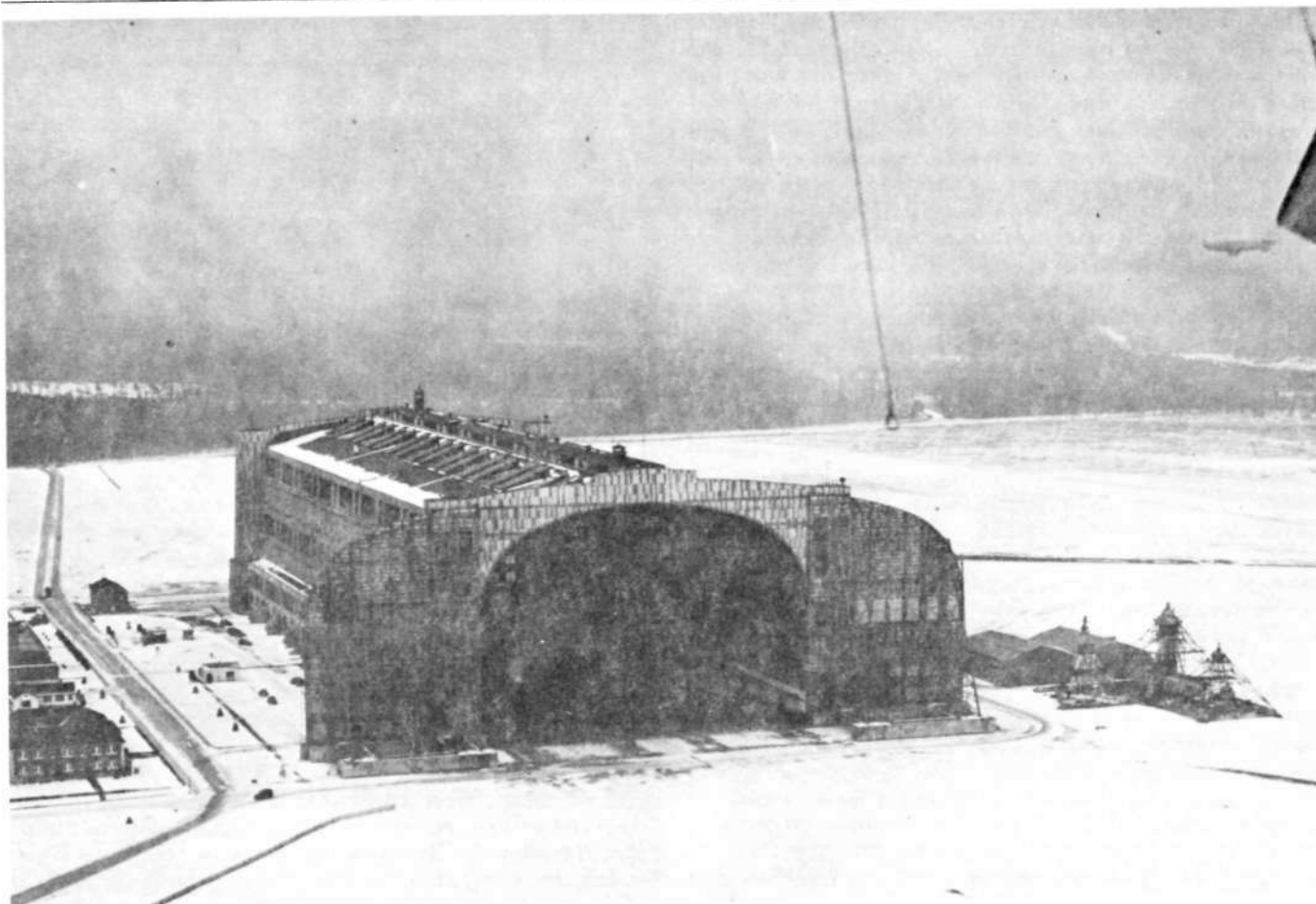




Hangar No. 1

NAS Lakehurst— The War Years

A PHOTOGRAPHIC HISTORY

by William F. Althoff

The airship operations of the U.S. Navy during World War II is one of the least known stories of the war. Ignored even by official histories, the widespread ignorance of the airship's contribution is remarkable.

Throughout 1941 the American military establishment was, in the words of one historian, to a large extent closed for alterations. The Navy for one faced appalling problems, and its lighter-than-air program was no exception. On December 7th, the Navy had only 10 airships to patrol the 5000 miles of America's sea frontier, with only one operational base—Naval Air Station, Lakehurst, New Jersey. By September 1945, however, nearly two dozen main and auxiliary bases had been established—and 15 squadrons organized under five wings had patrolled a three-million-square-mile area off the coasts of four continents. The blimp demonstrated convincingly that it was a superb platform for convoy escort and control, and for anti-

submarine warfare. No ships were sunk while under escort by airship. Airships also participated in hundreds of searches, air-sea rescues, photographic, mine detection and other utility missions.

Lakehurst itself became headquarters for the Commander Fleet Airships Atlantic. As a result, all squadrons destined for service in the North Atlantic, South America and Europe were commissioned and fitted out at Lakehurst and delivered through the station. The base provided housekeeping and logistic support for its own patrol squadron under Fleet Airship Wing One, also headquartered at Lakehurst.

Pilot, crewmen and maintenance training expanded to unprecedented levels during this period. Airship experimentation also intensified because of the war and many innovations were achieved.

This brief interval of intense, vital activity would prove to be the highwater mark of the U.S. airship program.

Hangar No. 1, Naval Air Station, Lakehurst, New Jersey, January 1940. The war in Europe is four months old. Here at Lakehurst it is the end of an era in naval aviation: *USS Los Angeles*, the Navy's last rigid airship, has just been dismantled and the hangar cleared of the scrap. Their airships only a memory, the mobile mooring masts near the airplane hangars at right will also be scrapped. The future of Navy lighter-than-air rested now with the non-rigid airship or blimp. NAS Lakehurst's entire inventory at this time consisted of the blimps G-1, L-1, K2 and the ex-Army airships TC-13 and TC-14. Three obsolete ships, K-1, ZMC-2 and the old J-4 were being used for experimental projects. Lansdowne Road and the main gate are at left. (U.S. Navy Photo)

J-4 prepares to pick up a fuel bag at sea (1939) while C-1 and TC-14 maneuver nearby. This photograph is expressive of the Navy's inability to meet the looming national emergency—with old equipment and tactics as yet unprepared for global conflict. Airship doctrine with respect to convoy escort and anti-submarine warfare (ASW)—the *raison d'être* of the blimp—remained to be formulated and put into practice. The Navy Department's deliberate indecision on airship matters had cost valuable time in the 1930s; the penalties for this posture would become painfully evident in 1940-42 with the Battle of the Atlantic. J-4 would not participate. The last of her design, J-4 was finally surveyed in September 1940 after a useful life of 13 years. (LCdr. L.E. Schellberg)

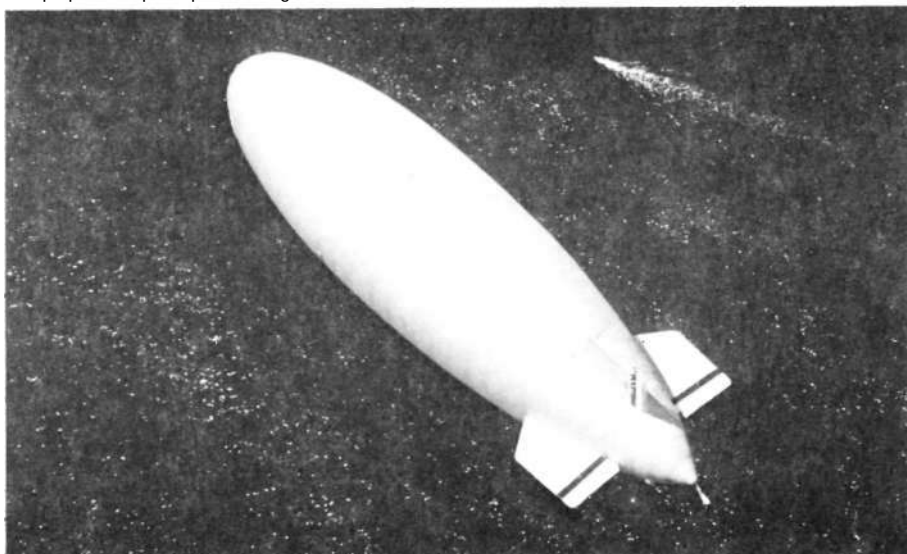
G-1 tracking a U.S. submarine somewhere off New London, Connecticut, 30 April 1940. In 1940, no tactical manual existed for the operation of non-rigid airships in convoy escort, ASW patrol, mine detection and other utility missions. Belatedly, in late 1939, long-neglected training began in earnest. Convoy training was obtained by picking up merchant ships and remaining with them for several hours. Submarine tactics and countermeasures, torpedo recovery, and search and rescue were practiced in 1939-40 by frequent exercises with units attached to Submarine Squadron Two. However improvised these initiatives were, they would soon realize vital wartime dividends. In August 1940, blimps were incorporated at last into the defense planning for the Atlantic coast. (U.S. Navy Photo Courtesy of LCdr. L.E. Schellberg)

Lakehurst's radio antenna system for receiving and transmitting, winter 1940-41. The old Aerological and Radio Building is at right; the Commissary store at left. Wartime expansion of the station is imminent: a \$2,000,000 authorization for improvements and expansion was received in the spring of 1941 and construction began immediately. The work included Hangars No. 2 and No. 3, additions to the BOQ and crew's barracks, magazines in the pine woods and a new General Services Building here for schools, aerology and a new radio communications center. The helium gasometer and potable water tank on "the hill" are visible behind the tall fire protection tank. The latter was a hazard to flight operations and was moved to the construction site for Hangars No. 5 and No. 6 in late 1942. (H.J. Applegate)

The training airship (ZNN)¹ L-3. Simple in design and structure and sensitive to the controls, the L-type proved to be an excellent primary trainer. The student pilot had a good opportunity to practice the basic principles of aerostatics and aerodynamics, and develop "feel" for the condition of his ship. The L-ships were also ideal for practicing "heavy" takeoffs on the wheel—a routine procedure given wartime payloads. Gas volume was 123,000 cu. ft.; cruising endurance was 13 hours or a range of 520 nmi. L-1 was delivered to Lakehurst in 1938, a period of very little training. (LCdr. L.E. Schellberg)



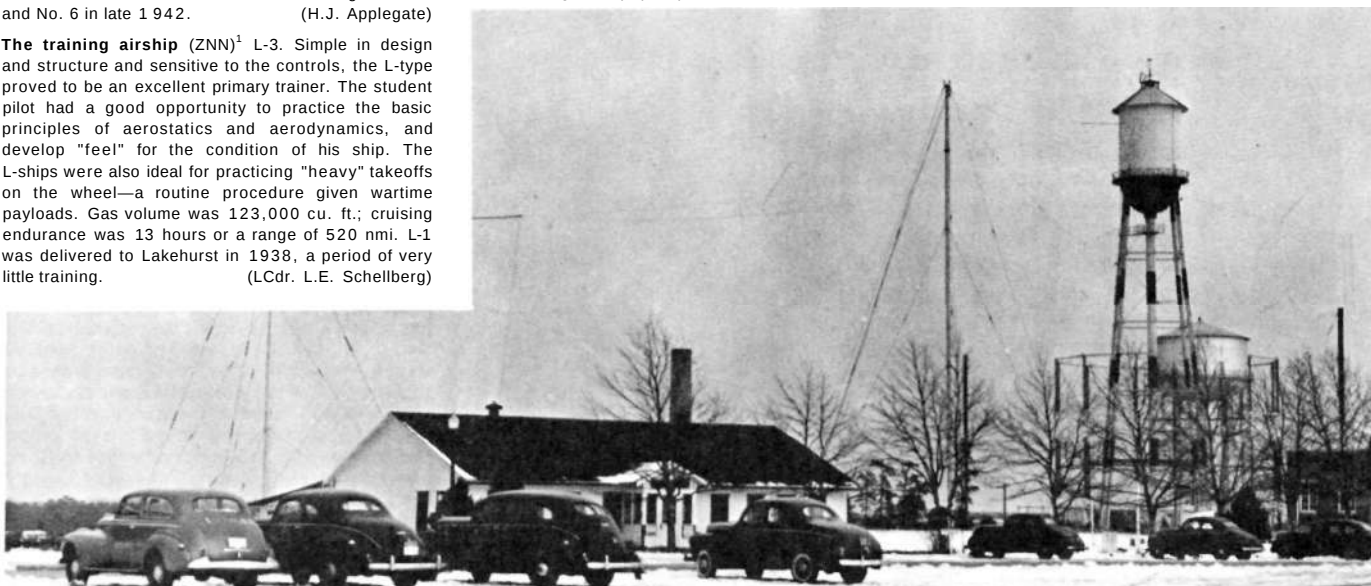
J-4 prepares to pick up a fuel bag



G-1 tracking a U.S. submarine



The training airship (ZNN) L-3



Lakehurst's radio antenna system



The ex-Army TC-13



K-2 towing a water recovery bag



K-1 on the stick mast

The ex-Army TC-13 at Lakehurst, 1940-41. On 30 June 1937, the U.S. Army terminated its airship operations and turned over its equipment to the Navy. This included the blimps TC-13 and TC-14, both designed as long-range patrol ships for coastal work. These Army hand-me-downs and four K-type blimps were the only airships capable of extended operations at sea at the time of Pearl Harbor. By December 7th, both Army ships had been equipped with bomb racks. TC-13 and TC-14 were transferred to Moffett Field, California, shortly after the attack and each took part in the first wartime patrols off the West Coast.

(Mrs. F.J. Tobin)

K-1 on the stick mast at (blimp) mooring circle No. 1, 23 July 1941. The 319,900 cu. ft. airship was delivered to Lakehurst in 1931 and was the largest non-rigid built up to that time. The ship was an invaluable testbed for airship development projects until 1940, when K-1 was grounded and used as a "dummy" airship for mooring out tests. K-1 was the prototype for the highly successful K-type non-rigid airship, the workhorse of America's wartime airship program. The ship was deflated and finally surveyed in October, three months after this photograph was taken. Note the watch shack near the mast.

(LCdr. L.E. Schellberg)

K-2 towing a water recovery bag, 28 August 1941. Based on the operational experience accumulated with K-1, K2 and her sister ships were designed expressly for long-range patrol and convoy escort work. K-2 was delivered to Lakehurst in December 1938 and, by 1941, she was a very busy airship. Bombing equipment for airships and other experimental projects relating to the wartime program were developed using K-2 as the test platform. The ship was used throughout 1941 for practice bombing to develop the eye and judgment of pilots and copilots. Later, in 1942, Loran would get its first airborne test aboard K-2. The New Jersey coastline is in the background.

(LCdr. L.E. Schellberg)

A 35,000 cu. ft. free balloon ready for flight, Non-Rigid Airship Hangar, 17 September 1941. Prewar flight training had required seven balloon flights for airship officers and three hops for enlisted men, but balloon experience was deemphasized during the war. Airship training had lain moribund during the latter 1930s but revived as the situation in Europe deteriorated. When the United States entered the war a huge increase in lighter-than-air personnel was urgently required and a revitalized training organization was established almost overnight. The control cars for TC-13 and TC-14 are at left; the engines have been removed and the cars are being readied for shipment by rail to Moffett Field, California.

(LCdr. L.E. Schellberg)

The newly delivered K-3 over Hangar No. 1, 21 September 1941. K-3 was flown directly to Lakehurst from the contractor and arrived on 17 September—the first airship delivered to the Navy under the "10,000 Plane Program" legislation of June 1940. The LTA portion of the Act contained authorization for 48 non-rigid airships; the first order for two L-type and four K-type airships was signed on 24 October 1940.² K-4 arrived on 16 October 1941; K-5 reached the station in November. Note that the airplane hangars have been moved and foundation work for an overhaul and a training airship hangar is underway. K-3 would carry out the first airship rescue of the war by finding the survivors of the torpedoed "Noress" on 15 January 1942.

(LCdr. L.E. Schellberg)

Aerial view of NAS Lakehurst at the time of Pearl Harbor. Taxiways had been prepared to blimp mooring circles 1 through 4; three ships are at the mast. Mat 1 had yet to be paved and the abandoned circles for Los Angeles, Akron and Hindenburg were still evident. Hangars No. 2 and No. 3 were under construction immediately south of Hangar No. 1 and other areas had been cleared for construction. New housing for enlisted personnel are at lower center. On December 7th, Lakehurst had a total of 10 airships on hand: L-1, L-2 and L-3, G-1, TC-13 and 14, and K-2 through K-5. Two airplanes rounded out the aircraft. Machine-gun mounts and bomb racks had been installed on only five of these. Station complement: about 140 officers and 400 enlisted men.

(National Archives Photo)

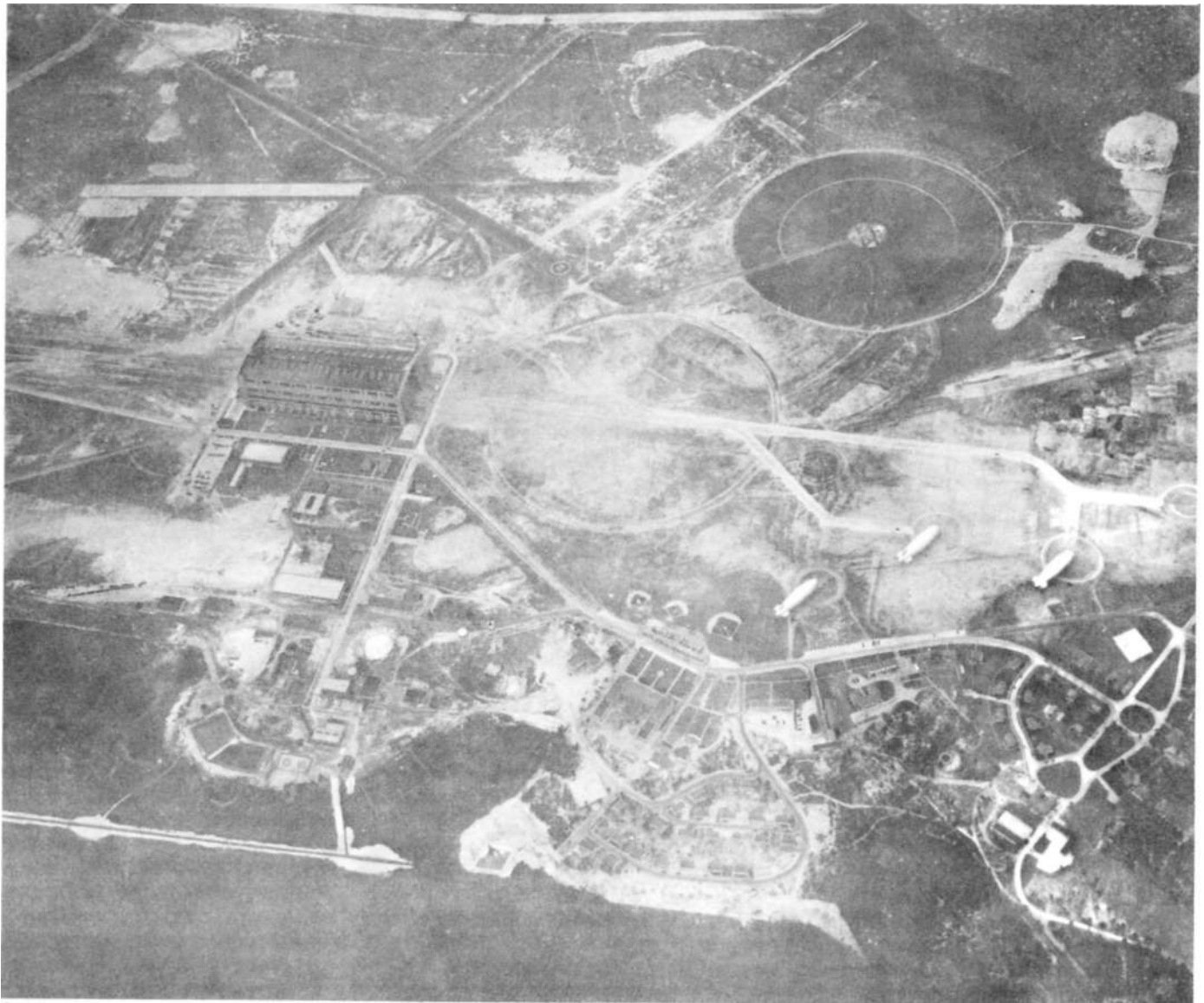
Courtesy of PAO, NAEC, Lakehurst)



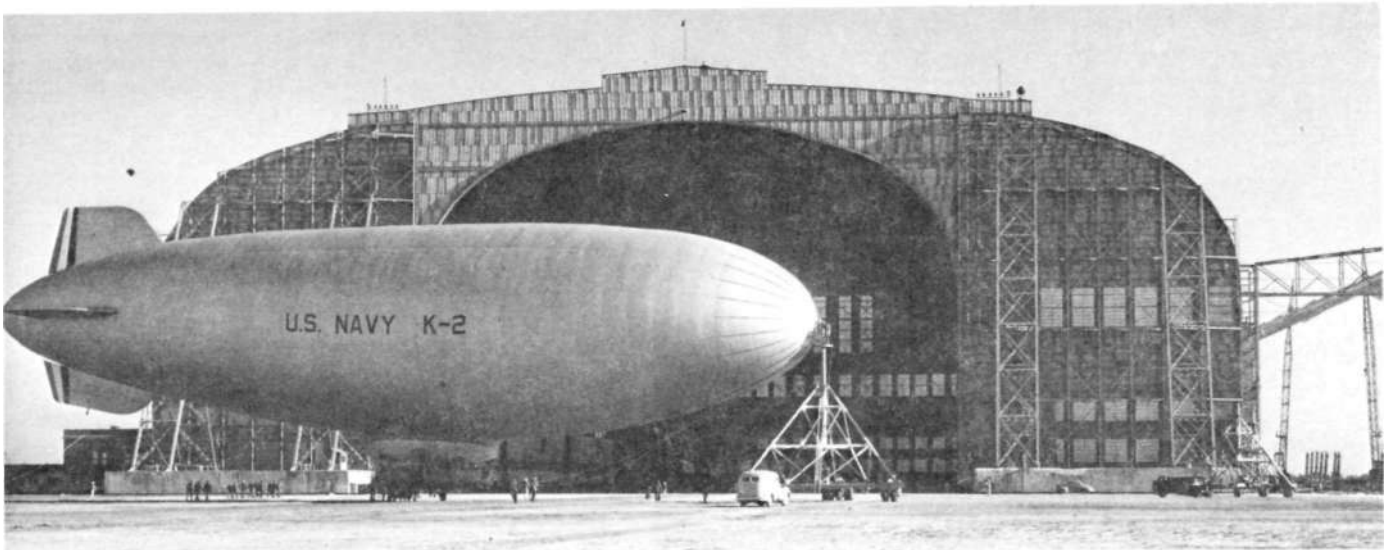
The newly delivered K-3



A 35,000 cu. ft. free balloon



Aerial view of Lakehurst



K-2 is walked into Hangar No. 1



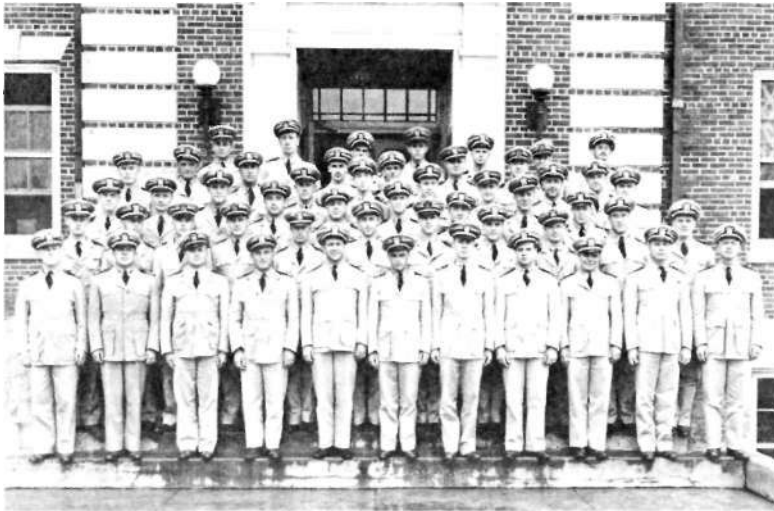
A class of enlisted men



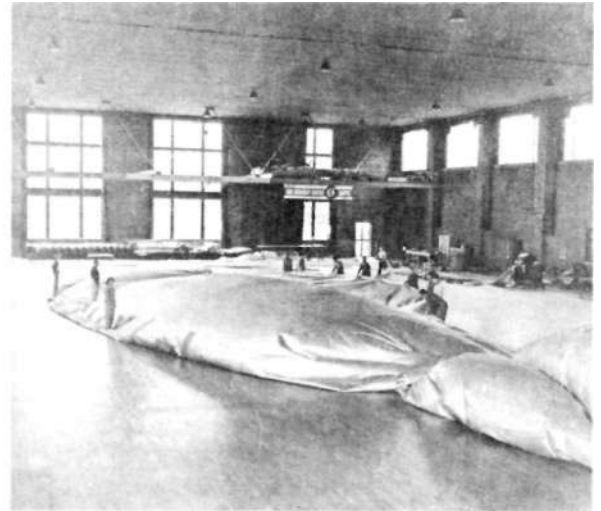
A K-ship on patrol



The paving of Mat 1



Class 19 graduates



L-ship envelope



War Bond campaign



Lt.(jg) H. H. O'Clare

K-2 is walked into Hangar No. 1 after an early war-time patrol, 16 December 1941. K-2 was among the first airships pressed into the Battle of the Atlantic; here she is armed with a stern machine gun and an early type of external bomb rack. Hangar No. 2, authorized in April, is under construction at right. Lakehurst was to be the main overhaul base for all airships assigned to the Atlantic coast as well as provide maintenance and repair for the station's own patrol squadron and training aircraft. These responsibilities fell to the Assembly and Repair (A & R) Department. Work was completed and Hangar No. 2 placed in operation as the A & R Department hangar on 13 May 1942. (LCdr. L.E. Schellberg)

A class of enlisted men graduates from the Naval Training School (LTA) marching in formation, about 1942. The flight and ground crews trained at Lakehurst were quickly absorbed into an exploding airship organization which, by 1945, was operating from bases along the East, Gulf and West Coasts, the Caribbean and as far away as Brazil and Gibraltar. Barely 100 aircrewmembers were available in December 1941, but their number would increase to 3000 by the end of the war. Ground School and flight activity at the Lakehurst and Moffett Field training centers reached a peak in 1943. Note the taped windows. (LCdr. L.E. Schellberg)

The paving of Mat 1 is underway, 24 July 1942. The old docking rails from Hangar No. 1 and the circle tracks have been torn up but the old mooring-out circle remains outlined in the scrub vegetation at top. Sandy landing fields had been a part of the Lakehurst scene since 1921 but they surrendered to the demands of intense air traffic and the need for a runway-like surface. Additions to the crew's barracks (left) were completed in late 1941; here the Recreation Building is under construction. The three structures

at center right are for the Aerographer's School. A new 50-unit housing complex for married enlisted personnel is just out of view at lower right.

(National Archives Photo
Courtesy of PAO, NAEC, Lakehurst)

A K-ship on patrol. It is difficult now to appreciate the genuine urgency of the war at sea in 1940-42; 1942 in particular was a grim year with 454 sinkings in Atlantic areas. Among the biggest airship boosters at this time were the various Sea Frontier Commanders responsible for assembling convoys and for coastal shipping. Airships were deployed from the operational office of each commander (in the case of Lakehurst, from the New York office of the Fourth Naval District), which had direct contact with their respective air stations, and coordinated airship and heavier-than-air operations with the changing requirements of their districts. The airship fleet would eventually make 35,600 operational flights in the Atlantic theater, totaling 380,000 hours in the air. (Capt. F.N. Klein)

Class 19 graduates from Lakehurst's flight training school, 8 October 1942. The war demanded an accelerated training schedule; the officer training program was reduced from one year to about six months and fewer flight hours were required than in prewar years. One of the above students, for example, graduated with 123 hours, including one free balloon flight. Class 19 promptly assumed command responsibility throughout the wartime airship organization. Ten officer classes graduated from Lakehurst in 1943 alone, exceeding the total for the entire decade of the 1930s. On 7 December 1941 Navy lighter-than-air had barely 200 officer and enlisted flight personnel. This multiplied to about 700 in 1942, 2300 in 1943 and approximately 4000 in 1944. (Capt. F.N. Klein)

War Bond campaign, September 1943. The booth is located in the Recreation Building. Pressure on air station personnel and employees was sufficient to make each bond drive on board a successful one. (Lt. H.R. Rowe)

L-ship envelope is unrolled by a work party in the inspection room of the A & R Fabric Shop, 26 March 1943. After its completion in 1933, the maintenance, inspection, repair and storage of airship envelopes and fabric accessories was centered here. The floor is polished maple to prevent abrasion of airship fabrics. This "bag" will be air-inflated for inspection and cleaning, patches will be cut and cemented into place or other repairs as needed. When work is completed on the bottom half the envelope will be cap-sized on the deck by 40 to 50 men to permit inspection and repair of the top half. The banner (center) says, "Our Job—An Airship Every 8 Days in '42," a reference to anticipated warship deliveries from the contractor. This rate was not achieved until 1943. (Althoff)

Lt.(jg) H.H. O'Clare, O-in-C, and students inspect an air-inflated envelope inside the fabric shop. Both the interior and exterior surfaces will be carefully examined for tears, cracked fabric, cuts and chafing, holes, mildew and other damage or deterioration, and then cleaned and repaired as necessary. The smallest hole or thin spot was easily visible from the darkened interior of the bag. A course of instruction in the maintenance, upkeep and repair of airship fabrics and fin surfaces in the field was offered at the Fleet Airships, Atlantic, Fabric School at Lakehurst in order to ease demands on the major overhaul bases and to permit the fullest possible operational schedule for each airship squadron.³ (Althoff)



Aerial view of NAS Lakehurst

Fabric shop personnel secure a rolled envelope with flannel tieoffs, 26 March 1943. Note the canvas carrier; later in the war articulated trains or carts were introduced to move the heavy fabric. If the bag is slated for storage it will be moved to the fabric shop "fingers" and stretched out full length (still rolled) on a long shelf. Fabric storage areas were kept cool and dry, and maintained at a constant temperature and humidity to inhibit deterioration. If needed elsewhere, the envelope will be packed for shipment to another base or moved to the A & R hangar for mating with a car, control surfaces and accessories. (Althoff)

Aerial view of NAS Lakehurst looking east, spring 1943. Mat 1 has been completed but the old mooring-out circle remains. Hangar No. 5 is nearing completion (right) and construction of No. 6 is underway. Lakehurst's wartime functions were fourfold: providing a base and facilities for airship units of the Fleet; serving as a major overhaul and fitting-out base for airships; airship training and experimentation; and acting as a major supply point for LTA logistics. At the peak of activity in 1943-44 about 2500 Navy, Marine and civilian personnel were manning the station. The town of Lakehurst is immediately south of the base. And 15 miles in the distance—the North Atlantic battleground. (National Archives Photo Courtesy of Dave Smith)

Hangar No. 5 (right) and No. 6 under construction, 29 April 1943. Construction was authorized in July 1942 and preliminary work began immediately. Wartime restrictions on the use of steel necessitated a standardized timber-and-concrete design.⁴ The fire-proofed timber shells have a useful length of 1000 feet, more than 241,000 square feet of hangar floor and each could accommodate six ZNP-K airships. The concrete towers support vertical flatleaf sliding doors. Office and shop space were built in. Number 5 was completed and occupied on 1 July 1943; No. 6 on 15 August. A control tower was provided atop the northeast tower of Hangar No. 5. Landing mats will be cleared, leveled and paved at the east and west ends of the twin-hangar complex.

(Courtesy of PAO, NAEC, Lakehurst)

Plan of Naval Air Station, Lakehurst, as of 30 June 1943.

A summer afternoon, wartime NAS Lakehurst (1943). (U.S. Navy Photo)

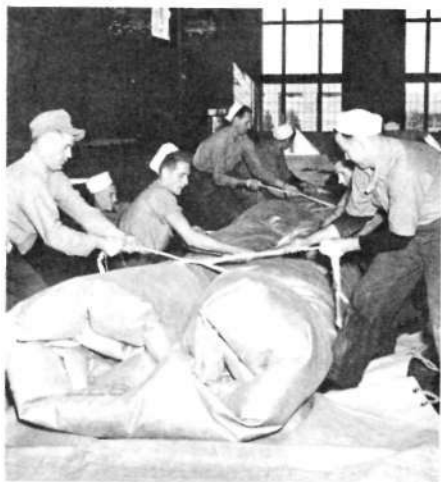
Courtesy of Mrs. E.P. Moccia)

A work party attends to the engines of a K-ship. The Pratt & Whitney Wasps delivered 425 hp at 1775 rpm for a top speed of 67.5 knots. The engines were given a 30-hour and a 120-hour check, and underwent a complete overhaul after 800 to 1000 hours. The engineering officer was responsible for the maintenance and repair of his airship's engines.

(Capt. F.N. Klein)

The control car is mated to the envelope of a K-ship, A & R Department hangar. An inflation net has been spread over the bag, which has already been air-inflated for inspection and installation of the internal suspensions and some accessories. Once attached, the car will be aligned and tensioned and all installations and rigging completed. A K-type airship required from three to five weeks to overhaul by various station departments.⁵ (H.J. Applegate)

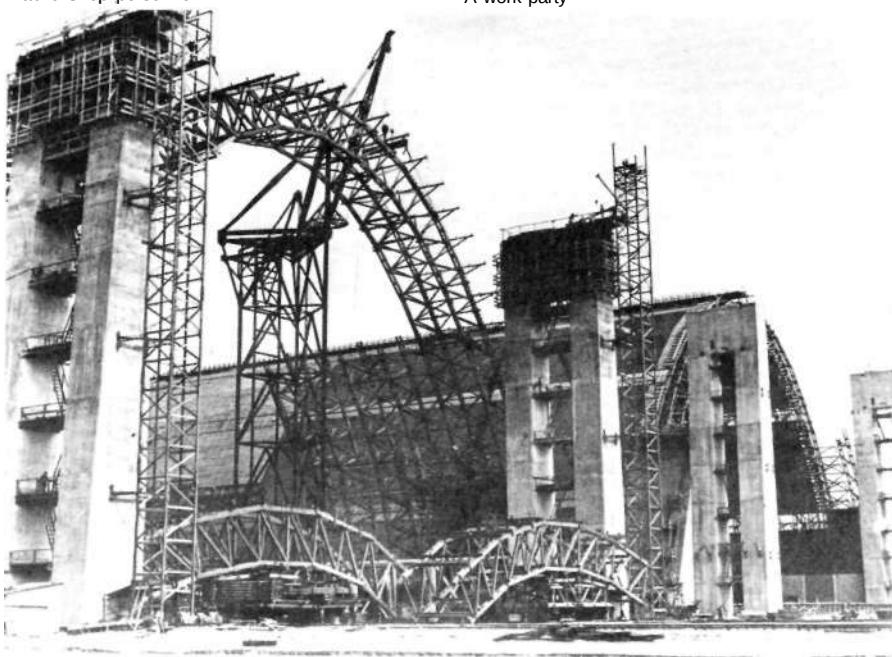
An A & R team prepares to enter the helium-filled space of a K-ship, 1943-44. Two men (right) are equipped with air-supplied masks connected to a portable compressor; the third (standing) is on standby with a self-contained oxygen re-breather for emergency rescue. Note the safety harnesses and knives. Work or inspection inside a helium-filled envelope required that two men always enter together, supported by another 6 to 12 on the deck. Since direct and reliable communication was essential, a communication system was used. The two inside spoke frequently with each other and with those outside as a check on their condition; changes or loss of speech indicated an emergency and the man was brought out immediately. Once inside, the airship's main suspension system, ballonets, ripcord and the envelope itself would be checked. This procedure, introduced during the war, was a physical and mental strain for the men inside. (Lt. H.R. Rowe)



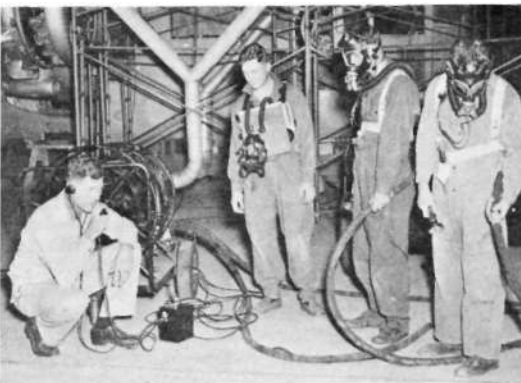
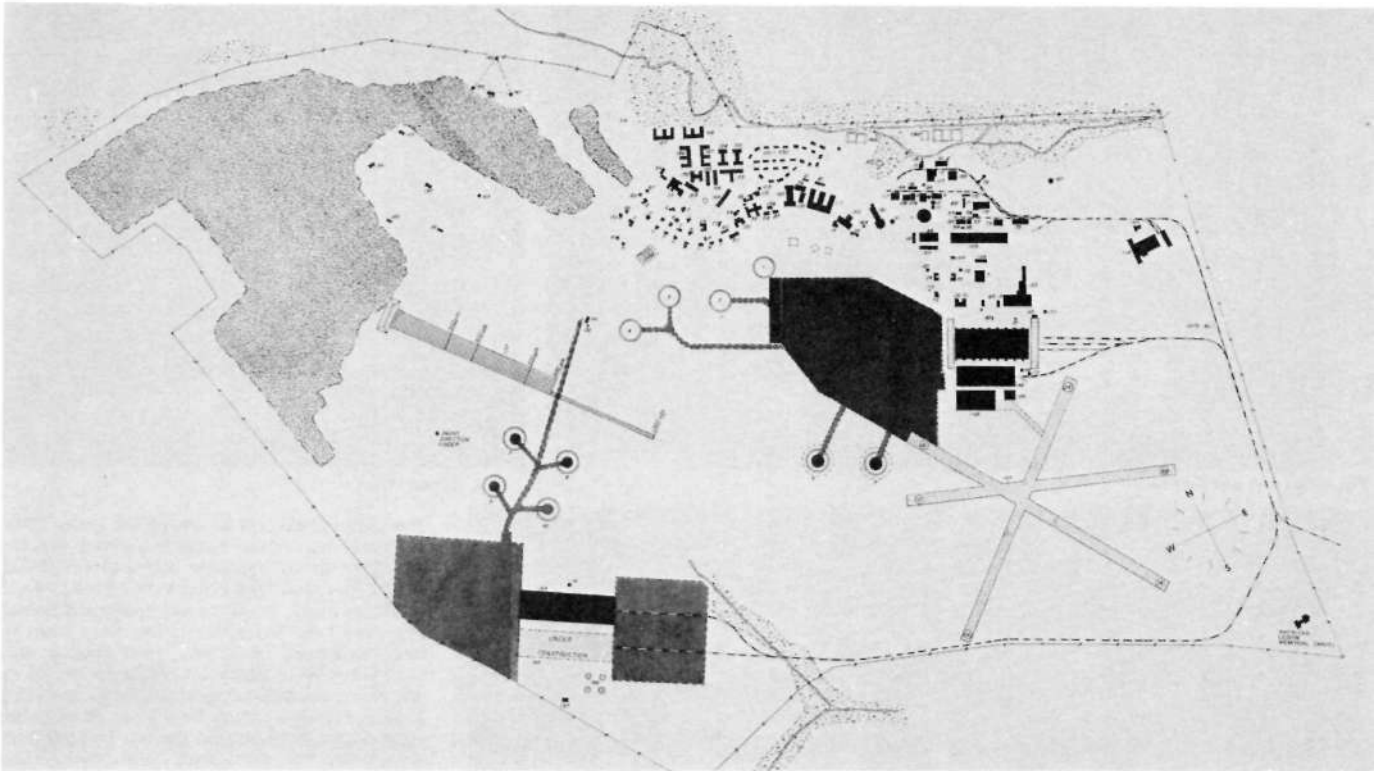
Fabric Shop personnel



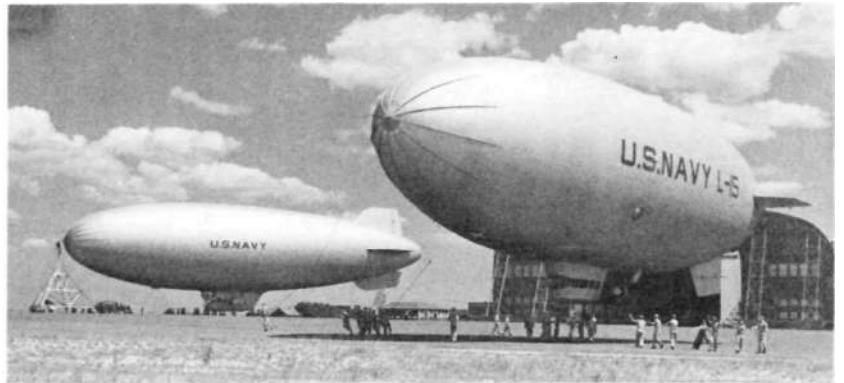
A work party



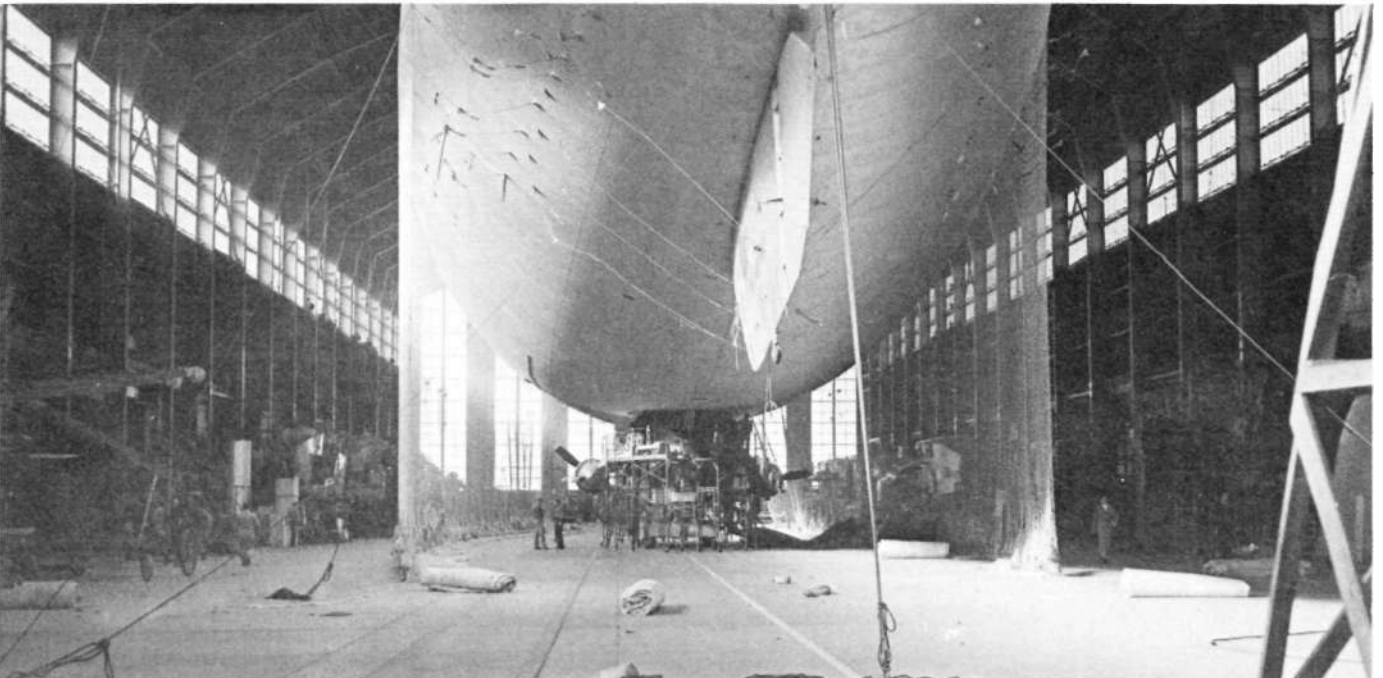
Hangar No. 5



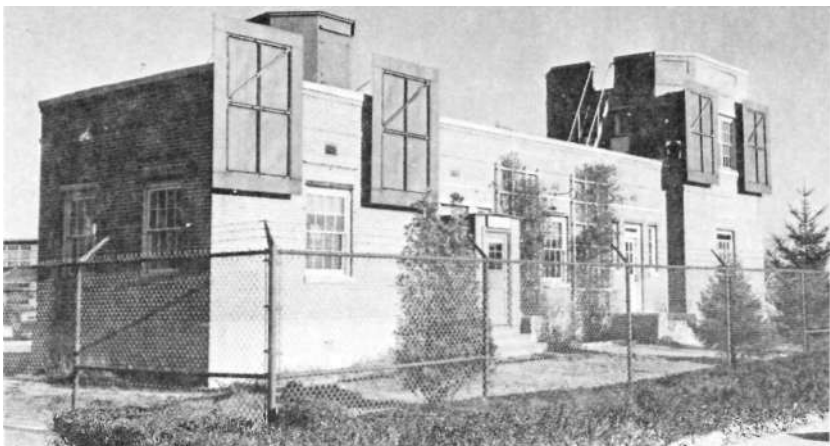
An A & R team



A summer afternoon



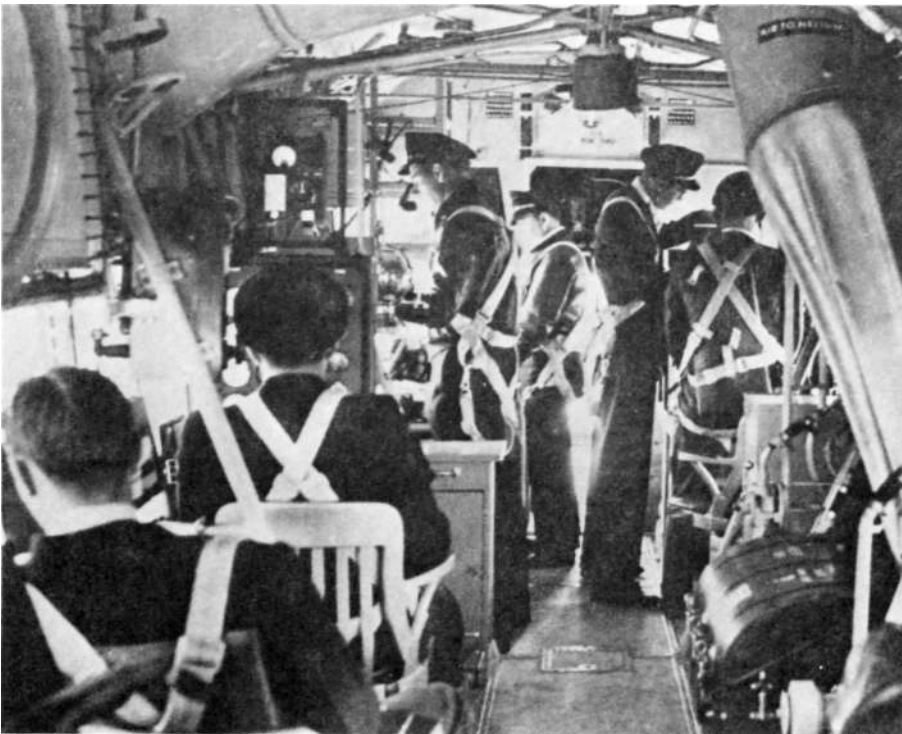
The control car



The disbursing (pay) office



WAVE "Pigeoneers"



Interior of a K-ship car



A ZNP-K landing at Lakehurst

The Disbursing (pay) Office, 29 December 1943. This was the original Aerology Building and was among the earliest structures on the new (1921) air station. The base radio station was moved to Aerology about 1927; the Radio and Aerological Building provided its vital functions until late 1941 when the new communications center was completed. Note the neon weather panels on the facade facing the mat. Numerals representing wind direction and velocity were flashed on these for the benefit of circling pilots; similar lights atop the General Services Building provided barometric pressure and temperature.

(Mrs. F.J. Tobin)

WAVE "pigeoneers" care for the station detachment, about 1943. Two to four birds were carried aloft on the free balloons and on airship and airplane flights, primarily for practice and to maintain contact with home base while in flight. The Pigeon Loft was a part of the Lakehurst scene for about 30 years. During the war, the number of birds increased from approximately 100 to 350. Each patrol airship going to sea received a crate with six pigeons, four for practice and two for emergency use. Favored station personnel received an occasional squab or two. The first WAVES arrived on board the station in December 1942.

(National Archives Photo)

Courtesy of PAO, NAEC, Lakehurst)

A ship is undocked for a wartime patrol, 1944. Upon word from the Flight Officer, the watch notified the airship's rigger and mechanic to prepare for flight. The engines were warmed up, last-minute checks carried out, necessary equipment and provisions placed on board and the ship was trimmed for flight. The ground crew manned the lines and car rails, and the flight crew was ordered on board. At this point the ship was turned over to the Ground Handling Officer (GHO). The airship was weighed off—and the undocking commenced. Once out on the apron clear of the hangar the tail lines would be cast off and the ship allowed to "watch" into the wind as the mast was towed to the point of takeoff. The creases along the airships' topsides are from the main suspension system for each control car.

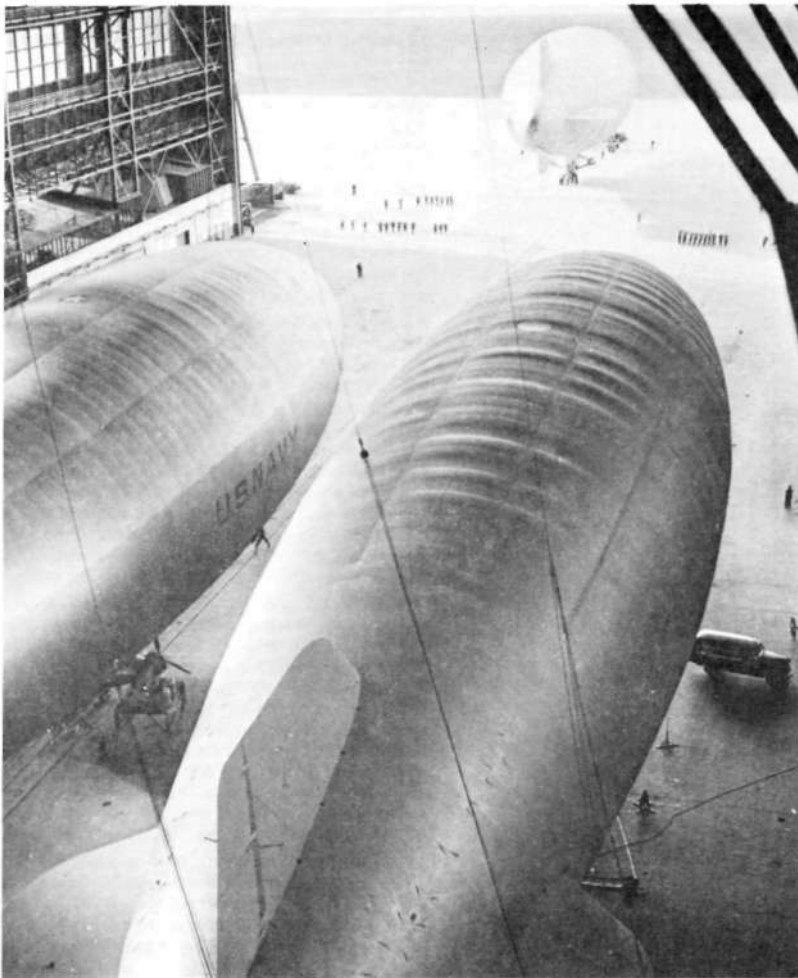
(National Archives Photo)

Courtesy of PAO, NAEC, Lakehurst)

A "King" ship departs Lakehurst for a wartime patrol at sea, about 1944. Operational flights were flown by a Combat Air Crew (CAC) consisting of a command pilot, two copilots, and six or seven enlisted men as the basic crew. Armament consisted of one Browning .50-cal. aircraft machine gun (BAM Gun) in the forward turret (early armament two 30-cal.) and four 325-lb. depth bombs. The bombs were locked until over water and the gun loaded only after crossing the coast. The newer ships had a total lift of approximately 28,300 lbs. or a net useful lift of about 8700 lbs. for fuel, crew, bombs and supplies.⁶ It was routine to take off about 10% heavy by taxiing down the runway like an airplane—the engines lifting the extra weight dynamically. Note the camouflaged potable water tank.

(Mrs. F.J. Tobin)

Interior of a K-ship car during a wartime patrol. The view is looking forward with the flight crew at their stations. The radio table and shelf with transmitters, receivers, reel-type antenna and related gear is aft of the pilot's compartment (starboard side); the naviga-



A ship is undocked



Interior of a standard wood hangar



Off duty, men relax

tor's table and instrument panel are to port. The mechanic's instrument panel is aft of the navigator's station and is visible. The car structure was a framework of welded chrome molybdenum steel tubing covered with aluminum skin. Weight-saving devices were used throughout the tightly packed interior. The bombardier's seat and his depth bomb releases were located between the pilot and copilot; the machine gun turret was directly above the bombardier's station. Empty weight of the car: about 10,900 lbs. (H.J. Applegate)

Off duty, men relax in the after part of the control car during a wartime patrol, 1944. The K ship had a range of 2200 nmi at a cruising speed of 40 knots, or a maximum endurance of 50 hours in the air. Wartime patrols tended to be long and rather tedious, many lasting 20 hours or more.' (Capt. F.N. Klein)

A ZNP-K landing at Lakehurst. The two long lines forward are in hand and the short lines have just been grabbed by the ground crew. In addition to the radio equipment and early radar gear, by early 1942 patrol airships were equipped with then secret Magnetic Airborne Detector (MAD) gear for submarine detection, tracking and bombing. Much of the original research for this equipment had been done at Lakehurst under contract. By 1944, combat crews had become proficient in the tactical use of this novel equipment, unfortunately late in the war.

(Mrs. F.J. Tobin)

Interior of a standard wood hangar. After docking, an airship was unmasted and secured to the deck by the ground crew. It was the duty of the hangar watch to see that all ships were properly trimmed and secured, and that adequate envelope pressure was maintained at all times. Any out-of-trim condition demanded immediate correction to prevent excessive strain on the different parts of the envelope, the suspension system and on the major and minor controls. Ships were kept from 25 to 100 lbs. heavy when in the hangar. The need to "fly" an airship when on the ground was a chronic headache of airship logistics. (Capt. F.N. Klein)



A "King" ship



An M-ship



An envelope is unpacked



NAS Lakehurst

An M-ship helps escort the surrendered U-858, May 1945. The M-class airship had an original volume of 647,468 cu. ft. and a useful load of more than 11,000 lbs., including eight depth bombs and a 50-cal. BAM gun. M-1 was delivered to Lakehurst on 19 November 1943 and represented the then largest non-rigid airship designed in the U.S. Three more were delivered to the station between January and April 1944 but all further M-ships were canceled. Because of their handling characteristics and crew amenities the M-type was a favorite among LTA pilots. A formidable ASW weapon, the "Mike" ships arrived too late to make a significant contribution to the war at sea. (Goodyear Photo Courtesy of Dave Smith)

An envelope is unpacked from its box, Naval Air Station, Richmond, Florida, 21 February 1945. Note the ground cloth. Overhead falls support successive bights of fabric as the box is pulled forward and the bag laid out on the deck behind it. The envelope will be unfolded, inflated with air for inspection and installation of internal suspensions and accessories, and then made ready for helium inflation. This packing box has been shipped from the Supply Officer at Lakehurst to the Supply Officer, NAS Richmond. The K-class envelopes (456,000 cu. ft.) contained more than 4000 sq. yds of neoprene sandwich fabric. Weight: about 9350 lbs. (Althoff)

G-2 is eased onto the mat, about 1945. The advance party is just grabbing the forward lines; once well in hand, the GHO will assume responsibility for the safety of the ship. A precise operation, the skill of the pilot was reflected by his landing technique. The G-type was used primarily in the utility squadrons and for advanced student training. These 196,700 cu. ft. airships had a 17-hour endurance at a cruising speed of 40 knots. Range: 680 nmi. The normal crew was seven men. Hangars No. 5 and No. 6 are complete and operational; note the word "Tower" on Hangar No. 5. (U.S. Navy Photo Courtesy of Dave Smith)

NAS Lakehurst from the pilot's compartment of a postwar airship, about 1960. The LTA organization was reduced quickly after the war. By the end of 1946 the number of squadrons had been reduced to two, and all Fleet Airship Wings had been decommissioned. Navy lighter-than-air would survive the war for 16 difficult years. Qualitative growth using larger ships of advanced design would yield significant technological and tactical progress through the 1950s. Nonetheless, for the naval establishment it was not enough. In June 1961 the Navy announced the termination of its lighter-than-air program. The final flight of a U.S. Navy airship took place at NAS Lakehurst on 31 August 1962. (Althoff)

NOTES

1. The letter Z was the U.S. Navy's designation for all lighter-than-air craft. Free balloons were ZTFs. Non-rigid training airships were designated ZNNs; patrol ships were ZNPs. The rigid airship U.S.S. *Los Angeles*, for example, was the ZR-3.
2. On 16 June 1942, Congress authorized an increase in airship strength from the 48 initially authorized to 200 non-rigid airships. As the war progressed new equipment was adapted to airships, so envelope capacity was increased to accommodate the additional weight and to improve performance. The 416,000 cu. ft. capacity of K-3 and her sister ships was increased to 425,000 cu. ft. with K-14 and finally to 456,000 cu. ft.
3. A fleet squadron was considered to be six airships, however, squadrons had from four to as many as 15 K-class airships. Lakehurst's own patrol squadron, Airship Squadron Twelve (ZP-12), was equipped with eight. Two crews were assigned to each airship. The L- and G-type were concentrated at the two training centers at Lakehurst and Moffett Field, California, but six G-ships comprised part of Airship Utility Squadron One, headquartered in Florida. They provided photographic, torpedo recovery, and other services to the Atlantic Fleet. M-1 was assigned to the Naval Airship Training and Experimental Command at Lakehurst; the remaining M-ships were assigned to ZP-31, NAS Richmond, Florida.
4. In addition to Hangars No. 5 and No. 6 at Lakehurst, 15 of these standard wood hangars were constructed at coastal stations in Massachusetts, North Carolina, Georgia, Florida, Louisiana, Texas, California and Oregon.
5. Before the war, airships had undergone overhaul about once every three years. Wartime operations

demanding an overhaul at the end of one or not more than two years. Lakehurst's A & R Department was the focus for all such work. The air station's departments and shops also included the Public Works Department, the Communications and Engineering Departments, Electrical Shop, Metal Shop, Machine Shop, Instrument Shop, Fabric Shop and the Parachute Loft.

6. Necessary equipment for flight which had to be stowed aboard included the airship's information or "dope" book, the navigation kit, including hand-held pelorus, confidential and other charts, maps, stopwatch and navigator's and communication notebook, a communications folder for call signs and recognition signals, binoculars, camera, pigeon crate, life-saving equipment including sufficient life jackets for all hands, standard and emergency rations, emergency kit, tool kit, flashlight, and so on.

7. The intensity of wartime operations is reflected in the number of flying hours accumulated by airship pilots. One member of Class XI (1937-38), for example, flew 168 hours in one month during 1942. Even senior officers flew considerably; one senior member of Class 19 (1942) flew 1378 hours between June 1942 and the end of the war. About 1000 hours per year was average for the war.

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G-2 is eased onto the mat

AIRSHIP DELIVERIES TO THE NAVY

On Hand at Lakehurst (7 Dec. 1941)		1941	1942	1943	1944	1945
TYPE						
K	(4)	4	20	92	17	
L	(3)	2	9*	10		
G	(1)	—	—	6	1	
M	—	—	—	1	3	—
TC	(2)	-	-	-	-	-

* L-4 to L-8 ex-Goodyear Fleet; L-9 to L-12 built by the Navy.

Airship deliveries to the Navy from the contractor, 1941-45. On December 7th, the Navy and Goodyear had only 16 airships of all types on hand, six of which were capable of long-range patrol. By the end of 1944, 133 K-ships, 10 L-ships, 7 G-ships and 4 M-type had been delivered to the Navy. These

were delivered through the operational and overhaul centers at Lakehurst or Moffett Field, California; most were assigned to other LTA stations and to expeditionary bases. At the dawn of 1945 the Navy had 141 airships on hand—the high-water mark of the U.S. airship program and the largest airship fleet ever constructed.

AIRSHIP LOSSES, NAS LAKEHURST 1942-SEPTEMBER 1945

DATE	SHIP	LOCATION	CASUALTY	LIVES LOST
8 June 1942	G-1, L-2	Off the N.J. coast	Night midair collision during research flight	12
10 May 1943	free balloon #04421	Ellisberg, N.J.	Exploded and burned on landing	3
16 October 1943	K-67, K-7	Off the N.J. coast	Midair collision in low visibility; K-7 returned to Lakehurst	9
16 May 1944	K-5	NAS Lakehurst	Ship hit Hangar No. 1 during training flight	10

Airship losses, NAS Lakehurst, 1942 to September 1945. There were also at least five ground handling accidents at Lakehurst during the war not involving the loss of a ship. Airship and personnel casualties throughout the LTA organiza-

tion multiplied these losses many times through the result of ground handling accidents, material failure, pilot error, weather and other causes. One ship, possibly two, was lost to enemy action.

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