



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.

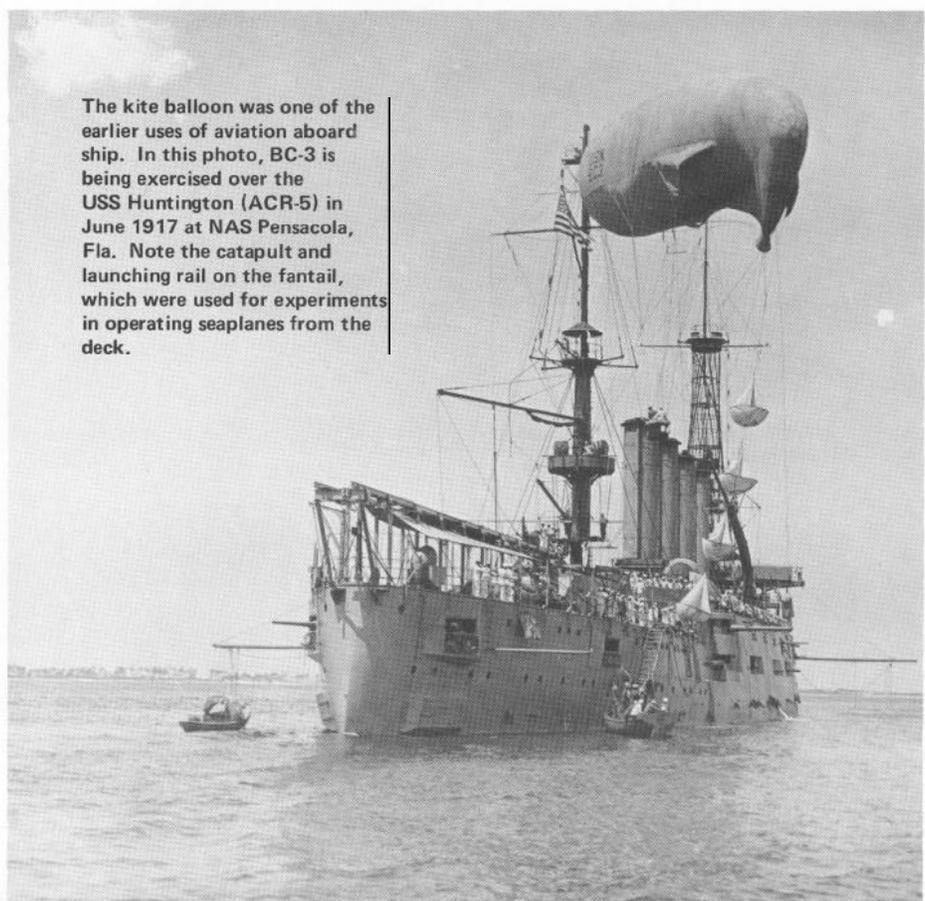
Lt.Cdr. Frank R. McCrary, pilot of the DN-1, had been assigned duty with the Connecticut Aircraft Company during her construction. Flight tests were conducted at Pensacola and revealed that the airship was overweight, the envelope

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.

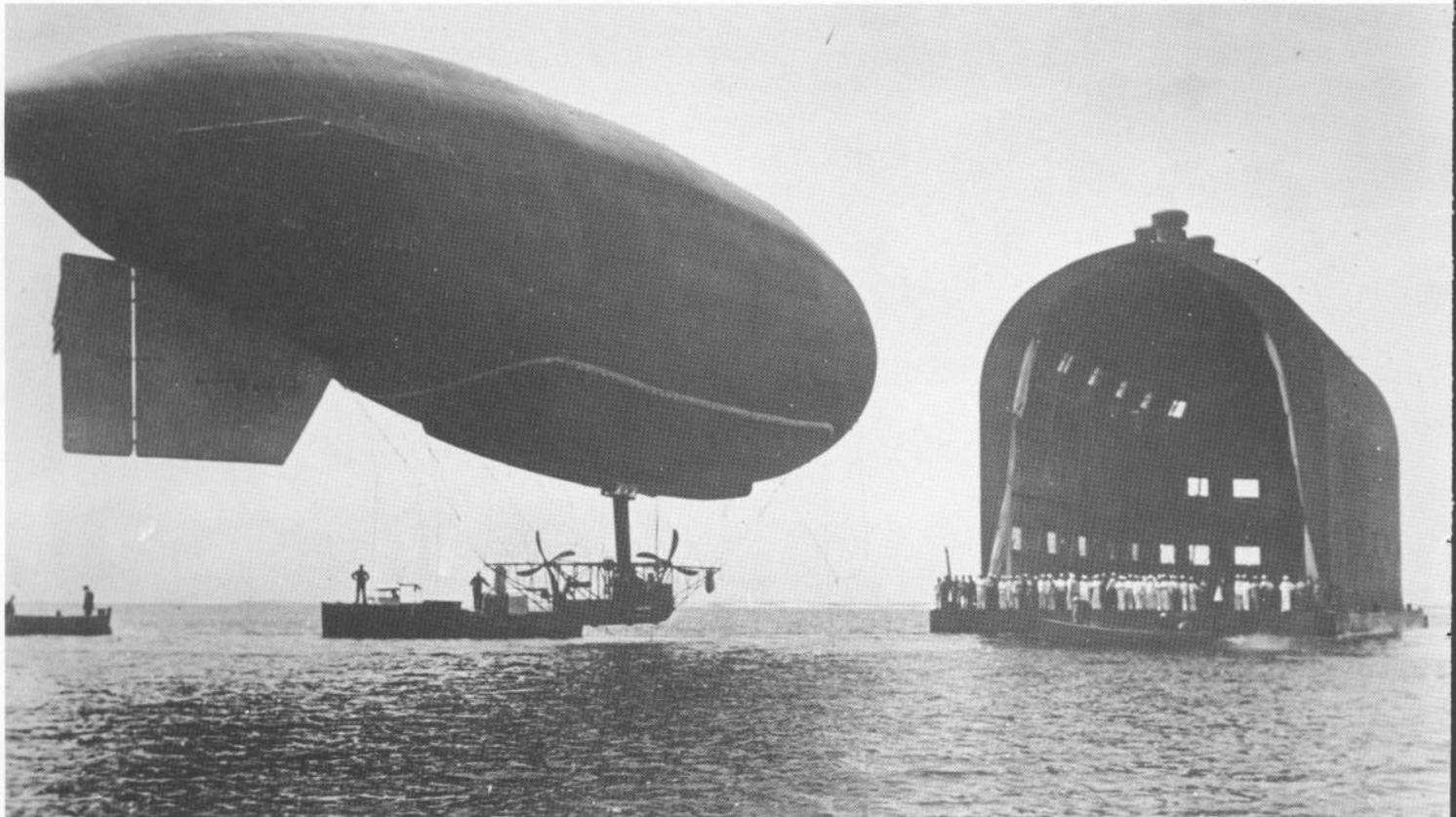
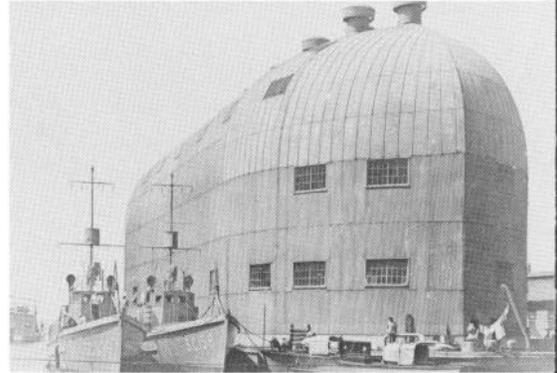
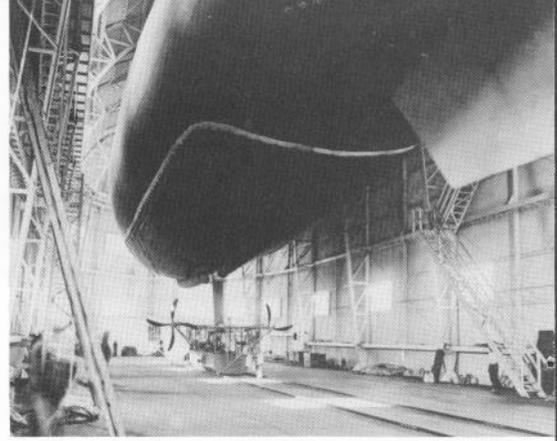
great importance to the Navy. It also approved the acting secretary of war's recommendation to establish a joint committee of Army and Navy officers to consider the entire subject of aeronautics.

The specifications for the training dirigible requested by the CNO in October were modified on December 13, 1916, to require a top speed of 45 miles per hour; a 12-hour endurance at 35 miles per hour; a crew of three; a radio range of 150 miles; and the capability of landing at sea and for being towed.

By January 6, 1917, plans were at an advanced stage and were submitted for approval, carrying the designation "B" type. This quick response by the Bu. of C&R was facilitated by early planning which had begun in the summer of 1916. The plans were approved by the General Board on January 26 and by the Secretary of the Navy on January 27, 1917.

It was initially planned to order one or

two of these new dirigibles as test models. However, on February 4, 1917, the Secretary of the Navy instructed Bu. of C&R to order 16 B-class dirigibles for immediate construction. Two days later, specifications were sent to five companies along with a suggestion that their representatives meet on February 12 with the Chief of the Bureau. The five companies were Goodyear, Goodrich, Connecticut Aircraft Company, Curtiss Aeroplane and Motor Corporation, and U.S. Rubber Company. This order for 16 dirigibles was beyond the capability of any one company. In addition, only the Connecticut Aircraft Company had any experience in building an airship. At the February 12 conference, a committee was set up by the companies and they agreed that each would bid only for the portion of the contract it felt capable of manufacturing. The committee would arrange the bids, and make the undertaking a joint effort by pooling all raw materials, information and



Top, a close-up view of the DN-1 inside the floating hangar. Center, this was the Navy's first and only floating LTA hangar. It was specially constructed for use by the DN-1 and later used for the operation of B-class airships during WW I. Above the DN-1 during flight tests conducted at NAS Pensacola, Fla., in April 1917.

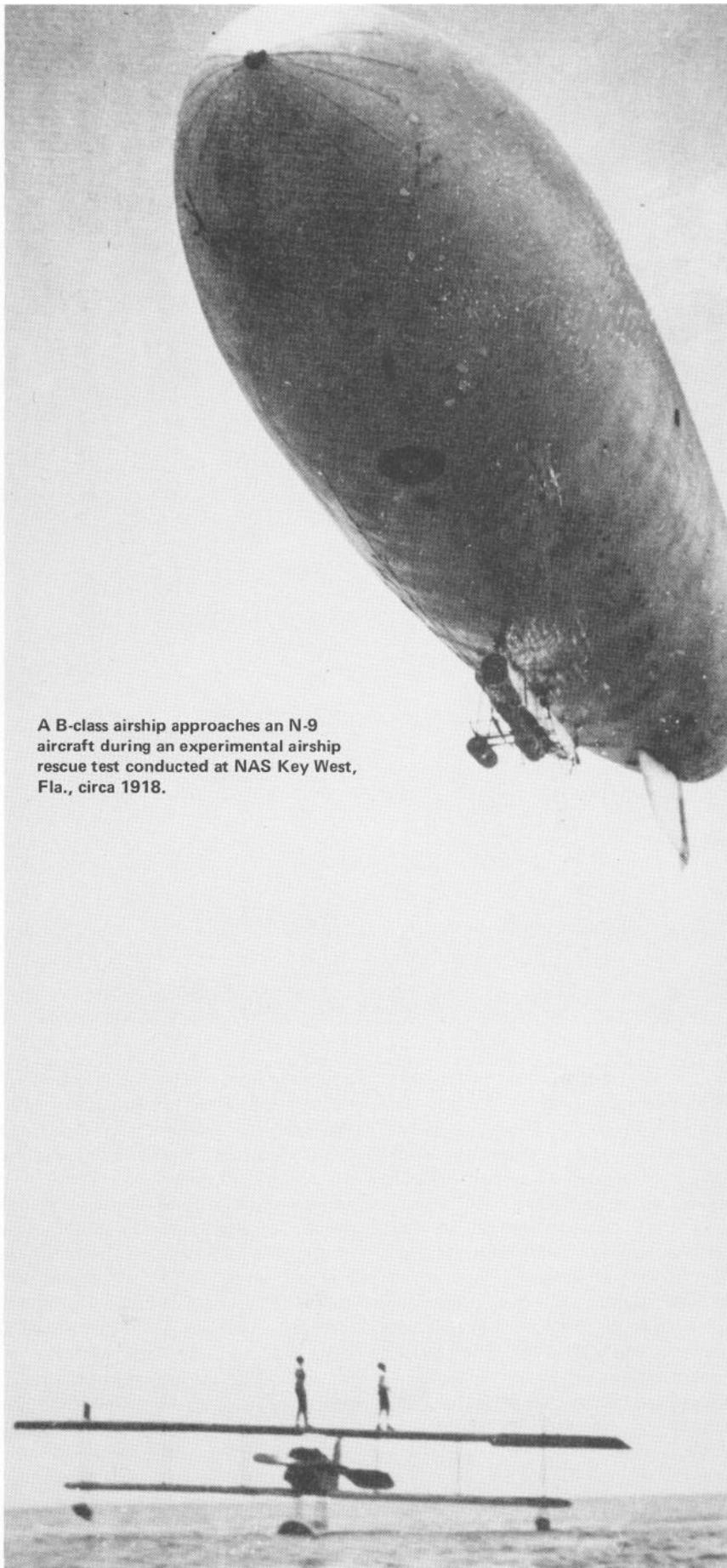
experience during construction. America was close to entering the war in Europe and patriotism and cooperation, even among rival companies, were at their peak.

On March 19, contracts were awarded for the B-class airships as follows: nine to Goodyear, two to Goodrich, three to Curtiss and two to Connecticut Aircraft. The U.S. Rubber Company confined its involvement to providing fabric to the Connecticut Aircraft Company. Curtiss was involved primarily in the building of the cars, power plants and fins for the airships manufactured by Goodyear and Goodrich. Thus, the initial contract for three airships received by Curtiss was later turned over to Goodrich.

The Connecticut Aircraft Company was the only American manufacturer that had constructed an airship, but Goodyear had considerable experience in building free balloons for the Navy. Goodyear's experience placed it in the best position to begin immediate work on the B-class airships. On April 1, 1917, at its own expense, Goodyear began constructing a hangar, a hydrogen-generating plant and test facilities at Akron. Goodyear also had two able aeronautical engineers, R.H. Upson and R.A.D. Preston, to assist in the development of the B-class.

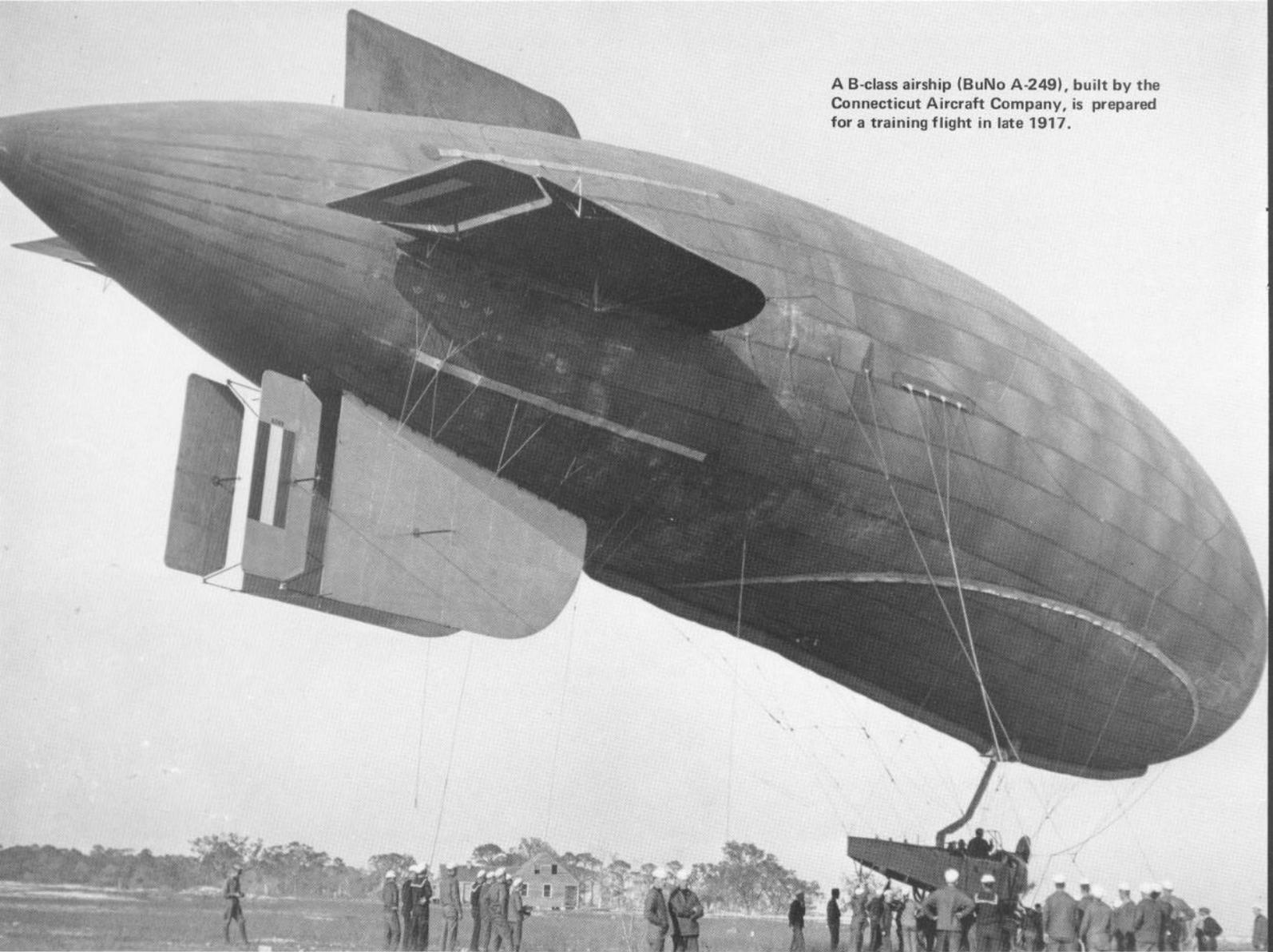
The first B-class airship, designated the B-1, was completed by Goodyear before the company had finished the construction of its LTA facilities. Since testing facilities were not available and there wasn't adequate shelter to inflate the B-1, Goodyear used the facility set up by Goodrich near Chicago. The first test flight was arranged to ensure the design was operable and also to benefit the other contractors who were building the airship. The B-1 was transported from Akron to a shed at "White City," located on the southside of Chicago. It was inflated and on May 24, 1917, two short flights were made. Ralph H. Upson, Goodyear's airship engineer, was at the controls during the flights and was favorably impressed.

On May 29, the B-1 was taken up for another test flight, and Upson was again at the controls. During the flight, Upson decided it would be safer to fly to Akron rather than land at the small field near Chicago. He headed the B-1 towards Akron at midnight and landed in a meadow 10 miles from Akron at noon on May 30. Had the oil supply held out, Upson could have landed the airship at the Goodyear field. This was a precedent setting flight, establishing a world's long distance record for non-rigids at that



A B-class airship approaches an N-9 aircraft during an experimental airship rescue test conducted at NAS Key West, Fla., circa 1918.

A B-class airship (BuNo A-249), built by the Connecticut Aircraft Company, is prepared for a training flight in late 1917.



time. The B-1 was the first of its class, built in two months from designs that used mostly theoretical and experimental calculations. To set a record on a test flight was indeed a remarkable achievement and boded well for the future of the B-class, as well as LTA in the Navy. This success gave the contractors the confidence needed to go ahead with the construction of the previously untested airship. The first, the B-1, was delivered on July 19, 1917, and shipped to Pensacola on August 7, 1917.

B-class airships were used extensively during WW I, primarily as trainers but also for coastal patrol. None were ever shipped to Europe during the war.

Changes and improvements were made to the airships as more of them became operational. Suggestions for the changes first came from the contractors

and later from the Navy pilots who were trained to operate the B-class dirigibles. Various improvements in the B-class design led to an increase in speed from the original 40 mph to 48 mph, using the same engine. All the airships, including the first group, had a useful lift in excess of the original designed load. B-class airships were used for coastal patrol during WW I at the following naval air stations: Chatham, Montauk, Rockaway, Cape May and Key West. NAS Hampton Roads had B-class airships assigned but used them primarily for experimentation. Those used for coastal patrol flew over 13,600 hours or roughly 400,000 miles.

One of the major functions of the B-class was as a trainer. Many of the pilots trained on the B-class went on to duty at American naval air stations in Europe flying European built airships.

The contract for the 16 B-class airships ordered on March 19, 1917, was fulfilled with the delivery of the last airship in June 1918. It was an amazing accomplishment, considering the design was new; there was no advance testing of an experimental model; no American company had built a successful airship; and it was during the war, when men and material were at a premium. The 16 B-class airships, designated B-1 through 16, were assigned bureau numbers A-235 through 250. After the war, Goodyear rebuilt three B-class gondolas which were given the designation B-17 through 19 and assigned bureau numbers A-5464, 5465, and 5467. One other B-class airship was ordered, the B-20, which had a modified configuration.

Technical data for these B-class airships vary because the envelopes

produced by the three companies, Goodyear, Goodrich and Connecticut Aircraft Company, were of different dimensions with later improvements in design.

IV. Early LTA Training

On September 4, 1915, Goodyear signed a contract with the Navy to manufacture a free balloon. Included in this contract was a provision proposed by Goodyear whereby they would train two officers to operate the free balloon. The two officers assigned to Goodyear for the training were Lt.Cdr. F.R. McCrary and Lt. L.H. Maxfield, both of whom became prominent figures in Navy LTA. They were ordered to Akron in August 1915 to begin LTA training for the Navy.

In March 1916, Capt. Bristol reported to the Secretary of the Navy that the

hydrogen plant at Pensacola was in operation and the free balloon was "in hand." The first flight of the free balloon was on May 5, 1916. This began LTA training at Pensacola which was conducted by McCrary and Maxfield in accordance with a syllabus proposed by Capt. Bristol in January 1916. Two officers from each class of students at Pensacola were to be instructed in free ballooning as part of preliminary training in the operation of airships.

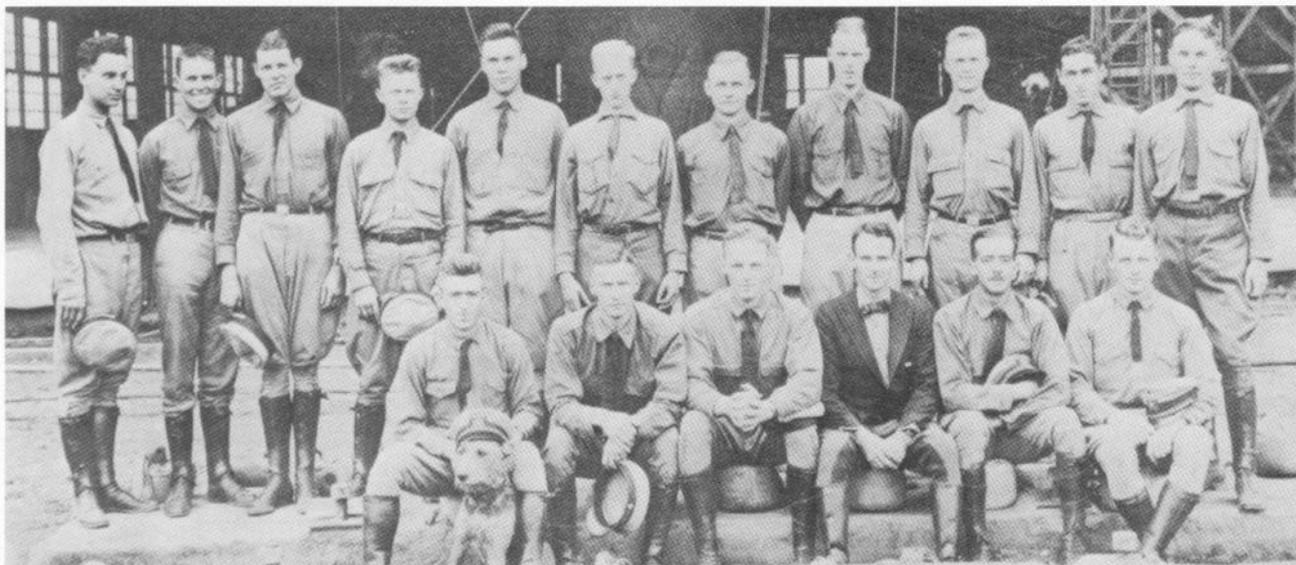
The first formal training syllabus for pilots had been issued by the Bureau of Navigation in June 1914. A revised syllabus was proposed by Lt.Cdr. McCrary on May 16, 1916, and approved by Commander Henry C. Mustin, Commandant of the Pensacola Aeronautic Station. Capt. Bristol approved this LTA syllabus and it was included in the second

revision of the training syllabus and approved by Secretary of the Navy Josephus Daniels on June 3, 1916. The syllabus issued by the Bureau of Navigation included meteorology, the handling of free balloons, the solving of problems relating to piloting and navigation, and theoretical instruction in weather forecasting and study of weather maps. Student pilots were required to complete flights covering instruction in ascension, control of ballast under varying air conditions, methods of sounding air currents and checking descent, reading of instruments, keeping the log, navigation, valving, use of appendix and drag rope, making a landing and ripping the bag. One of the flights required an intermediate landing wherein the instructor was dropped off and the student continued on a solo flight for not less than one hour.

With the declaration of war by the U.S. on April 6, 1917, the need for Naval Aviators and their training became crucial. When the contract for the B-class airships was signed, the need for airship pilots became critical. The only qualified airship pilot at that time was Lt.Cdr. McCrary. After McCrary and Maxfield had qualified as pilots in free ballooning at Goodyear in 1915, McCrary was assigned temporary duty at the Connecticut Aircraft Company during the



The B-class airships continued to operate in the post-WW I period. This one, the B-8, is on a training flight at NAS Pensacola, Fla.



The first class of LTA students from Akron. Standing: Gartz, Whitehouse, Delano, Williams, Talbot, Little, Brewer, Hamlen, Strader, Crompton and Chadwick. Sitting: Pennoyer, Norfleet, Culbert, Preston (of Goodyear), Maxfield (C.O.) and Coil. The mascot is Maxfield's "Lanny."

construction of the DN-1. Later he served at NAS Pensacola as executive officer and as pilot of the DN-1, which he flew in April 1917. By virtue of these assignments and as pilot of the DN-1, he is credited as being the first LTA pilot in the Navy.

When Goodyear signed the contract for B-class airships, it proposed a pilot training program. On May 29, 1917, a contract was let for Goodyear to train Navy personnel in free ballooning and as pilots of kite balloons and airships. Goodyear had already started construction of a training field after earlier negotiations and was ready to receive the students at facilities located a few miles from Akron, which later became known as Wingfoot or Wingfoot Lake. By early June 1917, when the first LTA class began training, the hangar was almost complete, shops had been completed and equipped, the hydrogen plant was ready, and the barracks for the students and officer quarters were finished.

Goodyear provided the equipment, supplies and instructors for flight training and some of the instructors for the ground school subjects. The Navy provided instructors for navigation, seamanship, signaling, communications and drill. Lt. Maxfield had been assigned as officer-in-charge of the Navy's LTA contingent/school at Goodyear. His staff consisted of Lieutenants Warren G. Child

and Robert R. Paunack; Lieutenants Junior Grade Emory W. Coil, Ralph G. Pennoyer and Joseph P. Norfleet; and Ensign Frederick P. Culbert. These officers, including Lt. Maxfield, were instructors but were not qualified as airship pilots. However, Maxfield, Paunack and Child were already designated Naval Aviators, HTA (heavier-than-air). All officers initially assigned to Akron did not remain there for the entire training period of the first LTA class. During that time, many of the officers also qualified as LTA pilots. The students in the first LTA class included Colley W. Bell, Arthur D. Brewer, Noel Chadwick, George Crompton, Merrill P. Delano, Richard C. Gartz, Warner L. Hamlen, Charles G. Little, Ralph M. Strader, Andrew B. Talbot, William P. Whitehouse II and Arthur S. Williams.

The first class received preliminary ground school training and all other essential background training prior to actual LTA flying. This procedure changed as the Navy geared up and organized its flight training program for both LTA and HTA. Ground school and other essential flight training was conducted at other facilities such as MIT, and then the men were transferred to the respective flight training centers for actual flight instruction. When the first class of LTA students completed ground school, they moved on to kite balloons and from there they progressed to free

balloon flying. The final stage of training was in the B-class airship since it was the only type available.

LTA training was conducted at many naval air stations at the beginning of WW I, including Pensacola, Chatham, Montauk, Rockaway, Cape May, Hampton Roads and Key West. Eventually, LTA training was concentrated at Akron, Pensacola and Rockaway. Naval Aviation personnel were also trained by the British and French at their air stations during WW I. A formal syllabus was prepared by Lt.Cdr. J. P. Norfleet in July 1918 for all phases of LTA training.

The number of officers trained as airship pilots or in free and kite ballooning is difficult to trace because training took place at so many different sites. It is generally estimated that over 170 were trained as pilots in the B-class airship. The total number of pilots trained as airship pilots and as free or kite balloon pilots is far greater than this. There were 57 dirigible and 12 free balloon officer pilots trained, while in the Student Reserve 205 dirigible and 222 kite or free balloon pilots were trained at Akron or Pensacola during the war. It is significant to note that during this training program for LTA pilots at Akron there were no fatalities.

Training operations are being conducted by a B-class airship at the Akron airfield. Goodyear not only trained many of the Navy's LTA pilots during WW I but it also built many of the B-class airships at Akron.

