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The Era of Dirigibles at Moffett Field

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Santa Clara County

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Acknowledgments

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Preface

Along with many, perhaps most people, I am fascinated by the early history of flight. The National Air and Space Museum in Washington recognizes this fascination. The Wright Brothers' Flyer hangs over the entrance hallway in the museum, the first thing a visitor sees.

Dirigibles played an important part in this history and Moffett Field was a key location- one of three such places in the United States. Now that I have learned more of the history of Hangar Number One, this familiar landmark is more than just a curious feature on the horizon. It is an important monument in aviation history, a reminder of how we got to where we are.

A prime mover in the history of NAS Sunnyvale, as it was known at first, was Rear Admiral William Moffett. This essay focuses on his role in the dirigible era at Moffett Field.

Most people in the Bay Area are aware that this year marks the 50th anniversary of the Golden Gate Bridge. There is another huge structure near the southern tip of San Francisco Bay which was also built in the same decade of the 30's. To those who know Moffett Field, it is simply called Hangar Number One. This giant hangar is a landmark of northern Santa Clara County. It can be seen driving along Bayshore between Mountain View and Sunnyvale or at a distance from many places including Skyline Drive and Dumbarton Bridge. A Naval Historical Monument, the hangar is a reminder of an exciting era remembered vividly by long-time local residents.

The peculiar shape of the hangar is a hint that it was built for an unusual purpose. The rounded ends are a clue to that brief era when Moffett was home to a giant dirigible. For a few years in the early 30's the skies of Santa Clara County and the Bay Area were dominated by airships far larger than today's 747's.

There is something romantic to us about this era. "Those Magnificent Men and Their Flying Machines", a movie about early airplane pilots, could refer to the men who flew airships as well. We are also reassured by the presence of the Goodyear blimp at college bowl games. We like a reminder of a slower moving time when things seemed simpler and life more relaxed. Just such a reminder is Hangar Number One on Moffett Field.

The man behind it all has been called "The Father of Naval Aviation." He was a short, pipe smoking, Rear Admiral of the United States Navy. His dream of an aviation arm for the Navy led in two directions--to aircraft carriers and to dirigibles. With his roots far back in the Confederacy, this admiral's vision stretched forward to the aircraft carriers of WWII. The field named after him is well known to Santa Clara

residents; his full name was William Adger Moffett.

Moffett was born in Charleston, South Carolina in 1869. His father, Captain George Hall Moffett, had served in the Confederate Army and William was his seventh child. The boy grew up idolizing Robert E. Lee and kept newspaper clippings about him in his diary. His later nickname, "The South Carolina Gamecock," recalled his home, his size and his fearlessness.

William passed the exam for the U.S. Naval Academy in 1886 and spent the next four years there with a brief period out of school with typhoid fever. In June of 1890, Moffett became the 2001st graduate of the Academy and he would spend most of the next 27 years serving on board U.S. Naval vessels all over the world.

In 1898, Moffett arrived in Manila aboard the USS Charleston as part of a relief force for Admiral Dewey. There he became the Captain of the Port and had the job of clearing the harbor of sunken vessels. He also earned another nickname, "En Seguida", or "Do It Now", given to him by his Filipino crew because he pressured them to get the ships raised.

Jeanette Whitten, a Canadian, became his wife in 1902 and together they had six children. Moffett and his young family got their first look at the Bay Area in 1910 when he became Inspector of the 18th Lighthouse District, headquartered in San Francisco.

When trouble broke out in Mexico under Huerta, Moffett again went to sea as skipper of the USS Chester, a light cruiser. In 1914, as part of a U.S. Naval force trying to prevent a German ship from resupplying Huerta, Moffett sailed the Chester into Vera Cruz harbor at night with no lights either on shore or on ship. The next morning his ship bombarded the town in support of troops landing.

The USS Mississippi, a battleship, was Moffett's last duty



Rear Admiral William Adger Moffett, USN
Chief of Bureau of Aeronautics
"Father of Naval Aviation"
1869-1933

on board a ship. From 1918 until 1920, Moffett skippered the "Queen of the Pacific", as she was called. She was the second Navy ship to carry planes-on a catapult ramp in the bow. The planes were used for spotting the fall of shot and could only take off from the ship. They had to land on the water and be lifted back onboard. This experience with planes led Moffett to an interest in aviation.

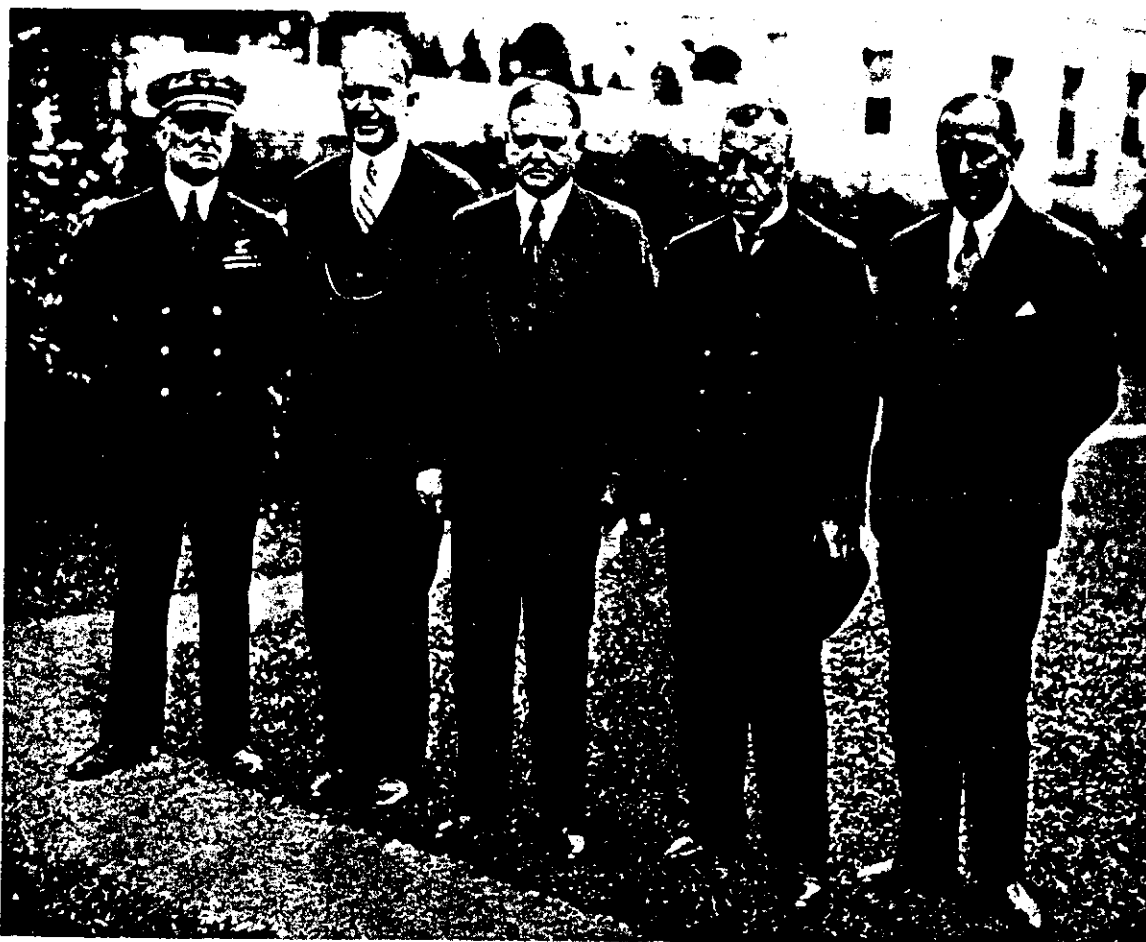
In 1921, Moffett became Commander of the Great Lakes Training Center. This enormous facility had trained 2 out of every 5 naval personnel in World War I. A naval aviation school was established there and Moffett became more involved with flying.

President Warren Harding appointed Moffett the first head of thenewly created Naval Bureau of Aeronautics on July 25, 1921. He was raised to the rank of Rear Admiral at the same time. Moffett was reappointed to the same post by Presidents Coolidge and Hoover and held that position for the next twelve years.

As chief of the Bureau of Aeronautics, Moffett pushed for more aircraft carriers. The USS Langley, the first U.S. carrier, had proven a success after her commissioning in March of 1922, and the Admiral was impressed by the potential of naval aviation. He also pushed for an expanded dirigible program; he saw the airships as far ranging, high endurance scouts for the fleet.

By the 1920's, dirigibles had already been in use for years. They were called lighter-than-air craft-or LTA-as opposed to airplanes, which were heavier-than-air craft. The Germans had led the way under Count Ferdinand von Zeppelin. During WWI, many dirigibles ofhis design and manufacture raided London and several had been shot down in giant balls of fire when their hydrogen burst into flame. However, one Zeppelin dirigible stirred world wide acclaim when she flew around the world. In 1929, the Graf (German for Count) Zeppelin left Lakehurst, New Jersey, eastbound. William Randolph Hearst,

a backer of the flight, had insisted that she leave from the United States. Crossing the Atlantic and Europe, she cruised over the vast expanse of Russia to Tokyo. After cruising the Pacific, the Graf flew over San Francisco on August 23, 1929 on her way to San Diego and eventually back to Lakehurst. Moffett later met Dr. Hugo Eckener, Captain of the Graf, and a protege of the Count. Everybody knew everybody in the small world of dirigibles.



Photograph by International

WHITE HOUSE, WASHINGTON, D.C.

Admiral Moffett, William P. McCracken, President Herbert Hoover, Dr. Hugo Eckener and Dr. C. G. Kiep, after the round-the-world zeppelin flight of Dr. Eckener on September 29, 1929.

The Graf was the most successful of all dirigibles. Before being scrapped in 1940, she had completed 590 flights, made 140 Atlantic crossings and traveled over one million miles while carrying 13,000 passengers.

Unfortunately, few dirigibles were so successful. The R101, pride of England, was rushed through trial flights in order to carry a VIP and all his heavy luggage on a flight to India. She crashed in France in October, 1930. The Diximunde, pride of France, crashed into the Mediterranean before that. Italy's Italia also went down.

In the United States, it was the USS Shenandoah. Moffett, no air-chair admiral, had flown in her from Lakehurst to Fort Worth, Texas, in 1924. While flying near Marietta, Ohio, the next year, her crew lost control in high winds and she came apart in mid-air. In Shenandoah Plaza on Moffett Field, there is a plaque reading, "In Memory of the Fourteen Officers and Men of the USS Shenandoah Who Were Lost September 3, 1925."

Given all these disasters, one wonders why any more dirigibles were ever built. There was much controversy at the time over just such questions. The answer involves an element, helium, and geography.

The earlier WWI zeppelins had been filled with extremely inflammable hydrogen. The least spark could create instant inferno. The largest of all dirigibles, the Hindenburg, burned her way into the public mind when she burst into flames at Lakehurst in 1937. Hydrogen was used because it was the lightest element and because it was available. The next lightest element, helium, was nowhere to be had except in a few areas of northern Texas and Kansas. The United States had a monopoly on this inert, completely nonflammable gas which had 92.6 percent of the lift of hydrogen. The Helium Act of 1925 forbade the export of this precious element. The proponents of dirigibles, including Moffett, argued that helium would make airships fire-proof and safe. First

produced at Fort Worth and costing 10 cents per cubic foot in 1921, it was later manufactured at Amarillo and cost only 1¢ per cubic foot by the late 20's.

The other argument in favor of dirigibles foresaw the need to protect the United States from attack by sea. In Europe the relatively short distances between countries made airplanes, even the short-ranged airplanes of the 20's, a practical method of patrol. The United States, however, had two oceans to patrol. She needed a long-range, long-endurance means to scout over immense distances. The dirigible offered just such a possibility.

Admiral Moffett wrote a memo to the Secretary of the Navy in 1922. In it he argued that aircraft carriers should be built to defend our shores.

The Navy is the first line of offense and naval aviation as an advance guard of this first line must deliver the brunt of attack. Naval aviation cannot take the offensive from shore; it must go to sea on the back of the fleet. I do not believe aircraft on shore can ward off a bombing attack launched, perhaps from carriers by night from an unknown point for an unknown objective. On the other hand, a fleet with adequate aviation of its own can drive the carriers back out of effective range.

This was only nineteen years after Kitty Hawk. It was also nineteen years before Pearl Harbor. Dirigibles, in Moffett's plan, would be the eyes of the fleet.

In the same memo, Moffett asked a prophetic question. "If the submarine with a sub-surface speed of only 12 knots, and carrying but a few hundred pounds of explosives with a range of only a few hundred yards, nearly won the last war, what will a vehicle having a speed of 200 knots and carrying torpedoes and bombs totalling 2,000 to 4,000 pounds of explosives do in the next war?" If the doctrine of the naval scholar and former shipmate of Admiral Moffett, Alfred Thayer Mahan, could be summed up in the phrase, "Control of the sea": Moffett's motto would have added, "Also of the air above it".

The dirigible would play a part in the control of the air over the sea. "The rigid airship," Moffett wrote, "is primarily a scouting ship, the purpose of which is to travel long-distances at high speed, and carry observers who can see what is going on and report back by radio.

The dirigible, in the 20's, had three times the speed of the fastest surface vessel, several times the carrying capacity of the largest airplane, and at least ten times the radius of operation of military aircraft. The technology of the twenties allowed the development of dirigibles which could stay aloft for two weeks and fly 10,000 miles.

One more exciting prospect opened to naval aviation in this decade. Why not combine aircraft and dirigibles? A dirigible could be built with a hangar inside to carry scout planes which would greatly increase its ability to "see what is going on." A flying aircraft carrier. From the perspective of the 1920's, this idea seemed filled with bright promise, a progressive and farsighted plan.

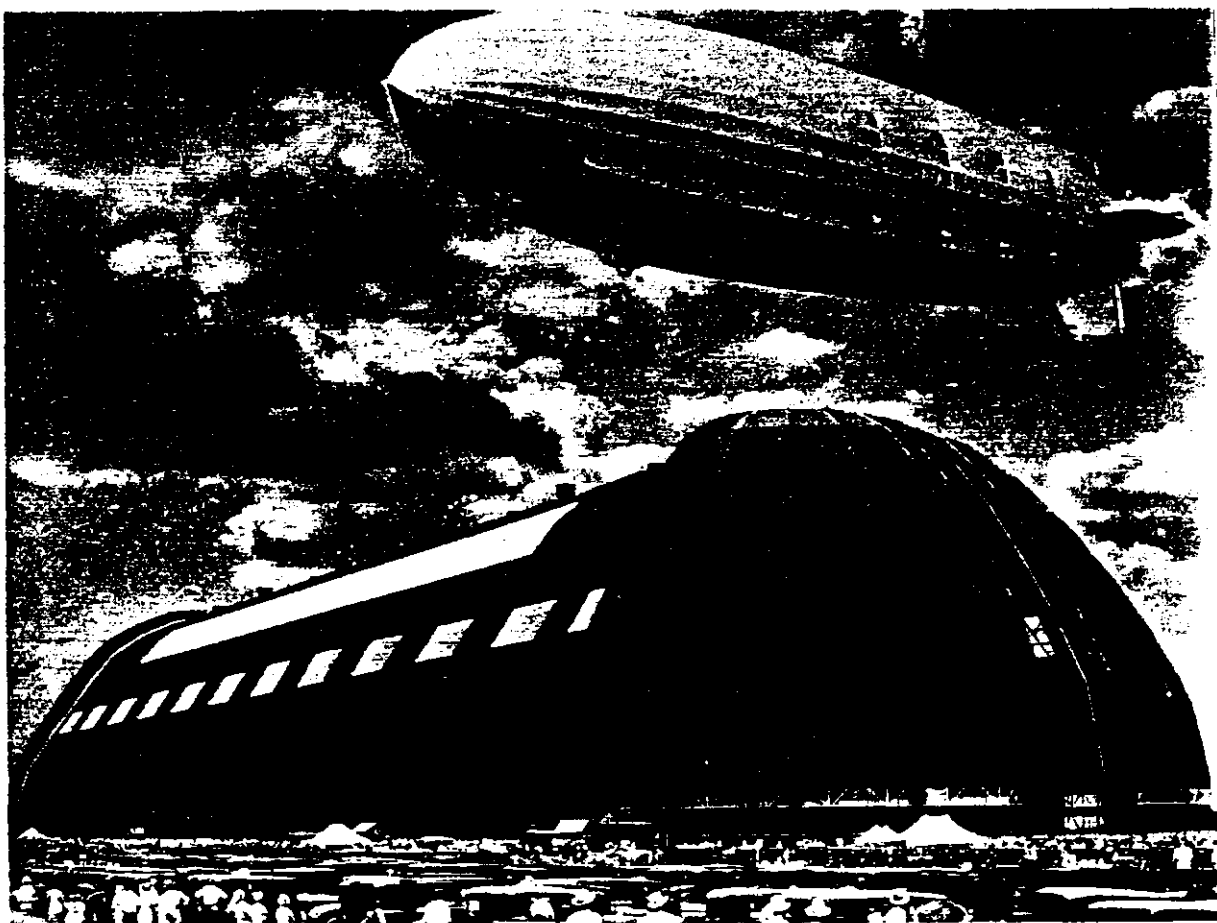
Moffett, along with others, argued successfully for construction of naval dirigibles capable of carrying aircraft. In 1926, Congress authorized the construction of two airships and an airship base on the West Coast. It was to be a five year plan. Lakehurst had been established as an airship base in the East since 1920. In order for one of the new airships to work as a scout for the western fleet, a facility was needed close to the Pacific. This new dirigible base would be built specifically to house, supply and maintain the second of the two new airships. The first would be based in New Jersey at Lakehurst.

The Goodyear-Zeppelin Corporation won the contract to construct the flying aircraft carriers. The Goodyear Tire and Rubber Company had joined forces with the Zeppelin Company of Germany and owned two-thirds of the joint venture. Goodyear's headquarters were in Akron, Ohio. Twelve dirigible engineers were brought from Germany to Ohio to work on the new ships.

The designer of the new craft was a German, Dr. Karl Arnstein, who had already designed 68 dirigibles in Europe. He had learned airship design and construction under the old master, Ferdinand Zeppelin.

A hangar was built in Akron to house the airships while they were being built. Lessons had been learned from the old hangar at Lakehurst. It was rectangular with square ends and huge doors which slid out on tracks at right angles to the building. When a wind blew, these doors and the square shape of the hangar created problems. The doors jammed on the tracks and tremendous turbulence was formed making the launching or landing of an airship difficult.

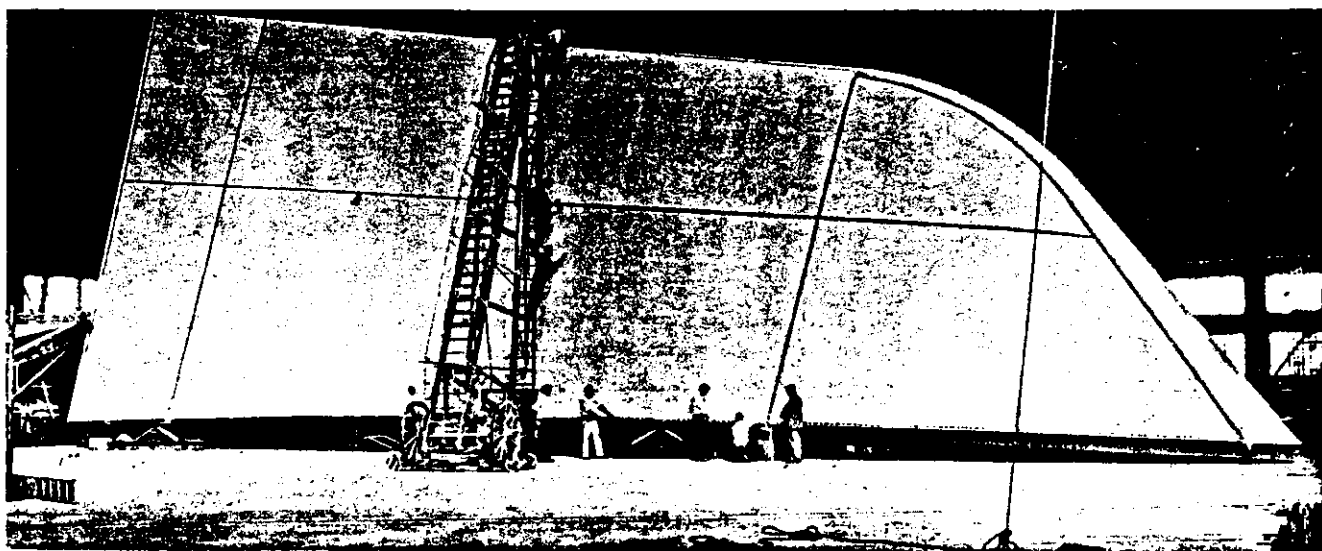
In order to avoid these problems, the new hangar at Akron was modeled after a German idea. Make the hangar rounded and have doors which curved along the side of the building when opened. Turbulence was reduced and the jamming problem eliminated. Dr. Hugo Eckener, of Graf Zeppelin fame, designed the new hangar.



The USS Akron above the Goodyear-Zeppelin Hangar where she was built.

The new airships were known officially as ZRS-4 and ZRS-5. About three times the size of the Shenandoah, they were the largest dirigibles yet constructed. Each measured 786 feet in length, 133 feet in diameter and each held 6,500,000 cubic feet of helium. The gas provided 72 tons of useful lift. Eight 12-cylinder Maybach engines with a total of 4,480 h.p. drove the ships up to 80 mph. These sister ships had a range of 10,500 miles, enough to cross the Atlantic and return without refueling. And each would have a hangar built inside large enough to hold five airplanes.

The contract with Goodyear-Zeppelin was signed on October 6, 1928, and construction on ZRS-4 began in November, 1929, in the newly built dock at Akron. The picture of the tail fin, measuring 104 feet in length, suggests the size of these giants.



GOODYEAR AEROSPACE CORPORATION

One of the fins having its outer cover applied. The fin weighed 2,700 pounds, as much as one of the F9C fighter planes. The gaps where the cloth is laced to the girders can be seen; they were covered by sealing strips of fabric before the painting was begun.

A new metal, also a German idea, was used in the structure of the dirigibles. Duralumin combined lightness and strength. A light alloy of aluminum, copper, manganese, magnesium and silicon, it was easily worked when new and then became harder with age until it was almost as strong as an equal weight of steel yet weighed only one-third as much.

In order to avoid the obvious structural weakness of the Shenandoah which had literally come apart in mid-air, the new dirigibles had 3 keels instead of one. A truss structure, well understood from bridge construction, was employed and a new technique called spot welding was used. Twelve huge gas cells held the helium; the airships would stay aloft even if one-third of the cells were punctured.

Other improvements over the Shenandoah included propellers which could swivel from a vertical to a horizontal position to help in take-off and landing and a mechanical system to recover water vapor from the engine exhaust. The vapor was condensed and stored to compensate for the loss in weight of fuel during a long cruise. Since these giants consumed 40 tons of fuel on a flight across the United States, it was important to maintain a steady ballast.

ZRS-4 was christened the USS Akron by Mrs. Herbert Hoover on August 8, 1931, standing before 100,000 spectators who were dwarfed under the canopy of the immense new hangar. The Akron cost \$5,375,000 to build. She was commissioned in October at Lakehurst and in November carried aloft 207 people on a demonstration flight. Their record for number of passengers carried lasted for more than twenty years. Moffett went up in the Akron not long afterwards and returned to the Lakehurst landing strip in one of her airplanes. He called her, "the safest dirigible ever built anywhere." The Akron's crew had proven they could pick up and deliver passengers as efficiently as any aircraft carrier.

Meanwhile, plans went forward for the new airbase on the West Coast. Originally, it seemed that Camp Kearney near San Diego was favored, indeed all but chosen. Money had been raised by citizens in the area to buy the land for the airbase. The plan was to donate it to the Navy. When word of this spread, a public outcry spread from Puget Sound to the Tehachapis. The long-standing rivalry between northern and southern California flared up. Cries of "skullduggery" echoed in the press. The uproar caused the federal planners to reconsider. Eventually, they decided to enlarge the site search area to include all of the West Coast. Soon there were proposals for sites all over the place--some 97 in all.

San Francisco Mayor, James Rolph, made a public appeal for a site in the Bay Area suitable for the new base. The Navy wanted a level piece of land of about 2,000 acres with unobstructed approaches, adequate water supply, railroad and communications connections and good flying weather.

Mrs. Laura Thane Whipple, a newly established real estate broker from the Niles area, heard of the Mayor's appeal. She was familiar with the Sunnyvale area and revisited several large tracts of land with her mother. One such tract was the Rancho Unigo, a former Indian reservation, at the southern end of San Francisco Bay. Her mother later reported that Laura "just gazed and gazed and seemed to forget all surroundings." When she asked Laura what she was looking at, Laura replied, "an airbase."

Mrs. Whipple soon obtained an option in her name on 1,750 acres of Rancho Unigo. The price was nearly half a million dollars. She sent a telegram to San Jose Congressman Arthur Free saying that she had found a "perfect site for a dirigible base." In order to give it more clout, she gave herself an impressive title-- "Chairman of the Landholders Commission."

Upon inspection, the land seemed to fulfill all the Navy

requirements. Enthusiasm began to grow in the local area. The Depression was well under way and the new base promised 500 construction jobs to begin with and a steady income from Navy salaries afterwards.

Since San Diego had planned on buying the land and donating it to the Navy, the local communities realized they would have to match the offer. And so a committee of several nearby chambers of commerce was set up to raise the money to buy Rancho Unigo. Communities from San Jose to San Francisco pooled their efforts. Two leaders in this drive were Chester Awalt, President of the Mountain View Chamber of Commerce and A.M. Mortensen, President of the San Jose Chamber of Commerce. A third leader, William Rudolph Pederson, President of the Sunnyvale Chamber of Commerce, has been called "The Father of Moffett Field."

Congressman Free, a native of San Jose, also was hard at work in Washington drumming up support. A Stanford Law School graduate in 1903, he had been District Attorney for Santa Clara County from 1906-1919. In 1920, Free was elected U.S. Representative from the 8th District. During hearings of the House Naval Affairs Committee beginning in May, 1930, he presented a great deal of physical and climatic evidence in favor of Sunnyvale. Speaking of the various communities working together to win the airbase for the area, he said, "I feel that the unselfish cooperation displayed in this matter has meant much toward building up a real Northern California spirit." In all, it would take a three year struggle on the part of these leaders and communities.

The West Coast Naval Airship Base Board, which included Moffett, visited many of the proposed sites. The list was narrowed to eight but Sunnyvale and Camp Kearney led the pack. The General Board of the Navy and Secretary of the Navy, Charles F. Adams, favored Camp Kearney. It was close to the naval base at San Diego and the exercise areas in the Pacific. It was also closer to the militarily strategic Panama Canal.

Moffett favored Sunnyvale. His reasons included the facts

that the wind conditions were generally better, the area was better protected from the weather, and it was less exposed to possible enemy action from the sea than was Camp Kearney. There was also more room to expand at Sunnyvale and too much airplane traffic in the San Diego region. The Base Board voted 4-1 in favor of Sunnyvale.

This town, in 1930, had a population of 3,093 with some 4,500 more in the surrounding township. Prune and apricot orchards covered the land. The town had contributed \$3,000 towards the purchase of Rancho Unigo. In December, 1930, the Sunnyvale Standard, the local newspaper, published a special edition in cooperation with ten area newspapers and chambers of commerce. This lavish special with pages of photographs trumpeted all the advantages of the area from Stanford University to the balmy Bay Area climate.

The choice boiled down to two bills in the House. H.R.6810, introduced by Arthur Free and called the Free Bill, favored Sunnyvale. Finally, on December 28, 1930, the fight ended in a 18-1 vote by the House Naval Affairs Committee selecting Sunnyvale. Camp Kearney was named an auxiliary base and was to develop into Naval Air Station Miramar.

Santa Clara County was ecstatic. Schools and businesses closed for the day. A spontaneous 500 car parade honked and cheered its way through Mountain View, Sunnyvale, Palo Alto, Santa Clara, San Jose, Los Gatos and back again. The San Jose Mercury Herald reported that residents "celebrated as if a dozen New Years had arrived at once." When the vote was announced, "Northern California and especially Santa Clara County stood up and shouted as violently as college football fans" the paper reported. William Pederson of Sunnyvale said, "It's like a dream come true. We are all so thrilled we hardly know what to say. To the Mercury Herald we are especially grateful. The paper's support was a big factor in the victory."

Wendell Thomas, President of the Santa Clara County Consolidated Air Base Committee, said, "This new hangar and base at Sunnyvale will be but the beginning of a program of aeronautical development, both federal and commercial, beyond our present comprehension." How right he was. Thomas said of Congressman Free, "His masterly handling of the case is the reason for the splendid victory."

The Mercury Herald carried a picture of Moffett on its front page on December 13, 1930. Moffett echoed Thomas' hopes for commercial development of the dirigibles. In this year after the Graf Zeppelin's round-the-world flight in twenty days, Moffett envisioned a commercial airship line running on a triangle from San Francisco to Hawaii to Los Angeles.

Flush with the glow of victory, Santa Clara County could relax in the expectation of a more secure future. In its February 13, 1931 edition, the Sunnyvale Standard proudly headlined: PRESIDENT HOOVER SIGNS DIRIGIBLE AIRBASE BILL. The newspaper changed its masthead to show a drawing of an airship and two airplanes.

The controversy which today clouds the proposal to home-port the USS Missouri at Hunter's Point in San Francisco Bay had no counterpoint during the campaign for Sunnyvale. If there were protests over concerns for the environment or peace activists carrying placards, their presence was not noted by the press. In those difficult Depression years, the jobs to be created were a great attraction.

The original name chosen for the new base was Naval Air Station Mountain View-Sunnyvale. However, the Navy felt that the word "mountain" in the name would create concerns about flight safety among members of Congress and so "Mountain View" was dropped. "Sunnyvale" had the connotations of good weather and a broad pastoral valley-perfect for an air station.

On August 2, 1931, a check for \$476,165.90, drawn on the San Jose Chamber of Commerce, closed the deal on 1,000 acres

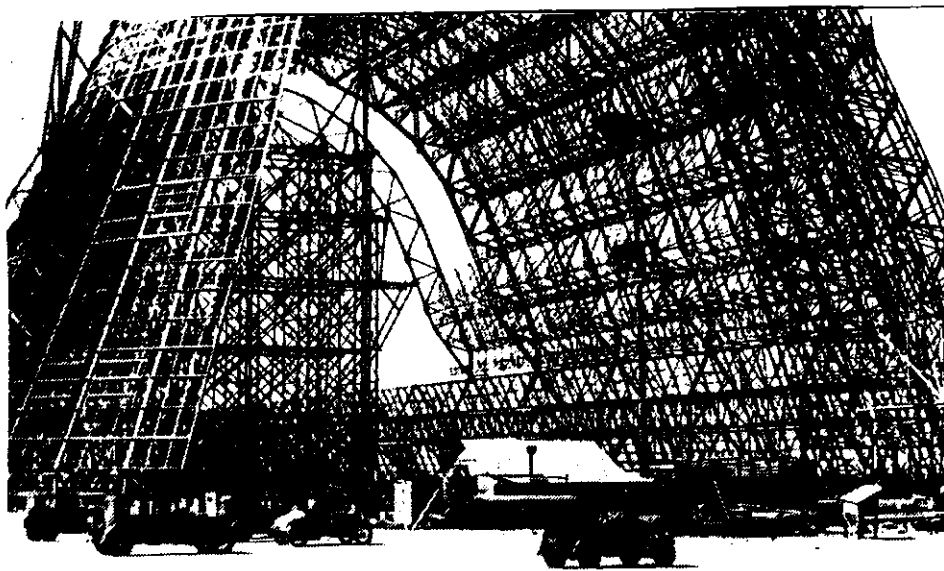
of Rancho Unigo and, on the same day, the title was transferred to the United States Navy for one dollar. The Free Bill had authorized the expenditure of some five million dollars for construction of facilities on the new base. Lieutenant Commander Earl Marshall was appointed by the Bureau of Yards and Docks to supervise the project. He was assisted by a civilian, Ernest Wolf, who had the title, "Associate Civil Engineer." Construction began on October 5, 1931.

Hangar Number One was the largest single item on the budget for Sunnyvale, costing some \$2,250,000. The Wallace Bridge and Structural Steel Company of Seattle won the bid for the steel work on the hangar and the curved doors for the sum of \$1,116,044. Three to four hundred men got work in Seattle from this contract. Seims-Helmerts, Inc. of San Francisco and St. Paul won the contract for the roofing, siding and windows on the giant airdock for \$398,937.

After studying the wind patterns in the valley, the designers laid out the axis of the hangar on the same line as the typical wind, nearly north to south. The Sunnyvale hangar was modeled after the Akron hangar with sloping sides and rounded ends. The huge doors at either end, weighing 600 tons each, were shaped like a one-eighth section of an orange peel and curved along the sides of the hangar when open. They were moved by 150 hp. electric motors on standard gauge railroad track, rolling on 40 wheels.

The building itself was 1,133 feet long, 308 feet wide and 198 feet high. The floor area was just over eight acres, enough for a small farm. Fog was said to form near the ceiling. Catwalks and two elevators which met near the top made the upper reaches accessible.

Named a Naval Historical Monument in 1966, Hangar Number One and its Akron sister, are the largest structures in the United States without internal support.



Hangar 1 under construction

No wonder the hangar is a landmark in Santa Clara County. Few buildings reach its dimensions even with internal supports. Erected five years before the Golden Gate Bridge was completed, it remains a testament to the engineering skills of the early 30's. Today it is used for anti-submarine warfare training.

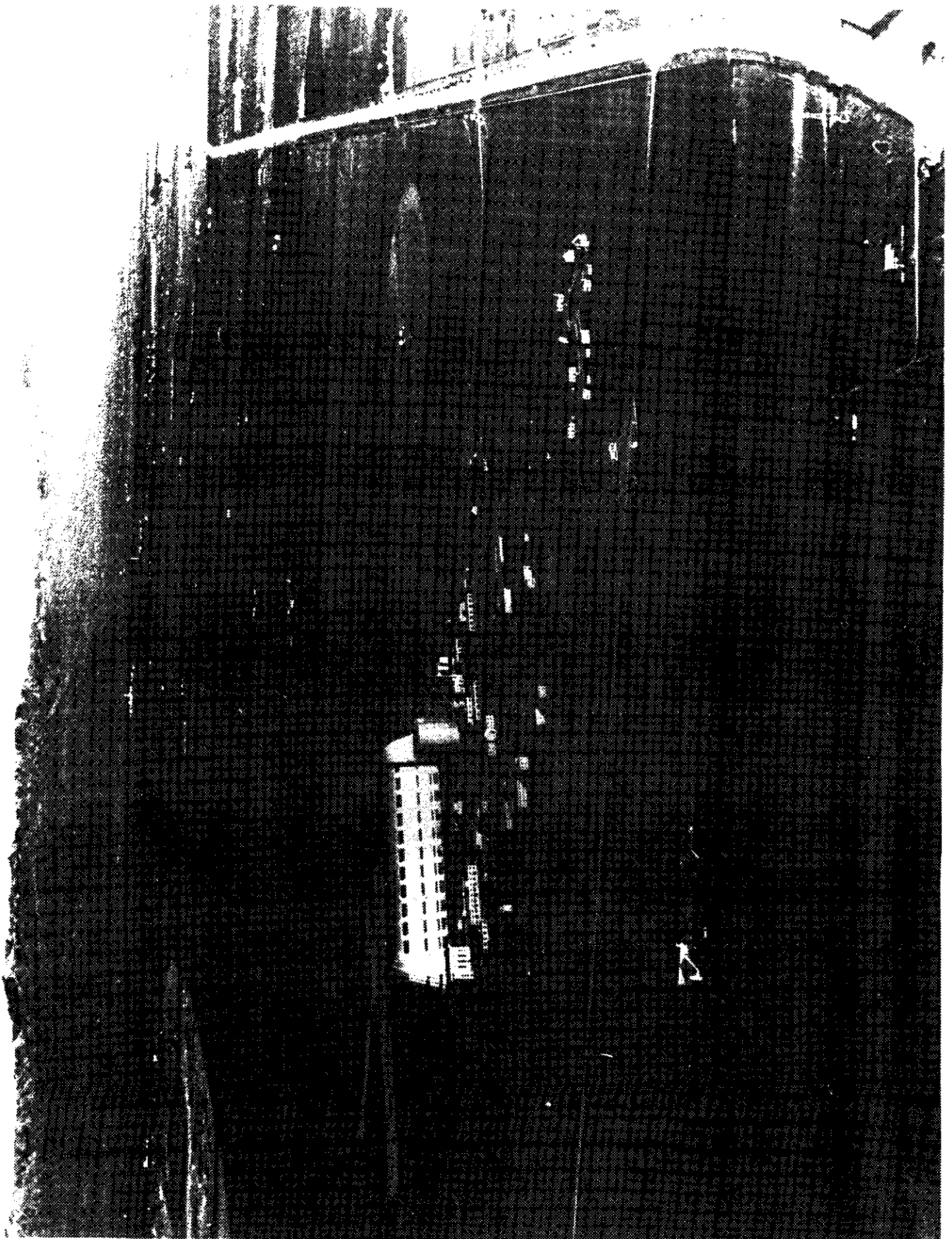
Running along the length of the hangar floor and out the giant doors were railroad tracks leading to a circle 600 feet in diameter. In the center of this circle was the mooring mast. This \$25,000 item was 75 feet high and weighed 115 tons. A relatively new invention, the mooring mast eliminated the need for a large ground crew. Instead of the 400 men needed previously, only 70 would be used at Sunnyvale.

The mooring mast, as its name implies, was the point of contact for a dirigible on landing. Lines were thrown down from the bow of the approaching airship and it was winched down and secured. Electricity and helium could be supplied to the airship from the mast. A line from near the stern of the airship was secured to a car on the circular track,

attaching it to the ground at two points. Pivoting around the mooring mast, the dirigible could be lined up with the hangar and the whole thing trundled inside.

Another large item on the new base was the helium storage system costing some \$295,000. Designed to hold some two million cubic feet, it was the third largest helium storage system in the world. As the Depression affected the Navy budget, there was less money for helium and production at the Amarillo plant became more intermittent and expensive. Since some helium was lost on nearly every flight, its replacement became a major concern.

The officer's quarters and enlisted barracks on the new base cost \$664,000 which is a large figure during a dollar-scarce Depression. Since the area had a Spanish heritage, it was decided to design the buildings for the new base in the mission style. Graceful arches and red tile roofs still mark Moffett's oldest buildings. All utilities were placed underground and hundreds of trees planted. The graceful curve of the drive leading from the main gate to the hangar can be seen in the photograph of Moffett Field. The mooring mast and circular track are on the right near the highway. The short runway in back of the hangar is not much longer than the hangar itself. Perhaps most noticeable of all to the modern viewer is what is missing. The two farms in the foreground have long been covered by houses, streets, apartment buildings and businesses. The road along the right has become traffic-clogged Bayshore Freeway.



The airship for which the hangar was built was ZRS-5, the sister ship to the Akron. Because of reduced costs in building the second ship, ZRS-5 was only about half as expensive as the Akron-\$2,450,000. She was also constructed in the Akron hangar, and she would also be named for a city. The Navy used city names for cruisers and since these dirigibles were as costly and as big as cruisers, they received the same rank in the naming.

Representative Carl Vinson of Georgia was in an election battle in 1932 when the naming decision for ZRS-5 came up. Mr. Vinson had been on the House Committee on Naval Affairs since 1914 and had been its chairman since 1930. In such a position, his political support was essential to the Navy. His opponent in this election was playing up the fact that even with his seniority, Vinson had been unable to get a ship named after a city in his district. In order to help the chairman politically, the Navy chose to name the ZRS-5 the USS Macon, the largest city in Vinson's congressional district. A modern aircraft carrier bears his name today.

The Macon was essentially identical to the Akron but with a few improvements. Her crew could change the pitch on her more modern propellers, 3-bladed metal Hamilton props. The Macon could fly six knots faster than the Akron- 75 knots at maximum power.

On March 11, 1933, Mrs. William Adger Moffett christened The Macon at Akron. As part of the ceremony, she pulled a string which released 48 pigeons from the bow of the ship-one for each state. The President sent a telegram to her husband.

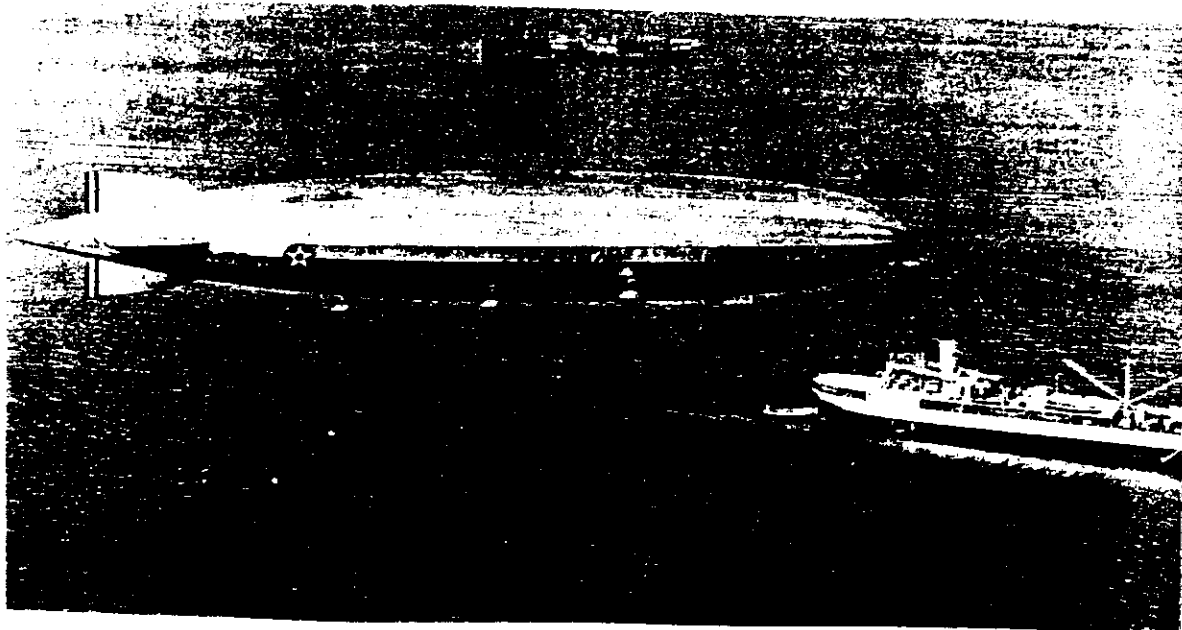
It must be a source of gratification to you because of the splendid and continuous record you have made as Chief of the Bureau of Aeronautics since it was created in 1921. To be able today to complete the Navy's Five Year Aviation Program by christening the USS Macon at Akron, Ohio,

I congratulate you,

FDR

While the Macon was still under construction in Ohio, the Akron paid a visit to the still incomplete Sunnyvale base. A survivor of the Shenandoah crash, LCD Charles Rosendahl, was Captain aboard in May, 1932, when the Akron flew across the continent. Her arrival over San Francisco just after midnight on May 13 was watched by thousands, but the headlines the next morning screamed another story: LINDY BABY FOUND SLAIN IN WOODS NEAR HOME, headlined the San Francisco Chronicle. A large picture of Charles Lindbergh's kidnapped child was underneath.

An inside story of The Chronicle carried details of the Akron's arrival. "There was something too awe inspiring about the hugeness of it to produce riotous acclaim. People stood silent and watched it with a certain tenseness of attitude...The great giant was like a prophecy written against the heavens." The Chronicle reported that 50,000 people watched the Akron dock. The Akron, the paper said, "carries just about the entire world's supply of helium." She waited until dusk to land so the helium would cool and lose lift. That way her crew did not have to release the precious gas to descend.



The USS Patooka

modified to carry a mooring mast on her stern

The Akron remained in the area two months. During that time, she made practice moorings at the mast on the stern of the USS Patooka, a Navy vessel specially rigged to provide a mobile mooring mast for dirigibles. The landings took place in San Francisco Bay.

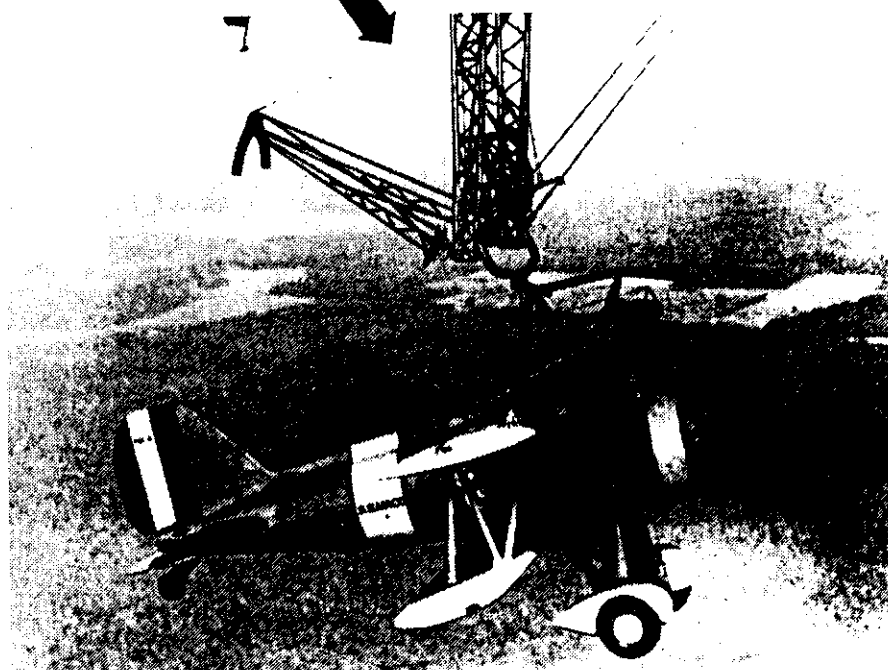
The Akron was only the second rigid airship built in the United States. Some of the problems encountered in her construction and early flight career helped to ease similar problems with the Macon. By the time the Macon was christened, the Akron had been flying for a year and a half, had made 73 flights, and had 1,700 hours in the air. She seemed to be a proven ship.

From her interior aircraft hangar which measured 70 feet by 58 feet by 16 feet, the Akron had perfected the art of aircraft launching and recovery. The Akron and the Macon were the only dirigibles ever fitted out with such hangars. A steel lattice work or trapeze was lowered out of the bottom of the ship. A slow-flying bi-plane with a steel framework above the wings approached and hooked onto the trapeze. Then the plane and trapeze were raised into the hangar. Although designed to carry five planes, these dirigibles carried only four because structural tubing restricted space in the hangar.

The Sparrowhawk, a small, high-performance fighter, was developed specially for the dirigibles. A Curtiss F9C, this plane weighed 2,500 lbs. and carried just the pilot. Once on board, the landing gear was removed to save weight and the airplane had to return to the trapeze to land. Despite the seemingly hazardous nature of this operation, there were no accidents involving Sparrowhawks.



The top photo shows a Curtis F9C about to hook up to the trapeze extending from the Macon's bottom.



The lower photo was taken just after hookup. The arm on the left will be lowered to hold the fuselage steady as the plane is raised into the hangar of the dirigible.

These planes were used not only to scout over oceans as extended eyes of the mother ship, they were also used as ballast. With four aboard, the Akron was five tons heavier. Since her normal ballast was ten tons, the planes made quite a difference. One might be flown aboard as the ship approached a mooring mast if extra weight were needed. Once, when the Akron was returning east over hot Arizona, she found her lift reduced and the ground uncomfortably close. The captain ordered a plane flown off just to get rid of her weight.

On the evening of April 3, 1933, just three weeks after he had received the congratulatory telegram from Roosevelt, Moffett boarded the Akron which was now back at Lakehurst after her California visit. The Commander, Frank McCord, planned a training cruise for a couple of days to test coastal RDF stations and Moffett went along to observe.

That night a storm hit the area. With lightning flashing all around and a heavy rain falling, McCord headed the ship out to sea to try to fly out of the storm. It was too late to escape. At 12:15 a.m. the Akron began to fall rapidly. McCord ordered ballast dropped and all engines full speed. The ship leveled off, rose, hit rough air and again began to fall. With her bow slanted up, the Akron struggled for altitude, but she ran out of room and her tail smashed into the sea. The 200-ton ship crumbled as she fell. Only three people survived the crash. The other 73 men on board, including Commander McCord and Rear Admiral William A. Moffett, died that night in the cold waters off Barnegat Light, New Jersey.

The shock to the nation was terrific, perhaps similar to the shuttle disaster in our own time. In a single blow, on-half of the 1926 airship program was destroyed and almost one-third of the Navy's experienced airship crewmen killed. In addition, Admiral Moffett's death was a tremendous loss to naval aviation and to the Navy and country in general. Moffett was within six months of retirement at the time of his death.

Only eight days later, on April 12, 1933, Naval Air Station

Sunnyvale was commissioned. The recent tragedy must have weighed heavily on the minds of those present.

It was Navy practice to name air stations for places and the landing fields on those air stations for individuals who had contributed to naval aviation by heroism or in some other significant way. So, a few days after commissioning, the landing field at NAS Sunnyvale became Moffett Field. When the Army took over the base in 1935, it chose the name Moffett Field Army Air Corps Base. The Navy recommissioned NAS Sunnyvale in 1942 when it again resumed control. On April 12, 1942, Secretary of the Navy, Frank Knox, officially changed the name to NAS Moffett Field, one of only four naval air stations to be named for a person and not a geographical location.

The Macon had had her maiden flight in April, 1933, the same month that Moffett perished at sea. By Fall, she was ready to fly to her new home. On October 12, she cast off her moorings at Lakehurst and turned south to fly over Macon, Georgia. Passing safely through a storm in Texas, the Macon reached Sunnyvale in 70 hours while consuming 38 tons of fuel.

The San Francisco Chronicle reported on October 16th that "30,000 Thrilled as Macon Moors at Home Station", and, "Mistress of the Nation's Sky Fleet, the Great Silvery Dirigible Macon Arrived in Sunnyvale Yesterday."

Willys Peck, a staff writer for the San Jose News, recalled his reaction to the arrival.

On a sunny October afternoon in 1933, a bunch of us fifth and sixth-graders hiked to the top of a hill north of Saratoga to watch the show. It was a good eight or nine air miles from the landing site at Sunnyvale, but the atmosphere was clear in those days and, given the size of the dirigible, we had grandstand seats.

The big ship lumbered toward the mooring mast and dropped her mooring line--about the only part of the operation we couldn't see at that distance--and was pulled down to the mast. The newspapers reported

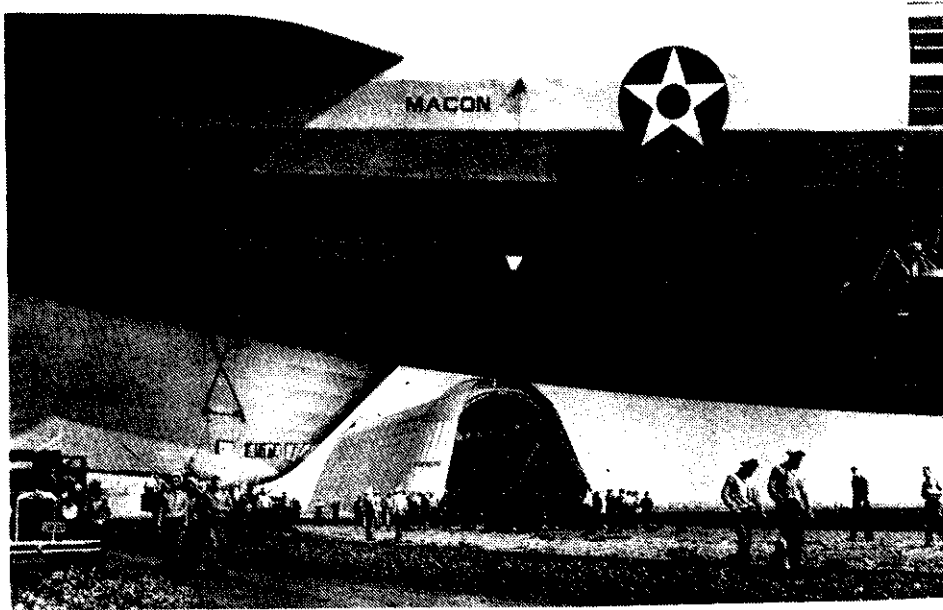
it as a perfect landing, compared to the seven passes the Akron had to make before it could tie up the year before.

For the next 16 months the Macon was, you might say, a presence in the valley that frequently intruded on our consciousness in her comings and goings from Sunnyvale in her role as "eyes of the fleet."

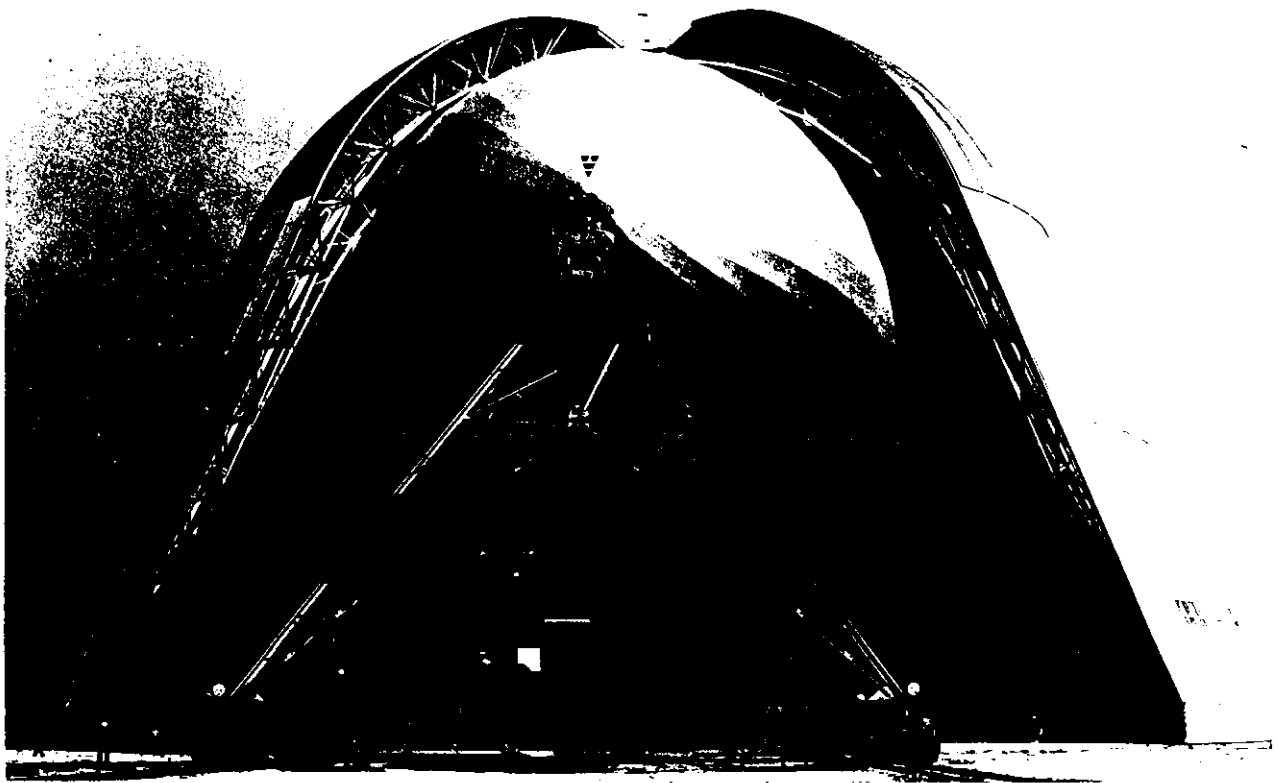


The Macon being moored at Sunnyvale

Her eight propellers can be seen turned to a horizontal position.



The tail of the Macon, ground crew, and hangar.
An emergency control cabin was in the bottom fin.



With only ten feet between her tail fins and the side of the hangar, it's a tight squeeze for the Macon into her new home.

They were a busy 16 months for the Macon and her crew. Twice she went out on maneuvers with the Pacific fleet in 1933 and 1934. In both exercises she was repeatedly "shot down" by "enemy" aircraft or fire from ships. In a war game between the Blues and the Browns, the Macon blundered out of cloud cover to find herself directly over an "enemy" cruiser.

Like the Akron, the Macon was consistently misemployed. She was never intended to take part in tactical combat exercises, yet that was the role assigned to her. Moffett's vision saw the airships as aloof, all-seeing eyes of the fleet, not in actual battle. The Macon, with its Sparrowhawks out on each flank, could have covered as much as 129,000 square miles of ocean in a day. She could have patrolled out to Hawaii, serving much like our long-range radar as an early-warning system. Instead, the Navy insisted on maneuvers for which she was ill-suited. The war games proved what everyone knew--that airships were useless in tactical situations.

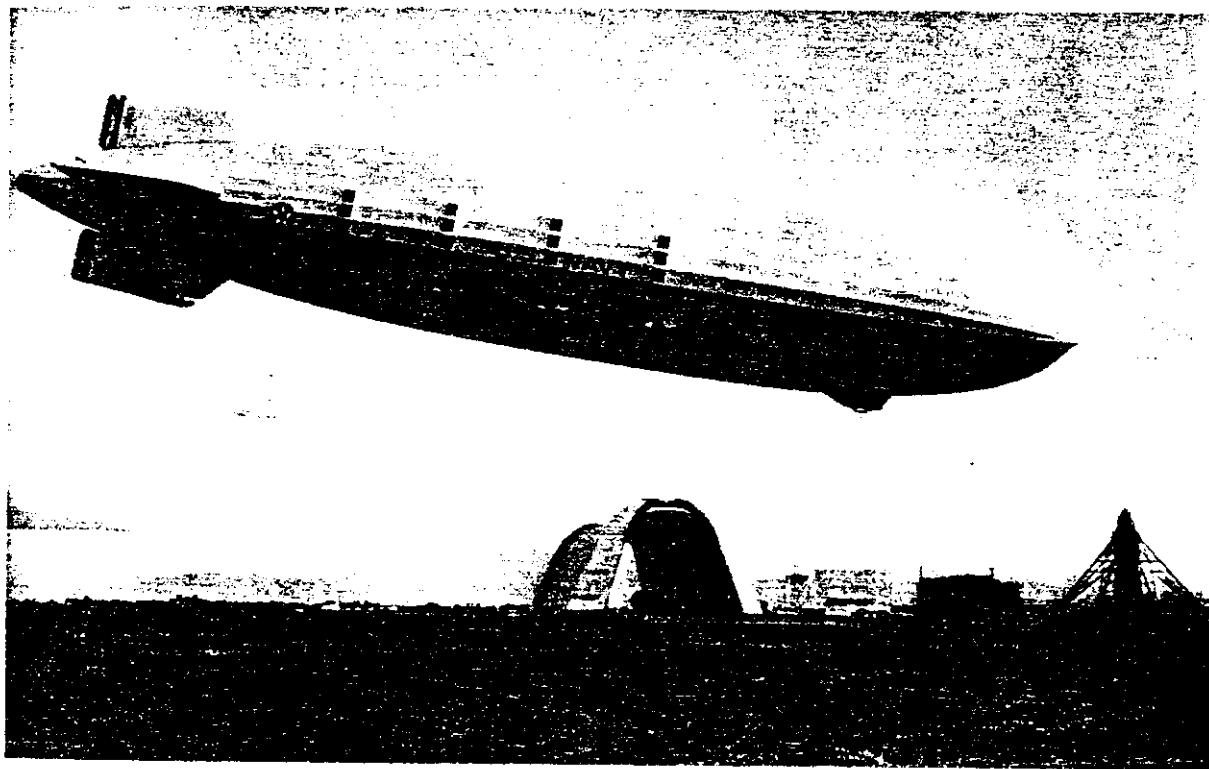
In May, 1934, the Macon left Sunnyvale for maneuvers with the fleet in the Caribbean. LCD Herbert Wiley, one of the three Akron survivors, was captain. He was an Annapolis graduate in 1915 and in the LTA service for 12 years. While flying over Texas, the ship experienced severe wind gusts which revealed a weakness in the hull structure near the tail fins. Temporary repairs were made and the ship went on to another unsatisfactory exercise with the fleet. Commander in Chief of the United States Fleet, Admiral David Sellers, reported that the Macon had "failed to demonstrate its usefulness."

Returning to Sunnyvale, the Macon continued her training missions. Permanent repairs were ordered for the structural weakness near the tail and material was ordered and delivered to do the job. However, the repair was not to interfere with her training schedule and it was never made.

Late that summer, Willys Peck's father used his leverage as a local newspaper editor to gain permission to visit the Macon.

...my father took my brother and me aboard the dirigible, a privilege enjoyed by few civilians.

It was a limited tour, while the ship was in the hangar, but that didn't lessen the thrill of climbing the steps into the control car.



The Macon, fastest dirigible ever built, took up residence in the newly completed hangar at Sunnyvale, California. (Navy Department Photo in the National Archives.)

Birge Clark also has personal memories of the Macon. This native of Palo Alto, aged 94, remembers missing a scheduled tour of the airship for members of the Palo Chamber of Commerce but later visiting the ship in the hangar. He has walked along a catwalk in the Macon like the one in the

next photograph. Clark, an architect well known to the area, recalls the Navy at Sunnyvale being very "public relations conscious." "The area was proud of the Macon," he said in a telephone interview. Since Clark had a free balloon license and flew hydrogen-filled blimps during WWII, he had "more interest than the average person" in the subject.

In February, 1935, the Macon took part in yet another exercise. On the 12th, she was returning to Moffett Field from the south, flying above the fleet. Off Point Sur she was hit by heavy gusts of wind. The light house keeper at Point Sur later testified that he was watching through field glasses as the top fin "seemed to go to pieces very suddenly." The unrepaired structural weakness had given way.

As the fin was torn from the hull, it punctured the gas cells in the stern. So much ballast was let go to compensate for the loss of lift that the ship rose far above its pressure height. At this altitude automatic valves began venting helium in huge quantities. Desperate but futile attempts were made to jettison the four Sparrowhawks on board. Twenty-four minutes after the fin disintegrated, the Macon hit the sea and began to sink.

This time the water was warm and the fleet was nearby. The men had time to don life vests and to launch ten inflatable life boats. Of the 83 crewmen on board, only two lost their lives by jumping from the airship too soon. Commander Wiley became a survivor of both the Akron and the Macon.

The Navy's dirigible program, however, did not survive. Beneath the headline, AIRSHIP, SMASHED BY WIND, FALLS IN SEA, The San Francisco Examiner, on February 13, 1935, carried a smaller headline- "Dirigible Doomed as Defense Factor, Officials Say."

Naval officials agreed tonight the wreck of the Macon dooms the dirigible as a factor in national defense...Secretary of the Navy Swanson was preparing to order an immediate investigation of the disaster by a Naval Board of Inquiry into this latest in a long series of dirigible crashes in this country and abroad.



A Catwalk in the Interior of the Macon.
The officer is using one of the 18 telephones aboard.
Most photos in this essay are by Photographer's Mate,
George Carroll, USN.

The Chronicle on the same day carried similar reactions from Washington. "Representative Vinson (Dem, Ga.), Chairman of the House Naval Affairs Committee, asserted the Macon crash probably would mean the 'death knell' of airships for the Navy,..." The period from the first flight of the Akron to the last flight of the Macon was only 42 months.

The Chronicle carried another article which described the cost of recent dirigible disasters. The combined loss of the Shenandoah, Akron, and Macon amounted to nearly ten million dollars. On another page, the Chronicle listed details of 18 major dirigible disasters in the previous 23 years.

The Naval Board of Inquiry included Professor William Durand of Stanford University, a Naval Academy graduate. The Board reported there was "nothing inherently unsafe" about the Macon and recommended further development. The public, however, thought that the airships were dangerous, and many in the Navy thought that they were useless. No further development was to take place. The Macon was the last dirigible built in the United States.

With her demise, the only part of the 1926 Five Year Plan left was Hangar Number One. The dirigible for which the hangar had been constructed lay beneath 150 fathoms of the Pacific. The Army Air Corps assumed control of NAS Sunnyvale only months after the Macon went down. They were to use the giant hangar for blimps.

Yet the dirigible dream did not die. Even after WWII, Goodyear was still trying to figure out why its dirigibles had disintegrated. Creighton Hartmann, an aeronautical engineer with Turbo Energy Systems of Los Altos, went to work for Goodyear in the early 50's. Working in the Akron hangar where the sister airships had been built, he studied this problem using models of the dirigibles. These models were whirled about in a circle and passed over gusts coming up from a vertical

wind tunnel. Stress gauges revealed the huge sheer forces which had acted on the airships. They were so long that the bow could enter a gust while the stern was still in calm air. Because they were rigid, there was no give to these stresses.

The only way to increase lift in the airships was to make them larger and larger. What the engineers of the early 30's did not understand were the sheer forces which acted on such large structures. Even in the 50's more was being learned about them by such engineers as Mr. Hartmann. The smaller blimps of WWII with less internal structure did give to sheer forces and were used in great numbers.

As already noted, the shock felt in the nation over the loss of the Akron and the Macon was similar to the shock felt with the loss of the Challenger. Both craft represented the cutting edge of the technology of the time. Both received a tremendous amount of press coverage. The Macon was front page news in San Francisco at the start of her journey west. The nation's prestige was involved in both craft and although the structures were unlike in design, they were very much alike in cost, in military implication, and in the tragedy of lives lost.

If Wendell Thomas, President of the Santa Clara Consolidated Air Base Committee, were to visit Moffett Field today, he would certainly reaffirm his statement when he said that aeronautical development would be "beyond our present comprehension." The NASA Ames Research Center at Moffett, to say nothing of jet travel, was beyond comprehension in the early 30's. Mr. Thomas would recognize, however, the red tile roofs of Moffet Field and the ever dominant presence of Hangar Number One. It stands alone today as a reminder of that brief era when airships rode the skies of Santa Clara County.

Appendix A

Significant Chronology of

USS Akron and USS Macon

Conceived as a BuAer Project	10 March 1924
Projected as a BuAer Design	April 1924
Formulated as a BuAer Proposal	24 April 1925
Formally proposed to SecNav	17 November 1925
Authorized by the 69th Congress	24 June 1926
First Design Competition	16 May-28 June 1927
Second Design Competition	26 July-5 September 1928
Contract to Goodyear-Zeppelin Corporation	6 October 1928

	<i>Akron</i>	<i>Macon</i>
Christened	8 August 1931	11 March 1933
First flight	25 September 1931	21 April 1933
Commissioned	27 October 1931	23 June 1933
First planes aboard	3 May 1932	6 July 1933
Lost	4 April 1933	12 February 1935
Formally stricken	30 April 1933	26 February 1935
Total No. of flights	73	54
No. of flight hours	1,695.8	1,798.2

Appendices A and B are from The Airships Akron and Macon.

Appendix B

Technical Data

USS Akron and USS Macon

Number of fuel tanks	110
Normal fuel load, lbs.	110,000
Maximum oil capacity, lbs.	12,000
Number of oil storage tanks	8
Normal oil carried, lbs.	2,400
Maximum ballast capacity, lbs.	223,000
Normal ballast carried upon unmooring, lbs.	20,000
Number of 4,400-lb. bags for storage ballast	28
Number of 2,200-lb. bags for storage ballast	4
Number of 1,000-lb., quick-release bags for emergency ballast	12

Gas Cells:

Material	5.3-ounce cotton cloth impregnated with a gelatin-latex compound
Number of gas cells	12
Volume of largest cell, c.f.	900,000
Total cell material, sq. yds.	54,000
Total weight of gas cells, lbs.	22,000
Normal number of gas valves per cell	3
Diameter of all gas valves, inches	32

Outer Cover:

Material	2.8 ounce, 65-lb. strength, cotton cloth
Treatment	four coats of clear dope, two with aluminum pigment
Weight of material per sq.yd. after treatment, ounces	5.5
Total material, sq. yds.	33,000
Total weight of outer cover after treatment, lbs.	11,300

Powerplant:

Engine	Maybach VL-II, 12-cylinder, 60° V-type, 560 h.p. at 1,600 r.p.m.
Dryweight of one engine, lbs.	2,600
Ratio: pounds per horsepower	4.5
Number of engines	8
Total horsepower	4,480
Maximum engine r.p.m.	1,600
Maximum propeller r.p.m.	925
Diameter of propeller arc, feet	16.33
Maximum upward thrust (propellers rotated), lbs.	6,000
Maximum downward thrust, lbs.	8,000
Generators (2)	Westinghouse 8-KW, 110-volt, D.C.
Prime movers (2)	Universal Lighting Co. 4-cylinder, 30 h.p., gasoline fueled

Complement and Crew:

Complement	16 officers, 75 enlisted men
Flight crew	10 officers, 50 enlisted men
Airplane pilots	4
Airplane mechanics	15

Appendix C

Technical Data

Curtiss F9C-2

TECHNICAL DATA (F9C-2)

Manufacturer: Curtiss Aeroplane and Motor Co, Inc, Buffalo, NY.

Type: Airship-based fighter/scout.

Accommodation: Pilot only.

Power plant: One 438 hp Wright R-975-E3.

Dimensions: Span, 25 ft 5 in; length, 20 ft 7 in; height, 10 ft 11½ in; wing area, 173 sq ft.

Weights: Empty, 2,089 lb; gross, 2,770 lb.

Performance: Max speed, 176.5 mph at 4,000 ft; initial climb, 1,700 ft/min; service ceiling, 19,200 ft; range, 350 st miles.

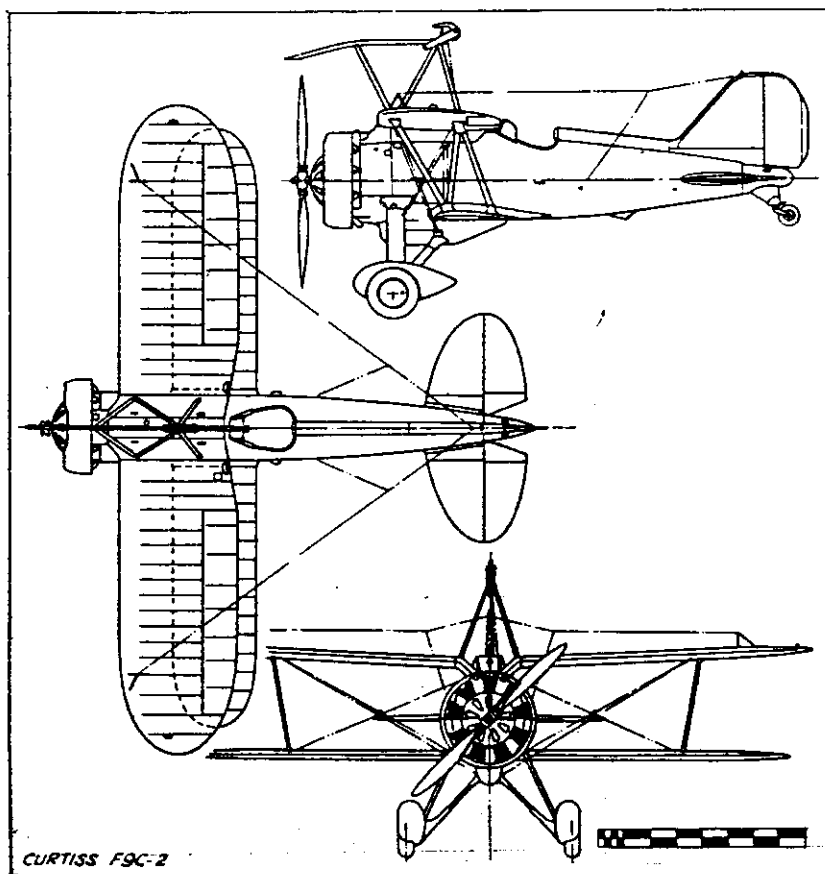
Armament: Two fixed forward-firing 0.30-in guns.

Serial numbers:

XF9C-1: A8731.

XF9C-2: 9264.

F9C-2: A9056-A9061.



Appendix C is from United States Navy Aircraft since 1911.

Sources Used

California History Center, Cupertino
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Moffett Field Library, NAS Moffett Field
Mountain View Library
Museum of Naval Aviation, NAS Pensacola, Florida
Palo Alto Main Library
Sunnyvale Library

People Consulted

Birge Clark- architect, native to Palo Alto, and
visitor to NAS Sunnyvale.

Michelle Drovdahf- Librarian at NAS Moffett Field.

Creighton Hartmann-Engineer with Turbo Energy Systems
in Los Altos.

John Shackleton- Public Affairs Officer, NAS Moffett Field.
The photographs on pages 3,19,27, and the
bottom of 28 were provided courtesy of the
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