The Story of Coast Guard Aviation

By
Lieutenant Colonel ROBERT H. RANKIN, *USMC*
and
NORMAN N. RUBIN

It all began some 43 years ago, back in 1915. Since that time Coast Guard aviation, although never great in numbers of personnel or equipment and constantly battling against odds, has established a proud record of achievement. Never numbering more than 2,000 officers and 440 aircraft at any one time —this during the height of World War II expansion—it has, among other things, been directly responsible for saving more than 8,000 lives at sea.

Although Coast Guard aviation dates officially from an Act of Congress dated August 29, 1916, authorizing the Treasury Department to establish ten Coast Guard air stations along the coasts of the United States, the story really begins a year earlier. One of the duties engaging the attention of the Coast Guard at that time was that of searching the sea lanes for derelict schooners. Reflecting on the difficulties often attendant upon locating these vessels with surface craft, two young officers, 2nd Lieutenant Norman B. Hall and 3rd Lieutenant Elmer F. Stone of the cutter *Onondaga*, decided that flying machines might offer a far better means of performing the job. Their idea received the enthusiastic support of their commanding officer, Captain B. M. Chiswell.

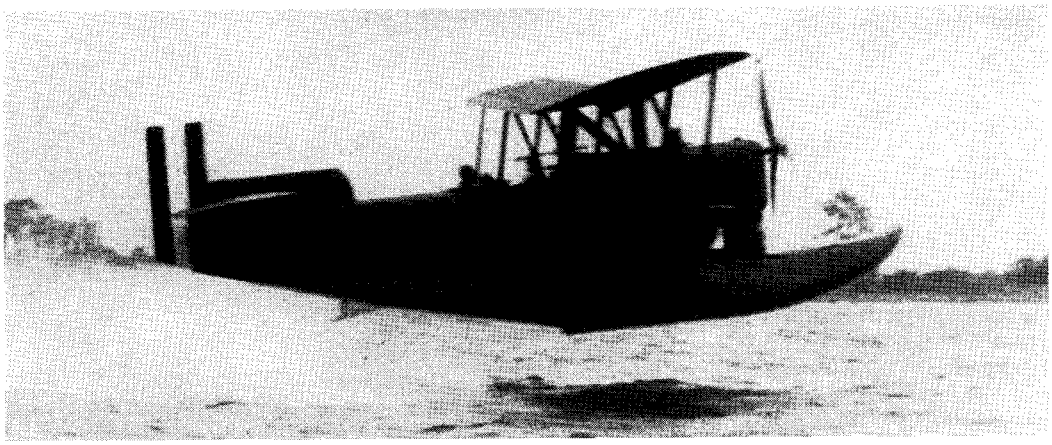
At that time *Onondaga's* base was Hampton Roads, Virginia. Nearby, at Boat Harbor Point, Newport News, was one of the early flying schools operated by the Curtiss Aeroplane and Motor Company principally for the purpose of training pilots for the Canadian service. Hall and Stone found an interested supporter in Captain Thomas A. Baldwin, a pioneer balloonist and pilot, who was manager of the school. He thoroughly supported their views that the airplane could serve a useful purpose in locating derelicts, in beach patrol duties, in rescue work, and in the whole catalog of other responsibilites charged to the Coast Guard. Baldwin arranged for the two officers to be flown on a number of experimental flights in a Curtiss "F" flying boat, one of the first successful flying boats developed. There were no facilities for navigation, and it was not feasible to get out of sight of land in their under-powered craft, yet their range of observation and operation was so great in the air that the flights conclusively demonstrated the practicability of their ideas.

Captain Chiswell and his two young officers then set about to sell aviation to Coast Guard officials. In the spring of 1916, when the *Onondaga* was at Washington, D. C., Captain Chiswell took the opportunity to entertain on board Glenn H. Curtiss, famous pioneer airplane designer and manufacturer and a long-time Government contractor, and Assistant Secretary of the Treasury, Byron R. Newton. (Newton as a young newspaper reporter had witnessed the first flight of the Wright brothers at Kitty Hawk. It is related that when he filed his first-hand account of that momentous occasion he was immediately fired from his job, his editor maintaining that only a drunk-

EXECUTIVE OFFICER, The Planning Office, National Headquarters, Selective Service System, Colonel Rankin is a military historian and writer and has been a frequent contributor to the U. S. Naval Institute PROCEEDINGS.

MR. RUBIN is an aeronautical engineer at Coast Guard Headquarters.

All Photographs illustrating this article were obtained by the authors from the U. S. Coast Guard and U. S. Navy except for the NC-4 (courtesy National Archives) and the Northrop Delta (courtesy Northrop Aircraft).



THE FIRST AIRCRAFT PURCHASED ESPECIALLY FOR COAST GUARD USE

This Loening OL-5 amphibian was the first aircraft purchased for Coast Guard use. When Congress made the first appropriation for Coast Guard aviation in 1926, it was no longer necessary to borrow aircraft from the Navy. The OL-5 cruised at 75 m.p.h. and had a range of 415 miles.

ard would dream up a story about a successful flying machine.) The idea developed during the meeting aboard the *Onondaga* is contained in a letter which Chiswell wrote to a Construction Corps officer at Coast Guard Headquarters, as follows:

"If practicable, please mail me as soon as convenient plans, specifications and blue prints of a type of motor surfboat which you may regard as best adapted to the following:

"Mr. Glenn H. Curtiss, at luncheon with Mr. Newton on the *Onondaga* last Sunday, suggested that it might be practicable to convert a surfboat into a flying boat with wings and motor so arranged that they could be quickly eliminated when the boat lighted on the water and within a few minutes it would be, instead of a flying boat, an ordinary motor surfboat. If the lifeboat is better adapted, send lifeboat. He promised to think about it and I am going to try to encourage him."

The original idea to fit wings, power plant, propeller, and control surfaces to a standard Coast Guard surfboat proved impracticable. Thereupon Glenn Curtiss, the inventor and original developer of the flying boat, designed and built his "life boat" plane. This was a triplane flying boat with short, boat-like hull and with the control surfaces mounted high to the rear on tail booms. (This idea of the short, boat-like hull with tail surfaces mounted aft on outriggers would be employed later by Curtiss and Navy aeronautical engineers in the design of the Navy's famous trans-Atlantic flying boats, NC-1, -2, -3, and -4.) Twin four-blade propellers mounted out in front of the wings were turned by a single engine mounted in the hull. Wings, control surfaces, and propellers could be easily cast off. The hull could then proceed on the surface under its own power. Unfortunately, by the time this craft had been completed, the United States was engaged in World War I and all further experiments were stopped.

In the meantime Coast Guard Headquarters took an active official interest in the ideas of Captain Chiswell and Lieutenants Hall and Stone. Captain Charles A. McAllister, Chief Engineer of the Coast Guard, drafted tentative legislation looking to the creation of an aviation section and the Commandant, Captain E. P. Berthholf, queried the Navy Department concerning the possibility of training Coast Guard officers as pilots. It was agreed that the Navy would accept two Coast Guard officers for training at the newly-established Naval Air Station at Pensacola, Florida, and on April 1, 1916, 2nd Lieutenant Charles E. Sugden and 3rd Lieutenant Stone were ordered to proceed to that station. 2nd Lieutenant Hall, who with Captain Chiswell and Lieutenant Stone was responsible for the introduction of the aviation idea, by virtue of

his education as a professional naval architect, was ordered on October 28, 1916, to the Curtiss Aeroplane and Motor Company's factory at Hammondsport, N. Y., to study aircraft engineering and construction.

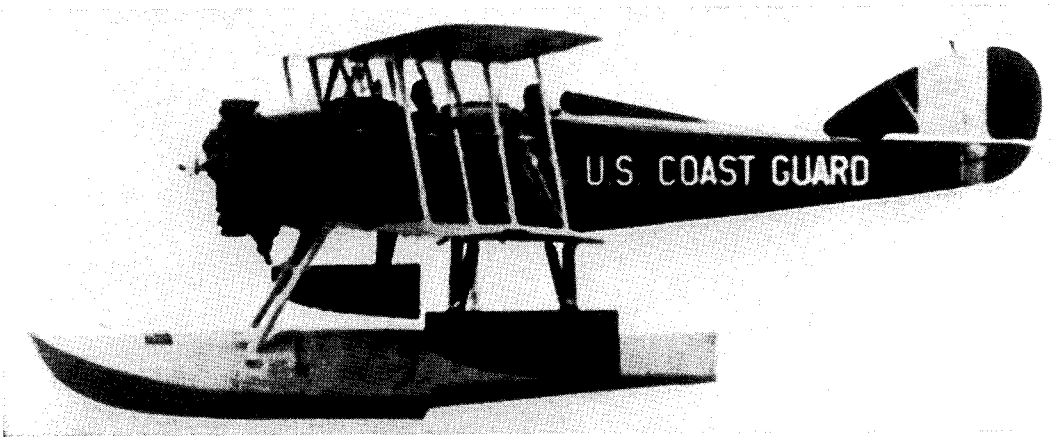
Concurrently, legislation promoted by the Aero Club of America and sanctioned by the Treasury Department was introduced into the Senate. This proposed legislation provided $1,500,000 for the establishment of an "Aerial Coast Patrol," this to operate as an auxiliary of the Coast Guard.

Almost simultaneously the proposed legislation previously worked up by Captain McAllister was revamped. When submitted, it received Congressional approval and was signed into law by the President on August 29, 1916. This legislation, a part of the Naval Appropriation Act of that year, provided for a total of ten Coast Guard air stations to be established along the Atlantic and Pacific coasts, the Great Lakes, and the Gulf of Mexico. Provision was made for the establishment of a Coast Guard aviation school, and an aviation corps was authorized, this to consist of ten line officers, five engineer officers, and forty enlisted mechanics. Implementing funds were not provided for and, in spite of repeated efforts, Congress refused to grant the money required to make the act operative.

Authorization was obtained in the meantime to train an additional sixteen Coast Guardsmen at the Naval Air Station, Pensacola. Thus, eighteen aviation pilots, an aviation engineering officer, and an office at Coast Guard Headquarters, with the legend on the door reading, "Inspector of Aviation," constituted the Coast Guard air section as this country entered World War I.

Coast Guardsmen gave a very good account of themselves in World War I, and the members of the aviation section were no exception, these being assigned to the Navy's Aviation Division and ordered to naval air stations in this country and abroad. One Coast Guard air officer became commanding officer of the Naval Air Station, Ille Tudy, France, and was honored by the French Government with the award of Chevalier of the Legion of Honor. Naval air participation in World War I was, of course, limited by the nature of that conflict and permitted but little opportunity for action over the lines or in actual combat.

With the end of the war, the Coast Guard returned to the jurisdiction of the Treasury Department. In the unsettled times following the war, Coast Guard aviation was all but lost, no provision being made for it in any way. In fact, it seemed doubtful that it had any future at all. The dedicated souls in the Coast Guard who wore the cherished wings of a naval aviator were more convinced than ever before, however, of the contribution which the flying Coast Guard could make to the country in peace time. Then an event oc-



TWO SEAPLANES WERE AMONG THE FIRST FIVE COAST GUARD AIRCRAFT

These single-float Vought UO-4 seaplanes were used for patrol work and in law enforcement activities. During the mid-1920s they were found to be particularly useful in apprehending rumrunners.

curred which gave them hope. The three Navy flying boats, NC-1, -3, and -4, in May, 1919, took off on a flight across the Atlantic to Europe, via the Azores, to demonstrate the reliability and usefulness of big, patrol-type flying boats. Co-pilot of the NC-4, the only one of the three flying boats successfully to complete the journey and the first airplane ever to fly the Atlantic, was Lieutenant E. F. Stone of the Coast Guard, the only non-Navy man in any of the crews.

The successful crossing of the Atlantic by the NC-4 had far-reaching effects. Among other things, it demonstrated the soundness of the big flying boat concept, proved the feasibility of long distance, over-water flying and navigation, and did much to sell both the general public and the Government on the worth of aviation. Nevertheless, at least two more years passed before there was any Coast Guard aviation activity, and then it was extremely limited. In the meantime, Stone served at the Naval Aircraft Factory, where he was responsible for the powder catapult which was used until the advent of World War II to launch aircraft from cruisers, battleships, and other vessels.

Fortunately the Coast Guard commandants have always made positive efforts to keep the air concept alive. Typical was the action in 1920 of Rear Admiral William R. Reynolds, Commandant at that time, in obtaining six Curtiss HS-2L flying boats on loan from the Navy's Bureau of Aeronautics. These were used in establishing the Coast Guard's first air station at Morehead City, North Carolina, opened on March 24, 1920. Although no operating funds had been appropriated, the station functioned on an experimental basis aimed at demonstrating the value of aviation in the performance of Coast Guard duties. Although these flights were a complete success, the Government did not take cognizance of them, nor provide positive financial support. So, after some fifteen months of operations, the Morehead City station was closed. The aircraft were returned to the Navy, then declared obsolete and destroyed. In spite of the strong representations made before Congress by Admiral Reynolds, the aviation program was denied Government blessing. It was not until four years later that there was again any aviation activity in the Coast Guard.

During the mid-1920's rumrunning became so flagrant that surface craft were unable to cope with it. Again it was decided to demonstrate the usefulness of Coast Guard aviation. This time the demonstration received official notice and action. Early in 1925 Lieutenant Commander C. G. von Paulson secured the assistance of Commandant Rear Admiral Frederick C. Billard in obtaining the loan of a Vought UO-1 seaplane from the Navy for a year. For a time this seaplane was based at the Naval Reserve Air Station at Squantam, Massachusetts. Then it was operated from a small base established on Ten Pound Island in Gloucester Harbor.

In 1925 a schedule of daily patrol flights substantially curtailed the rumrunning in the area. As a sideline to the patrol flights, the staff at the base gave instruction to Coast Guard aviation students and performed a number of experiments in the use of radio communications between aircraft in flight and between aircraft and ship-ground stations. One of the most important achievements in this latter area was the development of the first loop-type radio direction finder.

Impressed by the activity of the air station at Ten Pound Island and plagued by the increasing operations of rumrunners in other areas, Congress finally appropriated $152,000 for the purchase of five aircraft. These planes were the first the Coast Guard could claim as its own, all previous equipment having been borrowed from the Navy.

In 1926 an air station was opened at Cape May, N. J., the Navy again co-operating by making a portion of its air facility at that place available to the Coast Guard.

Another great stride forward was made in 1930 when Congress appropriated a substantial sum of money for additional aircraft and equipment.

Up until 1932 funds had been so limited that the Coast Guard could not usually afford to establish specifications. Consequently aircraft were most often limited to "off the shelf" types developed for the Army and Navy or for civilian use. With the funds now made available, it was almost possible to "custom tailor" planes to Coast Guard specifications.

Beginning in the early 1930's Coast Guard aviation progressed steadily. In 1933 an air

THE FIRST OF THE *DOLPHIN* AMPHIBIANS WAS COMMISSIONED IN 1931

Later converted to a flying boat, this Douglas monoplane amphibian was one of many similar amphibians purchased during the 1930s. Improved versions of this basic type were acquired as they were developed. They rendered excellent service, particularly in rescue work and when medical aid was needed at sea.

station was commissioned at Dinner Key (Miami), Florida. The following year all Treasury Department aviation activities were consolidated under the Coast Guard. At this time the Customs Service turned over fifteen aircraft to the Coast Guard. These planes had been confiscated for law violations, including smuggling and violation of flying regulations. These were light private planes and commercial aircraft types. Some were flown for a time, but after several crashes all but two were condemned in the interest of safety and standardization. During this same year the Navy turned over six Vought O2U-2, scout-observation, two-place biplanes to the Coast Guard. Although obsolete as Navy aircraft, they were useful for law enforcement and antismuggling operations.

Sufficient flying equipment was not available to activate three new air patrol detachments, at Buffalo, N. Y.; San Antonio, Texas; and San Diego, California. During subsequent years appropriations made possible the purchase of additional aircraft and the opening of new stations. By 1940 the Coast Guard had a total of fifty aircraft, many built especially to meet Coast Guard specifications. These aircraft operated from nine coastal air stations, at Salem, Mass. (replacing the former station at Cape May); Miami, Florida; St. Petersburg, Florida; Biloxi, Mississippi; San Diego, California; and Port Angeles, Washington. These air stations were located strategically in coastal areas where opportunities for tying in with ships and the lifeboat stations in rescue activities were greatest. Inasmuch as the Coast Guard is a part of the Navy during war, the location of these stations was planned so as to enable them to be a part of the national defense pattern. An Air Patrol Detachment was also located at Traverse City, Michigan, with a view to determining an acceptable location for an air station on the Great Lakes. For the most part, the air stations were located on sheltered waters near the coast, where both land and sea planes could operate safely and effectively.

With the advent of the war in Europe in 1939, the U. S. Government organized a neutrality patrol. Coast Guard personnel, vessels, and aircraft participated actively in this work. Then, in April, 1941, with the signing of an agreement with Denmark for the protection of Greenland, Coast Guard aviation responsibilities were greatly increased. Cutter-based planes took part in widespread antisubmarine

and coastal patrol activities in enforcing neutrality on the high seas.

As the international situation deteriorated, and some weeks before Pearl Harbor, the Coast Guard by order of the President was transferred to the Navy. Coast Guard aviation came under the operational direction of the Navy Area Commanders who were, in turn, under the commanders of the several Sea Frontiers. With the entry of this country into World War II, routine Coast Guard duties were subordinated or, in some instances, completely discontinued, in the interests of national defense. Rescue activities were greatly accelerated with the increased size and scope of military and naval air programs which entailed increased overwater flying. In addition to this activity Coast Guard aviation was charged with assisting and supporting the Navy in convoy coverage, antisubmarine warfare, and patrol and rescue activities.

From Pearl Harbor until the end of World War II, Coast Guard aircraft delivered 61 bombing attacks on enemy submarines, located some 1,000 survivors of downed aircraft and torpedoed surface craft, and actually took part in the rescue of 95 of these.

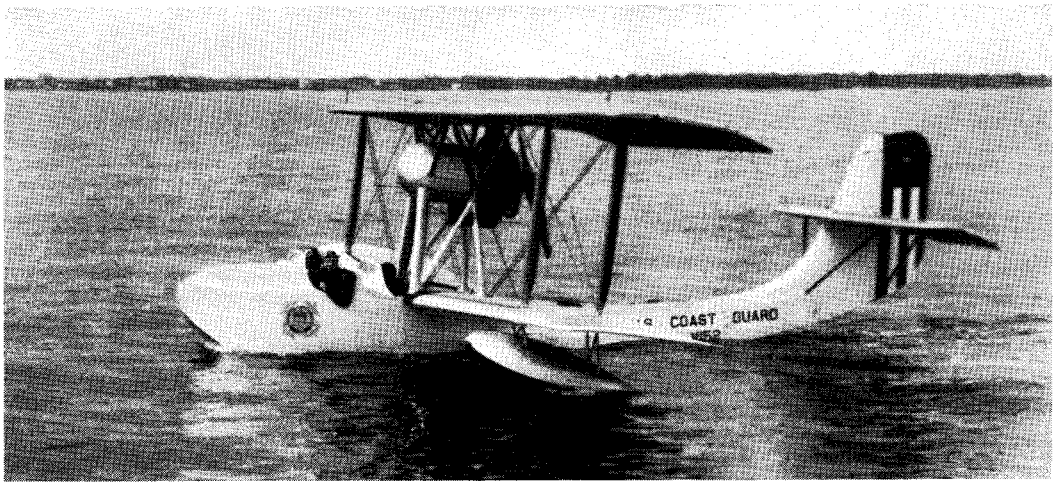
During 1943 a Coast Guard patrol bomber squadron was activated for antisubmarine patrol duties in the Canadian Arctic, Iceland, and Newfoundland. At the same time patrols were made in northeast Greenland for ice observation, searches for enemy landings, and weather station activities.

Some months earlier, in December, 1942, the Coast Guard participated in the establishment of the first United States air-sea rescue unit, which was organized at San Diego when the increasing number of military and naval flights in that area demonstrated a real need for a well-organized agency whose primary function would be that of rescuing flyers forced down at land or sea. It had become apparent that independent rescue activities by the Army, Navy, Marine Corps, and Coast Guard were resulting in confusion and duplication of effort. Upon the suggestion by the Coast Guard that a single agency co-ordinate all efforts, the Secretary of the Navy in March, 1944, established an Air-Sea Rescue Agency, headed by the Commandant of the Coast Guard. Army, Navy, Marine Corps, and Coast Guard representatives were members of this agency, which was charged with co-ordinating operations; conducting joint studies; recommending methods, procedures, and techniques; and disseminating information.

During World War II the Coast Guard operated Navy aircraft, including Grumman JF, J4F, SA, and JRF amphibians; Consolidated PBY flying boats and amphibians; Consolidated PB2Y and Martin PBM flying boats; Douglas R4D *Skytrain* and R5D *Skymaster* transports; Vought OS2U scout-observation planes; and others. At the end of the war most of these were returned to the Navy Bureau of Aeronautics, but a few were turned over to a variety of organizations and agencies, including Mutual Defense Assistance Program, U. S. Air Force, War Assets Administration, Fish and Wildlife Service, and the National Advisory Committee for Aeronautics. The few retained by the Coast Guard were gradually replaced by more modern aircraft.

During World War II and after, the Coast Guard, at first an interested observer, became active in helicopter development. The advantages of this particular type of aircraft had long been accepted; the problem was to adapt it to Coast Guard requirements. Coast Guard aviation engineers have constantly studied the development of new aircraft, as well as the modification of existing production aircraft, to meet Coast Guard specifications. In 1942 personnel of the Aeronautical Engineering Division proposed a "flying lifeboat," fitted with fore-and-aft rotors, a feature later to be employed on large helicopters. At that time, however, the only successful helicopter in this country was equipped with side-by-side rotors. Other Coast Guard helicopter studies and proposals included those of removing the regular monoplane wings from Douglas RD-4 and Grumman JRF-2 amphibians and substituting stub wings and a helicopter rotor system. Another interesting study proposed a helicopter glider, this to be towed behind a search plane and cast off, landing vertically when needed. The rotors were designed to be jettisoned when the craft alighted on the water. It would then proceed along on the surface under its own power. The crew was to be a pilot, co-pilot, and a doctor. None of these proposals ever progressed beyond engineering drawings.

On the helicopter operations side there was



FOR TRAINING AND FOR INSHORE BEACH AND RIVER PATROL DUTIES

Five small Douglas Viking flying boats were purchased in 1931 by the Coast Guard. These were lightweight, two-passenger, biplane types. They cruised at 88 m.p.h. and their range was approximately 400 miles.

considerable activity. When in November, 1943, the Coast Guard air station at Floyd Bennett Field, Brooklyn, N. Y., was designated a Coast Guard helicopter training base, three Sikorsky HNS helicopters were loaned by the Navy to get the project under way.

Shortly after this, the British Admiralty asked the Coast Guard to train a number of helicopter pilots and mechanics for the British service. The Admiralty supplied four helicopters for this purpose. More than 100 pilots and 150 mechanics were trained under this program. In addition to purely military uses, such as antisubmarine patrol duties, the Coast Guard demonstrated and continued to experiment with and employ helicopters in rescue and relief missions, which missions it could perform exceptionally well. The size and maneuverability of the helicopter makes it ideal for many Coast Guard operations, although it merely supplements and does not rereplace fixed-wing aircraft.

Following World War II the Coast Guard was returned to the Treasury Department. At this time the Air-Sea Rescue Service noted above was abandoned. Nonetheless, in view of continued and ever-increasing over-water aviation activities, both commercial and military, the need for such an organization continued. Consequently the Secretaries of Commerce, Treasury, and Defense, and the Chairman of the Civil Aeronautics Board and the Federal Communications Commission in the early summer of 1956 signed an agreement for the creation of a new air-sea rescue organization named the Search and Rescue Agency. To avoid confusion and duplication of effort, the Coast Guard has been given the responsibility through this agency of co-ordinating air search and rescue units of the Air Force, Army, Navy, Marines, and Coast Guard.

Presently the Coast Guard has 128 planes operating from air stations at Salem, Mass.; Brooklyn, N. Y.; Miami, Florida; St. Petersburg, Florida; Traverse City, Michigan; San Diego and San Francisco, California; Port Angeles, Washington; and from air detachments at Washington, D. C.; Quonset Point, R. I.; Keesler Air Force Base, Mississippi; Corpus Christi, Texas; New Orleans, Louisiana; Argentia, Newfoundland; Bermuda; San Juan, Puerto Rico; Barbers Point, Hawaii; Kodiak, Alaska; and Annette, Alaska.

Because the cost of aircraft has increased so greatly during the last twenty years, it is no longer feasible for the Coast Guard to underwrite development costs of special aircraft types. The present policy is to adapt existing types, having necessary changes built into

***ANTARES*, ONE OF THE FIVE FLYING LIFE BOATS PROCURED IN 1933**

Built to transport stretcher cases, these General Aviation PJ-series flying boats were the result of a design competition in which eight aircraft manufacturers participated. Between 1933 and 1936 each Coast Guard flying boat or amphibian was named for a star, a custom which became very popular with the general public because it enabled them to identify a particular plane.

them on the production line. Also, whenever and wherever possible, an attempt is made to have Coast Guard requirements incorporated in the design stages of aircraft sponsored by other branches of the government.

Coast Guard commissioned officers qualified to fly aircraft are officially classified as "aviators," while enlisted men so qualified are designated "pilots." These are trained at the Naval Air Station at Pensacola, Florida. Presently there are some 350 officers, including 312 aviators, and 1,091 enlisted men, including eight pilots, in Coast Guard aviation. Other than aviators and pilots, personnel in Coast Guard aviation include mechanics, radiomen, radar operators, aerial photographers, flight surgeons, engineer officers, and administrative personnel.

Although the primary duty of Coast Guard aviation is the saving of life and property, there are a number of collateral duties which it performs. For instance, it co-operates with the Treasury Department's Alcohol Tax Unit in spotting illicit stills. It assists in the historical Coast Guard duties of enforcing the customs laws and in suppressing smuggling. Under the Coast Guard's Captain-of-the-Port Program it plays an important role in the control and inspection of shipping.

Coast Guard aviation co-operates with other Federal agencies and activities in several ways. In this respect it assists the Coast and Geodetic Survey in aerial photography and aerial mapping, assists the Immigration Service in preventing the illegal entry of aliens into this country, and renders aid to the Fish and Wildlife Service by making surveys of wild life.

Flying Coast Guardsmen also engage in numerous other activities. These include the interception and escort of trans-ocean and domestic aircraft in distress, dissemination of storm and hurricane warnings to surface craft and to isolated communities, patrolling regattas, and lending assistance in forest fire control and in flood relief work. Also included are participation in the International Ice Patrol in the North Atlantic and the supplying of isolated Government installations in Hawaiian, Alaskan, and North Atlantic areas.

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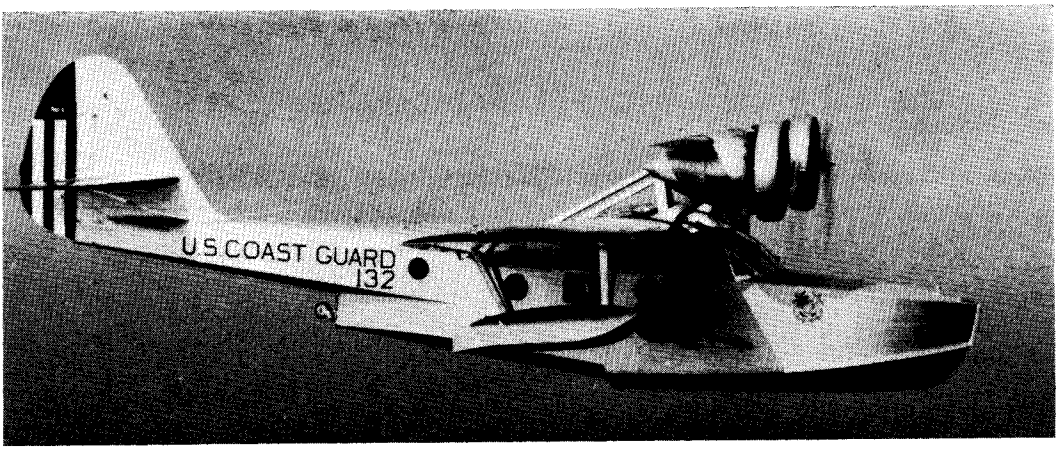
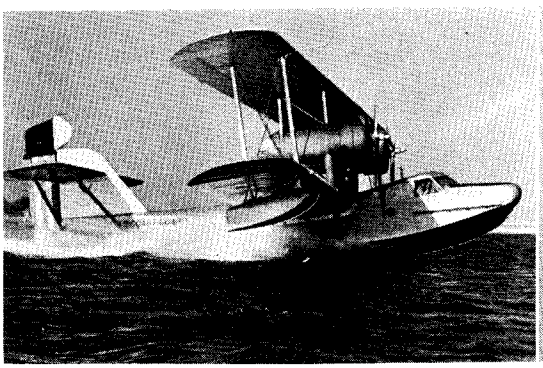
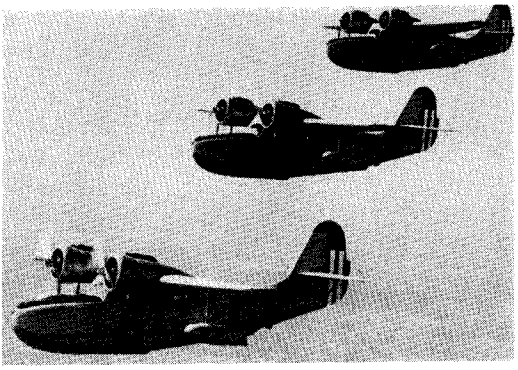


VARIETY IN AIRCRAFT ACCORDING TO OPERATIONAL NEEDS

A development of the Coast Guard's original Douglas amphibian of 1931, this RD-4 (*top*) was one of ten of the new improved type commissioned in 1934 and 1935. An all-metal Northrop Delta (*bottom*) was acquired in 1935 and used for five years as a utility plane and personnel transport.



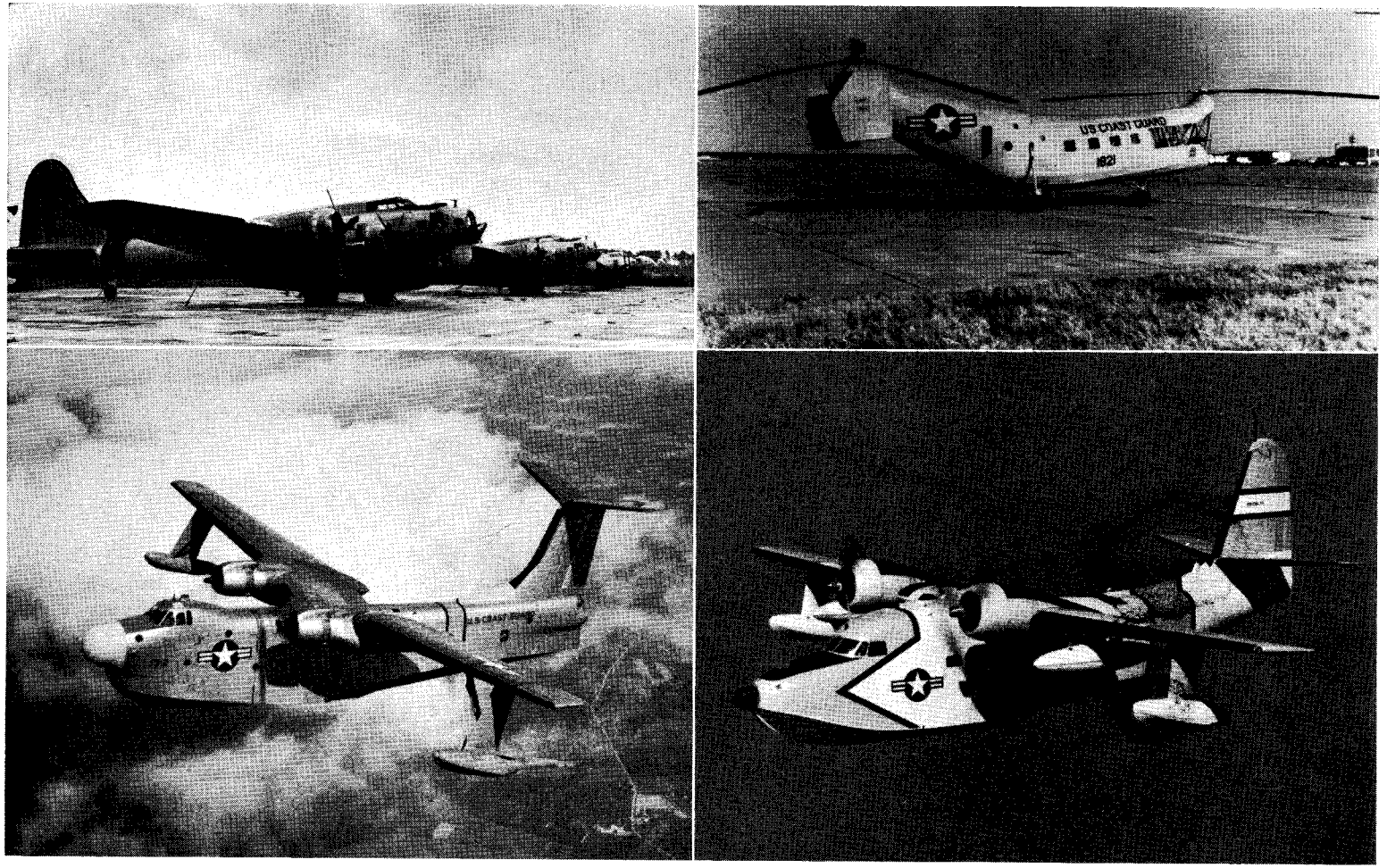


FLYING BOATS HAVE SERVED THE COAST GUARD WELL OVER THE YEARS

The PH-2 five-passenger flying boats (*left*) with a range of over 2,000 miles were the "big boats" of the aerial patrol fleet of the late 1930s. The JRF-2 Grumman Utility Transports (*right*) were commissioned in 1939 and 1940. This type of high-wing monoplane amphibian has been constantly improved since its inception and the latest models are still in service.

FOR WORLD WAR II ASW, PATROL, AND AIR-SEA RESCUE DUTIES

Amphibian models of the Consolidated PBY-5 Catalina (*top*) were furnished by the Navy. Over 100 were used by the Coast Guard for long range air patrol and air-sea rescue duties during the 1940s. The Vought OS2U-3 planes (*center*) carried the burden of ASW in the early part of the war. They were particularly useful for close-in work along the shore. The Curtiss SO3C-3 (*bottom*) was basically a scout-observation type which could be fitted with float landing gear and used for antisubmarine warfare.

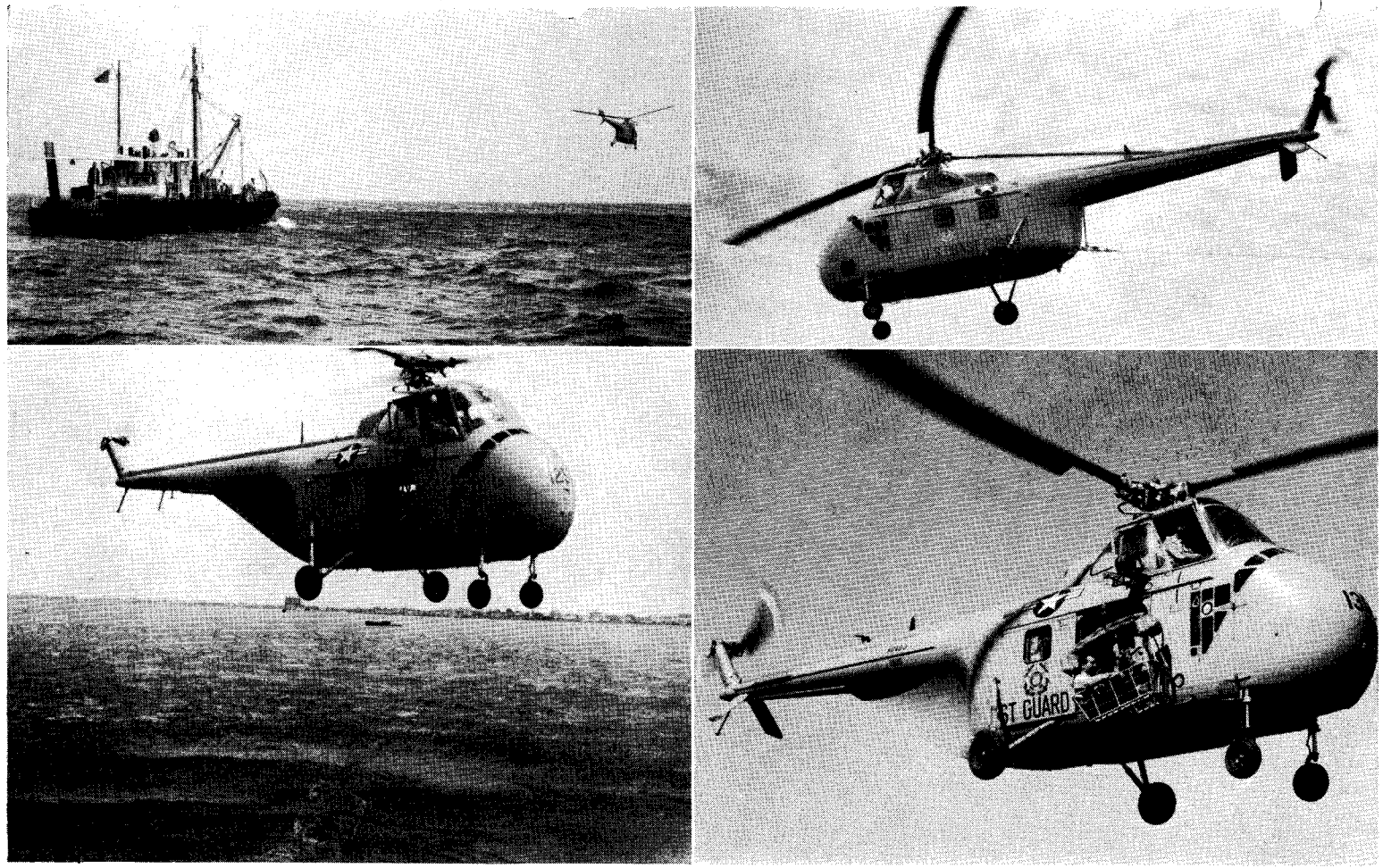


EFFECTIVE RESCUE WORK DETERMINES THE CONFIGURATION OF MANY COAST GUARD PLANES

Eighteen Boeing PB-1G aircraft (*top, left*) acquired during the mid-1940s were B-17H bombers altered to accommodate a lifeboat under the fuselage. A Piasecki HRP-1 (*top, right*) was one of three such craft which joined the Coast Guard in 1948. The Martin Marlin P5M-2 (*bottom, left*) is a big radar-equipped flying boat used for long range air-sea rescue work. Trial paint job on a UF-1G Grumman Albatross (*bottom, right*) is an experiment with color changes believed to make sighting easier.

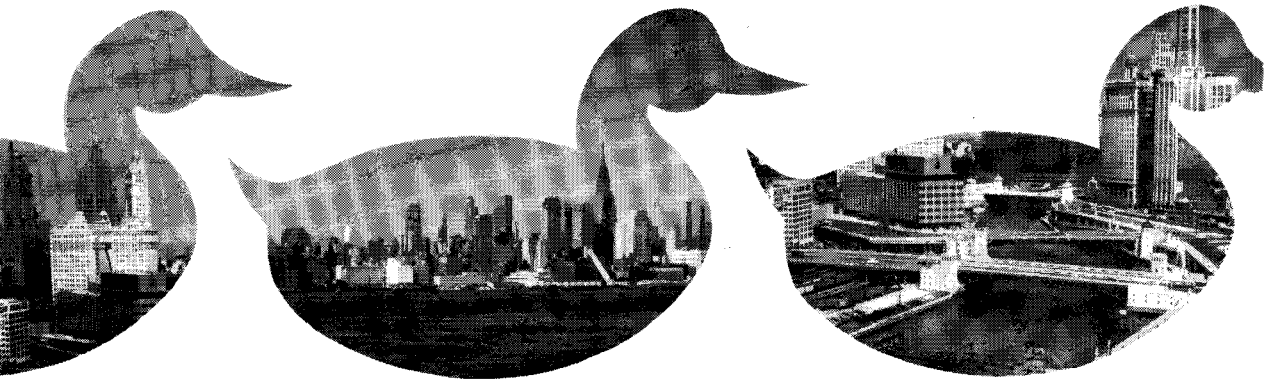
THESE FAMILIAR PLANE TYPES FOUND USEFUL EMPLOYMENT IN THE COAST GUARD

The Douglas DC-3 (*top*) was for many years the most widely used aerial transport in the world both commercially and by all the U. S. armed services, plus the British and the Russians. Known in the Coast Guard by its Navy designation, the R4D was used for search and rescue, intercept, and logistic purposes. The RD (*center*) was used for similar missions requiring the greater range and speed of the 4-engine Douglas. During World War II, the larger Coast Guard cutters carried on deck Grumman J2F-5 Duck amphibians (*bottom*) for reconnaissance flights.

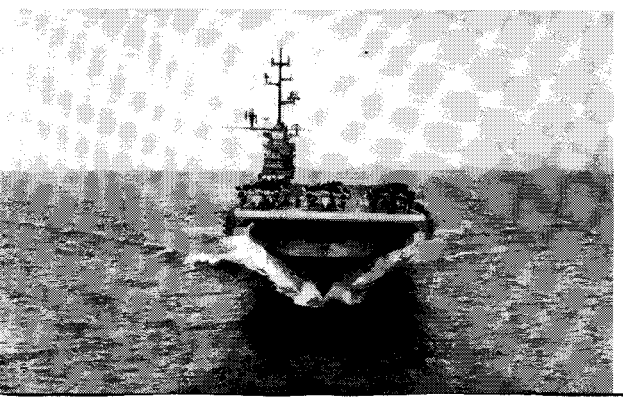


HELICOPTERS ARE PRACTICAL AND VERSATILE PLANES WELL SUITED FOR COAST GUARD DUTIES

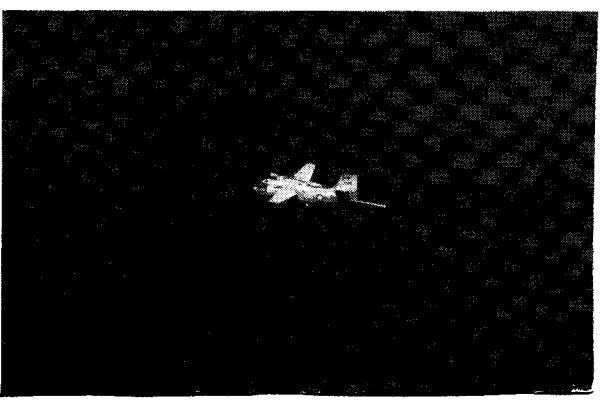
An HO4S-3 helicopter tows the 794-ton buoy tender *Birch* (*top, left*) during recently completed tests for proving the potential use of the helicopter in towing fishing, pleasure, and other types of vessels in air-sea rescue operations. The towing line (*top, right*) is a ¾" steel cable having a pulling strength of 6,900 lbs. Other HO4S-3 helicopters are shown (*bottom, left and right*) demonstrating the use of a hydraulic-hoisted basket in rescue work.

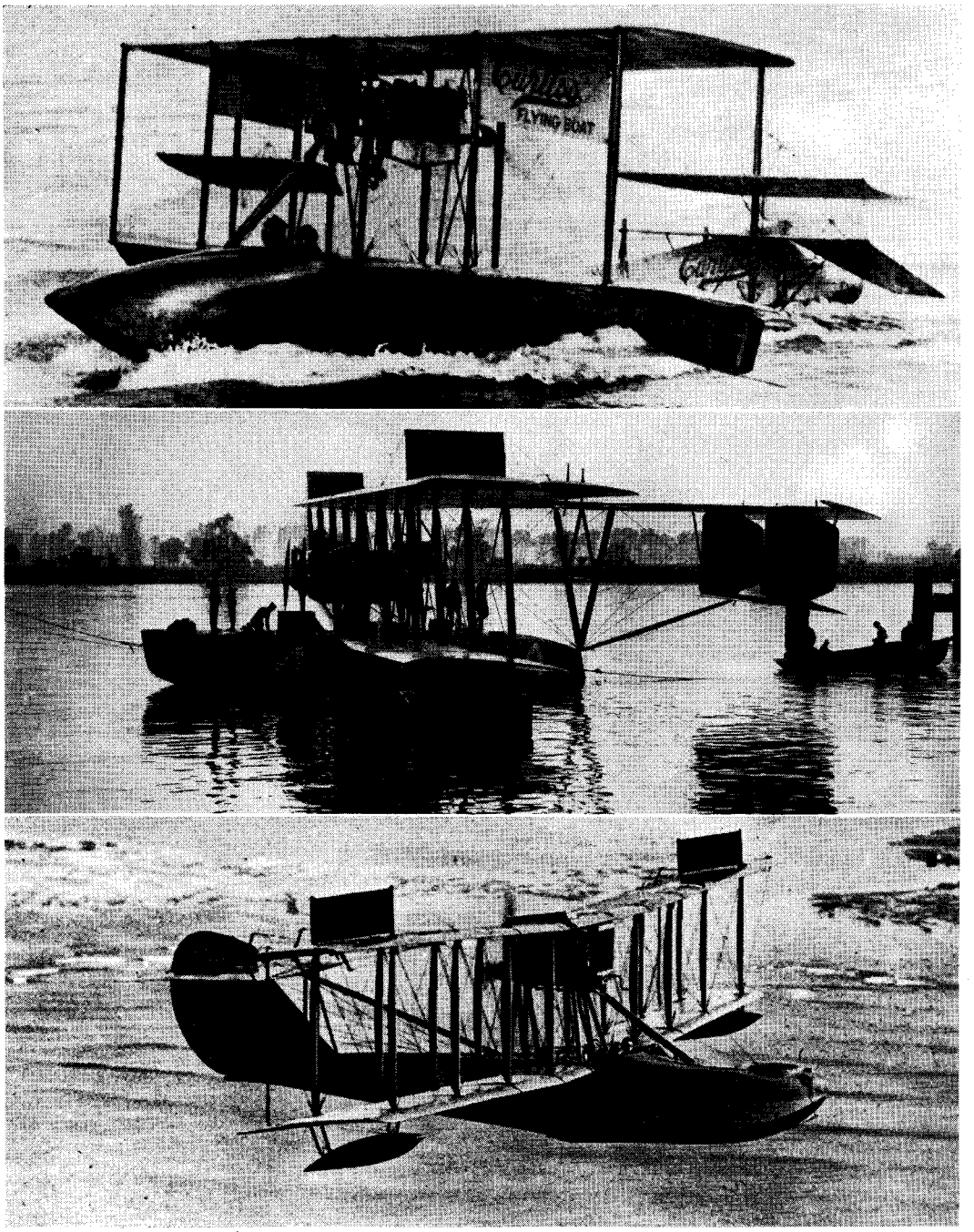


Here are Grumman S2F Trackers on board aircraft carrier, mainstay of United States Navy HUK Group on Anti-Submarine Warfare maneuvers.



S2F starts search with electronic gear that can detect snorkel, periscope, or sub radar, even the submerged sub's disturbance of the earth's magnetic field.





COAST GUARD INTEREST IN AVIATION BEGAN IN 1915

Lieutenants Norman Hall and E. F. Stone used the Curtiss Flying Boat (*top*) to prove the usefulness of aircraft for Coast Guard patrol duty, search, and rescue missions. Lieutenant Stone was co-pilot of the Navy's NC-4 (*center*) on its history-making flight from the United States to Europe via Newfoundland and the Azores in May, 1919. Six Curtiss HS-2L flying boats (*bottom*) were borrowed from the Navy in 1920 and used at the first Coast Guard air station at Morehead City, North Carolina.