and Fifty Years Later-- restor

By Chief Journalist James Johnston

The NC-4 was, in the beginning, for pioneer glider pilot Paul Garber a matter of professional interest, but in the years ahead it became an obsession.

Garber, recently retired assistant director of the National Air and Space Museum, first saw the flying boat at Rockaway Naval Air Station during the time of its preparation for the trans-Atlantic flight. He was a young man, then, with the air postal service. The next time he saw the NC-4, it had returned from Europe and had been put on display in New York's Central Park.

"I saw it twice in Washington, once at Anacostia, once on exhibit at the Washington Monument, and one other time in Philadelphia," he recalls.

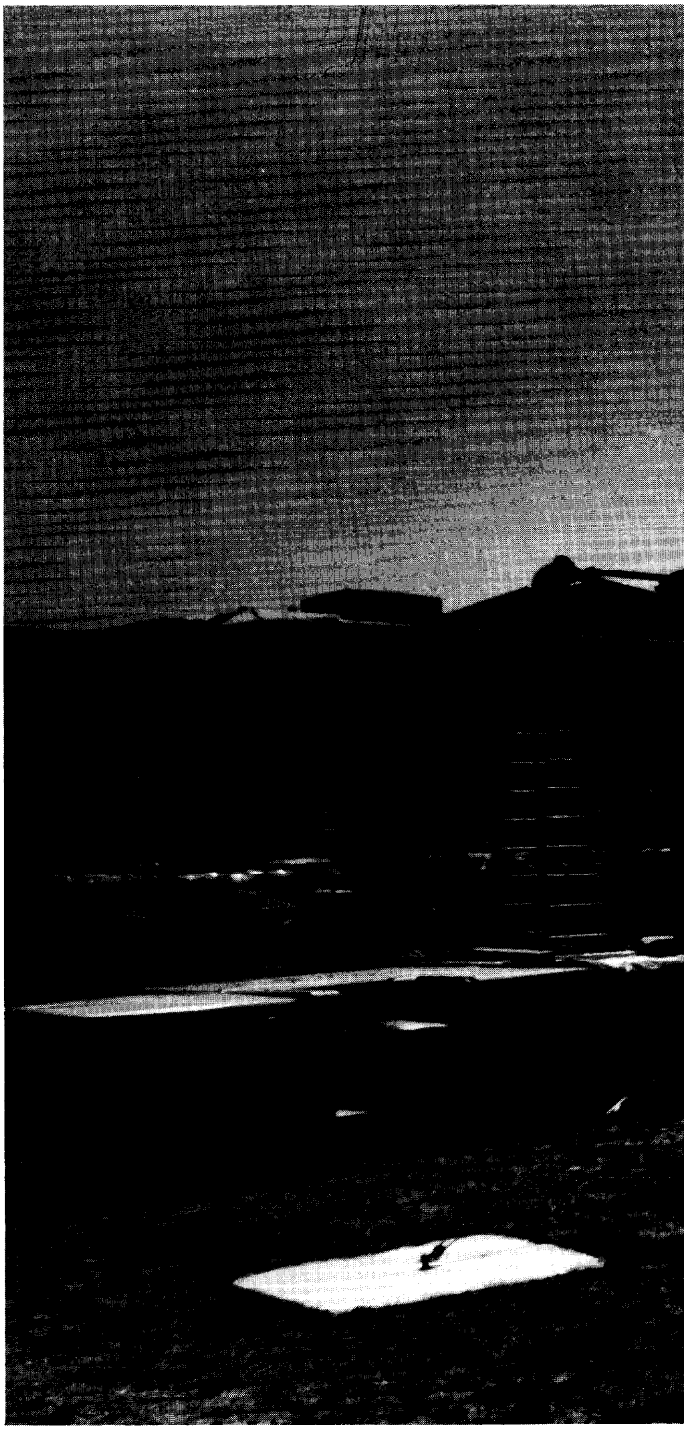
Throughout his years at the Smithsonian Institution, where he first went to work in 1920, Garber retained his enthusiasm for aircraft. When World War II broke out, Garber was commissioned in the Navy. By this time, he had begun efforts to have the NC-4 brought to the National Air Museum for preservation and display. He was unable to maintain close contact with the Smithsonian Institution during the war, but he did try to keep track of the NC-4 which he believed was stored at the Naval Gun Factory. He learned, however, that it was in Norfolk and, on a trip there, he visited the naval base to inquire about it.

"I found the airplane in a storage area in Norfolk," he said, "and a chief petty officer told me the buildings were being emptied and the contents would be moved elsewhere."

Garber, by this time desperate to salvage the famous flying boat, asked for an appointment with the base commander. By great good fortune, the Norfolk commander at the time was Rear Admiral Patrick N. L. Bellinger, who had been the pilot of the NC-1.

The admiral, of course, agreed with Garber that the NC-4 should be preserved and ordered the parts stored in a new location at Cheatham, Va. The seaplane remained in Cheatham until Garber, after World War II, arranged to have it moved to Washington and subsequently to the Air and Space Museum's preservation and restoration branch in Silver Hill, Md. The flying boat's hull was displayed in the museum in 1920, but its size and the lack of facilities precluded display in its entirety.

None the less, the restoration branch five years ago began restoring the airplane for eventual display in a new Air and Space Museum still being planned. Priority projects eventually pushed the NC-4 restoration into the background until two years ago when, with the 50th anniversary of the flight approaching, the Navy and the Smithsonian decided to refurbish the plane for display this summer.



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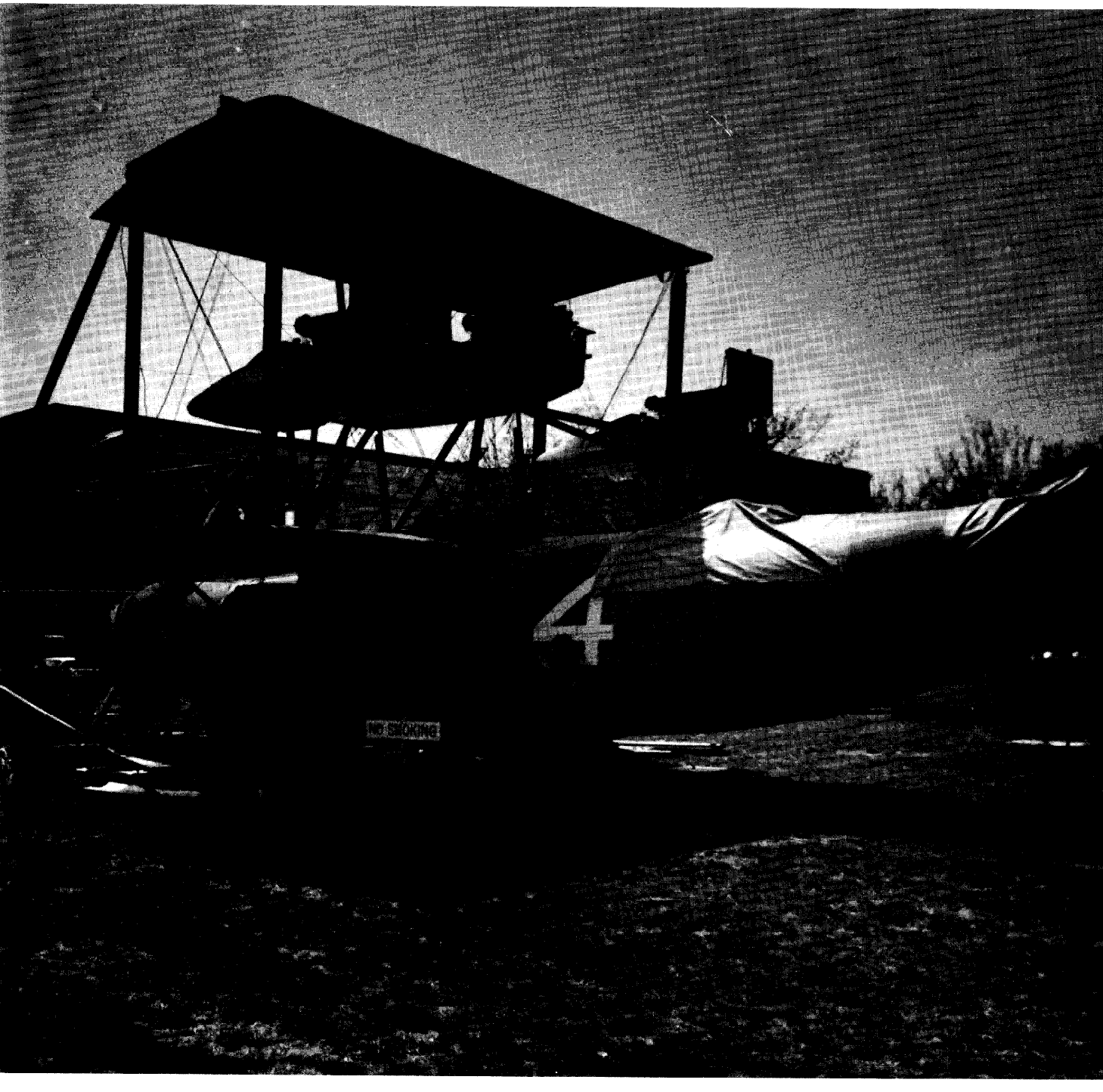
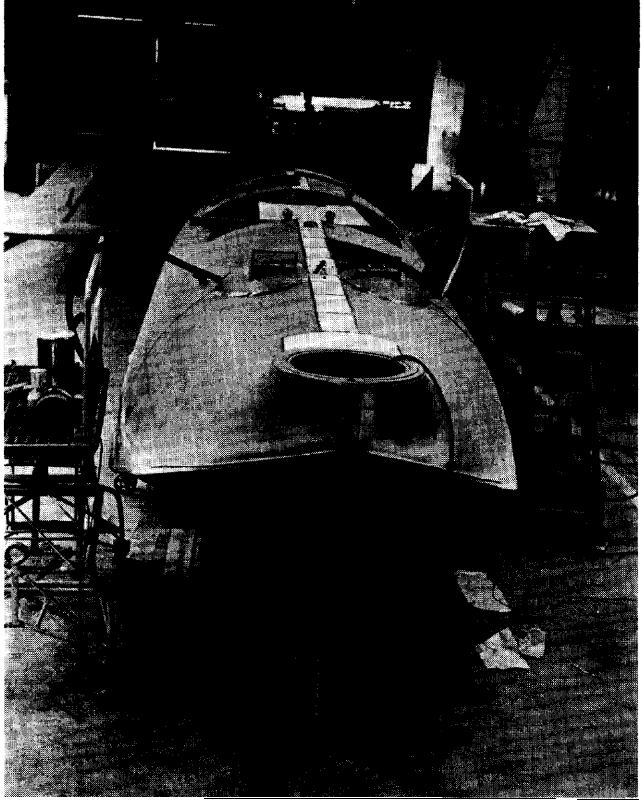
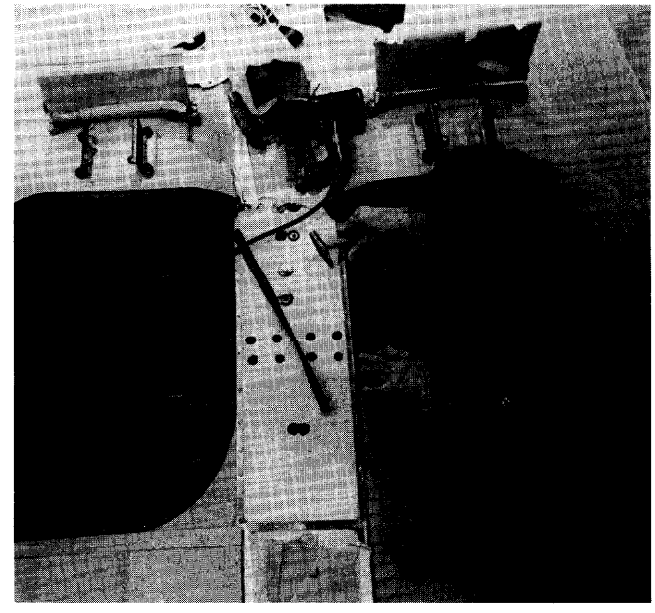
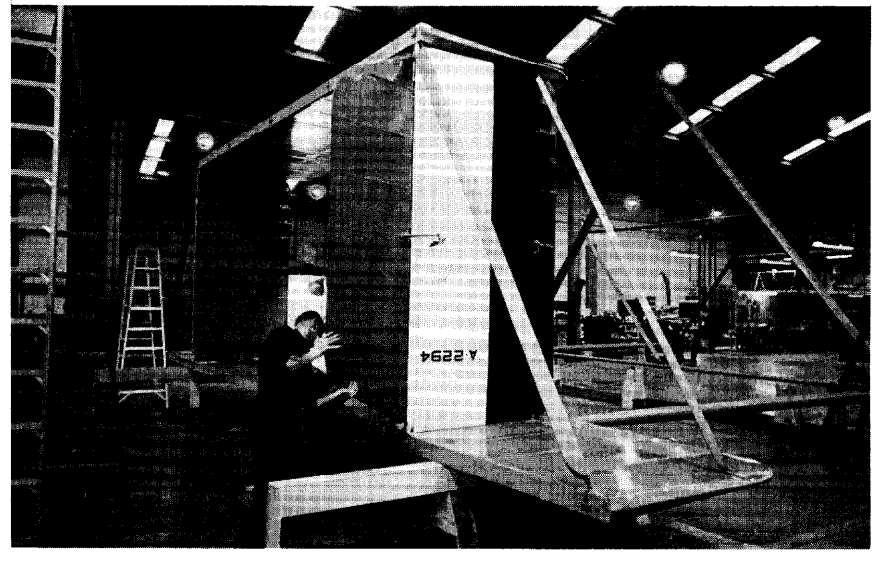






The NC-4 parts were scattered throughout two hangars at Silver Hill during the restoration. The hull (left) was strengthened inside with wooden braces and protected with three coats of gray paint. Walter Roderick added the final touches, cockpit upholstery (above). Meanwhile, still another group worked on the tail assembly.



The NC-4 again took precedence in the restoration division, with the full crew devoting its entire time to the flying boat — no small task.

Chief of the restoration and preservation branch at Silver Hill, Donald K. Merchant, says, "The NC-4 is the largest project we have undertaken to date, and quite probably it is the largest we will ever attempt."

Working over a two-year period on the engines alone, two men at Silver Hill have restored the four Liberty V-12's to mint condition. To do this, they disassembled the engines and rebuilt them.

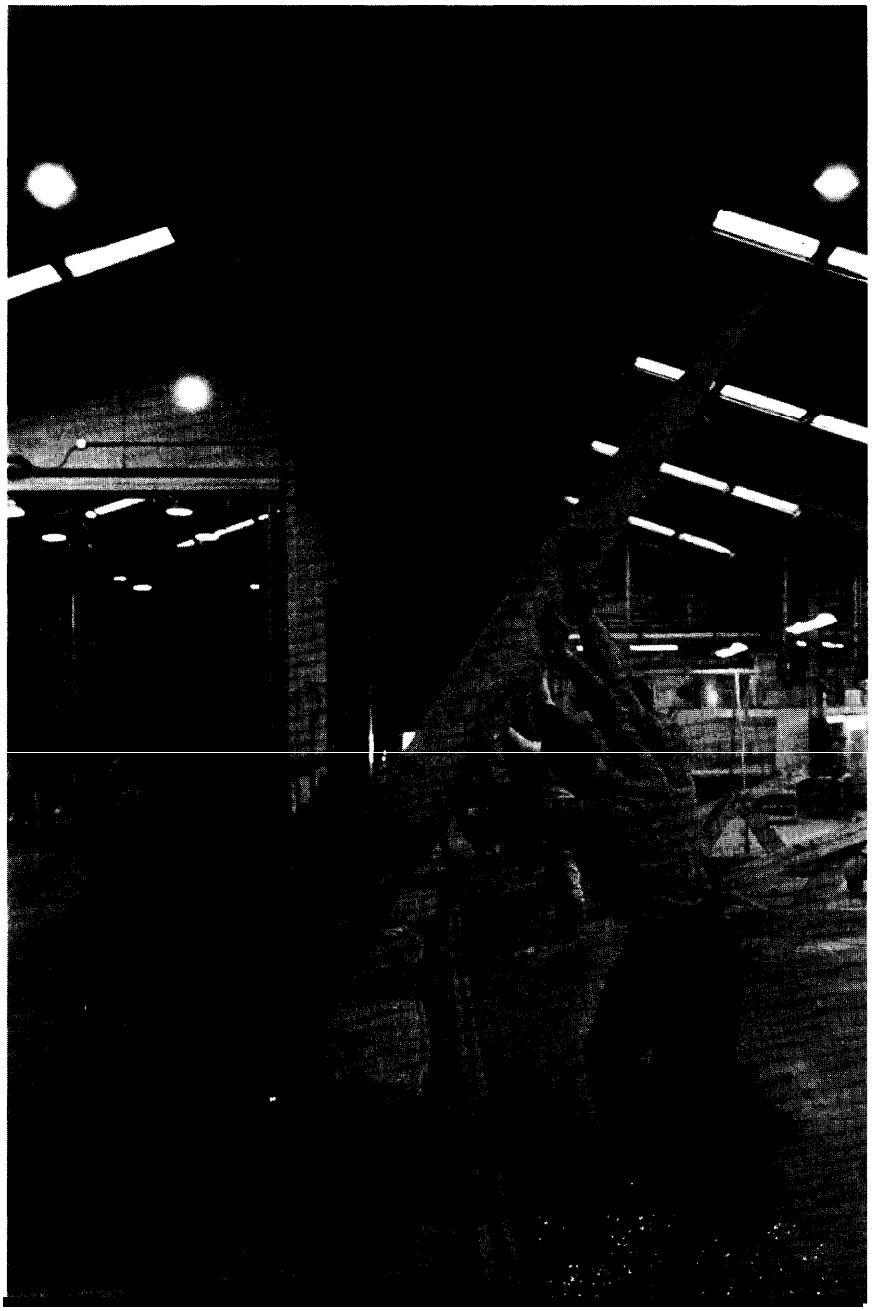
At the same time, two other men were working on the wing sections. The NC-4 surfaces cover an area of more than 4,785 square feet. Each section was stripped down and recovered with imported Irish linen, which is almost identical to the original material. Then three coats of dope were applied and, finally, six coats of color pigmentation were sprayed on.

The doping was, perhaps, the most frustrating aspect of the restoration. Humidity and temperature ranges for proper tautness and drying are critical — humidity of 40 to 50 percent in room temperatures, preferably 72 degrees. Therefore, the doping process frequently was delayed while the technicians awaited proper conditions. Additionally, each wing section has an average of 1,000 knots of rib stitching, all handsewn.

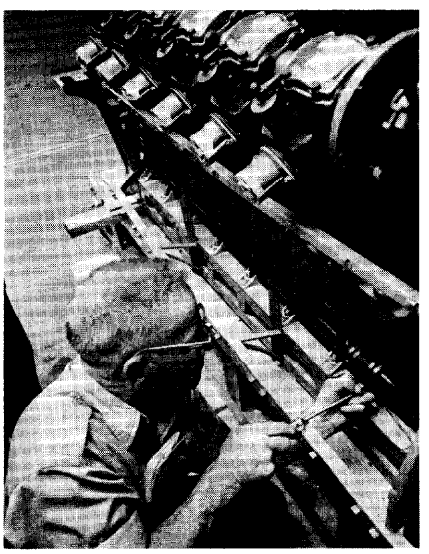
Simultaneously, but in another section of the Silver Hill hangars, another group of technicians worked on the hull. The 40-foot boat was reinforced from the inside with doublers and given three coats of gray paint. From the waterline up, it was re-covered with fabric over the wood. About 70 feet of new rubber walkway were installed on the hull and on the angled engine struts.

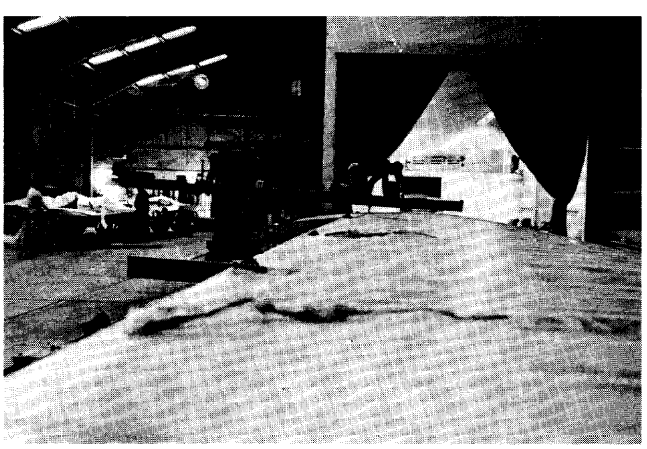
Most of the cockpit had to be reconstructed, from the instrument panels to the upholstery on the seats and around the cockpits.

The work was progressing, but the anniversary date — May 8 — was



It takes most of the Silver Hill crew (left) to turn a wing panel over for painting. Walter Roderick (below, left) uses a platform to paint a wing panel while other technicians work on a panel in the background. Albert Griffith (below), who recently retired after 30 years at the Smithsonian Institution, works on one of the four Liberty V-12 engines. Griffith did most of the engine restoration work. In another building, the refurbished engines were placed on the center wing.



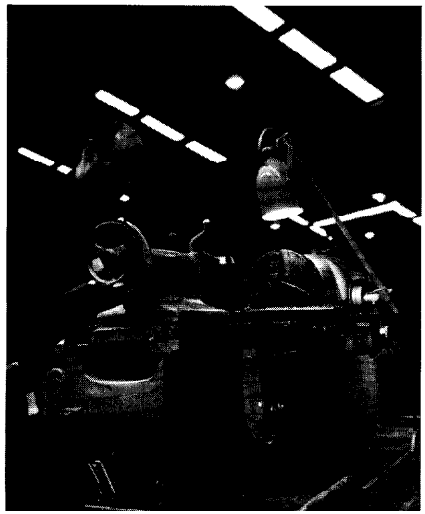


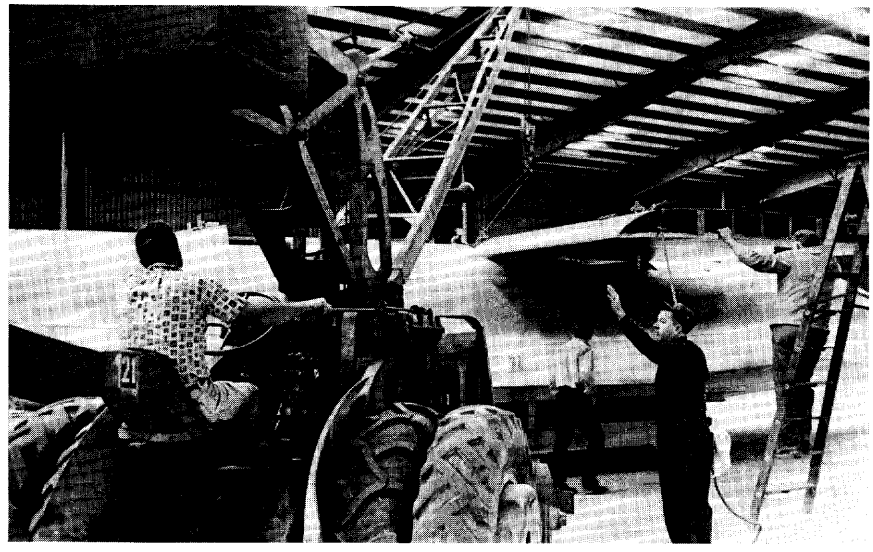
rapidly approaching, and there was still much work to be done on the flying boat. The Navy and Smithsonian Committee, with Commander C. A. E. Johnson, the Navy project coordinator, requested that three Navy enlisted men from NAF Washington be assigned to the NC project to help manufacture small parts and put the airplane together. The three men began working at Silver Hill in a temporary additional duty status the first of this year. Merchant says their work has proved invaluable. By March the restoration was nearing completion. The hull was finished for all practical purposes, with the "4" painted on the hull in six places.

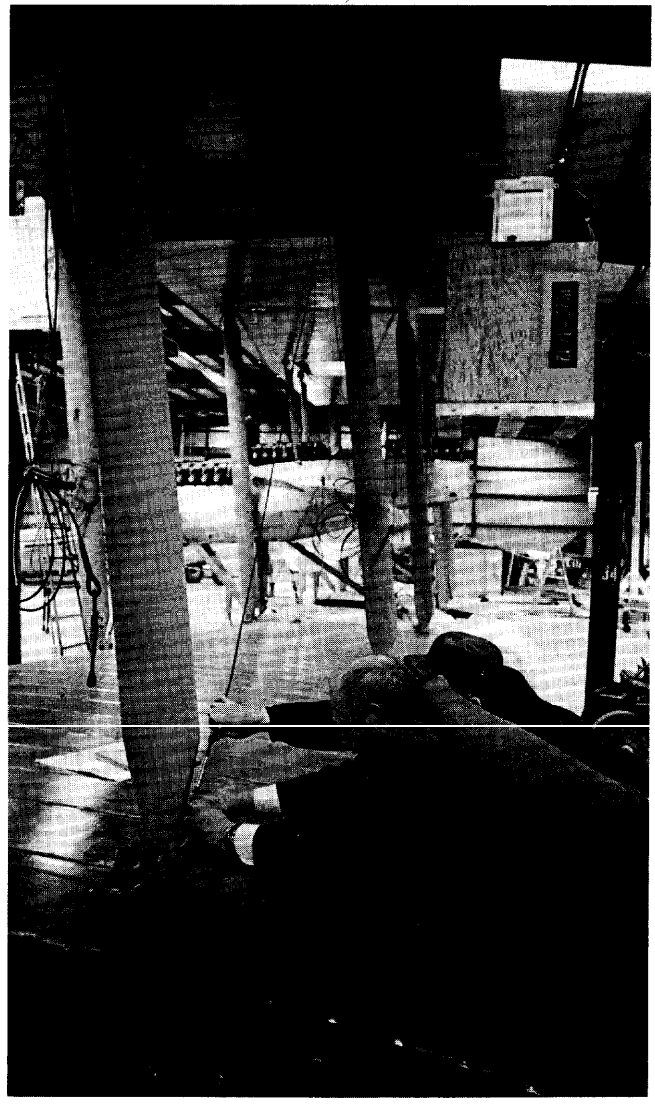
The technicians first fitted the lower center wing section to the hull to insure proper seating. Then the wind assembly was carried out in another hanger since none of the buildings at Silver Hill was large enough to accommodate the entire built-up flying boat. Starting with the center section, the four *Liberty* engines were slung. Then the outer panels, struts, cables and wires were fitted. Assembly took the crew the better part of a week.

The sections were disassembled for transporation downtown — about a ten-mile drive — for final reconstruction on the Mall near the Air and Space Museum.

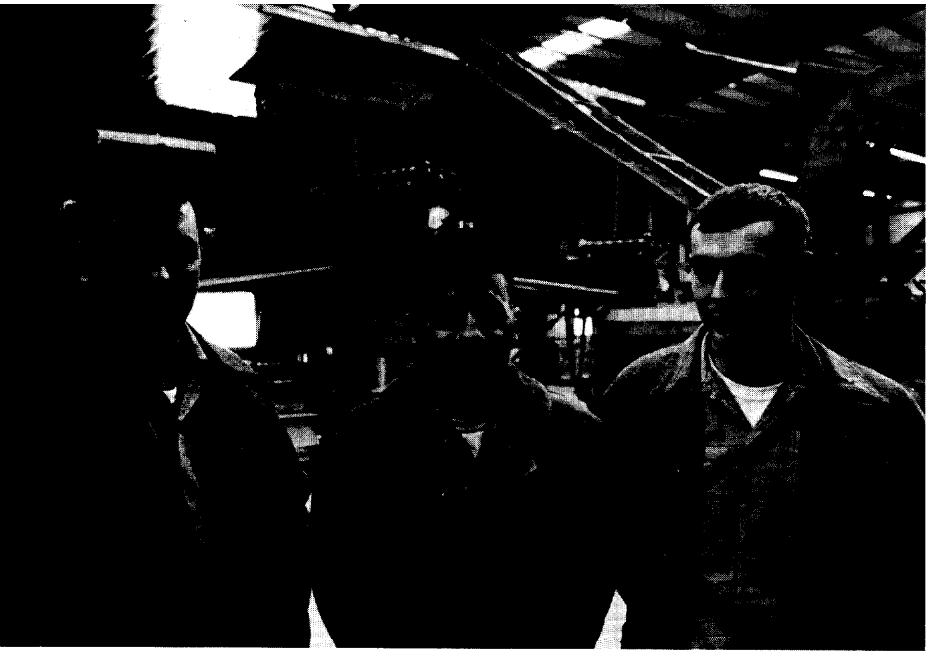
That the success of the NC-4 flying boat marked a monumental milestone in the progress of world aviation is undeniable. Yet it was this plane of which it was said a little more than 50 years ago: "The machine . . . is impossible and is not likely to be of any use whatever."



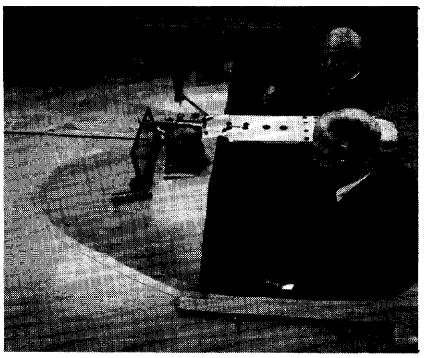




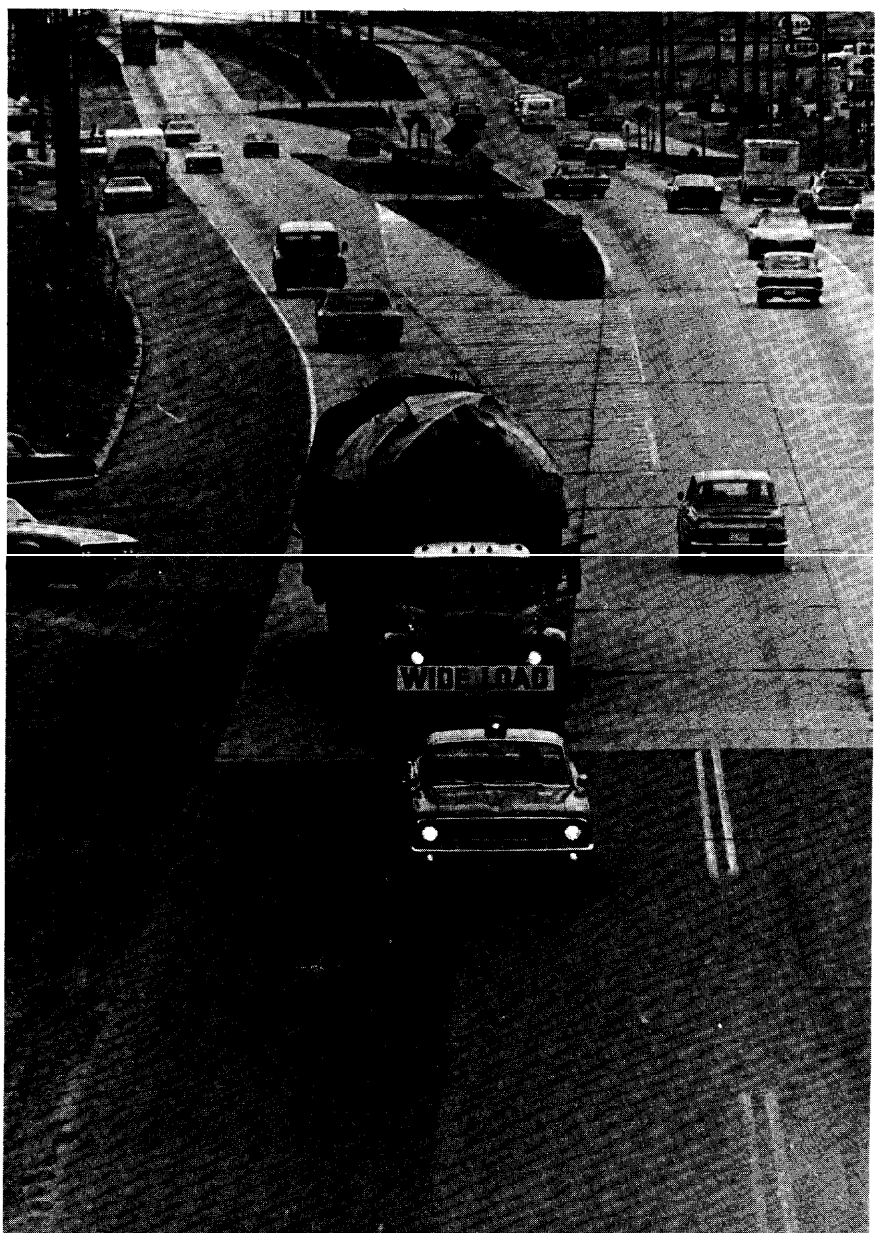
E. J. Thomas assistant chief of restoration, directs crane in fitting the center wing section. Donald K. Merchant (left), chief of restoration, and Thomas fit wires and cables on the wing section. Harvey Napier, machinist, makes small parts for the flying boat. Many of the original parts were lost or broken and had to be made for the NC-4.

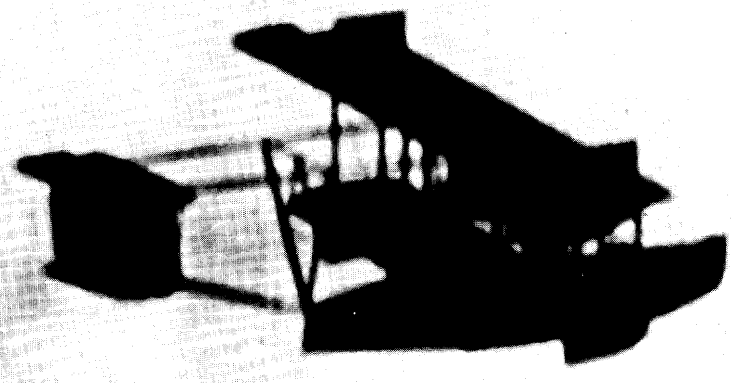


The three Navy men assigned to the NC-4 project from NAF Washington pose in front of the center wing section: (left to right) AMS2 Earl D. Campbell, ADR1 Edward Turner and AMSAN John W. Sargent. Below, VAdm. Thomas F. Connolly, DCNO(Air), and C. J. McCarthy, an early NC designer, in the NC-4 cockpit at the Silver Hill, Md., shop.



Commander C. A. E. Johnson, the Navy NC-4 project officer, poses in front of the hull. At right, Silver Hill technicians begin moving the huge seaplane from Silver Hill to the Mall for reconstruction and exhibit.





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