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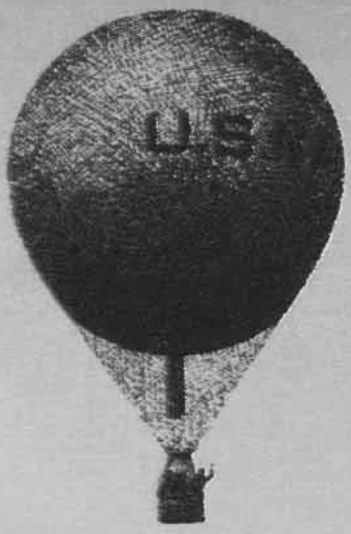

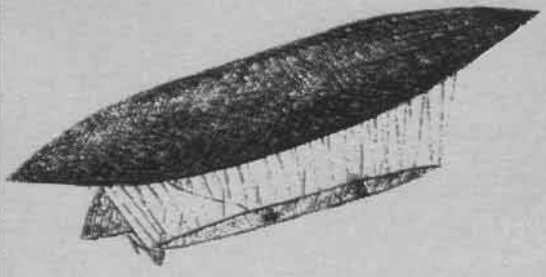

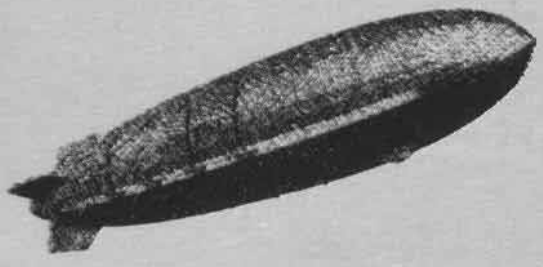

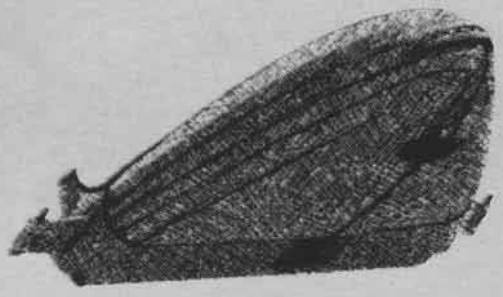

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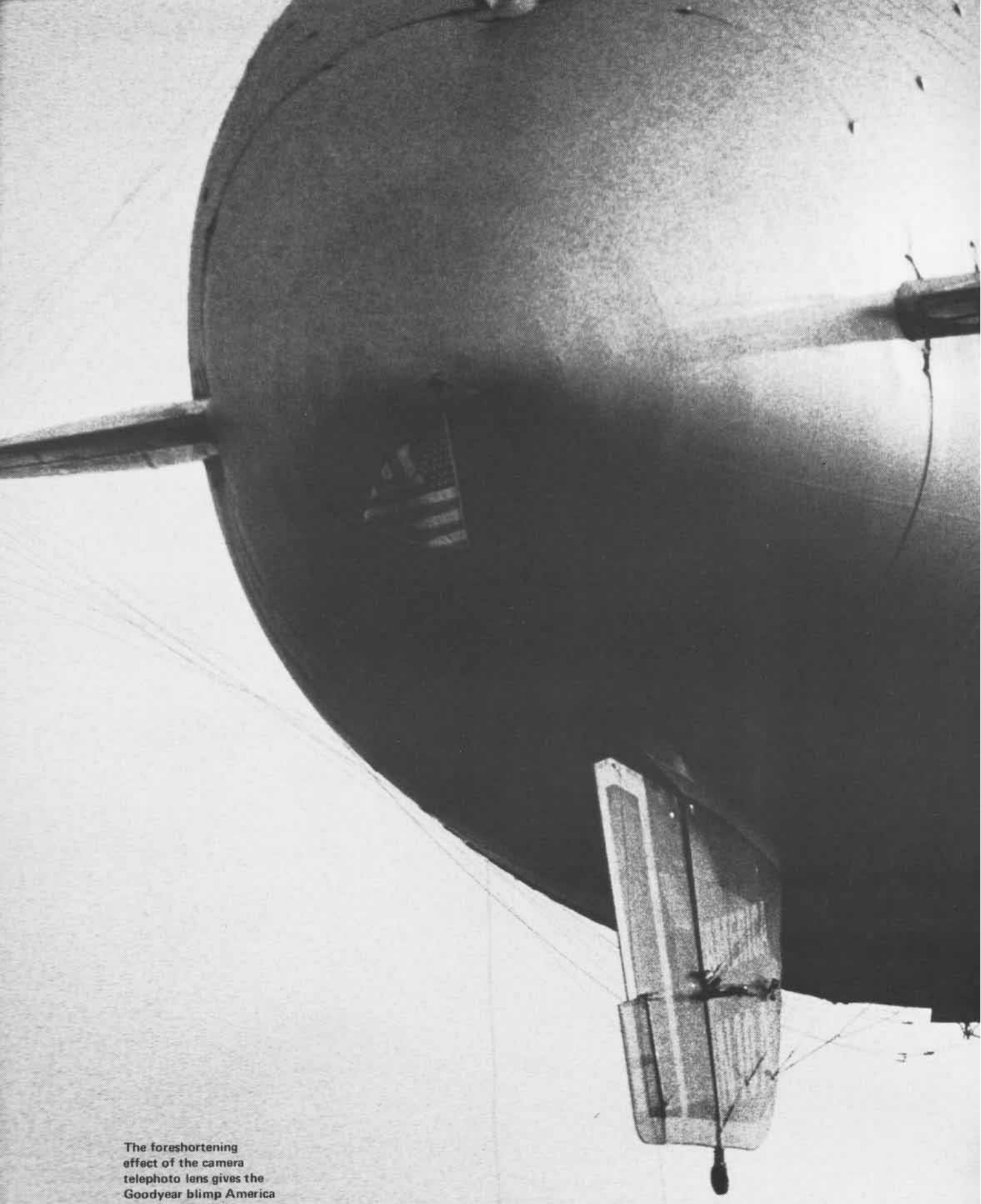
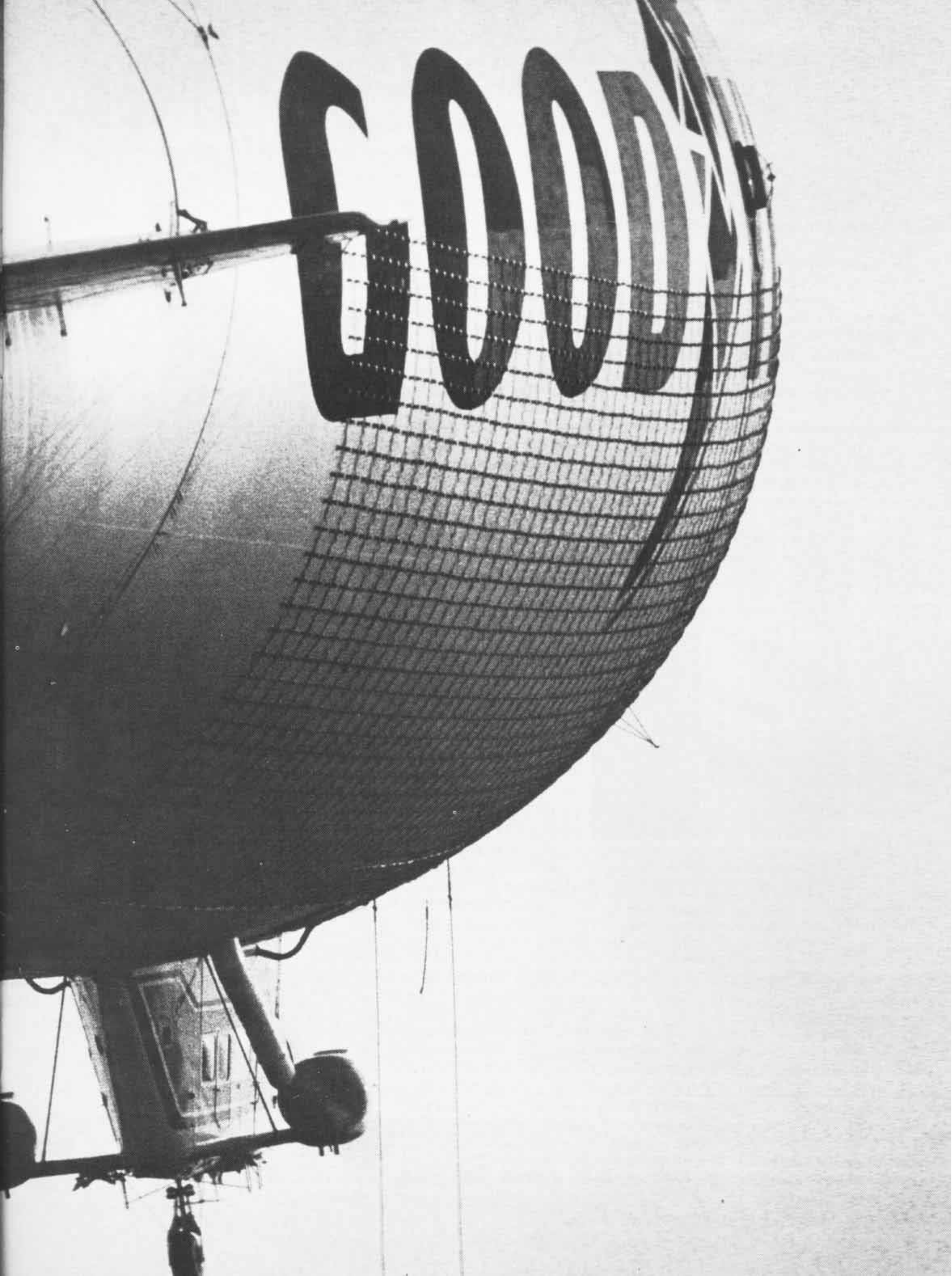
LIGHTER THAN AIR

NOVEMBER 1981



The foreshortening effect of the camera telephoto lens gives the Goodyear blimp America an even more balloon-like appearance.

(Photo by JOC Kirby Harrison)


GOOD

NAVAL AVIATION NEWS

Sixty-Third Year of Publication

Vice Admiral W. L. McDonald Deputy Chief of Naval Operations (Air Warfare)

Vice Admiral E. R. Seymour Commander, Naval Air Systems Command

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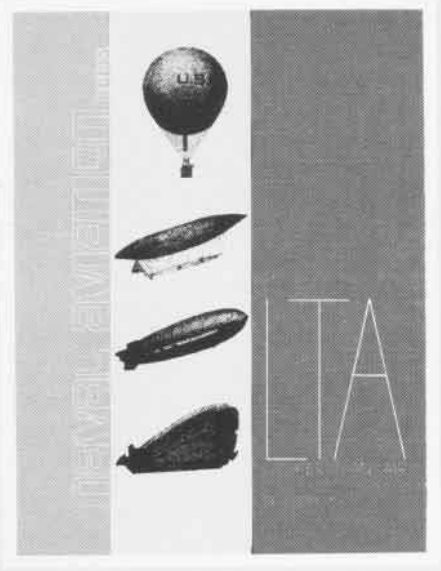


This month's cover by NANews Art Director Charles Cooney depicts the evolution of the lighter-than-air concept from the uncomplicated balloon and basket to the ultramodern airship of the future.

Features

Departments

Published monthly by the Chief of Naval Operations and Naval Air Systems Command in accordance with NavExos P-35. Offices are located in Bldg. 146, Washington Navy Yard, Washington, D.C. 20374. Phone 202-433-4407; Autovon 288-4407. Annual subscription: $18.00, check or money order ($4.50 additional for foreign mailing) direct to Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Single copy $2.50.

from the EDITOR'S NOTEBOOK

Walter Wellman
(Smithsonian Institution)

The lighter-than-air idea has been around for a long time. A successful manned hot-air balloon predated the Wright aeroplane by more than a century. As early as 1873, William Donaldson, Alfred Ford and George Lunt took off from Brooklyn, N.Y., in their balloon *Graphic* to fly across the Atlantic. But the time for such a feat had not yet arrived and they made it only as far as New Canaan, Conn.

It was Walter Wellman, journalist, airship enthusiast and adventurer, who made what can be described as the first serious attempt to fly across the ocean from the U.S. to Europe. The flight was underwritten by three prestigious newspapers, the *London Daily Mail, New York Times* and *Chicago Record-Herald*.

The vehicle employed in this venture was the airship *America* which boasted an envelope made of cotton, silk and rubber, 228 feet long and 52 feet in diameter. Capacity was 345,000 cubic feet of hydrogen gas.

Attached to the underside of the bag was a platform, 8 feet wide and 156 feet long, enclosed primarily by canvas and celluloid windows. It supported two gasoline engines, each of which drove two large wooden propellers. There was also a small auxiliary engine and a generator. A helmsman stood at the forward end of the platform and maneuvered the craft with a ship's wheel.

Suspended beneath the platform was a large lifeboat which served as galley, smoking compartment and sleeping quarters. It had one other obvious use which attested to the realistic approach to the venture taken by Captain Wellman and his crew. As to the latter, there was a navigator and a wireless operator plus an engineer and two assistants. The expedition also included a cat named Miss America who served as mascot.

The craft had one very unusual piece of equipment which was called an equilibrator. It consisted of a series of steel tanks strung on a long cable which dangled from the airship. At the very end were 40 wooden blocks which dragged in the water. The steel tanks carried extra fuel for the engines but the primary purpose of the equilibrator was to provide a kind of reusable ballast to compensate for lift differential created during daytime heating and nighttime cooling of the hydrogen gas. As lift decreased at night the airship descended and more of the steel tail was immersed in the water, relieving the craft of weight. Then as the heat of the day increased lift the airship rose, pulling more of the device from the water which added more ballast weight. It was a novel idea.

America departed Atlantic City, N.J., at 8:05 on a foggy Saturday morning. The date was October 15, 1910, and the airship was towed out beyond the breakers by a motorboat. There the engines were started and the helmsman set a course for Europe.

Although *America* experienced engine difficulties almost from the beginning, she made 150 miles by the evening of the first day. That night she almost collided with a sailing ship but except for this brief encounter *America* proceeded on course. The following day, which was Sunday, one of the engines gave out completely and was jettisoned. Wellman kept on with dogged determination.

Monday turned out to be a hot day and the equilibrator was not able to compensate adequately for the gas expansion and increased lift. A large amount of hydrogen had to be released to maintain altitude. So much of the lifting element was lost that it soon became apparent that there was only enough for one more day aloft. Still they kept going.

That night when the hydrogen cooled and *America* descended dangerously close to the water, they lightened ship by jettisoning fuel and nonessential equipment to stay in the air. Early the next morning they came upon the steamship *Trent*. By this time it was clear that the project would have to be abandoned and they signaled for assistance.

The lifeboat was lowered into the water and *America*, relieved of the weight, rose quickly and eventually disappeared from sight. The entire crew, including the cat, were taken aboard *Trent*.

Man's first serious effort to span the Atlantic by air had failed but it represented a significant aeronautical achievement nonetheless. The intrepid

(Continued on page 56)

DID YOU KNOW?

Ground Threat Radar Simulator

A Navy pilot is flying tests over his base when suddenly a Soviet plane appears out of nowhere on his warning systems. According to the readings, it is close enough for visual contact but nothing is in sight. The pilot can't see it because the plane doesn't exist.

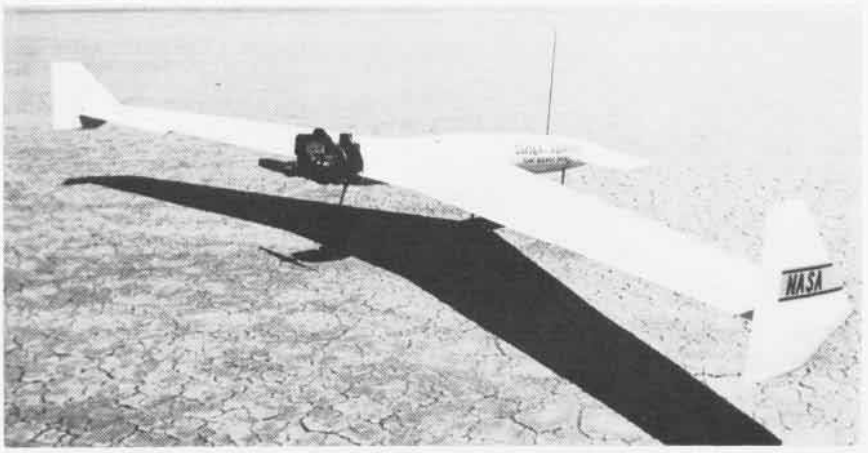
The signal on the radar is a fake. It's coming from a mobile ground threat radar simulator (GTRS) designed primarily by Marine Staff Sergeant John Graham of the Electronic Warfare Division at Pacific Missile Test Center, Point Mugu, Calif.

With certain adjustments, the simulator's emissions can appear on radar warning systems as an adversary aircraft, ship or ground radar station. The signal may also be used to test the accuracy of radar warning receivers. The GTRS is directionally oriented. It must be pointed at its objective. Part of its configuration houses powerful binoculars to spot and track its target. For future models, SSgt. Graham is designing and fabricating new control boxes for the units that will simulate emitter parameter changes, including some simulated scan modulations.

The Navy, Marine Corps and Army have all expressed an interest in the project.

Mini-Sniffer

The Mini-Sniffer is part of a fleet of remotely piloted research vehicles being developed at NASA's Dryden Flight Research Center in Edwards, Calif. This remotely controlled, propeller-driven vehicle was originally tested with a small air-breathing engine. Recently, a non-air-breathing hydrazine engine was installed which will allow the vehicle to reach altitudes up to 100,000 feet. A larger propeller which will be more effective in the thin upper atmosphere will also be used.



Like a strange visitor from another planet, the Mini-Sniffer rests on the lake bed at Dryden.

The Mini-Sniffer will fly behind large aircraft at high altitudes, taking samples of the air to determine the effect the jet aircraft have on the upper atmosphere. It takes off and lands under its own power and is controlled using standard radio-control equipment. Test instrumentation is located in the forward fuselage.

Gray Eagle

Vice Admiral Robert F. Schoultz, Commander Naval Air Force, U.S. Pacific Fleet, became Gray Eagle No. 33 on June 26 in a ceremony at Pearl Harbor. The trophy was passed to him by Marine Lieutenant General Andrew W. O'Donnell, who was Commanding General of the Fleet Marine Force before his recent retirement.

The Vought-sponsored award goes to the active duty Naval Aviator with the earliest date of designation. The trophy is inscribed "in recognition of a clever eye, a stout heart, a steady hand and a daring defiance of gravity and the law of averages." Each recipient receives a personal replica of a larger trophy which is displayed at the Naval Aviation Museum in Pensacola, Fla.

Daedalian Award

The Daedalian Weapon System Award for outstanding systems achievement was presented to the Naval Air Systems Command for the A-6E TRAM (target recognition attack multisensor) project at the annual convention of the Order of Daedalians held in San Antonio, Texas, on June 6, 1981.

Each year, the Order of Daedalians, a national fraternity of military pilots, bestows the award — represented by the Colonel Franklin C. Wolfe Memorial Trophy — to an individual, group or organization, military or civilian, judged to have contributed the most outstanding weapon system for a particular period of time. The recipient is selected from nominations submitted by the Department of the Army, Navy and Air Force on a rotating basis.

The A-6/EA-6B project manager, Captain S. L. Sayers, accepted the award for NavAirSysCom. The recipient industry team was Grumman Aerospace Corporation, the prime contractor for the A-6E. Also recognized were: Hughes Aircraft Company for the design and development of the electro-optical sensor system (detecting and ranging set); United Technologies, Norden Division, for the multipurpose attack radar; IBM Corporation for the computer system which permits full integration of all the weapon system components; and Naval Weapons Center, China Lake, for technical support during the development of the TRAM system.

Aviation Hall of Fame

Four outstanding aviation pioneers, selected from a field of 87 nominees, were honored during the twentieth enshrinement ceremonies of the Aviation Hall of Fame, held in Dayton, Ohio, on July 25, 1981. The new members are:

Olive Ann Beech, recognized worldwide as "The First Lady of Aviation," was honored for her more than 57 years of outstanding contributions to the development and progress of worldwide general aviation, and her nearly half century of devotion to the creation, growth and success of the Beech Aircraft Corporation, which she and her late husband, Walter H. Beech, founded in 1932.

Charles Stark Draper, decorated as one of the world's leading space scientists, was recognized for his development of gunsight and artillery fire control systems in WW II and Korea, as well as for his work on principles used in the development of systems to guide B-29 bombers in flight in the 1950s.

Edward Henry Heinemann, known internationally as "Mr. Attack Aviation," was honored for his outstanding career as an aircraft designer, engineer and executive, during which he fathered a remarkably successful series of attack aircraft which fought in more wars than any other plane. Some of his creations include the SBD *Dauntless,* A-1 *Skyraider,* A-3 *Skywarrior* and A-4 *Skyhawk.* Admiral Thomas H. Moorer, USN(Ret.), former Chairman of the Joint Chiefs of Staff and Chief of Naval Operations, served as Mr. Heinemann's presenter.

Lawrence Burst Sperry, Sr. (1892-1923), was one of American aviation's most dashing and popular aviators. He was enshrined for his pioneering inventions — many of which used the principles of the gyroscope — in the fields of automatic flight control, aircraft instruments and guided missiles. Serving as Mr. Sperry's presenter was Vice Admiral Wesley L. McDonald, Deputy Chief of Naval Operations (Air Warfare).

Grampaw Pettibone

From the Mailbag

Gramps received the following note from an interested reader, Ltjg. Frank Giblin, assistant safety officer, ComMAtVAQWingPac, concerning the comment Gramps made in the October 1980 issue relative to the F-14 chock walker injury. His request follows:

"As an integrity watch officer, it was my understanding that the proper A/C tie-down required chains to have hook points "up" vice "down" to prevent a momentarily slack chain from disengaging the padeye. Did the tire blow because it was punctured by the hook, or some other reason? Please clarify. If this is dangerous, then the integrity watch instructions used aboard USS *Coral Sea* (November 79-June 80 cruise) should be changed to reflect the hazard."

Grampaw Pettibone says:

The proper position for tie-down hook points is "up" as stated in your IWO instructions. For further information, a write-up with photos on tie-down procedures appeared in the summer 1980 issue of *Mech* magazine, page 38. They are also described in NavAirSysCom Tech Manual (17-1-537) for Operations and Service Procedure For Aircraft Handling and Securing Equipment.

The important point in this feature was that the safety petty officer pointed out the hook hazard, was ordered off the deck, and aircraft movement continued. The aircraft rolled over the "up" hook point, causing the tire to explode and seriously injured the chock walker. The action speaks for itself! It was just plain dumb!

Many thanks for the interest and inquiry.

The Uncollected Collective

BRAAAAAAH! BRAAAAAAH! Rang the klaxon, then the crank phone sounded. The crew quickly ran outside the hangar to observe one of our SH-3 helos returning to home plate with flight control difficulties.

As the airframes work center supervisor joined the gathering crowd of observers, he shouted, "What's that aircraft doing in the air anyway? I told maintenance control that helo was down! I guess my 16 years of experience doesn't mean a thing, 'cause it looks like somebody decided it was up."

His words rang in my ears and I watched anxiously as the helo executed an emergency landing and shutdown. Shortly after takeoff, the pilot of this ill-fated helo reported a slight stiffness in the collective which he diagnosed as interference from the co-pilot's hand or knee. The stiffness went away and nothing more was thought of it until 10 minutes later.

In attempting to level off from a climb, the pilot discovered that he could not lower the collective. After some experimenting, the crew noted that they could climb but not descend.

ILLUSTRATED BY Osborn

Realizing the seriousness of the situation, the pilot declared an emergency and hastily retreated to home field.

Once over the field, the crew determined that something was binding the collective linkage. Both pilots grasped the collective and exerted sufficient force to bend the aluminum feedback control arm which had become fouled on the helo's drip pan. They were then able to lower the collective and descend safely.

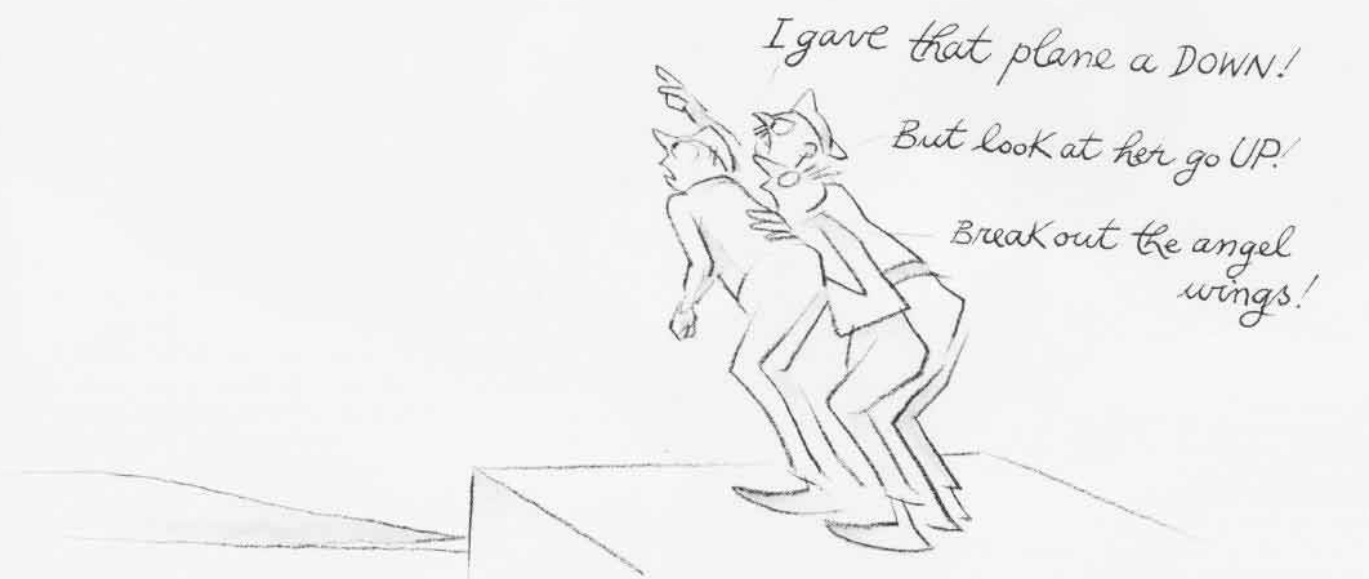
Grampaw Pettibone says:

Jumpin' Jehoshaphat! This pair of collected cohorts was able to foil the Grim Reaper only through their collective efforts and to avoid the catastrophe so carelessly concocted in this colossal case of collective incommunicado. The investigation revealed the helo had just returned from a two-week det with a barometer altitude (BarAlt) discrepancy. It was inducted into phase C inspection after the BarAlt was removed and sent to the AIMD for repair. Maintenance control was notified that the BarAlt controller had been removed, and made an appropriate notation on the VIDS aircraft visual status board. The petty officer who wrote up the BarAlt removal then departed for 10 days of well earned leave. Heard this before?

During phase C, no inspection of the BarAlt controller is called for. It was assumed that the part would be replaced before the aircraft came out of phase C. It was not. The loose collective arm was neither tagged nor noted in maintenance control. The aircraft exited phase C with only an UP discrepancy. During the plane captain's inspection following phase C, he found the feedback arm resting on the drip pan. On his way to maintenance control, he stopped in the airframes shop and asked a metalsmith to take a look at the problem. The metalsmith agreed that it didn't look right but advised that the problem belonged to work center 220 not 120. The plane captain then led an electrician from work center 220 out to take a look. He commented, "No problem. You don't need a BarAlt to have an UP airplane. You only need it for IFR or night flight.".

The tenacious plane captain continued on to maintenance control to write up the gripe, only to be met by the same cocky petty officer in maintenance control who assured him it wasn't necessary because there was already an outstanding discrepancy on the BarAlt and even a grease pencil note on the VIDS board, "BarAlt removed."

Well, you guessed it. The next day the aircraft was issued to this unsuspecting flight crew for a routine training mission. How many times have you heard Old Singed Whiskers' sermon on this sort of sinful neglect. Well, I'll spare the words this time, but break out the "collection plate" gang, 'cause a lot of folks owe some dues on this one.



With a blast of propane-heated air, the Navy's hot air balloon takes to the air with pilot Cdr. Richard Butterfield at the controls.

Hot Air Ballooning with the Navy

Story and photos by
JOC Kirby Harrison

Just so much hot air. That's what a hot air balloon is, mostly. "True," agrees the Navy's Hot Air Balloon Team leader, Commander James McBride, "but it's a beautiful wrapping that goes around that hot air, and one terrific ride."

The Navy's balloon is one of an estimated 2,500 hot air craft flying in the U.S. today, in the revival of a sport that originated nearly 200 years ago.

The French say that the more things change, the more they remain the same. Hot air ballooning is one example. The French should know. They pioneered the sport. The Montgolfier brothers made the first known lighter-than-air flight in a hot air balloon made of paper, near Paris in 1783. It was an intrepid effort cloaked in short-lived sensation. That same year, another Frenchman sent aloft a hydrogen-inflated balloon. For the next 190 years, hot air craft occupied the rumble seat of lighter-than-air development.

In the early 1970s, hot air ballooning experienced a rebirth. Ripstop nylon had been invented, propane gas was adapted to systems better able to heat the air, and greater knowledge of weather and air currents gave balloonists a far greater chance of predicting a flight path. *(Continued)*

Left, the balloon receives a preflight inspection from the inside. Below, an apparently apprehensive but still smiling passenger starts her first balloon flight.

Above, Cdr. Butterfield adjusts the propane heating unit as Capt. Denis Weichman watches.

In 1971, Albuquerque, N.M., hosted the nation's first hot air balloon festival. The event drew 20 balloons. Today, more than 200 balloon teams are permanently based in Albuquerque. It is considered the ballooning capital of the world, and at this year's festival nearly 800 balloons literally covered the skies of the area. The Navy's colorful red, white and blue craft was part of that celebration. "It was the event of the year," says Cdr. McBride.

On the Navy balloon, an anchor holds down the line used to stretch out the craft during the deflation process.

The Navy balloon team is based in Albuquerque, at the Naval Weapons Evaluation Facility. It is a location Cdr. McBride describes as "the most perfect place in the U.S. for hot air ballooning."

He is talking about what balloonists call "the Albuquerque box," a unique system of temperatures and air currents. The climate in the area during the April-October season is one of cool mornings and numerous air currents going in different directions at different altitudes. The phenomena allows balloonists more time in the air, and considerably more control over the direction of the flight.

"You can get much better lift when the weather is cooler," explains McBride. "And, with the wind currents here, sometimes you can take off and actually return where you started by finding a different wind direction at another altitude."

The Navy's balloon team, to a great degree, owes its existence to the efforts of Captain Ronald Caldwell. Caldwell was the former commanding officer of the Navy's Albuquerque facility.

The balloon was designed to assist in Navy recruiting as an inexpensive and highly visible way of attracting interest. Red, white and blue was a logical choice of colors, and the 60-foot-high envelope proclaims, "NAVY, an adventure," along with recruiting's toll-free phone number. On the side of the blue skirt above the basket is a pair of gold Navy Wings symbolic of Naval Aviation.

The balloon team consists of eight active duty officers and enlisted men from the weapons evaluation facility. It is a volunteer job, something they do on their own time. And there is rarely any problem recruiting new members when others are routinely transferred. "Two men left recently, and we had 10 candidates to take their places," says McBride.

Training of the balloon team is done in the Albuquerque area. "It sounds simple but, like flying any kind of craft, if you make a mistake, it's a long way to the ground."

The instruments in a hot air balloon are spare by comparison with an airplane. There is an altimeter, a rate of climb indicator, and a gauge to indicate the air temperature at the top of the balloon. Temperatures at the top of the balloon can easily reach levels that would damage the fabric. Team members are taught to assemble the basket, heating unit, and to inflate the balloon. They practice recognizing weather patterns and air currents and, under the watchful eye of the pilot, practice taking off and landing. And they learn to properly collapse the 77,000-cubic-foot envelope after flight and to maintain it and the other equipment.

McBride says that balloons create an illusion that they are very safe and easy to fly. He explains, however, that they are safe only when flown within established parameters, "like any form of transportation."

A fatal hot air balloon accident in Albuquerque last year would seem to confirm this. Investigators said the balloonists had taken the craft up during high winds, in an area of known wind shears, and that the balloon had not been inspected in more than two years for fabric strength.

The balloon, a pilot and two crew members normally travel with the craft to various events during the ballooning spring, summer and fall season. This past season has included the nation's capital, Louisville for a Kentucky Derby celebration, and the Albuquerque balloon festival.

Funds from Navy Recruiting provide for maintenance, upkeep, annual inspections, souvenir pins, radios, press packets and photographs. The team and balloon travel when possible by military air.

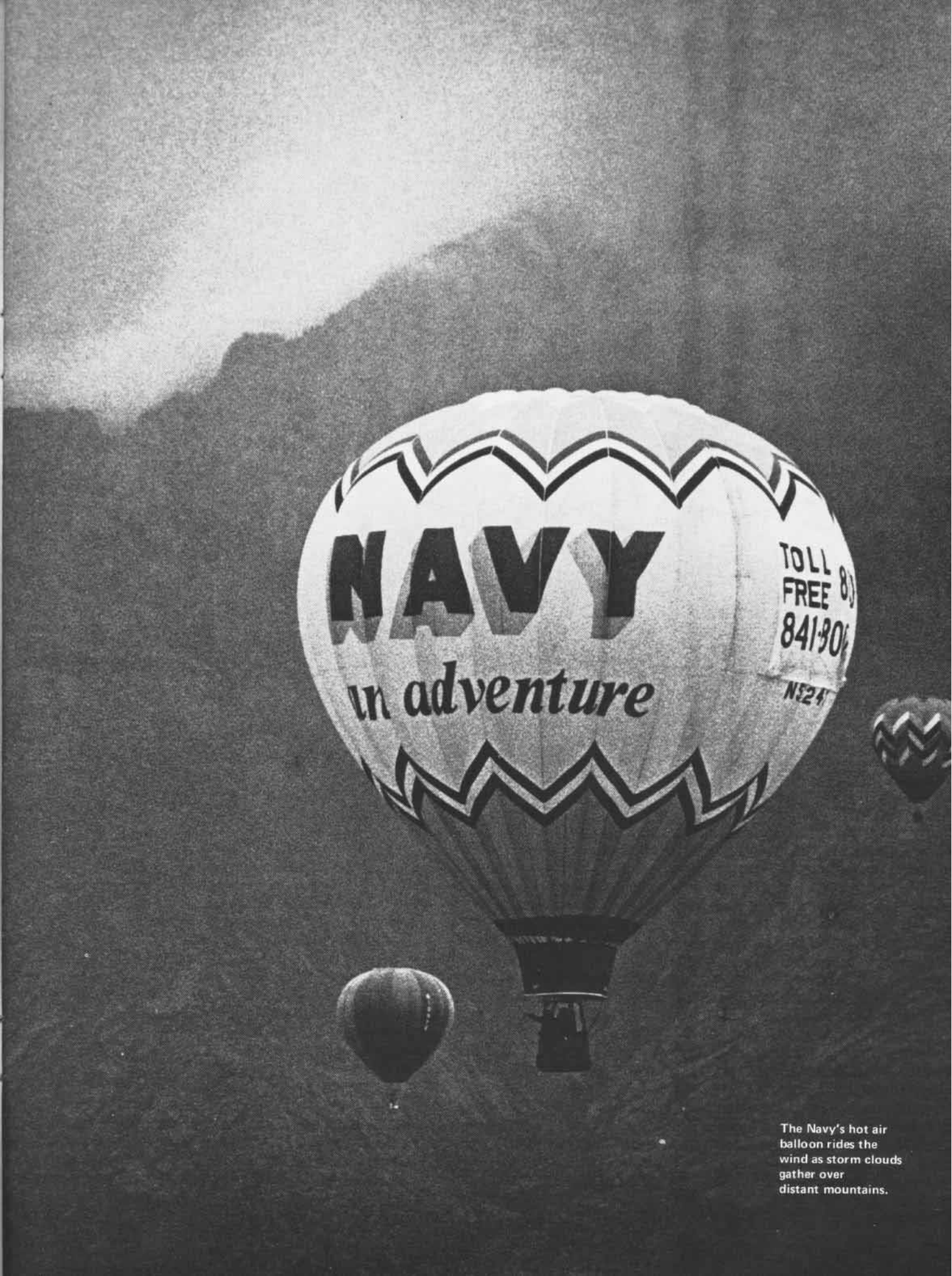
"Recruiting looks at it as a giant, floating billboard, but with much more potential to reach a large audience with the message that the Navy is an adventure," says Cdr. McBride.

Most of the team agree that the most enjoyable part of a balloon meet is a variation of the old "hare and hounds" game. In it, one balloon designated as the hare will take off, find a wind current and set off on what can be a complicated route. The hounds take off minutes later and attempt to follow. The object is to land as closely as possible to the marked spot where the hare finally alights.

"Sometimes there's a wind shift in the middle of things," says McBride. "Then you see the hare sailing off in one direction and the hounds helplessly floating away in the other. But it doesn't matter," he adds, "it's the ride, not the race."

For balloonists, there are actually two rides. The serenity of the balloon is at the opposite end of the bouncing, bone-jarring and laughter-filled trip in the chase truck. Where the balloon goes, the chase vehicle follows, and sometimes that means dead-end streets, impassable gullies, and washed-out bridges. Little wonder that the end of a balloon voyage is marked by the popping of champagne corks. "The breakfast of balloonists," says the Navy's newest pilot, Commander Richard Butterfield.

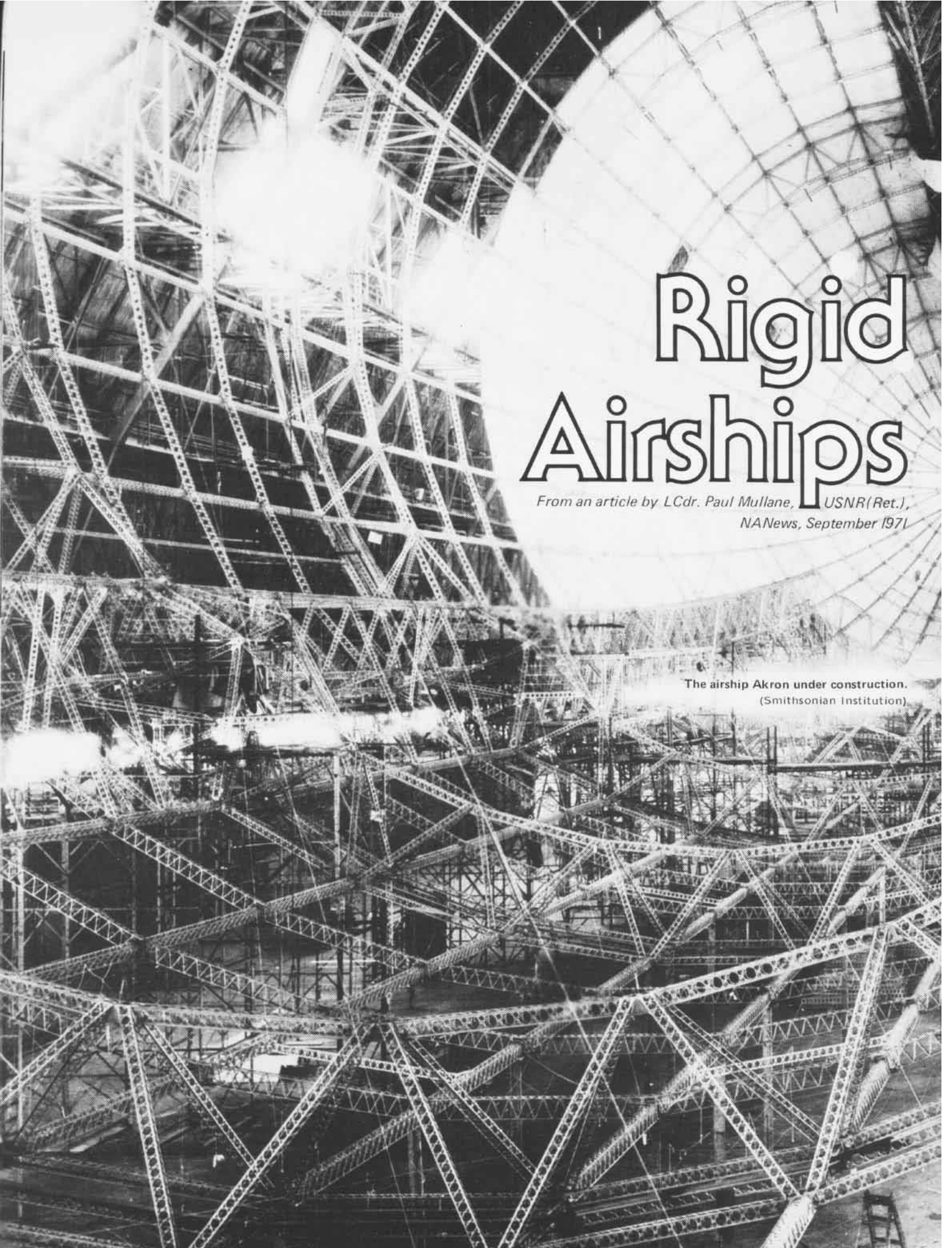
The flight is terrific. And the landing is pretty good. How many other sports events end with a champagne picnic?



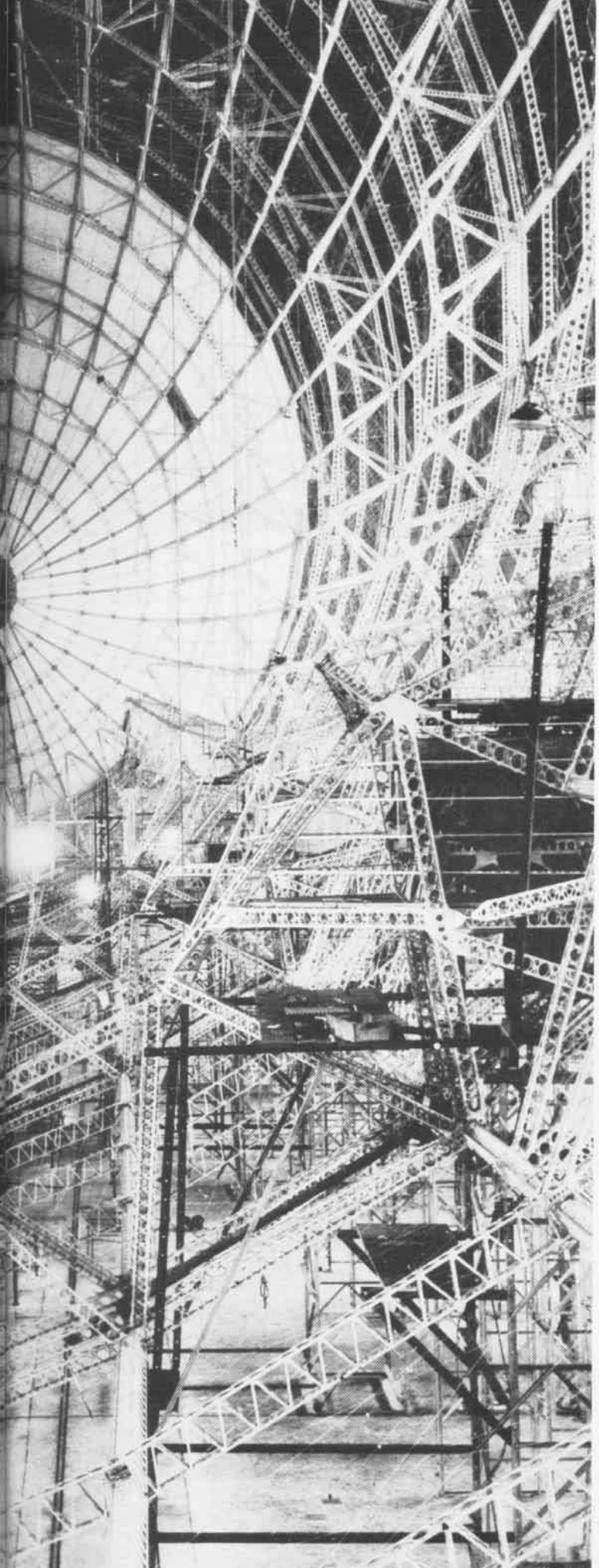
The Navy's hot air balloon rides the wind as storm clouds gather over distant mountains.

Rigid Airships

From an article by LCdr. Paul Mullane, USNR(Ret.), NANews, September 1971



The airship Akron under construction.
(Smithsonian Institution)



The first lighter-than-air flight, in fact, the world's first flight of any kind took place in 1783 when Montgolfier ascended in his hot air balloon. That same year Professor Charles, also of France, built the first hydrogen-filled balloon. Though numerous lighter-than-air vehicles were conjured up on drawing boards in the following years, only nonrigid dirigibles and free balloons saw actual use.

Count Ferdinand von Zeppelin, born in the Kingdom of Wurttemberg near the Swiss border, in 1838, was to change that in 1900. Count Zeppelin, as a volunteer officer with the Union Army during the American Civil War, saw balloons used for military observation. Later, as a general in the Wurttemberg army, he observed their use in the Franco-Prussian War. Two years later, in 1873, he drew his first design of an airship. By July 1900, Zeppelin saw his ideas come to fruition over Lake Constance. Zeppelin's 420-foot-long craft, powered by two 16-horsepower engines, defied the consensus of scientific opinion that it would collapse. It was the first successful flight of a rigid airship.

In 1909, the German Army decided to acquire its first rigid airship and, in 1912, the German Navy followed suit by purchasing the L-1. The performance of the L-1 convinced German naval officials that zeppelins were essential to naval warfare and the L-2 was ordered. These airships were powered by four 180-horsepower engines and were far superior in performance to Zeppelin's first attempts.

With the outbreak of WW I, German commercial airships, which had provided more or less regular passenger service within Germany, were transferred to the army and navy. Ninety percent of the flights were in support of naval operations, mainly reconnaissance over the North Sea. In contrast, the British, who did not produce rigid airships until late in the war, concentrated their use in search for U-boats and mine fields and occasional convoy escort duties. Britain's version of the rigid airship was quite similar to Count Zeppelin's design since their models were essentially copies of captured German craft.

By 1915, the German navy, which began the war with only one zeppelin, was operating 10. Production reached a level at which an airship was completed every six weeks, but the German navy never had more than 19 in commission at any one time. These made a total of 1,345 flights, of which 200 were bombing raids. Naval airships carried out most of the raids on Britain.

Zeppelin airship construction and performance improved steadily during the war. Although low-altitude reconnaissance provided the principal use of these giant craft, their vulnerability to attack from Allied aircraft – firing British-developed, incendiary bullets into their hydrogen-filled bulks – caused the Zeppelin Company to continually increase their altitude capabilities. By war's end, most highly developed German airships could reach 20,000 feet with a three-ton bomb load. A total of 88 German airships were built during the war with a little over 60 percent going to the Navy.

Wartime performance of the zeppelin accelerated the development of rigid airships in England, France, Italy and the U.S. The British achieved the first round-trip crossing of the Atlantic in July 1919 with their R-34, which was essentially a copy of a 1916-model zeppelin design. While commercial airships were allowed to resume operations in Germany after

the war, their size was restricted and their use as military craft forbidden.

A German-flag airship was not to cross the Atlantic until the passenger flight of *Graf Zeppelin* in October 1928 when size restrictions had been lifted. Before a year had passed, it had also flown around the world from Friedrichshafen, via Lakehurst and Tokyo, logging 21,200 miles in an average speed of 76 miles per hour in a little over 300 hours. Germany still led the world in airship development ten years after the war ended.

Meanwhile, France and Italy had lost interest in airships following the loss of their airships *Dixmude* and *Roma*. The following year, the British ended their rigid airship program when R-101 crashed en route to India. U.S. interest, however, continued because of the availability of nonflammable helium and the need for long-range ocean reconnaissance to cover the expanses of ocean separating the U.S. from potential enemies.

The rigid airship recommended itself for use in naval warfare in the post-WW I era due to its range (approximately 10 times that of aircraft in the 1920s), its far greater load-carrying capacity in relation to contemporary aircraft and a speed three times greater than the fastest surface vessel.

The U.S. fleet, faced with guarding vast ocean areas washing each coast, was short of modern cruisers in the 1920s. Fast scouting forces were particularly needed in the Pacific. Commander Jerome C. Hunsaker, on his return from duty with the Allied Armistice Commission, reported the airship's value in supplementing the work of scout cruisers. Cdr. Hunsaker, who supervised the design of every naval aircraft from 1916 to 1926, was also responsible for the design and construction of the U.S. Navy's first airship, the ZR-1 *Shenandoah*.

The Navy Department, in 1919, authorized the acquisition of ZR-1 and ZR-2, as well as the establishment of a supporting station — NAS Lakehurst. Navy battle plans in the 1920s called for the U.S. Fleet in the Pacific to advance behind a screen of rigid airships, augmenting scout cruisers and allowing some of the latter to strengthen the battle line. Government economies in mid-decade, however, slowed the planned airship construction program and put most funds into ships and heavier-than-air aircraft, which were showing greater progress per unit cost than the rigid airship. Still, Navy plans in 1925 called for completion of 9 to 11 scout airships by 1930. The airship's advantage over the cruiser, in addition to its speed, was the amount of area which came within its visibility due to altitude. Under ideal visibility conditions, the cruiser could sweep an area 15 to 20 miles wide, depending upon the height of the observer. An airship cruising at 3,000 feet under the same conditions could theoretically attain over 60 miles' horizontal visibility on either side of its path, a 120-mile width, while traveling at three times the speed. In actual practice, German airships in WW I had found 60 miles their maximum practical sweep width.

ZR-1 was built inside her hangar at NAS Lakehurst and completed in 1923. Though her design was based on the WW-I German zeppelins forced down in England, she was the first American-built rigid airship, the first airship to use helium as a lifting agent, the first to use a water recovery apparatus for the continuous production of ballast from engine exhaust gases, and the first rigid airship to fly across the U.S. *Shenandoah* made her first flight from Lakehurst on September 4, 1923, and during her brief career logged 28,000 miles and some 750 hours in the air.

In August 1924, a shipboard mooring mast designed for airship operations with the fleet was used for the first time when *Shenandoah* was secured to the mast on the fantail of the fleet oiler *Patoka* while she was underway in Narragansett Bay. Less than a week later, ZR-1 participated in her first exercise with fleet units, taking part in a scouting problem with the Scouting Fleet, involving 40 hours of continuous operations 300 miles at sea. In October, *Shenandoah* left Lakehurst on a 19-day, 9,317-mile trip taking her across the nation to NAS North Island and thence north to a point near the Canadian border and back to San Diego before returning to the East Coast via Fort Worth, Texas. After her transcontinental flight, *Shenandoah's* activities were curtailed until the following summer, probably because of the delivery of USS *Los Angeles*, ZR-3, and a shortage of helium which restricted the concurrent use of both airships.

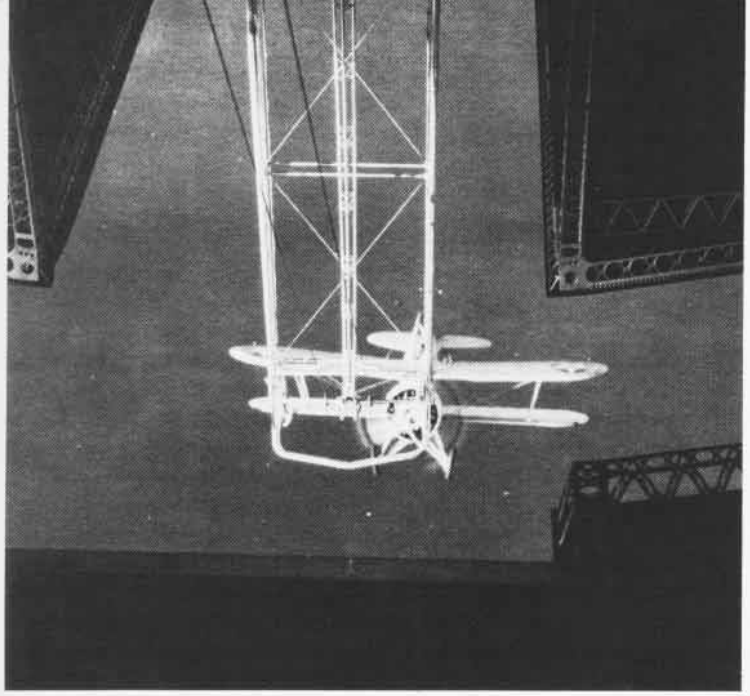
Shenandoah's next operation came in July 1925 when she participated in a fleet exercise in the Atlantic, performing scouting missions and towing targets for the battleship *Texas*. In September, ZR-1 left her mooring mast at Lakehurst on her last flight. En route to Columbus, Ohio, *Shenandoah* encountered a severe thunderstorm near Ava, Ohio, and broke in two. The forward portion, flown as a free balloon by the officers and men trapped in that section, remained aloft for nearly an hour before being successfully landed without loss of life. The after section fell to earth, breaking into two parts. The control car and two engine gondolas were wrenched loose and plummeted to earth killing their occupants.

Lieutenant Commander Zachary Lansdowne, the commanding officer, and 13 officers and men died in the disaster. Twenty-nine of the crew survived.

The Navy was left with one airship, *Los Angeles*. Another airship, the British-designed ZR-2, planned for use in long-range offshore patrol, had crashed in England where, as R-38, it was being flight tested prior to acceptance. Unfortunately, the R-38 crash took the lives of a number of the relatively small band of experienced LTA personnel, including Lieutenant Commander Lewis Maxfield who headed Navy LTA activities in Europe during WW I.

Los Angeles was built in Germany by the Zeppelin Airship Works as LZ-126, a direct descendant of WW-I naval zeppelins. Leaving Friedrichshafen on October 12, 1924, ZR-3/LZ-126 reached Lakehurst on the 15th, the second airship to cross the Atlantic and the third non-stop east-west crossing by any aircraft. The 5,000-mile flight of the German-manned craft was made in 81 hours. On November 10, ZR-3 was accepted by the Navy and two weeks later flown to NAS Anacostia where she was christened *Los Angeles* by Mrs. Calvin Coolidge and entered upon an active and varied career. She proved extremely valuable as a training ship and vehicle for a variety of scientific and technical experiments, including aiding in developing improvements in airship design which would later be used in construction of *Akron* and *Macon*. *Los Angeles* in her active career from 1925 to 1932, when she was laid up for economy reasons, made long-distance flights to such places as Bermuda and the Canal Zone, became the first and only rigid airship to land on an aircraft carrier *(Saratoga)* and was the first airship to conduct aircraft hook-on and launching tests for the U.S. Navy.

In 1932, with *Akron* in commission and an economic depression gripping the nation, *Los Angeles* was decommissioned after 331 flights and 4,181 hours in the air. She was lodged in



XF9C-1 about to hook on.

the Lakehurst hangar and remained there except for occasional outdoor testing until scrapped in 1940.

The U.S. Navy once again was down to one rigid airship but that was one more than any other armed force in the world. Germany, although operating *Graf Zeppelin* in commercial service, was barred from military airships, and all other nations had lost interest in the huge aerial craft. In *Akron* and, later, in *Macon*, the Navy carried the rigid airship to its highest state of military development. Its internally carried aircraft could extend its practical sweep width to 180 miles when deployed to a point 60 miles on either side of the airship. This capability would allow five like airships to replace 40 fast cruisers scouting a 1,200-mile-wide front. Aside from their increased size and the technical and structural improvements, ZRS-4 and ZRS-5, *Akron* and *Macon*, respectively, differed in one major aspect from all other previous or subsequent airships. Between frames 125 and 147.5 on the underside of their gigantic hulls was a T-shaped door through which aircraft could be hoisted or lowered on a trapeze recovery/launch device to and from an internal hangar.

This made them unique among airships. Though the launching of military aircraft from airships had been tested as early as 1918 when the German L-35 carried an *Albatros D III* aloft and successfully released and flew it to the surface and the British and U.S. Army had carried out similar experiments, no airship had ever been built capable of carrying and recovering its own aircraft. ZRS-4 and ZRS-5 represented a new concept — an airborne aircraft carrier. Not an aircraft carrier in the sense of *Langley, Lexington* and *Saratoga*, which were contemporaries, but more in the sense that cruisers and battleships carried their own observation aircraft. These planes at first had to maintain visual contact with their mother ship. Later, with radios installed, they were able to scout more effectively. Even so, *Akron's* and *Macon's* planes were expected, at least as first conceived, to provide protection for their mother ship from attacking fighters and dive bombers.

The first of these two huge rigid airships to be constructed was USS *Akron* which made her first flight as a commissioned airship November 2, 1931, from Lakehurst to Washington, D.C. and return. In January 1932, *Akron* carried out operations with the Scouting Fleet in the Atlantic and later rendezvoused at Hampton Roads with *Patoka* to make her first mooring to the tanker's mast.

In May, with her trapeze gear finally installed, she achieved her first recovery of aircraft when Lieutenant D. Ward Harrigan and Lieutenant H. L. Young flew N2Ys and an XF9C-1 to hook-ons. Five days later, the airship departed for Camp Kearny near San Diego, carrying one N2Y and the XF9C-1 *Sparrowhawk*.

Akron took part in an exercise with the Scouting Fleet in early June. Though she was twice successful in locating the "enemy" forces, O2Us launched by their cruisers carried out attacks against the big airship which raised questions concerning her vulnerability, even though her F9C was not present to offer protection. Her performance in this exercise and those conducted earlier in the Atlantic resulted in varied opinions among the senior officers participating as to her usefulness, and the Commander Scouting Force did not feel he could recommend to CNO any further expenditures for rigid airships in the immediate future. Also in question was the ability of the airship to operate away from her hangar facilities.

On return to Lakehurst, *Akron* received three-bladed props to replace the two-bladed ones which she had originally been fitted out with and increased her maximum speed by seven knots. Hook-on operations resumed and new pilots were checked out in this unique type of flying. In September, six F9C-2s were received and hook-on drills and gunnery flights with these aircraft became routine as the heavier-than-air pilots worked out tactics and procedures for the new planes.

These activities, gunnery exercises for the *Akron's* gun crews and the various services she was called upon to perform for other Navy units occupied ZRS-4 into March 1933. But late on the afternoon of April 3, *Akron* departed Lakehurst on what was to be her final flight.

On board, in addition to her crew, were Rear Admiral Moffett; Lakehurst's commanding officer, Commander F. T. Berry; and two other observers. The flight was to be a routine training mission, but the airship was soon caught by a fast moving squall line which had not been predicted, and maneuvers to work clear while visibility was limited by clouds and darkness proved futile.

Caught in violent downdrafts, *Akron's* tail struck the ocean surface and the huge airship was rapidly dragged down. Though the German motorship *Phoebus* was on the scene within 20 minutes, only four survivors were found, one of whom died shortly afterward.

The loss of *Akron* once again reduced the number of Navy rigids to one. *Macon*, though not yet delivered, had been christened at the Goodyear-Zeppelin Company airship dock in Akron, Ohio, only three weeks earlier. While *Macon* would carry on the work of *Akron* in developing the tactical employment of the airship with the fleet, serious and irreparable harm had been done to the rigid airship program.

Macon made her first flight, April 21, 1933, only 17 days after the loss of *Akron*, making a speed run in which 70 knots was reached. Two days later climb trials and fuel consumption tests were conducted on a second flight. This flight also marked the introduction aboard *Macon* of three-bladed, adjustable pitch, metal propellers as replacements for the

Los Angeles landing on Saratoga, 1928.

older style two-bladed wooden props.

After two more test flights, Rear Admiral Ernest J. King, new head of the Bureau of Aeronautics, placed *Macon* in commission in June, and then boarded the airship for her delivery flight to Lakehurst. With only minor differences *Macon* had the same construction as *Akron*, plus some features introduced from lessons learned during ZRS-4's operation.

From July through September, numerous hook-on drills were held and minor bugs worked out. Then, on October 12, 1933, after only a little more than four months in commission, *Macon* departed Lakehurst on her first transcontinental flight. Following arrival at NAS Moffett Field, ZRS-5 made two local flights over San Francisco Bay before participating in fleet exercises in mid-November.

CNO had advised Commander in Chief, U.S. Fleet that *Macon* was to be employed to the fullest extent possible during these exercises to evaluate her military value.

During a number of exercises held in the months that followed *Macon's Sparrowhawks* demonstrated their usefulness in scouting, but *Macon* in each exercise was ruled shot down.

Late in April, *Macon* crossed the continent once more, but not without difficulty. Encountering severe turbulence over west Texas, several girders in her afterstructure buckled and broke. Damage control teams quickly made emergency repairs and the airship was able to continue the flight to her Opa-Locka, Florida base where more permanent repairs were made in time for her to join the fleet exercises of Fleet Problem XIV in the Caribbean in early May.

In that exercise, once again *Macon* was ruled lost but, resurrected as ZRS-6, the airship continued to search for enemy forces. Through the use of newly worked out tactics, her aircraft conducted scouting operations controlled by her radio, which proved very promising in solving the airship's problem of vulnerability when in the close presence of enemy forces.

Three days after completing the Caribbean exercise, *Macon* left Opa-Locka for Moffett Field via Texas, where she was employed in a variety of duties ranging from routine hook-on training to gathering calibration information for coastal radio direction-finding stations. These activities occupied ZRS-5 from late May until early November 1934, broken only by two long-range reconnaissance flights.

In early November, *Macon* once more joined in fleet exercises off California's coastline. This time, however, the airship remained in the background and let her aircraft carry out the scouting mission. Her planes were successful in finding *Saratoga*, the enemy carrier, and keeping her under surveillance for several hours, while *Macon*, content to act as carrier for scouting aircraft, avoided the embarrassment of being downed again. However, in December, the airship was counted as shot down in yet another exercise.

Between the end of that exercise and February 1935, *Macon* was involved in several tests, together with surface vessels, to determine visibility of both the airship and sea-going ships in daylight and darkness. Then, on February 11, 1935, the U.S. Navy's last commissioned rigid airship departed Moffett Field on her final flight.

Macon was rolled out of her hangar in the dim light of early morning into drizzle and low overcast conditions. She was not scheduled to participate in the fleet exercise being conducted but was to make use of the ship's movements to train in strategic scouting, the type of mission for which *Akron* and *Macon* had been originally conceived. Restricting her activities to serving as an aerial facility for operating and servicing her aircraft, *Macon* was highly successful in locating and tracking various fleet units.

Upon release from her assignment, the airship began her trip back to Moffett Field. Nearing Point Sur on the California coast, *Macon* began to encounter lowering ceilings, rain and severe turbulence. Approaching the Point Sur lighthouse, the airship was struck by a violent gust of wind which caused the progressive disintegration of her upper fin and led to the puncture and deflation of three of the after helium cells.

Attempts to bring the situation under control proved futile and, at approximately 5:40 pm., *Macon* settled into the ocean. Since the situation had progressively worsened over a period of nearly half an hour, the crew had sufficient time to prepare for their escape once the airship came to rest in the Pacific.

Of the 83-man crew only two were lost. *Macon* finally sank from sight about 6:20 p.m., carrying with her four F9Cs and the hopes of rigid airship enthusiasts.

Though *Los Angeles* still remained intact in the hangar at Lakehurst, she never flew again. Fire which destroyed the German passenger zeppelin *Hindenburg* at Lakehurst, May 6, 1937, sealed the fate of the rigid airship.

Only one more airship was to come into existence, LZ-130/*Graf Zeppelin II*, which made its first flight in September 1938. It was taken over by the Luftwaffe and prior to the beginning of WW II was used by the Germans for ECM activities, flying along England's east coast to locate and analyze the British early warning radar network.

Los Angeles was used for mooring mast tests and structural studies during her decommissioned life in the 1930s but in February 1940 she, too, came to her end and was dismantled for her materials. *Graf Zeppelin II* swiftly followed her into oblivion. On the third anniversary of *Hindenburg's* accidental destruction, LZ-130 was blown up along with her hangar at Frankfurt, Germany, on orders of Reichsmarschall Hermann Goering.

Thus ended a 40-year era in which rigid airships competed for a place in military and commercial air service, sometimes with success, but often with accompanying tragedy.

Pioneer with a Premonition

Lansdowne of the *Shenandoah*

As one of 1,147 U.S. Navy officers who served overseas in WW I, LCdr. Lansdowne flew blimp patrols with the British in France. He added Royal Air Force heavier-than-air wings to his Navy Wings of Gold from Pensacola.

After the war, he was the U.S. Navy observer on the first nonstop flight over the Atlantic in the British airship R-34. The flight started July 2, 1919, and took 108 hours and 12 minutes. Over North America, fringe squalls overtook the R-34, while two of her five engines were shut down to conserve fuel. The ship was rapidly thrust upwards 700 feet. Looking aft out the window, Lansdowne saw the entire tail bend to a point where he thought it would collapse. But, miraculously, it held. The R-34 changed its course to seaward and outran the storm.

For that historic flight, Lansdowne earned the Navy Cross and also the Air Force Cross, the latter from the King of England.

For the next two years, he commanded the naval air station at Akron, Ohio. Nearby, Goodyear was making blimps as well as components for the ZR-1.

On December 5, 1921, Lansdowne participated in a test flight to demonstrate that helium could be used successfully in airships instead of hydrogen. The five-hour flight in the C-7 from Hampton Roads to Anacostia in a driving snowstorm had the crew flying the blimp at times as low as 300 feet. The snow's heavy weight on the envelope forced them to jettison their radio equipment, but they arrived at their destination safely.

When *Shenandoah* made her first flight on September 4, 1923, she had a troika of skippers: Captain Frank McCrary, who was mainly an HTA pilot; German test pilot Anton Heinen; and Commander Ralph Weyerbacher, who had been Lansdowne's classmate at the Naval Academy and supervised construction of the airship. In mid-January of 1924, the airship broke away from the high mast at Lakehurst in a gale and was brought back with a skeleton crew after a nine-hour flight. Some $80,000 in repairs were needed. At this point Lansdowne succeeded to command.

Less than two weeks before the fatal crash, Lansdowne wrote a 19-point letter, outlining his recommendations for the ongoing airship program. He detailed the type of hook-on planes to be built to scout in advance of the "mother" ship. He also called for better maps, better clothing, improved radios, and moving the control car up into the structure. All these things came to pass in the airships of the 1930s.

Story by Thom Hook, Acting Chief, Public Inquiry Center, FAA Headquarters, Washington, D.C. He is the author of Shenandoah Saga, now in its third edition.

Nestled in the rolling hills of Ohio, the little town of Greenville is the home of sharpshooter Annie Oakley, news commentator Lowell Thomas and Captain Zachary Lansdowne of the U.S. Navy's ill-fated first helium-filled, large, rigid airship ZR-1, christened *Shenandoah*.

In the town's Darke County Historical Society Museum, more memorabilia are devoted to the first two celebrities than to Zach Lansdowne, who at age 36 on September 3, 1925, died in the service of his country. That Thursday morning, as day broke, the distinguished American airshipman and 13 of his shipmates fell to their deaths when severe local thunderstorms broke the 680-foot-long ZR-1 into three sections over a tenant farmer's house near Ava, Ohio. Lansdowne's body was tragically battered against a garden fence post, after falling out of the airship's control car. The navigating gondola was wrenched from the storm-wracked airship, which had been stressed beyond its limits by the severe up and downdrafts.

The late Vice Admiral T.G.W. "Tex" Settle told how one day he was standing with Lansdowne by *Shenandoah's* control car in Lakehurst's big hangar. Unlike *Los Angeles* (ZR-3) and

the airships yet to come (*Akron* and *Macon*), *Shenandoah's* car hung suspended by wires and struts. Lansdowne observed casually, "Someday that car could break off the ship." Both officers knew that the state of the art called for future airships to have the control car or navigating gondola firmly attached to the main body of the dirigible.

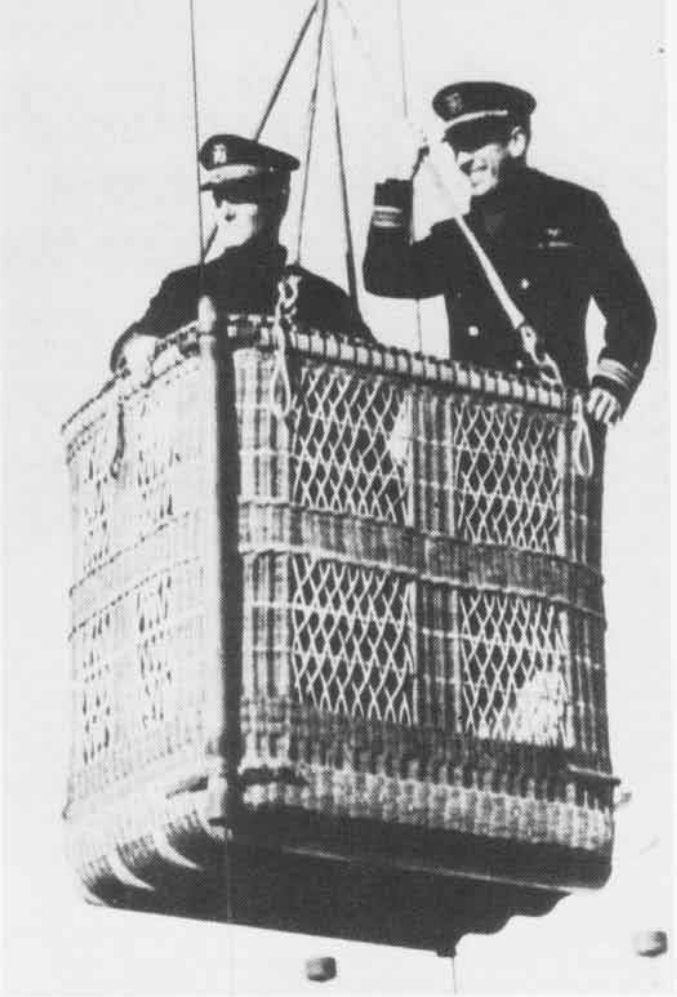
When the day of departure for the Midwest cruise arrived, Lansdowne's crew of 42 were eager to start the long trip. They were to land at Minneapolis without a mast and then go on to test Henry Ford's new mooring mast at Detroit. It was a flight they looked forward to making and there was no apparent reason for concern. The previous October, Lansdowne had taken them on a 9,317-mile trip from the Mexican border to Seattle, over deserts and mountains, without incident. The ship spent nearly 20 days away from her base at Lakehurst. Mooring to expeditionary masts at Fort Worth, San Diego and Seattle, the successful flight tended to make the Bureau of Aeronautics and the public confident about the airship's capabilities. The name *Shenandoah* was an Indian word meaning "daughter of the stars." After the West Coast flight, the airship was nicknamed "The Iron Horse" and people began to refer to "*Shenandoah* luck," conveying the idea that this machine was somehow immune to disaster.

There was little question in most minds that this rugged airship, with nothing more than the Alleghenies to negotiate, could easily overfly state fairs in response to the more than 400 letters requesting that she do so. On the West Coast flight, she had braved Pacific headwinds which at one time were strong enough to keep her from making headway down the coast for several hours. The airship had also twice squeaked through the narrow cut of Arizona's Dos Cabezos pass against winds which taxed her capabilities. Failure of any of her five engines then would have spelled disaster.

Speaking before the New Jersey Society of Pennsylvania in Philadelphia, December 18, 1924, Lansdowne referred with humor to that spine-tingling moment when the airship skidded toward the mountainside for several interminable seconds. "Fortunately, the gust didn't hold," he said. "Otherwise, we might still be there, snugly tucked away in single bungalows, with nickel-plated handles." Only by using full power and with rudder hard over was the airship able to negotiate the pass.

Lansdowne's talks before business and professional organizations always espoused the rigid airship as "the safest known means of transportation, not excepting pedestrianism." His belief was not based solely on *Shenandoah,* which was being flown overland as a flying laboratory. He would point to the airships slated to be built, each with a six-million-cubic-foot capacity for helium. The ZR-1, based on a 1916 German zeppelin design, had been stretched to 46 feet longer than the captured L-49 on which she was modeled. A commercial airship was designed for overwater flight, not for flight over mountains and deserts. Military use was as a naval scout, covering more area more quickly and economically than surface cruisers.

If filled with flammable hydrogen, *Shenandoah* would have had a cruising radius of 4,000 miles. But with nonflammable helium, her radius was cut to 2,200 miles — insufficient to make an ocean crossing with any safety margin. The newer airships still on the boards would cross oceans with ease, as had the hydrogen-filled ZR-3 *Los Angeles* when she was delivered October 15, 1924, while *Shenandoah* was on the West Coast. But there was some misunderstanding about the limitations of the Navy's first rigid airship. On August 18, 1924, the Bureau scheduled operations for *Shenandoah* with the fleet in Hawaiian waters from February to June 1925. Lansdowne wrote a long two-page letter on September 2, 1924, explaining why this was not practical unless a base could be established with a hangar in California. Lansdowne also wrote: "The rigid airship will always present a special problem in operating and handling and may not be . . . forced to conform to the requirements of surface vessels. A bird cannot be made to lead the life of a fish, but this does not prove that the bird runs any greater risk of extermination under the law of the survival of the fittest."



RAdm. William Moffett (l.) and LCdr. Zachary Lansdowne are lifted in a balloon basket to the Shenandoah at San Diego.

During this period, Lansdowne had made detailed plans for a flight to the North Pole. An economy-minded Congress and President Coolidge vetoed the flight in June of 1925. A month earlier, a flight to Minneapolis and other cities was scheduled for *Los Angeles*. Captain George Steele started the flight, but was obliged to turn back after only 418 miles because of threatening weather and engine trouble. That Midwest flight was then reassigned to *Shenandoah*.

On June 15, 1925, Lansdowne wrote the Chief of Naval Operations, Admiral E.W. Eberle, advising him that the July heat would reduce his cruising radius sharply. He cited the many thunderstorms would would be present at that time of year in the upper Mississippi Valley, adding that more masts and helium facilities were needed. At first, his request for postponement was turned down flatly. In doing so, Adm. Eberle wrote that "if the limitations and apprehensions

outlined . . . are sound, it would appear that our airships are of little military or commercial value, and that the great cost of their upkeep and repairs would not be warranted."

Lansdowne left Lakehurst for Washington to plead his cause. On June 29 he succeeded in having the flight rescheduled for the latter part of August or first part of September.

On July 4, *Shenandoah* flew to Bar Harbor, Maine, where a Governors' conference was in progress. The summer before, Lansdowne had made the first successful mooring to a shipboard mast, and he was once again to moor to USS *Patoka*. At the conference, Lansdowne told his friend, Godfrey L. Cabot, president of the National Aeronautic Association, that he was anxious to get his orders changed so as not to leave for the Midwest trip until after the thunderstorm season ended.

To save weight and thus increase the airship's cruise radius, Lansdowne recommended reducing the number of large automatic valves atop the ship, designed for wartime when hydrogen was used by the Germans. The Bureau of Aeronautics, in responding to the suggestion that maneuvering valves and petticoats be eliminated, pointed out that *Shenandoah's* gas valve capacity should "be sufficient to permit a rate of climb of 600 to 800 feet per minute. It is understood that German airships have occasionally burst their gas bags due to insufficient valve capacity when suddenly thrown upward in squalls." The existing gas valve system was then replaced by lighter-weight combination automatic and maneuvering valves along the top of the ship and an enlarged gassing manifold was installed along the keel with a valve at each end. The top valves would be used in emergencies.

Even with these modifications, Lansdowne felt that he would be in jeopardy if he got into a thunderstorm which he couldn't skirt. Through the summer of 1925, he and his young wife, the former Betsy Ross, would walk at night by the lake and Lansdowne often voiced his concerns about upcoming weather conditions for the forthcoming flight. Lansdowne's efforts to obtain dates more conducive to optimum weather for the long Midwest flight bowed to the weight of an itinerary to which cities were constantly being added, based on the more than 400 letters on file with the Bureau of Aeronautics requesting appearances of the airship.

On August 12, Adm. Eberle wrote Lansdowne that orders were being issued in accordance with the airship captain's general plan — Lakehurst to Minneapolis, via Scott Field and Des Moines, and return by way of Detroit.

The Chief of Naval Operations wrote: "Your recommendation to make the flight the second week in September has not been approved. Starting Sept. 2, the airship will fly over State Fairs as follows: Columbus, Sept. 3; Des Moines, Sept. 4; Minneapolis, Sept. 5; Milwaukee, Sept. 5; and Detroit, Sept. 6." In transmitting the disappointing news, Rear Admiral William A. Moffett added that the Bureau had "great respect for Lansdowne's judgment, yet an analysis . . . shows it based largely on worry over contingencies — running out of fuel due to weather, high temperatures, thunderstorms and being able to land at Minneapolis with an untrained ground crew to refuel."

On Wednesday, September 2, 1925, aerologist Lieutenant J. Bruce Anderson reported to Capt. Lansdowne that a low-pressure center north of Minnesota would probably spread southward into the Ohio Valley. Lansdowne frowned. "These cyclonic storms usually turn eastward before they go too far south, Captain," Anderson reassured him.

At 2:52 p.m. Lansdowne megaphoned the order from the control car up to the mast, "Cast off!" The cup on the mast released the ship's cone. The huge ship headed over the pines toward a forboding sky in the west, without circling the base as was her usual habit.

By dawn the following day, the aft two-thirds of *Shenandoah's* hulk lay in shards and tatters, near Ava, Ohio. The bow section was free-ballooned to a safe landing 12 miles away, near Sharon. Two-thirds of the airship's crew survived. Thanks to helium, there was no fire.

After two-thirds of Shenandoah lies twisted and broken where it came to rest in September 1925.

Lighter-than-air precision – "L" type airships from NAS Moffett Field in "V" formation.
(Smithsonian Institution)

The War Years

By Roy Grossnick

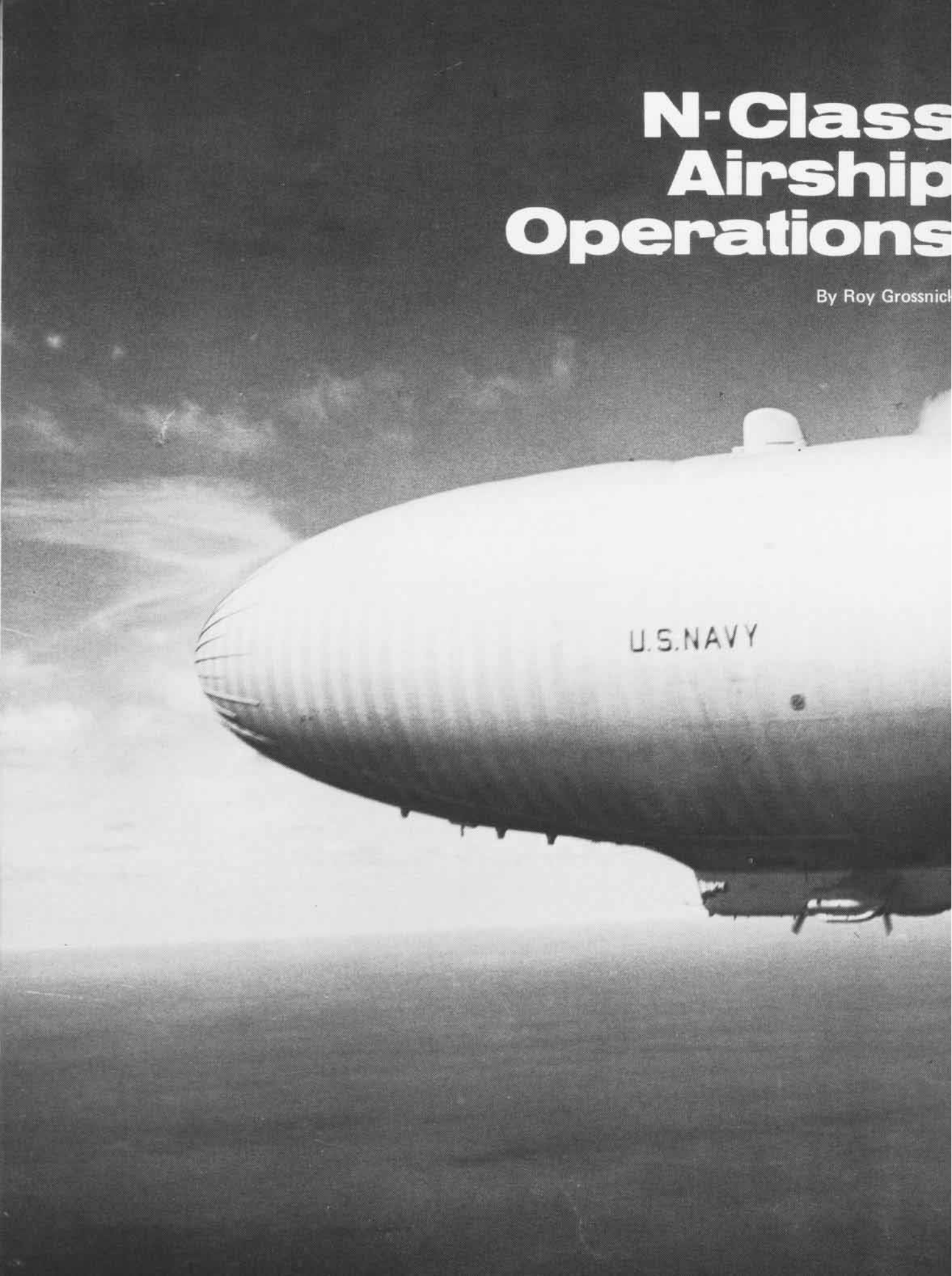
When the U.S. entered WW II, the Navy's airship fleet consisted of 10 airships and only one operational airship base. Early in the war, enemy submarine contacts and the sinking of merchant ships were almost a daily occurrence in U.S. coastal waters. This reaffirmed the need for fleet airship groups and their squadrons. Coastal patrol and escort of convoys became their most important missions. General utility missions were also assigned which included assistance in the recovery of practice torpedoes, search and rescue, photography, calibration, training, research and minesweeping operations.

Airship operations, along the East Coast, ranged from Newfoundland, Canada, to Santa Cruz, Brazil, and included the Caribbean. On the West Coast, airships were in evidence from Quillayute, Wash., to Del Mar, Calif. In May 1944, ZP-1 was transferred to Port Lyautey, French Morocco to patrol the Straits of Gibraltar, with detachments later in France, Italy, Algeria and Tunesia. The flight of ZP-14 airships to Morocco was the first crossing of the Atlantic by nonrigid airships.

At the peak of wartime airship operations, the Navy was patrolling three million square miles with 15 airship squadrons, and by 1945 168 airships were in the air. The Navy's airship fleet made 55,900 operational flights totaling 550,000 hours. It lost only one airship to enemy action.

N-Class Airship Operations

By Roy Grossnick



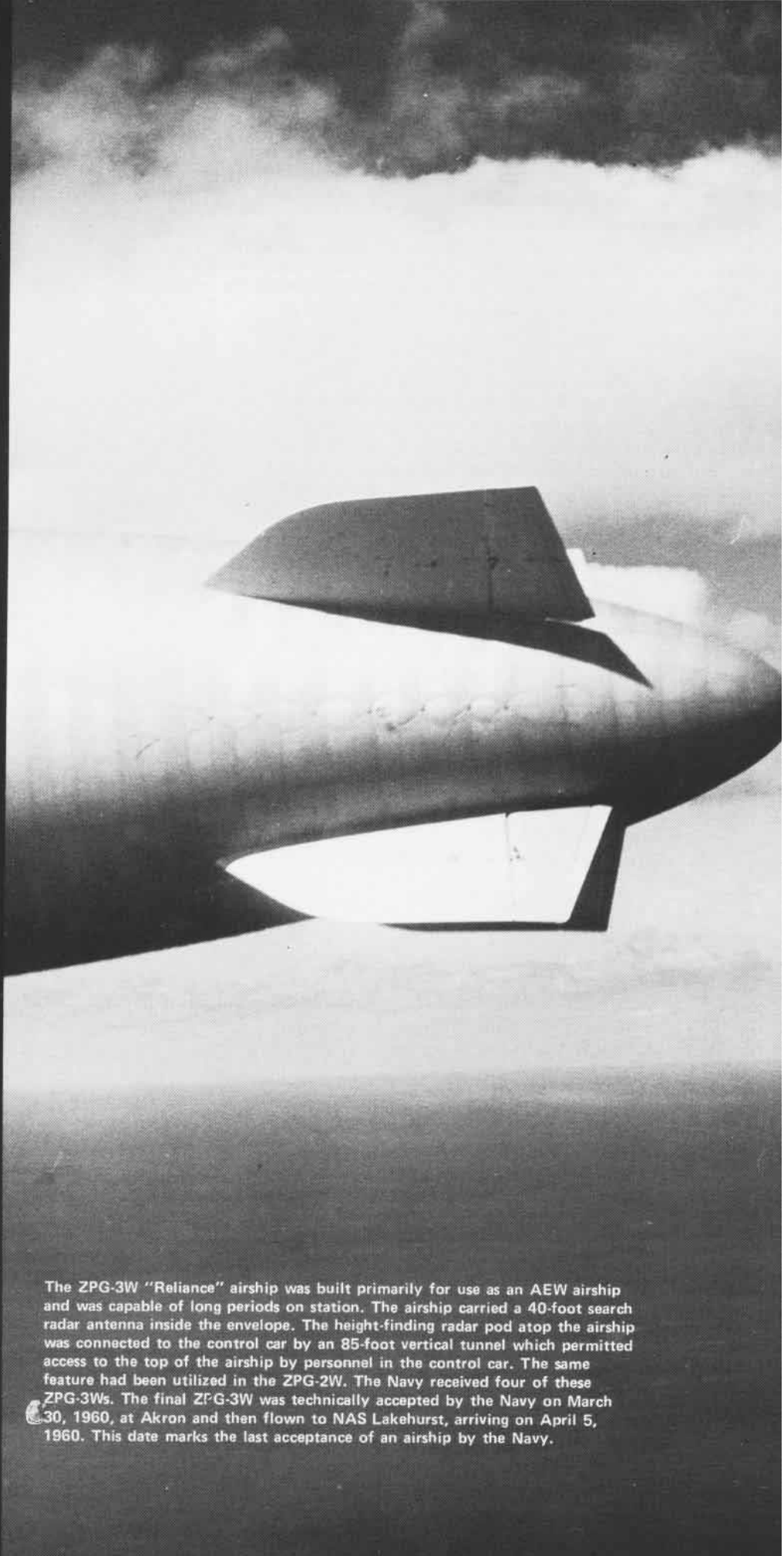
Jules Verne's fantasy of balloon adventure, written in the latter part of the 19th century, captured the imagination of the earthbound and stimulated the imagination of man. Whether one's everyday existence tends to be humdrum or hectic there is something very appealing in the idea of drifting contentedly for extended periods over the earth's surface.

While all this may be overly romantic, the idea of spending days aloft was nothing out of the ordinary for lighter-than-air personnel of the U.S. Navy in the 1950s. The Navy's last airships which flew during this period and into the early sixties were sophisticated vehicles and lighter-than-air advocates of the day believed them to be competitive with other airborne vehicles in the Naval Aviation inventory, particularly in the areas of airborne early warning (AEW) and antisubmarine warfare (ASW). One of their strong points was the ability to remain in the air for long periods of time. Every opportunity was taken to demonstrate this unique capability and in the process many new records were established.

The first of these was set in May 1954. A ZPG-2 airship under Commander Marion Eppes departed NAS Lakehurst for an endurance flight which took her north to Nova Scotia, east to Bermuda and then south to Nassau, the Caribbean Sea and the Gulf of Mexico. The airship landed at NAS Key West on May 25 with an elapsed time of 200.1 hours in the air. It was a notable achievement and Cdr. Eppes was awarded the Harmon International Trophy for his achievement.

At about this time, the Chief of Naval Operations ordered a series of tests to evaluate the all-weather, continuous patrol capabilities of the airship. These features were of particular concern during the 1950s because the U.S. was seeking a reliable, high-endurance AEW platform which could detect incoming enemy bombers.

Beginning January 14, 1957, a continuous patrol was maintained for 10 days, 200 miles off the coast of New Jersey, by personnel from the Naval Air Development Unit, South Weymouth and Airship Airborne Early Warning Squadron One (ZW-1).



The ZPG-3W "Reliance" airship was built primarily for use as an AEW airship and was capable of long periods on station. The airship carried a 40-foot search radar antenna inside the envelope. The height-finding radar pod atop the airship was connected to the control car by an 85-foot vertical tunnel which permitted access to the top of the airship by personnel in the control car. The same feature had been utilized in the ZPG-2W. The Navy received four of these ZPG-3Ws. The final ZPG-3W was technically accepted by the Navy on March 30, 1960, at Akron and then flown to NAS Lakehurst, arriving on April 5, 1960. This date marks the last acceptance of an airship by the Navy.

A ZPG-2 from Airship Patrol Squadron Two refueling from USS Leyte (CVS-32) during an ASW exercise in 1958. The ZPG-2 was the first nonrigid airship capable of rearming and remanning in flight.

Cockpit view of a ZPG-3W. The N-series blimps were the first nonrigid airships to have controls similar to those of an airplane.

The weather proved to be the roughest part of the test. It was the worst the area had experienced in 35 years. The crews and their airships dealt with snow, freezing rain, icing, sleet, fog, rain, zero temperatures and high surface winds. During the patrol, all military and commercial aircraft were grounded due to severe weather but the airships kept going and continued their patrols without mishap.

With these tests completed successfully, the drama involving the final phase of the tests, a long-distance flight, took center ring. The Navy was out to do nothing less than break the long-distance record set by the German rigid airship *Graf Zeppelin* in 1929 when it flew nonstop from Friedrichshafen, Germany, to Tokyo, Japan, a distance of 6,980 miles without refueling. There had not been a transatlantic airship flight in 12 years but on March 5, 1957, *Snow Bird*, a ZPG-2 airship, took off from NAS South Weymouth, Mass., and headed out over the ocean.

Snow Bird, flown by Commander Jack R. Hunt and a crew of 13, was no more than 600 miles out to sea when she encountered a storm. But because of earlier all-weather airship tests the crew was confident they could handle any problems they might encounter. They were correct in their assessment. The storm did not deter the airship's progress and by March 7 *Snow Bird* was off the southwest tip of Portugal heading south toward the Canary and Cape Verde Islands.

Life aboard the ZPG-2 was very similar to what might be experienced aboard a small vessel at sea, including the constant rolling motion. When the airship passed Casablanca on the North African coast on March 8, the decision was made to return across the Atlantic without refueling.

Morale was high aboard the airship on the eighth day of the flight as they approached and then surpassed the endurance record set by Cdr. Eppes and his crew in 1954. Then on March 13, *Snow Bird* broke the endurance and distance record set by *Graf Zeppelin*.

It was a jubilant crew which landed at NAS Key West on March 15, 1957. *Snow Bird* had set a new distance record of 9,740 miles and an endurance record of 10 and a half days without refueling.

Despite such impressive demonstrations, there followed a slow reduction in the airship force. On June 28, 1957, Airship Patrol Squadrons One and Four (ZP-1 and ZP-4) were disestablished, and Airship Development Squadron Eleven (ZX-11) was disestablished on December 1 of that same year. Still, there was hope that decision makers could be convinced of the value of the airship to Naval Aviation and that the trend could be reversed.

N-Series Statistics

	Volume (cubic ft.)	Length (ft.)	Width (ft.)	Height (ft.)	Crew	Max. Speed (kts.)	Max. Endurance (hrs.)	Patrol Range (n.m.)	Engines
ZPG-1 (ZPN-1)	875,000	324	73.5	94.5	14	75	85	3,400	2 @ 800 h.p. Wright R-1300-2A Cyclone 7
ZPG-2 (ZP2N-1)	975,000	343.65	75.5	94.68	14	71	52	2,100	2 @ 800 h.p. Wright R-1300-2A Cyclone 7
ZPG-2W (ZP2N-1W)	975,000	342.7	75.5	107.3	21	70	55	1,930	2 @ 800 h.p. Wright R-1300-2A Cyclone 7
ZPG-3W	1,516,300	403.4	85.11	116.52	21-25	82	80	2,800	2 @ 1,525 h.p. Wright R-1820-88 Cyclone 9

Note: Control car length and width for all four N-series airships was 83 feet long and 11.5 feet wide.

During this period, airships continued to undertake unusual projects not in the realm of normal operations. In 1958, a ZPG-2 was assigned to assist in an Arctic weather research project. The flight was also designed to evaluate the use of airships in the harsh Arctic environment. The airship proceeded across the Arctic Circle without incident. Mail and supplies were dropped to scientists at their Arctic ice station and a number of scientific experiments were conducted by the airship's crew before returning to South Weymouth on August 12, 1958. In all, it had been a 9,400-mile journey, the longest Arctic flight ever made by a non-rigid airship.

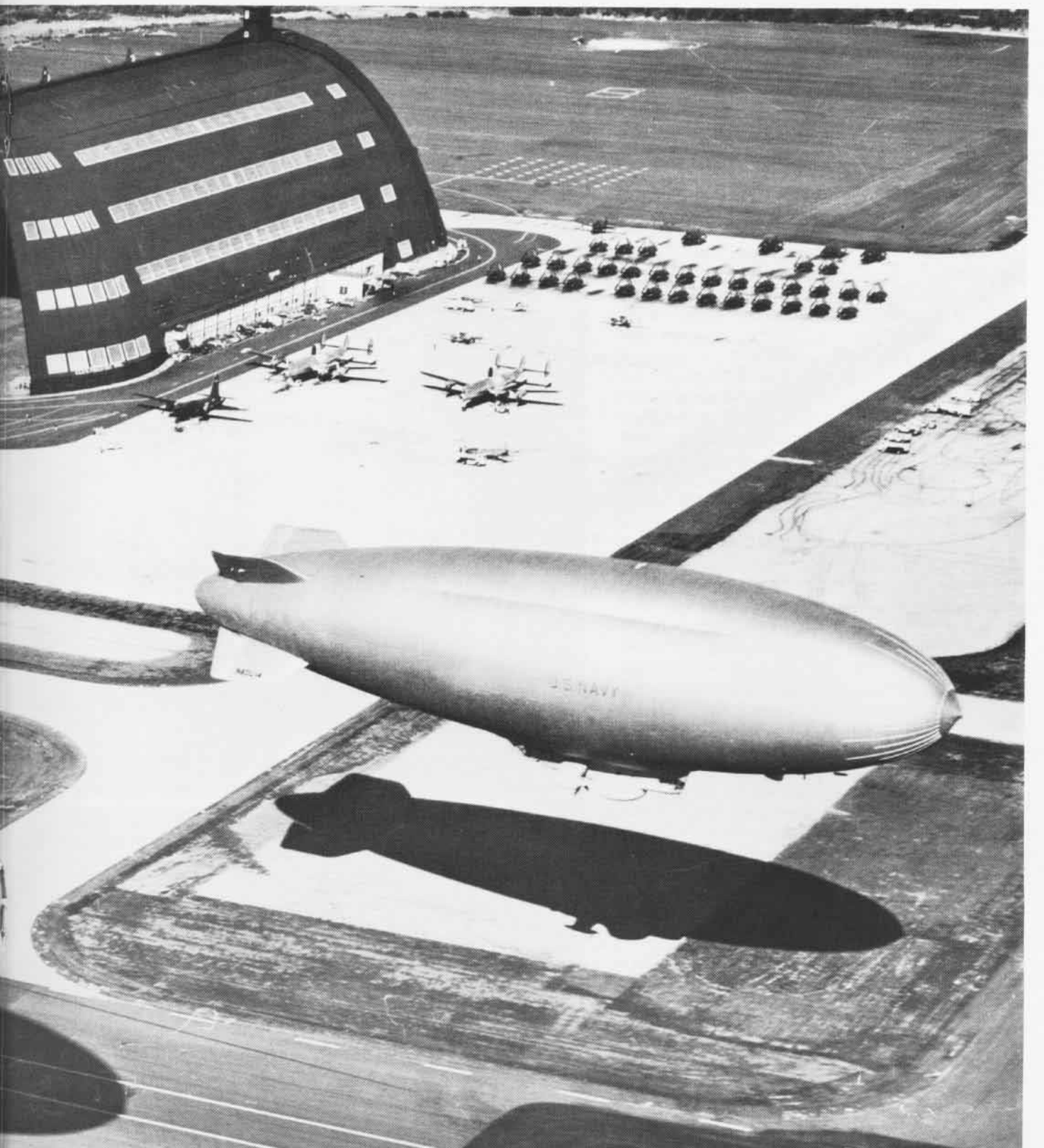
But the drawdown continued. On November 30, 1959, Airship Patrol Squadron Two (ZP-2), the oldest ZP squadron in the Navy, went out of business. Airship Early Warning Squadron One (ZW-1) was redesignated Airship Patrol

Squadron One (ZP-1) on January 3, 1961, and continued in existence as an ASW squadron. But the handwriting was on the wall.

That same month an N-series airship flew cross-country from NAS Lakehurst to MCAF El Toro to participate in an oceanographic research project off the coast of California. Her return flight in March of that year was the last major long-distance flight of an airship in the U.S. Navy.

On June 21, 1961, the Secretary of the Navy announced plans for terminating the Navy's LTA program and by the end of October 1961, Airship Patrol Squadrons One and Three were disestablished. They were the last operating units of the Navy's LTA branch. Their demise marked the end of a colorful era of Naval Aviation.

A classic photo of two ZPG-2s in formation over NAS South Weymouth, Mass., in 1954.



The "N

One of the characteristics of the Navy's nonrigid airships over most of their years was their letter class identification. While this system gave way to one similar to that used for other Navy aircraft in 1954, it is fitting that the last airships operated by the Navy were also the last ones that began life with a letter designation — the N-class airships.

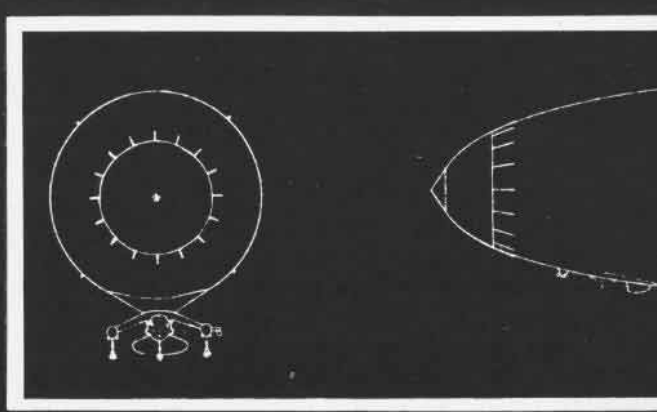
Their story begins with the success of the K-class airships in WW II ASW operations, and the resultant lack of real need for the much improved M-class of the late WW II period, only four of which were built. Following the war, it was clear that, while improved versions of the K ships could handle many LTA tasks, the installation of radar, towed sonar and other new ASW systems, as well as the need for greater patrol ranges, would require larger airships than the Ms. In 1947, the Bureau of Aeronautics initiated a design competition for a larger ASW airship to incorporate the new requirements. Goodyear and Douglas were contenders. Douglas was the design winner but subsequent arrangements led to Goodyear building the new *Nan* ship with the Navy purchasing Douglas design data and making this information available to Goodyear.

Initial go-ahead in 1948 covered design engineering, mock-up and a ground test propulsion system for the most novel feature of the new ship — the two Wright R-1300-2 air-cooled engines mounted in the car driving two reversible-pitch propellers on outriggers, with clutches and transmissions so that either engine could drive both propellers, as well as using both engines in the normal manner. While this work proceeded, the contract for building the ZPN-1 prototype was signed. It would be the largest nonrigid airship built, with an 875,000-cubic-foot envelope, a double-deck car with ample crew provisions for the 14-man crew, extensive ASW equipment and inflight refueling capability for extended operations refueled by accompanying Navy ships. In January 1950, the ground test rig was running, but even this lead wasn't enough when transmission difficulties were encountered later in the year, delaying the first flight into 1951. Meanwhile production versions were ordered as the ZP2N-1, with many improvements including a larger envelope of 1,011,000 cubic feet.

The ground rig resumed running in early 1951, with power plant installation in the N-1 following in April, and first flight in June. Soon after the initial flights, it was realized that the ballonets would have to be replaced due to fabric characteristics, but this was postponed until after Board of Inspection and Survey (BIS) trials. Late in 1950, flight testing was interrupted for modifications, including increased fin strength and reduced control system friction.

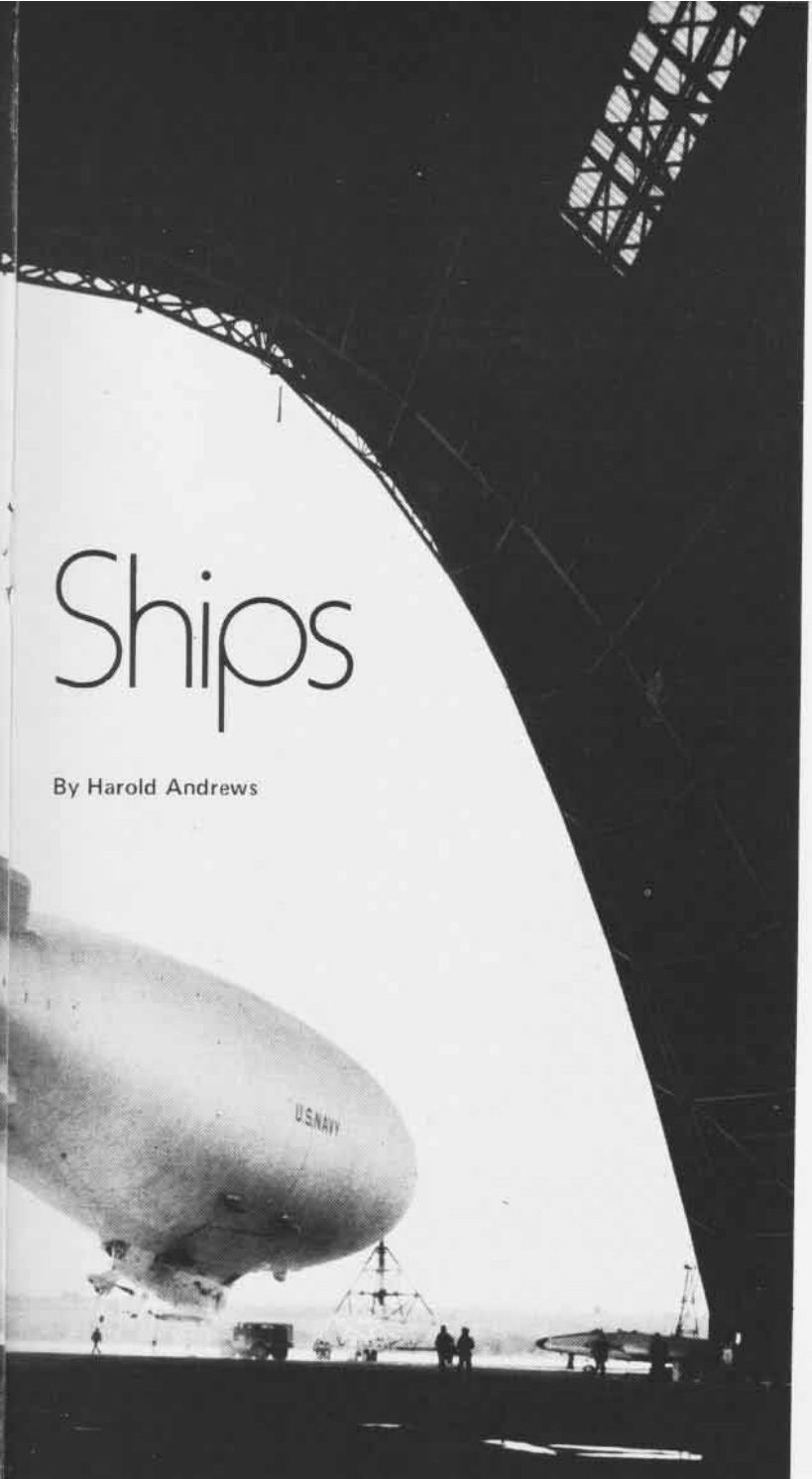
Early 1952 saw final solution to the fin design problem, with the tail surfaces being further modified for final tests at Akron, followed by June delivery to Lakehurst, and Navy Preliminary Evaluation (NPE) in July. The NPE results were disappointing, particularly in the airship's performance and further tests followed to explore specific improvements. Meanwhile the first production ZP2N-1

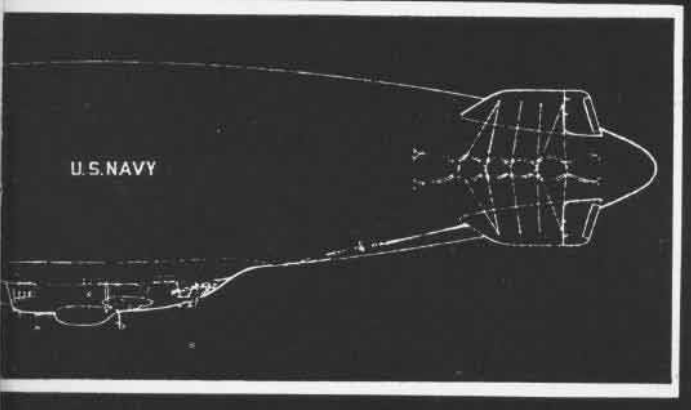
ZPG-2 during undocking operations.



Ships

By Harold Andrews





was approaching completion and an AEW version of the *Nan*, the ZWN-1, was initiated. Activity essentially came to a halt at Goodyear during a fall strike, and the first ZP2N-1 did not fly until May 1953. By this time the ZWN-1 had been redesignated ZP2N-1W, a prototype ordered, and first flight scheduled for September 1954. It would feature larger radar antennas inside the envelope than could be mounted externally without excessive drag.

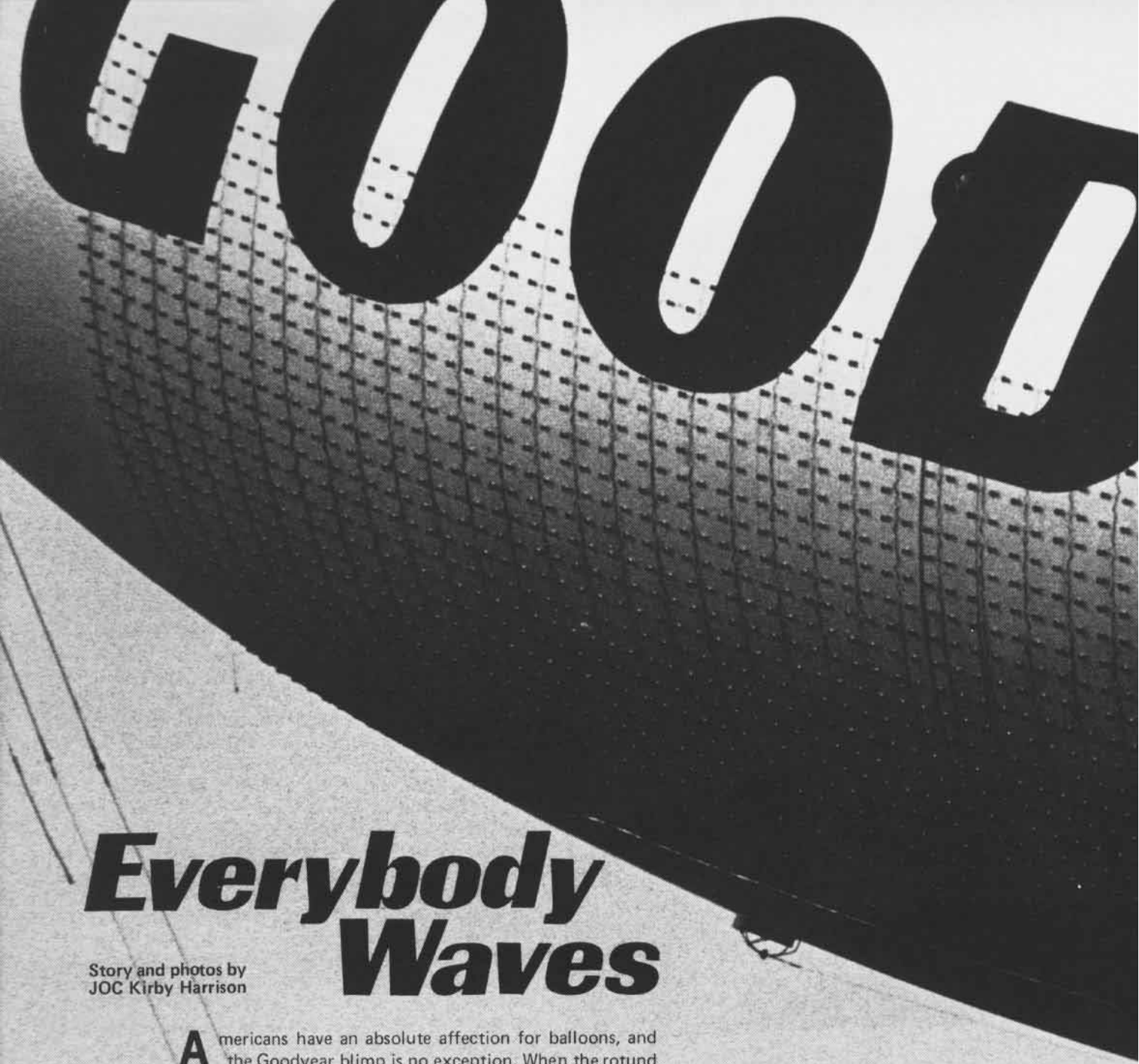
Lakehurst operations with N-1 and flight testing of the ZP2N-1 at Akron continued through spring, summer and into fall. Mock-up inspection of the -1W took place in May. While the flights of N-1 showed the potential of the *Nans*, it also confirmed the need for the larger envelope, as had been decided for the ZP2Ns. In November, N-1 was deflated for the ballonet replacement, and subsequently overhauled and rebuilt with a larger 975,000-cubic-foot envelope.

After a delay for correcting a transmission problem, the first ZP2N-1 was delivered to Lakehurst late in the year for Navy trials, with the next two already in the air. A ballonet failure, due to overpressurization in January 1954, required corrective action to the pressure system, but the fourth ZP2N-1 was delivered that month. Spring saw the first APS-20B installation in the fifth ship, with BIS trials of the new radar at Lakehurst. The airships were also redesignated at about this time with the *Nans* becoming ZPGs. The ZP2N-1 and -1W became ZPG-2 and -2W, respectively. The first fully-equipped ZPG-2 was delivered from Akron to the fleet for operational use in July.

BIS trials of the ZPG-2 were completed in December, with ZX-11 beginning extended operational trials early in 1955, while another -2 went to Naval Air Development Unit, South Weymouth, Mass., for all-weather tests with emphasis on extreme winter-weather conditions. The first flight of the ZPG-2W early in the year coincided with increased interest in the use of nonrigid airships as part of the national early warning network. The ZWG-1, designed specifically for this mission, was ordered but was subsequently replaced by a much-modified ZPG design as the ZPG-3W. Larger radar antennas were installed inside the 1,516,000-cubic-foot envelope while the higher-powered Wright R-1820-88 engines were returned to external nacelles.

With the first ZPG-2W delivered to Lakehurst in May, production and operation of the ZPGs continued, interrupted by a suspension cable failure problem that resulted in grounding the ships for replacement with redesigned cable assemblies during the summer. By the end of the year the mock-up inspection of the ZPG-3W had been completed, as well as first delivery of a ZPG-2W to ZP-3.

Before the ZPG-3W made its first flight in July 1958, production of the 12 ZPG-2s and 5 ZPG-2Ws purchased had been completed and the -2s had set a number of records for extended-duration flights. Four ZPG-3Ws were subsequently delivered, but a fatal accident to the first one at sea in the summer of 1960 and a change in early warning mission left the ZPG-2s as the major LTA long-endurance aircraft. Operations continued into the fall of 1961, when all fleet operations were ended. Two research and development ZPG-2s continued their special assignments as a flying wind tunnel and an ASW research laboratory through August 1962, when all Navy LTA operations ended.



Everybody Waves

Story and photos by
JOC Kirby Harrison

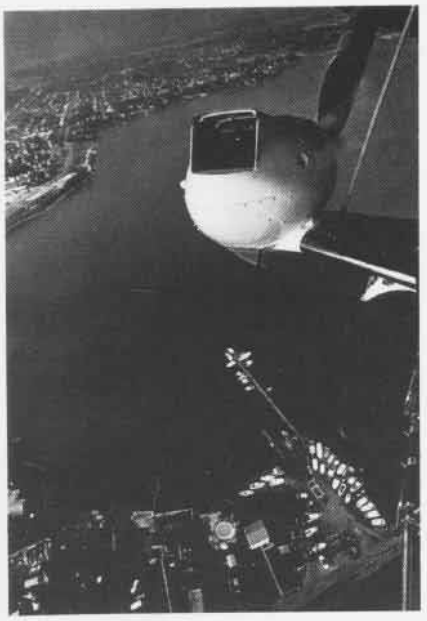
Americans have an absolute affection for balloons, and the Goodyear blimp is no exception. When the rotund airship *America* glides low over Baltimore's east side suburbs, everybody waves. It's an irresistible urge. A man on a diving board in a backyard pool waves, loses his balance and topples in with a splash. On a playground, a softball game comes to a momentary halt as the blimp passes overhead. Even the umpire waves.

The Goodyear Tire and Rubber Company's blimp *America* is based in Houston, one of three in the U.S. Goodyear's fourth blimp is based in Rome, Italy. By definition, they are nonrigid airships with the shape of the envelope, or bag, entirely maintained by internal pressure of the lifting gas. Or, more simply, blimps.

A number of stories have circulated about the origin of the name blimp. The most popular, but not necessarily most accurate, was that it is a contraction of the British WW I airship designation, "Balloon, type B, limp." More colorful is the suggestion that it is a contraction stemming from the British habit of liberally lacing phrases with the adjective "bloody," as in "bloody limp." *(continued)*

Goodyear blimp America takes to the air in a recent appearance at Martin State Airport, Baltimore, Md. America is powered by two light reciprocating engines and lifted by 202,700 cubic feet of helium contained in a rubber-coated, polyester skin.

The Goodyear blimp pilot's wings, below, appropriately feature a blimp at the center. Bottom, moving along at a liesurely pace, the blimp provides a good look at suburban Baltimore.



More recent, and more likely, is the story of an inspection of His Majesty's Airship SS-12 in 1915 by Lieutenant A. D. Cunningham. During his inspection, the lieutenant playfully thumped the side of the gasbag with his thumb and was rewarded by an odd noise that echoed off the taut fabric. According to the account, Cunningham smiled and orally imitated the sound, "blimp!" The midshipman who commanded the airship repeated the sound to his mates at the mess and the "blimp" was named.

Goodyear has been in the lighter-than-air (LTA) aviation business since P. W. Litchfield witnessed a balloon race and other LTA craft in France in 1910. That was more than 1,000 balloons, hundreds of blimps and a couple of rigid airships ago. Today, *America* and her four sister ships are the only lighter-than-air craft operating on a regular schedule.

The blimps travel more than 100,000 miles a year as "goodwill ambassadors." They are also flying billboards — the ultimate in public relations vehicles — an advertiser's dream. Goodyear calls the 7,560 lights spread over the sides of the blimps "Super Skytacular." They can spell out messages from "Beat Army" to "Happy New Year." The light panels are 105 feet long by 24.5 feet high, and the specially designed lamps include red, blue, green and yellow reflectors. The messages are "born" on a cathode ray tube drawn by the technician/artist with a special "light beam" pencil. A computer converts the drawing to a magnetic data tape. A typical six-minute tape, with as many as 40 million pieces of "on-off" information, tells the electronic readers on the airship which lamps and colors to use and at what speed the message should run.

The drawing may be a written message or an animated scene of a golfer driving off the tee. One of the more popular animated scenes is that of a turkey running to escape an ax-wielding man intent on catching Thanksgiving dinner.

According to Goodyear, with the blimp flying at 1,000 feet, the messages can be read by people on the ground from a mile away. Goodyear also points out that 75 percent of the messages are of a public service nature on behalf of nonprofit and service organizations.

The blimps are also in great demand by the nation's news media and frequently by motion picture producers. Television in particular makes extensive use of the blimps as camera platforms for sports events.

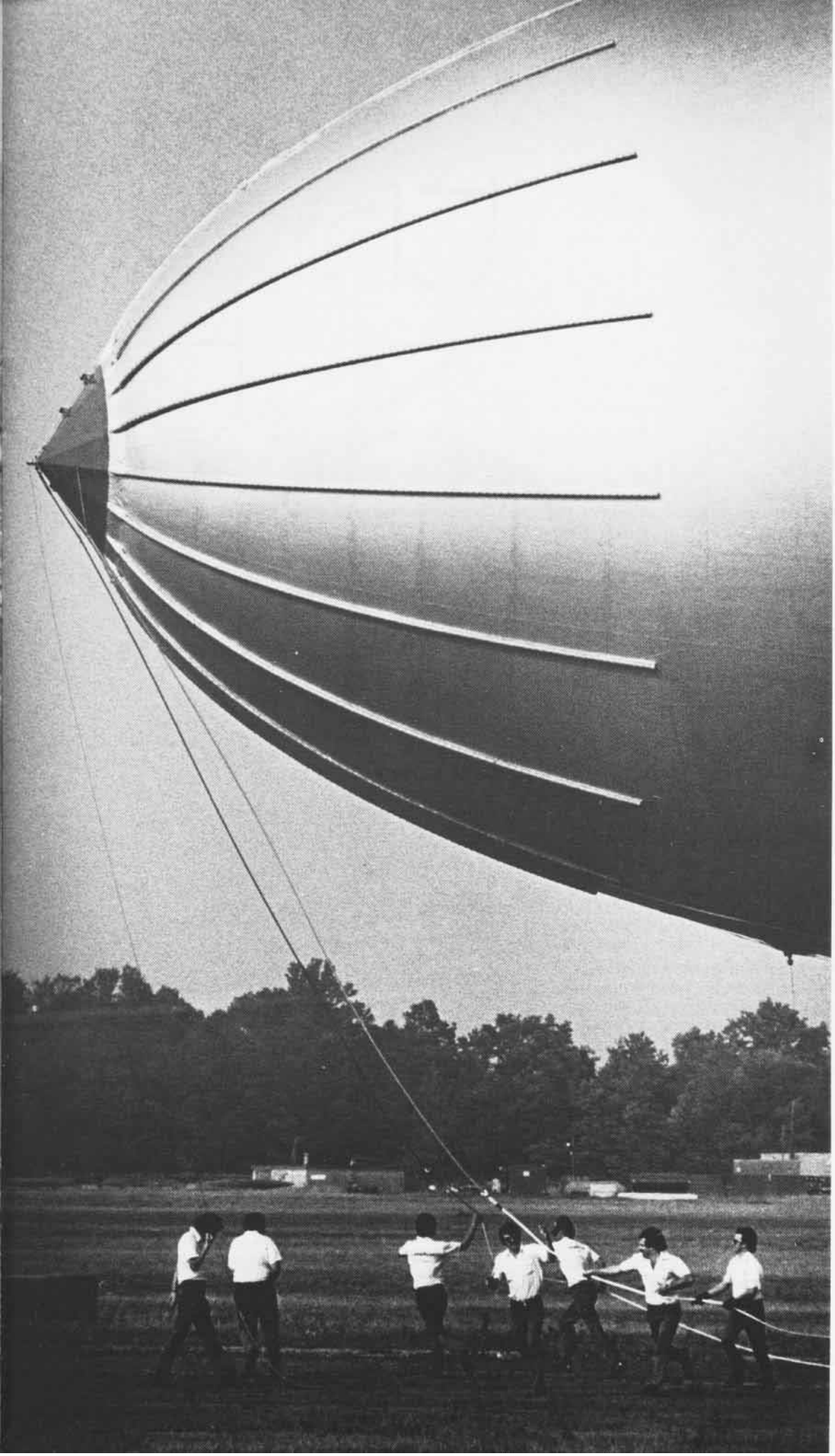
Even First Lady Nancy Reagan took advantage of a Goodyear invitation to host a birthday party for Ron Junior earlier this year. During the previous administration, Rosalyn Carter celebrated her birthday on the blimp and during President John F. Kennedy's period in office, the airship crew was surprised one morning by Mrs. Kennedy and her children. "We were told to be ready first thing in the morning," recalls Goodyear representative Tom Ryan, "but we hadn't been told who was coming aboard."

The four airships carry approximately 32,000 passengers a year, most by invitation. The figure is remarkable when considering that the capacity is six passengers at a time. Even more remarkable is the safety record. Goodyear's airships have operated for more than five decades without a single passenger fatality.

The term airship is an apt description of the blimp. It floats as well as flies. Goodyear's airships "float" on 202,700 cubic feet of helium inside the rubber-coated, polyester fabric envelope. This "lift" provided by the helium makes the blimp a much more economical way to fly when time is not a factor. At a top speed of 50 miles per hour and cruising speed of 35 miles per hour, the blimp is hardly going to compete with the *Concorde.* But the blimp can operate eight hours a day for nearly a week on the amount of fuel it takes the *Concorde* just to taxi from the ramp to the runway. This ability to lift heavy loads and carry them economically for long distances is stimulating new interest in lighter-than-air craft. The Coast Guard, Navy and private industry are watching developments with interest.

In the meantime, Goodyear's four airships sail a dignified and sedate route between the romantic era of the past and a possible revival.

When the blimp passes over your neighborhood, go ahead and wave. Everybody does.



Landings by the blimp, left, are usually gentle and marked by crewmen rushing to catch the mooring lines. Above, canvas bags filled with shot provide ballast to adjust the blimp's buoyancy as the temperature changes.

things to

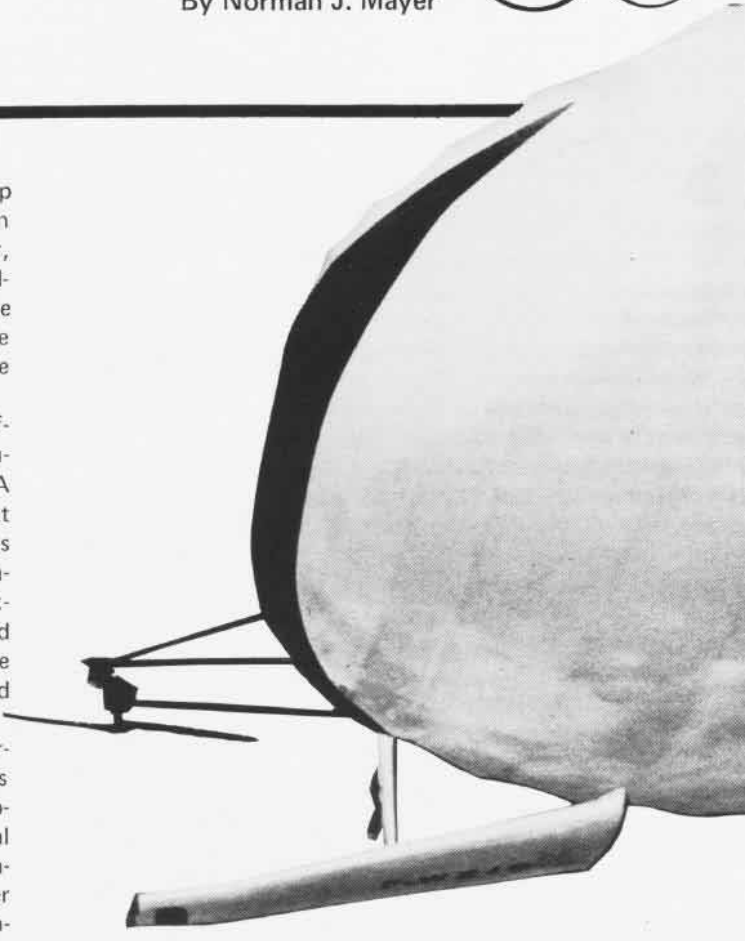
By Norman J. Mayer

A one-two punch brought an end to U.S. Navy airship operations in the 1960s. This was the result of a change in the AEW threat, in the form of ICBMs instead of slower, manned bombers, accompanied by an across-the-board budget reduction of all ASW forces, in which airships trailed the faster, fixed wing airplanes employing sonobuoys. Only the giant hangars remain today as testimony to a service once considered invaluable to the nation's maritime security.

Yet, today, the world is again alive to the potential offered by aerostats as solutions to new problems in communications, transportation and surveillance. Studies of LTA applications are being carried out in the U.S., Canada, Great Britain, France, Germany, Japan and several other countries in South America and Africa. The United Nations organization recently concluded an international symposium to examine the merits of new technology developments. Beyond the broad academic or analytical aspects, however, there are concrete programs involving actual vehicle development and substantial investment.

In the United States Northwest, millions of acres of forests stand unharvested because they are located in areas where roads cannot be built either for ecological or economical reasons. Many of these timber stands are in Federal parkland or reserves. The U.S. Forest Service has been mandated to develop methods of harvesting some of this timber without violating the ecology or exceeding economic constraints. Aerial logging using helicopters is the present method. However, the payload of helicopters is limited and their operating costs high. Therefore the Forest Service is exploring other solutions.

One approach being developed is an experimental hybrid airship called a "Heli-Stat." (See article in this issue.) The Navy is cooperating with the Forest Service by supplying most of the major components for the hybrid including the airship envelope and the helicopters. The naval facilities at NAEC Lakehurst are also being used for manufacturing and assembling the vehicle. After assembly and flight testing, the hybrid will be ferried or shipped to the Northwest to engage in an experimental logging program in the latter part of 1982.



Another attractive application stems from conditions similar to those in forests. Today, there are many areas in the world with good potential for development because of their natural resources. However, climate and terrain limitations prevent the use of normal systems for transporting heavy equipment and workers. In the Canadian Northwest, for example, abundant gas and oil reserves can only be ex-

Come

French-built, lenticular-shaped hybrid vehicle for heavy lift and general utility.

ploited during winter periods when the frozen surface allows the transport and placement of heavy drilling and construction equipment. The working season is constrained on each end by the periods required to move men and equipment to and from working sites. If this can be accomplished by air, using heavy lift airships, the time spent on actual productive work could be doubled. A heavy-lift hybrid capable of vertical takeoff and landing could also eliminate much of the cost of building temporary roads to circumvent obstacles such as rivers and valleys for pipeline routes. Added to this would be the advantage of direct delivery of heavy equipment in larger components than presently possible.

A somewhat parallel situation exists in some tropical areas where presently undeveloped and remote locations also have attractive potential for adding to the wealth and self-sufficiency of the nations in which they are found, but where roads and other transport facilities are nonexistent. Construction of airports is not economically feasible since only temporary sites may be needed.

Transport capacity needed for these remote areas ranges close to 1,000 tons. Present proposed types of heavy-lift hybrid airships, using nonrigid envelopes and improved rotor lift-propulsion systems, can be developed up to 150 tons without extensive research. Other versions of higher capacity would require further development. An advanced 75-ton payload size has been studied by the Goodyear Aerospace Corp. This incorporates auxiliary propellers for forward and aft thrust as well as pod-mounted, helicopter-type lifting rotors, and a central control station. Its envelope would hold 2.5 million cubic feet of helium and it would be capable of speeds up to 80 knots. A smaller version of this heavy lifter is also under study for possible Canadian applications.

A more radical departure from tradition is seen in the Cyclocrane. This hybrid concept, under development by D.C. Associates, also combines propeller and rotor thrust with gas lift to achieve hovering control and additional lift. This vehicle is also being built to demonstrate its capability for logging and will be used in Canadian western regions. The Cyclocrane is equipped with four wings or vanes projecting outward from a mid-length location. Each of these in turn supports a wing mounted at 90 degrees to the tip. Engines and propellers are mounted at the juncture and furnish thrust for rotating the entire hull and wing assembly and for forward propulsion as well. Control forces are generated and directed by rotating the wing-vane assemblies about their spar axes as the aerostat rotates around its longitudinal axis. As forward speed increases, the rotation is slowed and finally stopped for full forward flight. A Cyclocrane demonstrator lifting two and one-half tons is scheduled for completion in the latter part of 1981.

A different application for airships is under study by the U.S. Coast Guard. This one resembles past naval uses in that the same areas of the U.S. will be involved and many of the mission scenarios are similar. This interest on the part of the Coast Guard eminated from the new 200-mile offshore limit established by the 1976 Fishery Conservation and Management Act. The Coast Guard's responsibilities to enforce these new fishing limits were greatly extended. Studies made of available aircraft and surface vessels for surveillance revealed two major shortcomings. One was the high cost involved in aircraft surveillance where endurance limitations required many additional flights. The other was that although surface vessels offered long endurance, their transit times, particularly in bad weather, were long, thus requiring large increases in numbers of ships and personnel. The preliminary studies also indicated that airships might offer a solution to cost and endurance problems as well as a potential for combining some ship and aircraft functions. The appeal of achieving a stable observation platform with provisions for high endurance and low crew fatigue is intrinsic to airship flight. However, the Coast Guard is also investigating the possibility of incorporating advanced features in these vehicles which would allow improved low speed control, as well as higher maximum speeds. These are sought because interdiction operations require boarding suspicious vessels and it is anticipated that boarding parties could be dispatched via a small boat from the airship to the vessel, or perhaps even directly under proper circumstances, all of which requires a rather precise degree of control at or near the surface.

The Navy is providing the technical management for the present studies which are in three major phases. The first phase will define characteristics needed in a full-scale operational airship. The second phase involves definition and design of a small-scale demonstration vehicle, and the last includes carrying out a number of Coast Guard operations (within the limits of the demonstrator). This program will be completed in 1985.

There are similar developments in other countries. Private interests in Great Britain succeeded in constructing a small nonrigid in 1979. This 181,200-cubic-foot airship incorporated some novel features such as tilting ducted fan propellers, lightweight composite materials in the car, fins, and mooring system, and a single-ply fabric envelope. These innovations combined to give the airship payloads equivalent to those previously available in airships of 15-percent larger volume. The prototype was unfortunately wrecked after its second flight, but a second airship has been built and is presently under flight test. Larger nonrigids are also being designed with greater lift and power.

A German company saw the benefits of aerial advertising via signs on the broad surface of airships and constructed modified versions of Goodyear designs for that purpose. At present, two are operating in Germany. The company has also been interested in development of larger airships for transport in areas lacking normal facilities and has proposed designs for this application. Thus far these have not been built.

The heavy vertical lift uses for airships have also been studied in France. A number of concepts were investigated by the government, some of extreme lifting capacity (one million pounds payload). Recent interest has centered on a small demonstration-size vehicle on the principle of the Heli-Stat, but incorporating two rotors. The French have also flown an airship remotely piloted vehicle for meteorological research. It is expected that studies and interest will continue in this field on the part of the government, and privately as well. One example of the latter is a series of studies and experiments by a French firm, S.E.A.B., on lenticular-shaped hybrid vehicles for heavy lift and general utility. Present effort centers on development of a 219,000-cubic-foot size equipped with three rotors and three propellers, scheduled for completion in 1982.

The Japanese have set up special study teams to evaluate the potential of airships for solving some of the unique transport problems in the Japanese islands. Two of the major needs are the placement of heavy electrical generating equipment (nuclear and conventional) in several relatively inaccessible locations, and the maintenance of communications and supplies for people living on the many islands. Recommendations for using airships were positive.

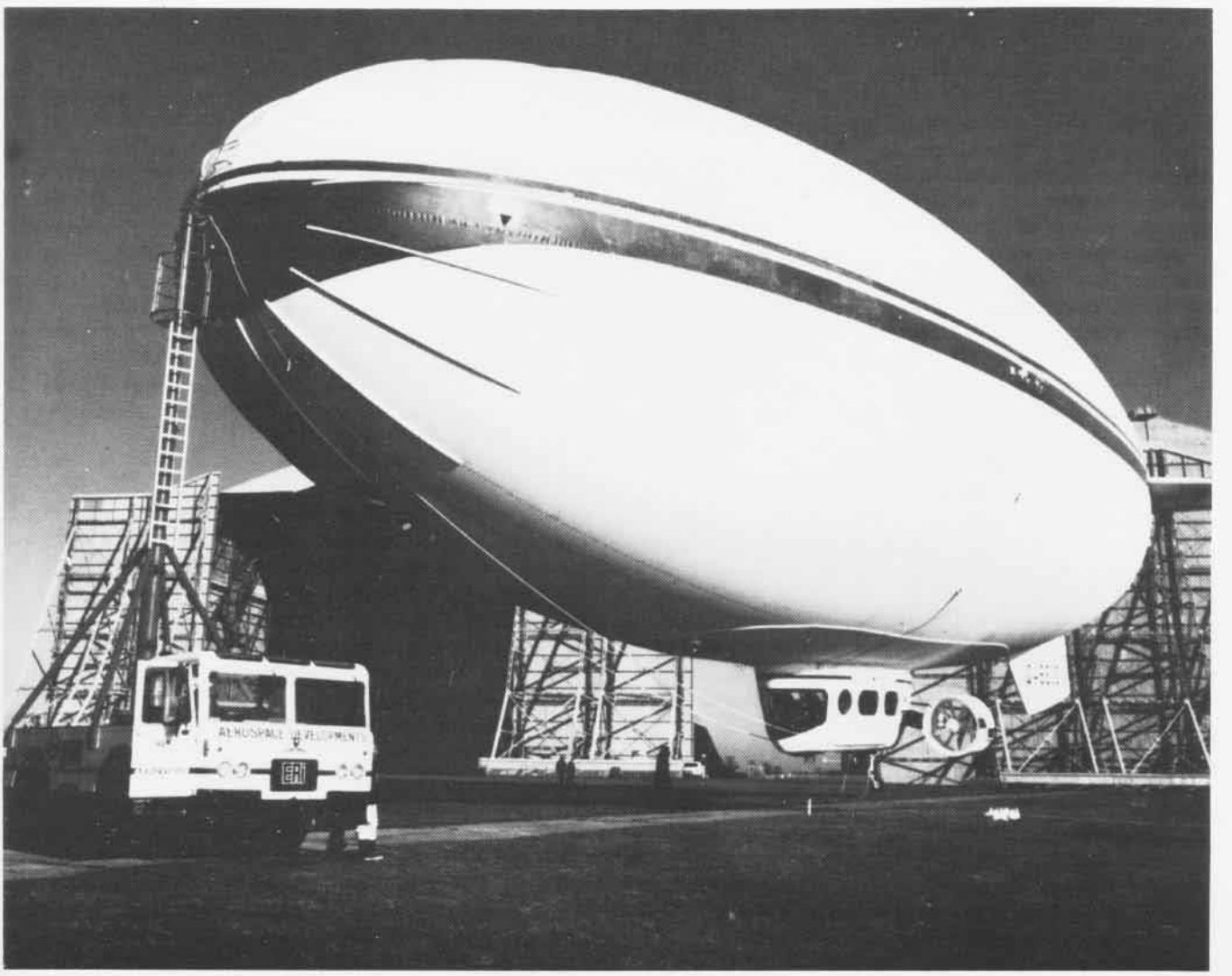
It would be misleading not to mention the fact that while airship activities suffered a limbo period, their ancestor, the balloon, never quite left the scene. During the 1950s, the Navy sponsored some very fundamental research on balloon design based on pioneering concepts by Ralph Upson of earlier metal airship fame. Upson conceived a so-called "natural shape" which instead of a sphere resembled a flat-topped onion. This geometry minimized all circumferential stresses in the balloon skin and enabled designers to take advantage of new ultralight synthetic polymer films for use as balloon envelopes. Using these techniques, balloon volumes soared, opening the path to exploration of the atmosphere up to 150,000-foot altitudes. Today, the scien-

tific balloon, with volumes up to 10 times that of the airship *Hindenburg*, remains unchallenged as a low-cost means of high altitude research in several countries. Many experiments and components designed for space application are also checked out via balloon platforms. In contrast to its space role, NASA is a heavy user of balloons for this purpose, as well as for astronomical and general science research.

Low-altitude versions of natural-shaped balloons using rugged fabric envelopes are presently employed for airborne logging in applications previously described for heavy-lift airships. These represent a step between ground systems and helicopters since they offer some of the benefits of aerial systems and, most of all, low cost. They are, however, limited to ranges of less than one mile since they are operated with cables and movable tether lines.

The need for relatively low-altitude military surveillance brought about the development of improved tethered balloons. During the early 1970s, a very stable tethered system, using a 200,000-cubic-foot balloon, was developed to fly at a 10,000-foot altitude and carry a large scanning radar. The altitude provided scanning circles 150-200 miles in diameter and enabled balloon systems located in the Florida Keys to scan the entire sea-air area below them past Cuba. This system is in heavy use at present not only as an item in the Air Force's TAC system but also invaluable to the Coast Guard and Navy in monitoring surface activities in the Florida Gulf area.

A civil version of the military system was developed by the TCOM Corporation, a division of Westinghouse, to provide telecommunication to areas where none previously existed. It enabled a nation to acquire a 20th century com-



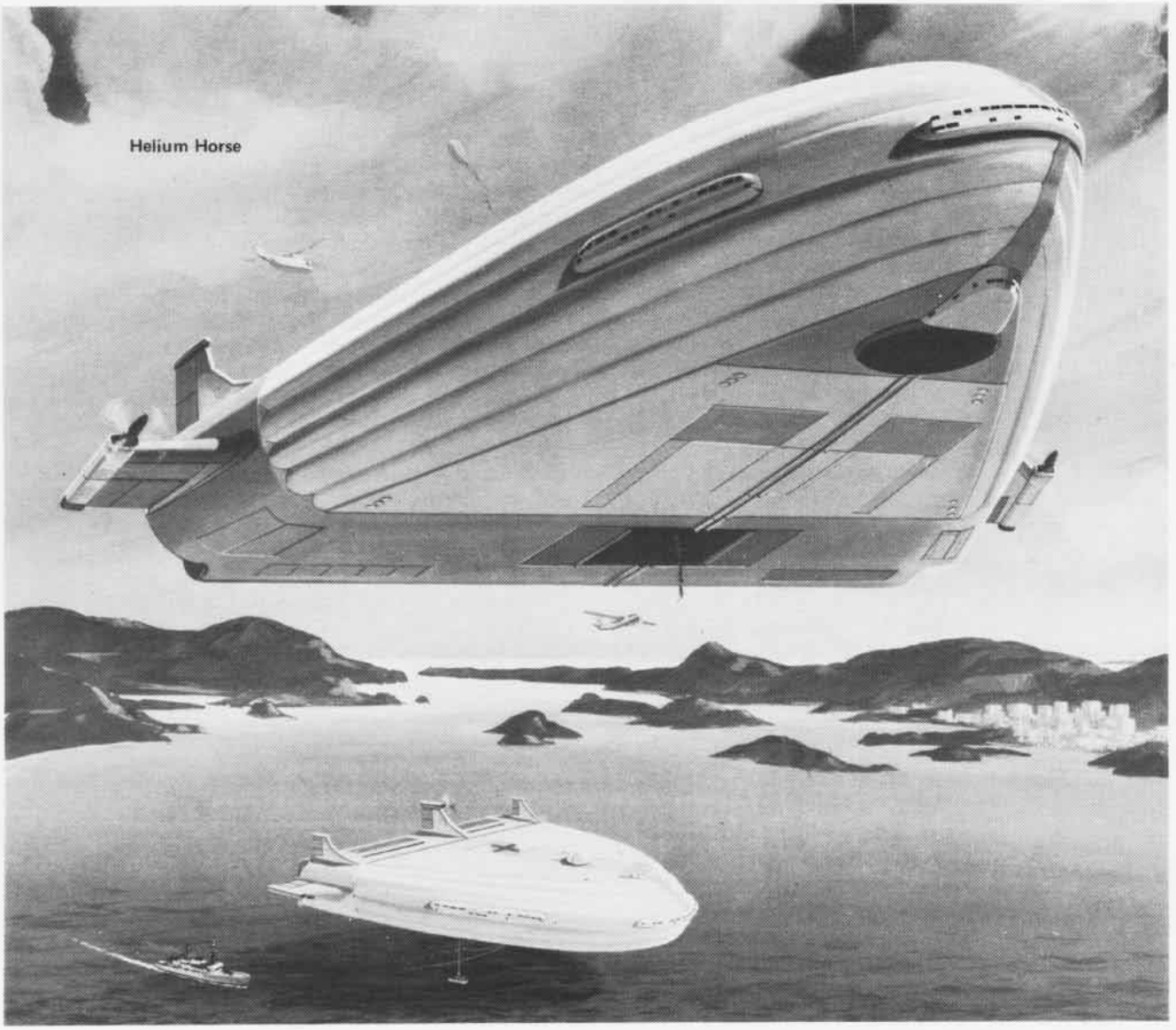
Prototype of British Skyship 500.

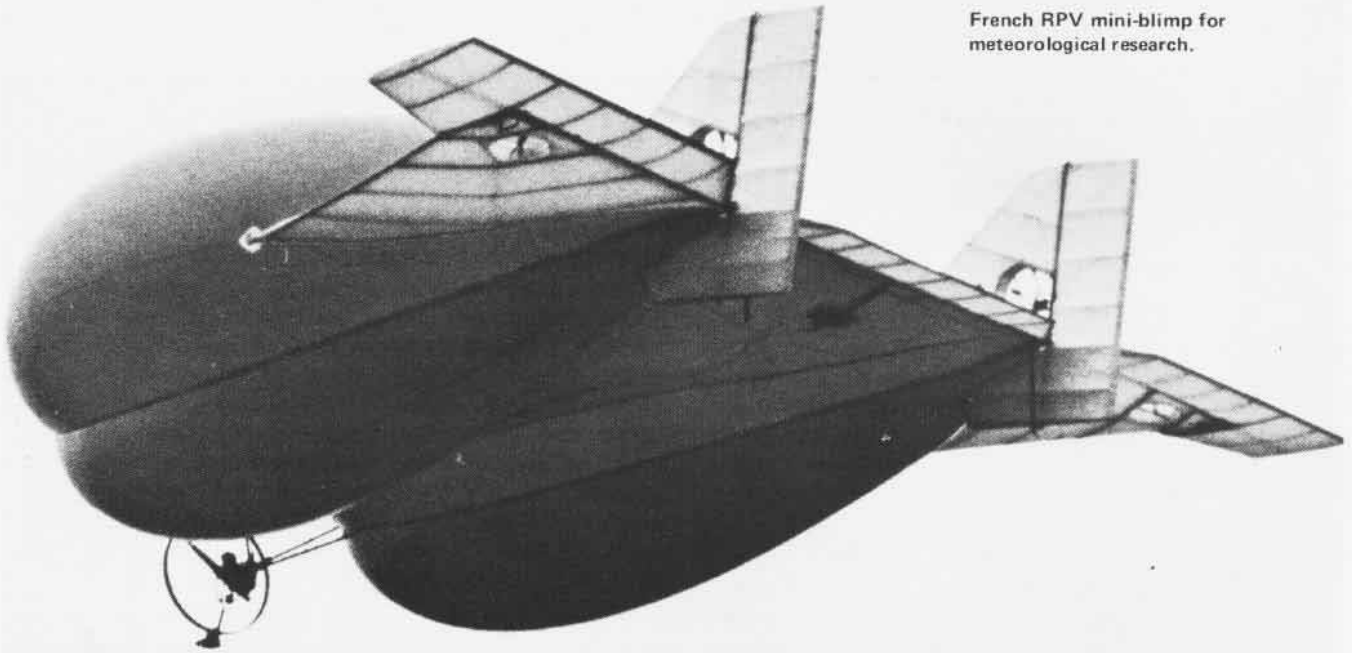
munications capability and to leapfrog the evolutionary development normally required to get there. The TCOM balloons are almost double the volume of the military systems. They can provide several simultaneous VHF and UHF television and radio programs directly to conventional home receivers. The programs are relayed from ground studios to the balloon. Other services include mobile telephone, community telephone service, trunking, air traffic control, medical information services, fire control, and optical surveillance.

Research and Development

Despite renewed interest in LTA, little has been accomplished to improve the data base for new design. A step in this direction has been undertaken by NASA in several parametric studies and research in hybrid airships. The aerodynamics, flight dynamics, and the control of vehicles combining helicopter and airship components are largely unexplored. Preliminary wind tunnel tests, conducted in 1975 as part of studies of modern airships, revealed several discrepancies between analytical and experimental results. These pointed out the need for more accurate analysis and better experimental data. Both of these goals are now part of the NASA program.

In addition, in 1980, NASA and the Coast Guard agreed to cooperate in the development of technology needed for surveillance and patrol-type vehicles. These differ from the hybrids since they must be capable of long endurance flight with high propulsive and aerodynamic efficiency. Although some vectored thrust may be incorporated for low-speed control and hovering, the high drag of full-size rotor systems would not be acceptable.





French RPV mini-blimp for meteorological research.

The Future

Structures and materials will also be the subject of research programs. The overall size and power requirements of airships is directly affected by the structural weight. One component which accounts for a major part of this is the envelope or hull. The design of this item represents a compromise between weight and service durability. The retention of helium gas and the protection of materials over long periods is usually a function of the amount of barrier material in the envelope fabric. In present constructions, this represents half of the fabric weight. Research will include investigation of new cloth and fiber combinations and use of improved elastomers and films.

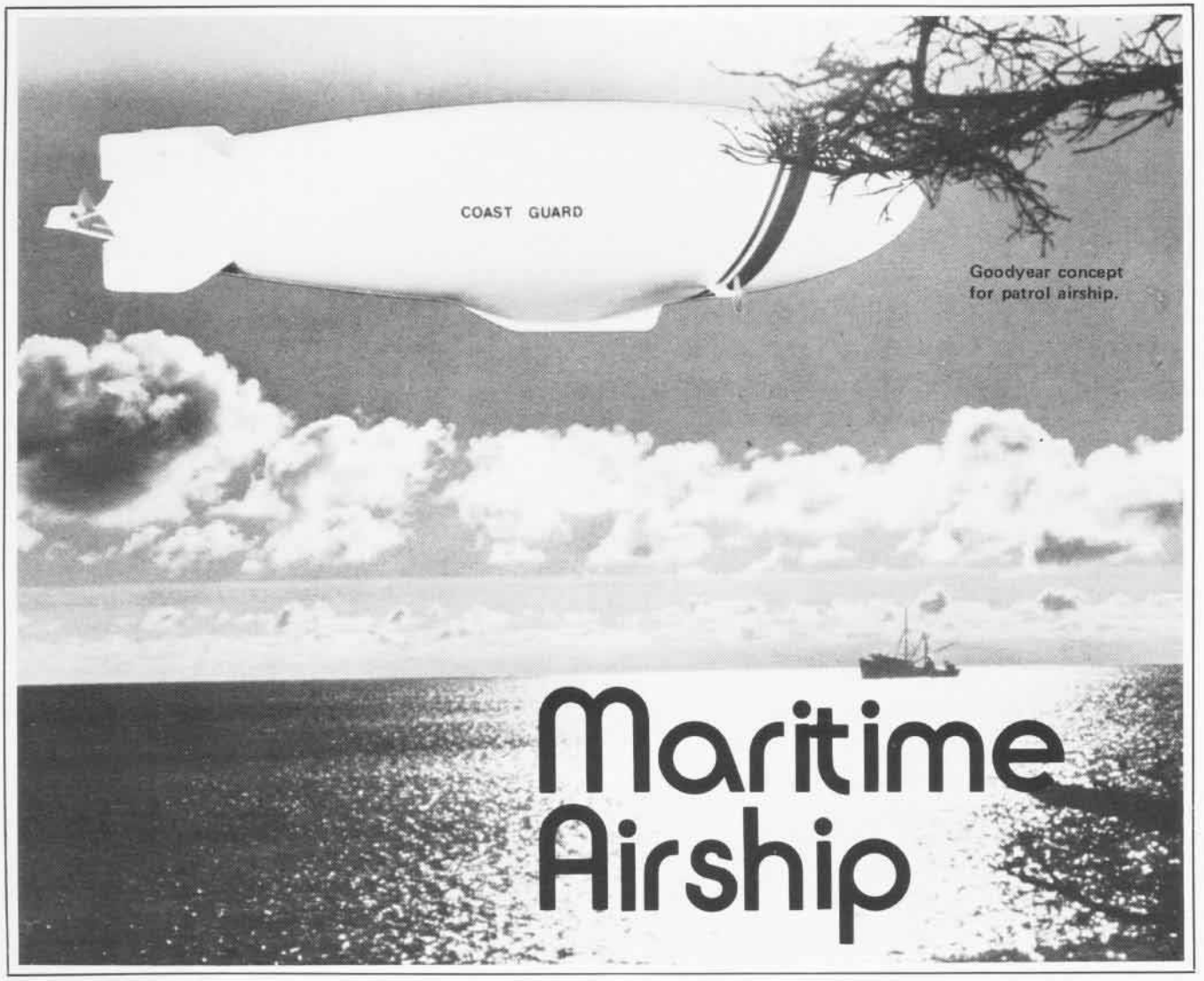
Since the strength and hence the weight of the structure are dependent on the design assumptions regarding loads, it is expected that significant research effort will be devoted to improved definition of the flight environment including turbulence.

A much different effort is also represented in studies of airships as very high altitude platforms. These would function essentially as atmospheric satellites. Both NASA and the Navy are engaged in studies of this kind. The NASA application is aimed at telecommunications and sensor civil missions while the Navy is interested in fleet reconnaissance and surveillance.

It is evident that the subject of lighter-than-air vehicles continues to generate activity and support as organizations and countries seek solutions to new problems in transportation and economic development. Whether airships of any kind will provide the answer to these needs remains to be determined, but certainly the several developmental programs now under way will help to supply the evidence. In addition, the Navy has not eliminated LTA from consideration as a future possibility. It has been included in studies comparing various advanced naval vehicle concepts and was a part of Navy-sponsored NASA studies of modern airships. An operational requirement for a heavy-lift type was also established, although not implemented, and, as already noted, the Navy has been cooperating in assisting other agencies in the evaluation and development of new types.

Aerocrane.

In the past airships and balloons have been most useful when they were unique solutions to problems. Seldom have they offered direct competition to other systems. Often they were the pioneering means to flight, transport and surveillance. New needs in the world and new capabilities in LTA could one day cause this class of aircraft to become again a useful and respectable member of society.



Goodyear concept for patrol airship.

Maritime Airship

Lighter-Than-Air for the Coast Guard?

By Helen Collins

If gunrunning or drug smuggling is your thing, you may be in your boat one day, somewhere offshore, on your way to a rendezvous. Suddenly, you look up. Perhaps it was a shadow overhead that caught your attention. There, hovering above you, is a large, cigar-shaped object. Take heed. You might just as well forget the rendezvous you were on your way to keep, because that object up there is going to keep you under surveillance while it calls for an assist. Or it might even lower a boat with a boarding party!

Coast Guard airships presently exist only on paper and as models but, if current research and development produces the hoped-for results – and the funds needed are forthcoming – the Coast Guard will, in not too many years, be operating lighter-than-air vehicles in maritime patrol operations. Based on the past performance of airships and the infusion of modern technology for propulsion, structures, materials and flight controls, it is assumed that these airships would be hover-capable, have a maximum speed of 90 knots, be capable of vertical takeoff and landing, able to tow sensors and vessels, have low-power requirements and operate in all weather conditions.

In the interval between the end of U.S. Navy airship operations, in 1962, and the middle of the 1970s, the field

of lighter-than-air engineering and development was in a dormant state. The only continuity was provided in flight operations by private firms in the U.S. and West Germany in WW II-type training airships.

Several developments in recent years, however, have focused new attention on these half-forgotten craft. For one thing, fuel conservation has now become a way of life. Then, there has been an increasing awareness of the need to conserve marine resources, which will require the establishment of extensive offshore zones of protection and an expanded surveillance capability.

The Fishery Conservation and Management Act of 1975 added a new dimension to the Coast Guard mission when it established a 200-mile zone outward from most of the U.S. coastline, covering an area of 2.2 million square miles. Added to that have been the problems caused by an increase in illegal maritime traffic.

The new applications have created requirements for airships with characteristics considerably different from past designs. These include VTOL capability under a variety of conditions, long-period hovering and, in some cases, higher speeds – capabilities which may not be available without combining lighter-than-air and heavier-than-air features. Hybrid concepts will require the development of basic aerodynamic data, better understanding of their flight dynamics and other new technology.

There are two major programs in lighter-than-air development under way in the U.S. One is the development of heavy-lift hybrid airships and the other is the Coast Guard program to evaluate airships for maritime surveillance and to develop a vehicle which would be suitable for Coast Guard missions. Many options are being examined, with increasing recognition that there is a place for lighter-than-air and a need for the rebirth of the airship. Senator Barry Goldwater once commented, "Lighter-than-air is older by a century than heavier-than-air craft. Like every pioneering development, it has had its setbacks but the solid accomplishment made entitles it to thoughtful consideration."

Ideally, the modern, conventional airship that would serve the Coast Guard as a surveillance and patrol platform would use approximately one-third the fuel that jet patrol aircraft use on a similar mission. The hybrid airship would combine the economical lift of helium with the technology of rotary wing aircraft. According to Goodyear Aerospace Corporation, which is one of the bidding contractors in the Coast Guard airship program, such an airship might have three power platforms, one engine on each side and two hooked together at the tail. It would cruise with only one stern engine operating and would provide fuel efficiency for long endurance missions.

The Coast Guard airship would resemble the old Navy blimp but, since the engines would be vectorable, the vectored thrust would provide good low-speed controllability to the airship, a near helicopter-like hover capability, thus reducing the amount of ground crew needed to handle it.

The Coast Guard program involves a contract with the Naval Air Development Center at NADC Warminster, Pa., to design, fabricate and test a scaled version of a Coast Guard maritime patrol airship; and a contract with the National Aeronautics and Space Administration to develop the technology, aerodynamics, flight characteristics, etc. NASA has agreed to expand the scope of its existing heavy-lift airship project to include possible configurations and areas of technology which would be compatible with a Coast Guard maritime patrol airship.

The Naval Air Development Center is developing data to evaluate the feasibility and cost-effectiveness of airships in Coast Guard mission areas. It will demonstrate the capabilities and limitations of airships in these areas by testing a subscale, or downsized, demonstration vehicle. The decision to proceed with a subscale vehicle rather than construct a full-size maritime patrol airship was based on time and cost considerations. It is the least expensive route.

The subscale vehicle consists of a remote control flying model 32 feet long and 865 cubic feet in volume. It will be approximately a one-tenth scale version of a Coast Guard patrol vehicle concept and will incorporate a tilting bi-rotor propulsion and control system.

If the data derived from the testing of the small-scale demonstration vehicle indicates the suitability and cost-effectiveness of airships in the Coast Guard mission environment, a long-term program would then begin for the development, test and evaluation of a full-size prototype vehicle in the 1987 to 1988 time period.

The Coast Guard is charged with responsibility for a variety of missions in the maritime environment which might effectively use the capability of an airship.

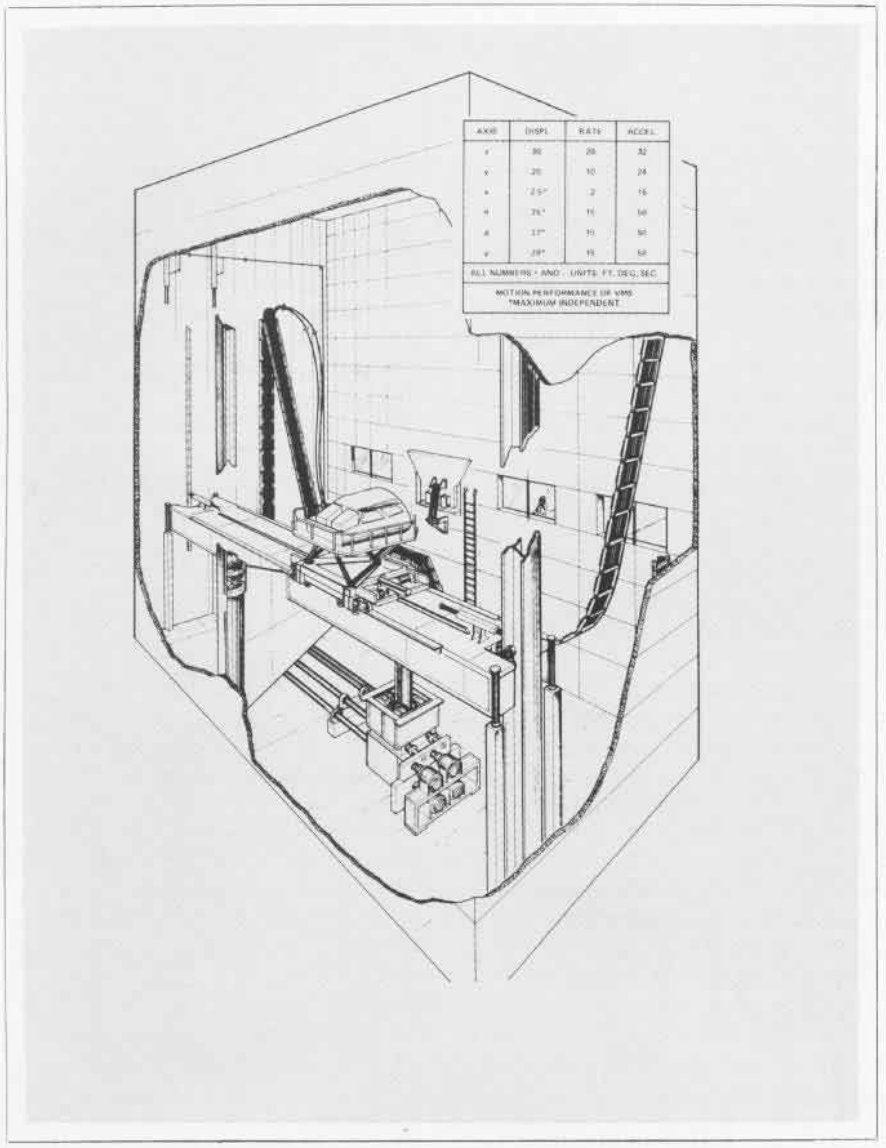
1. Search and rescue, with surveillance capability for the search function, boarding and towing vessels, transfer of equipment and personnel in rescues. (A Coast Guard airship could cover an area of many miles, could launch a boat with a boarding party to examine a suspect vessel, could maintain station over a position, and with long endurance it would be an ideal command, communications and control vehicle in SAR operations and other emergencies.)

2. Preparedness for military operations requiring a capability for surveillance of enemy forces, for towing ASW sensors and countermine devices, protection of offshore installations, convoy duty, logistics support – and an offensive armament capability. As David Bailey at NADC points out, 'since the Coast Guard operates under the Navy in wartime, the two have a sort of cousin relationship at all times.

3. Enforcement of laws and treaties, international agreements concerning fisheries, smuggling of narcotics and aliens, protection of marine mammals and exploitation of natural resources.

4. Marine environmental protection requiring operation of equipment to to clean up oil spills and other pollutants.

5. Port and environmental safety, which involves escorting vessels carry-



Moving base simulator at Ames Research Center used for testing control characteristics of modern airships.

ing hazardous cargoes, etc.

6. Ice operations – icebreaking services on icebound domestic waters and in polar regions.

7. Marine science activities, which include the International Ice Patrol from February to August each season, and other oceanographic activities.

8. Short-range aids to navigation requires the establishment and maintenance of navigation aids such as buoys, beacons, lights and radio beacons in or near U.S. navigable waters.

Surveillance is the common denominator, the single-mission platform characteristic common to all of these programs – the capability to search, detect and identify or examine. Therefore, the surveillance potential of the airship is considered the primary mission requirement. In addition, of course, since Coast Guard operations cover climates which vary from arctic to near tropical conditions, the airship must be able to operate and survive in the full climatic range.

Many technological advances have taken place which have changed airship operations: use of helium as the lifting gas which, since it is non-inflammable, eliminates the greatest hazard to airship safety; engines more reliable and powerful; propellers more efficient with pitch that can be varied; better and more durable materials; more efficient structures; better flight instrumentation and navigation equipment; improved flight control; and improved performance characteristics.

No effort in research and development is ever risk-free or guaranteed to result in viable, cost-effective mission hardware and systems. There are many problems to be solved before an airship system can be integrated into the operational Coast Guard. However, the test and evaluation that takes place in the airship program minimizes the risks and helps to resolve the problems concerning airship application. If the results are positive, airships may one day be taking to the skies again – in the service of the Coast Guard.

David Bailey at the Naval Air Development Center and Larry Nivert and Kenneth Williams of the Coast Guard in Washington, D.C., are guiding the airship program step by step through the gestation period. These men talk to each other daily. They believe in the airship program and are seeking to show the relevance of modern lighter-than-air vehicles to current and future maritime applications. They feel that past operational usage, the fuel-efficient and long-endurance nature of airships, and the ongoing flight demonstration programs document a clear picture of unique capability at an affordable price.

Heli-Stat

Solving a Weighty Problem

By Roy Grossnick

Artist rendering of the Piasecki Heli-Stat showing logging capabilities for U.S. Forest Service.

The gasoline crunch which first reared its head during the oil embargo of 1973 brought long lines at filling stations and a genuine concern about the vulnerability of an energy-dependent U.S. economy. One of the positive aspects of this concern was some serious thought and effort to render American industry more fuel efficient. Some of the proposals put forward have been impractical or uneconomical but others have offered realistic possibilities for further development.

One idea which falls into the latter category is the heavy lift vehicle, a hybrid involving both lighter-than-air (LTA) and heavier-than-air components. The heavy vertical air lift (HVAL) vehicle which evolved from the concept is an almost weightless conveyance with a hover capability and the power to transport heavy loads. It combines the airship lift feature with the additional lifting capability of the helicopter.

One of these unlikely vehicles is currently being developed for the U.S. Forestry Service by the Piasecki Aircraft Company. If the project is a success the Heli-Stat, as the vehicle is called, could significantly reduce the cost of transporting logs from the felling site to a stream, road or railroad siding.

The U.S. Navy is administering the program for the Forestry Service. Mothballed Navy H-34 helicopters and an old ZPG-2W airship envelope are beng employed in the experiment.

Under the concept, four helicopters, two on each side, are connected to beams running athwartship. These are connected to a keel which is attached to the envelope. Anti-torque rotors on the helos are replaced by pusher propellers for motion in the horizontal plane.

A pilot stationed in the left rear helo cockpit operates the entire mechanism although each of the three nonpiloted helos will be manned by a flight engineer. The result is a system which is expected to have a lift capability greater than any U.S. helicopter now in existence.

While the HVAL, if successful, will have a wide variety of civilian applications, it may also have significant military potential. Its advocates suggest shore-to-shore, ship-to-ship and ship-to-shore logistics employment. The latter capability may be particularly valuable in areas where wharf facilities are limited or nonexistent.

The Heli-Stat is being constructed in an old Navy airship hangar at Naval Air Station, Lakehurst, N.J. It is scheduled for delivery to the Forestry Service in mid-1982. When ready, it will be one of the world's first operational HVAL vehicles and may well be in the vanguard of a limited lighter-than-air revival.

Holden C. Richardson

From an article by William J. Armstrong, Historian, NavAirSysCom, NANews, *April 1977*

In April 1912, Holden C. Richardson was on temporary duty with the Navy's aviation unit at North Island, Calif. A young lieutenant, he was there at the order of the Director of Naval Aeronautics, Captain W. I. Chambers, to study the questions surrounding the operations of aircraft from water.

Richardson was fit for the task. He had an analytic mind and a keen understanding, for his day, of aerodynamic and hydrodynamic laws, and he was determined to see them applied in a systematic manner compatible with his engineering training and outlook. His approach was badly needed, but it often ran counter to the trial-and-error method so popular in those early years of aviation.

As the Navy's first engineering test pilot, Richardson pioneered in nearly all areas of aeronautics, especially in the testing and design of seaplane floats and flying boat hulls. His work with models and wind tunnels made him an authority recognized throughout the world. He was an original member and the first secretary of the National Advisory Committee for Aeronautics which was the forerunner of NASA. But these were not all of his achievements. Throughout his career he never deviated from his fundamental belief that cut-and-try experiments must give way to the engineer's technique. His conviction left a permanent stamp on Naval Aviation.

Initially, it may seem that Richardson's position in naval aeronautics is obvious, but such is not the case. Everyone recognizes him in summaries of the subject, and students of aviation history know his name, but his activities are inadequately delineated and his exact accomplishments remain vague. However, he must have been more than just another early Navy pilot. Merely being a designer of flying boats would hardly merit his induction into the Aviation Hall of Fame on July 22, 1978. Something about him commanded the enduring respect of his colleagues, placed him among Naval Aviation's greats, and led Vice Admiral Patrick Bellinger to remark, "Dick Richardson . . . did more for Naval Aviation and got less credit for it than any one I know."

Born in 1878 in the little coal mining town of Shamokin, Pa., Richardson lived there until 1897 when he won a competitive appointment to the Naval Academy. He finished his instruction in 1901 and spent the next two years at sea as a midshipman to fullfill requirements, receiving an ensign's commission in June 1903.

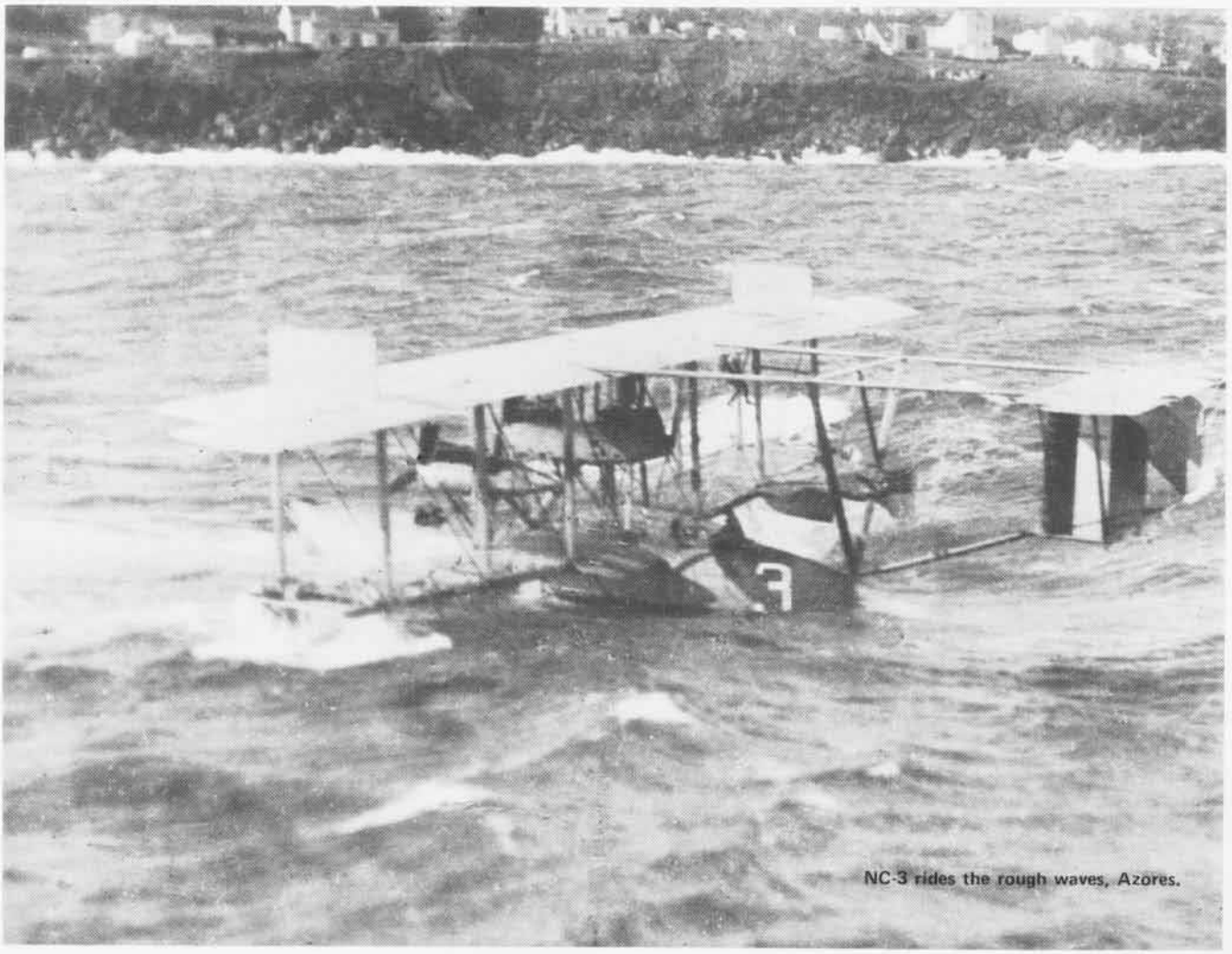
By then, Richardson's noticeable engineering talent caused his superiors to consider him for further education. In 1904, they made him a lieutenant junior grade and Assistant Naval Constructor with orders to proceed to M.I.T. for advanced study. Three years later, he had attained his B.S. and M.S. in engineering, and reported to Newport News as Assistant Superin-

tending Constructor. There, he began to apply his interest in aeronautics and hydrodynamics. Shortly after his arrival, he made an ascent in a captive spherical balloon. The next year he built a box kite and a canvas canoe. In 1909, he fitted hydrovane blades to his canoe which could then plane-in-tow at five knots. His success convinced him that he should pursue the concept further. That same year he left Newport News and was assigned to the Philadelphia Navy Yard, where he undertook more experiments.

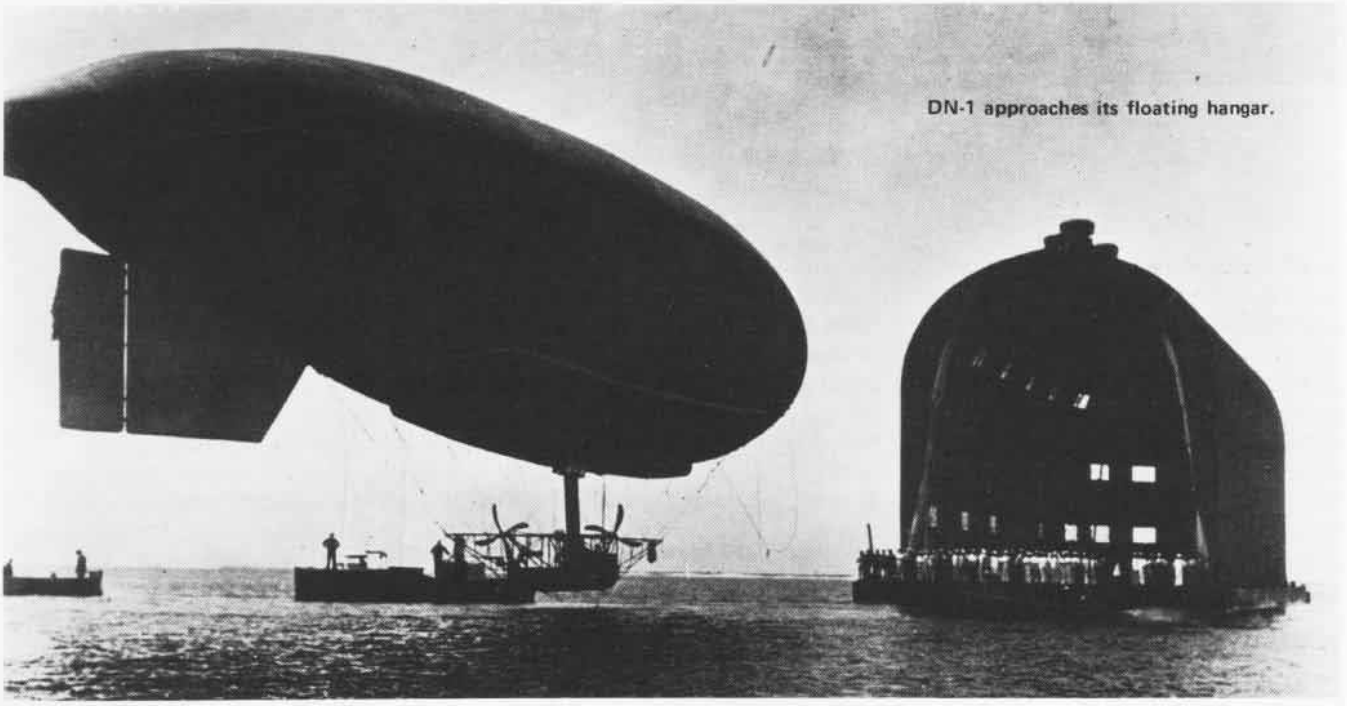
The encouraging results of Richardson's efforts in 1910 with a glider towed behind an automobile and a dinghy equipped with hydrovanes brought him to the attention of Capt. Chambers, who saw an opportunity to involve the promising young engineer in Naval Aviation. Richardson was equally enthusiastic because, thus far, his aeronautic efforts had been unofficial and carried out during off-duty hours.

Early in 1912, Chambers arranged for Richardson to come to Washington, D.C., and spend some time working with David Taylor and William McEntee at the Model Basin in the Navy Yard. While there, he elaborated upon his theories and developed some new ones.

In January, the Naval Aviation Camp moved from its location at Greenbury Point, Md., to North Island, Calif. This shift was only temporary and, with summer, the flyers were back at Annapolis. However, the weeks spent on the West Coast were important enough to warrant assigning such people as T. G. Ellyson, John Towers, Victor Herbster and John Rodgers to participate in the flight activities. Richardson joined them in February and devoted his time to testing pontoons of his and McEntee's design and to learning how to fly. Glenn Curtiss was instructing stu-



NC-3 rides the rough waves, Azores.



DN-1 approaches its floating hangar.

dents at the time but, to avoid slow progress as one among several, Richardson's training was placed in Ellyson's hands. He later went on to finish his instruction under John Towers. Although he was the Navy's first engineering test pilot, Richardson did not receive his designation, #13, until 1915. It was slow in coming partly because he was a naval constructor and had duties that frequently took him from aviation training.

Capt. Chambers had toyed with the idea of an effective catapult for launching aircraft from aboard ship for a long time. Late in 1911, he set about designing such a device, with Richardson's collaboration. By the summer of 1912, the plan was complete. They built the catapult at the Washington Navy Yard and moved it to the Naval Academy in mid-June for installation. But the launch failed as Ellyson rode an A-1 *Triad* into the Severn River. Ellyson was unharmed and the catapult was returned to the Navy Yard for further study. In November, Richardson set up the catapult on a barge on the Anacostia River. This time Ellyson piloted a new Curtiss seaplane, the A-3, and the operation was successful.

From late 1912 until 1916, Richardson worked at the Model Basin, attempting to perfect seaplane floats and flying boat hulls. The results were invaluable and the techniques used were as untried as the concepts being tested.

Richardson was one of the earliest engineers to apply model basin testing to aviation. He was also designer of one of the first U.S. Government-built aircraft, the 82-A, and supervised its construction at the Washington Navy Yard in 1915-16. Concurrently with the design of this aircraft, Richardson devoted further time to the catapult question. In January 1914, he completed a new catapult and it was moved to Pensacola for tests but was not used for over a year. In the spring of 1915, Richardson and pilot Lt. Patrick Bellinger conducted experiments with the catapult aboard a coal barge. Ultimately, it was installed aboard USS *North Carolina.* On November 5, Lieutenant Commander Henry Mustin flew an AB-2 flying boat off the catapult in the first successful launch from aboard a ship underway.

Staying on at the Model Basin until mid-1916, Richardson then left for a new assignment at NAS Pensacola. By the time he left Washington, he had assisted in designing the wind tunnel at the Navy Yard, supervised the construction of the floating dirigible hangar used at Pensacola, and had drawn up the specifications for the Navy's first airship, the DN-1.

Throughout WW I, Richardson divided his time between Pensacola and the Curtiss plant at Buffalo, N.Y., where he was Naval Inspector. He also had responsibilities at the Naval Aircraft Factory, Philadelphia, where he shared in the development or modification and production of many aircraft which the Navy accepted before the Armistice.

In late summer 1917, the Navy took an interest in building large flying boats for antisubmarine warfare. Known as Navy-Curtiss NCs, they were designed for transatlantic ferrying. The NC-1 was built at the Curtiss plant in Garden City, Long Island, N.Y., with Navy and Curtiss engineers cooperating. Navy engineers were G. C. Westervelt, J. C. Hunsaker and Richardson. Richardson's main duties concerned the craft's hull, which was based on an existing Curtiss design.

As it finally developed, three NCs were used for the transatlantic flight. By May 1919, NCs 1, 3 and 4 were assembled at NAS Rockaway and were ready for flight. The commander of NC-3 and of the squadron was Commander John Towers. Richardson was copilot. Unfortunately, NC-3 encountered bad weather en route and was badly damaged. The crew had no choice but to "sail" the craft the remaining 200 miles toward its destina-

tion in the Azores. On the evening of May 19, they blew backwards into the harbor. NC-1, commanded by LCdr. Bellinger, suffered a similar fate. It was forced to land, sustained damage precluding flight and was later taken in tow by a Greek vessel. Eventually it broke up and sank. NC-4, under Lieutenant Commander Albert C. Read, was the only NC to complete the flight, arriving in the Azores on May 17, and at Lisbon, Portugal, on May 27.

Richardson spent much of the next decade designing and testing Naval Aviation projects. However, he freely admitted that his "big moments" had come and gone with the flight of the NCs. At that point, his reputation was solidly established and he might have coasted easily into calm retirement. But Dick Richardson was too dynamic an individual ever to wear well the status of a museum piece. It was easy for him to work hard at avoiding it throughout the remaining 40 years of his life.

From 1919 to 1923, he was chief engineer at the Naval Aircraft Factory where he designed the turntable catapult, capable of rotating on a turret and launching a plane in most directions without turning the ship. Richardson also assisted in the design of *Shenandoah,* the first Navy-built rigid airship. He developed experimental metal floats, which he had long considered preferable to wood, and eventually spearheaded the general adaptation of metal for use in naval aircraft.

He left Philadelphia in 1923 and became head of the Design Branch of BuAer's Material Division. Following his retirement in 1929, Capt. Richardson accepted a position as engineering consultant with Allied Motor Industries' Great Lakes Aircraft Corporation. His separation from the Navy was short-lived. In 1936, he was recalled to active duty as a consultant in patent work with occasional engineering responsibilities. He remained on active duty until 1946 when age forced his second retirement.
In later years, Richardson could be found daily at a desk in the Main Navy complex in Washington, D.C., where he occupied himself with the design drawings of a later generation of engineers and worked on historical matters. He died on September 2, 1960.

Much of the work Richardson did no longer has a place in the Navy. Seaplanes, flying boats and even the turntable catapult have become obsolete in an age of giant aircraft carriers. Yet, he was a vital part of Naval Aviation in its early formative years. He stood in the forefront of research and development and pointed the way for others to follow.

Richardson, in his 70s, posed by commemorative plaque in Washington, D.C.

TOUCH AND GO

Coming and Going With the Carriers

Aboard *Constellation* in July, 83 crew members reenlisted. In two separate flight deck ceremonies, they shipped over for a total of 321 additional years of service and $280,674 in reenlistment bonuses. Chief of Naval Operations Admiral Thomas B. Hayward gave the reenlistment oath at the second ceremony, July 31.

The two F-14 crews who shot down attacking Libyan planes.

The carrier *John F. Kennedy* spent the first two weeks of September undergoing refresher training in the Caribbean with Carrier Air Wing Three aboard. Along with "Big John's" training was a man overboard that was no drill. A crewman from food services fell from a sponson and an alert shipmate yelled, "man overboard." An equally alert watch threw a life ring and, 11 minutes from the time the bridge was notified, HS-7's helicopter deposited the wet but safe crewman back aboard.

During operations in the Mediterranean, two F-14 *Tomcats* from *Nimitz* shot down two Libyan SU-22 aircraft, following an unprovoked attack by the Soviet-built Libyan jets. The VF-41 *Tomcats,* deployed with Carrier Air Wing Eight, were flown by pilot Commander Hank Kleeman and radar intercept officer Lieutenant Dave Venlet; and pilot Lieutenant Larry Muczynski with RIO Lieutenant Jim Anderson.

President Ronald Reagan, visiting *Constellation* on August 20, referred to the incident the previous day in which the Navy F-14s had shot down the Libyan aircraft. "We did not go there to shoot down a couple of Libyan planes," said the President. "They came out and fired on ours.

"We all sleep a little better at night knowing you are on duty," he told more than 2,000 cheering crew members, adding that the Navy would not be taken for granted during his administration.

Saratoga is undergoing a major face-lift as part of the Navy's service life extension program (SLEP) at the Philadelphia Naval Shipyard. She is the first of the *Forrestal* class to undergo the baseline and life enhancing modernization program and is tentatively scheduled for completion in January 1982. *Forrestal, Independence* and *Ranger* are scheduled for SLEP between 1983 and late 1989.

Reservists Patrol Up Front

A five-month Western Pacific deployment by five Naval Air Reserve patrol squadrons concluded August 16. Those involved were VP-60 and VP-90 out of NAS Glenview, Ill.; VP-69 from NAS Whidbey Island, Wash.; VP-67 of NAS Memphis, Tenn.; and VP-65 from NAS Point Mugu, Calif.

Flying alongside their active duty counterparts in support of Commander Task Group 72, the reservists supplemented active duty crews in meeting ASW, battle group support, surveillance, search and rescue, and refugee assistance missions.

Operational training periods were spent at Kadena Air Force Base, Okinawa; Cubi Point, R.P.; and Utapao, Thailand. The aircrews accumulated 3,565 flight hours in 432 sorties, of which 95 percent were operational.

Numerous reserve crews received the Humanitarian Service Medal for participation in Operation Boat People rescue service. Reserve squadrons also received the Golden Lens Award for achievement in photo reconnaissance during three of the five months deployed.

Commodore Edward Anderson, Commander Patrol Reconnaissance Forces, Seventh Fleet, commended the Naval Air Reservists.

"Their performance across the spectrum of operational employment was superb," he said. "It clearly reflected the credibility of the VP reserve program."

JO2 Nancy Dodge

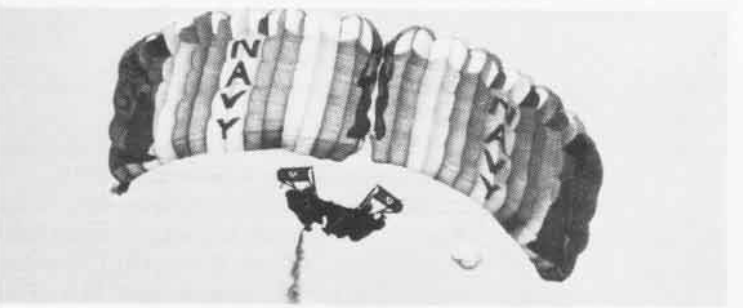
Lemoore Aerial Open House

NAS Lemoore marked its 20th anniversary June 27-28 with an air fair and open house that drew more than 57,000 persons. The celebration also commemorated the 70th anniversary of Naval Aviation, and the 35th anniversary of the Navy's Blue Angels aerial demonstration team.

Despite temperatures of over 100 degrees on both days, crowds thronged such events as the chili cookoff competition, an "over 30" softball game between the Navy and the area's leading contemporary music radio station, a Filipiniana Fiesta, and a music festival at the station theater. Hangar exhibits and static display aircraft were popular features, and the highlights included the Navy's Hot Air Balloon Team, the *Leap Frogs* parachute exhibition team, and the *Blue Angels*.

A field of 412 runners participated in the 13.1-mile half-marathon, including some from as far away as Washington State. Among the entrants was a 61-man formation from the Lemoore Marine Barracks which finished, still in formation, to the cheers of spectators.

"The events of the weekend far exceeded expectations in terms of enhancing community relations, recruiting and understanding," said Dave Fraker of the Lemoore Public Affairs Office.



Navy parachutist helps mark NAS Lemoore 20th anniversary.

VXE-6 Deep Freeze Bound

Antarctic Development Squadron Six (VXE-6) recently completed Operation *Fly-In* in support of Operation *Deep Freeze*. The flights, conducted under severe weather conditions, are vital for establishment of the early season programs at McMurdo Station on the Antarctic Continent, and to augment the winter detachments.

The squadron is presently deployed for a five-month period to Christchurch, New Zealand, and McMurdo Station. Weather conditions during that time, beginning with arrival of the austral summer, are the most favorable to human exploration.

VXE-6, under skipper Commander Paul Kykeman, is the only squadron of its kind and has as its sole mission the airborne logistic support of the entire range of *Deep Freeze* Antarctic exploration. They provide Operation *Deep Freeze* the unique capability of almost limitless range over the 5.5 million square miles of frozen continent.

This is VXE-6's 27th deployment in support of the National Science Foundation-sponsored operation.

Magic Sword Strikes

Approximately 60 ships and almost 200 aircraft from eight NATO nations participated in two similar, but separate, exercises in September. Exercises *Magic Sword North* and *Magic Sword South* were held to demonstrate and improve the capability of allied forces to conduct maritime operations under wartime conditions.

Magic Sword North took place in the Norwegian Sea, during which the Striking Fleet Atlantic, under command of Vice Admiral James A. Lyons and comprising two U.S. carrier battle groups, provided tactical air support to allied forces in Norway. *Magic Sword South* utilized one U.S. carrier battle group to provide tactical air support to allied forces in Denmark and central Europe.

Surface, air and subsurface opposition to the *Magic Sword North* carrier battle groups came from Norwegian and U.S. units. Denmark, the Federal German Republic, Norway and the U.S. provided opposition units in *Magic Sword South* operations. Other nations participating in the exercises included Canada, the Netherlands, Portugal and the United Kingdom.

Newest Hawkeye Arrives

Carrier Airborne Early Warning Squadron 116 has received its first E-2C advanced radar processing system (ARPS) *Hawkeye* aircraft. Among those to welcome the arrival was Vice Admiral Robert F. Schoultz, Commander Naval Air Force, U.S. Pacific Fleet and the reigning Gray Eagle.

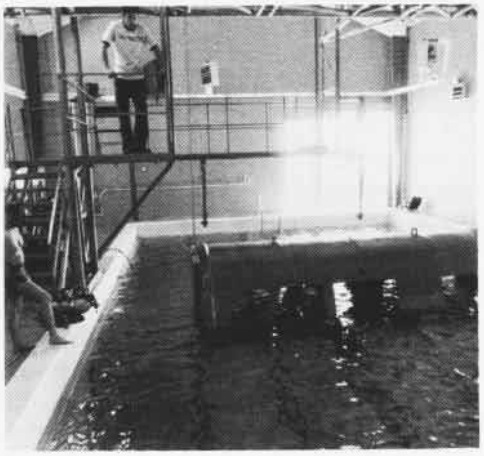
The E-2C was the first of its kind to be delivered to the Miramar airborne early warning community, and the first of its kind on the West Coast.

The *Sun Kings* have received a total of two new *Hawkeyes* and are awaiting two more to fill the squadron complement. The squadron is part of Carrier Air Wing Two and is awaiting deployment aboard *Ranger*.

Latest Sun King E-2C turns up.

Rescues

The value of water survival training using training devices, was vividly demonstrated in a helicopter accident. On April 6, 1981, while conducting water training exercises, a Coast Guard HH-52A overturned and sank in Jamaica Bay, N.Y. The three crew members safely egressed from the helicopter after it rolled inverted. All three had received training at the Naval Aviation Schools Command, NAS Pensacola, Fla., in the 9D5 Universal Underwater Egress Trainer or Multiplace Dunker, as it is commonly known, within the last year. The crewmen felt the training had been invaluable in their successful escape from the inverted helo. They described their ex-



perience as "just like the multiplace dunker." (See *NANews,* April 1981, "Training for Survival in the Open Sea," pp. 12-15.)

VR-24 has received another commendation for its professionalism and concern, after once again laying it on the line to help others in need. Recently the ammunition supply ship USS *Nitro* had a major fire in her engine area that brought the ship to G.Q. Only quick action by the crew saved the ship from almost certain disaster. There were some seriously injured who required immediate medical attention. Shortly after being requested to make the medevac attempt, the VR-24 crew took off in an RH-53D. The pilots had only a rough estimate

of *Nitro's* position and night had already fallen. Although the flight deck of *Nitro* is not H-53 certified, they found that it was larger than some they had been servicing during their det in Souda Bay, so they felt it safe to try. LCdrs. Livio Capilla and Paul Russell, and crewmen AD1s Greg Atz and Alan Robinson, AD2 Constance Woodworth, and ATAN Chris Husted evacuated the injured sailors that night. The entire crew has been recommended for commendation. But the real reward was in the satisfaction that comes with helping shipmates in need.

Established

Air Anti-Submarine Squadron 0294 was established July 1, 1981, at NAS North Island. VS-0294's mission will be to train and qualify pilots, Naval Flight Officers, enlisted anti submarine warfare operators, aircrewmen and maintenance personnel to augment fleet carrier ASW squadrons in the event of mobilization. Rather than utilize Reserve Force equipment, the unit, with the exception of maintenance personnel, will train on simulators or trainers, which are realistic mock-ups of S-3As.

Records

Several units marked accident-free flight-hour milestones: VT-46, 140,000 hours; HML-267, 70,000; VMGR-352, 60,000; VP-68, 50,000; VMA(AW)-121, 39,000; HS-74, 35,000; VT-24, 25,000; HMM-165, 23,000; VA-72, 20,000; and VS-30, 14,000.

Some units recorded safe flying hours in years: VP-49, 19 years; VP-56, 17; VAW-114, 10; HC-3 and VA-113, 7; VA-127, 6; VF-24, 5; and VX-1, 4.

The *Tigertails* of VAW-125 recently made E-2 history when they flew a record-setting 1,101.2 flight hours during the second quarter of 1981.

Lt. George Keeler, the VS tactics officer at VX-1, recently received Lockheed's 1,500-hour milestone plaque for S-3A Naval Flight Officers. Lt. Keeler has over 2,300 hours in the *Viking.*

VR-24 achieved a new record during carqual ops on board *Forrestal,* while off the coast of Palermo, Sicily, when squadron flyers bagged 66 traps in the C-1A *Trader* and 24 traps in the C-2 *Greyhound.* Two of the C-1 pilots made their first trap during the operations. Ltjg. Mike Veringa and Ens. Dave Mahoney earned the anchor on their Navy wings. Cdr. Koch, C.O. of VR-24, was on hand to congratulate the two in a wetting down ceremony after their first day of carrier qualifications.

Ltjg. Elizabeth Toedt became one of the first women to carrier qualify. She completed 10 arrested landings in a propeller-driven C-1A *Trader* aboard *Constellation* off the coast of southern California. The 23-year-old Naval Aviator is assigned to VRC-30, NAS North Island. The squadron, commanded by Cdr. D. R. Gapp, is tasked with supporting Pacific Fleet carriers by supplying equipment, mail and personnel via the C-1A COD aircraft. In addition, VRC-30's flexibility and rapid response allow the squadron to provide high priority airlifts. "I joined the Navy to land on carriers and I've finally done it. I hope there'll be many more," Toedt said. "I was happy I had a good copilot and landing signal officer," she added. Ltjg. Toedt is the second woman to carrier qualify in VRC-30. Lt. Rebecca Beener accomplished her carrier qualification in VRC-30 in April 1980.

Et cetera

Airman David M. Horvath peers through a 20-foot-long cylinder on the flight deck of *Ranger* (CV-61). The cylinder is but a small part of one catapult on the carrier. Each of the ship's four catapults has two

pistons, each over 250 feet long. The cylinder shown here is a part of the long shaft which covers the pistons. Horvath took a break from cleaning the cylinder to smile for the camera. *Ranger's* crew is working to rehabilitate the carrier after her recent deployment to the Western Pacific and Indian Oceans.

Four bells rang on board *Kitty Hawk* and the public address system announcer intoned, *"Kitty Hawk* departing." However, this time, that routine announcement of the commanding officer leaving the ship meant something just a bit different for the *Kitty Hawk* crew. They were in 30,000-foot-deep water just five miles off the coast of Saipan. It was time for "swim call" and the captain was the first one in the water, followed by 1,600 "Hawkmen." This was a common

practice on Navy ships years ago, but swim calls have been few and far between recently. According to executive officer Capt. J. L. Unruh, "In typical fashion, *Kitty Hawk* doesn't worry about what other carriers have or haven't done. We aren't necessarily looking to do things different from other ships — just to do what is best for the crew."

On July 24, Squadron Leader Nobby Clark, of the Royal Air Force, made his last flight in the U.S. with VF-171. Flying with the squadron leader was his replacement FltLt. Al Pulfrey. Sq.Ldr. Clark, one of VF-171's three RAF exchange officers, had been assigned to the squadron since May 1979. Clark will report to RAF Coningsby upon his return to the British Isles where he will be a member of the course design team for the F-2 *Tornado*.

Honing the Edge

A bomb-laden A-4 prepares for takeoff on the expeditionary airfield at Marine Corps Air-Ground Combat Center, Twenty-

nine Palms, Calif., during a recent combined arms exercise.

Change of Command

AIMSO, NAS Patuxent River: Capt. William K. Tracy relieved Capt. Ronald W. Pyle.

ComNDW: RAdm. Lowell R. Myers relieved RAdm. Karl J. Bernstein.

ComFAirWestPac: RAdm. James W. Austin relieved RAdm. Jack F. O'Hara.

ComTacGru-2: Capt. D. E. French relieved Capt. W. F. Agnew.

CVW-1: Capt. James T. Matheny relieved Capt. James B. Best.

CVW-11: Cdr. F. Lee Tillotson relieved Capt. R. E. Smith.

CVW-6: Capt. James A. Lair relieved Capt. Timothy W. Wright.

FASOTraGruPac Det Moffett: Cdr. James C. Barnes relieved Cdr. Kenneth M. Kirkwood.

HS-1: Capt. Barry A. Spofford relieved Capt. Roger L. Rich.

HS-74: Cdr. John T. Williams relieved Cdr. David B. Frye.

H&MS-16: Maj. John D. Reeke relieved LtCol. William R. Gage.

MACS-5: Col. Joseph W. Robben, Jr., relieved Maj. John D. Schessler.

MCAS El Toro: Col. Richard C. Hoffman relieved Col. Herbert F. Saeger.

MWHS-3: LtCol. George W. Burkley relieved LtCol. James E. Hayes.

MWSG-37: Col. D. Edward Baker relieved Col. Alvin Ribback, Jr.

NAS Miramar: Capt. James E. Taylor relieved Capt. Roland K. Huisman.

NAS North Island: Capt. Robert B. Watts relieved Capt. Warren E. Aut.

NATSF: Cdr. William K. Arnold, Jr., relieved Cdr. Robert A. Kogler.

ResASWTraCen, NAS Willow Grove: Cdr. Fred Wood relieved Cdr. Bob Fletcher.

TraWing-5: Capt. John P. Smith relieved Capt. Kenneth A. Dickerson.

U.S. Naval Academy: VAdm. Edward C. Waller relieved VAdm. William P. Lawrence.

VA-128: Cdr. Rod Franz relieved Capt. J. M. McNabb.

VAW-121: Cdr. Donald E. Walker relieved Cdr. Jay W. Sprague.

VAQ-309: Cdr. Dixon J. Smith relieved Cdr. James W. Pate.

VF-2: Cdr. Chris Wilson relieved Cdr. Bob Hickey.

VMFA-312: LtCol. Randy H. Brinkley relieved LtCol. Thomas A. Schmidt.

VMFA-314: LtCol. Robert L. Pappas relieved LtCol. Donald D. Bergman.

VP-31: Cdr. Kenneth D. Sullivan relieved Capt. Robert M. Howard.

VP-67: Cdr. Myron G. Hamm relieved Cdr. Robert H. Tietz.

VP-4549: Cdr. Ronald G. Whittaker relieved Cdr. Donald A. Hannsz.

VR-56: Cdr. Morris D. Newton relieved Cdr. Melvin G. Burkart.

VR-58: Cdr. J. W. Seeley relieved Capt. R. W. Kortum.

VS-38: Cdr. Lee M. Telquist relieved Cdr. Richard T. Myers.

Professional Reading

By Lieutenant Commander Peter Mersky, USNR

Lamb, Commander Charles. *To War in a Stringbag.* Bantam Books, 1980. 369 pp. No photographs; illustrated with drawings and maps. $2.50.

To British carrier pilots of WW II, "Stringbag" meant only one thing: the Fairey *Swordfish,* a lumbering biplane designed in 1933 as a combination torpedo/spotter/recce aircraft. The *Swordfish,* as archaic as it was when war began, was employed until the end of hostilities and participated in several historic actions, especially during the first three years of the war. This entertaining book was written by a *Swordfish* pilot who flew this aircraft through the hectic period which followed the invasion of Poland in 1939. He served aboard HMS *Courageous,* and participated in the historic attack on Taranto Harbor in 1940, which effectively ended any threat from the Italian Navy. This officer was also on hand during British efforts to assist Greece in 1941. Besides containing some exciting descriptions of an area of combat operations less well known to most Americans, this book also provides a glimpse of life aboard a carrier in wartime. The story is told in a down-to-earth style, laced with British humor.

Pearce, George F. *The U.S. Navy in Pensacola.* University Presses of Florida, Gainesville, Fla. 1980. 207 pp. Illustrated, indexed.

This book covers the early history of the Pensacola area from the 16th century under Spanish rule, through the establishment of a U.S. navy yard in 1825, to the creation of the nation's first Naval Aeronautic Station in 1913. World War I and postwar activities are also detailed through the 1920s. Those who have spent any time in the Pensacola area, should find this book of both nostalgic and historic interest. Photographs of the developing complex, personalities and aircraft add to the story.

O'Neil, Paul. *Barnstormers & Speed Kings.* Time-Life Books, Alexandria, Va. 1981. 176 pp. Illustrated, indexed. Bibliography. $12.95.

This volume of the *Epic of Flight* series concerns itself with the unique collection of people, airplanes and events of the 1920s and 1930s, usually referred to as the barnstorming era of aviation. Peace always brings periods of uncertainty and unemployment for wartime flyers and those who stayed with the new business of flying after WW I sometimes found themselves wandering from place to place, earning whatever money they could offering rides and thrills to the ever-ready public. This was also a period of aviation progress. Although air shows and air races were good entertainment they also provided testing grounds where some of the aircraft, power plants and equipment used in WW II were first developed. Illustrated with a wealth of photographs and specially commissioned drawings common to this series.

Hook, Thom. *Shenandoah Saga.* Air Show Publishers, Ferry Farms, N.A.P.O., Annapolis, Md. 1981. 208 pp. Illustrated. $8.95.

When USS *Shenandoah* (ZR-1) crashed into a valley near Ava, Ohio, early on the morning of September 3, 1925, she was one day shy of her second birthday, her first flight having taken place on September 4, 1923. This book deals with early U.S. airship activity in the years following WW I, along with initial experiments with helium.

Shenandoah is described in text and detailed photographs, showing construction of the giant airship, as well as photos and information on the men who flew her. The last chapters provide good coverage of *Shenandoah's* final flight and tragic end. There is also a discussion of the investigation and public reaction.

Jackson, Donald Dale. *The Aeronauts.* Time-Life Books, Alexandria, Va. 1980. 176 pp. Illustrated. Bibliography. Indexed. $12.95.

History records man's first controlled aerial flight as being the ascent of two young French noblemen in a balloon constructed by the Montgolfier brothers on November 21, 1783. From that time until over 100 years later, the balloon was the only way man could ascend and descend at will, in semi-controlled flight. This book traces the developments of balloon flight, as it captured the imagination of Europe towards the end of the 18th century, through initial use in wartime by Napoleon, who was bent on crossing the English Channel. It discusses the balloon's use by various armies, including the Union Army during the American Civil War, and cites records set and attempted. Period photographs and drawings complement the text. There is also an up-to-date account of the successful crossing of the Atlantic in 1978 by the *Double Eagle II.*

Botting, Douglas. *The Giant Airships.* Time-Life Books, Alexandria, Va. 1980. 180 pp. Illustrated. Bibliography. Indexed. $12.95.

The airships were generally seen as romantic leviathans of the sky until the spectacular *Hindenburg* disaster in 1937 which almost single-handedly destroyed public confidence in this method of travel. Despite this, the airship in its non-rigid form continued in military service throughout WW II and into the early 1960s.

This volume in the Time-Life *Epic of Flight* series details the development of the airship, beginning with its introduction in Germany by Count von Zeppelin through the American and British experience of the 1930s. Civilian transoceanic service is also covered. Period photographs, drawings and specially commissioned artwork, including an attractive painting of ground crews at work on *Hindenburg* and *Graf Zeppelin* by British artist Frank Wootton, complement the text.

Letters

AF Guardian

I am writing an operational history of the Grumman AF *Guardian*. I need help with the names of the carriers that the AF operated from and the approximate dates of those cruises. I would also like to hear from anyone who served during carrier operations with the AF and who would like to share their sea stories.

Bob Kowalski
12 Juniper Drive
Freehold, NJ 07728

Moffett Field

Enjoyed Sandy Russell's story on RAdm. W. A. Moffett in the August issue of *NANews*. It gave me some insight into the man that I had never known before, and will help a great deal as we begin putting together our 50th anniversary celebration in 1983.

One correction, though, is the date that NAS Sunnyvale was renamed NAS Moffett Field. For your information, let me list the chronology involved as taken from the official history:

12 April 1933 – NAS Sunnyvale commissioned.

1 June 1933 – The landing field at NAS Sunnyvale was named Moffett Field.

26 Sept 1935 – NAS Sunnyvale transferred to Army.

16 April 1942 – NAS Sunnyvale recommissioned.

20 April 1942 – NAS Sunnyvale renamed NAS Moffett Field.

J. R. Shackleton, PAO
NAS Moffett Field, CA 94035

Ed's note: We appreciate the information. Thanks for keeping us straight!

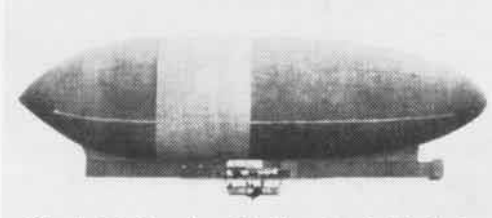
Reunions, Conferences, etc.

Bombing Squadron VB-5's 40th anniversary reunion in late June 1982 in San Diego. Contact John W. Trott, 4512 Pescadero Avenue, San Diego, CA 92107.

Bombing Squadron VB-102/VPB-102 Liberators, WW II, Pacific. Reunion in New Orleans, June 24-27, 1982. For information write, Christian Capdevielle, Rt. 5 Box 119, Covington, LA 70433.

USS Chandeleur AV-10 ship's reunion is planned for August 5-7, 1982, in Bellmawr, N.J. All interested who served aboard please contact: Ship's Reunion Secretary, Mrs. Kenneth E. Boyd, RD 4, Box 145, Culpepper, VA 22701.

VPB-216 (1943-44) reunion, May 6, 1982, Marriott Hotel, Anaheim, Calif., and the **Association of Naval Aviation's** seventh annual meeting, May 6-8. For details of both events, contact Bob Smith, 6468 W. 85 Place, Los Angeles, CA 90045, (213) 645-1791; or Dick Gingrich, 468 E. Baltimore Street, Greencastle, PA 17225, (717) 597-8250, by December 15, 1981.



The airship America. (Smithsonian Institution)

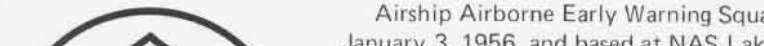
(continued from page 3)

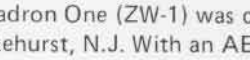
aeronauts had remained aloft for almost three days, breaking the previous record of 37 hours and traveling an estimated 1,000 miles.

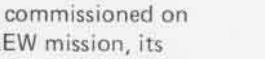
Wellman, defeated but unbowed, commented on the flight in the December 1910 issue of Hampton's magazine. His philosophy is one which has undoubtedly been shared by countless other unknown heroes whose efforts fell short of their dreams. It provides a glimpse of that indefinable something which has been called "the indomitable spirit of man."

"It is always worthwhile," Wellman wrote, "to strive, to venture, to work, to dare – and to leave the rest to the gods. . . ."

SQUADRON INSIGNIA







Airship Airborne Early Warning Squadron One (ZW-1) was commissioned on January 3, 1956, and based at NAS Lakehurst, N.J. With an AEW mission, its basic task was to train personnel, evaluate equipment and formulate tactics in preparation for manning a station in the Contiguous AEW Barrier System. In July 1957, ZW-1 became an integral part of the Contiguous Radar Barrier of the North American Defense Command and the first squadron to man an early warning station. In December 1959, the squadron received the first of four ZPG-3W *Reliance* airships, the largest nonrigid airships ever constructed.

The squadron was redesignated Airship Patrol Squadron One (ZP-1) on February 3, 1961, assuming the mission of ASW patrol. Flight operations ended in June 1961 and ZP-1 was decommissioned on October 31, 1961, along with ZP-3, ending the era of airship squadrons in the Navy.

naval aviation news