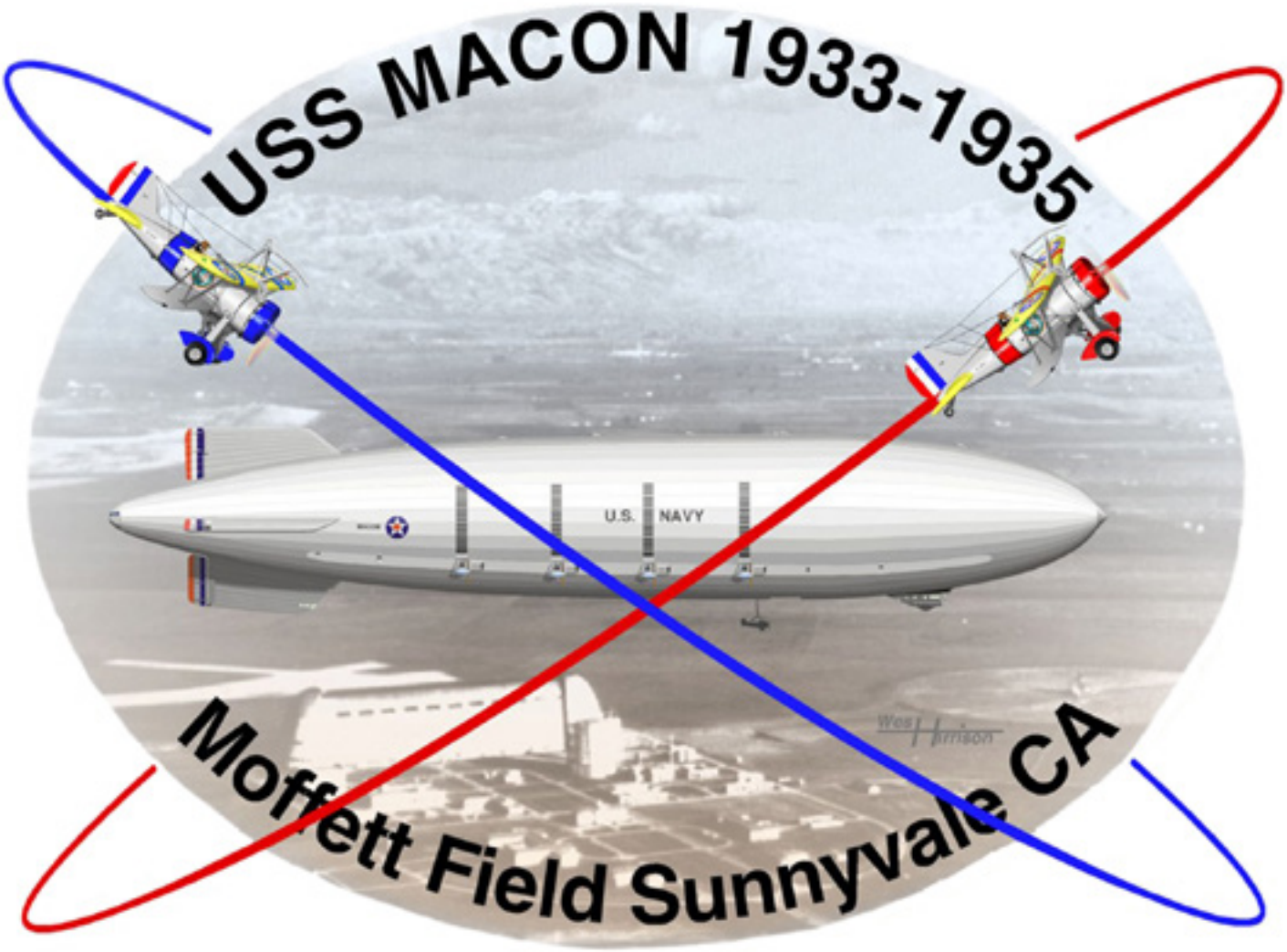
THE NOON BALLOON

The Official Publication of THE NAVAL AIRSHIP ASSOCIATION, INC.

No. 108 Winter 2015

THE FLYING CARRIERS



Art at top created by Wes Harrison, who is also the cover and back cover artist.

F9C-2 models were built by James Simpson to guide his painting (left) for the DVD "The Flying Carriers." CAPT Bob Rasmussen created what *should have* been, a Sparrow-hawk less landing gear circa 1933. (right) Sadly this was not accomplished until later, after the tails had been blackened for Fleet uniformity.

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On the Cover: An F9C-2 approaches her mothership in this painting by Wes Harrison.

THE NOON BALLOON
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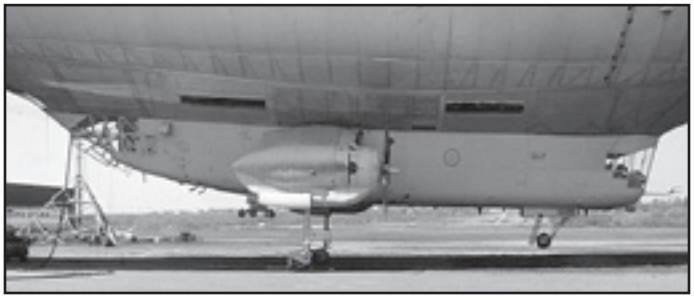

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EDITORIAL

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As a young man, the late Don Venton had traveled to the construction site that was to later become Moffett Field in order to see the mighty USS *Akron* (above, Don on right). He found the experience of seeing the visiting flying aircraft carrier and her (two) hook-on planes so inspirational it was a large part of the reason he entered Naval Aviation - and wound up a WWII blimp pilot. In your Editor's case, about 45 years later, looking for something to read at the base library - and finding R.K. Smith's then-new book on the ZRS ships - lead to the next forty year's fascination with the *Akron-Macon* subject.

Now read what one Megan Eckstein wrote this past September, as NOAA once again visited the *Macon's* resting place: "Russ Matthews – whose family's Edward E. and Marie L. Matthews Foundation helped pay for the expedition, along with the Oceangate Foundation – said Tuesday that bringing this "odd branch of aviation evolution that went nowhere" into the public discourse was important to him. He said the history of the dirigible program, "reads like science fiction," and he hopes that research teams can continue to learn more about the program and preserve and document artifacts for future generations."

"Science fiction" indeed. The accomplishments of the "sky sailors" back in what "Star Trek's" Mr. Spock called "this zinc-plated, vacuum-tube culture" still astonishes even the layman today. It's also what inspired our member Rowan Partridge to pen his novel, "ZRS," of which we want to make a major motion picture.

It was my intention to roll out our ZRS the movie efforts somewhere along here, but creating a stand-in of the BuAer Design #124 airship's fighter (our Silence "Twister" kit airplane) has been itself quite overwhelming. Of course NAA/LTA has priority, such as taking a month off to prepare the proposal for DARPA you'll see inside this issue. As of this writing, I am deep into "AbbacaDebra's" avionics installation, finding it somewhat challenging despite my experience with the Space Shuttle's analog-to-32 bit vintage electronics. Happily, amid my struggle, it turns out, truth is stranger than fiction.

Member Eric Brothers had located unpublished Goodyear-Zeppelin plans for their next generation Flying Carrier. Eric guided me to work with our friends at the University of Akron to locate even more of these unseen plans, including their airplane-handling details. It's our centerspread.

If that weren't enough, recently we were entrusted with a copy of RADM H.B. "Min" Miller's presentation about his ZRS days. Obviously made from on-the-fly notes, it contained many hand-scribbled additions in the margins - and no slides. We have done our best to recreate his presentation, locating images he describes to the best of our ability. I have put my captions in [brackets] so it's clear which words are those of the last senior HTA aviator aboard an airship. Enjoy!

While our movie effort awaits a website wiz to join the team, I am happy to report one LTA-related dream has been worked to come true. That young ZRS visitor, Don Venton, has done what so many vets said they would, but did not get done. He's written the definitive, well-illustrated memoir of WWII LTA. Just as important, his daughter, Janet Estes, has gone to the considerable trouble and expense to make it a book. We'll have a review of this unique work in the next issue.

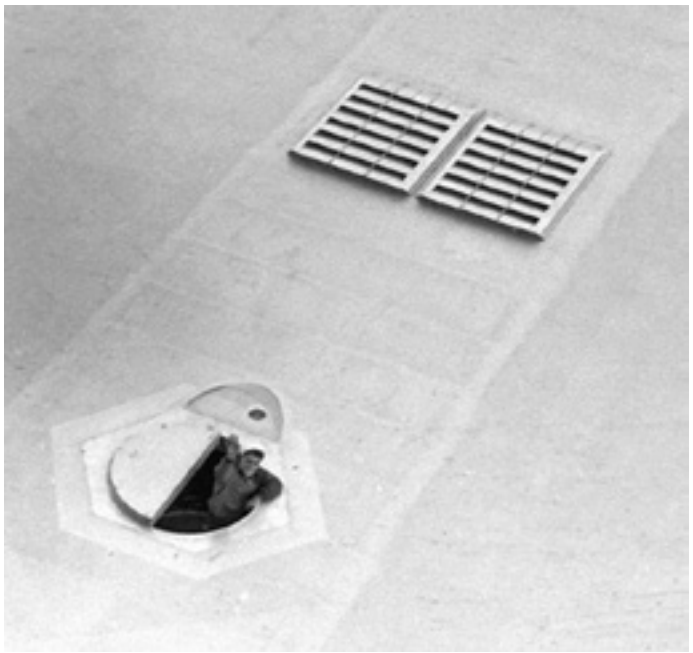
– Richard G. Van Treuren

View From The Top: PRESIDENT'S MESSAGE

It has been a relatively quiet summer, other than for a couple of hospital stays. One high point was that the new Goodyear zeppelin spent a couple of days at the Plymouth, MA, airport. Being housebound in between hospital stays I was at least able to see it flying by from our balcony. I would like to have seen it close up at the airport and get some photographs. Much still needs to be done regarding the May 2016 Reunion/Conference in Pensacola, but I am being ably helped by Mort Eckhouse. My sincerest thanks to Mort for his help. I have tentative plans to meet with Mort and the hotel event planners in November to resolve the details. I hope we have a tremendous turnout for what should be an exciting event at an attractive location.

As I stated in my last message, organizationally we were unable to maintain last year's total membership number. We are not alone in this. I have talked with some other similar organizations and they are experiencing a decline in the overall number of members. We will need to come up with some new ideas to attract new members. We have a lot to offer and the next few years look to be very exciting for the NAA as we have a number of activities planned and have been in contact with other similar mission veteran groups about some joint activities. More on this as things develop. As I wrote before, I am also very encouraged with the amount of renewals that included an extra donation. As a non-profit association we depend upon renewals and Small Stores sales for our income. Our biggest expenses are *The Noon Balloon* and the Reunion/Conference. Donations, large and small, help us maintain our low membership fee, publish the finest airship magazine in the world and supplement our Reunion/Conference expenses. We are most grateful for all of you who donate.

Ross Wood has been busy working with the nominating committee to present a slate of candidates for election at the Reunion/Conference. It is not an easy task and much credit goes to Ross and his committee for all their work.



Small Stores sales have been somewhat slow, but this is typical for the summer months. Please look at the flyer enclosed with this issue. We have a couple of new products that I think will be great additions and that we now accept Mastercard and Visa should be a great benefit. NAA logo products make good gifts and do much to promote our association.

We have begun the process of expanding the web page on past presidents and Bo Watwood has done a fine job in posting some bios and photos of our past presidents. I have also started the process to have an LTA Hall of Fame on the website. As the name indicates, we want to recognize those individuals that played a major role in establishing LTA. We are fortunate to have had some important people in this country that made significant contributions to Navy LTA and LTA worldwide. Some were, or still are, NAA members. I have contacted a couple of volunteers to serve on a screening committee and will be posting info on this in upcoming *Noon Balloon's*. I will be making a nominating form available on the website for anyone wanting to nominate someone to our Hall of Fame. As I stated earlier, the initial goal is to induct four to six people at the 2016 Reunion/Conference and two to four every year after that. Thank you for your continued support.

– Fred Morin, President

TREASURER'S STRONGBOX

The last year and a half has been a great learning experience for me. We have made some big changes in the way we do business to help streamline our operations. The new software is working out very well and is easier now that I have had some time to work with it.

One of the changes we instituted was to streamline postage for Small Stores to reflect the actual costs of packaging and postage. This small change has put us in the black on costs. Many thanks to Dave Smith and his team at Ron Smith Printing for doing that.

I have also prepaid another year of our Membership Subscription Software. We were able to do that ahead of a rather substantial increase in fees, thereby saving our Association $360 for the year.

Another item was to synchronize statements for our bank accounts. Now savings and checking will be closed each month on the same day relieving me of some confusion.

As of this writing we have 441 paid members. We have seen some of our lapsed members come back into the fold as well as a few new members. Bank balances as of October 1st, Checking: $6971.72, Savings: $20,319.69. All of our obligations have been met as of today. We should have enough in our treasury to cover the next issue of *The Noon Balloon* and most of the spring issue, barring unforeseen expenses.

In October, the invoices for 2016 Dues will go out. Please pay those dues promptly so we may continue to bring you your *Noon Balloon*.

Up Ship!

– Deborah Van Treuren, NAA Treasurer

PIGEON COTE

Member Donald Layton has prepared a detailed article on his experiences with the unique 4K airships for the next Noon Balloon. The following was compiled from e-mail in which he'd answered some questions concerning this unique model:

"What I flew in ZP-4 was the ZP4K or ZSG-4. It had a slightly larger envelope, a sonar operator station above the pilots (old machine gun station), and magnesium skin on the car to reduce weight (burned well when ZSG4 ship #1 burned in the hangar at Weeksville) and no internal APU. There was a Constant Speed Drive (CSD) on the port engine to provide the regulated electrical power that was required. The engines were run at a constant RPM from the time just before unmasting until you masted again after the flight. Instead of using the throttles to maneuver, you used "Thrust Sticks" that changed the pitch of the prop. When the pitch was increased, the engine tended to slow down until the carburetor was opened by a motor operated by a computer.

If you changed the prop settings too rapidly, the engine would stall and drop down to idle. This happened to me several times. Once it resulted in the airship going into the sea off Cape Hatteras and one time we almost hit a hangar while taking off during a night hurricane evacuation.

The winch was hydraulically powered by a pump on the CSD and had over 1,000 feet of cable. The center of the cable contained the electronic link to the sonar. As I recall there were seven wires, multi-plexed to 28 channels.

The "Fish" *[next page top, shown on a "5K airship]* weighed 750 pounds in air and about 300 in the water. It had provisions for both active and passive sonar – at the same time. On the *Nautilus* exercise, we were following the sub, staying about 500 yards behind it when the sonarman called out that the screws had stopped.

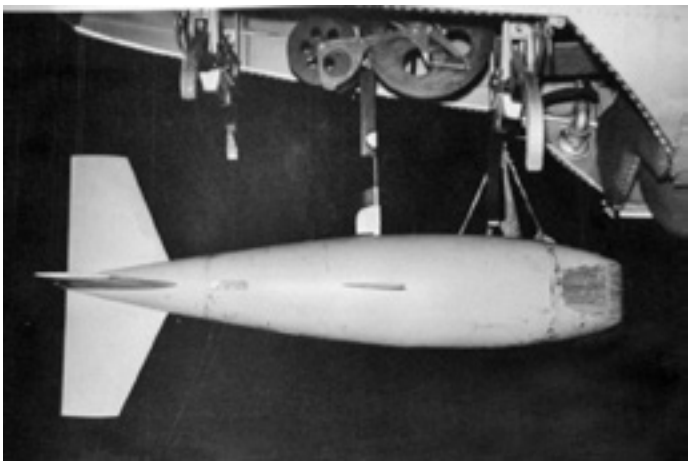
We throttled back to almost zero ground speed (we were almost at equilibrium weight-wise) and did not overrun the target.

NOW HEAR THIS

NAA REUNION MAY 2-5, 2016

Reserve the dates **2-5 May 2016** on your appointment calendar! Come see the Blue Angels Practice Air Show session (weather permitting) and take guided tours of the National Naval Aviation Museum and National Flight Academy. Attached to this issue is the info sheet and sign-up for the 2016 Reunion/Conference printed on the same page with your 2016 membership renewal form. You can sign up for the Reunion and/or renew your membership with one check and mailing to the Treasurer.

If you are reading this and finding no sign-up form, visit the NAA website, or e-mail or call any NAA officer for more copies of the sign up and renewal sheets.

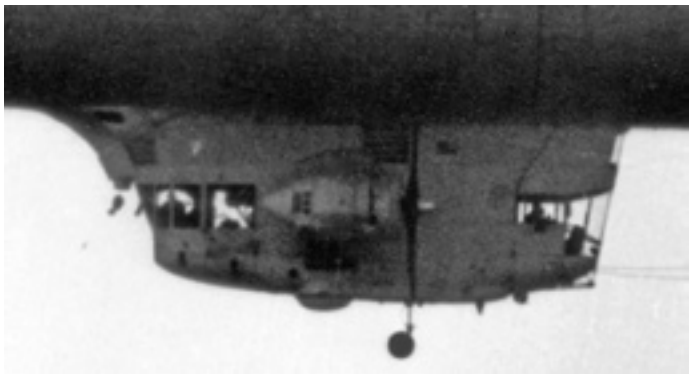


When the first ZSG-4 was built, I took a crew to Lakehurst to get checked out by Ben Leavitt, who had conducted the BIS trials. Before I could get enough experience with "Beta Prop" system the aircraft went down for rudder problems. The second ZSG-4 was ready and I went to Akron to pick it up. It, too, went down and I picked up #3 at Akron. At that time ZP-4 had three ZSG-4 airships and I was the only pilot qualified to fly them! Once the rudder problem was solved I began checking out the other pilots.

Don also answered some questions that came up after his last *NOON BALLOON* article: "The initial testing on the towed sonar was done at Key West by Airship Development Squadron Eleven (ZX-11), using a ZPG-2 airship. Some later work was done at Airship Squadron Two (ZP-2) at Lakehurst, also with a ZPG-2.

For the first fleet operation with the nuclear powered *Nautilus*, LTA was allocated two airship spots – the two ZSG-2s. A couple of weeks before the exercise, all of the ZSG-2s were grounded for problems with the internal tension cables.

One Sunday afternoon I received a telephone call from the commander, Fleet Airship Wing One in which he informed me of the ZSG-2 problems and said that they would be substituting a ZSG-4. I had never seen a towed sonar and had just begun to feel comfortable flying the ZSG-4 with its Beta Prop system. I was told that a sonar was being air-shipped from Key West and the next day a Sonar Officer and a Sonar Operator would arrive at Weeksville to start training my crew.



We flew two flights a day for two weeks – including weekends and the Fourth of July before taking off for Lakehurst where we would stage for the operation off Narragansett Bay." **Ω**

Leandro Miranda e-mailed, "I am the newest member of the NAA: I am researching the accident that occurred with the K-36 blimp in Brazil on the date of January 17, 1944, when it crashed into the Cabo Frio Island. My goal in this research is to detail this interesting history that has been lost over time and recount the more minutiae details of this story as much as possible with the help of members of the NAA. Perhaps some relevant information, possibly a photo or list of the crew on the day of the accident,

or any other information about the accident. My grandfather took part in the rescue of the crew and the wreckage and is no longer with us.

Looking at the report on the accident, I still have doubts about the times indicated, for example, the fourth line (00:30 P) times are followed by the letter "P," which leads me to believe that it would be "PM," it gives the impression that the fall has occurred late, but it is known that it occurred at night. The Lord knows what may have happened to the report? There is the remote possibility that report contains the name list of the crew on board? What is the possibility of my publishing a photo in my article (or book possible), since only this document proves in fact what happened? It would be of paramount importance to the publication of this document, as in Brazil memory is short. Once again thank you very much!!" Leandro also sent along photos from their museum display and asked for details.

'Red' Layton responded, "That red pennant is probably from the safety pin on a bomb release rack. When a bomb (or depth charge) is loaded, a pin is inserted in the release mechanism so that the device cannot be inadvertently released. Just before takeoff, a member of the ground force removes the pin. The red pennant was attached to the pin so that it would be quite apparent that the munitions were still safetied. The ordnance man would hold up the pennant(s) so that the pilot could see them before he took off."

Leandro had also asked about the envelope, in case he finds any remaining shards. Mark Lutz responded, "The K-ship envelope was constructed of 3 layers of canvas, glued together: R-R, H-H, and B-B bias types.

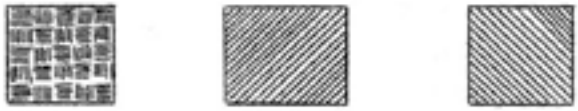
The description is a little confusing because it also gives the fabric used on the smaller training ships (H-H bias only) I THINK the rubber was neoprene (not completely sure). The inside was coated with paraffin wax, because paraffin is a better helium barrier than rubber. I THINK the paraffin was

ENVELOPE

The envelopes of the Navy Non-Rigids are constructed of 3 ply rubberized fabric. One or two of the plys can be laid on the bias in the manufacture of this type fabric to aid in maintaining a constant shape throughout the life of the envelope.

A lighter "HH" cloth is used on the training ships. As greater volumes of gas are contained, a stronger fabric must be utilized in the manufacture of the envelope. The large patrol ships gas volume is confined safely by using 3 ply fabric, the plys of which differ in weight and strength per square yard. A strong multi-threaded cloth is used in the construction of the envelope to attain this safety.

Two plys of biased fabric are used to aid in strength and to eliminate as much as possible the gradual distortion giving a conbination of "RR" (Basket-weave) "HH" bias and "BB" bias resulting in a total of approximately 20 oz. to the square yard.



R-R (Basket weave) H-H (Bias) B-B (Bias)

dissolved in benzene, and coating done by painting with brushes. The painters wore masks (activated charcoal) to protect them from the benzene. I don't know how thick the envelope material was - I have no information on that." Can anyone help with more details? **Ω**

In response to "Historian's Letters - Part VII," CP Hall wrote, "Only three Army air crews were lost in combat." (?) I am presuming that "lost in combat" is a euphemism here for "shot down in flames with all hands lost" or almost all hands as I believe one fellow survived the crash of LZ-37. The writer offers the three as LZ-37, LZ-77, and SL-11. Not really looking at reference works upstairs but merely perusing the more popular titles downstairs, I quickly came up with THE ZEPPELINS by Lehmann & Mingos citing, on the Eastern Front on 28 AUG 14, Army Zeppelin Z-V (Z-5) being shot up with shrapnel and brought down near Liepovick. The crew was captured trying to burn the wreck (hydrogen can be difficult to ignite). The crew was sent to prison camp in Siberia. One escaped and returned to Germany in 1917 reporting most of the crew "... died of starvation, disease and abuse." The Captain and a lesser rating escaped and were killed attempting to cross the Sino - Russian frontier. I ceased my search at this point. I guess you have to light up the night sky to count in some folk's record books?" **Ω**

Member Wilbur Sohn sent along a San Angelo, Texas, newspaper clipping covering the Goodyear airship's visit, and wrote, "I am a former LTA sailor (AD2) assigned to NARTU, Santa Ana, California, from 1952 to 1955 as an aircrew member on "K" ships. Memorable events for the ships were air-sea rescue training, dragging sonar for naval research, and doing smog collections for the US Weather Service in the Los Angeles basin. During WWII I had been on the USS *Hornet* and in '55 I transferred to the USAF, retiring as E-9 in 1975." **Ω**

The August issue of AIR & SPACE contained "Dirigible Riddle," prompting CP Hall to write them, first quoting the article's, "Why have none met with success?"

CP wrote, "Actually several versions have been successful. Post-World War I, in 1919, the Zeppelin Company dirigibles *Bodensee* and *Nordstern* were successes. They were small, commercial airships with passenger capacity comparable to, and more roomy than, the Douglas DC-3 that would not enter service until 15 years later. *Bodensee* made daily flights from Friedrichshafen to Berlin. Both ships were confiscated by the Allies and served in France and Italy until scrapped in the late 1920s.

U.S.S. *Los Angeles* was a Zeppelin Company design comparable in size (lifting gas capacity) to the largest wartime zeppelin. Built to compensate the USA for German naval dirigibles scuttled by their crews, she was limited in size and designed as 'commercial' by Allied agreement. Delivered in 1924, she flew until 1932 when she was laid up as a depression-era economy measure. She was inspected and found airworthy in later years and not scrapped until 1940. *Graf Zeppelin* (LZ-127) was the largest dirigible that could be built in the available construction hangar. She was designed to make long distance, demonstration flights with token passenger groups along for the ride. Launched in 1928, she flew to America and returned that year. In 1929, *Graf Zeppelin* flew around the world with but three intermediate refueling stops. In the years that followed, she made more than one non-stop flight from Germany to the Middle East and return; and a Polar Expedition over the Arctic Ocean. *Graf Zeppelin* pioneered a scheduled service from Germany to Brazil, often with a stop in Spain during the 1930s. It flew some 590 flights and over 1.0 million miles from 1928 until *Hindenburg* burned at Lakehurst in 1937. It was scrapped in 1940.

Goodyear Tire & Rubber Company began using small dirigibles (blimps) for publicity after WWI. It pioneered the use of helium instead of hydrogen after the *Wingfoot Express* crashed into a Chicago bank in 1919. They have often had as many as six blimps flying in the USA and Europe at one time. There have been occasional mishaps but the safety record is exemplary and no passenger has ever died. Recently, Goodyear has announced that it will retire its blimps and replace them with the new concept, semi-rigid dirigibles, Zeppelin NTs.

During World War I, the British mass-produced blimps for coastal, anti-submarine patrols. It has been said that no ship protected by British blimps was sunk by a German submarine. During World War II, Goodyear built over 100 blimps for coastal anti-submarine patrol. Where the blimps roamed, the U-boats departed. Arguably, a single ship was sunk by a U-boat while escorted by a Navy blimp.

This is not to say that there were no failures. It has been pointed out that when an airplane goes down, it is a crash. When an airship goes down, it's a DISASTER! It certainly begs the point, "Why have none met with success?" **Ω**

JLENS suffered a negative press article that was widely reprinted across the country. (next page)

A Gasbag by Any Other Name Remains a Waste of Money By Jack Perry

Hey, did you know we spent over $2.7 billion dollars on some blimps the military wanted? No, I'm serious; I'm not making this up. And I haven't been huffing helium from those blimps, either. I read this in the newspaper the other day. I didn't know we had blimps! I saw a blimp pass overhead here the other day, but, alas, it was on its way to a football game and not valiantly defending us from the return of the *Hindenburg*. I was disappointed...

See here, this flying cigar program is called JLENS. Yes, another U.S. military alphabet soup. Bet you didn't see that one coming, did you? These initials stand for: Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System. This blimp program has been going on for two decades now. The purpose of these bags of gas (the blimps, not Congress) is to defend the United States against cruise missiles. Wow, really? Yes! And also small aircraft that could get in under our radar. Hey, remember that guy that landed a gyrocopter on the West Lawn of the U.S. Capitol some time back? Yeah, they asked the Pentagon, "How come JLENS didn't sound the alarm?" Some Pentagon general said JLENS wasn't "operational that particular day…"

After two decades, and $2.7 billion dollars. Ok, well, let's be realistic. That's $2.7 billion dollars they TOLD us about. This is nothing new, of course. More taxpayer money vanishing into thin air—literally. Oh, I know, we've got to be ready for those inbound cruise missiles! Gee, how were we ready for them during the Cold War when that threat was actually semi-real? These gasbags only manifested after the Cold War was over. Again, not the Congressional gasbags, the blimps. Yet, the very day the blimp could have earned its salt, it was out to lunch. A guy in a home-brewed VTOL landed at the Capitol to cheers and amusement from those of us who saw the humor in it. **Ω**

Pentagon Has Spent $2.7 Billion On Disappointing System By David Willman, LA Times

Unknown to most Americans, the Pentagon has spent $2.7 billion developing a system of giant radar-equipped blimps to provide an early warning if the country were ever attacked with cruise missiles, drones or other low-flying weapons. After nearly two decades of disappointment and delay, the system - known as JLENS had a chance to prove its worth April 15. That day, a postal worker from Ruskin flew a single-seat, rotary-wing aircraft into the heart of the nation's capital to dramatize his demand for campaign finance reform.

JLENS is intended to spot just such a tree-skimming intruder, and two of the blimps were supposed to be standing sentry above the capital region. Yet Douglas Hughes flew undetected through 30 miles of highly restricted airspace before landing on the West Lawn of the U.S. Capitol.

Seventeen years after its birth, JLENS is a stark example of what defense specialists call a 'zombie' program: costly, ineffectual and seemingly impossible to kill. Raytheon Co., the Pentagon's lead contractor for JLENS, has asserted that the system is 'proven,' 'capable,' 'performing well right now' and 'ready to deploy today.' The Los Angeles Times found otherwise: JLENS has struggled to track flying objects and to distinguish friendly aircraft from threatening ones. 2012 report by the Pentagon faulted the system in four 'critical performance areas' and rated its reliability as 'poor.' A year later, in its most recent assessment, the agency again cited serious deficiencies and said JLENS had 'low system reliability.' The system is designed to provide continuous air-defense surveillance for 30 days at a time but had not managed to do so as of last month. Glitches have hobbled its ability to communicate with air-defense networks - a critical failing given that JLENS' main purpose is to alert U.S. forces to incoming threats. The massive white blimps can be grounded by bad weather. **Ω**

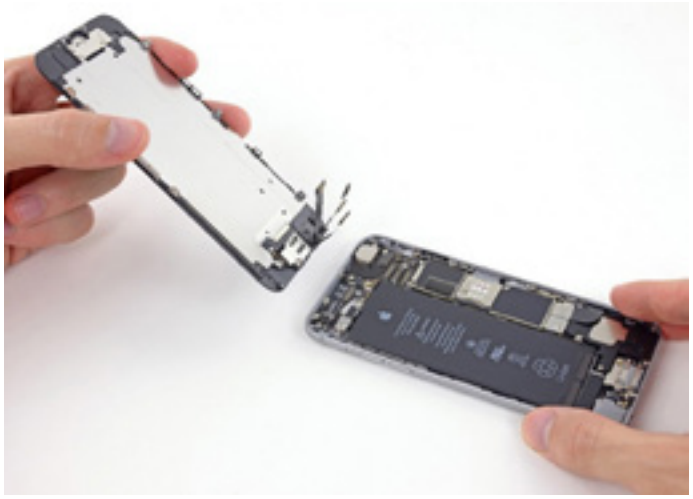
SHORT LINES

Helium leaking from massive earthquake fault under Los Angeles reveals giant rift Using samples of casing gas from two dozen oil wells ranging from LA's Westside to Newport Beach in Orange County, BofMines discovered that more than one-third of the sites show evidence of high levels of helium-3 (3He). It follows a report from the U.S. Geological Survey that has warned the risk of 'the big one' hitting California has increased dramatically. "The results are unexpected for the area, because the LA Basin is different from where most mantle helium anomalies occur," said Boles, professor emeritus in UCSB's Department of Earth Science. Considered primordial, 3He is a vestige of the Big Bang, and its only terrestrial source is the mantle. **Ω**

NASA Starts Ballooning Program In New Mexico Aerospace Technology (9/2) reports that NASA has begun its scientific ballooning program at Fort Sumner in New Mexico to assist with research in heliophysics, astrophysics, and planetary and Earth sciences. Balloon Program Office Chief, Debbie Fairbrother said, "the depth and breadth of missions flying during this campaign really show the versatility of balloon-based research platforms." **Ω**

Navy's FLIMMER UAV Will Be Able To Fly And Swim Network World (8/13, Cooney) reports that the US Naval Research Lab is developing a UAV that is able to "fly, land in the water and swim like a fish." In a new video about the FLIMMER UAV, Navy officials say they are looking at where to place "fins for underwater propulsion in order not to mess up the aerodynamics" and where to place the wings to ensure the hydrodynamics are not adversely impacted. **Ω**

RaD-X Balloon Flight To Help Confirm NAIRAS Model The Newport News (VA) Daily Press (9/1, Dietrich, Subscription Publication) reports that the Langley Research Center will be launching a science balloon from New Mexico to gather a "good, quantitative measure for exactly how much radiation" those flying receive, according to Langley's Kevin Daugherty. The Radiation Dosimetry Experiment (RaD-X) will collaborate with a German Aerospace Center research plane to confirm the first physics-based analytical model to determine biologically harmful radiation levels in aviation in real time. The model is called NAIRAS (Nowcast of Atmospheric Ionizing Radiation for Aviation Safety (NAIRAS), and will also be helpful in tracking the radiation exposure of astronauts at the ISS. The mission will also have 100 experiments from the Cubes in Space student program, which Daugherty said consists of "just about everything they can think of." **Ω**



Prototype iPhone 6 contains power system that creates electricity by combining hydrogen and oxygen Henri Winand, Intelligent Energy CEO, says "We have now managed to make a fuel cell so thin we can fit it to the existing chassis without alterations and retaining the rechargeable battery." After one week of the hydrogen-oxygen system powering your phone, you will need to refill the device with hydrogen through a readapted headphones jack. The reaction also produces a small amount of water and heat, which are eliminated through a vent. The company plans to make their product commercially available in the next two years. **Ω**

SHORE ESTABLISHMENTS:

Tillamook

Christian Gurling sent photos of two curious pits he found in the hangar floor, "I'm working to uncover the area and cover with plexiglass (creating a display for our visitors) but am attempting to locate more information... ...there is a pipe (pictured) that leads from the hole itself back to the East end of the hangar. And some of the equipment in the hole is labeled with the company Crouse-Hinds, which appears to manufacture electrical equipment. Any ideas?"

Ed. speculated the Crouse-Hinds power connections were not unlike the later designs used in the Orbiter Processing Facility. You'd want spark-proof power plugs in a floor pit likely to be subject to sinking gasoline fumes, if not liquid avgas spilled and of course water wash-down. Christian e-mailed back, "What do you think the power was primarily used for? ...It seems that we actually have two of these underground power stations. The other one is located directly across from the one pictured (on the other side of the railroad tracks). But these are the only two in the hangar (that I have seen so far). Yes, it would be interesting to know what their primary function was for during the war." Can any old hands help out here?

Christian also sent along photos of the hangar's helium compressor, whose impressive bulk and power-dimming current draw will contribute to the discussion re: in-flight helium compression. **Ω**

Moffett Field

Bill Wissel wrote about a past visit by "members of the RAB committee (Restoration Advisory Board, the oversight committee that has been managing the remediation of the toxic material and super-fund cleanup process at Moffett. When the board was negotiating what to remove, what parts of Hangar One to preserve, I told the RAB committee about the 'cork room.' It is (was) a long narrow room on the second deck where the spare gas cells for the *Macon* were stored. It was lined with cork to keep it cool. It had long narrow shelves along the walls to store the gas cells. And it had a sort of "meat hook" overhead rail crane for transporting the cells out of storage to the main hangar bay. I talked to Eric Brothers, he said there was never such a structure in Akron, as they never intended to "store" gas cells like that. Rick Zitarosa at Lakehurst told me that the Lakehurst Hangar One did have a gas cell storage room, but that it had been removed long ago. What's left of the cork room is now seen as part of the hangar frame." **Ω**

Request for Information (RFI) on Distributed Airborne Capabilities
Solicitation Number: DARPA-SN-15-06 Submission Title: Airship Flying Carrier
Author: R. G. Van Treuren, Editor, '*The Noon Balloon*'

The Naval Airship Association, Inc. (NAA), a non-profit corporation since 1984, encompasses members who strongly suggest the DARPA consider a buoyant platform for its vision of *"… a large aircraft that, with minimal modification, could launch and recover multiple small unmanned systems from a standoff distance."* These requirements can be met with the modern hybrid airship designs pioneered by Lockheed-Martin and quickly followed by Northrop-Grumman. The *Sky Tug* is currently undergoing certification, and the former US Army RZ-4A is expected to fly again with the Northrop-Grumman subcontractor, HAV, as a cargo airship demonstrator in the summer of 2016.

Conceived to carry outsized cargo and advanced sensor suites, respectively, the central "pickup truck" hull of either airship would be easily adapted to the UAS-carrier role. Background:


While the US Army pioneered hook-on flying, more than 80 years ago the USS *Macon* scouted enormous areas by deploying her five adapted landplanes some 200 miles abreast of the airship, without wheels, using homing gear. Her wheeled planes also transferred personnel and small cargo to the fleet and ashore. *Macon* could carry airplanes both internally and externally along the keel.

During WWII, two iconoclast officers published that America should build 20-mil ft^3 rigid airships, each basing dozens of planes for over-the-horizon strike capability. Comparing in price to "baby flattops" then being torpedoed by U-boats, the study presented powerful monetary, logistical and strategic arguments even when the possible combat loss of such airships were considered. That 1943 study correctly suggested larger, heavier airplanes than were practical for flattop vessels could be perfected simply by developing hook-on gear capable of greater differential speeds.


1944 saw launching a spotter/attack airplane rigged for unmanned remote control (left). A modified ZPG-2 became the "Flying Wind Tunnel" for aerodynamic research 1961-1962. The airship's stable slow speed during low altitude night calm allowed a suspended V/STOL airplane model to collect unique data.

"1. System-level conceptual designs, including affordable small UAS and airborne launch and recovery systems; feasibility analysis, including substantiating preliminary data if available."

The flying airplane carrier represents the most unique and capable of all Lighter-Than-Air (LTA) proven concepts. The carrier airship and her planes move in the same medium, so may choose any course for launch and recovery. Immediately offering a base aloft for today's UAS, the airship platform's aerodynamically-independent structure offers flexibility for future UAS enhancements. *"Keeping the cost of individual vehicles low is critical for a usable capability."* Slight modifications allowing existent UAS to operate from an airship will avoid expensive, time consuming new UAS designs. Respectable numbers of today's smallest and foldable-wing remotely-piloted vehicles could be housed in the airship hull. The airship's typical operating altitude and available airspeed ranges make it a natural to interact with UAS. Since many UAS recovery procedures involve a slow, flat approach to the ground, or a minimal altitude stall, or hooking on a line, they are already operating in a similar manner to the hook-on airplanes proven in practice long ago, with differential speed near zero. Since one UAS size or operating parameter does not fit all; various mission-specific types could be launched, recovered, serviced, and redeployed by the single airship. *"Small UAS have limited range and responsiveness, however, compared to larger airborne platforms."*

Historically, the only purpose-built parasite airplane for an HTA mothership was an expensive failure. The most capable remotely piloted planes are full size, yet these could be hooked on externally to an airship, with recovery equipment engineered to make their relative speeds compatible. Contrasting the typical one-mission airplane platform, built to accommodate a specific engine range, weapons system or payload, airship designers have flexibility to accommodate many missions and changing requirements.

"…volleys of small UAS from one or more existing large platforms (e.g., B-52, B-1, C-130, etc.)…"

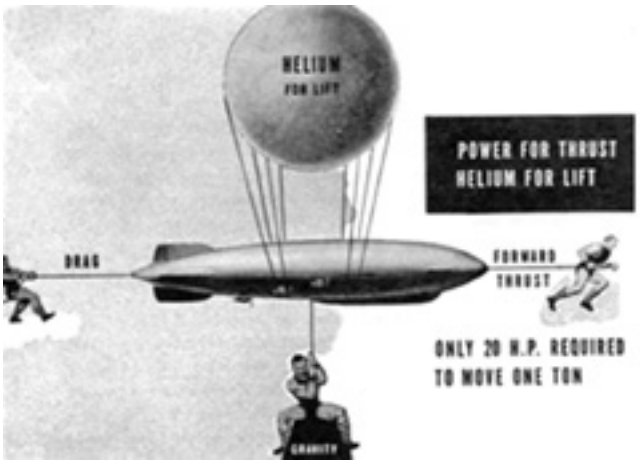
Serious technical challenges await those trying to match altitude and speed of two vastly different airplanes, particularly when one has to then be converted to become payload. Increased UAS capability while itself being limited by even the largest, highest-operating-cost fuselage tubes are design goals in conflict with each other. Today's largest airplane models - C-5B, 747-8, A-380 and AN-124 - have roughly the same overall dimensions and performance. They demonstrate the materials/propulsion-science barrier that cannot be breached in the foreseeable future, i.e. a larger airplane cannot be built to carry larger & heavier payload, owing to the "square-cube law." Just the opposite with airships; their "golden age" ended just as the last Zeppelin, LZ-130, had, at 7 mil ft^3, only then just equaled the lift/weight ratio of today's jet airplanes. Furthermore, In contrast to vibrating choppers or pressure-cycled airplane fuselages, the lightly-stressed airship's indefinite lifespan is assured with the easy replacement of accessories. Today's airship envelope life spans were once thought impossible, with 10 to 12 year service not uncommon using new fire-resistant, anti-UV ray fabrics. Life-cycle costs are comparatively low, especially factoring in mission longevity.

"… affordability vs. conventional approaches (e.g., Monolithic aircraft and payloads…"

Before launch and after recovery, when servicing or transporting UAS to & from theatre, the flying carrier is at heart a cargo vehicle. More than 95 years ago an airship flew 4,000 miles non-stop carrying 39,000 lbs. of relief supplies; it lifted off and landed in its own length. The largest helicopter ever built (retired prototype V12) could not duplicate that feat today. Furthermore, the elementary school science quiz trick question, "which weighs more, a ton of lead, or a ton of feathers?" is indicative of the underappreciated aspect of cargo density. A Norseman cargo plane can carry a ton of lead to the Arctic; it cannot fly a ton of insulating feathers. A 1970s study suggests a cargo density of 11 lbs./ft^3 was the economically practical airplane cut-off, but most manufactured goods weigh in less than 10 lbs/ft^3. Today's UAS weigh considerably less than 10 lbs/ft^3. At 8 lbs/ft^3 LTA is cheaper than a boat, even leaving out the cost of switching modes when reaching shore. A 1970s study showed airships to be 87% faster than merchantmen but only 13% slower than airplanes, an easy decision for most shipments even if the manufacturer was on an airport and the 3rd world target area had a friendly runway. LTA's typical one-half-G loads (compared with trucking's 8 Gs and train's 20 Gs) would insure fully assembled UAS would arrive ready to fight.

Even if profitably dense, cargo physically incompatible with the fuselage cannot fly. Thinking "outside the tube," the single AN-224, at the limit of the square-cube law, represents HTA's maximum ability to carry outsized cargo. Fully loaded, it requires a two-mile takeoff run.

The carrier airship, whose lift consumes no fuel, will become ever more financially attractive to operate than when a 1970s study showed LTA's highly competitive ton-mile costs. A 1946 study pointed out the flying boat required 100 hp to move one ton, five times as much as the rigid airship. (The four diesel engines of *Graf Zeppelin* (LZ-130) totaled 4,400 hp vs. the *Mars*' 12,000 hp.) Noted a LZ-129 passenger, "Eating up less than $300 worth of crude oil, they propel across the Atlantic, 50 passengers at $400 each and 26,000 pounds of freight at $1 a pound. A very tidy sum of money to receive for an average of little more than two day's work!" A 1980s study pegged LTA fuel consumption rates eight times as efficient as jets of the day with comparable loads.



Inherently more cost-effective, a carrier airship has the edge on safety as well. Since the airship is submerged in its operating fluid, at rest, unlike an airplane, it becomes part of the atmosphere surrounding it. Like the simpler manned balloons that have floated around the world, disturbed air brings no harm to the craft; airships were the original all-weather flying vehicles. Reliance on engines to maintain altitude, unforgiving structural integrity, dependence on unobstructed forward speed and intolerance of landing options repeatedly checkmates the most sophisticated and expensive airplane safety efforts. (A cargo airplane was recently lost due to software issues.) Propulsion independent of forward speed for altitude maintenance is the airship's overwhelming safety advantage.

Frustrated by its airship adversary's repeated locating and tracking the submerged USS *Sea Poacher* during 1950s wargames, when the blimp's engines suddenly quit, the sub crew took delight in towing the airship and crew safely back to Key West.

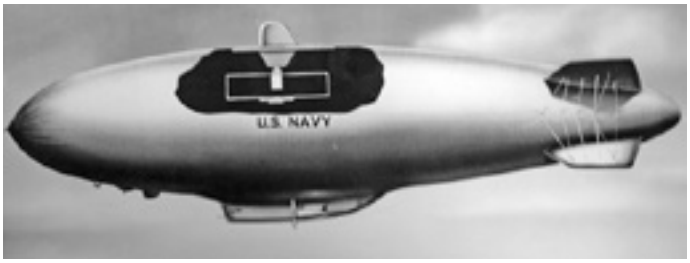
Training to operate an airship is much more tolerant of the types of errors that wrecked 12,506 Army airplanes, killing 13,624 crewmen, without firing a shot at the enemy in WWII. While a few training airships were damaged, no LTA cadets or instructors were lost in WWII training. *"…enhanced effectiveness and survivability via collaborative operations among multiple small UAS."* By surfing the edge of storms and fronts, Zeppelins picked up speed without expending energy. The 242-ton *Hindenburg*, with a load of passengers and freight, once made a ground speed of 90 mph – and we must remember passengers opted for airship travel to avoid seasickness. The art of sailing in ocean currents of air is one that will be re-learned. In the end, no storm can chase down an airship. Course decisions are those of the operators. Modern radar, GPS and ADS-B are as beneficial to LTA as HTA.

'Project Lincoln' was described by All Hands, "…five airships manned an AEW station continuously for 10 days. Weather was the area's worst in years with combinations and variations of ice, snow, rain, fog and 60 knot winds… One airship flew in continuous icing conditions for 32 hours; another was airborne under similar conditions for 56 hours. Takeoffs and landings were made with ceilings under 100 feet during snowstorms, and with winds from 30 to 50 knots… Conclusion? Blimps could relieve each other on station during a period when weather had grounded *[all]* other types of military and commercial aircraft."

While it seemed the cumbersome "blimps" would be easy prey for heavily armed and highly maneuverable adversaries if they met, actually no more than two non-rigids in each armed force operating them were lost to enemy fire in both World Wars. In spite of thousands of hits, no blimp has ever been lost to small-arms fire. Defensively, airships will always be able to carry larger, more capable defensive systems than could otherwise be carried aloft against them. Today's would-be attackers would find targeting an airship difficult, since radar emissions likely pass right through the envelope. Already low infrared signatures would be easily masked with beneficial H_2O recovery. Even a purpose-built weapon would likely only cause retirement to "retirement" mode, with a good chance the crew could escape injury. Sighting from the "high ground," the

carrier airship response need not be limited to target illumination, chaff and flare decoys; airships launched standoff weapons, including unmanned gliding explosives, more than 90 years ago.

"High-payoff operational concepts and mission applications for distributed operations concept and architecture; relative capability…" The multi-billion dollar cost of today's CVs, whose flattop deck space is divided between strike and self-preservation in spite of a fleet of expensive escort vessels, strongly encourage the concept to be revisited. Most important, the carrier airship need not pass UAS control to or from a remote pilot; it could additionally act as both its own Air Traffic Control and Combat Information Center. A 1980s study determined a 100 foot UHF antenna with low side lobes could achieve a 1-2° azimuth beam width, impractical for airplanes to jam. Even more unlikely for HTA, a long-wave 1,000 square foot antenna lofted to 10,000 feet would extend today's 25-nautical-mile radar horizon out to more than 120 miles, easily tracking individuals in a swarm of deployed UAS.



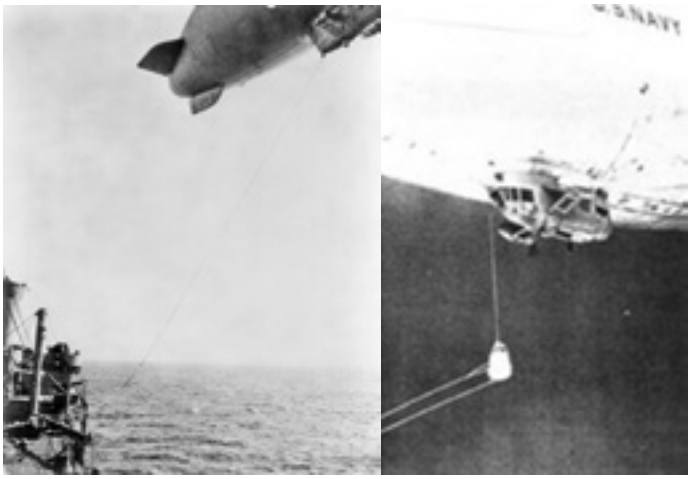
Late 50's Navy AEW airships featured a high-res 40-foot wide antenna (right, on test stand) rotating inside the helium space. Right out of the factory the first ZPG-3W held CINCNORAD station for 49.3 hours. Others stood in for Washington, D.C. ATC for a week. A concept was dubbed "airborne AEGIS" and could direct war fighting from surface groups.

A recent avionics suite for the Blue Devil II airship contained a supercomputer capable of sifting through massive data streams taken from Wide Area Surveillance Systems to glean critical information in time for it to be useful. Vital for today's increasingly joint operations, the buoyant switchboard platform could transfer secure communications, translating incompatible formats relayed from spacecraft, beachhead stations, airplanes, unmanned aerial vehicles, and vessels at sea.

Phase differences from antennas placed bow and stern would enable interferometric processing, yielding three-dimensional data on a single pass. Going silent in drift mode, the airship would be a stealthy target to track. The dirigible's airless displacement hull offers a benign environment for electronics. Gentle takeoffs & landings coupled with vibration-free, low noise operation guarantees longer deployed life for both operators and their equipment. The airship platform offers demonstrated game-changing mission length and persistence. The first production ZPG-2 easily set an eight-day endurance record right out of the factory.

During Operation "Whole Gale" ZPG-2 pilot Lundi Moore recorded: "0820 29 March 60: On the mast. Fuel 2,605 lbs. All systems still operational, including the crew, except withdrawal symptoms for some when the tobacco ran out… Shot a picture of the whole crew. It's only 95.5 hours – hardly much to write home about alongside the long ones by CAPT Eppes [200] and CDR Hunt [264]. At least it was strictly operational."

Another ZPG-2 holds today's combined powered, unreplenished endurance record of 264.2 hours, a 9,448-mile mission completed more almost 60 years ago. When onboard stores are finally exhausted, the airship does not require the specialized facilities or single-purpose vessels demanded by airplanes.



Demonstrating indefinite mission persistence via replenishment from flattops late in WWII, the 1935 K-ship design was later updated to refuel via winched hose from ordinary oilers (left). Late 1940s ASW designs added rearming, bladder refueling, and even crew exchange (right) from non-aviation combat Fleet units.

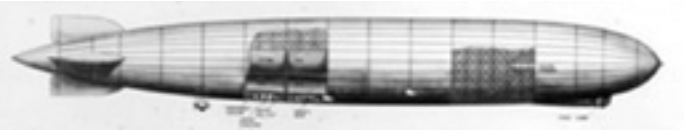
Two World Wars challenged airships in many hemispheres, with these craft comparing favorably against HTA ops in real-world conditions, including snow-packed and flooded runways. A modern hoverpad-gear airship carrier would be even more flexible. Mechanized ground handling equipment had already reduced personnel requirements; today's Zeppelin NT is routinely ground-handled with four people and a masting truck.

British "SS" airships were based in simple berths hewn from forests near coastal trade routes. Their "base" was little more than some tents and a hydrogen generator. K-ships arriving in Brazil were secured to moorings cut from local jungle.

Goodyear-California operated from a stick mast for 14 years with a single envelope, its occasional hangar visits for washing and routine maintenance being the rough equivalent of an ocean vessel's need for a drydock. In contrast to extensive infrastructure ashore and manpower-intensive billion-dollar aviation-capable seagoing vessels, the carrier airship has relaxed operational demands. Impossible to run aground in narrow straights and leaving submarines behind, the airship UAS carrier would be the ultimate cost-effective forward presence.

No ocean-going vessel to base airships operating with the fleet was ever purpose-built, although an oiler was once equipped with a mooring mast to support scout rigids of the late 1920s / early 30s. The oiler/tender USS *Patoka* supported the USS *Los Angeles* away from her hangar for nearly a month during 1931 Caribbean war games. WWII ended before a proposed K-ship harbor-based mast setup duplicating WWI British experiments (right), could be tested.

Though airship art is only now being re-learned and refined, the future holds great promise when one adds past achievements to modern materials and techniques. Current DoD alternate fuel initiatives go beyond eco-friendly public relations; they are based on legitimate concerns about the availability of affordable energy based on non-renewable oil and its expensive, habitat-destroying food-based alternatives. The common problem of refined petroleum offering the greatest energy density by volume complicates alternatives' employment in HTA. It's just the opposite in LTA where bulk is less relevant: Gaseous fuels' far greater energy density by weight enhances performance. Daytime electrical loads could be shared with printed solar cells mounted on the airship's large upper surface area. With some UAS testing fuel cell powerplants, the carrier airship also offers the promise of being able to use the same fuel as Ion Tiger and subsequent electric UAS. Adding to the safety of altitude maintenance immune from propulsion failure, the adoption of fuel cells would generate electrical power independent of propulsion RPMs for greater flexibility, as demonstrated by the battery-less Space Shuttle. If carrier airships follow the lead of their submarine counterparts toward hydrogen power, they become energy independent.



LZ-127 (above) *Graf Zeppelin's* 10 year accident-free globetrotting success was in part due to small tankage of liquid gasoline used only to regulate her static condition. "Blau gas," a propane-like air-weight mix carried in bags beneath the hydrogen cells, allowed the ship to cross the Pacific in 1929 in the same aerostatic condition liftoff to landing. Today, hydrogen-rich liquid ballast is already proven to provide storable lift to ease the day/night, sun-heat/cloud-cool, precip/dry cycle.

Their home base will produce its own lifting gas and fuel, even if that base is a nuclear-powered vessel of the ocean-going Fleet.

"This RFI also seeks rough order of magnitude (ROM) cost and schedule information to assist in planning a potential future DARPA program in this area." As to the initial as yet-unset price of the LMZ1M, the entire Lockheed airship program has been internally funded without Government contract, with the goal of delivering vehicles affordable to commercial operators. Though the US Army RZ-4A's design and prototyping was funded by the taxpayer, its current owner expects it to play a role in the civilian cargo market. *"…demonstration events to evaluate program progress and validate system feasibility and interim capabilities, and culminating in full-system flight demonstrations… Program plans for achieving a rapid yet compelling system demonstration within four years."* The Navy's MZ-3A is immediately available to carry on small proof-of-concept individual component testing, with Lockheed's P-791 prototype likely available for somewhat larger component development and testing on short notice.

Lockheed pilots, using their simulator calibrated with scaled-up real world data from their P-791 flying prototype, are expected to have little trouble acclimating to their forthcoming *Sky Tug* airships even on their initial flights. Having entered the certification process more than a year ago, the LMZ1M is closest to full production.

Design & construction of UAS launch, recovery and stowage elements for a demonstrator could run in parallel to the cargo airship construction line, for the shortest possible development time.

LTA's contributions to air progress predate its creation of structural duraluminum developed to support the rigids' construction. Lifting gases' assentive force overcame bulk, weight, and aerodynamic unsuitability for countless breadboarded prototype systems, which were then refined for HTA. However, even if the DARPA considers the hybrid airship only as a refinement tool for some ultimate HTA UAS-carrier plan, the DARPA, like any organization considering LTA applications, will probably contend with an inexplicable entrenched prejudice against anything that utilizes simple aerostatics.

The last major DARPA airship program briefly configured NASA Ames' six-degree of freedom simulator (right) and found pilots could re-learn the art of sailing our ocean of air. The program was terminated when a WWII-era timber hangar housing the demonstrator was ignited by a welder's torch and burned to the ground.

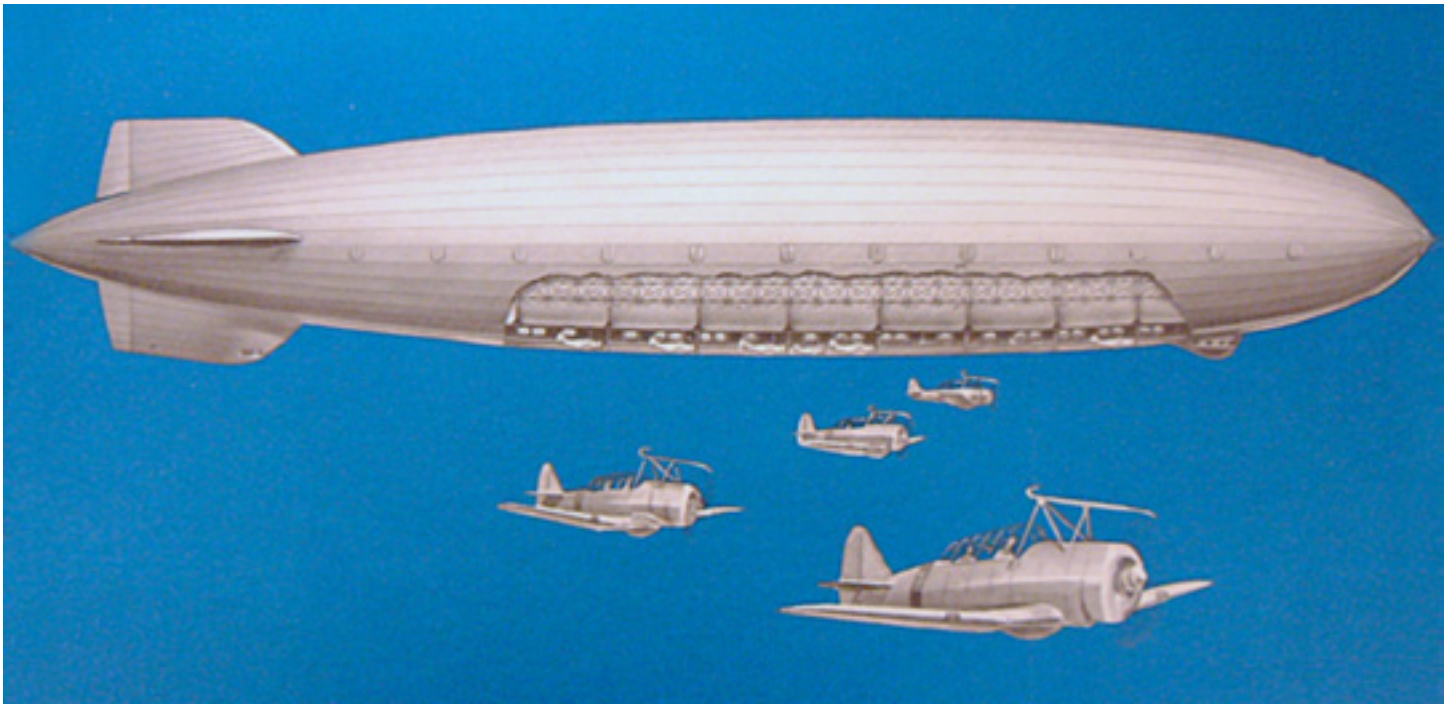
Seemingly, only the most cacophonous machines guzzling fuel and belching pollutants while rushing forward to defy gravity meet the "cool" description. CAPT Marion Eppes, senior LTA officer in 1959 as the last Navy airships were being delivered, noted, "The unaccountably low esteem held for blimps by many naval officers… has created an atmosphere wherein one who 'goes to bat' for airships is often under some suspicion as to his intelligence or his basic loyalty to the Navy…the operations of ZW-1 during a period of more than two years have given indisputable proof of the value of the AEW airship." LTA advocates at DARPA would seemingly face similar career-limiting prejudice.

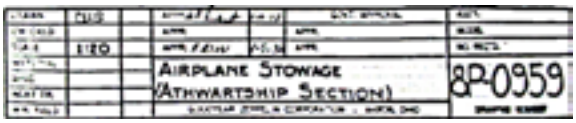
This past decade, however, has seen both the cargo airplane's practical limits reached, and the aviation marketplace evolving elsewhere. Boeing has no new orders for its 747-8, and it was said Airbus will only reach break-even if they manage to sell an unlikely one hundred A380s. Lockheed-Martin, quite aware they could not compete with an L-1011 update, was the first major player that recognized LTA as its best hope for profits in today's cargo aircraft market. In an unprecedented expenditure of private resources for LTA, L-M developed and flew an entirely new prototype hybrid airship. Complex reasons caused the Army's contract award system to choose Northrop-Grumman to produce the LEMV. Their teams' flying prototype nonetheless reflected similar design conclusions, and HAV expects to use the flown prototype on the road to profitability. The civilian market could soon support either one or both of these efforts on their respective sides of the Atlantic. DAPRA can allow the US taxpayer to take full advantage of the considerable time, expertise and funding already expended to date, by building a modest, affordable modification to accomplish the ultimate goal of this RFI.

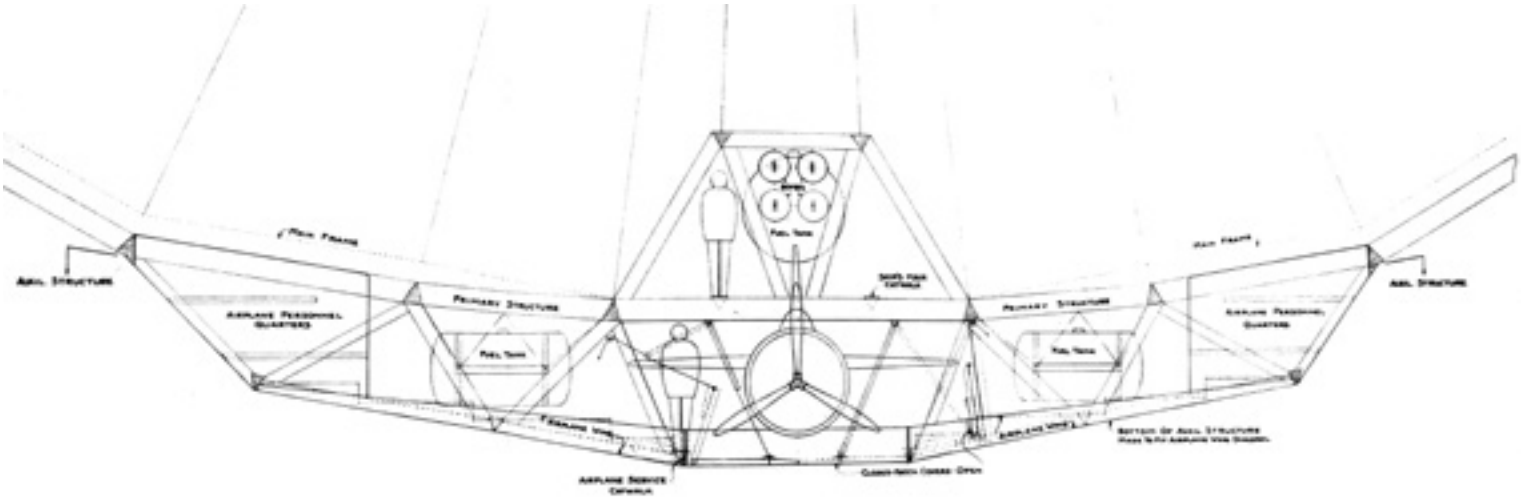
Privately funded Goodyear advertising blimps were commandeered and crews recruited for ASW duty on both coasts in 1942. Today, relatively small initial expenditures adapting the new hybrid airships for Distributed Airborne Capabilities would accelerate private cargo airship investment, encouraging a future "Fort To Foxhole" lift capacity to soon become part of the Civil Reserve Air Fleet – at little continuing cost to the taxpayer. Ω

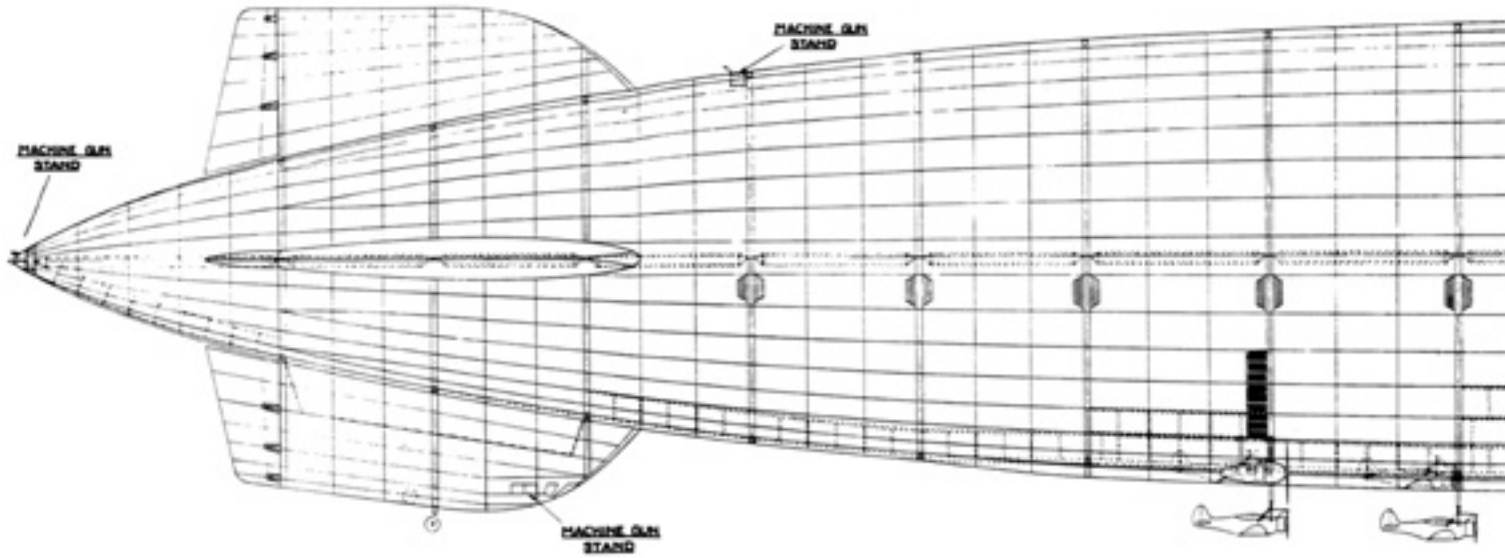
[End of DARPA RFI]

The drawing below first appeared in a Goodyear P.R. booklet 1939-40 (date judged by the composite photos showing K-2 patrolling the Panama Canal) showing F-9C2s in the foreground. It was updated at least once with the BT-13/SNJ like envisioned hook-on airplanes seen here. Their ultimate flying carrier design is presented on the following pages, the first time these detailed drawings have ever been published anywhere.




AIRPLANE STOWAGE
(ATHWARTSHIP SECTION)
8P-0959


AXIL STRUCTURE
AIRPLANE PERSONNEL QUARTERS
PRIMARY STRUCTURE
FUEL TANK
AIRPLANE SERVICE CATWALK
AXIL STRUCTURE


MACHINE GUN STAND
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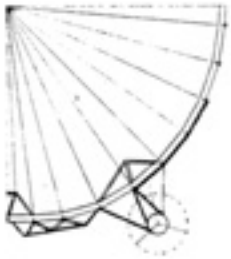
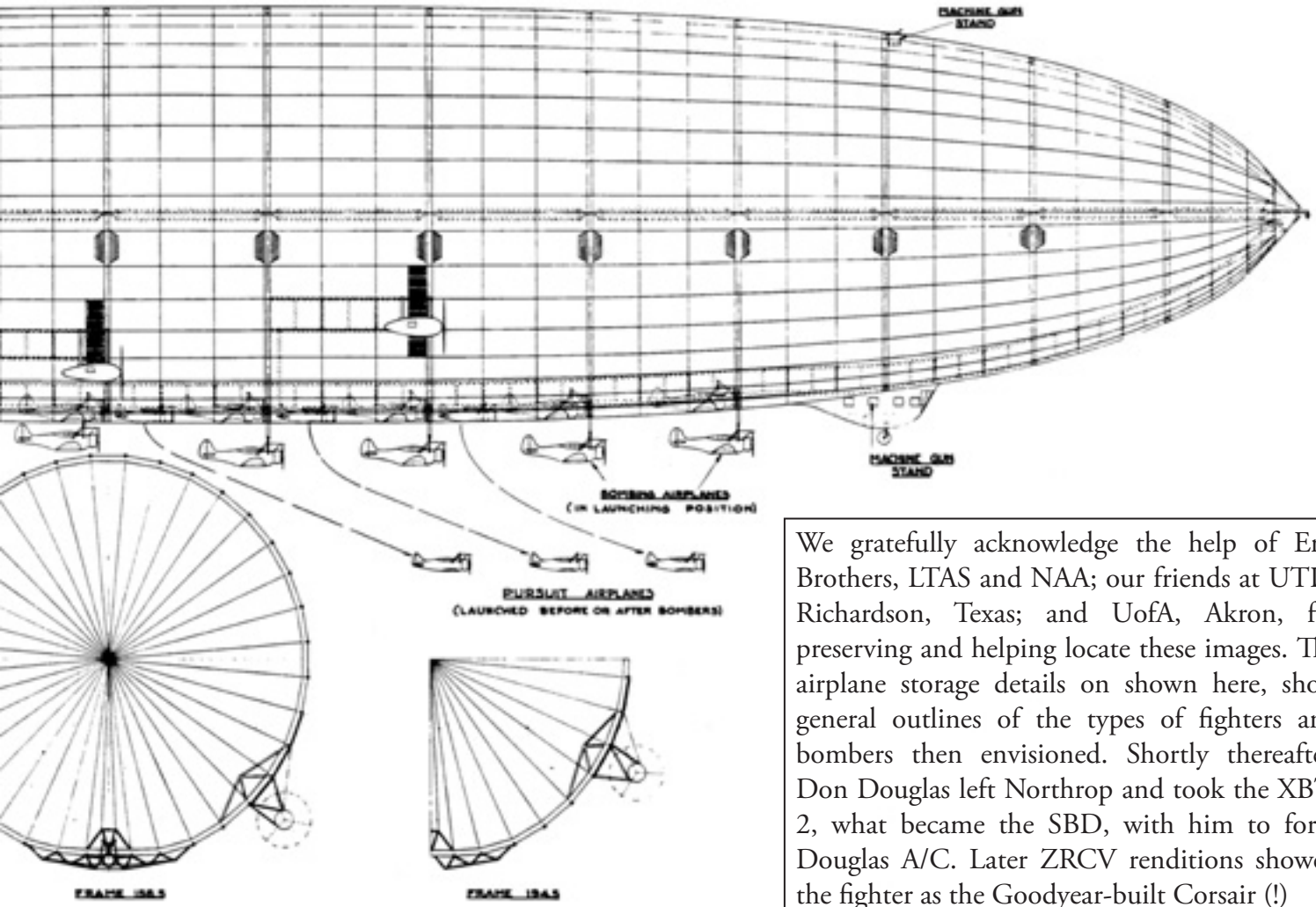
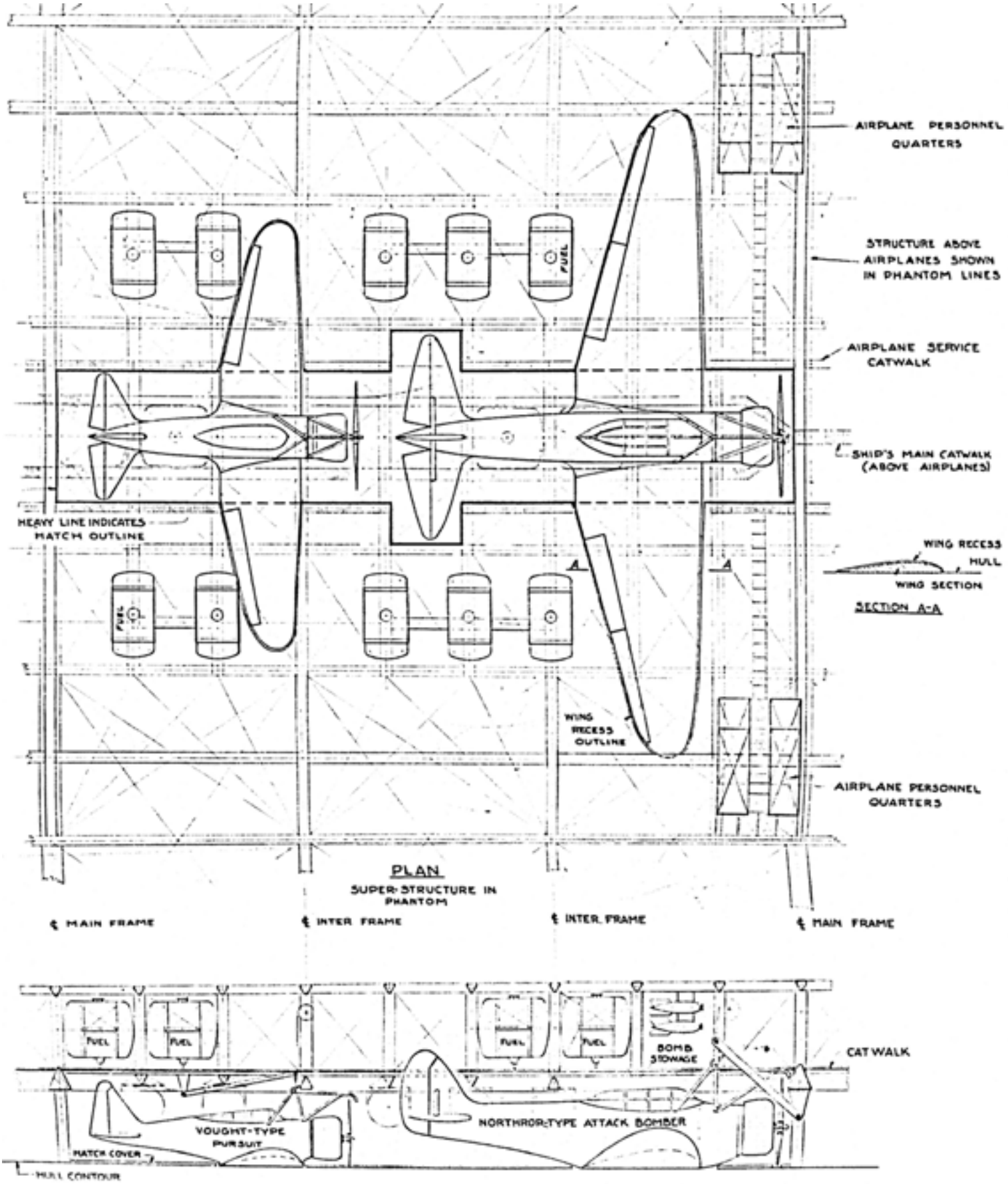


Their ultimate flying carrier design, as engineered by Goodyear Aircraft in 1935-37, shown here as approved in January 1938, was repeatedly revised in the coming years. This previously unseen photo, from the Rosendahl Collection at UTD Dallas, is another view of the quiet presentation made in 1944 to then-RADM Rosendahl and CAPT C.V.S. Knox (not in this shot), though ZRCV had no chance under the Roosevelt administration. Note the "bow planes" hull revision tacked to the back wall. Goodyear's Litchfield and Arnstein have their backs to the camera.



We gratefully acknowledge the help of Eric Brothers, LTAS and NAA; our friends at UTD, Richardson, Texas; and UofA, Akron, for preserving and helping locate these images. The airplane storage details on shown here, show general outlines of the types of fighters and bombers then envisioned. Shortly thereafter, Don Douglas left Northrop and took the XBT-2, what became the SBD, with him to form Douglas A/C. Later ZRCV renditions showed the fighter as the Goodyear-built Corsair (!)


AIRPLANE PERSONNEL QUARTERS
STRUCTURE ABOVE AIRPLANES SHOWN IN PHANTOM LINES
AIRPLANE SERVICE CATWALK
SHIP'S MAIN CATWALK (ABOVE AIRPLANES)
HEAVY LINE INDICATES MATCH OUTLINE
WING RECESS
HULL
WING SECTION
SECTION A-A
WING RECESS OUTLINE
AIRPLANE PERSONNEL QUARTERS
PLAN
SUPER-STRUCTURE IN PHANTOM
℄ MAIN FRAME
℄ INTER FRAME
℄ INTER. FRAME
℄ MAIN FRAME
FUEL
BOMB STOWAGE
CATWALK
VOUGHT-TYPE PURSUIT
NORTHROP-TYPE ATTACK BOMBER
MATCH COVER
HULL CONTOUR

Lighter-Than-Air Aircraft Operations
By Rear Admiral Harold B. Miller, USN (Ret) [photo, above]

This is quite a title! It might be "HTA and LTA" or it may even be "HTA vs. LTA!" But, the idea is correct and I propose to discuss the operations of a heavier-than-air machine which is launched or recovered by an airship in flight. This covers such things as gliders and airplanes, and I would consider the "spy basket" to be part of that system. I am sure that in an audience such as this there are proponents of airships. Should my discussion cross the line into a discussion of the merits or detriments of airships - so be it.

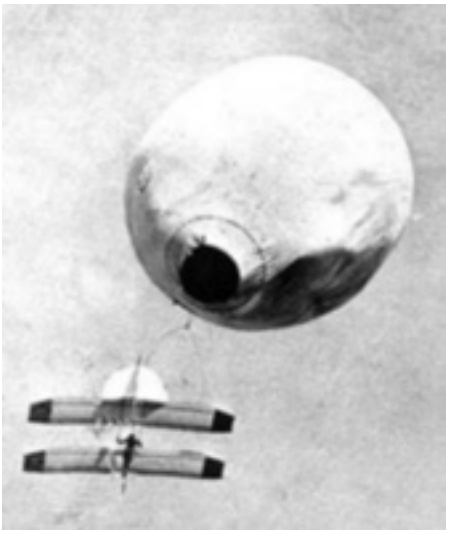
The basic thought behind this operation was to provide the airship with some means of dispatching scouts for reconnaissance, or fighters for protection, or even taxi aircraft to transport passengers or cargo to and from the airships, freeing the ships from the necessity of docking at frequent intervals and making them relatively independent in flight. It is clear, however, that whatever the mission of the airship, the carrying, launching, and recovery of aircraft must be an integral part of the design and operation.

Obviously, there comes to mind two possible missions for an airship. The first, of course, is military use, and the second is the transportation of freight and passengers in the course of commercial operations. To be sure, believers in lighter-than-air craft advocate many other missions. I was simply amazed to see a publication the other day cover uses of airships I had never dreamed about, such as dusting of crops, planting of seeds, and things of that sort, but, utterly impractical.

A certain amount of romance surrounded the work of the heavier-than-air units attached to the *AKRON* and the *MACON*. Certainly it was a unique operation, which excited onlookers as they saw the tiny airplanes being swallowed up into the belly of the airship, while equally exciting was the sudden dropping of a tiny fighter airplane from the huge hull. The fact was, however, that those sun-worshippers on the beaches along the New Jersey and California coasts were seeing merely the ultimate development of an idea which was nothing new.

At the beginning of the century, balloonists plied their trade at all county fairs. Frequently they rode the balloon down but often they bailed out in a parachute. The aeronaut, Professor Montgomery, at Santa Clara, California, actually carried gliders aloft in balloons and released them. That was the first case I could discover of this particular operation.

[Editor's caption: John Montgomery's HTA contraptions killed pilot Daniel Maloney in 1905 and the "Professor" himself in 1911. Montgomery's heirs sued to invalidate the Wright brothers' patent, arguing John had the first controllable HTA machine. They lost. To this day, few people realize the Wrights used a catapult to launch their underpowered *Flyer*, and it is considered sour grapes to mention how many men were killed by the early Wright machines.]



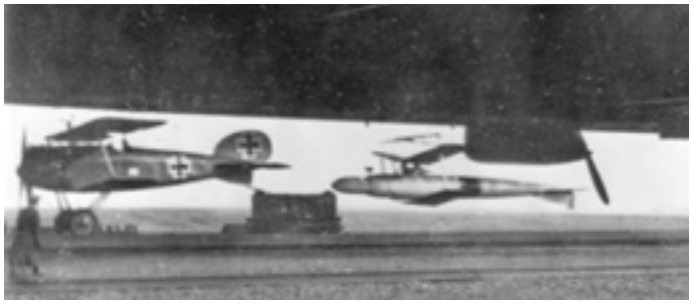
Perhaps this inspired the well-known Brazilian aeronaut, Santos Dumont. Although he did most of his flying in France as an airship pilot, he also qualified as a heavier-than-air pilot--when he could get into the air, as witnessed by this slide [*above, right*]. He found almost insurmountable problems in endeavoring to fly his Hargrave-type boxkite [- *based airplane*] into the air from the ground. Being a LTA pilot, he conceived the idea of attaching the airplane to his airship number 14. In this way he hoped to get the airplane into the air with flying speed at which point he would release it and have a little flying experience that afternoon. As is true of so many great ideas, the equipment he had to work with was unequal to the task and that combination of HTA and LTA never got off the ground.

[Editor's caption: Santos-Dumont also made the first purely HTA flight in Europe. Many also thought actual liftoff <u>without</u> catapult, and full control, predated the Wrights' eventually similar achievement; Wrights were still using a catapult in 1908, the year Glenn Curtiss made the first <u>publicly witnessed</u> flight in the US.]

As early as 1912, Count Zeppelin discussed the feasibility of using airplanes in conjunction with his Zeppelins - his large airships. Already some of his airships were being used for passenger carrying in Germany. As a matter of fact, although this operation started as a sightseeing venture, it did blossom into a rudimentary sort of a scheduled airline. The Count foresaw the ease with which passengers could be transported by airplane to the airships. L-3 carried a plane aloft and launched it in the vicinity of Berlin.

Shortly afterwards, World War I put a stop to these dreams, since the Zeppelins were enlisted into the war effort. But this novel idea emerged again in 1915 in connection with the carrying of fighters aboard airships. Two years later a plane was carried aloft and launched in the vicinity of Berlin. Captain Strasser, the Chief of German Naval Airship Service, who sponsored the idea of launching this fighter, unfortunately was killed in the [*shooting down*] crash of the L.70, and this ended the development of the German efforts with an aircraft. They did, however, come up with a variation idea in which mounted wings on a torpedo and launched it on target. [*Photo, next page*.] It had no particular accuracy and the project was dropped and the Germans again resorted to bombs.

[Ed. Caption: Both HTA units described, hanging below the Zeppelin's hull, are seen in this photo, courtesy the late Douglas Robinson.]

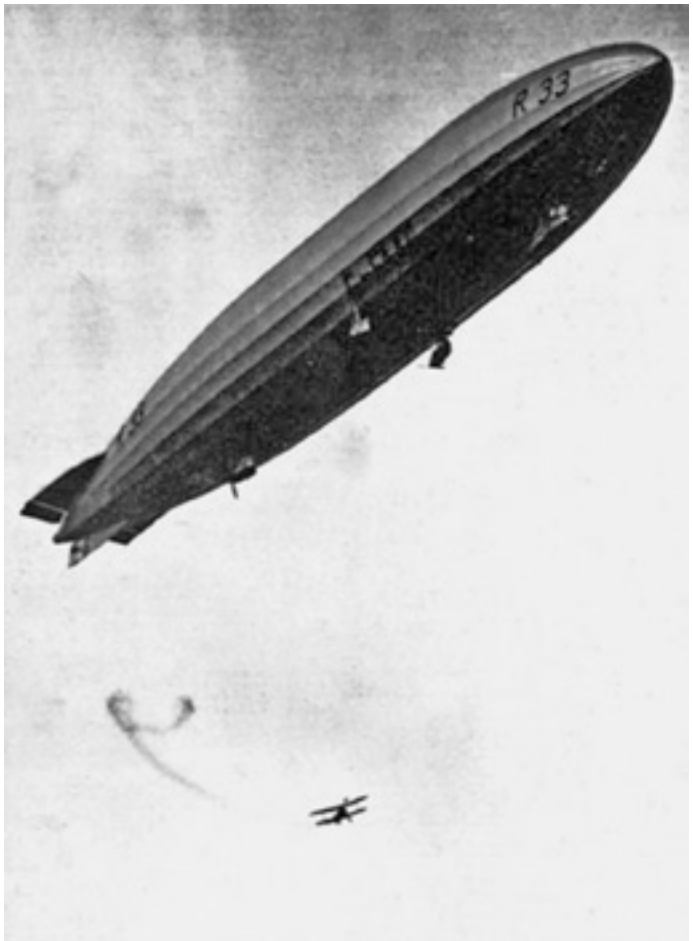


The Zeppelins were giving the British problems, for the airships could out-climb the low-powered British fighters. HNAS Squadron Commander [*W.P de C.*] Ireland, unconsciously turned the pages back to Santos Dumont and reconceived the idea of attaching a fighter aircraft to a non-rigid envelope [*photo below*]. On the approach of the Zeppelins, he proposed to launch this hybrid aircraft to achieve altitude, conserve fuel, and [*then drop off to*] attack the airship.

[Ed. caption: Squadron Commander Ireland's creation, above, appears to have utilized the envelope of an SS-type airship.]

He not only planned projects but he executed them. It was February 1916, when the experiment was carried out with Wing Commander [*Nevil F. Usborn*] acting as observer and Ireland himself piloting this odd craft. They reached their ceiling, and the pilot pulled the cables. These failed to release evenly and the [*HTA*] pilot was thrown out to his [*drowning*] death. The whole mess floundered to the ground killing [*Ireland*].

The British, who had become enamored with airships, then began to plan to carry airplanes on their few airships. In 1918, the R-23 launched an unmanned Sopwith Camel with locked controls. The plane went into a perfectly normal glide and made a very respectable landing. Shortly afterward, the same airship launched a Camel with an R.A.F. pilot, F. O. Keyes, at the controls. Although the launching was successful, no effort was made to recover the airplane in flight. With the end of the war came a slowdown in LTA operations and the experiments were discontinued [*for years*]. Seven years later, the British again worked on their lighter-than-air airplane combination. They made several launches and succeeded in making one landing [*sic*] aboard the R-33. Interest in this work came to a halt.



[Editor's caption: Motion pictures appear to verify that this test shown was only a drop-off from R.33, no "landing."]

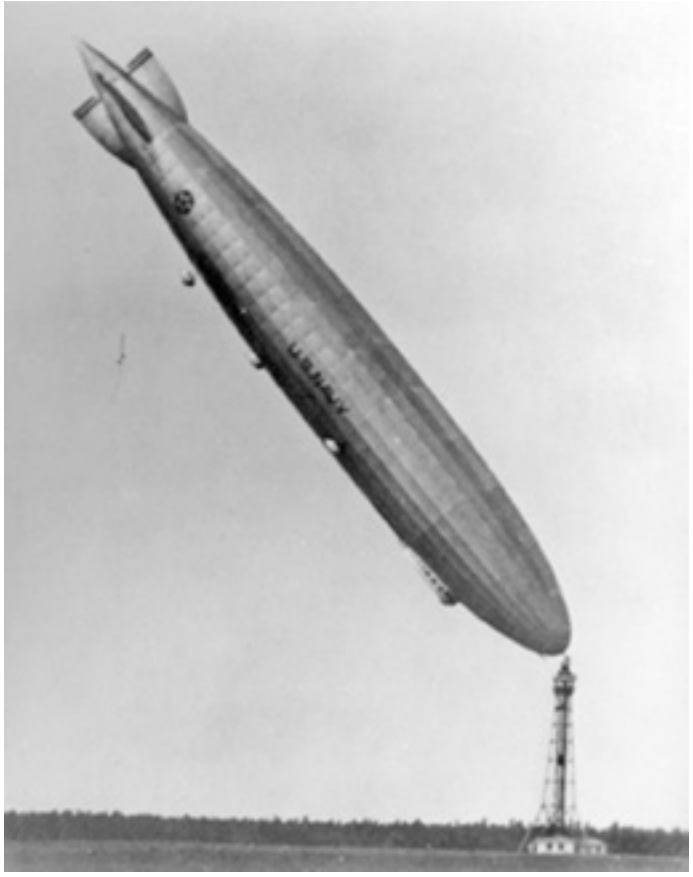
It is now the summer of 1924, and the scene shifts to the United States where the Army Air Corps began to experiment with non-rigids and the launching of radio-controlled aircraft armed with bombs. From this idea evolved a set of orders to

First Lieutenant Clyde Finter to proceed to Scott Field, Belleville, Illinois, for the purpose of "testing apparatus for hooking Messenger airplanes to airships." [*Photo, below*]

[Ed. Caption: In addition to the TCs, US Army hook-on experiments were also conducted with the larger D-type airship.]

The non-rigid TC-7 was a bit under 200,000 cubic feet capacity. The Sperry Messenger, which weighed about 900 pounds, carried a pyramidal structure with a horizontal guide bar reaching out over the propeller. Lowered from the ship was a trapeze bar which carried the plane [*as it was lifted skyward*]. The plane was launched in flight. No problem there whatsoever. Finter then endeavored to recover, and that became a difficult problem owing to the lunging airship. If the pilot hit the trapeze too hard, he went right through the automatic releasing gear. He went through and kept on going. That happened three or four times to the point the pilot gave up. It was a month later when they made another effort along this line and actually had one successful [hook-on] landing. This success closed out the Army experiments at that time. The U.S. Navy was given the responsibility for the development of rigid airships, hence the Army was dealt out of that type of an operation, and they discontinued their efforts. But they actually had made the first [hook-on] landing on a lighter-than-air craft with this little operation right here.

In the meantime, in October 1924, the USS *Los Angeles*, the ZR-3, was added to the U.S. Navy list as war reparation from the Germans. This shot [*photo, below*] demonstrates one of the problems we had with the airships. This is a high mast, as you can see. The only portion of the ship touching the earth is through the nose cone, which means that she is nothing but a windsock. She's free to swivel around in the wind with the tail high in the air. You actually had to fly the ship even though she was moored to a mast.



[*While*] doing that--you kept her in equilibrium, using ballast to meet whatever the conditions were.

Interest was aroused in the Navy in the use of heavier-than-air with lighter-than-air. The Navy didn't know quite how to go about this thing. They discussed using a straight wire loop as a trapeze, but finally, after considering all previous work the Army had done, adopted a firm and rigid trapeze-type of gear. Now with the *Los Angeles*... a very fine airship in operation... a start was made by the Navy. It was in July 1929 when a Vought, the old UO-I you may recall, piloted by Lieutenant Jake Gordon, flew under the *Los Angeles*, but after several nibbles, he found that he was unable to secure the plane to the

trapeze. The project personnel then took a month off and played around with more ideas. Once more they tried, and this time Jake Gordon had no difficulty making three firm landings. [*Photo, below*] This was considered pretty good.

Two other pilots, Nicholson and Stevens, were able to make successful landings, and before the year was out some 20 landings had been made. By this time it had passed from the experimental and it was well into actual operation.

[Editor's caption: In addition to the UO-1 in this photo, the N2Y-1s and the XF9C-1 also tested the ZR-3 trapeze. ZR-3 was grounded for economic reasons before the F9C-2 production was complete.]

The experience learned from this particular operation was built into the *AKRON* and the *MACON*--the trapeze gear and all the accessory gear was accepted as practical for use with the fleet. We now move into the airship as we know it--the large rigid type airship--the *AKRON* and the *MACON*. Many of you are familiar with these particular ships but let's look at one of them, in this case the good old *AKRON*--an enormous thing. [*Landing/masting*] this made it a very difficult operation.

[Ed. Caption: ZRS-4 and her two airplanes visited Sunnyvale/Mountain View when the site had little more than a mast and mooring track circle, as construction of Hangar One had only begun a few months earlier.]

You may recall when she took off on this particular flight, two men were lost [*at Camp Kearny, near San Diego*]. They held on to the lines too long and were carried aloft, falling to their death. Now down below [*photo, above*] is Sunnyvale. I made a point about the airship and the high mast being a bit of a problem. [*Later, planes could be sent out for landing ballast. If still light after all planes taken aboard, the ship could*] drive to ground [*to be winched in and*] hook up water lines [*pumping ballast aboard*]. Now if only we could get the tail of the airship down on the ground, lower the whole operation, and say, set it on a railroad car of some sort... a heavy weighted car, and put that on a circular track, then you'd have your ship moored to the ground, free to rotate with the wind. It would be a great operation. That's the way we finally came to the low mast and the circular railroad track. You can see the mooring mast [*photo, above*]. The ship would be towed out, moored in the center of the mooring circle and she was then free to rotate.

[*Now to the smaller aircraft*], there are several remarkable things about the [*F9C-2*] airplane. It was built because the Navy wanted to get more airplanes on its surface aircraft carriers. This meant that you

had to have either a small airplane or you had to have folding wings. It was even proposed, at one time, that you stow airplanes on the deck by putting horses under them at, say, a forty-five degree angle of stowage. Anything to get more airplanes aboard.

[Editor's caption: The XF9C-1 prototype, showing its lower wing and high-pressure tires designed for carrier landings.]

This Curtiss fighter was the result of effort to design a small airplane to get the maximum number aboard ship. Fokker was in this competition with Berliner-Joyce as the third one. Of them all, none were successful as a carrier aircraft.

[*The Sparrowhawk*] is one of the most beautiful airplanes ever built. Not only was it beautiful from a visual point of view, it was a beauty from an operational point of view. The Navy had no restrictions on it... terminal velocity, greatest stunt fighter ever built, because it had no [*large*] dimensions. It had a twenty-six and half foot wingspan. It weighed something just under 3,000 pounds, [*with a*] 450-horsepower Wasp. You could do anything with it.

This picture [*below*] happens to be me. I brought it because of the hook [*visible in center*] which was the key to the whole operation. The hook is similar to the one used earlier by the Army. The bar stretches out over the prop to prevent [*it*] hitting the trapeze while trying to hook on. That was protection. As you look further aft, you see the hook itself. This contains a spring loaded, automatic lock. Once you got your hook around the bar, you were hooked on firmly and you had no problems.

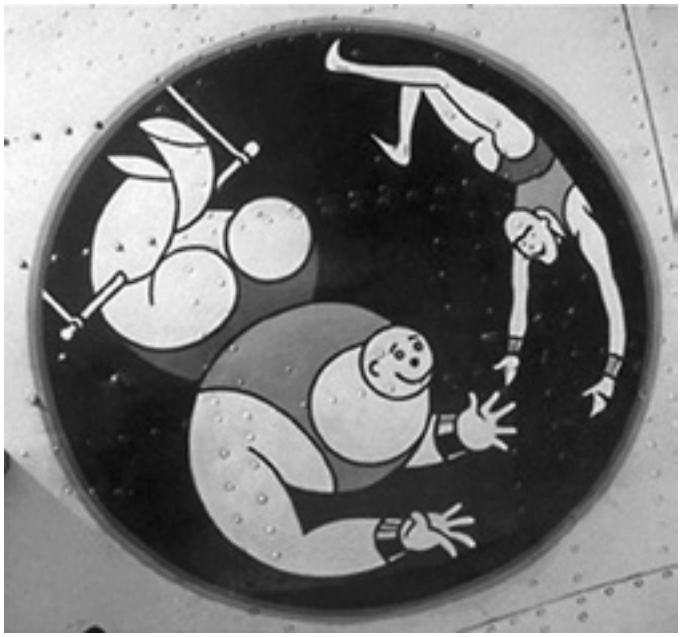
Notice the fairing on the wheels. We added those little flanges, because we never knew when we were at sea working from the airships whether or not we might have to go down and land aboard an aircraft carrier. We qualified and checked out on

carriers, but if the landing gear wire on the decks of the carriers were to jump up over the fairings, we felt that we would probably go over on our back. Hence the fairings. And, of course, we carried a carrier hook for carrier landings. We had about three hours fuel.

The plane had floatation gear, an inflatable bag on each [*under*] side of the [*upper wing*]. The visibility for the pilot was poor although the upper wing was lifted four inches to provide more visibility [*beginning with the XF9C-2*]. This resulted in the gull wing. The cockpit was very tiny and crowded. As it happened, most of us were rather large, and when you wore a winter flying suit, you got in by a proverbial shoehorn and you didn't do much moving around. It was an unstable aircraft. You had to fly it constantly. What I'm really getting at is trying to navigate the F9C-2 at sea became quite a problem. But, I must say, in three years flying off the airships, we never had a forced landing nor the slightest bit of engine trouble. Our upkeep or maintenance was superb.

We had no trouble at all in operating the airplanes. Good weather, bad weather, daytime, nighttime, it made no difference. Small problems we had. But one thing that did make it difficult was if the ship would go into a turn and you were nearly in a stall, and not seeing the horizon--you didn't know what was going on, except you had to keep skidding, and skidding, to hold your position under the ship. It made it difficult because you were trying to put your hook on the center of the trapeze gear. The reason for that was, as small as the airplane was, the hangar aboard the airship still had no clearance. You may recall we had an insignia depicting a trapeze, a great giant of a fat guy hanging from the trapeze and he was throwing a little, skinny guy up in the air, etc. [*photo, above right*] Well, that was the nice one we accepted. As you might imagine, the first design we had was that of a horse's tail with flies buzzing around it. Lighter-than-air didn't care for that one.

[*The hook-on planes*], of which we had a total of eight, one XF9C-1 and one XF9C-2, six were built as the F9C-2. There were also four N2Y-1s, [*and*] two XJW Wacos, used as taxis.



[Editor's caption: N2Y-1 launching from *Macon* for a taxi mission in 1934. Note removable combing atop the airplane's fuselage. Small cargo – such as a cockpit full of lobsters coming up to *Akron* over Panama – could be carried. These simple trainers lacked basic instrumentation and even radios, following railroad tracks for overland navigation.]

Inside the ship is an airplane hangar. Thus, she is a flying aircraft carrier. The hangar was constructed to house the little F9C-2's which we see. Once on the trapeze, you are hoisted up and attached to overhead trolleys that stretched diagonally to each of the four corners. So you can carry four airplanes in the hangar

of the ship. Of course, you could hold a fifth airplane on the trapeze itself but this would remove a great deal of flexibility because, if you had a dead airplane on the trapeze, you couldn't do anything with the other four. Those were some of the problems which, fortunately, we never experienced.

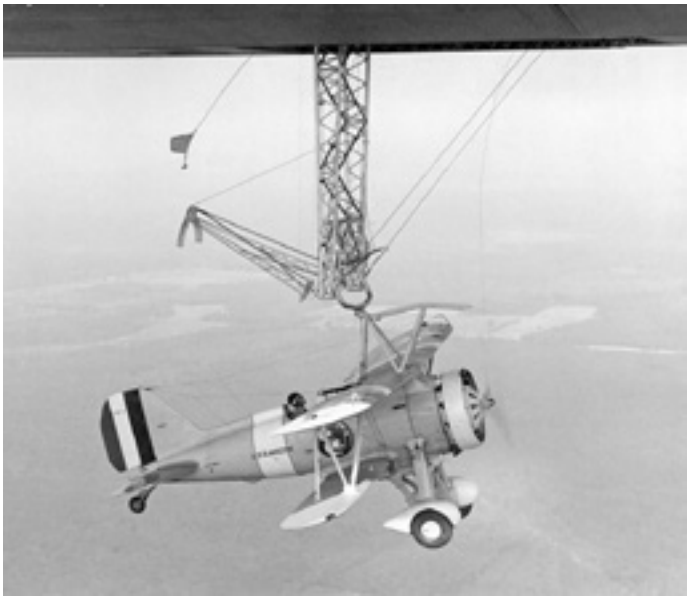
Now we come to the actual operation of these aircraft. That [*photo, below*] is the *MACON* in flight. You notice two of the F9C-2s down below, and you can see the trapeze gear hanging down, considerably aft of the control car, just about parallel to the Number One engine.

We'd come alongside the control car, and they'd give us the signal to come aboard. They'd lower a green flag, and the trapeze and the ship would get up to speed. These fighters had a stall [*speed*] of about 71 miles an hour, somewhere in there, which in those days we thought was pretty fast. The ship itself was not [*all that*] fast. She could make 85, if all engines were going full.

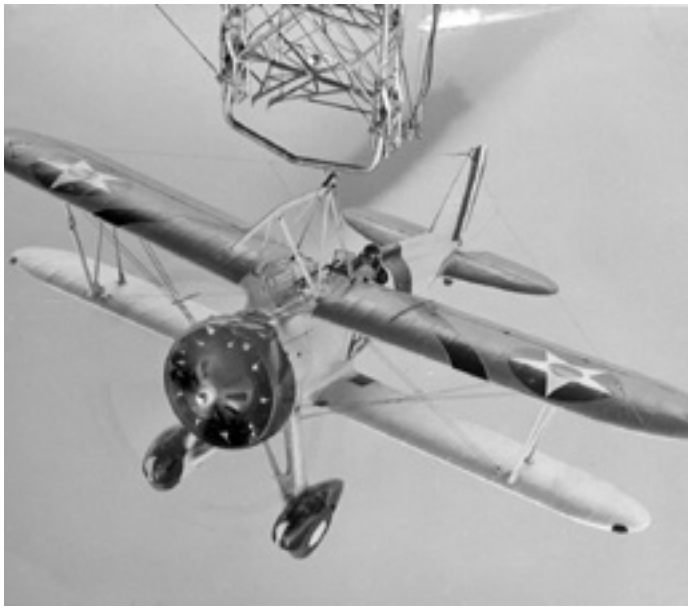
The point was, as we got better with our landing procedures, the ship might not be up to speed before we approached. Obviously we had to have the ship at a speed above our stall. So what would happen? We'd place ourselves about 25 feet below the ship and just outboard of No. 1 engine, skid in underneath the ship, about 25 feet behind and below the trapeze. Now, the only problem we had was that you shifted your eyes from the horizon. Your horizon now was the belly of the ship above you. [*Simulation here by member George Diemer*] That made it difficult to follow the ship in a turn. The problem became purely a mathematical one. Our problem was to close the distance between the trapeze and the hook. That was all we were trying to do. We were trying to move the hook up to the trapeze. How we got there didn't make a bit of difference. Many times I've gone on the hook with a closed throttle. What that meant was the ship was coming down. Those airships fly a sort of sine curve. The ship might be coming down on me, but giving me what I wanted, which was to close the distance.

I didn't care how the distance was closed. So what you did was to place yourself underneath looking up, *[next photo]* hold the stick and throttle and just keep your eyes on the trapeze as you close distance. If the ship was flying too slowly, then some time you'd just

have to open the throttle and practically force yourself up in there. Or, if the ship were too slow, there would be times you'd just be ready to grab hold and then fall off into a stall. You'd just simply start over again.



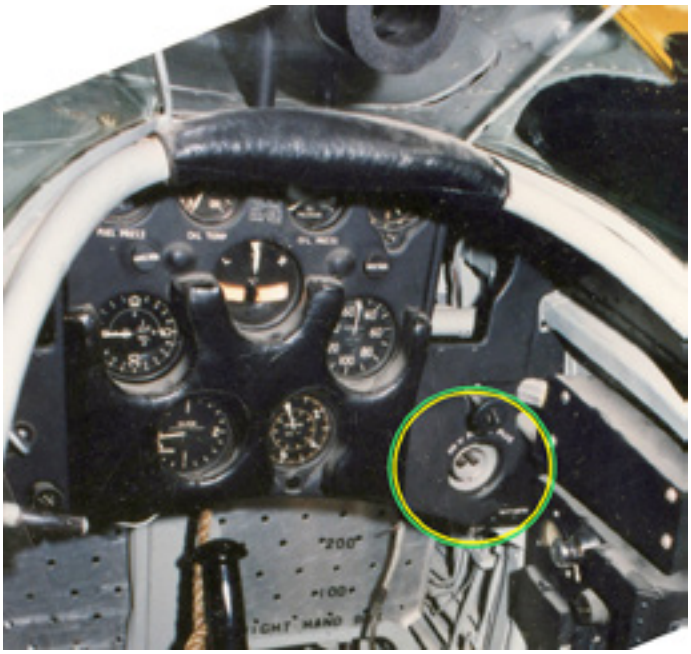
[*Photo, above*] Now here is a fighter coming up. Tension [*springs on the*] bars [*are*] for shock of landing. You notice that the bar of the trapeze is a Vee notch. The reason for that is that when they hoist you aboard, the plane must be absolutely centered, because of the small wing clearance. But, if you should land off-center, all you had to do was kick your rudder and let the plane slip down to the center. The pilot would keep his prop turning over until he knew he was locked aboard. Notice the angle of the plane as he landed. He is just on the verge of a stall. We only had about one or two knots above stalling speed. Speed of airship was key to [*safe*] landings. Notice that the pilot is looking straight up. He's now aboard. You see the flag [*photo above*] which signaled him to come aboard. You notice the cable that will pull the trapeze with the airplane up. That strange gimmick to the left is a "saddle." The reason for that again was because we had little clearance for the airplane as it went through the hangar floor. The saddle was lowered down on the fuselage, holding the plane steady fore and aft. Occasionally, you'd think you were locked on and sit there fat, dumb and happy, and the first thing you know, you would just fall off. It didn't make any difference, of course, for you had 1,200 feet to work with, but it did teach you to keep your engine turning over until you knew you were really locked securely on to the trapeze.



[*Photo, above*] If you were a member of the airship's crew, here's what you would have seen. You're looking aft. I don't think he's quite hooked on yet. Now the hangar door slides forward. [*Just forward of*] Where the trapeze is now seen there were two big flaps that would open up and there would be room to hoist the plane in, transfer to the overhead trolley and get it out of the way. Refuel it and the plane was ready to go again.

The skin covering of the ship was a type of [*doped*] fabric so you had to learn to walk very carefully, as you moved around the hangar. One of the concerns of lighter-than-air, of course, was that the heavier-than-air pilots might get careless, and the first thing you know, you've got a prop up through the skin of the ship, or some idiotic thing like that. However, we achieved a tremendous rapport and gained the confidence of the lighter-than-air personnel. It became a very happy family relationship.

Incidentally, launching a plane was purely the reverse of hooking on. You'd move it from the corner, put it on the trapeze, and lower it away. With oil heaters in the tanks, we could start at any time. We had electric starters energized from a power cable the crew would drop to us. [*After unplugging it*] You launched yourself by pulling a handle in the cockpit which released the control lock.

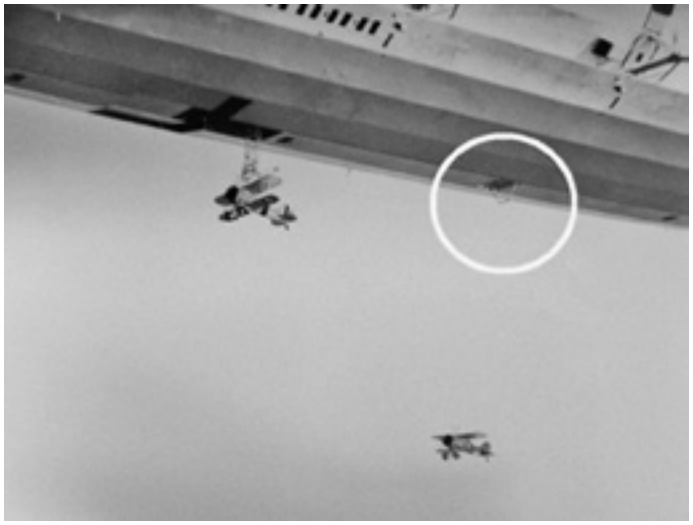


[Editor's photo & caption: Connection for 110V ship's power is highlighted here on the NASM- restored F9C-2 Sparrowhawk. Pilot would unplug the cable and hang it on the trapeze after startup.]

Simultaneously you eased back on the stick a bit, put lift on the wings, taking weight off the trapeze, then fall free, skid out, and go to work. But still it was a 10-minute operation.

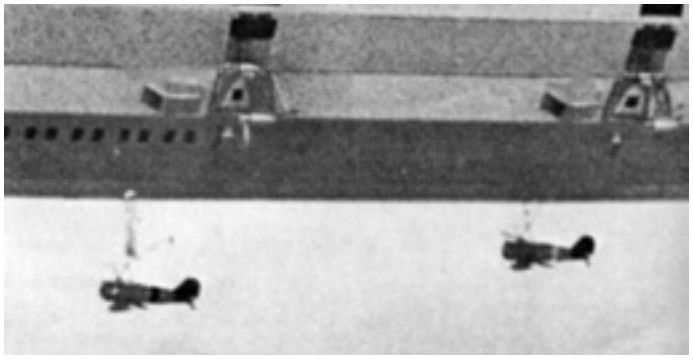
Now suppose you were in real trouble and wanted fighter protection. Why not hang a plane outside someplace other than the trapeze, or two or three for that matter, and be ready to have them drop off and go to work? So, the after trapeze is called a "perch." [*Photo, above right*] It was very close to the ship as you can see. The reasoning behind this was that it still took 10 minutes to get a plane out of the hangar and onto the trapeze. The "perch" was not a hangar operation since it was purely a hang-on device.

We could carry a plane there and often did. We could change pilots and refuel the airplane. We could keep a pilot sitting in it ready to go at a moment's notice. All he had to do was start his engine and release the hook. Now let's go out and make another landing. This [photo below] happens to be the same airplane... the white [*trimmed*] airplane, Number One, coming in. Notice it has no landing gear. I'll discuss that in a minute.



[Editor's caption, photo above: "Perch" at Main Frame 102.5 is circled. Two additional perches were planned and possibly built but had not been installed by Feb. 1935.]

What he's doing is making his approach to come aboard. You notice he engaged the trapeze as the ship went into a turn and it was a difficult maneuver because the pilot was unaware of the ship's turn. He's a little off-center. You notice his hook is not quite down in the notch of the Vee.

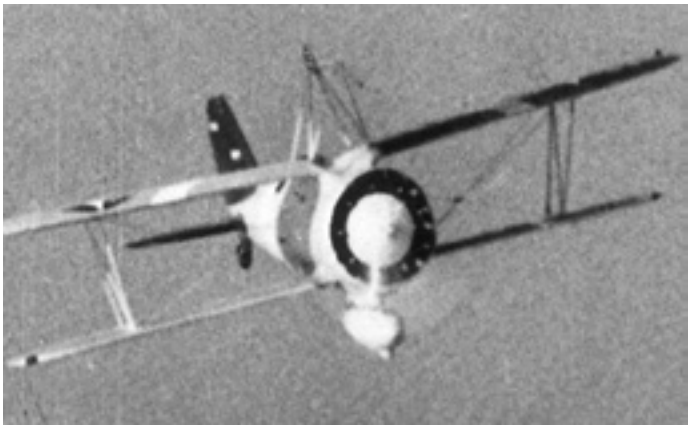


[Ed. Caption: These are motion picture frame enlargements. No still photos of F9Cs sans landing wheels are known to exist.]

[*Finally in mid-1934 we began to*] remove the landing F9C-2's landing gear [*once aboard*]. Far better for [*forced*] water landings. Substituting a belly tank giving us another hour and a half [*of endurance*]. Planes ranged 200 [+] miles. We developed [*homing gear to show the ship's direction*]. The planes were usually operated in pairs, with a single airplane being able to range 200 [+] miles from the ship. [*Later we*]

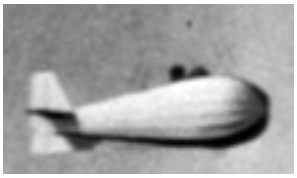
cut down pair of aircraft to singles to provide extra coverage and rest for pilots. 60-degree angles. Out an hour and a half. Always turn 120 degrees toward ship to see her ahead.

[Ed. Caption: Also a film frame enlargement, hence the coarse grain reproduction. Film was also shot by N2Y cockpit-based visiting cameraman on a *Macon's* "press day," Navy Day 1934.]



Notice there are two airplanes hanging from the ship [*photo, previous page*]. The first is on the trapeze itself and the plane aft is on the "perch." Oddly enough, it was much easier to get on the perch back aft, closer to the ship, than it was on the main trapeze, because the main trapeze received turbulence from the control car forward. But the "perch" was no problem. We did all sorts of things. From the perch and the trapeze, we would drop off simultaneously, and frequently you'd drop from the perch and just fly on forward to the main trapeze. We were having fun in those days.

You may recall that the Germans used spy baskets in World War I. There it is [*photo, right*]. We actually had it aboard, and we used it. However, they contributed very little, but we thought we would try one. The quarter inch cable for rescue gear was also used to suspend the spy basket. It was a dummy fuselage, as you can see. There was, perhaps, a quarter-inch of rudder action, no wings, no stabilizing affect at all, just a dummy fuselage. We wore a parachute but what good it would have done, I don't know. We tried to rig a telephone using the cable wire but we could never make it work. We had a little key set and we'd tap out Morse code. As the basket was lowered, this quarter-inch wire visually became an eighth, and then a sixteenth, and then a thirty-second and so on, and the wire just got to [visually] be a nothing that was holding you up in the air. With about 3,000 feet of cable out you were praying that those up there working on the reel knew what they were doing. You wanted a lot of cable to be left on the reel. As the basket was lowered, the cable became a catenary. The spy basket would trail the ship far astern to a point of absolute silence. You couldn't hear the ship which would be somewhere up above the clouds. You were below the clouds or going through clouds with somebody else controlling your destiny. The reason I questioned the parachute was because if they lost you, they'd never have known. It was fun, after a fashion, but had absolutely no practical value.



[Editor's caption: A WWI German "cloud car," above left, is seen in contrast to the *Macon's* perfected "spy basket," right, also from a motion-picture frame enlargement. "No practical value" it is said? A spy basket, similar to the left photo, flew with LZ-130 on a radar-sampling mission in mid-1939. Just weeks before WWII began, that is more than four years after the one on the right went down with *Macon*.]

Suppose a plane had gone into the water: How would the ship get us back. Naturally, that concerned us considerably; so we built...converted shall we say...a ten [*sic*] foot inflated rubber life raft with a web on the bottom and a safety belt.

[Editor's caption: Not seen in still photos, the pilot rescue device is shown here in a faded NARA print hand line-enhanced by our Treasurer. Motion pictures show the device being lowered from *Macon* and touching the water's surface. Decades later "project YGAR" developed a

crew exchange basket demonstrated with 4K and 5K non-rigid airships, though the British had demonstrated crew exchange in 1918.]

The airship carried a 4,000-foot cable-reel to lower the raft to the water, let us get aboard, and hoist us back to the ship. The fact is we used to have the skipper practice towing the life raft on the water, and he'd do a beautiful job. He could tow this little raft on the surface with the giant airship 2,000 feet above the water, and put it along side of a buoy. It gave us great confidence. Those big ships had crews of about 80 to 85 people. The *MACON* crew included four or five heavier-than-air pilots and eight heavier-than-air mechanics. [*photo, HTA pilots, below*]

They looked a bit different than they did the next morning when... this is [*me and*] the *MACON* crew when we were aboard the USS *RICHMOND* [*photo, below*]. Timing is always the primary thing in this world.

So what happened to airships? We lost the *SHENANDOAH.* We lost the *AKRON*. We lost the *MACON*. A little discouraging. At that time, I was one of the ardent proponents of the airship. I thought, "Here is something that gives us 8,000 mile range as a scout, covers the whole Pacific, and there's nothing like it." Now, there were disadvantages to be sure, but we thought we could overcome some of those things. For instance, large handling crews, proximity of fields which can take an airship. You get a radio call... and find out that the ship will land. The airplanes were used to ferry pilots to return to the ship with more airplanes for ballast. You need two or three hundred men, and cannot afford to valve expensive helium, and all that sort of thing. [*The ship's bow*] would be driven to the [*mast*] and water lines hooked up. It becomes a very difficult operation. The weather becomes a factor with the ships.

Plans had been laid on for an airplane carrier airship. The *AKRON* and *MACON* were 6,400,000 cubic feet capacity...the [proposed] big ships were designed for [9, 12 and] 15 million cubic feet and were to carry 10 airplanes.

What would a Kamikaze have done to an airship? One Zero is all you needed. [*But*] As a matter of fact, I blame the death of the airships on the good old venerable PBY. Two ships, the *AKRON* and *MACON* cost about $4 million apiece, for $4 million you could pick up, say, 12 PBYs. From a scouting point of view, these PBYs could go out in all directions. They could land at most anyplace. They could be serviced most any place. They had none of the problems of manpower, maintenance, facilities and things like that; so for an equivalent value of one ship, think of what you could do with twelve PBYs. I really believe that this is just about what happened to the airship. I say all this with my good friend [*VADM C.E. Rosendahl*] still pushing airships, etc. But when a 747 comes along that can carry, in seven and a half hours, 350 people across the Atlantic, I find it very difficult to believe that the airship on a 48-hour schedule, with all the problems involved, could be a real competitor.

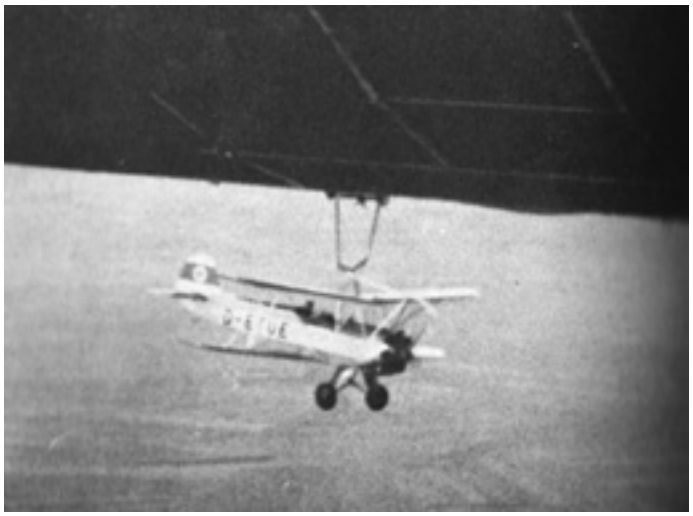
Let's not think that the Navy didn't prove something. First of all, they proved by this ambitious lighter-than-air program, the airship wasn't feasible. But that wasn't a waste of money. Let me tell you why. For example, when they were planning and designing the *SHENANDOAH*, the first airship that we ever built, it became clear that we didn't know much about airship techniques nor the technical knowledge concerning duraluminum. Now called Dural, we use it every day in our kitchen and everyplace else. The United States knew little about it. The Germans knew, the British knew a little bit, but we didn't know. We went to the Aluminum Company of America, and got them started. This is 10 years before the metal was really used, basically, in heavier-than-air craft. Now that alone -- getting the industry started producing that metal -- was one of the great contributions of the airship program. **[Ed. Caption: Following her 1937 South American run, LZ-129 made a couple local flights to test her new perch. Miller and one of the Wacos were being considered to make US hook-ons but details were not settled in time.]**

Lifting gas... helium, a desirable gas because it was inert. We didn't know where it was, really. Didn't know what to do about it. This demand for helium which today is an important commercial product, was all brought about by the lighter-than-air program. The [*richer*] Fort Worth plant began to extract helium from natural gas [as the original plant ran low in 1928].

That was one of the great contributions made. Still another development emerged from the LTA experience. RADM Ward Harrigan, one of the original HTA pilots attached to LTA, designed [*a seat-pack*] parachute small enough for the F9C-2 that saved many a life in WWII.

But even more… The big ships were using the Maybach engine of 750 [*sic*] horsepower. We wanted to get away from German products. We wanted American products. General Motors was working on the Allison V-1710 at that time, and that was the engine selected to replace the Maybach in our airships. The *MACON* went down in 1935 and we had no need for these engines, but it was on the block--its development was well along. What happened to it? The war came and that was the engine that powered the P-38, the P-39, the P-40 and the [*first*] Mustang, the P-51. If it hadn't been for this early work in lighter-than-air, that engine would have undoubtedly not have been available. Certainly, this was one of LTA's great contributions.

So, I will argue that the Navy, although we lost every ship we built, the *SHENANDOAH*, the *AKRON*, the *MACON*, still proved that it was worth the effort because these and other developments evolved out of LTA efforts. **Ω**



BLACK BLIMP

Paul H. Hawley, 90, passed 23 May 15. Hawley served in LTA, achieving the rank of Lt. during WWII. He qualified as a Naval Aviator, Navigator, and Gunnery Officer, and served in ZP11 (So. Weymouth, MA), ZP24 (Hitchock, TX), ZP42 and ZP41 (Brazil) and ZP12 (Weeksville, NC). Following the war, Paul graduated from the University of Connecticut with a degree in civil engineering, working in construction until his retirement. He is survived by a son, two daughters, grandchildren and great grandchildren. Ω

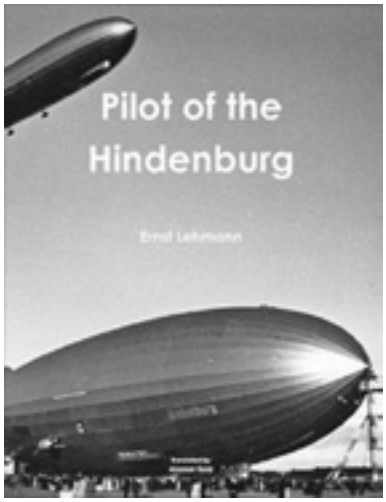
MEDIA WATCH

PILOT OF THE HINDENBURG

By Ernst Lehmann

Translated by Alastair Reid

Reviewed by C.P. Hall II



PILOT OF THE HINDENBURG is a marvelous time capsule! Much of the book was composed in 1927 when Ernst Lehmann, former WWI Zeppelin captain, was a licensed commercial Zeppelin Captain who had recently been Executive Officer on the ZR-3 U.S.S. *Los Angeles* when it was delivered from Germany to the U.S. Navy. In 1936, Lehmann brought his story up to date describing the flights of the *Graf Zeppelin* of which he commanded on 272 of its 505 flights through 1935. He also commanded *Hindenburg* on multiple flights across both the North and South Atlantic in 1936.

The 1936 edition was published in German under the title AUF LUFTPATROUILLE UND WELTFAHRT. Following Lehmann's death, resulting from the crash of the *Hindenburg* in May, 1937, an abridged English translation with an added chapter by Commander Charles E. Rosendahl, USN was sold in the United States under the title, ZEPPELIN.

The new edition is soft cover, 8 ½ X 11and 352 numbered pages. It is lavishly illustrated throughout with familiar and unfamiliar photographs. It also contains a simple map to the "Eastern Front" where Ernst Lehmann flew Zeppelins against the Russians in the Great War's early years. It does include almost every location mentioned in Lehmann's text! We are talking divided, occupied Poland where quite often there were Polish names, German names, or Russian names (some irregularly translated from the Cyrillic alphabet). It is a delightful addition by the translator.

There is a common literary form where the author starts Chapter One with an anecdote in the middle of his chronological story. Chapter Two doubles back to the beginning and, over the next few chapters, brings the reader along to the starting point. Lehmann does this on both the macro and micro levels. He begins with the longest flight (time in the air) that *Graf Zeppelin* ever flew; doubles back to himself leaving the Navy and joining the pre-war Zeppelin Commercial service, then doubles back again to the beginning of the Zeppelin Airship story. Throughout, Lehmann relates one interesting, informative anecdote after another. Occasionally several are strung together such that time passes from beginning to end; then he must double back in time to start again. Lehmann spins a good yarn; however, it requires the reader to follow with care if he is interested in the order of events.

In the modern literature, both historical and fictional, in both historical programs and in motion picture dramatizations, it has become popular to portray Ernst Lehmann as a corporate climber who pandered to the Nazis as a route to personal promotion; as compared to his boss, Dr. Hugo Eckener who openly detested and defied the Nazis and paid a price for his courage. In Lehmann's book, there are multiple references to Field Marshal and President Paul von Hindenburg but only one mention of Adolph Hitler. In 1936, Eckener was a "non-person" whose name was not to be mentioned in the German press; however, herein are numerous, flattering, references to him. The most egregious of these is in a brief chapter about the government's reorganization of the Zeppelin Companies. There is a lengthy quotation of opening day comments by Herman Goering dating from 22 MAR 35 who made several complimentary comments about Hugo Eckener. This unedited quotation strikes me as courageous to the border of foolhardiness; not the act of a panderer wishing to curry favor.

This is a fascinating story of aviation pioneering, both combat and commercial. It is available from LULU for $22.90 (US) delivered in the USA. I recommend it even if you already own a copy of ZEPPELIN. **Ω**

The Navy's Last Flying Aircraft Carrier

By Thom Patterson, CNN

Off the California coast lies the sunken wreckage of the U.S. Navy's last flying aircraft carrier.

The idea that the Navy had flying aircraft carriers is probably new to a lot of people. Imagine a nearly 800-foot "blimp" where five military airplanes can land and take off in midair.

Last August, a team of oceanographers got a close look at the airship USS *Macon*. More than 1,400 feet under the sea, robots from the exploration ship E/V *Nautilus* examined the *Macon* with cameras and other equipment.

The *Macon* -- technically not a blimp, but a rigid airship -- crashed into the water off Point Sur during a storm in 1935, killing two of its 83 crewmen. Outfitted with four deployable Sparrowhawk biplanes, it was the last of its kind in the U.S. military. The crash spelled the end of the U.S. military's flying aircraft carrier program.

Nonetheless, magnificent floating airships have "remained in the collective consciousness partially because of the popularity of sci-fi and things like the 'steam punk' revival," said aviation archaeologist Megan Lickliter-Mundon, who took part in the underwater mission from the surface. "When we first got down to the site -- about 900 meters away -- I can't really describe the excitement of watching the screen and waiting to see what's going to come out of the blue at you."

Soon the wreckage came into view, including parts of the airplanes. "It looked like two tubes -- one was pointing down and one was up. And I said, 'What is that?' Soon it became obvious the tubes were remnants of a wing, wreckage from an airplane engine and a propeller."

"I was shocked -- really, kind of saddened" that there was so much damage, she said. The airship's "biplane No. 1" is the most intact, she said. The U.S. Navy emblem is still legible on it.

The wreckage was first discovered in 1990, when experts were able to photograph it for the first time. In 2006, another expedition got a look at it. Last week's mission gathered even more images that will allow scientists to evaluate its deterioration. They're hoping to create a 3-D model of the wreckage site.

Lickliter-Mundon and other aviation archaeologists want to know more about the *Macon's* hangar system. When a plane would approach, a trapeze would lower from a hangar inside the belly of the airship, said aviation historian Dan Grossman of Airships.net. The plane would fly to a metal bar hanging down from the trapeze and attach to it by a hook on top of the plane. The plane would then be raised into a T-shaped hole in the belly of the airship. Then, inside, a crane would move the plane to its storage place. Sadly, the *Macon* will remain on the ocean floor forever, Lickliter-Mundon said. Trying to safely bring what's left of it to the surface would be too expensive and time-consuming. It's hard to know how these kinds of aircraft would have performed if the Navy hadn't shut down the program. Some people wonder if they could have changed history. "There are a lot of people who argue that these kinds of airships might have been able to warn the Navy about the Japanese fleet that attacked Pearl Harbor," said Grossman. "Instead of it being a surprise attack, America would have been able to take appropriate defensive measures."

What about the future? Will the U.S. ever consider new airborne aircraft carriers? The Pentagon apparently isn't ruling it out. Last year, the Pentagon's research arm asked for ideas about carriers that would launch and recover unmanned aerial systems -- aka drones. **Ω**

(Ed. note: See page 11 for one proposal to DARPA)

Exploring the Wreck of USS *Macon*, The Navy's Last Flying Aircraft Carrier (excerpt)

By Megan Eckstein

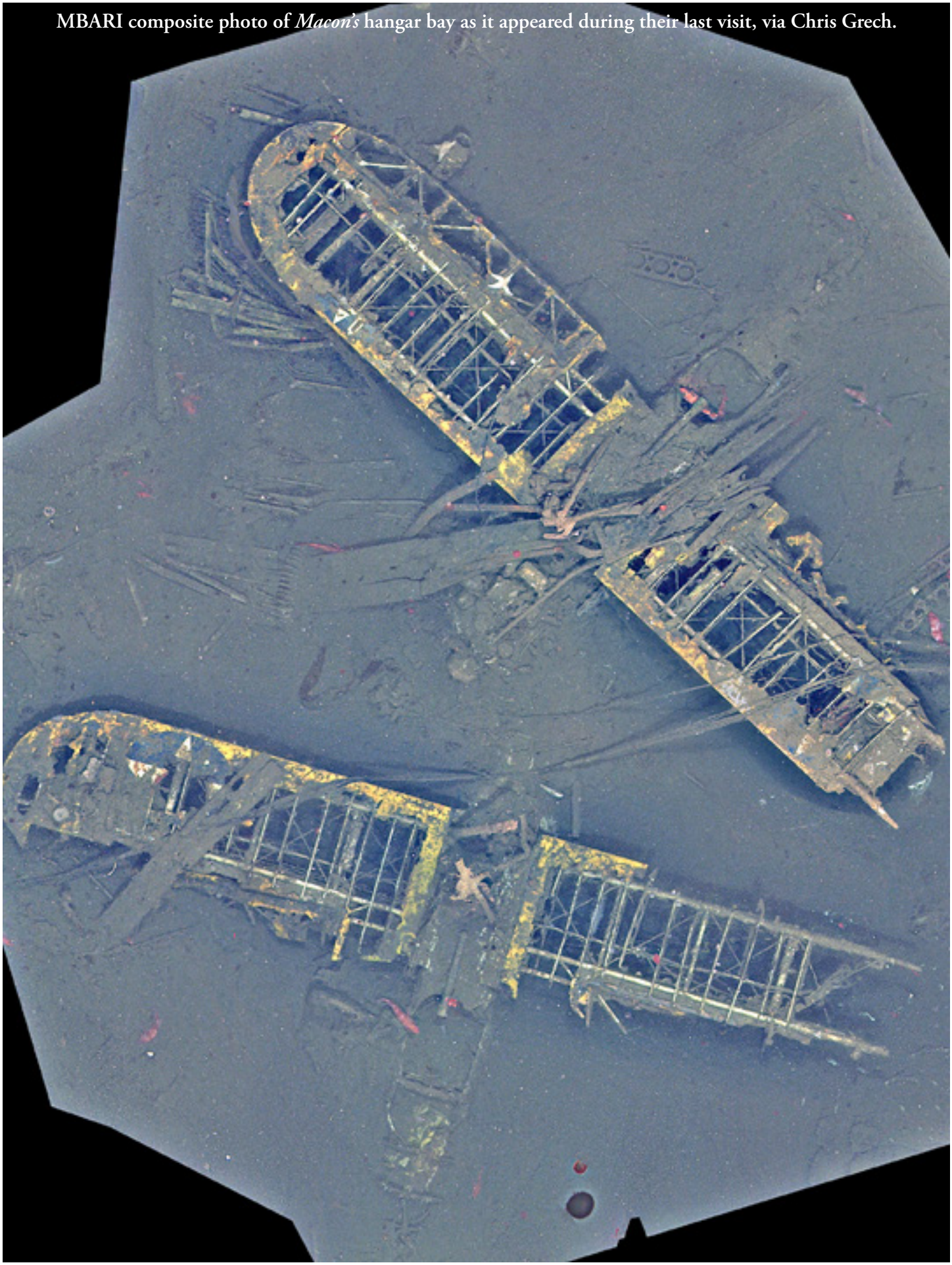
The Naval History and Heritage Command, National Oceanic and Atmospheric Administration (NOAA) and several non-profits came together to explore the wreckage, mapping out pieces of the airship and its four biplanes and studying the change in its material condition over time. Their hope: to understand life aloft in the floating aircraft carrier, to piece together a clearer map of the wreck site and to research how quickly the airship's remains are being consumed by the sea.

Bruce Terrell, chief archaeologist and historian at NOAA's Office of National Marine Sanctuaries' Maritime Heritage Program, told USNI News on Tuesday that the *Macon*, for all it lacked in longevity, shed a lot of light on how the Navy perceived the threats to the U.S. in the Pacific. "It's showing the pre-World War II mindset of the Navy. And as early as the turn of the century, the Navy was focused on Japan, watching Japan, because their military was increasing so fast and they kind of were getting clues as to the Japanese government's designs on South East Asia and the islands," he said. "*Macon* was envisioned as basically a scout for the fleet, *Macon* and *Akron*… it kind of shows how the Navy was looking at scouting for the fleet, protecting the fleet. And *Macon* was kind of the highest expression of the technology, but as this was happening seaplanes with longer and longer-range capability were being developed, radar was starting to be developed and newer technologies were coming along. So I think the Navy, at that point when *Macon* finally crashed, it was like, okay, we're cutting our losses here. … But I think the concept was proven after Pearl Harbor – the big what-if question is, if *Macon* had been operational and successful, might *Macon* and the little scout aircraft, might they have spotted the Japanese fleet before they could hit Pearl Harbor?"

The layout of the *Macon* site is already fairly well understood. Explorations in 1991 and 2006 photographed and identified the bulkiest items on the ocean floor – engines, fuel tanks, ovens, tires, and the four biplanes still relatively intact, among others – and even retrieved some items for study and display. But Terrell explained that this exploration will provide even greater detail, thanks to technological advances. New high-definition sonar will give researchers a better look at some of the smaller items, which are key to shedding light on what daily life was like aboard *Macon*. "We want to understand the more human story... we want to know basically how the workspaces were arranged on *Macon*, how this big complex ship in the sky actually operated – how they interacted with each other, how they communicated, what kind of personal effects may have been onboard. We know we've got a lot of the galley there, it would be interesting to know how they cooked and ate their food up there in the sky."

To answer the questions, the team took the Ocean Exploration Trust's 211-foot *Nautilus* and its dual-body remotely operated vehicle system, composed of primary ROV *Hercules* and secondary vehicle *Argus*. *Hercules* and *Argus* then "mowed the lawn" for about five and a half hours in Field A and for more than three hours for Field B, taking photos every few seconds to create the photomosaic. The ROVs were able to take 360-degree video of a biplane, take some measurements of corroded parts of a plane wing, and measure how much sediment had built up since 1935. The last item on the mission agenda was to pick up a piece of aluminum girder to bring back and study. Terrell told USNI News on Wednesday that the first piece the ROV's manipulator arm picked up "turned to dust" when moved. Right as time expired for the mission, the scientists brought up the girder, found it fit in their protective box, and were able to call the mission a success, Terrell said. **Ω**

(Ed. note: See Terrell's article in TNB #72)



MBARI composite photo of *Macon's* hangar bay as it appeared during their last visit, via Chris Grech.


MACON
WES MORISON