# Kite Balloons to Airships... the Navy's Lighter-than-Air Experience

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Edited by Roy A. Grossnick
Designed by Charles Cooney

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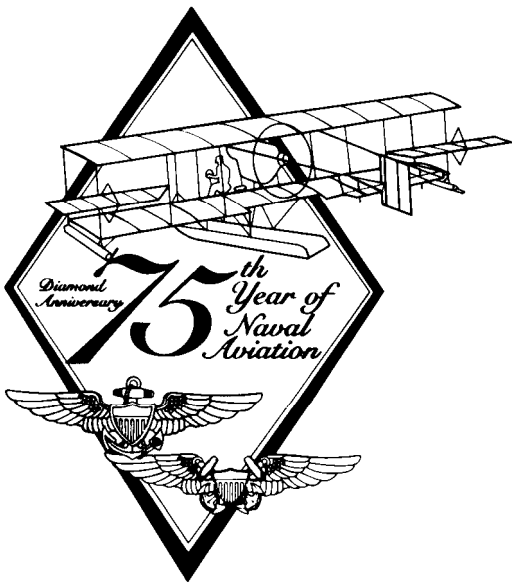



## Introduction

The dawn of aviation began with lighter-than-air craft and gliders. They were in the forefront of what eventually led to the Wright brothers' activities at Kitty Hawk.

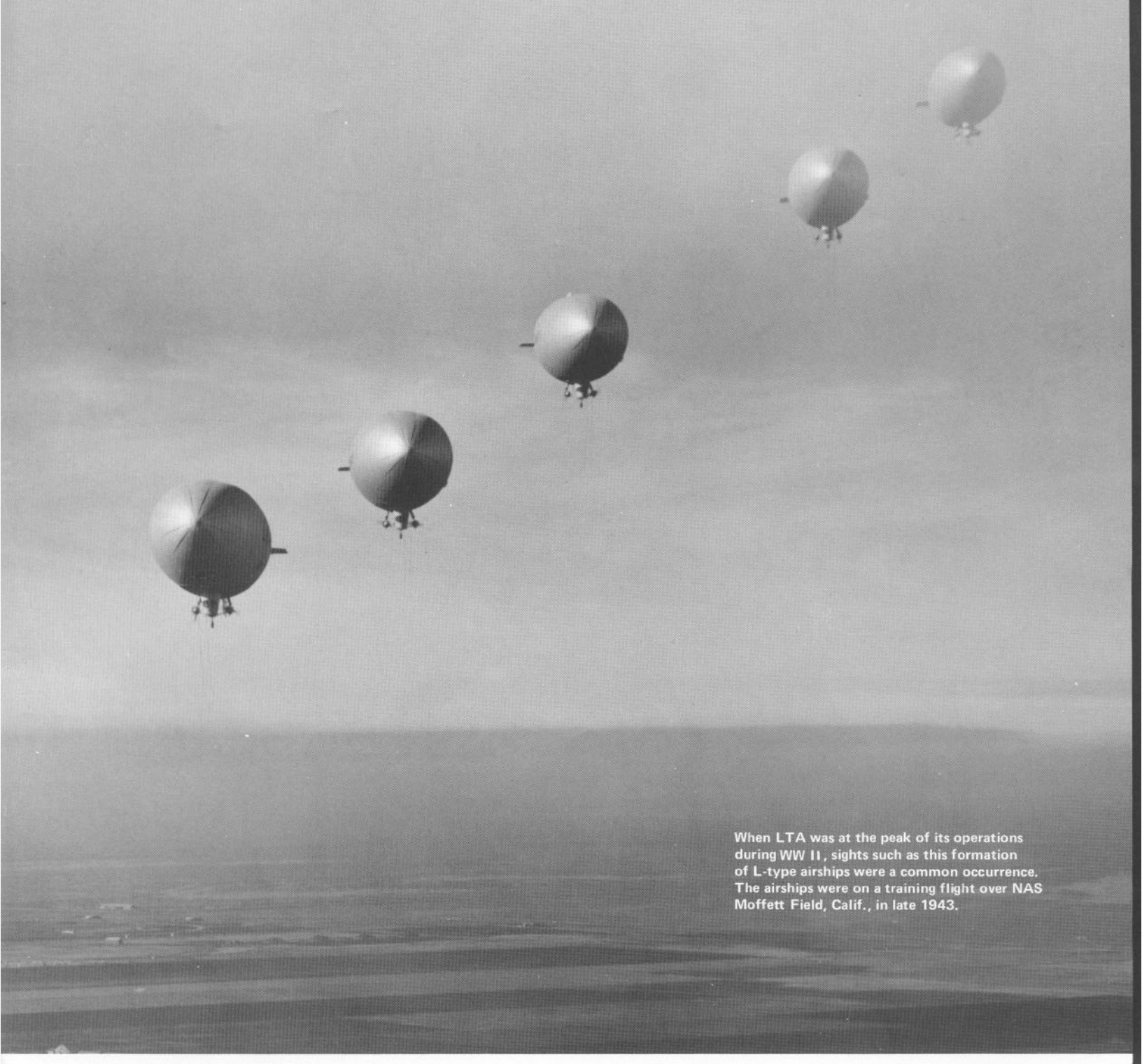
The Navy's early use of lighter-than-air craft may be traced back to the American Civil War. However, it was a short-lived affair and these LTA possibilities were not pursued after the war. With the advent of airplanes in naval service, the Navy again turned its interest to lighter-than-air craft. The Navy's lighter-than-air program blossomed and its fleet of airships became the largest the world has ever seen. During the era of the giant rigid airships, the Navy built some of the largest airships in the world. Many achievements were recorded by the Navy's LTA branch and new records were set, records which still remain unbroken today.

This monograph is intended to provide an overview of the Navy's involvement with balloons, airships and their operations, which shows their failures and accomplishments and their contributions to the Navy's mission of guarding the sea lanes of America. It is not an in-depth study of the LTA program, but provides an overall look at the history of LTA in the Navy. Various aspects of the LTA program have had extensive coverage, especially the rigid airship era; however, the entire history of LTA in the Navy has not been told under one cover.

The Navy's LTA program technically ended in the 1960s. But the evolutionary trends that can be seen in history could possibly bring back certain functions of LTA and make them viable in today's world of supersonic flight and space travel.

# Kite Balloons to Airships...

## the Navy's Lighter-than-Air Experience



When LTA was at the peak of its operations during WW II, sights such as this formation of L-type airships were a common occurrence. The airships were on a training flight over NAS Moffett Field, Calif., in late 1943.

## I. The Early Period

The birth date of U.S. Naval Aviation is recognized as May 8, 1911, when the Navy ordered its first aircraft. Four years later, on June 1, 1915, the Navy contracted for its first airship. Use of lighter-than-air (LTA) craft in U.S. military operations, however, goes back to the nineteenth century. During the Civil War, Union forces used hydrogen-filled balloons, with attached baskets, to lift observers for aerial reconnaissance of enemy lines and artillery spotting. Some of these balloons were tethered to barges or specially constructed boats. This was the forerunner of Navy involvement in LTA.

The military lost interest after the Civil War and it was not until fixed-wing aircraft had become a component of the Navy that interest in LTA revived. Captain Mark L. Bristol, the second Director of Naval Aviation, became an enthusiastic supporter. He felt the dirigible (in coordination with seaplanes and surface craft) would provide the best protection against submarines. Specifications for the Navy's first airship were drawn up by Victor D. Herbster, Holden C. Richardson, and Frank R. McCrary, and the first contract for an airship was let to the Connecticut Aircraft Company on June 1, 1915.

Two other LTA craft were ordered in 1915: a free balloon from Goodyear in September, followed by a kite balloon as an experimental model for gunfire spotting and reconnaissance missions. Included in the Goodyear contract for the

**A naval observer disembarks from his balloon after an antisubmarine patrol. Duty as an observer in kite balloons during WW I was a hazardous job.**

free balloon was a provision for training two officers in LTA operations. Lieutenant Commander Frank R. McCrary and Lieutenant L.H. Maxfield were ordered to Akron, Ohio, where they completed their training in the latter part of 1915. The Navy's LTA program was "off the ground" in three categories: non-rigid airships, free balloons and kite balloons.

While at Akron, Lt. Maxfield observed the testing of the kite balloon in November and accepted the free balloon for the Navy on December 14. The kite balloon was accepted on December 22 and shipped to Pensacola, arriving there April 5, 1916, accompanied by Goodyear representatives. They instructed the officers and ground crew in its handling, and inflated the balloon. It was left moored at a height of about 200 feet at the air station after the course was finished. Two days later, on April 7, a strong wind hit Pensacola and tore the kite balloon from its moorings, inflicting considerable damage. However, it was repaired and, later in the year, two more kite balloons were ordered.

Because of the damage to the kite balloon, the tests that had been scheduled aboard USS *North Carolina* were delayed. Eventually, after repeated requests by Capt. Bristol, the kite balloon was tested aboard USS *Nevada* and *Oklahoma.* Robert R. Paunack (Naval Aviator No. 27) was assigned to *Nevada* for duty in LTA (in November 1917 he was designated an LTA pilot).

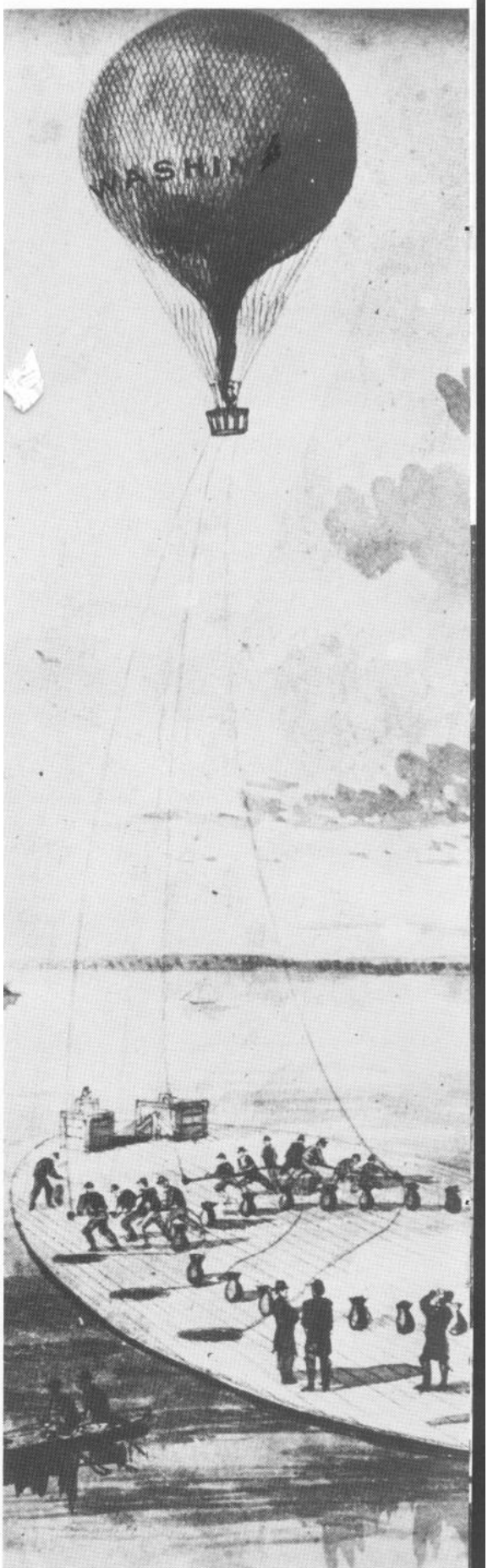
The tests on *Nevada,* which were completed November 18, 1916, demonstrated that kite balloons could provide an added advantage for battleships in gunfire spotting and scouting/reconnaissance. However, tests conducted on *Oklahoma* a few days later disclosed problems in the operation of kite balloons from battleships. The balloons posed an increased hazard to the ship when carrying hydrogen; it took too long to inflate the balloons; they leaked; they were easy targets for antiaircraft fire at ranges under 12,000 yards; and, if kept inflated and moored to the ship, the balloons restricted maneuverability.

The report by Captain Wells, C.O. of *Oklahoma,* suggested that if some of the problems could be corrected the kite balloon might be of value to the battleship. These reports failed to mention that when the balloons were raised for scouting/reconnaissance, although they provided increased observation ranges, they also revealed the position of the battleship to the adversary. The issue of kite balloons on board ships continued throughout WW I.

## II. The Navy's First Airship

Development of the Navy's first airship progressed under unfavorable conditions. The specifications that had been drafted called for some unique and advanced features which had not been tested. Other requirements were not stringent enough to make the airship viable in even normal operations. Among the ideas suggested were a control car capable of resting on water and moving through the water at slow speeds; swivel-type twin screws; and a means of mooring securely to a mooring mast. Some of these advanced ideas were later developed and successfully implemented but not until many years afterward.

These design problems, coupled with the fact that no U.S. manufacturer had the technical data or know-how to build an airship, produced disastrous results for the Navy's first airship. Development was further complicated by restrictions imposed by European countries on airship technology because of the outbreak of war. When the U.S. entered WW I, it began to receive some technical data on LTA but that was after the Navy's first lighter-than-air craft, the DN-1 (a non-rigid airship), had been built.



This painting depicts the use of an LTA vehicle during the Civil War. The concept of a balloon tethered to a barge might be considered the forerunner to basing aircraft aboard ships, and eventually the evolution of the aircraft carrier.

The Connecticut Aircraft Company received the contract to build the DN-1 on the basis of its lowest bid. The designation stems from D for dirigible, N for non-rigid and "1" as the Navy's first airship. Years later, the DN-1 became known as the A-type blimp even though never officially assigned the A designation. She was the only airship of this type/class ever built.

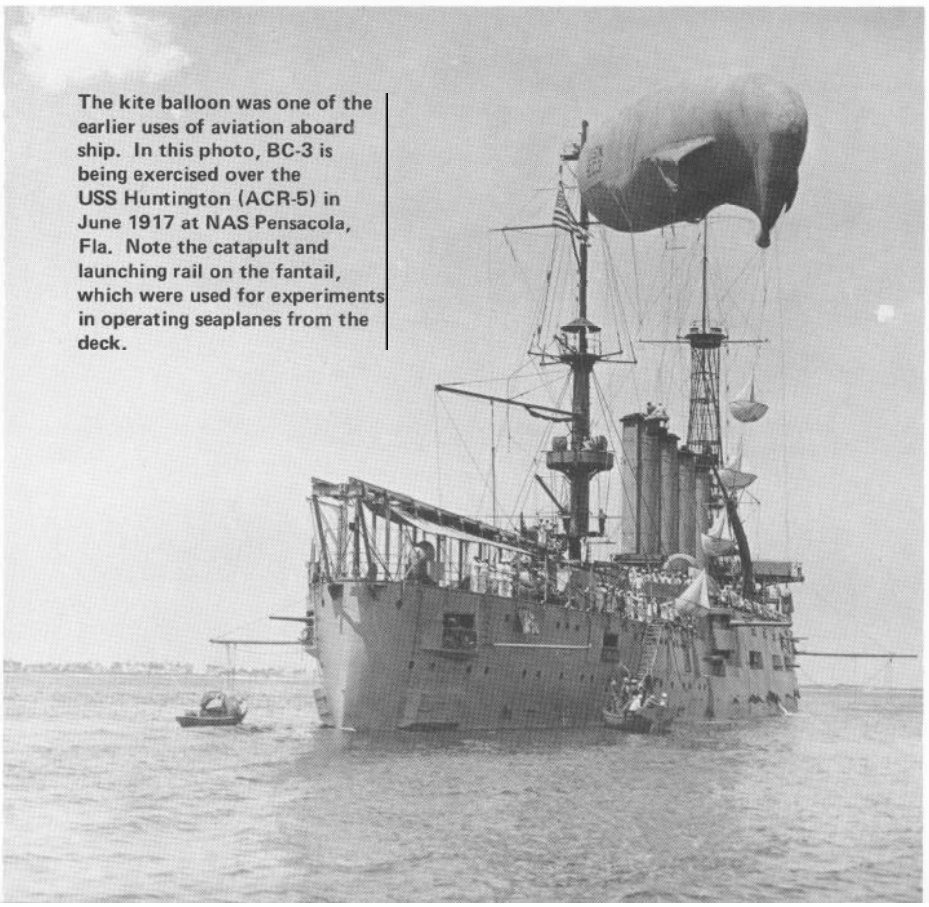
The DN-1 was to be built in four to five months, with delivery in October 1915. Construction proceeded at a snail's pace with numerous delays, due to material problems and the lack of technical engineering ability of Connecticut Aircraft Company personnel. This was compounded by the lack of qualified LTA engineers in the Navy Department. During construction of the DN-1, the Navy authorized the building of a floating hangar to house the new airship. The hangar was completed and delivered to Pensacola in early 1916 long before the DN-1 arrived. The airship was shipped in November 1916 and arrived at Pensacola in December, but was not ready for flight until April 1917, the month the U.S. entered WW I.

Lt.Cdr. Frank R. McCrary, pilot of the DN-1, had been assigned duty with the Connecticut Aircraft Company during her construction. Flight tests were conducted at Pensacola and revealed that the airship was overweight, the envelope leaked and the power plant functioned poorly. One of the two engines had to be removed to make the DN-1 light enough to get off the ground. Her first flight was on April 20, 1917. Two other flights were made and, during an attempt to tow her over water, the airship was severely damaged. Because of her poor performance, she was considered not worth repairing. She was deflated, later removed from the inventory and broken up.

The development of the Navy's first airship was an inept experiment in LTA. However, the DN-1 program did underline the need for technical skills and knowledge to construct airships, as well as qualified personnel to operate them.

## III. The B-class

In the summer of 1916, even before construction on the DN-1 was completed, design studies were going on in the Bureau of Construction and Repair (Bu. of C&R) for a future class of dirigibles. The need for these studies was reinforced when Admiral Benson (the first CNO) directed the Bu. of C&R on October 2, 1916, to prepare designs for two training dirigibles and one rigid dirigible. On October 19, 1916, the General Board endorsed the development of zeppelins and other mobile LTA craft as a matter of



The kite balloon was one of the earlier uses of aviation aboard ship. In this photo, BC-3 is being exercised over the USS Huntington (ACR-5) in June 1917 at NAS Pensacola, Fla. Note the catapult and launching rail on the fantail, which were used for experiments in operating seaplanes from the deck.