NAVAL AIR STATION LAKEHURST:
Part I: Beginnings and USS SHENANDOAH (ZR 1)
Part II:
The Last Two Lakehurst US Navy Dirigibles, USS AKRON (ZRS 4) and USS MACON (ZRS 5)

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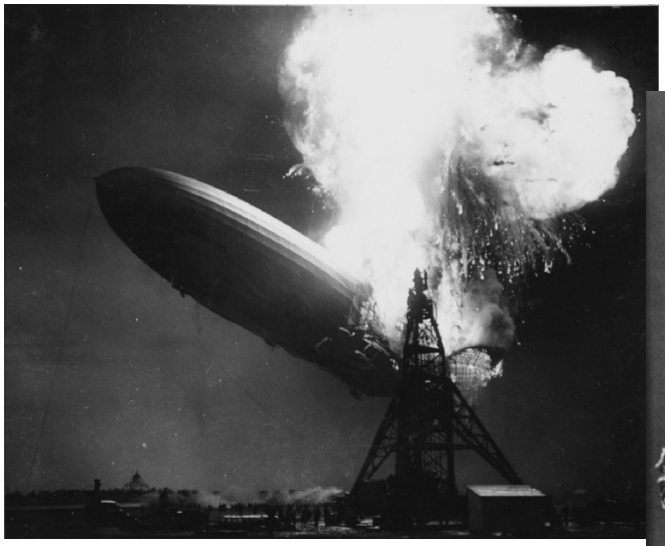
By Lawrence B. Brennan

NAVAL AIR STATION LAKEHURST-ALMOST A CENTURION[1]: Part I

By Captain Lawrence B. Brennan, US Navy Retired[2]

This series is an introductory overview of nearly 10 decades of naval aviation progress in the New Jersey Pinelands. Best known for the fatal explosion and crash of the German dirigible *Hindenburg* 6 May 1937, Lakehurst has enjoyed a multipronged naval career.



Naval Heritage & Command photos NH 57965 & 57964[3]

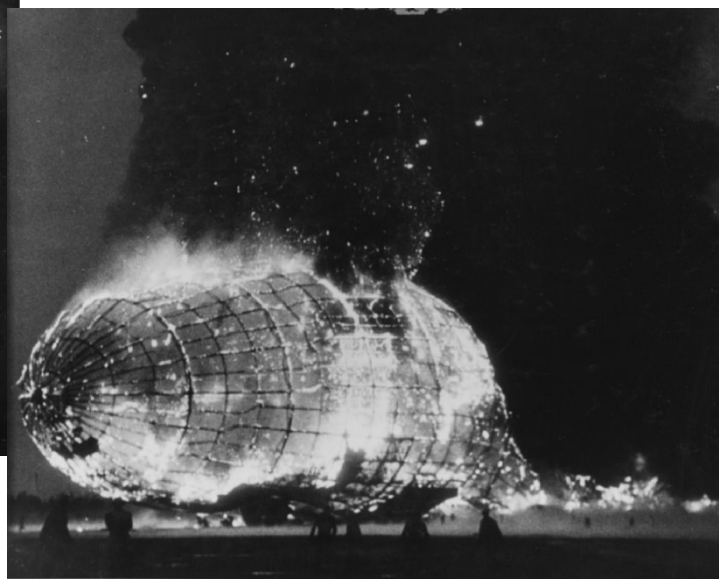


Fig. 1 & 2: Lakehurst's most memorable heritage:* HINDENBURG *burning and about to crash at NAS Lakehurst, New Jersey on 6 May 1937. [4]

Lakehurst's 20 years primarily dealt with the development and ultimate failure of the concept of international dirigibles for military and civilian aviation purposes. The second phase was the two decades, beginning with World War II to the early 1960s, when Lighter than Air (LTA) blimps were engaged in anti-submarine warfare. The third phase, which began before the end of blimps, was the development of rotary wing aircraft (helicopters) for naval service.

This third period began to evolve at the end of the Second World War and continued as Navy deployed helicopters ashore and in anti-submarine missions on board specialized fleet aircraft carriers (CVSs) for two decades between the 1950s and mid-1970s. In addition to shore-based roles, Navy and Marine Corps helicopters were used in amphibious assault roles, first assigned to *Essex*-class fleet aircraft carriers converted to amphibious assault ships (LPHs) and new construction assault ships. The large-hull, flat-deck ships began to appear in the late 1950s and continued in service nearly three decades. Beginning in the mid-1970s they have been replaced by two classes of large-hulled, flat-deck amphibious assault ships (LHAs and LHDs) which continue the tradition of sea to land warfare and also support Vertical/Short Takeoff and Landing aircraft (VSTOL).

The fourth, and current, phase has been primarily a long-term education and testing mission which can trace its origins to the beginning of naval aviation and continues today. Occasional tests of blimps resumed in 2006; other special purpose aircraft are being operated and tested.

We will address these phases in a series of articles detailing the Lakehurst legacy.

BEGINNINGS

Naval Aviation involvement with the current Lakehurst Naval Support Activity began in 1921, when Navy obtained Army's Camp Kendrick[5] which had begun its military career as a munitions-testing site for the Imperial Russian Army in 1916. On the recommendation of Lieutenant Commander Lewis H Maxfield, US Navy, Acting Secretary of the Navy Franklin D. Roosevelt initiated the deal to acquire 7,400 acres (later expanded) from the US Army during the summer of 1919 for $13,099. The cost of the first hangar was nearly $3 million.

Construction of major hangars began soon after commissioning in 1921; Lakehurst Naval Air Station became the hub of naval lighter-than-air activity. Interest in airships in the United States had begun early in the twentieth century. The Lakehurst Naval Base presently occupies 7,400 acres of flat lowlands just north of Lakehurst, New Jersey. Lakehurst Maxfield Field is the naval component of Joint Base McGuire–Dix–Lakehurst (JB MDL), a joint base headquartered in Manchester Township approximately 25 miles east-southeast of Trenton and eight miles northwest of Toms River. The only body of water within its boundaries is Lake Horican, about the size of a football field. The base is surrounded by fish and wildlife management areas.

Originally known as Manchester, the community of Lakehurst became a separate municipality in 1921. During the American Revolution, the area was a major industrial center for iron and charcoal. Settlement flourished until 1850, when these industries disappeared. In 1860 the arrival of the railroad revived Manchester's economy. It became a resort town by the beginning of the 20th century.[6]

Now, Lakehurst primarily is home to Naval Air Warfare Center Aircraft Division Lakehurst, although the airfield supports several other flying and non-flying units as well.

Fig. 3: Location of Naval Air Station, Lakehurst.[7]

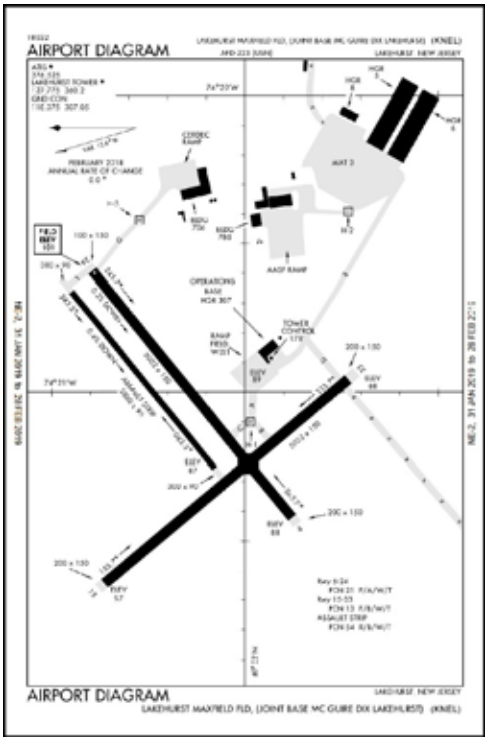
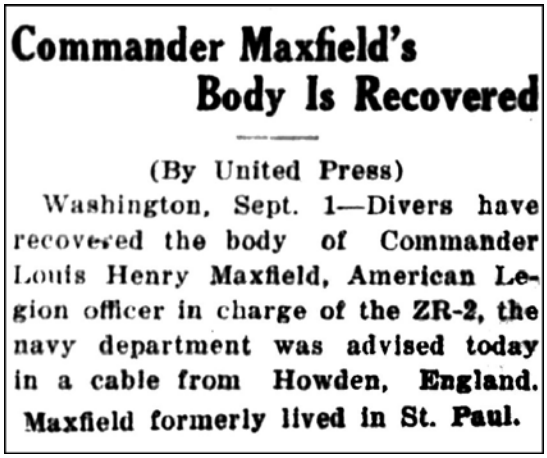


Fig. 4: Airfield diagram of Maxfield airport (KNEL)[8]**.**

On 6 January 1944, the field was named in memory of Commander Louis H. Maxfield, US Navy[9] who lost his life when R-38/USN ZR-2 airship crashed during flight 24 August 1921 near Hull, England. Commander Maxfield, Naval Aviator (LTA) 17, was the prospective commanding officer of the British-built ZR-2 which was due to be delivered to the US Navy. Along with British Air Commodore E.M. Maitland, Leader of Airships, and 16 Americans, Commander Maxfield was among the 44 men lost when the airship broke in two on a test flight and crashed to earth. Five men survived the casualty. The tests disclosed multiple problems with the airship.

Fig. 5: Commander Louis Henry Maxfield, born Nov. 1883, and died in a test flight of ZR-2.[10]



Commander Maxfield's Body Is Recovered

(By United Press)

Washington, Sept. 1—Divers have recovered the body of Commander Louis Henry Maxfield, American Legion officer in charge of the ZR-2, the navy department was advised today in a cable from Howden, England. Maxfield formerly lived in St. Paul.

Fig. 6: Newspaper article noting the death of Maxfield on Sept. 1, 1921. Maxfield airport at Lakehurst was named for him. [11]

On 23 August, R-38 left Howden on another test flight. After spending the night over the Channel, it attempted a high-speed rudder drill when the girders cracked during a sharp turn. The fuel and hydrogen in the forward section exploded and burned. The crash of the R-38 was the worst aviation disaster in history to that time.

The initial practical American lighter than air craft was *California Arrow*, built by Thomas S. Baldwin in 1904. The U.S. Army purchased the first US military airship from Baldwin five years later. Germany was the pioneer in the manufacture of rigid airships (dirigibles) which had the gas containers enclosed within compartments of a fixed fabric-covered framework — and during World War I maintained a fleet of Zeppelins, which it used primarily for patrolling and secondarily for bombing missions. The success of these airships prompted interest in the United States in developing them for coastal patrol, to detect enemy submarines and mines and as a scouting arm for naval fleets.

Navy was dilatory in the use of blimps (non-rigid airships); it only ordered its first one in 1915, two years before the US became a combatant. By the end of combat in November 1918, Navy recognized the utility of blimps and used several for offshore patrols for long range German U-boats. No convoy supported by blimp surveillance ever lost a ship but this probably was due to numerous factors in addition to the blimps.

Between the wars, it was decided that the Army would use non-rigid airships to patrol the coasts while Navy would use its aluminum hulled, helium-inflated rigid airships for long-range scouting and fleet support. In 1937, the Army transferred all its remaining non-rigid blimps to Navy.

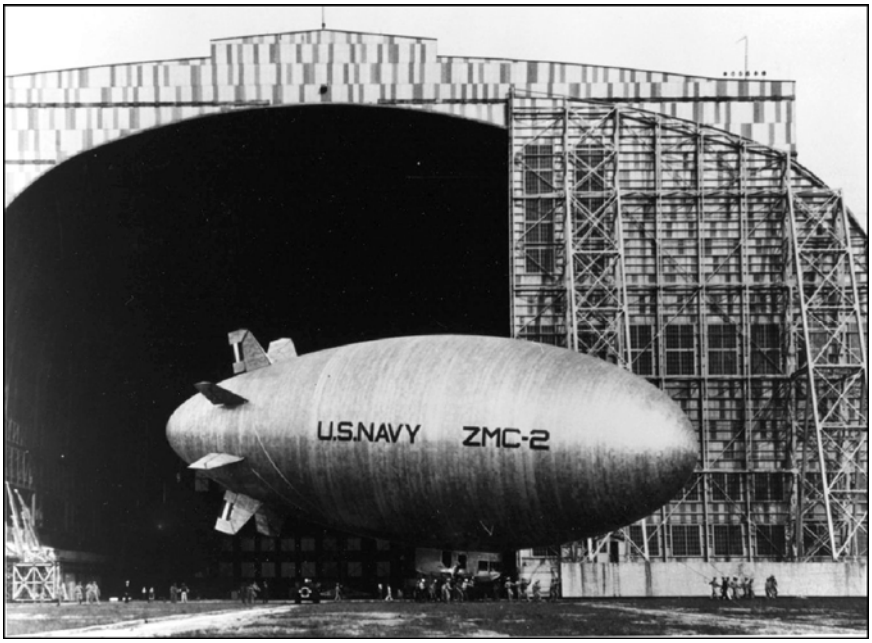


Fig. 7: ZMC-2, a U.S. Navy airship with a rigid metal skin strengthened by internal pressure, seen leaving a hangar at the Lakehurst Naval Air Station c.1929.[12],[13]

Navy ended its construction and employment of the rigid airships in the 1930s after three ships crashed: USS *Shenandoah,* USS *Akron*, and USS *Macon*. The German-built USS *Los Angeles* had been decommissioned in 1932 but was briefly recommissioned in 1933 following the crash of USS *Akron*. She was struck from the Navy List in 1939. In Part I we will deal with *Shenandoah*; future sections will follow on the other ships

During the late 1920s, Lakehurst became internationally known as a port for commercial lighter-than-air flight. It was the only stopping place in the United States for German airships, and in 1929 it played host to *Graf Zeppelin*, then in the process of making the first round-the-world trip. However, of the rigid airships eventually owned by the United States after World War I, all but one--the German-built *Los Angeles* – crashed, and many US officials were skeptical of the desirability of continuing the program. Nevertheless, Navy and public support remained, largely because of the success of the German Zeppelins. Change occurred in 1937, when *Hindenburg*, the largest airship ever built, was destroyed while landing at Lakehurst. Thirty-six passengers died and the crash of *Hindenburg* marked the end of commercial airship travel and the end of experimentation with hydrogen as a lifting device.

WING OF GOLD

14

The Dirigible/Balloon Pilot Insignia

LAKEHURST NAVAL AIR STATION

The National Parks Service, which includes Hangar No. 1 Lakehurst Naval Air Station among its National Registry of Historic Places, publishes a helpful description of the hangars and structures at Lakehurst, "*Aviation: From Sand Dunes to Sonic Booms*" which is the primary basis for the following description.[15]

Fig. No. 8: Hangar No. 1, Lakehurst.[16]

Fig. No. 9: Hangar No. 1 still looming over the NAES installation today[17]**.**

> The first major facility at Lakehurst was Hangar No. 1, a gigantic structure built in 1921 to house the helium-filled dirigibles. It measures 961 feet long, 350 feet wide and 200 feet high. At each end are two pairs of massive steel doors, mounted on railroad tracks. These double doors are structurally separate from the hangar itself. Each door weighs 1350 tons and is powered by a pair of 20 horsepower motors, although provisions were made to open the doors manually, which required the assembled manpower of nine men.
>
> Inside it, Navy engineers assembled the first American-built rigid airship, *Shenandoah.* On 4 September 1923, the ship made its maiden flight from Lakehurst. Navy obtained its second rigid airship in 1924. Built in Germany and delivered to the United States as part of the reparations, *Los Angele*s shared Hangar No. 1 with *Shenandoah*. Navy used [this] dirigible extensively for experimental work on flight and mooring problems--it was the first US airship developed to catch and release airplanes in flight. Lakehurst was also the home of USS *Akron* and USS *Macon*.
>
> In addition to Hangar No. 1 there were five other hangars in two clusters, which have been converted for training and testing activities. Hangar Nos. 2 and 3 housed blimps; Hangar No. 4 housed balloons; Hangars Nos. 5 and 6 housed either rigid air ships or blimps. The area between the two clusters of hangars formerly had been used for mooring the airships and maneuvering them into the hangars.

This article will discuss *Shenandoah*'s history and postal history only; the history of *Akron* and *Macon* will follow in later issues.

The Norman-Gothic Cathedral of the Air was erected at Lakehurst by the American Legion in 1932:

> *to serve as a place of worship for the nearby military base, but also to do something considerably rarer: commemorate the history of aviation on its incredible stained glass windows.*
>
> *Shining from the colorful stained glass are beautiful depictions of humanity's quest to reach the heavens. It begins with the myths of Pegasus and Icarus' wax wings. The 18 panels then gradually lead along the history of human flight, from experimentation with lighter-than-air travel such as zeppelin airships to the Wright Brothers pioneering airplane flight.*
>
> *The chapel is located near the Naval Air Station in Lakehurst…an active military base, it is also a destination for visitors to Hindenburg crash site, which tragically caught fire while attempting to land at the base. Surrounded by pine trees, the beautiful chapel is an unexpected gem at the air station. Aside from the stained glass windows, at the front of the church near the entrance are memorials to the [men] who lost their lives in the tragic crashes of the USS Akron and USS Shenandoah airships, two military dirigibles that had been based at the Lakehurst air station.*[19]

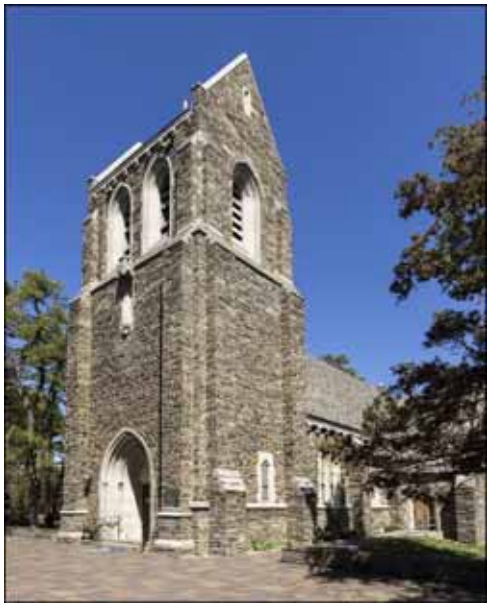


Fig. 10: Cathedral of the Air, Lakehurst, NJ.[18]

Our voyage of New Jersey philatelic aviation history will focus on the airships: *Shenandoah*-the first, *Los Angeles*-the only survivor, and *Akron* and *Macon*-the near sisters who were lost at sea during the early 1930s. Also, we will touch upon the mail from the German commercial airships *Graf Zeppelin* and *Hindenburg*. We will explore some mail from Lakehurst and the World War II blimps until their last flights nearly 60 years ago.

USS *Shenandoah* (ZR 1)-The First[20]

USS *Shenandoah* (ZR 1) was the first of four US Navy rigid airships. It was constructed during 1922–23 at Lakehurst Naval Air Station, and first flew in September 1923 but had an operational life of just two years. It developed the U.S. Navy's experience with rigid airships, and made the first crossing of North America by airship. On the 57th flight, *Shenandoah* was destroyed in a squall line over Ohio 3 September 1925.

Shenandoah was originally designated FA-1, for "Fleet Airship Number One" but this was changed to ZR-1. It had a range of 5,000 miles and could reach speeds of 70 mph. *Shenandoah* was assembled at Hangar ONE Naval Air Station Lakehurst during 1922–1923, from parts fabricated at the Naval Aircraft Factory in Philadelphia. *Shenandoah* was the first rigid airship to join the fleet.

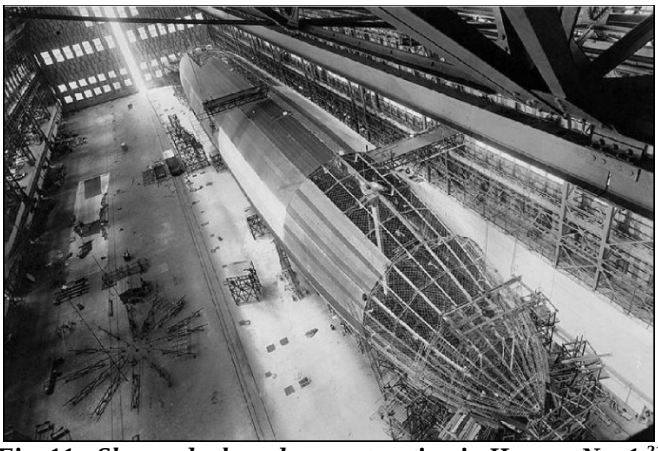
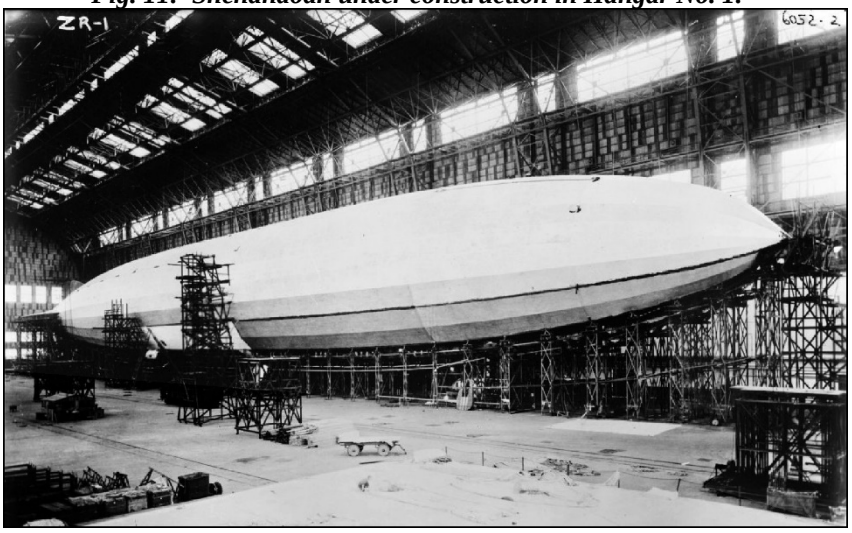


Fig. 11: Shenandoah under construction in Hangar No. 1.[21]



Library of Congress photo, call number: LC-B2- 6052-2. Bain Collection.[22]

Fig. 12: The future USS* Shenandoah *(ZR-1) newly completed, in a photo dated 25 August 1923.

The first rigid airship built in the United States, *Shenandoah* was designed by the Bureau of Aeronautics and was intended primarily for naval purposes. It also was expected that it would serve as an experimental prototype for commercial airships. Design work began in Sept. 1919 and was completed in early Oct. 1921.

Helium, chemically inert, was substituted for hydrogen, a gas with one of the widest explosive ranges, during her construction. This greatly improved the airship's safety against explosions and fires but reduced her lifting capacity and range. Helium was difficult to obtain and expensive; its use limited *Shenandoah*'s employment with the fleet and caused operational problems.

The design was based on Zeppelin bomber L-49 (LZ-96), built in 1917. L-49 was a lightened Type U "height climber," designed for altitude at the expense of other qualities. The design was found insufficient and a number of the features of newer Zeppelins were used, as well as some structural improvements. The structure was built from a new alloy of aluminum and copper known as duralumin. An outer cover of high-quality cotton cloth was sewn, laced or taped to the duralumin frame and painted with aluminum dope. Girders were fabricated at the Naval Aircraft Factory. Whether the changes introduced into the original design of L-49 played a part in *Shenandoah*'s later breakup remains questionable.

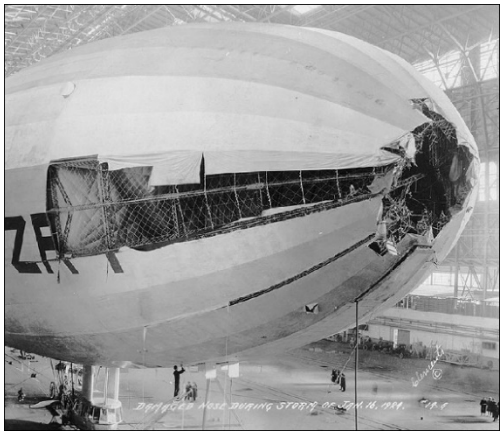
As the first rigid airship to use helium rather than hydrogen, *Shenandoah* had a significant edge in safety over previous airships. Helium was relatively scarce at the time, and the Shenandoah used much of the world's reserves just to fill its 2,100,000 cubic feet volume.

Shenandoah was powered by 300 hp (220 kW), eight-cylinder Packard gasoline engines. Six engines were originally installed, but in 1924 one engine (aft of the control car) was removed. The first frame of *Shenandoah* was erected by 24 June 1922; fourteen months later, 20 August 1923 – soon after the death of President Harding, the completed airship was floated free of the ground.

Fig. 13: Commander McCrary, the ship's commander, is shown at the wheel in 1923.[23]

Less than two weeks later, 4 September 1923, *Shenandoah* first flew. It was christened and simultaneously commissioned six weeks later, 10 October 1923, with Commander Frank R. McCrary, US Navy in command.

Shenandoah was designed for fleet reconnaissance of the type that had been performed by German naval airships during World War I.



NH 96212

Fig. 14: Damaged nose of Shenandoah, torn away from her mooring mast in Lakehurst on 16 January 1924.[24]

Its pre-commissioning trials included long-range flights during September and early October 1923, to test airworthiness in rain, fog and poor visibility. On 27 October, *Shenandoah* celebrated Navy Day with a flight down the Shenandoah Valley and returned to Lakehurst that night by way of Washington and Baltimore, where crowds gathered to see the new airship in the beams of searchlights.

At this time, Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics, a staunch advocate of airships and carriers, considered the possible use of *Shenandoah* to explore the Arctic. He believed such a program would produce valuable weather data, as well as experience in cold-weather operations. With its endurance and ability to fly at low speeds, the airship was thought to be well-suited to such work. President Coolidge approved Moffett's proposal, but *Shenandoah*'s upper tail fin covering ripped during a gale on 16 January 1924, and the sudden roll tore her away from the Lakehurst mast, ripping out her mooring winches, deflating the first helium cell and puncturing the second. Zeppelin test pilot Anton Heinen rode out the storm for several hours and landed safely while the airship was being blown backwards. Extensive repairs were needed, and the Arctic expedition was scrapped.

Repairs were completed in May, and the summer of 1924 was devoted to work with its engines and radio equipment to prepare for fleet duty. In August 1924 *Shenandoah* reported for duty with the Scouting Fleet and took part in tactical exercises. It discovered the "enemy" force but lost contact in foul weather. Technical difficulties and lack of support facilities in the fleet forced it to depart the operating area ahead of time to return to Lakehurst. Although this marred *Shenandoah*'s role in the exercises, it emphasized the need for advanced bases and maintenance ships.

In July 1924, the fleet oiler USS *Patoka* (AO 9) entered Norfolk Naval Shipyard for modifications to become the Navy's first airship tender. An experimental mooring mast 125 feet above the water was constructed; additional accommodations both for *Shenandoah*'s crew and the men who would handle and supply the airship were added; facilities for the helium, gasoline, and other supplies necessary for airships were constructed, as well as handling and stowage facilities for three seaplanes. *Shenandoah* engaged in a short series of mooring experiments with *Patoka* to determine the practicality of mobile fleet support of scouting airships. The first successful mooring was made on 8 August. During October 1924, *Shenandoah* flew from Lakehurst to California and north to Washington State to test newly erected mooring masts. This was the first flight of a rigid airship across North America.

Shenandoah did not fly again until 26 June 1925, when it began preparations for summer fleet operations. In early July, it participated with USS *Patoka* in the Governor's Conference in Bar Harbor, Maine. During July and August, it again operated with the Scouting Fleet in its primary scouting mission.

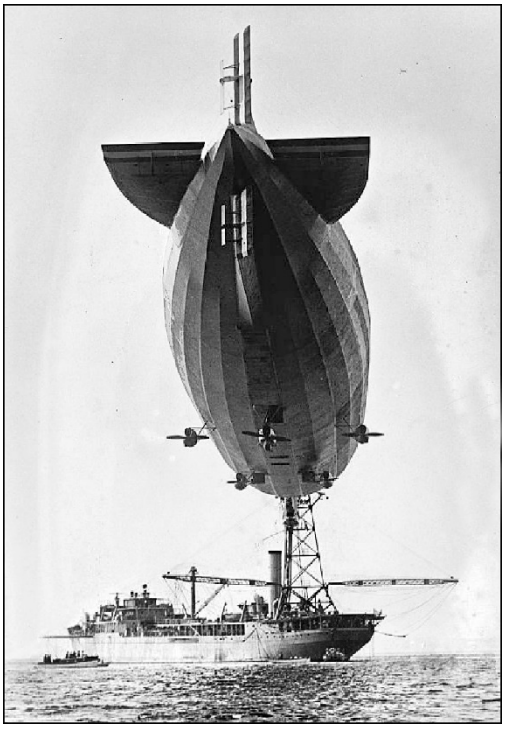


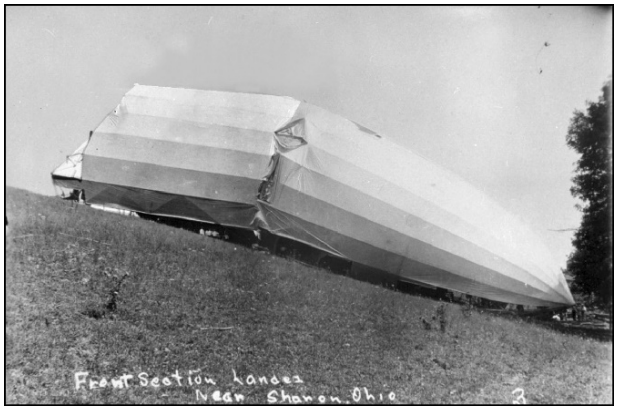
Fig. 15 & 16: **Shenandoah** ***moored to the mast aboard USS*** **Patoka.** ***This is true in the Bar Harbor photo as well (*****Patoka*** ***is behind the pagoda and trees), at the Governor's Conference July 3-4, 1925.***

LOC photo LC-F8 31898

For the final time, on 2 September 1925, *Shenandoah* departed Lakehurst on a promotional flight to the Midwest scheduled to include flyovers of 40 cities and visits to state fairs. Testing of a new mooring mast was scheduled at Dearborn, Michigan. While passing through an area of thunderstorms and turbulence over Ohio early in the morning of 3 September, during its 57th flight, the airship was caught in a violent updraft that carried it beyond the pressure limits of its gas bags. It was torn apart in the turbulence and crashed in several pieces near Caldwell, Ohio.

Fourteen crewmen, including Commander Zachary Lansdowne, were killed. This included every member of the crew of the control car (except for Lieutenant Anderson, who escaped before the car detached and fell from the ship); two men who fell through holes in the hull; and several mechanics who fell with the engines. There were twenty-nine survivors who succeeded in riding three sections of the airship to earth. Eighteen men made it out of the stern after it rolled into a valley. Four others survived a crash landing of the central section. The remaining seven were in the bow section which Commander (later Vice Admiral) Charles E. Rosendahl, US Navy, managed to navigate as a free balloon. In this group was Anderson who—until he was roped in by the others—straddled the catwalk over a hole.

The first theory of the cause of the loss was that the gas cells over-expanded as the ship rose, due to Lansdowne's decision to remove the ten automatic release valves, and that the expanding cells damaged the framework of the airship and led to its structural failure.



NH Photo 42044

Fig. 17: Bow section of Shenandoah which was navigated to the ground as a free balloon by Commander Rosendahl, with 7 survivors.

NH Photo 42038 & 42031[25]

Fig. 18a & b: Stern section of Shenandoah – two views. Eighteen men survived the crash landing of this section. Another four survived the middle section landing.

Zeppelin test pilot, Anton Heinen, according to the *Daily Telegraph*, placed the mechanical fault for the disaster on the removal of eight of the craft's 18 safety valves, saying that without them he would not have flown on her "for a million dollars". These valves had been removed in order to better preserve the vessel's helium, which at that time was considered a limited global resource of great rarity and strategic military importance; without these valves, the helium contained in the rising gas bags had expanded too quickly for the bags' valves' design capacity, causing the bags to tear apart the hull as they ruptured (the helium which had been contained in these bags became lost into the upper atmosphere).

A Lakehurst dispatch to the *New York Times* reported:[26]

> Checking up of the stories told by survivors of the Shenandoah indicates that a "twister" or cyclonic disturbance which wrenched the nose off the Shenandoah was responsible for the wreck. The theory advanced by Capt. Anton Heinen, former Zeppelin pilot, that the removal of eight of the sixteen safety-valves was responsible, is [doubted] by all of the remaining crew of the dirigible.
>
> All agree that the actual breaking-up of the ship occurred at or near the 3,500-foot level when the cells were only normally inflated, and point out that had the break been due to the bursting of one or more gas-cells, it would have occurred when the *Shenandoah* was shot up by an "air geyser" to a height of 7,000 feet.
>
> Lieut. Joseph B. Anderson, aerological officer of the ship, states that as the airship started up after coming down from her highest altitude, Commander Lansdowne ordered gas to be valved, but when she shot downward again he tried to steady her by loosing some of the water ballast. He then gave orders to point her nose down and drive through the storm, but at that moment the ship seemed to be seized by two parallel currents of air, one of which was traveling upward at a far greater speed than the other.

Another correspondent, writing from the scene of the accident:

> Just what caused the accident is still a matter of doubt tonight, but there were two theories put forward by survivors of the ship. One was that the radio cabin and control cabin, which were wrenched loose and fell to the ground clear of the ship, left holes in the outer covering of the vessel through which the night gale rushed, ripping the helium bags to bits and causing unequal stresses which broke the ship in two. The other was that the gas-tanks broke loose, and in sliding through the ship smashed girders and so weakened the structure that it collapsed.

Capt. Anton Heinen thus explains his theory that the disaster was due to the reduced number of safety-valves for the escape of the helium gas:

> Those fourteen gallant men need not have been killed. An airship might possibly go through her whole career without ever being subject to an emergency such as that which arose on the fateful third of September. Yet it is for just such emergencies that the system of safety-valves is provided. At the time that her extremely able constructors turned her over to the Government of the United States, she was provided with safety-valves sufficient in number to withstand any kind of weather conditions which our past experience had encountered.
>
> I am afraid that a false feeling of security has brought about a change in the construction of the all-important safety-valve device, which was to safeguard the most precious thing aboard the ship—human lives—from destruction. From a device used for the protection of human life it has been changed to a device for saving the valuable helium contained in the gas-bags.

> The referred-to change in the plan and construction of the safety-valve system is the primary and only cause of the terrible disaster. As a result we have been deprived of many splendid friends and promising airmen. Then, too, we have lost the wonder ship, *Shenandoah*, that has found a glorious but unnecessary place in the disaster list of airship history.
>
> In spite of what has happened, the airship, when properly constructed, handled and cared for, is the safest way of human transportation. Years that are to come will prove this to be so. And in the passing of years, with the greater and more pronounced success of airship transportation, will come the realization that the apparent greater regard for the safety of the helium than tor the lives of those now our heroes has brought about this ghastly situation.
>
> Time will show that the inexcusable change in the construction of the Shenandoah has caused the loss of part of her crew and the ship itself, which was such a tender part of my heart and my life, and the pride of all who watched her float among the clouds." [27]

According to an Associated Press dispatch, Commander Lansdowne of the Shenandoah, before starting on the trip, had criticized the new water-recovery system which was installed some weeks ago. One man quotes him as saying, "I don't like it. It's going to cause trouble in a high wind." The change involved is explained as follows:

> The original water-recovery system distributed the water recovered from exhaust gas of the engines to ballast bags scattered throughout the ship to counteract the loss in weight from gasoline consumption.
>
> The new system, installed at Section 110, near the place where the dirigible is said to have broken, concentrated a great part of the recovered water in a canvas bag holding three tons at the spot where the ship broke.
>
> Not only is it believed that the new system concentrated too much weight in one part of the ship, but in addition it is believed that the cutting of one of the main circular ribs of the ship and an intermediate rib for installation of the new system resulted in further weakness. These formed the main structure of the ship.
>
> The two ribs, or rings, as they are called in dirigible construction, were reunited by a square connection instead of the original circular form, and this also was criticized by Commander Lansdowne in private conversations just before departure of the ship.[28]

Weather also may have contributed to the casualty. Commander Lansdowne, a native of Greenville, Ohio, had warned the Navy Department of the violent weather conditions that were common to that area of Ohio in late summer. His pleas for a cancellation of the flight only caused a temporary postponement; his superiors were keen to publicize airship technology and justify the cost of the airship. As Lansdowne's widow maintained at the inquiry, publicity rather than prudence won the day.

> [M]any of the survivors, we are told, say that the accident was caused by "the most feared of storms to an aviator, a "line squall," [perhaps a "microburst" or "wind shear?] which no craft, once caught in its clutches, could have survived. "The line in a line squall," explains Prof. Henry J. Cox, forecaster for the Chicago weather bureau, "is defined by the sudden clash of temperatures or of winds blowing from different directions." Mrs. Lansdowne is quoted as saying that her husband had grave misgivings about taking the Shenandoah over Ohio at this season, knowing the prevalence of such disturbances in that region.[29]

After the disaster, airship hulls were strengthened, control cabins were built into the keels rather than suspended from cables, and engine power was increased. More attention was also paid to weather forecasting.

The crash site attracted thousands of visitors in its first few days who reportedly looted the wreckage and remains. No one was prosecuted. Several memorials remain near the crash site. There is another memorial at Moffett Field, California, and a small private museum in Ava, Ohio.[30]

Covers associated with the short life of *Shenandoah* follow.

These two covers are from 1924, in conjunction with *Shenandoah's* cross-country flight. She flew to San Diego, and then north to Seattle, Washington, before returning to Lakehurst.

Siegel Auction lot 2138, Sale 871[31]

Fig. 19: 1924, Oct. 8-12 -- U.S.S. "Shenandoah" (ZR-1), Transcontinental Flight (AAMC Z-500). 1c pair tied by U.S. Naval Sta. Lakehurst Oct. 8, 1924 duplex on cover to San Diego, receiving duplex, "U.S.S. Shenandoah" straightline.

Siegel Auction lot 2139, Sale 871[32]

Fig. 20: 1924, Oct. 12-28 -- Return Flight, U.S.S. "Shenandoah" (ZR-1), Seattle to Lakehurst (AAMC Z-501a). San Diego U.S. Naval Sta. Oct. 11, 1924 duplex, purple handstamped flight cachet for Seattle dispatch, 2c tied by Lakehurst Oct. 28 machine cancel for return mail to California.

The following July, *Shenandoah* participated with *Patoka* at the Governors' Conference, held July 3-4, 1925 at Bar Harbor, Maine.

Siegel Auction lot 2141, Sale 871

Fig. 21: 1925, Jul. 3 -- Governors' Conference Flight, U.S.S. "*Shenandoah*" (ZR-3), Lakehurst to Bar Harbor Me. (AAMC Z-502). 2c tied by Lakehurst Jul. 3 machine cancel, purple handstamped cachets and U.S.S.* Patoka *receiving duplex.

Siegel Auction lot 2142, Sale 871

Fig. 22: 1925, Jul. 4 -- Governors' Conference Return Flight, U.S.S. "*Shenandoah*" (ZR-3), Bar Harbor Me. to Lakehurst (AAMC Z-503). 2c Norse-American tied by Bar Harbor Jul. 4 machine cancel, purple handstamped cachets and U.S.S.* Patoka *receiving duplex.

Siegel Auction lot 2242, Sale 906 (Mar 2006)

Fig. 23: 1928, Jul. 4 -- Governors' Conference Return Flight, U.S.S. "Shenandoah" (AAMC Z-503). 2c Lexington-Concord tied by "Air Mail Service via U.S.S.* Shenandoah*" circular handstamp and "U.S.S. Patoka Jul. 4, 1928 P.M./Governors' Conference" duplex on cover to Roessler.

Other memorial cacheted covers follow:

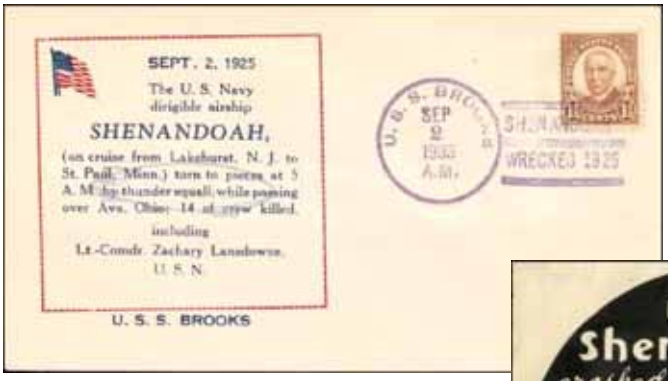


Fig. 24: A 1935 cacheted cover from the USS* Brooks *circular cancel with* Shenandoah/ *Wrecked 1925 between the bars.

Fig. 25: A 10th anniversary memorial cover from USS* Monaghan *3 September 1935.

Fig. 26: An Ava, Ohio memorial cover with a 4-bar cancel dated Sep 3, 1935.

ENDNOTES:

[1] "Centurion" is a term of art for naval aviators-most commonly used for an aviator who has 100 traps (arrested landings) on a carrier or in a type of aircraft. They often then get centurion jacket patches or cakes.

[2]

[3] https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/NH-57000/NH-57964.html

[4] https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/NH-57000/NH-57965.html

[5] Pace, Kevin, Montgomery, Ronald, and Zitarosa, Rick, *Images of America NAVAL AIR STATION LAKEHURST* (Charlestion, South Carolina, 2003, Arcadia Publishing), pp. 17-18. https://www.worldwar1centennial.org/index.php/nj-wwi-related-locations/647:camp-kendrick-lakehurst.html#

[6] See, Encyclopedia Britannica https://www.britannica.com/place/Lakehurst and https://www.history.com/this-day-in-history/navy-opens-a-blimp-base-in-new-jersey

[7] NAVAIR Lakehurst: One-Stop Shop for the Fleet - Naval Aviation News (March–April 2003), SkyVector aeronautical chart for KNEL, FAA Airport Diagram (PDF), effective January 3, 2019 https://en.m.wikipedia.org/wiki/Lakehurst_Maxfield_Field http://www.airnav.com/airport/KNEL

[8] Both map and diagram from http://www.airnav.com/airport/KNEL.

[9] Commander Louis H. Maxfield, USN, who was in charge of the U.S. Rigid Air Detachment in training at Howden, and who was to be the Commanding Officer of the ill-fated airship on the flight to America, was born in 1883 at St. Paul, Minnesota. He was a 1907 graduate of the US Naval Academy and one of 13 members of that class recognized in Memorial Hall. He entered the Naval Aviation service in 1914, and was promoted to Temporary Commander in 1918. During the War he was in command of the U.S. Naval Station at Painbaeuf, France. During a flight in the French airship "Capitaine Caussin" he dived overboard from a great height and rescued an enlisted man who had fallen overboard. Commander Maxfield was decorated by the Italian Red Cross with a silver medal for distinguished work during the Messina earthquake, with the French Naval Life-saving Medal (Silver), was an Officer of the Legion of Honour, and was decorated by the U.S. Government with the Navy Cross and the Victory Medal. https://navy.togetherweserved.com/usn/servlet/tws.webapp.WebApp?cmd=SBVTimeLine&type=Person&ID=531243

Louis was survived by his wife and two children; he is buried in Arlington National Cemetery. Three other Naval Academy graduates also were lost when ZR-2 crashed: Valentine Bieg '10, Emory Coil '12, and Henry Hoyt '14.

The USNA 1907 *Lucky Bag* entry reads:

An enthusiastic ex-student of Boston Tech. who recites with such vigor that the people of Annapolis wonder if the Brigade is having cheer practice. Was made adjutant of the Plebe Battalion because he had parallax of the eyes, and could dress the companies by the intersection of his two lines of sight. Commanded the Nevada in fine style First Class cruise. … Made himself eligible for Royalty at the class supper and was crowned by Dr. Grady the next week. Has rosy cheeks, a debonair manner and a hearty way about him ….

The Lucky Bag, his headstone, and all contemporary references spell his name "Louis." Memorial Hall has "Lewis."

[10] https://www.findagrave.com/memorial/57196722/louis-henry-maxfield, Photo added by Michael Belis, Sept.2018.

[11] https://www.newspapers.com/clip/12694050/louis_henry_maxfield_body_recovered/

[12] https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/80-G-1027000/80-G-1027200.html.

[13] ZMC-2, built at Naval Air Station Grosse Ile (Michigan). See https://en.wikipedia.org/wiki/ZMC-2.

[14] Naval aviator wings LTA from Wikipedia https://en.wikipedia.org/wiki/Dirigible_Pilot_Badge

The badge first appeared in Navy Uniform Regulations in 1922, during which time the Navy was experimenting with lighter-than-air craft, as opposed to conventional, fixed-wing aircraft.

The Dirigible/Balloon Pilot Insignia was issued well into the 1970s, with occasional awards, on a case-by-case basis, to the end of the 20th century. The 1978 U.S. Navy Uniform Regulations removed the Dirigible/Balloon Pilot Insignia from the authorized list of aviation breast insignia. Although the Dirigible/Balloon Pilot Insignia is considered obsolete, it may still be found on various insignia and badge charts promulgated through U.S. Navy instructions and publications.

[15] https://www.nps.gov/articles/hangar-no-1-lakehurst-naval-air-station.htm

[16] Hangar No. 1 Lakehurst on Flickr. Photo by Earl Leatherberry: https://www.flickr.com/photos/23711298@N07/21915828989/in/photostream/

[17] Aerial view at http://thedrive.com/the-war-zone/17748/the-navys-giant-hangar-that-housed-the-hindenburg-hides-a-mock-aircraft-carrier-inside

[18] Wiki Commons, photo by Acroterion (https://commons.wikimedia.org/wiki/User:Acroterion) (cropped) at https://commons.wikimedia.org/wiki/File:Cathedral_of_the_Air_NJ2.jpg#/media/File:Cathedral_of_the_Air_NJ2.jpg .

[19] https://www.atlasobscura.com/places/cathedral-in-the-air

[20] *The Hindenburg, Graf Zeppelin, U.S. Navy Airships and other Dirigibles*, https://www.airships.net/us-navy-rigid-airships/. A large part of the material here appears on Wikipedia which uses *The Dictionary of American Fighting Ships* as its source. As the *DANFS* is a work of the U.S. government, its content is in the public domain, and the text is often quoted verbatim in other works (including in some cases Wikipedia articles). Many websites organized by former and active crew members of U.S. Navy vessels include a copy of their ships' *DANFS* entries. (https://en.wikipedia.org/wiki/USS_Shenandoah_(ZR-1)#cite_note-p64-4). Other sources include Naval History and Heritage Command at https://www.history.navy.mil/research/histories/ship-histories/danfs/s/shenandoah-ii.html..

[21] https://en.wikipedia.org/wiki/File:USS_Shenandoah_Bau.jpg#file.

[22] Photo available on LOC site at http://cdn.loc.gov/service/pnp/ggbain/36300/36328v.jpg, or Navsource at http://www.navsource.org/archives/02/99/02990133.jpg

[23] Shenandoah ZR-1 on Wikipedia, https://commons.wikimedia.org/wiki/File:Shenandoah_controls.jpg .

[24] National History & Heritage photo NH96212.

[25] Naval History & Heritage Command, at https://www.history.navy.mil/our-collections/photography.html .

[26] http://www.1920-30.com/aviation/dirigible-shenandoah.html

[27] *Literary Digest*, September 19, 1925. http://www.1920-30.com/aviation/dirigible-shenandoah.html

[28] *Literary Digest*, September 19, 1925. http://www.1920-30.com/aviation/dirigible-shenandoah.html

[29] *Literary Digest,* September 19, 1925 http://www.1920-30.com/aviation/dirigible-shenandoah.html

[30] Hayward, John T., VADM USN "Comment and Discussion" *United States Naval Institute Proceedings* August 1978; "The Shenandoah Adventure*" A Brief Official Account of the Accident Flight 21 February 1924*; USS Shenandoah at Airships.net: Photos and History; history.navy.mil: USS *Shenandoah* (ZR-1); Naval Historical Center Article and Images of Construction; See generally, *Dictionary of American Naval Fighting Ships*, (excluding airship USS *Shenandoah*) https://www.history.navy.mil/research/histories/ship-histories/danfs.html ;"Aviation: From Sand Dunes to Sonic Booms, a National Park Service Discover Our Shared Heritage Travel Itinerary"; Swanborough, G. and Bowyers, P. M. *United States Navy Aircraft Since 1912*. London: Putnam, 1976 (2d ed.) ISBN 0 85177 838 0; *Shenandoah* Crash Sites, National Park Service, "Shenandoah is looted of all valuable parts*". St. Petersburg Times*. 43 (248). St. Petersburg, Florida. 5 September 1925.:1; "U.S. raids private homes to recover loot from *Shenandoah*". *Milwaukee Sentinel*. 17 September 1925. p. 3; *Pittsburgh Press June 27, 1937* ; Death of a Dirigible www.americanheritage.com ; *Shenandoah* Crash Site www.nps.gov ; *Shenandoah* Airship Disaster, www.roadsideamerica.com ; "Noble Local School District". Noble Local School District; Dalhart, Vernon, Carson Robison, and Elmer S. Hughes. "The Wreck of the Shenandoah: Song" New York: Shapiro, Bernstein & Co, 1925. OCLC 43456313; Massey, Guy, and Carson Robison. Wreck of the Shenandoah. [U.S.]: Pathé Actuelle, 1925; MacSwords, J. R. "15 dead in blimp disaster: lightning flash, terrific storm; Shenandoah wages losing battle with elements." *The Times Recorder*, Zanesville, Ohio 4 September 1925; Wood, Junius B., "Seeing America from the 'Shenandoah' ", *National Geographic*, January 1925; *Ill Wind: The Naval Airship Shenandoah In Noble County, Ohio*. Gray, Lewis. Gateway Press: Baltimore, 1989; Robinson, Douglas H., and Charles L. Keller. *Up Ship!": U.S. Navy Rigid Airships 1919–1935.* Annapolis, Maryland: Naval Institute Press, 1982. ISBN 0-87021-738-0; Keirns, Aaron J. *"America's Airship Disaster": The Crash of the USS Shenandoah,* Howard, Ohio: Little River Publishing. ISBN 978-0-9647800-5-7.

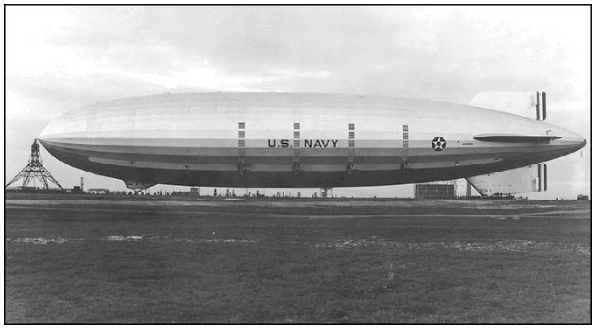
[31] Siegel Auction 871 (December 2003): Siegel descriptions used.

[32] Siegel Auction 871 (December 2003), Lot 2139: https://siegelauctions.com/lots.php?sale_no=871&lot_no=2139 . Siegel description used.

NAVAL AIR STATION LAKEHURST: PART II, The Last Two Lakehurst US Navy Dirigibles, USS AKRON (ZRS 4) and USS MACON (ZRS 5)- October 1929-February 1935

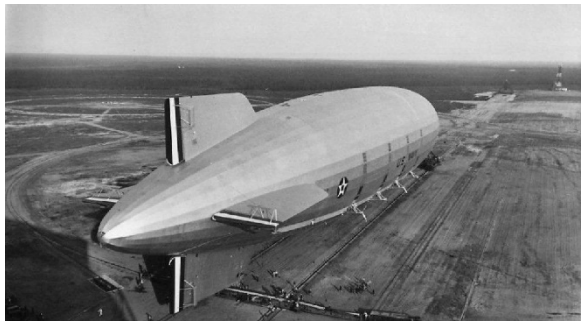
By Captain Lawrence B. Brennan, US Navy Retired[1],[2]

Two days after the infamous Stock Market crash and the beginning of the Great Depression on Black Monday, 29 October 1929, construction on the penultimate US Navy dirigible, *Akron* (ZRS 4) 31 October 1929 was begun at Goodyear-Zeppelin Corp., at Akron, Ohio. The airship would be lost three and a half years later in the Atlantic Ocean off the New Jersey shore during the early hours of 4 April 1933, four weeks into the first term of President Franklin D. Roosevelt.



NH 42158[3]

Fig. 1: USS* Akron *moored at Lakehurst in 1931.



NH 163567827224

Fig. 2: USS* Macon *at Lakehurst (undated).

Both ships were built as aircraft carriers, carrying small planes which could be deployed and "trapped" in midair.

Construction on the ultimate US Navy dirigible, *Macon* (ZRS 5) commenced by Goodyear-Zeppelin Corp. in May 1931 and christened on 11 March 1933, by Jeanette Whitton Moffett, wife of Admiral Moffett who would not live to see *Macon* commissioned. *Macon* would be lost 12 February 1935 when she crashed in the Pacific Ocean off the California Coast. The two losses claimed the lives of 75 officers and men; in *Akron* and 2 in *Macon* and ended the dirigible part of the US Navy's lighter than air program.

Only 20 feet shorter than *Hindenburg*, both *Akron* and *Macon* were among the largest flying objects in the world in terms of length and volume. The two American-built sisters still hold the world record for largest helium-filled rigid airships.

For collectors of flight or ship covers, these airships were military aircraft, meant for reconnaissance, not to carry passengers or mail as their German counterparts, nor with long-term living quarters for crew as naval ships. They had no onboard post offices, as ships did, and except for two flights of the *Akron* and some favor mail carried on the *Macon*, flown mail is quite rare and scarce. The majority of the covers related to the various flights are commemorative event covers, some very attractive. Many of these covers were postmarked and cacheted on US Navy Ships, making this collecting area of interest to collectors of ship mail.[4]

USS AKRON (ZRS 4) 31 October 1929- 4 April 1933

Construction of the rigid airship ZRS 4 commenced 31 October 1929 at Akron, Ohio, by the Goodyear-Zeppelin Corp., and two years later, on 7 November 1931, Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics, drove the "golden rivet" in the ship's main ring. Erection of the actual "hull" sections had begun in March 1930. On 10 May 1930, Secretary of the Navy Charles Francis Adams chose the name *Akron,* to honor the city where the airship was being constructed; four days later, on 14 May 1930 Assistant Secretary of the Navy Ernest Lee Jahncke announced it. On 8 August 1931, *Akron* was launched (floated free of the hangar floor) and christened by the First Lady, Mrs. Lou Henry Hoover.

Fig. 3: USS* Akron *cover commemorating its christening on 8 August 1931, cancelled at Akron. Ohio, where she was built. Note distinctive Roessler-type air mail envelope.

Akron, the lead dirigible of her class, had a dead weight 221,000 pounds; useful load 182,000 pounds; length 785 feet; maximum diameter 132.5 feet; height 152.5 feet; nominal gas volume 6,500,000 cubic feet; speed 72 knots (maximum), 50 knots (cruising); complement 89; armament 4 aircraft, 7 machine guns. A team of experienced German airship engineers—led by Chief Designer Karl Arnstein—supported design and construction of both the U.S. Navy airships *Akron* and *Macon*.

The airships had a structured duraluminum hull with three interior keels. They were kept aloft by 12 helium-filled gas cells made from gelatin-latex fabric. Inside the hull, the ships had eight German-made Maybach 12-cylinder, 560 hp gasoline-powered engines that drove outside propellers. The propellers could be rotated down or backwards, providing an early form of thrust vectoring to control the ship during takeoff and landings. The rows of slots in the hull above each engine were part of a system to condense out the water vapor from the engine exhaust gases for use as buoyancy compensation ballast to compensate for the loss of weight as fuel was consumed.

Akron conducted her maiden flight on the afternoon of 23 September 1931 around the Cleveland, Ohio, area, carrying 112 passengers, with Secretary Adams and Admiral Moffett embarked. She made eight more flights, principally over Lake Erie but ranging as far as Detroit, Milwaukee, Fort Wayne and Columbus, before her delivery flight from Akron to Naval Air Station (NAS) Lakehurst, where she was commissioned on Navy Day, 27 October 1931, Lieutenant Commander Charles E. Rosendahl, US Navy in command.

Fig. 4: First experimental flight of USS* Akron *23 September 1931, in the Cleveland area, carrying 112 passengers, including Rear Admiral William A. Moffett. Signed by survivor Moody E. Erwin. Several additional short flights followed before delivery to Lakehurst.

For sale on Ebay by DaveKatz

Fig. 5: Another short flight out of Akron, this cover commemorates* Akron's *flight to Columbus, Ohio shortly before her flight to NAS Lakehurst on 21 October 1931, and commissioning 27 October 1931.

Aviation editors and press enjoyed a special press flight 2 November which was comprised of 109 persons including Admiral Moffett and an NBC broadcast.[5] 3 November 1931, *Akron* cast off from Lakehurst and cruised down the eastern seaboard to Washington, setting a new record for the largest number of individuals carried into the air by a single craft—207. Over the weeks that followed, she amassed 300 hours aloft in a series of flights, including a 46-hour endurance round trip flight to and from Mobile, Alabama. The return trip made via the valleys of the Mississippi and Ohio Rivers.

NS02990420[6]

Fig. 6: USS* Akron *flying over Washington, DC in 1931 – shown here over the Lincoln Memorial.

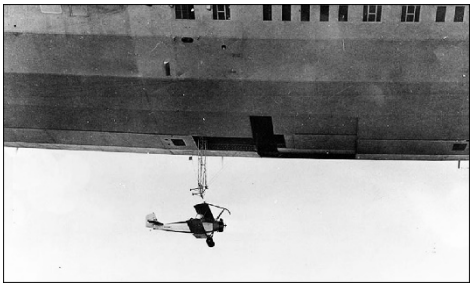
On the morning of 9 January 1932, *Akron* cleared NAS Lakehurst to work with the Scouting Fleet on a search exercise. Proceeding to the coast of North Carolina, *Akron* headed out over the Atlantic, tasked with finding a group of Guantanamo Bay-bound destroyers. Once she had sighted the ships, she was to shadow them and report their movements. Clearing the North Carolina coast at 0721 on 10 January, *Akron* proceeded south. Bad weather prevented her from sighting the destroyers (she missed them at 1240, although they sighted her); she continued on, eventually shaping a course toward the Bahamas. Heading northwesterly, *Akron* changed course shortly before midnight and proceeded to the southeast. Ultimately, at 0908 11 January, *Akron* spotted USS *Raleigh* (CL 9) and a dozen destroyers, positively identifying them on the eastern horizon two minutes later. Sighting a second group of destroyers shortly thereafter, *Akron* was released from the evolution[7] about 1000, having achieved a "qualified success" in her initial test with the Scouting Fleet. Historian Richard K. Smith wrote in *The Airships Akron and Macon:*

> *[With] consideration given to the weather, duration of flight, a track of more than 3,000 miles flown, her material deficiencies, and the rudimentary character of aerial navigation at that date, the Akron's performance was remarkable. There was not a military airplane in the world in 1932 which could have given the same performance, operating from the same base."*

A 22 February 1932 casualty prevented *Akron* from taking part in Fleet Problem XIII. As the rigid airship was being taken from her hangar, the tail came loose from its moorings and, caught by the wind, crunched into the ground. The greatest damage was confined to the lower fin area, and required repairs before the ship was ready to go aloft again. In addition, ground handling fittings had been torn out of the main frame, necessitating repairs. It was not until later in the spring that *Akron* was airworthy again. On 28 April, the rigid airship cast off for a nine hour flight with Admiral Moffett and Secretary Adams on board.

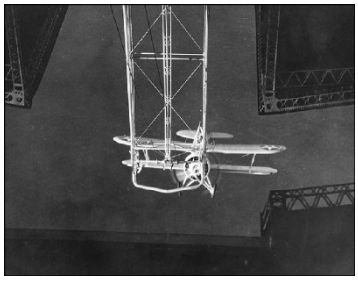
Soon after returning to Lakehurst to disembark her distinguished passengers, *Akron* took off again to conduct a test of the "spy basket," something like a small airplane fuselage suspended beneath the airship that would enable an observer to serve as the ship's "eyes" below the clouds while the ship herself remained out of sight above them, meant to serve much like a periscope on a submarine. Fortunately, the basket was only "manned" by a sandbag, for the contraption proved "frighteningly unstable - swooping gracefully from one side of the airship to the other before the startled gazes of *Akron's* officers and men." It was never tried again.

Akron and her sister ship *Macon* (ZRS 5) (still under construction) were regarded as potential "flying aircraft carriers." On 3 May 1932, *Akron* cruised above the coast of New Jersey with Rear Admiral George C. Day, President of the Board of Inspection and Survey, on board; for the first time the "trapeze" installation for handling of aircraft while airborne was tested. Lieutenants Daniel W. Harrigan and Howard L. Young were the pilots who carried out those historic "traps," first with a Consolidated N2Y trainer and then with the prototype Curtiss XF9C-1 *Sparrowhawk* fighter. The following day, *Akron* carried out another demonstration flight, this time with members of the House Committee on Naval Affairs on board, providing the lawmakers a demonstration of *Akron's* ability to handle aircraft.



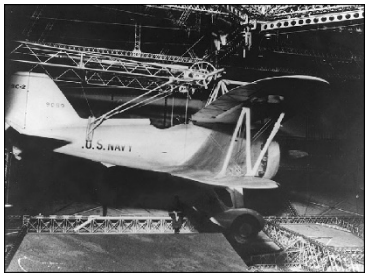
NH 80-G-463185

Fig. 7: A Sparrowhawk being deployed from* Akron. *The dark cross above is where the planes entered and left the airship.



NH 80-CF-4184-10

Fig. 8: Aircraft "landing" on* Akron *in flight.



NH 80773

Fig. 9: One of* Akron's *planes, housed in her on board hangar.

Following the conclusion of those trial flights, *Akron* departed Lakehurst 8 May 1932 for the West Coast. This was one of *Akron's* two flights which carried official U.S. Mail. The other was in August, and both bore US Post Office cachets. The airship proceeded down the eastern seaboard to Georgia, across the gulf plain and over Texas and Arizona, en route to her base at Sunnyvale, California. She reached Camp Kearny, California, on the morning of 11 May, and attempted to moor.

Fig. 10: May departure on a coast to coast flight carrying mail, with post office cachets front and back. Although canceled with a May 6, 1932 cds, the back cancel indicates it did not leave Lakehurst until May 8, arriving in San Diego 11 May 1932.

Since neither the trained ground handlers nor the specialized mooring equipment needed by an airship of *Akron's* size were there, the landing at Camp Kearny was fraught with danger. By the time she started the evolution, the heat of the sun's rays had warmed her, and her engines had further lightened the airship by using 40 tons of fuel during her voyage across the continent. As a result, *Akron* became uncontrollable. Her mooring cable cut to avert a catastrophic nose-stand by the errant airship, *Akron* headed up. Most men of the mooring crew, predominantly "boot" seamen from the Naval Training Station at San Diego, let go their lines. One man was carried 15 feet into the air before he let go and suffered a broken arm. Three others were carried up even farther. Two men lost their grips and fell to their deaths. The third clung desperately to his line and made fast to it before he was hoisted on board *Akron* one hour later. Eventually, *Akron* moored at Camp Kearny later that day and proceeded to Sunnyvale.

During the following weeks, *Akron* "showed the flag" on the West Coast; she ranged as far north as the Canadian border before returning south to exercise with the Scouting Fleet. Serving as part of the "Green" Force, *Akron* attempted to locate the "White" Force. Although opposed by Vought 02U *Corsair* floatplanes from "enemy" ships, the rigid airship managed to locate the opposing forces in just 22 hours.

With *Akron* in need of repairs, the airship departed Sunnyvale on 11 June 1932, bound for Lakehurst. Difficulties studded the return trip, principally due to unfavorable weather. After a "long and sometimes harrowing" aerial voyage, she ultimately arrived on 15 June. "Seventy-nine weary men climbed down the gangway in the after end of the control car, more than glad to be back."

Fig. 11: Returning to Lakehurst 11 June 1932 for repairs from Sunnyvale Field in California (later named Moffett Field).

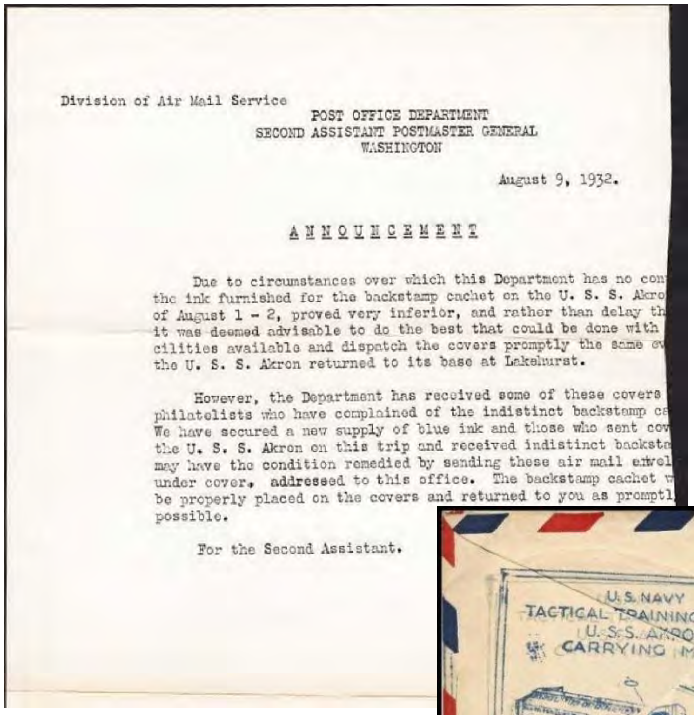
Akron underwent voyage repairs upon her return. During July she took part in a search for *Curlew,* a yacht which had failed to reach port at the end of a race to Bermuda. She resumed operations with her "trapeze" and her planes. On 20 July 1932, Admiral Moffett again embarked in *Akron* but the next day left the airship in one of her N2Y-ls which took him back to Lakehurst after a severe storm had delayed her return.

That summer *Akron* entered a new phase of her career, one of intense experimentation with the revolutionary "trapeze" and a full complement of planes, Curtiss F9C-2 *Sparrowhawk*s. A key element of that new phase was the new commanding officer, Commander Alger Dresel, US Navy, replacing Commander Rosendahl 22 June 1932.

Fig. 12: A tactical training flight 1 August 1932 was chosen as a second opportunity to carry mail. Numerous covers were carried and most have the faint imprint of the back cachet as shown.

Fig. 13: The post office cachet on a cover cancelled 1 August 1932, signed by Commander Rosendahl.[8]

The post office evidently received a number of complaints about the back strike on these covers, and posted the letter below to recipients, offering to restrike the back cachet. An unusual move, but one that shows their participation in the growing area of cachet collecting.



Division of Air Mail Service
POST OFFICE DEPARTMENT
SECOND ASSISTANT POSTMASTER GENERAL
WASHINGTON

August 9, 1932.

ANNOUNCEMENT

Due to circumstances over which this Department has no con
the ink furnished for the backstamp cachet on the U. S. S. Akro
of August 1 - 2, proved very inferior, and rather than delay th
it was deemed advisable to do the best that could be done with
cilities available and dispatch the covers promptly the same ev
the U. S. S. Akron returned to its base at Lakehurst.

However, the Department has received some of these covers
philatelists who have complained of the indistinct backstamp ca
We have secured a new supply of blue ink and those who sent cov
the U. S. S. Akron on this trip and received indistinct backsta
may have the condition remedied by sending these air mail envel
under cover, addressed to this office. The backstamp cachet w
be properly placed on the covers and returned to you as promptl
possible.

For the Second Assistant.

Item for sale on Ebay from brainyeros

Fig. 14: Letter from the Post Office Department offering to restrike covers which received a weak back cancel on this 1-2 August cover.

Naval Cover Museum[9]

Fig. 15: The reverse of a cover which clearly was returned for this cancel, as it shows two different inks and a double impressing.

Another casualty hampered her training. On 22 August 1932, *Akron's* fin fouled a hangar beam after a premature order to commence towing the ship out of the mooring circle. Prompt repairs enabled *Akron* to conduct eight flights over the Atlantic during the last three months of 1932. These operations involved intensive work with the trapeze and the F9C-2s and included the maintenance of two aircraft patrolling on *Akron's* flanks.

After local operations out of Lakehurst for the remainder of the year 1932, *Akron* was ready to resume her work with the fleet. On the afternoon of 3 January 1933, Commander Frank C. McCord, US Navy relieved Cmdr. Dresel as commanding officer; Commander Dresel was ordered to *Macon* as her prospective commander. Within hours of this event, *Akron* was shaping a course toward Florida. She refueled at the Naval Reserve Aviation Base, Opa-Locka, Fla., near Miami, on 4 January and then proceeded to Guantanamo Bay, Cuba, for an inspection. She used one of her N2Y-ls as an aerial "taxi" to ferry members of the inspection party back and forth.

Soon thereafter, *Akron* returned to Lakehurst for local operations which were interrupted by a two-week overhaul and poor weather. During March, the rigid airship carried out intensive training with her embarked aviation unit of F9C-2s, honing her hook-on skills. During the course of these operations, she overflew the capital on 4 March 1933, the first of four consecutive inauguration days for the former Assistant Secretary of the Navy (1913-20), Franklin D. Roosevelt as President.

On 11 March 1933, *Akron* departed Lakehurst and headed for Panama. She stopped briefly at Opa-Locka before proceeding to Balboa, Canal Zone. There an inspection party looked over a potential air base site. While returning northward, *Akron* paused at Opa-Locka for local operations, exercising her gun crews with the N2Y-ls serving as targets. Finally, on 22 March, she got underway to return to Lakehurst.

On the evening of 3 April 1933, *Akron* cast off from her moorings to operate along the coast of New England, assisting in the calibration of radio direction finder stations, with Admiral Moffett embarked. Also on board were: Commander Harry B. Cecil, the admiral's aide; Commander Fred T. Berry, Commanding Officer NAS Lakehurst; and Lieutenant Colonel Alfred F. Masury, USAR, the admiral's guest, a vice-president of the Mack Truck Co. and a strong proponent of the potential civilian uses of rigid airships.

Akron encountered severe weather which did not improve as she passed over Barnegat light at 2200 on 3 April. Wind gusts struck the airship unmercifully around 0030 on 4 April 1933, and pushed her down toward the sea. She crashed tail first and then sank in the stormy Atlantic. The German MS *Phoebus,* in the vicinity, saw lights descending toward the ocean at about 0023 and altered course to starboard to investigate, believing that she observed a plane crash.

At 0055 4 April 1933, *Phoebus's* men picked up Lieutenant Commander Henry V. Wiley, US Navy, *Akron's* unconscious executive officer, while a ship's boat picked up three more men: Chief Radioman Robert W. Copeland, Boatswain's Mate 2d Class Richard E. Deal, and Aviation Metalsmith 2d Class Moody E. Erwin. Chief Copeland never regained consciousness but died on board *Phoebus*. Although the German sailors spotted four or five other men, they did not know that their ship had chanced upon the crash of *Akron* until Commander Wiley regained consciousness a half hour after being rescued. *Phoebus* unsuccessfully searched for more survivors of aviation's the most costly single tragedy to that date. A Navy blimp, *J-3,* sent out to join the search, also crashed, with the loss of two men.

The Coast Guard destroyer *Tucker* (CG 23) [ex USS *Tucker* (DD 57)], the first U.S. ship on scene, arrived at 0600 and took on board the *Akron* survivors and the body of Chief Copeland, thus releasing the German ship. Among the other search ships were *Portland* (CA-33), *Cole* (DD-155), Coast Guard cutter *Mojave (*WPG 47), and the Coast Guard destroyers *McDougal* (CG 6) [ex USS *McDougal* (DD 54) and *Hunt* (CG 18) [ex USS *Hunt* DD 194 which was transferred to the Royal Navy as HMS *Broadway*, served during World War II and scrapped in 1945] as well as two Coast Guard aircraft.

Akron's loss spelled the beginning of the end for the rigid airship in the Navy, especially since one of its leading proponents, Admiral Moffett, perished along with 72 men. As President Roosevelt commented:

> *The loss of the Akron with its crew of gallant officers and men is a national disaster. I grieve with the Nation and especially with the wives and families of the men who were lost. Ships can be replaced, but the Nation can ill afford to lose such men as Rear Admiral William A. Moffett and his shipmates who died with him upholding to the end the finest traditions of the United States Navy.*

Photo from This Day in Aviation[10]

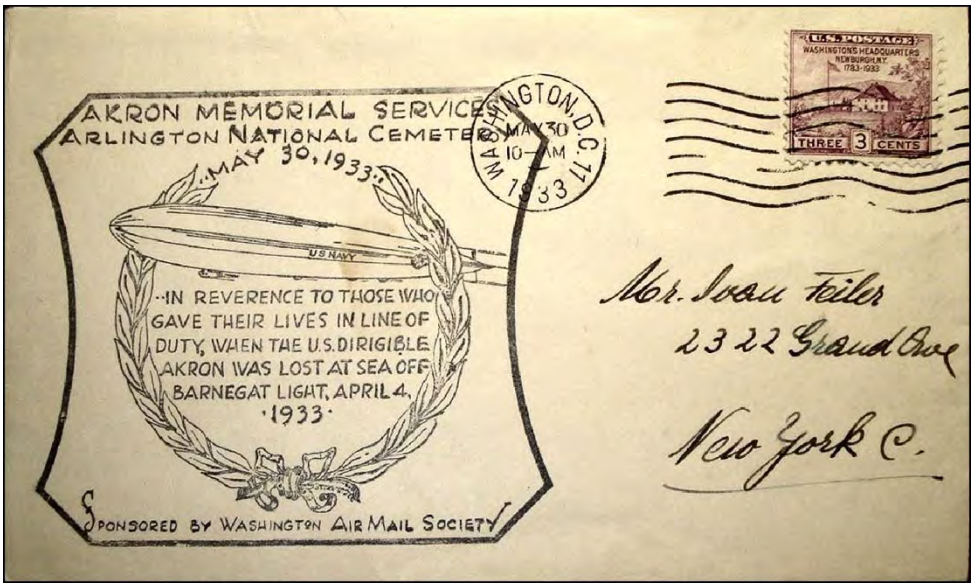
Fig. 16: The three survivors of the crash of USS* Akron*: Aviation Metalsmith 2nd class (AM2c) Moody E. Erwin, Lieutenant Commander Herbert V. Wiley, and Boatswain's Mate 2nd Class (BM2c) Richard E. Deal.

New York Times Photo[11]

Fig. 17: Moody E. Erwin on board Coast Guard destroyer* Tucker *at the New York Navy Yard, rescued after the* Akron *crash.

For sale on Ebay from topcat2001565758590[12]

Fig. 18: Many covers were prepared to honor the men lost on the* Akron*. This one, created for Memorial Day 1933 is signed by all three survivors of the crash of the* Akron*: Deal (to whom it is addressed), Erwin, and Wiley.



For sale on Ebay

Fig. 19: A memorial Day 1933 cover honoring all 72 men lost in the* Akron *tragedy.

Greg Cielieski at [13]Naval Cover Museum

Fig. 20: A cover honoring Admiral Moffett, one of the greatest proponents of naval airships, lost 4 April 4 1933 in the* Akron *crash.

Inexplicably, *Akron* had not been equipped with life jackets; that oversight contributed to the death of nearly all hands. USS *Macon* and other airships received life jackets to avert a repetition of this tragedy. When *Macon* was damaged in a storm in 1935 and subsequently sank after landing at sea, 70 of the 72 crew were saved.

Credit: Robert J. Cressman for his excellent article on NHHC's DANFS ZRS 4 Ship History[14]

Several other USS Akron covers can be seen in the article on Fred Bernet by John Lupia in this issue. *See pages **110 & 111**.*

USS MACON (ZRS 5) May 1931- 12 February 1935

USS *Macon* (ZRS 5) was a rigid airship built and operated by the US Navy for scouting and served as a "flying aircraft carrier," designed to carry five single-seat Curtiss F9C *Sparrowhawk* biplanes or two-seat Fleet N2Y-1. In commission for less than two years, in February 1935 *Macon* was damaged in a storm and lost off California's Big Sur coast, though most of the crewmen were saved. The wreckage is listed as the USS *Macon* Airship Remains on the U.S. National Register of Historic Places.

NH 42102

Fig. 21: **Macon *under construction at Goodyear Airdock, in Akron Ohio, 1931.***

Macon was built at the Goodyear Airdock in Springfield, Ohio by the Goodyear-Zeppelin Corporation. Her construction also was begun in May 1931 during the Hoover Administration. *Macon* was christened on 11 March 1933, the second week of FDR's first term, by Jeanette Whitton Moffett, the wife of Rear Admiral William A. Moffett, Chief of the Navy Bureau of Aeronautics. The airship was named after the city of Macon, Georgia, the largest city in the Congressional district of Carl Vinson, then chairman of the House Committee on Naval Affairs and later the namesake of the fourth nuclear powered aircraft carrier, USS *Carl Vinson* (CVN 70).

Just over two weeks after the loss of *Akron* in which Admiral Moffett and 72 others were killed, *Macon* first flew on 21 April over northern Ohio for nearly 13 hours with 105 aboard. Before leaving Ohio, she executed preliminary turning and climbing trials as well as a speed run in which she reached 70 knots.

Macon was commissioned 23 June 1933 with Commander Alger H. Dresel, US Navy in command. On 24 June 1933, *Macon* left Goodyear's field for NAS Lakehurst, where the new airship was based for the summer while undergoing a series of training flights.

Fig. 22: Christening 11 March 1933.

Fig. 23: First flight 21 April 1933.

Fig. 24: Departure from Akron, Ohio for Lakehurst 23 June 1933.

Macon was the last rigid airship procured for the Navy.

Macon (ZRS 5) received her planes on board for the first time, 7 July 1933, while underway over Long Island Sound. Lt. D. Ward Harrigan tested the trapeze with an N2Y-1 trainer, and then together with Lt. (j.g.) Frederick N. Kivette checked the apparatus with heavier F9C-2 Sparrowhawks.

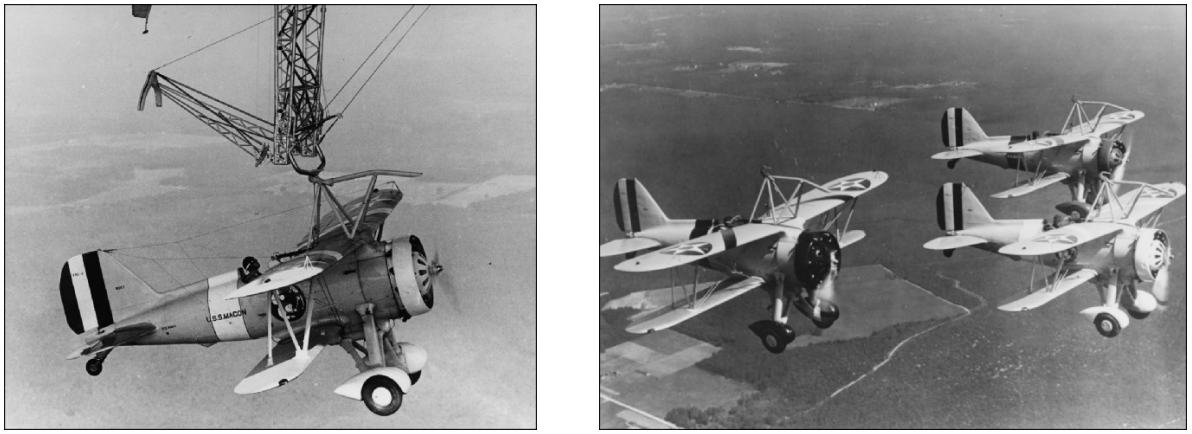


Fig. 25:* Macon*'s Sparrowhawks fitted with gear for mid-air trapping, and shown suspended in the trapeze apparatus below the mother ship. LOC 80-G-441979 & NH 711617

Macon had a more productive career than *Akron*. The commanders of *Macon* developed the doctrine and techniques of using her on-board aircraft for scouting while the airship remained out of sight of the opposing forces during exercises. *Macon* participated in several fleet exercises, though the men who framed and conducted the exercises lacked an understanding of the airship's capabilities and weaknesses. It became standard practice to remove the landing gear of the Sparrowhawks while aboard the airship and then replace it with a fuel tank, thus increasing the aircraft's range by 30 percent. As *Akron*, *Macon* also had a spy-basket, with no better result.

Macon first operated aircraft on 6 July 1933 during trial flights out of Lakehurst. The planes were stored in bays inside the hull and were launched and retrieved using a trapeze.

Fig. 26: Trial flights out of Lakehurst occupied* Macon*, including over New York City 7 July 1933.

NH 43901

Fig. 27:* Macon *over Manhattan in July 1933.

12 October 1933 *Macon* (ZRS 5) departed NAS Lakehurst, N.J. for her new home on the West Coast at NAS Sunnyvale, California, near San Francisco. The airship followed the Atlantic coast down to Macon, Ga., and turned westward over the southern route. The craft arrived at Sunnyvale on the afternoon of 15 October, completing the 2,500-mile nonstop flight in approximately 70 hours. *Macon* embarked a single N2Y-1 trainer for the voyage.

Fig. 28:* Macon *departs for her new home at Moffett Field in Sunnyvale, California. Sponsored by the Lakewood NJ Stamp Society, it is cancelled 12 Oct 1933 with a Lakehurst NJ machine cancel.

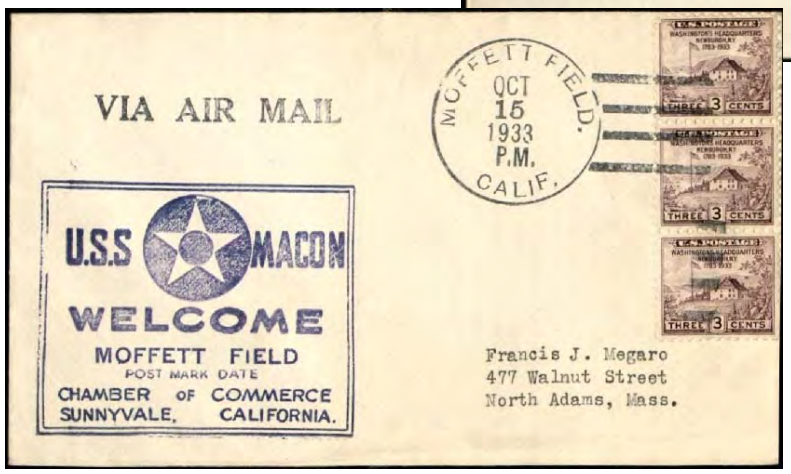
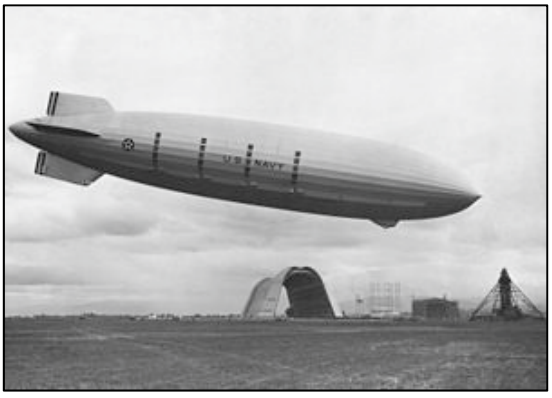
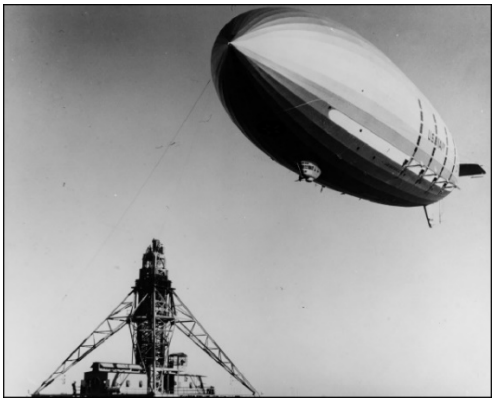


Fig. 29: Arrival at Moffett Field. Sunnyvale, CA, with an 15 Oct 1933 Moffett Field cancel.



Wikipedia

Fig. 30:* Macon *arriving at her new home at Moffett Field, flying cross country from Lakehurst, NJ



NH 85747

Fig. 31: Close up view of* Macon *approaching the Moffett Field mooring mast 15 October 1933.

Macon (ZRS 5) made a transcontinental flight 20 April 1934 from Moffett Field to Florida. The airship encountered severe turbulence en route that caused diagonal and interring girders to buckle, but the crew accomplished temporary repairs and continued. *Macon's* planes flew cross country independently. *Macon* returned to Moffett Field on 16 May.

Fig. 32: A cover commemorating* Macon's *arrival in Miami, Florida on 22 April 1934.

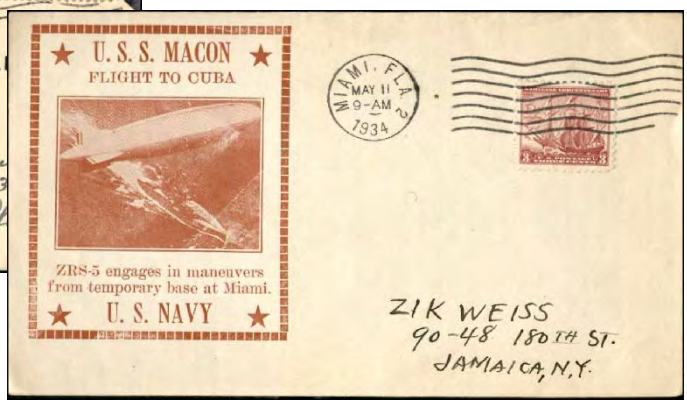


Fig. 33: While on the East Coast,* Macon *also flew to Cuba. Cover dated 11 May 1934 with Miami cds.

Fig. 34. A Moffett Field cover cancelled 18 May 1934. Cover signed by Admiral Ernest J. King (who would become the Chief of Naval Operations and Commander-in-Chief U.S. Fleet during World War II, as a Fleet Admiral), and by Commander Alger H. Dresel.

In July 1934, Lieutenant Commander Herbert V. Wiley, US Navy took command., replacing Commander Dresel. Wiley, one of only three survivors of the crash of *Akron*, was soon promoted to commander and ultimately served as Commanding Officer USS *West Virginia* (BB 48) in the final two years of World War II, before retiring in 1947 as a rear admiral.

While on a long duration flight over the Pacific, *Macon* located and tracked USS *Houston* (CA 30), which was carrying President Roosevelt on a return trip from Hawaii. This surprised President Roosevelt and shocked Navy. Newspapers and mail were dropped to the President who responded with a personal message: "from Houston: 1519 The President compliments you and your planes on your fine performance and excellent navigation 1210 and 1519 Well Done and thank you for the papers the President 1245."[15] The Fleet Commander Admiral Joseph M. Reeves, US Navy was upset; Commander of the Bureau of Aviation, Rear Admiral Ernest J. King, US Navy was not.

Illustration from This Day in Aviation[16]

Fig. 35: Captain Herbert V. Wiley on the bridge of USS West Virginia (BB-48).)

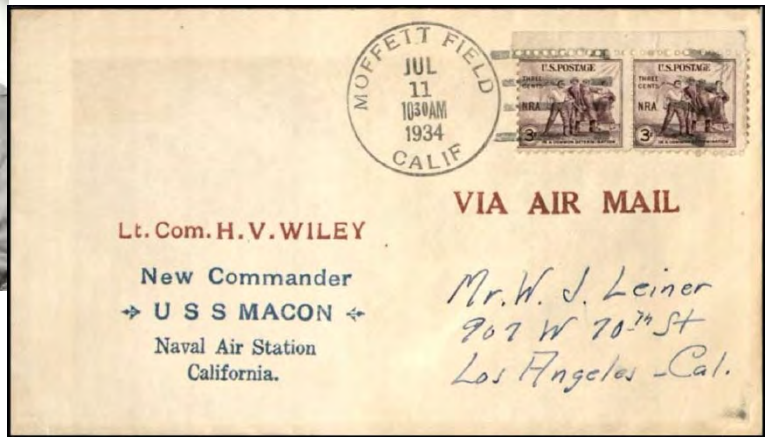


Fig. 36: Cover commemorating the appointment of H .V. Wiley as the new commander of* Macon*, on 11 July 1934.

Captain Wiley served as *West Virginia*'s commanding officer until 2 May 1945. He retired 1 January 1947, after nearly 36 years of service. Rear Admiral Herbert Victor Wiley, United States Navy, died at Pasadena, California, 28 April 1954.[17]

Naval Cover Museum[18]

Fig. 37: Fleet Maneuvers in January 1935, with a USS* Pennsylvania *cancel 15 Jan 1935 "ZRS 5 OVER /FLEET AGAIN slogan between the bars.

Brennan Collection

Fig. 38: Another cover cancelled on the USS* Northampton *15 Jan 1935, addressed to New Jersey, with MACON / OVERHEAD slogan.

In April 1934, during the crossing of the continent, *Macon* was forced to climb to 6,000 feet to clear mountains in Arizona. As the ship's pressure height (the height at which the gas cells' pressure would equal or exceed ambient atmospheric pressure) of 3,000 feet was exceeded, a large amount of helium was vented to prevent the cells from leaking and eventually rupturing due to the increasing positive pressure differential at increasing altitude. To compensate for the loss of lift from venting, 9,000 lbs of ballast and 7,000 lbs of fuel had to be dumped. *Macon* was being flown 15,000 lb "heavy" and was operating at full power in order to have sufficient dynamic lift and to have enough control to fly in the severe turbulence through a mountain pass near Van Horn, Texas. Following a severe drop, a diagonal girder in ring 17.5, which supported the forward fin attachment points, failed. Rapid damage control by Chief Boatswain's Mate Robert Davis repaired the girders before further failures could occur. *Macon* completed the journey safely but the buckled ring and all four tailfins were in need of strengthening. Girders adjacent to the horizontal and lower fins were repaired, but the repairs to the girders on either side of the top fin were delayed until the next scheduled overhaul, when the adjacent gas cells could be deflated.

On 12 February 1935, the repair process was still incomplete when, returning to Sunnyvale from fleet maneuvers, *Macon* ran into a storm off Point Sur, California. During the storm, the ship was caught in a wind shear which caused structural failure of the unstrengthened ring (17.5) to which the upper tailfin was attached. The fin failed to the side and was carried away. Pieces of structure punctured the rear gas cells and caused gas leakage. It took nearly 45 minutes for *Macon* to succumb to its wounds as the officers and crew fought to maintain flying trim. When the casualty first occurred, the crew dumped every bit of ballast to raise the tail section. But that overcompensated, and the airship then vented helium as the dirigible yo-yoed from 1,000 to 5,000 feet (near its operational limit), and back. This was somewhat similar to a submarine passing test depth and failing to return to the surface before going beyond crush depth. [19]

Acting on fragmentary information, the Commander Officer ordered an emergency discharge of ballast. Control was lost and, tail heavy and with engines running full speed ahead, *Macon* rose past the pressure height of 2,800 feet, and kept rising until enough helium was vented to stop the lift, she reached an altitude of 4,850 feet. The last SOS call from Commander Wiley stated, "Will abandon ship as soon as we land on the water somewhere 20 miles off of Pt. Sur, probably 10 miles at sea."[20] It took 20 minutes to descend and, settling gently into the sea; *Macon* sank off Monterey Bay. Only two crew members were lost thanks to the warm conditions and the introduction of life jackets and inflatable rafts after the *Akron* tragedy.[21,22,23]

Radioman 1st Class Ernest Edwin Dailey jumped while still too high above the ocean surface to survive the fall and Mess Attendant 1st Class Florentino Edquiba drowned while swimming back into the wreckage attempting to retrieve personal belongings. Commander Wiley was commended by Claude A. Swandon, Secretary of the Navy, for his handling of the casualty; he was awarded the Navy and Marine Corps Medal for personally rescuing a member of the crew at the risk of his own life.[24] Sixty-four survivors were picked up by USS *Richmond* (CL 9), USS *Concord* (CL 10) took 11 aboard, and USS *Cincinnati* (CL 6) saved six.[25]16]

Eyewitness Dorsey A. Pulliam, serving on board USS *Colorado* (BB 45), in a 13 February 1935 letter wrote:

> *Tuesday it was so rough, and with the rain, we had an awful time getting along. We had gunnery drill Tuesday and more fleet maneuvers. The Macon came out about 1 pm Tues. to maneuver with the fleet and to enter Frisco with us this morning. The Macon came out in the storm not knowing that she would never get back to land. The Macon circled high above the fleet all the afternoon, and about 6 o'clock, radio messages began coming in that the Macon had had casualties and would have to land. The C.C. of the fleet radioed all ships in company with us to go at full speed for the wreckage. The crew abandoned it as soon as it hit the water, and all were saved except two. There were 83 men in the crew. The wreckage sank within a few minutes after it hit the water. We lingered around the spot where it sank looking for any parts which might be floating around. The search lights on all ships were combing the waters all through the night. The crew to the Macon were floating around in rubber floats and almost froze to death. I had to read about the Akron disaster, but this one I witnessed. The commander Clay had just been transferred to the Macon from this ship. This may contradict with the papers, but this is straight. There was an explosion in the tail and they could not control it.*

In another letter, dated 16 February 1935, he wrote:

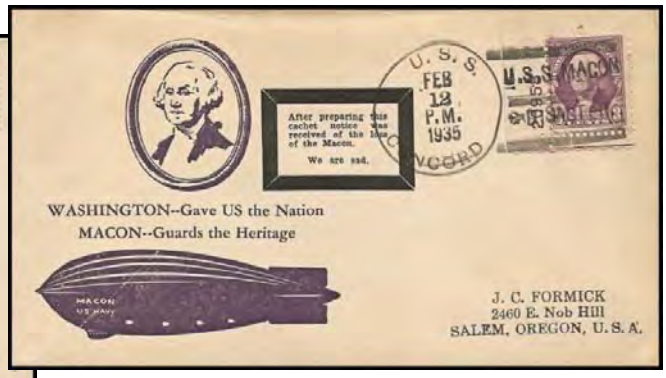
> *I guess that you all read all about the wreck of the Macon. Well, the papers out here were full. I guess the Navy sunk about 3 million dollars there in about 20 minutes. The people will have to pay that back in taxes. It sure was a pity that the Macon had to sink. It sure was pretty sailing around when the sun was shining on it. There sure was plenty excitement on board here that night. Everybody was trying to see what had happened. When the thing hit the water, the gas caught on fire and burned almost all night on the surface of the water after the bulk of the wreckage had sank. The Macon was supposed to go to Hawaii in May. They had started fixing up a field for it.* [26]

Macon, after 50 flights since it was commissioned, was stricken from the Navy list on 26 February 1935. Subsequent airships for Navy use were of a nonrigid design.

A bevy of crash covers followed the loss of the *Macon*. Some are shown below.

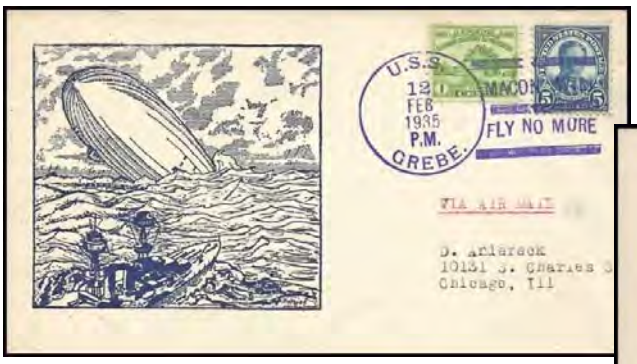
Naval Cover Museum[27]

Fig. 39: Cover prepared for a* Macon *sighting, altered to indicate the tragic crash 12 Feb 1935, with a Chicago, Ill. Air Mail duplex.



Naval Cover Museum[28]

Fig. 40: Ship cover from USS* Concord *noting the crash of the* Macon, *with* USS MACON / DISASTER *slogan.



Naval Cover Museum[29]

***Fig. 41: USS MACON WILL / FLY NO MORE slogan on a 12 Feb 1935 cover from USS* Grebe.**

Naval Cover Museum[30]

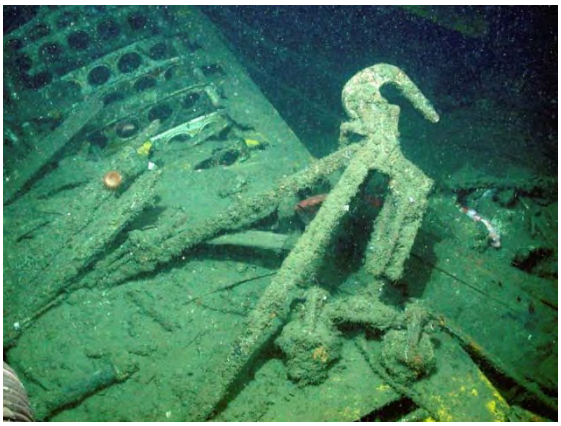
Fig. 42: USS MACON AFIRE&SINKING slogan on a cover from the* Northampton *12 Feb 1935.

MACON WRECK SITE EXPLORATION

The Monterey Bay Aquarium Research Institute (MBARI) located and surveyed the debris field of *Macon* in February 1991; it was able to recover some artifacts.[31] The exploration included sonar, video, and still camera data, as well as some recovery of parts. Fourteen years later, in May 2005, MBARI returned to the site as part of a year-long research project. Side-scan sonar was used to survey the site. Eleven years later, in September 2006, researchers from MBARI, Stanford University, and the National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries conducted a more complete return, including exploration with remotely operated vehicles. Video clips of the expedition were made available to the public through the OceansLive Web Portal, a service of NOAA. High-definition video and more than 10,000 new images were captured, which were assembled into a navigation-grade photomosaic of the wreck.[32]

Fig. 43: The pre-1941 pattern U.S. roundel emblem still faintly visible on the sunken wreckage of a* Macon *airplane.

Fig. 44: Skyhook still visible on this underwater relic.



Both images from Wikipedia USS *Macon* ZRS 5 page.[33]

The wreckage of *Macon* was listed in the National Register of Historic Places on 29 January 2010. The location of the wreck site remains secret, but is within the Monterey Bay National Marine Sanctuary. It is not accessible to divers due to depth (1,500 ft). The site also contains the remains of four of the airship's squadron of small Curtiss F9C Sparrowhawk scout aircraft which the *Macon* carried in an internal hangar bay.[34]

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- Robinson, Douglas H., *Giants in the Sky*. Henley-on-Thames: Foulis, 1973. ISBN 0 85429 145 8
- Miller, Henry M., *"Human Error: Road to Disaster,"* Canyon Books, 1975, ISBN 0-89014-128-2
- Smith, Richard K. *The Airships Akron & Macon (Flying Aircraft Carriers of the United States Navy)*, United States Naval Institute: Annapolis, Maryland, 1965

External links

- Airships.net: U.S.S. *Akron* and *Macon*
- A 1964 KPIX-TV documentary about the U.S.S. *Macon*
- U.S. Naval Historical Center pages on ZRS 5
- Lucidcafe.com has a good page with some additional photos of the ship and crew called USS *Macon*: The U.S. Navy's last dirigible
- Casualties: US Navy and Marine Corps Personnel Killed and Injured in Selected Accidents and Other Incidents Not Directly the Result of Enemy Action
- Uncovering the USS *Macon*: The Underwater Airship" *Der Spiegel*
- Construction of the USS *Macon* Airship (photo gallery)
- KQED has put together a video with info about USS *Macon*, historical and wreck-site footage, as well as info about the new zeppelin that is flying over the San Francisco Bay Area.
- Moffett Field Museum near San Jose, CA has an exhibit dedicated to the USS *Macon*.

ENDNOTES:

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[2] A large part of the material here appears on Wikipedia which uses *The Dictionary of American Naval Fighting Ships* as its source. As the *DANFS* is a work of the U.S. government, its content is in the public domain, and the text is often quoted verbatim in other works (including in some cases Wikipedia articles). Many websites organized by former and active crew members of U.S. Navy vessels include a copy of their ships' *DANFS* entries. Other sources include Naval History and Heritage Command at https://www.history.navy.mil/research/histories/ship-histories/danfs/a/akron.html and https://www.history.navy.mil/content/history/nhhc/research/histories/ship-histories/danfs/m/macon.html. NH preceding photos indicate the photo number on this site. The *Akron* material was taken from an article written by Robert J. Cressman for Naval History and Heritage Command.
Ship histories:
https://www.history.navy.mil/research/histories/ship-histories/danfs/a/akron.html
https://www.history.navy.mil/content/history/nhhc/research/histories/ship-histories/danfs/m/macon.html
Some photos are sourced from Navsource Online: Rigid Airship Photo Archive at
Akron photos http://www.navsource.org/archives/02/99/029904.htm &
Macon photos http://www.navsource.org/archives/02/99/029905.htm#02990524
Where covers are not credited, they are from the collection of the author.

[3] NH designated photos can be found on the Naval History & Heritage Command site, for *Akron* at https://www.history.navy.mil/content/history/nhhc/search.html?q=%22ZRS-4%22&docType=photograph and *Macon* https://www.history.navy.mil/content/history/nhhc/search.html?q=%22ZRS-5%22&docType=photograph

[4] US Airships at https://www.americanairmailsociety.org/wecollect/us-zeppelins/, which recommends Mellone's Photo Encyclopedia of USS *Akron* and *Macon* Event covers, and Michel Zeppelin Specialized Catalogue 2003 as information sources.

[5] Naval History and Heritage Command article "The Development of LTA's Home Base and the Rigid Airship Program" (Pages 23-34) on airships at https://www.history.navy.mil/research/histories/naval-aviation-history/navys-lighter-than-air-experience-monograph/the-development-of-ltas-home-base-and-the-rigid-airship-program-pages-23-34.html

[6] Courtesy of the Boston Public Library, Leslie Jones Collection , on NavSource Online at http://www.navsource.org/archives/02/99/029904.htm.

[7] A naval term referring to any scheduled event, https://en.wiktionary.org/wiki/Appendix:Glossary_of_U.S._Navy_slang

[8] A history of C.E. Rosendahl is available at https://www.airships.net/airship-people/charles-rosendahl/ .

[9] Cover from Naval Cover Museum, this one from the collection of Greg Cielielski at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_Akron_19320801_2_Back.jpg

[10] See This Day in Aviation at https://www.thisdayinaviation.com/12-february-1935/.5/18/2019

[11] Rotogravure Section of the New York Times, April 9, 1933, for sale on Ebay by timhu at

https://www.ebay.com/itm/USS-AKRON-United-States-Navy-AIRSHIP-Crash-Disaster-PHOTOS-1933-NYC-Rotogravure/391676388985?_trkparms=aid%3D111001%26algo%3DREC.SEED%26ao%3D1%26asc%3D20160811114145%26meid%3D2533ff0396694d84bdbcfc771f1ff7ed%26pid%3D100667%26rk%3D1%26rkt%3D8%26sd%3D391676388985%26itm%3D391676388985&_trksid=p2045573.c100667.m2042

[12] The Ebay lot includes a letter from Deal, distributing this envelope to his friends. The cover is backstamped Tom's River 31 May 1933, and still available at this writing at https://www.ebay.com/itm/USS-AKRON-AIRSHIP-MEMORIAM-ON-US-NAVY-COVER-SURVIVORS-AUTOGRAPHED-w-DEAL-LETTER/163614370743?hash=item26182d2bb7:g:9~sAAOSwUpFcA~77

[13] Cover from Naval Cover Museum, this one from the collection of Tom Kean and listed by Greg Cielielski at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_MoffettField_19340530_1_Front.jpg

[14] Dictionary of American Fighting Ships (DANFS) *Akron* (ZRS 4) ship history at https://www.history.navy.mil/research/histories/ship-histories/danfs/a/akron.html.

[15] Covers dropped to the President were autographed by the well-known philatelist-sailor and are known to be located in collections. See also post by member artlaunier on "What's in Your Album" page on the Stamp Community site at https://www.stampcommunity.org/topic.asp?TOPIC_ID=18655

[16] Wiley photo from This Day in Aviation at https://static.thisdayinaviation.com/wp-content/uploads/tdia//2018/02/18129967_1408033831-1.jpg.

[17] Wiley biography at https://www.usswestvirginia.org/veterans/personalpage.php?id=3433.

[18] Cover from Naval Cover Museum, this one by Greg Ciesielski at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_Pennsylvania_BB38_19350115_1g_Front.jpg

[19] U.S. Navy Airships U.S.S. *Akron* (ZRS 4) and U.S.S. *Macon* (ZRS 5)" at https://www.airships.net/us-navy-rigid-airships/uss-akron-macon/

[20] Raiser, M. A., Associated Press, "Airship Macon Sinks In Pacific After 81 Rescued By Naval Craft", *The San Bernardino Daily Sun*, San Bernardino, California, Wednesday 13 February 1935, Volume 41, page 1. Wikipedia article on *Macon* at https://en.wikipedia.org/wiki/USS_Macon_(ZRS-5)#cite_ref-Raiser,_M._A._1935,_page_1_16-0.

[21] Various sources cite the total number of passengers aboard at the time of the incident between 76 and 81 crew and officers.

[22] See "Exploring the Wreck of USS Macon, The Navy's Last Flying Aircraft Carrier" by: Megan Eckstein, USNI News, August 19, 2015 at https://news.usni.org/2015/08/19/exploring-the-wreck-of-uss-macon-the-navys-last-flying-aircraft-carrier

[23] *Associated Press (13 February 1935). "Dirigible Macon Forced Down At Sea; Ships Run To Rescue Of Her Crew". Leominster Daily Enterprise. San Francisco.*

[24] *"Herbert V. Wiley, Veteran of the USS West Virginia (BB-48)". www.usswestvirginia.org*, .and https://www.thisdayinaviation.com/12-february-1935/]

[25] See Raiser, M. A., Associated Press, "Airship Macon Sinks In Pacific After 81 Rescued By Naval Craft", op cit.

[26] Wikipedia article for USS *Macon* (ZRS 5): https://en.wikipedia.org/wiki/USS_Macon_(ZRS-5).

[27] From the Naval Cover Museum, from collection of William J. Wladyka at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_Chicago_IL_19350212_1W_Front.jpg

[28] From the Naval Cover Museum, from collection of William J Wladyka at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_Concord_CL10_19350212_1W_Front.jpg

[29] From the Naval Cover Museum, from collection of William Lowe at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_Grebe_AT134_19350212_2L_Front.jpg

[30] From the Naval Cover Museum, collection of Tom Kean, at https://www.navalcovermuseum.org/wiki/File:GregCiesielski_Northampton_CA26_19350212_2_Front.jpg.

[31] *"MBARI's First Decade: A Retrospective" (PDF). Monterey Bay Aquarium Research Institute. c. 1997.*

[32] *"USS Macon Exploration Findings Unveiled". KSBW-TV. 27 September 2006.*

[33] Wikipedia *Macon* ZRS 5 page at https://en.wikipedia.org/wiki/USS_Macon_(ZRS-5)#/media/File:Uss-macon-sparrowhawk-sky-hook-09-2006b.jpg

[34] See "Exploring the Wreck of USS Macon, The Navy's Last Flying Aircraft Carrier" by: Megan Eckstein, *op cit*.

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