roles, and the spectre of the HINDENBURG disaster will at last be firmly relegated to a subject of historical interest only, which is where it now belongs.
M1400 AIRSHIP NEARS COMPLETION, PROGRAMME IN JEOPARDY

The US Air Force has informed MAV6 that there is no funding for the M1400 airship programme past the 31 June (the beginning of the 2013 budget) and the airship is to be deflated and crated ready for shipment and storage. At the time of writing the airship is reported to be between 90 and 95 percent complete, and within a couple of months of flying,

MAV6 report they are pursuing every avenue to ensure the continuation of the programme, and have powerful political supporters in the form of influential senators Thad Cochran and Daniel Ionuye, plus high ranking members of the military Combatant Commands who want to see the airship deployed to Afghanistan as originally planned. Cochran and Ionuye sent a letter to Deputy Defense Secretary Ashton Carter on 14 February calling for the continuation of the programme. In the letter the pair state “We believe it would be a significant failure to stop work and not deploy this much needed platform to Afghanistan” and “The U.S. Central Command continues to maintain a requirement for this capability. A number of decisions were made to deviate from the programme’s execution plan and baseline capability which has resulted in programme cost growth and schedule delays. We strongly urge you to examine the programme and if necessary, de-scope the programme back to the original baseline requirements so that combat troops in Afghanistan benefit from this capability as soon as possible.”

It remains to be seen what the future of the M1400 is, MAV6 report ‘our allies are mobilizing to ensure a future for the effort. We can’t predict exactly what this future will look like right now, but there are a number of options on the table. Stay tuned…”

The team developing the airship have made some very impressive achievements in just eighteen months;

Working with its supplier, TCOM, they have designed and built the largest airship envelope produced in the last 55 years, and the largest airship envelope in history constructed of synthetic materials. The ballonet system is the largest (by 200%) ever installed in a traditional low-medium altitude airship by 200%. The system uses a unique ‘tank-body’ ballonet to control the large gas volume which allows flights at 20,000 feet. Dimensionally the M1400 is the world’s largest aircraft, airship, and UAV. The envelope pressurization system features the most powerful airship pressurization fan ever built, the largest custom valves in 55 years and the most sophisticated electronic ballonet contents measurement system ever built. This, combined with the most sophisticated electronic ballonet contents measurement system ever built, and custom developed actuators and controls for the contents measurement system enables a maximum climb and dive rate of 3,000 feet per minute, the most aggressive rates ever developed for an airship. (The typical rate is usually somewhat over 1000 feet per minute - editor.)

A certified diesel engine has been significantly upgraded into a high-efficiency airship propulsion,
power generation and hydraulic system. This required the development of custom engine to propeller belt transmission, termed the Propeller Speed Reduction Unit (‘PSRU’), and a custom designed variable pitch propeller control system (that does not use a traditional propeller governor) comprising a unique combination of existing propeller hubs and blades (MT MTV-27 propeller blades) to create a high-efficiency propeller that measures 11 feet across for long-endurance flight. The engines are fitted with a custom cooling and air induction system that enable operations at full power and zero airspeed in conditions up to 135°F without overheating.

The M1400 is capable of Vertical Take Off and Landing (‘VTOL’) right up to maximum static weight. The VTOL capability is provided by two Honeywell TPE331-12 turboprops engines, mounted on the sides of the envelope, that are able to vector nearly 180° in range while producing nearly 5,000 lbs of thrust each. The entire mounting and vectoring system is a custom design and includes a full electric and electronic engine control system (for an otherwise analogue engine) to allow for UAV operation. A ‘remote re-oil system’ allows servicing of the envelope mounted engines from gondola servicing points. The unique fuel system is capable of feeding six engines of three different types, widely separated on the airship.

The airship’s tricycle landing gear is also a custom design. It provides a large ‘footprint’ for stability with two gears mounted on the power car, and the third on the forward payload car.

The flight control system has been developed in coordination with Rockwell Collins. It is a triple-redundant, digital fly-by-wire system that monitors and controls all systems on the airship. The system includes five to seven times the number of items a typical system uses to enable operations in both manned and unmanned modes.

TOP TO BOTTOM: one of three diesel cruise engines mounted on its outrigger (note the cooling unit). The tail mounted turbine manouevring engine. An envelope mounted, vectoring turbine engine that makes VTOL possible.
TOP LEFT: The forward fuel tanks mounted directly to the envelope.

TOP CENTER: The rear fuel tanks similarly mounted to a frame on the envelope.

BOTTOM CENTER: Fuel tank attachment detail.

BOTTOM LEFT: Technicians install gas valves on top of the envelope.

MAIN PHOTO: The eleven foot diameter of the vectoring turbine engine mounted on the side of the hull, give a good impression of scale.
Two views of the unique two gondola arrangement, designed to allow fast exchange of payloads. The command gondola, which carries the payload, is towards the camera in the main photo. An engine outrigger and center engine mounting point are visible on the power car. Note the suspension cables and the top frame on which the command car is mounted to the envelope. The insert photo gives the same view, but from the rear.
GRM Hartcup - 1919 – 2012
Past Chairman, Vice President of the Airship Association

Guy Rider Monyns Hartcup died on the 18th March 2012 aged 92. He had an interesting and varied life. He wrote twelve books as well as numerous historical articles and reviews, was Chairman of The Airship Association for seventeen years, chaired the Association’s Technical Committee and was a life long member of the Wyndham Lewis Society. His books on the Mulberry Harbour and on Camouflage are the authoritative works and his The Achievement of the Airship is much referred to.

Guy was born at Early, Reading on 30 May 1919 whilst his mother was staying with her parents, as his father, a mining engineer whose German ancestors emigrated to England in the early 1700’s, was serving with the British Army in France. His mother came from the distinguished Weldon family and one of his Godfathers was the author Rider Haggard.

Following an excellent education at Pinewood Preparatory School and then Lancing College, he went up to St Catherine’s College, Cambridge at the age of 19 to read History. A year later WW2 interrupted his studies and in November 1939 he joined the Royal Berkshire Regiment. He served as a Lieutenant in the 23rd Indian Division in Assam and in Burma for a short while before transferring to the RIASC (Royal Indian Army Service Corps) until 1946.

In 1946 he returned to Pembroke College, Cambridge and graduated with an honours degree in History. His first job was teaching at Dover College – a job that he hated. Meanwhile he had his name on the list for a history/writing job with the ex-service job seekers organisation – Social Services. In April 1948 he was interviewed and joined the Air Historical Branch (AHB) as a member of the founding team. In doing so he was lucky in that he had the required history degree, but had no flying experience. He enjoyed his work there writing histories of events in the Second World War.

In his spare time Guy continued with his other interest - art and painting. Whilst attending life drawing classes at the Chelsea School of Art he met his wife, Iti, an Austrian widow interested in sculpture, with two young boys aged three and five. They were married in Chelsea Old Church on Guy’s birthday in 1953 and lived in Danvers Street, Chelsea. Here his wife brought up the two young boys and pursued her sculpting when time permitted. Meanwhile Guy had also become an accomplished artist in his own right, exhibiting on many occasions at the Royal Academy and elsewhere. A sketchbook was never far away and many beautiful watercolours were produced, often after holidays in the country and elsewhere.

At the end of 1960 Guy left the Civil Service and joined the International Atomic Energy Agency in Vienna as English Editor. Here the family enjoyed meeting many of his wife’s friends and family and Austria became his second home. Nearly three years later the family returned to London and thanks to Sqn Ldr L A Jackets at the AHB, he joined the Cabinet Office Historical Section under Brigadier Mallory, for a year. In 1964 he joined the Treasury as Historian and retired from the post in 1977.

By 1972 he had become an established author and was commissioned by his publisher to write a history of the development of rigid, semi-rigid and non-rigid airships. (The Achievement of the Airship: A History of the Development of Rigid, Semi-Rigid and Non-Rigid Airships, David & Charles, 1974) This is how I came to meet him when he came to undertake research at the Royal Aeronautical Society. He joined the Airship Association in 1972, and was its Chairman from January 1977 – November 1993.


He was a remarkable man, articulate, with great intellect and exceptional intelligence and above all a good historian and a creditable artist in his spare time. 

Arnold W L Nayler
GREENPEACE HOT AIR AIRSHIP

A hot-air-airship owned and operated by the environmental group Greenpeace played a high profile role in a campaign to convince the residents of Cincinnati, Ohio to change their electricity supplier. Greenpeace contends that the current provider, Duke Energy, had made no progress moving towards the use of green energy and had no plans to do so. The campaign was run in coordination with Ohio Citizen Action and proved to be successful when the city switched to all green energy. The hot-air-airship became a familiar sight around the city during the campaign.

AEROSCRAFT UPDATE

In a brief update for AIRSHIP, World Wide Aeros Corp report that work continues on the AEROSCRAFT at their facility in the hangar at the Tustin Marine base in California. The advanced proof-of-concept vehicle will test and prove a number of features including a hard aero-shell and the COSH system (Control of Static Heaviness) which is designed to control buoyancy. The airship is expected to fly towards the end of the year.
Starting the 2012 season, GoodYear's European airship, G-HLEL, makes her first flight from Cardington, Bedfordshire on 13th March. The A60+ had overwintered inside historic shed one. She will cover the Olympic Games this summer.
# Membership Application Form

**The Airship Association**

**Limited by Guarantee**

**President: D.M. Stone, Hon. Secretary**

**Membership Application Form**

**Block Letters Please**

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**For Office Use Only**

- **Proposer:** [Name]
- **Seconder:** [Name]
- **Signature:** [Signature]

If I am elected as a Member of the Airship Association, I agree to abide by the Articles and Bye-Laws of the Association.

The Treasurer, The Airship Association, PO Box 819, Gillingham, Kent, ME8 1BY United Kingdom.

Acceptable methods of payment are cheques on UK banks, sterling drafts on London correspondent banks, cheques drawn in sterling, euros or US dollars drawn on any US bank – all made payable to The Airship Association.

Annual Fees are: Full Member resident in the United Kingdom £35, Overseas members £40. For United Kingdom residents who are (a) full-time students or (b) over 65, the annual subscription is £20.

Signed: [Name]

Date: [Date]

**Subscriptions for Standing Order Payees**

Those with United Kingdom bank accounts may pay the annual subscription by Banker’s Standing Order. If you wish to pay in this way please complete the form below and send it to the Treasurer with your membership application.

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Please pay to: [Airship Association account number*]: [Sort Code]

*Please leave the above boxes blank. In order to preserve the security of our bank account from identity fraud, we have withdrawn our bank details from this form. They will be completed by the Treasurer on receipt.

1. On receipt of this instruction, and
2. On the next 1st October, and
3. On the 1st October next year and in each subsequent year until further notice.

Signed: [Name]

Date: [Date]

*If applying to join the Airship Association between the 1st April and 30 September in any year, delete Item (2).

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Name on Card: [Name]

Expiration Date: [Expiry Date]

Start Date: [Start Date]

Security Code (last three numbers on rear of card): [Issue Number (Maestro)]