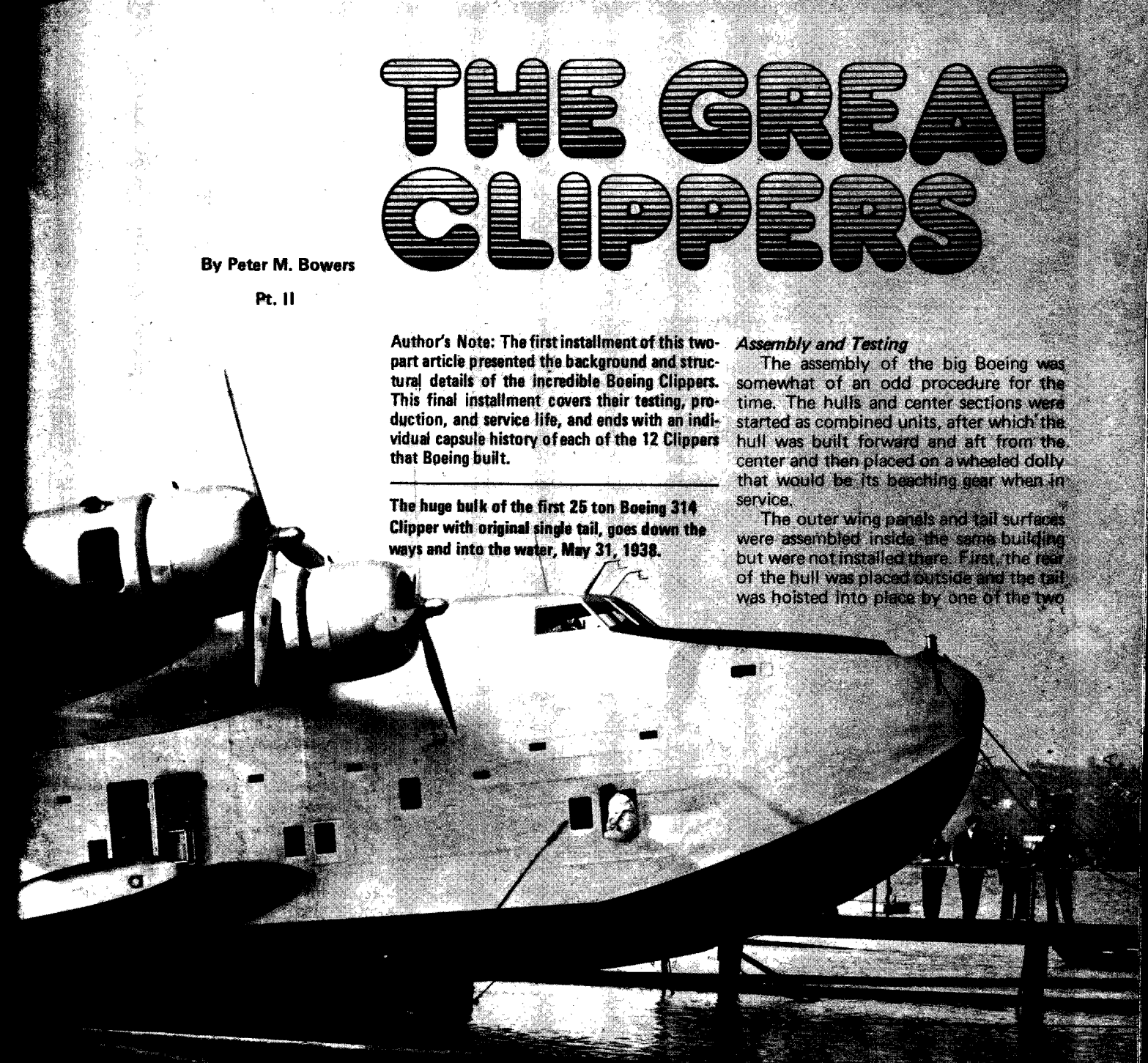

NX
18601

THE GREAT CLIPPERS

By Peter M. Bowers

Pt. II

Author's Note: The first installment of this two-part article presented the background and structural details of the incredible Boeing Clippers. This final installment covers their testing, production, and service life, and ends with an individual capsule history of each of the 12 Clippers that Boeing built.

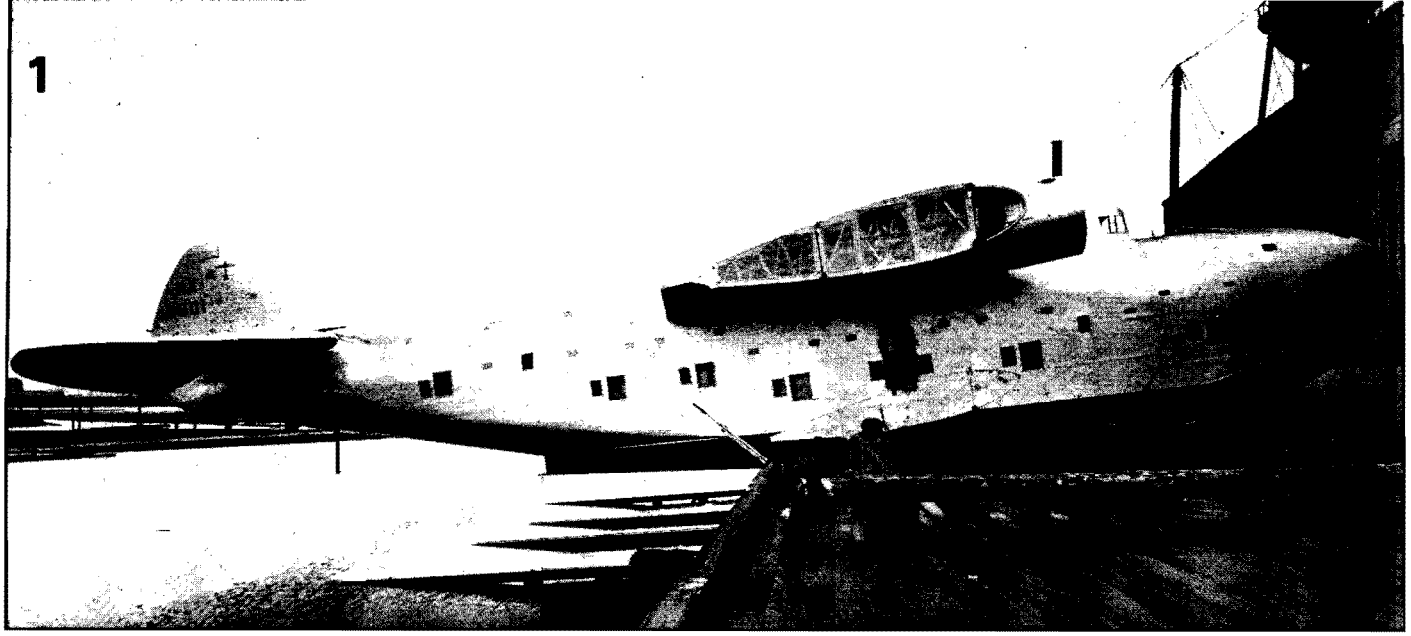


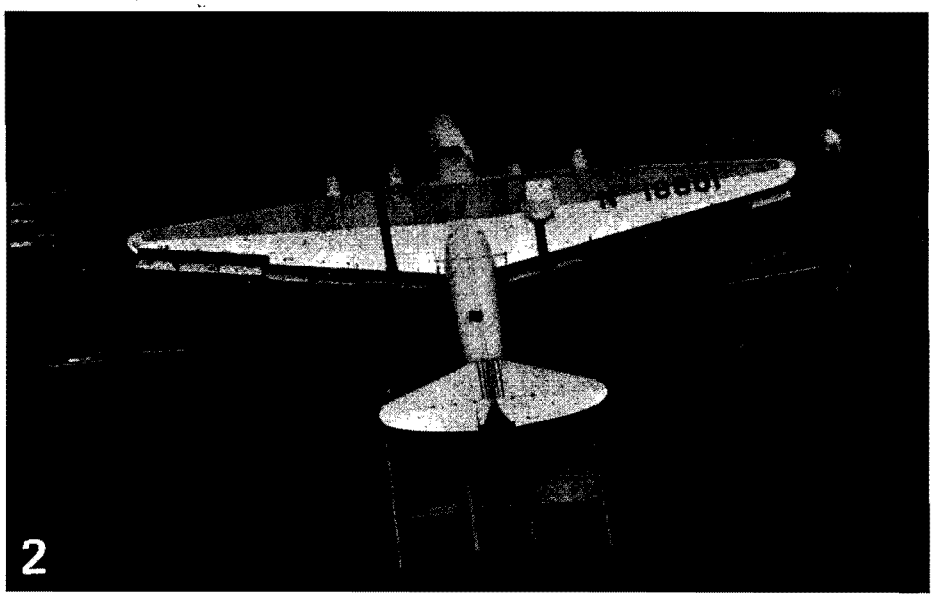
The huge bulk of the first 25 ton Boeing 314 Clipper with original single tail, goes down the ways and into the water, May 31, 1938.

Assembly and Testing

The assembly of the big Boeing was somewhat of an odd procedure for the time. The hulls and center sections were started as combined units, after which the hull was built forward and aft from the center and then placed on a wheeled dolly that would be its beaching gear when in service.

The outer wing panels and tail surfaces were assembled inside the same building but were not installed there. First, the rear of the hull was placed outside and the tail was hoisted into place by one of the two



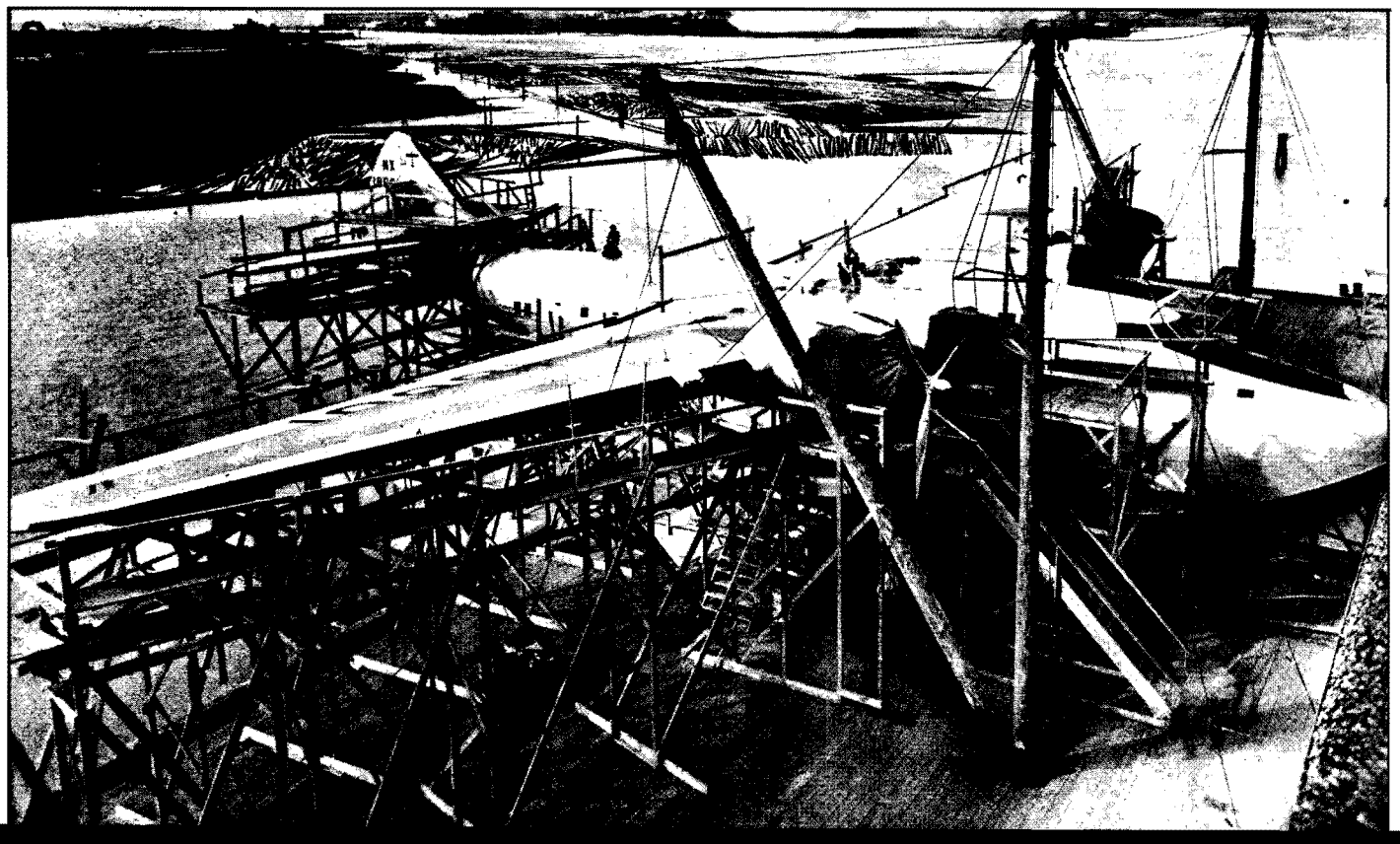


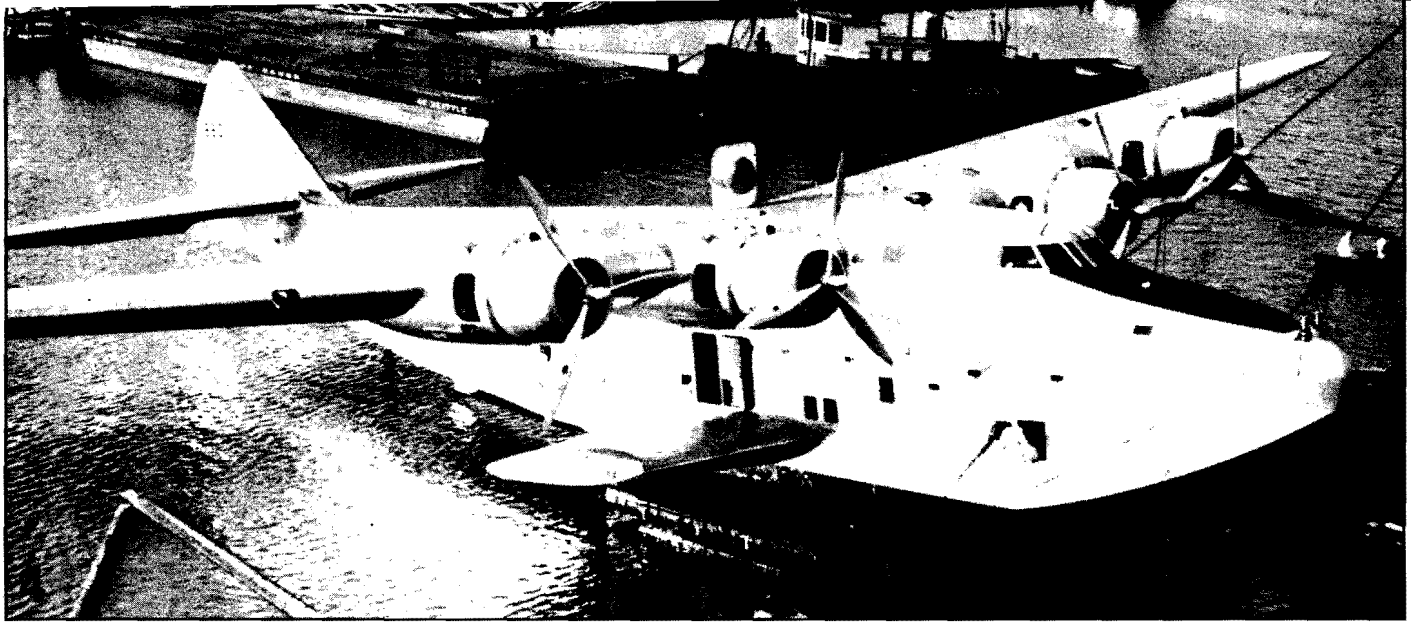
1. Its immense whale-like hull resembling that of the sea creature it was patterned after, the first Clipper on the ramp outside of old Boeing Plant I. The tail surfaces were installed after the aft end of the hull was outside the door. Note how central wing and inboard nacelles are integral part of hull.

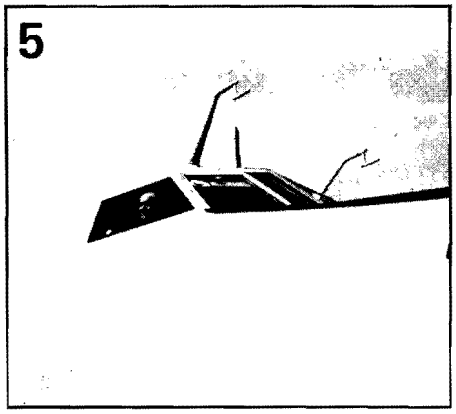
2. Number 1 now has its wing (they were too long to install in erecting hangar) but no engines. Notice the blank space in the registration. When licensed, the plane will be NC18601, but it will be NX for its test period, so the X will be applied in easily removeable paint. (Gordon S. Williams photo)

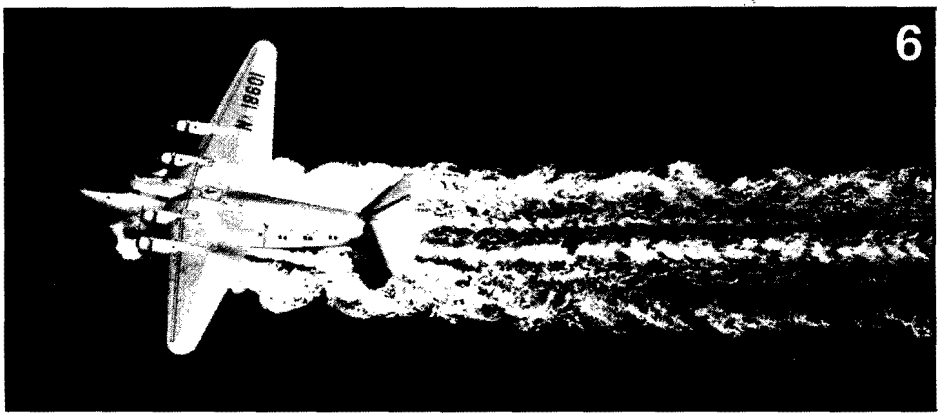
3. Tail, wings, and engines were installed with the aid of cranes erected on the factory ramp. Photo was taken two weeks before launching.

4. Different angle on previous scene. Tugboat is bringing in barge that the Clipper will be tied to for the trip down the river and into the harbor.







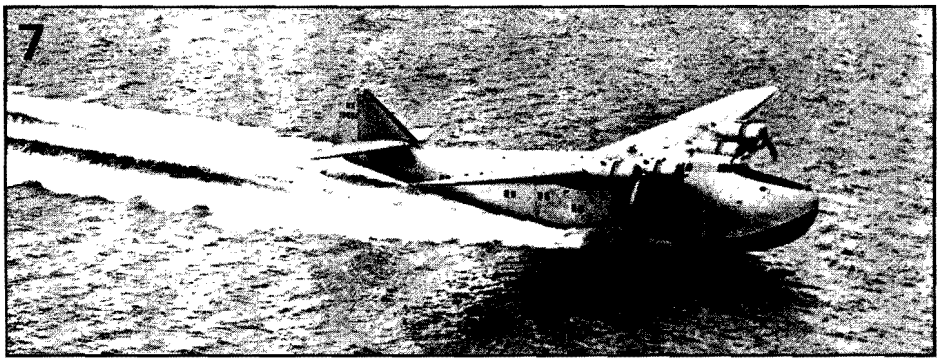


THE GREAT CLIPPERS

cranes erected on the assembly apron. Later, the hull was moved far enough out to allow the wings, hydrostabilizers, and engines to be installed.

When the planes were ready to fly, they were launched down ways, but not quite like a ship since they were on their dollies and floated off of them. For the trip down the Duwamish River and into Elliot Bay, the Clippers were lashed to a barge, which was then towed down the river by a small tugboat at each end.

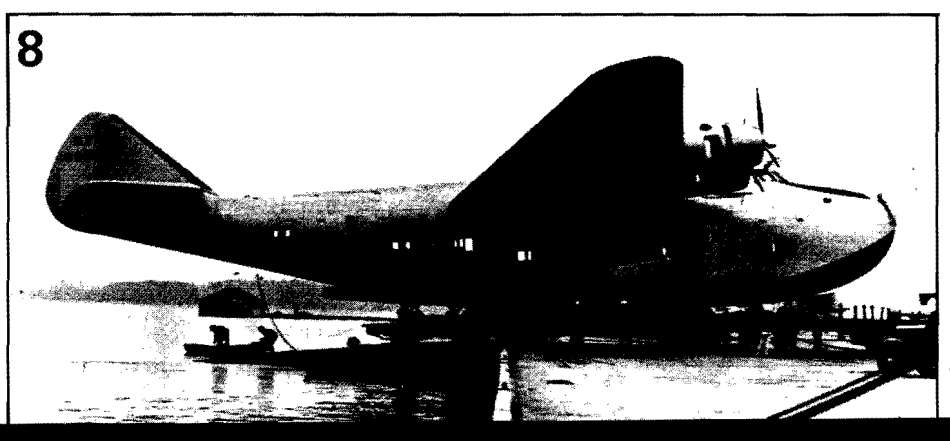
The first Clipper was launched on May 31, 1938, and was taken to Boeing's temporary test base in Elliott Bay, where a week of intensive testing and preflight taxiing was undertaken by test pilot "Eddie" Allen. A number of significant "bugs" showed up, the most serious being a tendency to heel over and dig a wingtip into the water during cross-wind turns made "off-the-step". This showed up during the first taxi test on June 3. Part of the trouble was quickly traced to the fuel loading — all of the fuel on board was in the wing tanks and none was in the hydrostabilizers, making for an extremely top-heavy condition. It was also determined that the hydrostabilizers had too high a deadrise angle, which contributed to the

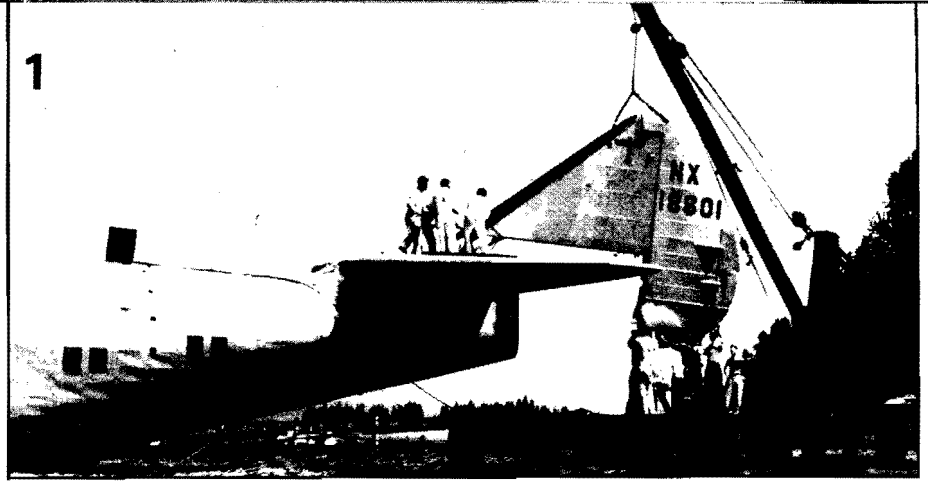


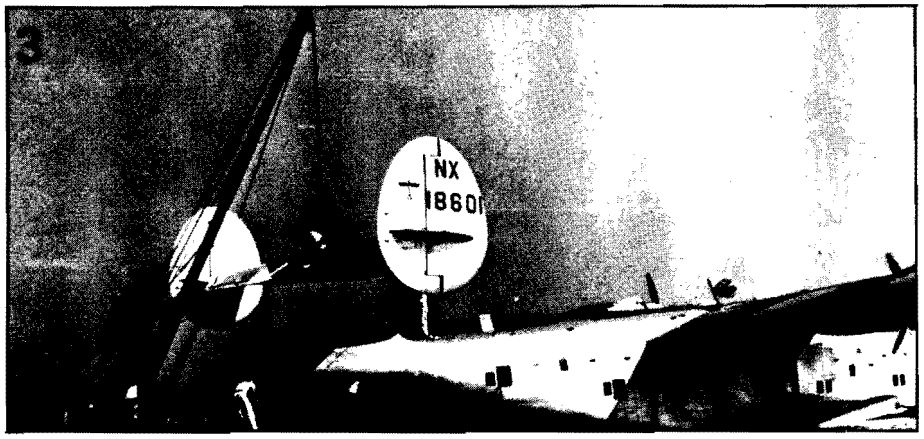
5. Free-lance test pilot Edmund T. "Eddie" Allen in the cockpit of NX18601. Allen, who later died in the crash of a B-29 test plane, encountered difficulty with original tail and angle of sponsons, causing Clipper to heel over while turning on water.

6&7. The first Clipper underwent a week of taxi runs and near-takeoffs in Elliott Bay and Puget Sound before making its first flight. Loading of all fuel in wing tanks also contributed to stability problems, which dipped wing into water up to outboard nacelle.

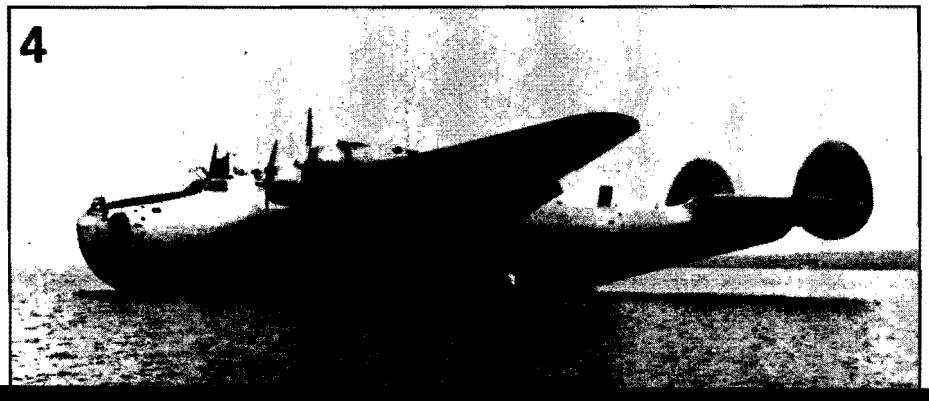
8. After first flight, June 7, 1938, the first Boeing Clipper landed in Lake Washington and was hauled out of the water, at the Sand Point Naval Air Station, to await modifications.







1. Since the original vertical tail proved to be inadequate, the first order of business after the first flight was to remove the single tail and design a new one.
2. Powerplant and other systems tests continued while the new tail was being built.
3. Installing the new two-rudder tail assembly on the first Boeing Clipper. Design was currently in vogue on Lockheed "Electra".
4. NX18601 with the new two-rudder tail and modified rear end of hull. Flight characteristics improved, but original fin would be added to new setup. (Gordon S. Williams Photos)
5. After returning to flight status with the new tail, the first Clipper was flown across Puget Sound to Winslow, where it was put in drydock for modifications to the lower hull and a change of hydrostabilizer angles.
6. Resembling a scale model, first Clipper takes off from pond-like bay.
7. Flight view of the first Clipper with the short-lived twin rudder configuration.
8. To hold the speed down during powerplant tests, NX18601, with revised triple tail was tied to tugboat which served as a brake.



heeling, but there was nothing that could be done about that at the time.

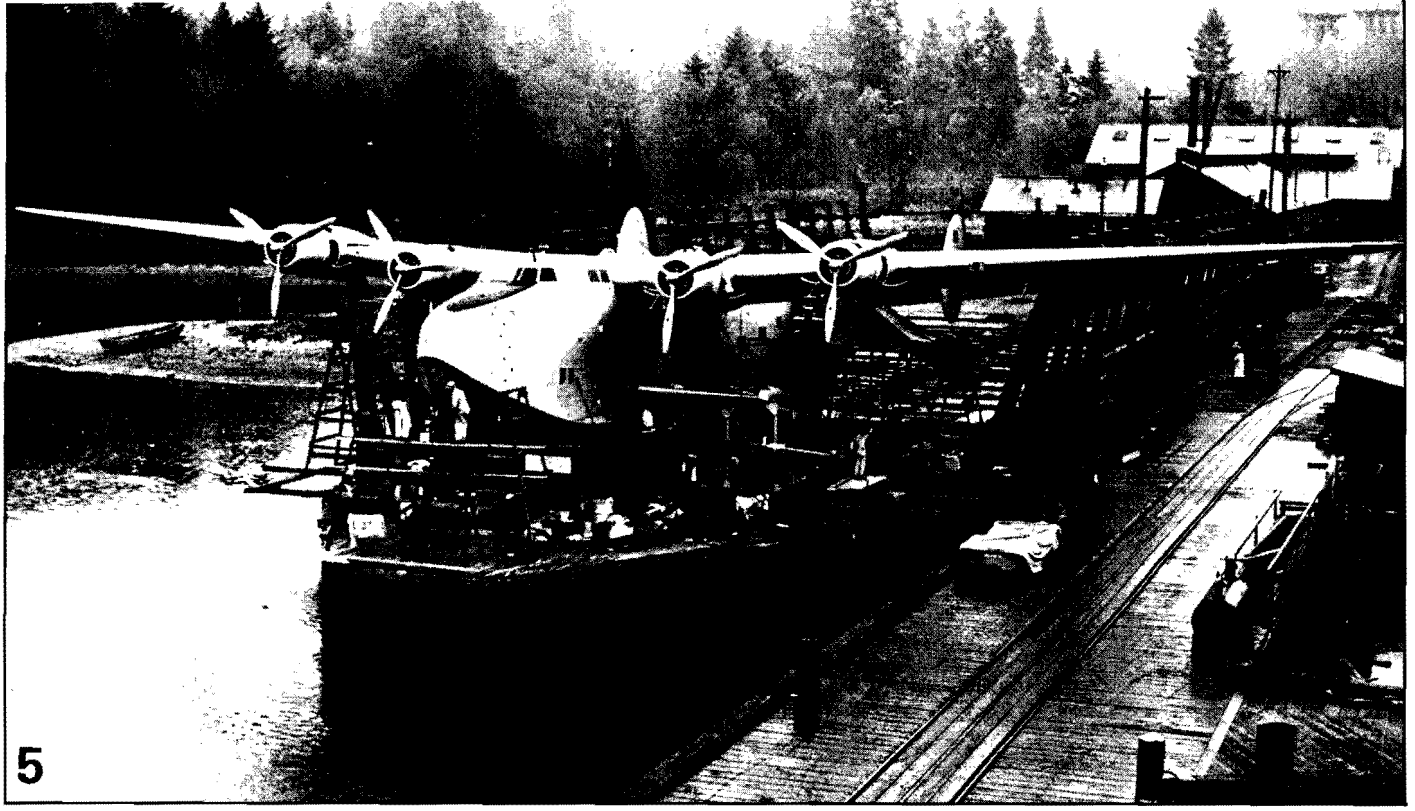
The water-tight compartments saved the ship on those initial dunkings. With the wing tip buried so deeply in the water that the outboard propeller was almost awash, Allen was able to use power and rudder to slew the plane around so that the wing literally flew itself out of the water. The action was so fast that the opposite wing almost went in after the wet one came out.

In spite of 2600 gallons of gas in the hydrostabilizers and a ton of lead shot in the hull, the wingtips still went under on Sunday, June 5, the day picked for the first flight. Unfortunately for historians, these dunkings took place at odd times when no photographers were on hand to record the nearly disastrous events.

The big day finally came on June 7, but for most of it the wind was too high and the water too rough. The wind dropped by evening, and the initial takeoff was made at 6:17 p.m., just a week and an hour after the launching. In spite of the troubles and delays, this was a remarkably short preflight period for such a new and complex airplane.

The first flight was relatively short — only 38 minutes. Allen found that the rudder was almost useless in the air and he had to use asymmetric power to turn the big boat. Many people knowledgeable in aircraft had commented on the apparent shortage of vertical tail area, even school-age kids who built model airplanes, but the engineers stood by their figures and the wind tunnel test which proved that there was enough rudder area. However, full-scale performance and model performance often differ and did in the case of the Clipper. That first flight was the only one made with the original tail design.

At the end of its first flight, the big boat was hauled out of the water at the Sand Point Naval Air Station, a peninsula on the western shore of Lake Washington. However, the test program was conducted a little farther north, at the Matthews Beach facility established by Pan American as the Washington terminus for its flying boat service to Alaska. The first Clipper and two others operated simultaneously from here and were mainly moored out on a buoy or tied up alongside the long pier — there was no hangar, apron, or ramp. Since the eyeball engineers and the kids were right and the wind tunnel wrong, a new tail was quickly designed for the Clipper. Originally, this replaced the centerline fins and rudder installation with twin oval-shaped fins and rudders at the ends of the horizontal tail in the manner of the famous contemporary Lockheed "Electra" transport. The plane remained at Matthews Beach during the weeks that this was being built. There was no point in taking it back to the factory — it couldn't get through the narrow cut or the locks, and besides, the second airplane had taken its place on the factory apron. The time was not wasted, however, for



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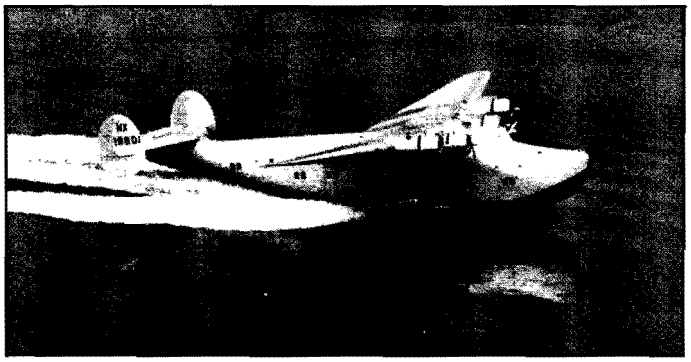

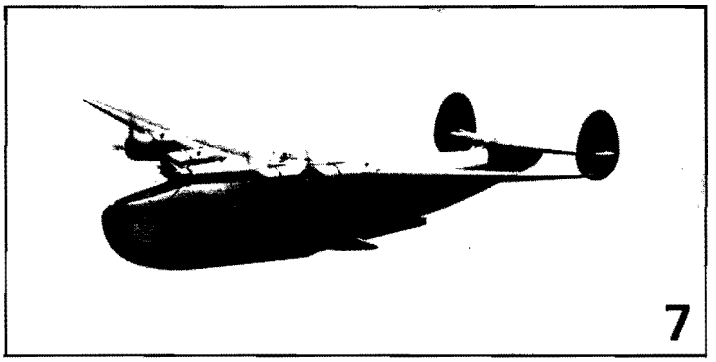

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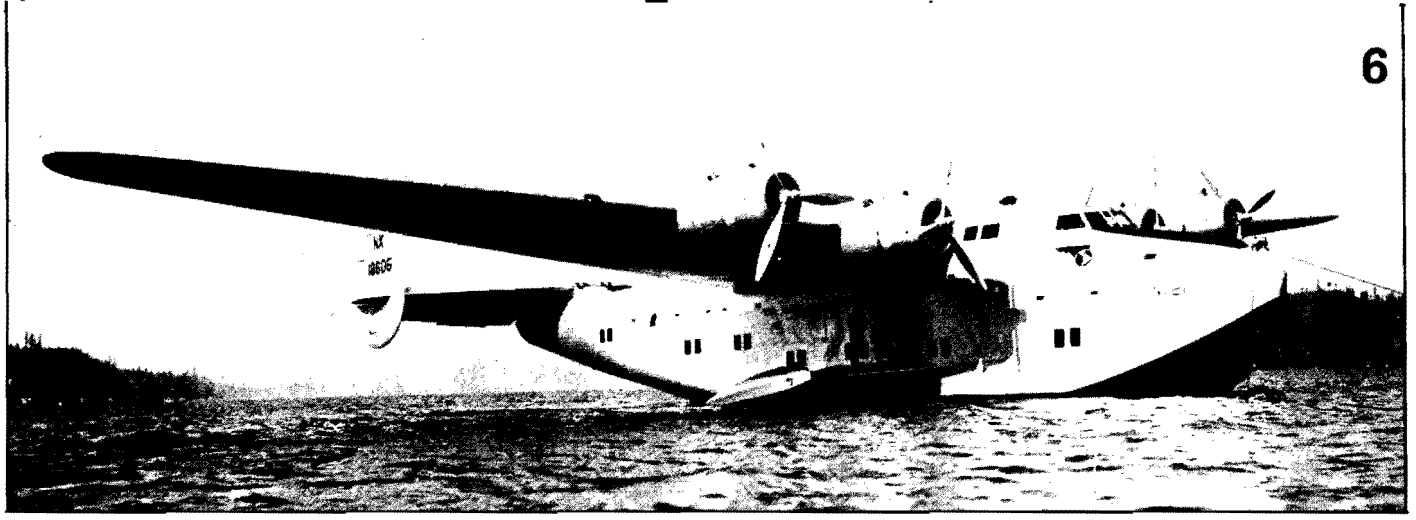
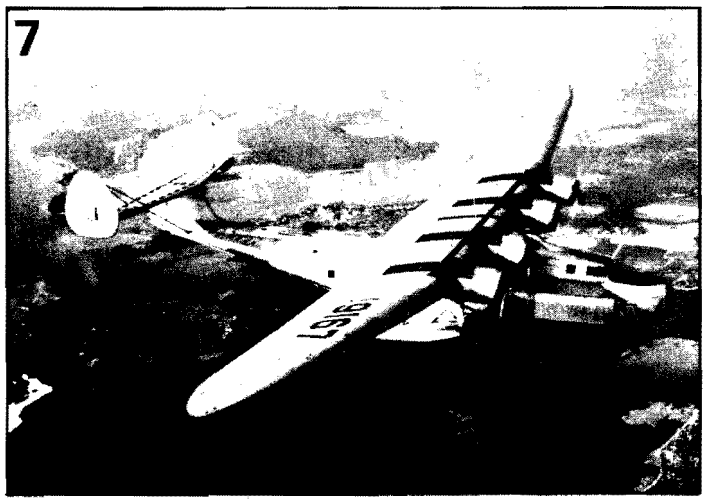
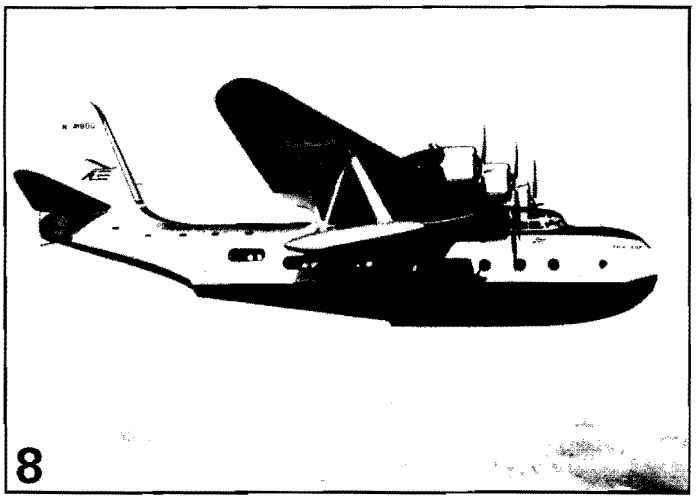






1. Boeing 314 in final three tailed configuration. The Clippers were tied to barges and moved down the river sideways by two tugs. This is the second Clipper, but is included here to illustrate the launch-ferry sequence.

2. NX18601 under test in Lake Washington after the center fin had been added to the tail.

3. As part of the test program, NX18601 demonstrates controlled flight with both engines on one side shut down. Note the full-feathered propellers, a first for airliners.

4. Tests did not always go smoothly. Here's NX18601 now decked out with Pan American markings, with a damaged hydrostabilizer, February 21, 1939. In rough water, hull and sponsons took tremendous pounding.

powerplant and other systems tests could be conducted with the tail off.

The new double tail was a big improvement, but was still short of perfection. The airplane made several flights with it, and took advantage of its renewed flight status to be flown across Puget Sound to a drydock where it was raised so that the angle of the hydrostabilizers could be changed to increase the righting moment.

The final tail modification was to add a fixed fin on the centerline that duplicated the size and shape of the original fin-rudder combination.

Boeing and Pan American testing continued to the satisfaction of those organizations, after which the Department of Commerce took over for its own ok. Approved Type Certificate A-704 was awarded to the Boeing Model 314 on January 25, 1939. The improved A-314 model was added to the same Certificate on May 2, 1941.

Deliveries

Pan Am took delivery of its first Boeing Clipper two days after certification in a real comic-opera affair. In order to avoid the Washington State sales tax, the delivery was made at Astoria, Oregon, with the airplane anchored on the Oregon side of the Columbia River and the proceedings taking place in an Astoria banker's office. A conference phone call was set up between the bank, Pan Am offices in New York, a New York trust company, and government offices in Washington, D.C. and there was an elaborate printed procedure to follow.

Part of the procedure was for Pan Am to hand over a check for the final $100,000 payment due on the plane, which was done, but panic ensued when it was time for Wellwood Beall to hand the Certificate of Title over. It had been left in its display case on a cabin wall in the airplane! Rather than stop the proceedings to go and get it, Frank Gledhill, who was supposed to receive it for Pan Am, said to go ahead with a blank piece of paper. This was done, and the ceremony was successfully completed. Beall got the certificate off the wall after they got back to the airplane, and signed it over.

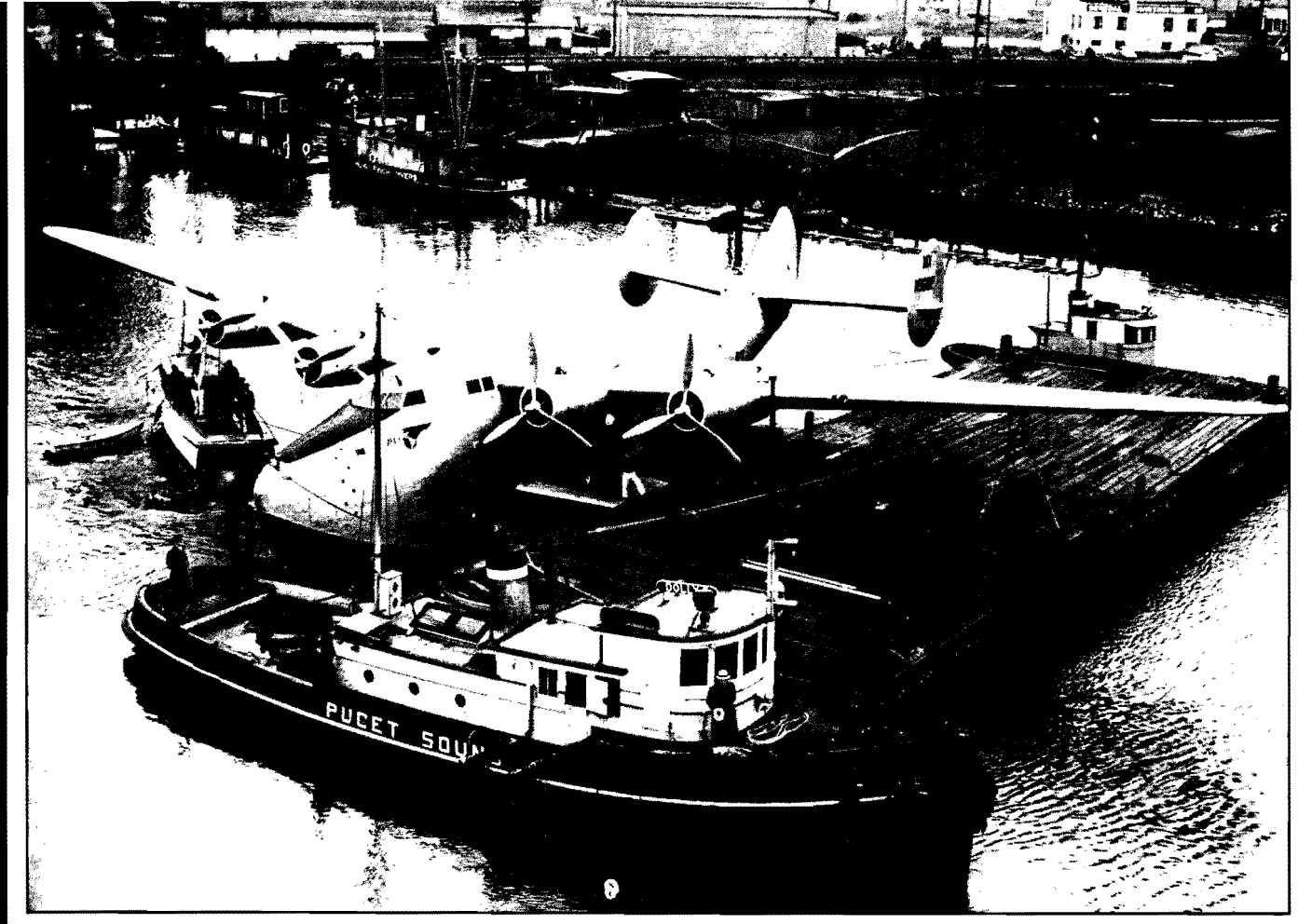
These financial monkeyshines continued well past World War II, with Boeing delivering Model 377 "Stratocruisers" to the Portland, Oregon airport until Washington decided that the sales tax should not apply to out-of-state sales. As originally delivered, the average cost of the first six Clippers was $668,908. An additional $756,450 covered spare engines and parts for all six.

Early Service

Of the six original Clippers, four were scheduled for the new transatlantic route while two would be added to the existing Pacific operation. The first two delivered, named ***Honolulu Clipper*** and ***California Clipper,*** respectively, were used for the Pacific. The first of the eastern Clippers got a good sendoff when Eleanor Roosevelt, wife of the President, christened it ***Yankee Clipper*** in Washington, D.C. on March 3, 1939. However, ***Yankee*** was not the first to operate in the Atlantic; the yet-unchristened fourth Clipper had already been carrying passengers on the New York to Bermuda run.

Survey flights to Europe began on May 20, 1939, when ***Yankee*** left New York for Lisbon with a load of mail but no passengers. It reached Lisbon on May 22 and then proceeded on to Marseilles before returning to New York on May 27. A non-revenue passenger flight started on June 17, with what would now be called a press flight. Revenue passenger operations began on June 28, 1939, with the cost of a one-way New York-Marseilles ticket being $375.00.

The Atlantic crossings were by two main routes — from New York City to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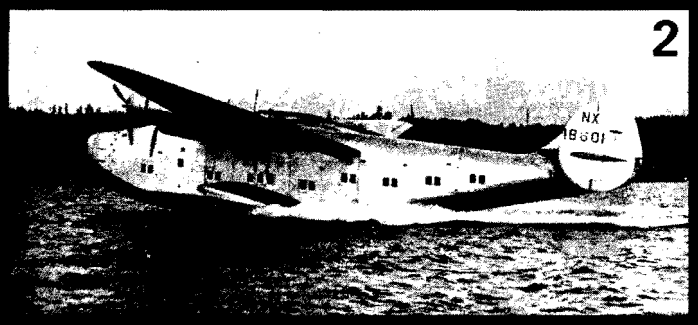
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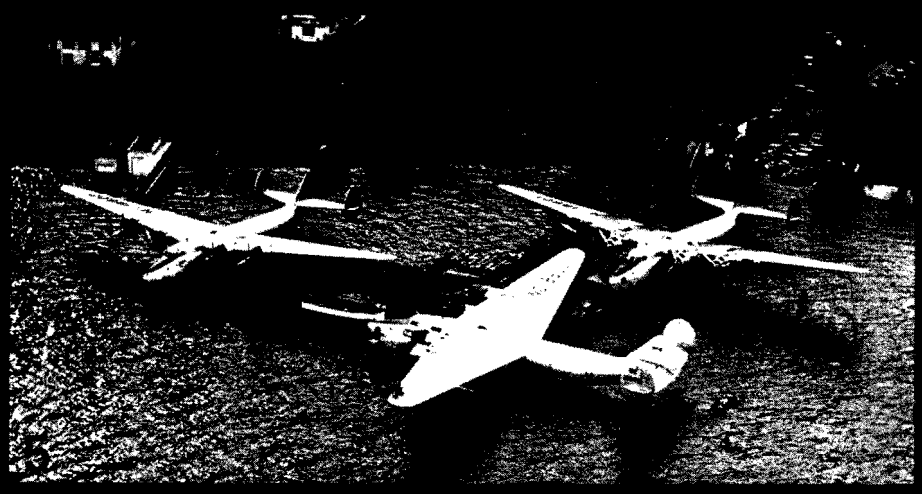

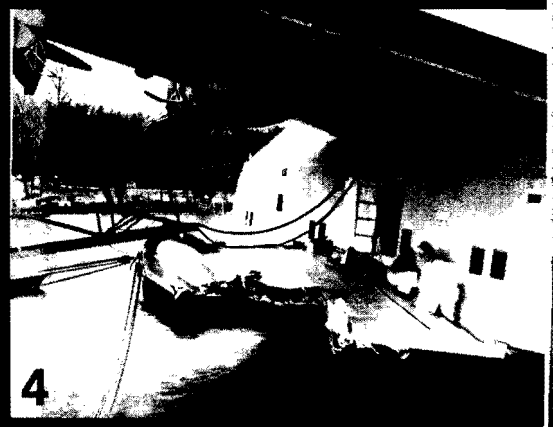
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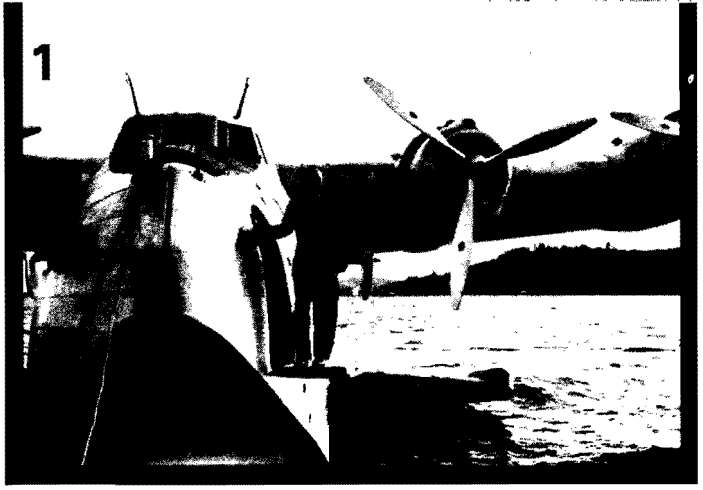


Southampton, England, with stops at Shediac and Botwood in Canada (not far from Gander, Newfoundland) and from New York to Lisbon and on to Southampton or Marseilles via the Azores. Later, Pan Am would fly the South Atlantic via Port-of-Spain in Trinidad, Belem in Brazil, and Bolama in Africa. Normal load for an Atlantic crossing was 40 passengers and 5000 pounds of mail and cargo. On December 18, 1940, ***Yankee Clipper*** carried a record mail load of 13,402 pounds. Normal load on the Pacific run was 30 passengers, plus mail and cargo. For a relatively short hop, like New York-Bermuda, up to 74 passengers were carried.

The Competition

Since the Boeings were a much later design, they had no competition from Pan Am's other boats, the Sikorsky S-42 and the Martin 130 and what could have been regarded as commercial competition on the Atlantic was really a joint operation with Britain's Imperial Airways. With WW II imminent, it was the need to operate jointly with the British, plus the need for negotiations at State Department level, that kept Pan Am from going ahead on its own and starting Atlantic operations sooner.

The British planes were Short "Empire" Class flying boats, technically and economically inferior to the Boeings and money-losers at transoceanic ranges, because of the high ratio of fuel to payload needed to go the distance. However, they were all the British had at the time, and so were placed in service. Later, the British were to buy three Boeing 314s from Pan American for the Atlantic and other routes.

While the big Boeings were the first airliners in transatlantic service, future competition was coming on the scene. The big Douglas DC-4 landplane made its first flight the same day that the first Clipper flew, but the triple tailed version turned out to be unsuited to the needs of the airline consortium that had sponsored it, so it was back to the drawing boards for Douglas. When the new DC-4 appeared, the U.S. was at war and the Army took over all production under the military designation of C-54 (Navy equivalents were designated R5D). The airlines, including Pan Am, were not to get DC-4s for civil operation until after the war. (See ***Airpower*** Jan. 1974)

The U.S. did not have a monopoly on advanced aircraft design, however, and Europe came up with a surprise. The German airline ***Lufthansa*** had encouraged the development of the Focke-Wulf Model 200 "Kondor", a fast four-engine landplane that could carry revenue passengers over transatlantic distances. ***Lufthansa*** got a lot of publicity when it flew an FW-200 nonstop from Berlin to New York a distance of 4075 miles, on June 27, 1938. While this flight was in the nature of a publicity stunt, it clearly showed the shape of things to come, and the shape was not that of a big flying boat. Speed was the winning hand in the North Atlantic passenger game, whether in steamships or airplanes, and had not the war intervened, Lufthansa's FW-200s, with their 220 m.p.h. cruising speed topping the Boeings by over 40 m.p.h., would have siphoned off a great deal of Pan Am's business.

As it was, Pan Am recognized the advantages of the new landplane designs and, but for the war, would have replaced the flying boats on its South American routes with landplanes by 1942. It actually started this program with three Boeing 307 stratoliners, transport developments of the B-17, in 1940.

The war had an interesting double effect on civil flying boats — it prolonged their service life on some routes, by keeping later high-performance landplanes out of the hands of the airlines until the end of the war; but wiped out some of the routes that could have been regarded as exclusive flying boat territory for many years to come, by fostering the installation of long paved runways capable of serving the biggest bombers and transports in remote parts of the world.

Late Deliveries — The A-314s

After the six 314s were delivered in 1939, Pan Am exercised its option on the contract for an additional six. These were improved versions designated A-314, not, as would be expected, 314A. Since it introduced the changes that had to be proven, the first one (18607) flew on an experimental license until the testing was completed.

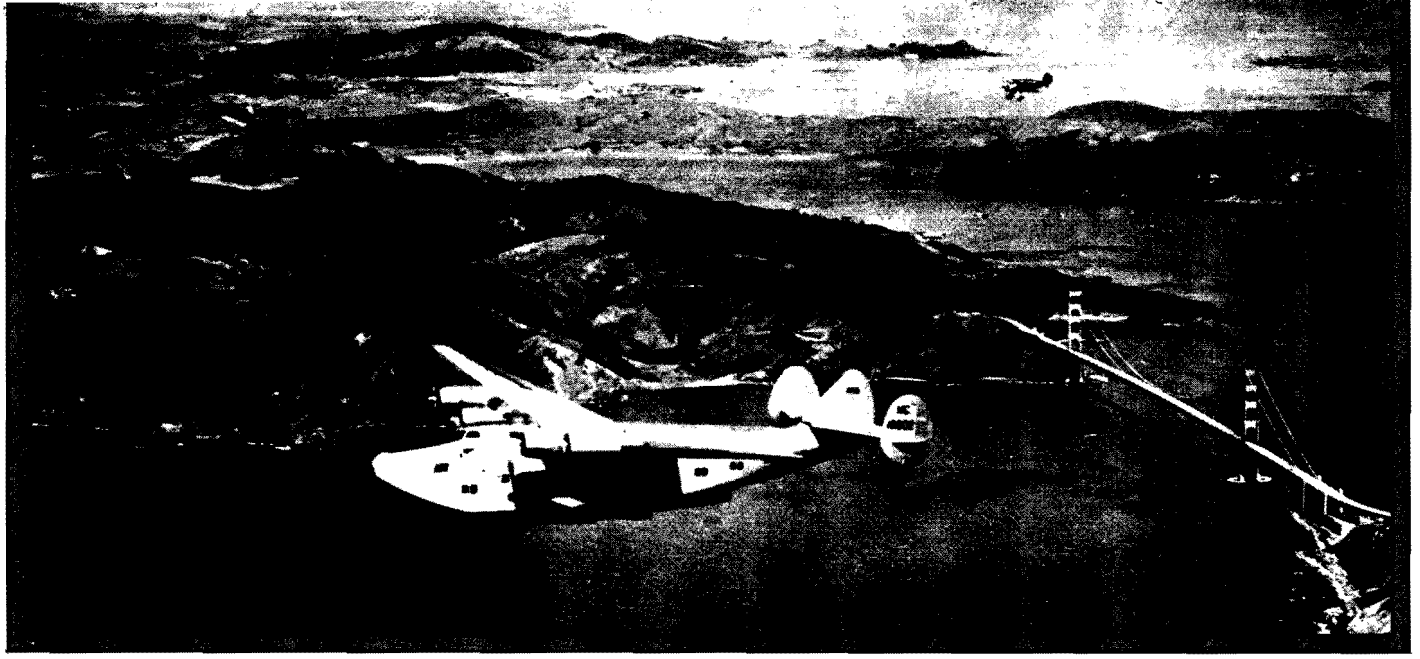
Structurally, the A-314 was identical to the 314. Changes were relatively minor. The engines delivered 100 h.p. more for takeoff, but were still rated at 1200 h.p. for normal operations. While the engines were essentially the same, the designation was changed from the GR-2600-A1 used in the 314 to 709C14AC1 for the A-314. Fuel capacity was increased by 1190 gallons to 5448, while the oil load was decreased from 300 gallons to 206. Personnel capacity was increased from 82 to 85, and gross weight was increased from 82,500 lbs. to 84,000. Top speed increased from 193 to 199 m.p.h. and the range increased to 5200 miles with required reserves.

Externally, only two changes were noticeable. The recessed steps from the chime (the extended rim of hull in water) to the top of the hull on the left side of the bow and midway between the wing trailing edge and the tail were deleted, as was the water rudder at the end of the pointed rear step. Since the first six boats were eventually converted to A-314s, the absence of these features on"first-six photographs" means that the planes had been converted.

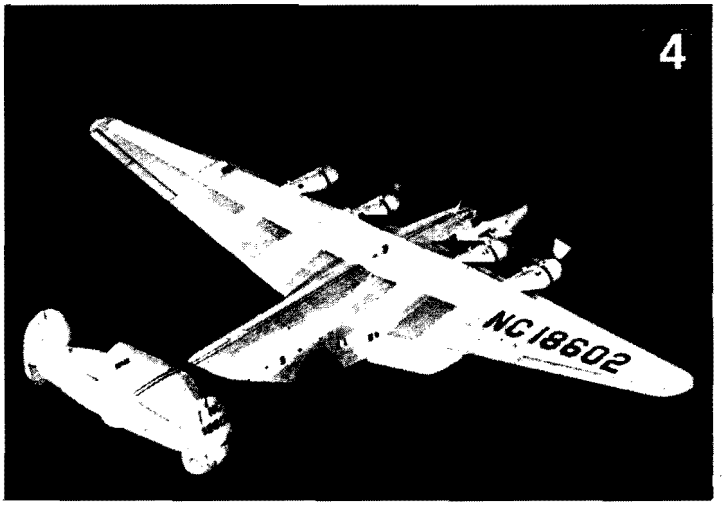
The first A-314 was launched in March, 1941, and all six had flown by July. Again, two were slated for the Pacific and four for the Atlantic, but World War II changed those plans even before the U.S. got into it.

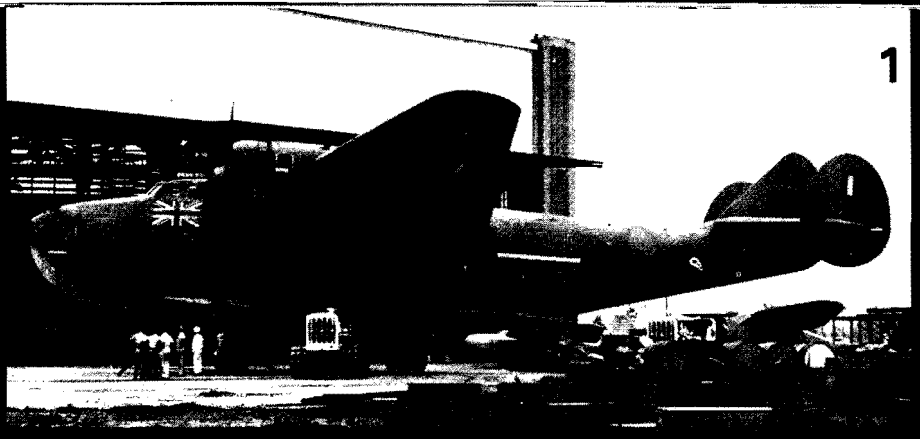
Before the A-314s were completed, the British Purchasing Commission arranged to purchase three of them from Pan Am for use by British Airways, a subsidiary of British Overseas Airways Corporation (BOAC). Britain needed such equipment for essential wartime transport. Following the completion of certification testing, NC18607 was ferried to the new British Airways base at Baltimore, Maryland, by a Pan Am crew. There it was painted with British camouflage, given the British registration G-AGBZ, and named BRISTOL. It was followed by NC18608, which became G-AGCA BERWICK, and NC18610 which became G-AGCB BANGOR.

The British Boeings were initially put on the route from England to Lagos, on the west coast of equatorial Africa, in the summer of 1941, but were soon on regularly scheduled runs to the States. As a time saving expedient, BERWICK was used to take British Prime Minister Winston Churchill back to England after visiting President Roosevelt in the U.S. in January, 1942. The Prime Minister was so pleased with this mode of travel that he



1. Test pilot "Eddie" Allen on the forward door of an early Boeing Clipper.
2. Eleanor Roosevelt, wife of the President, christens NC18603 the YANKEE CLIPPER at Baltimore, Maryland, on March 3, 1939.
3. Westward Ho! Shadowed by a Waco cabin monoplane, NC18602, the CALIFORNIA CLIPPER, leaving the Golden Gate on its first scheduled flight to Hawaii, in March, 1939.
4. Another view of CALIFORNIA CLIPPER showing the American flags and Pan Am's Fleet Number 18. The orange area of the wing shows as white because of the combination of film and filter used. Note that the left-wing flag (difficult to see, outboard of No. 4 engine) is laid out along the chord of the wing, not spanwise.
5&6. The last of the original Boeing 314 Clippers, NC18606, was christened AMERICAN CLIPPER in Los Angeles on July 6, 1939, and was then flown to the east coast. As can be seen by lower windows, passengers sat just above waterline and on takeoffs and landings, their view was often obscured by waves and spray. (A.U. Schmidt Photos)





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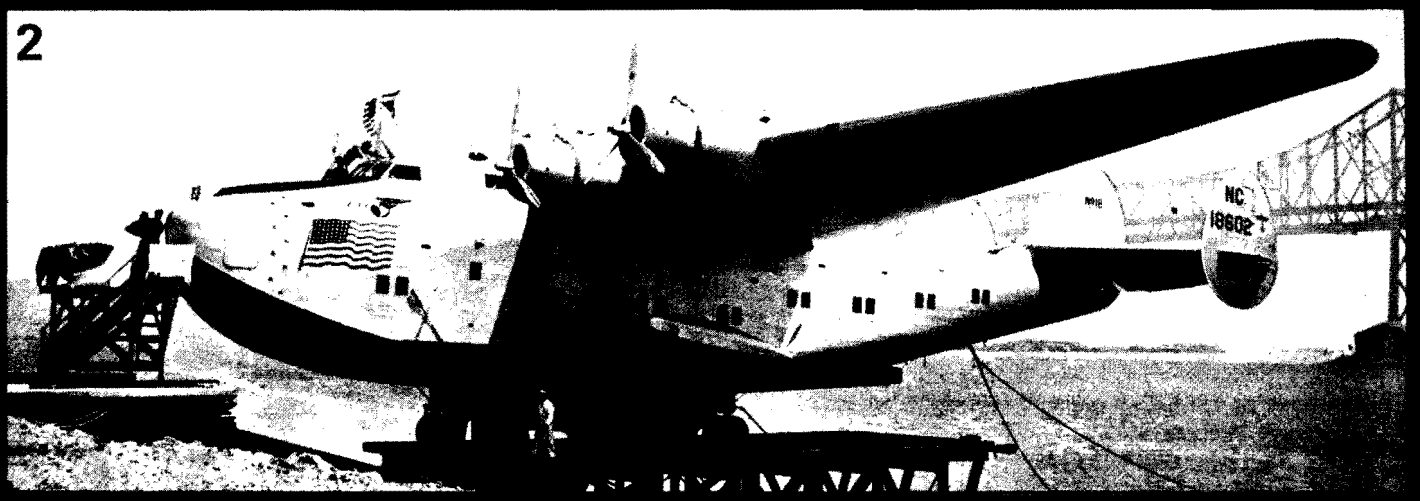

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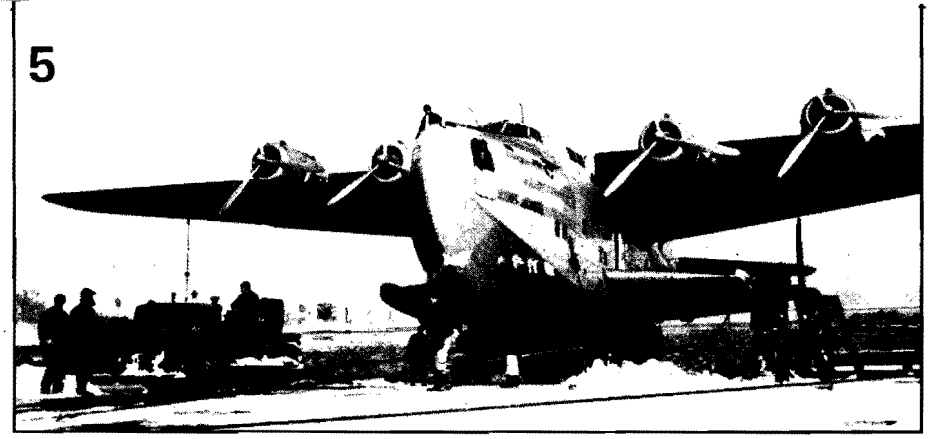
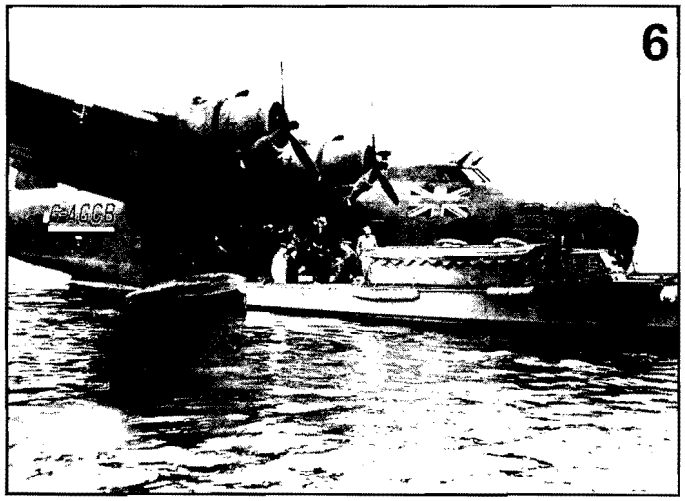
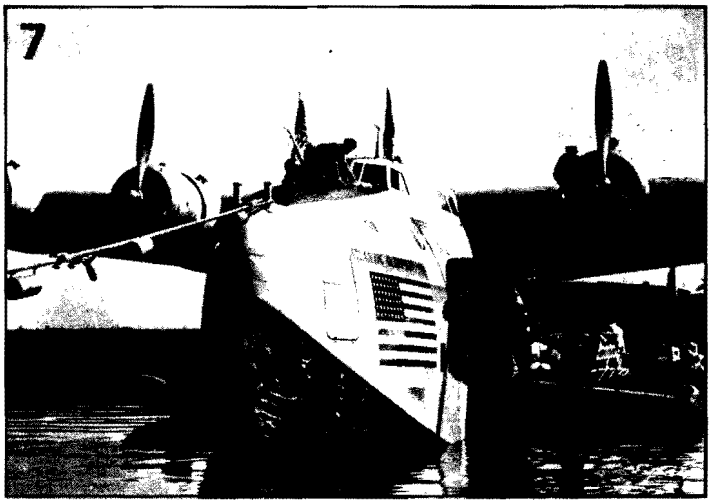
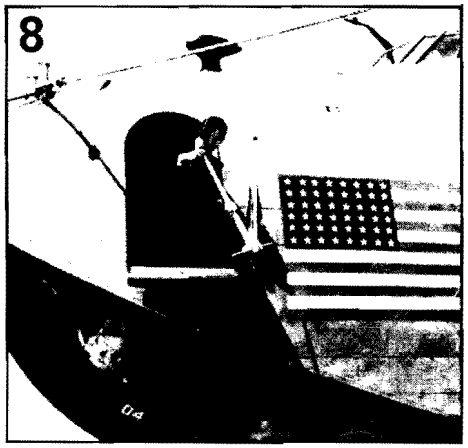
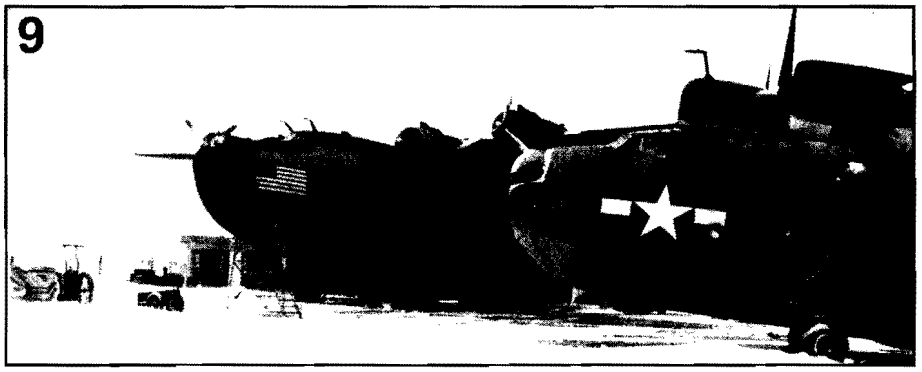
were given standard Army designations in the C-for-Cargo (and transport) category – C-98. Army serial numbers were 42-88622 and 42-88630 through 88632. The apparent discrepancy of airplanes acquired in 1941 having 1942 serial numbers, results from the Army's fiscal year serial number system. The government's fiscal year begins July 1, so 42-88622 meant that ***Capetown Clipper*** was the 88622nd Army airplane procured or contracted for in fiscal 1942, which began July 1, 1941, a rather optimistic growth program.











6. Passengers debark from British Airways BANGOR into a motor launch. Airplane is moored to a buoy instead of being docked.

7. Closeup of ATLANTIC CLIPPER'S snout at a dock reveals ladder up to wing cargo compartment. The painted flag is straight instead of wavy as on CALIFORNIA and AMERICAN CLIPPERS in earlier photos, and the aluminum paint has been removed.

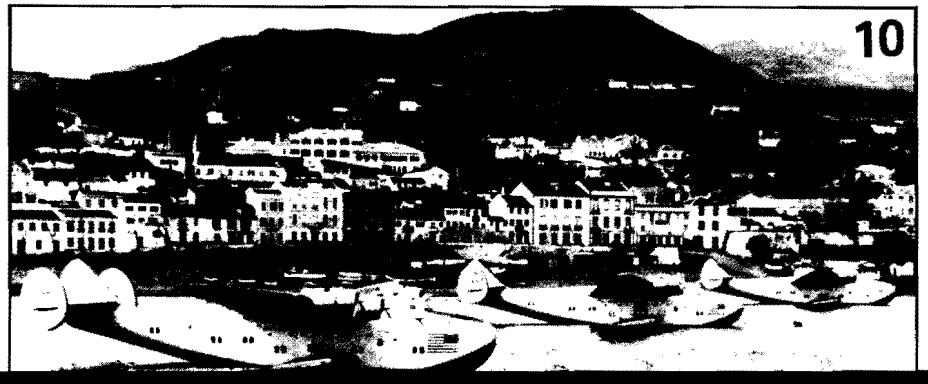
8. Crew member prepares to drop the anchor of CALIFORNIA CLIPPER. The camouflaged Clippers carried the last two digits of their registration numbers on the V-bottom above the waterline as shown. If this airplane is really '04, the names have been switched around, since earlier photos confirm that CALIFORNIA CLIPPER is '02.

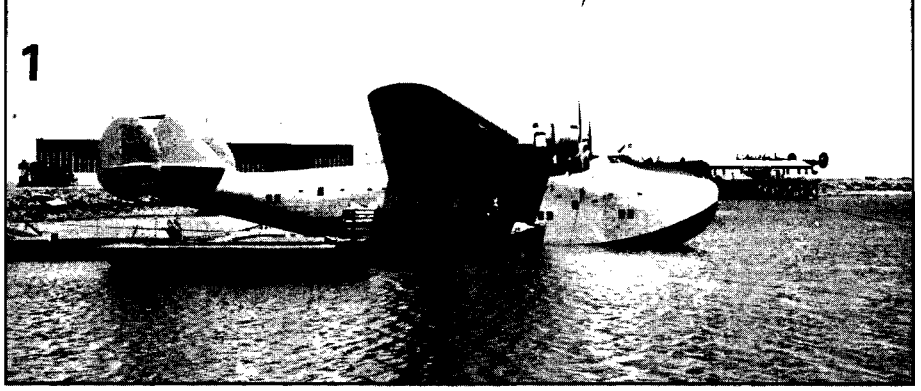
9. Wartime shot of a Clipper on its beaching cradle for comparison with a Navy Martin PBM Mariner, which has beaching gear attached manually to each side of the hull.

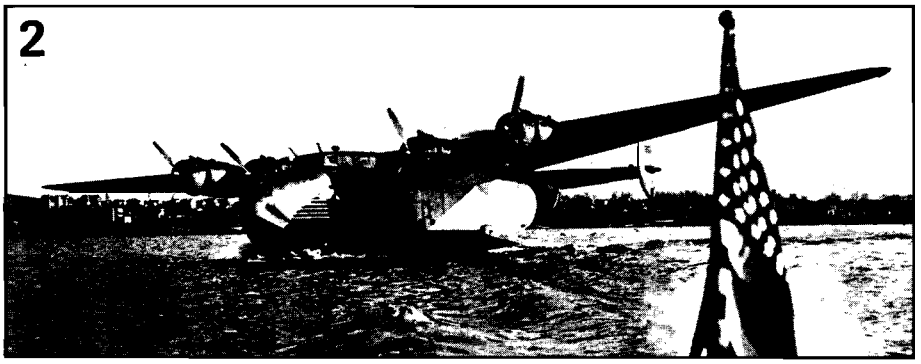
10. YANKEE, AMERICAN, and DIXIE CLIPPERS anchored in Horta, Azores, after Pearl Harbor and their acquisition by the Navy, but before they were given Navy camouflage.

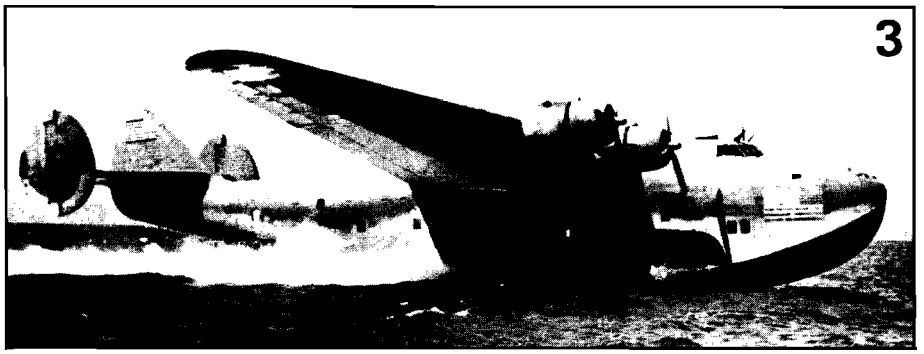
The operation of these was rather unorthodox. They were not taken over by Army crews or given Army markings. They were flown by Pan Am crews under their original civil registrations. The missions were far from routine – mainly flights to Southeast Asia via the South Atlantic and Indian oceans, and along coastal routes where there were no facilities for large landpalnes. One, NC18611, was turned back to PAA for its own use, but the Army kept title. As bases suitable for big landplanes became available in remote parts of the world, the Army's Air Transport Command got out of the flying boat business and transferred its C-98s to the Navy late in 1943.

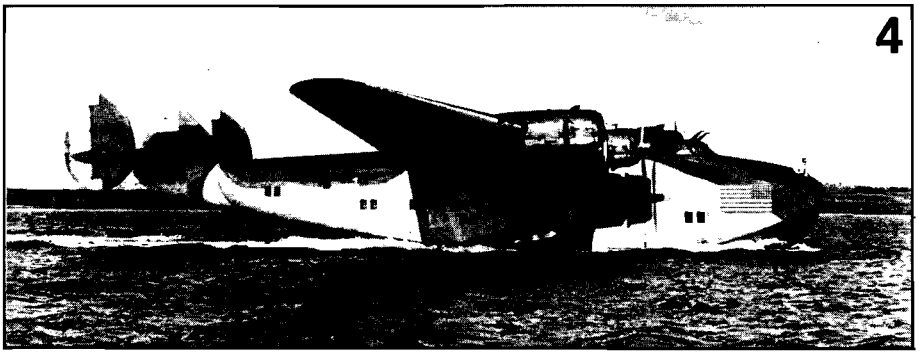
U.S. Navy Operations – Following the Army's lead, the U.S. Navy took over Pan Am's remaining five Boeing Clippers soon after Pearl Harbor. The Navy serial numbers were 48224 through 48228, but no







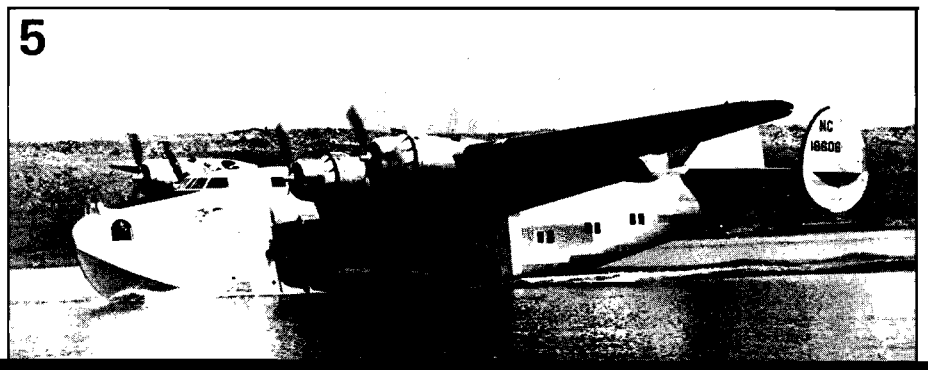




1. During the war, Pan Am moved its San Francisco base from Treasure Island to Mills Field, the municipal airport. Here is HONOLULU CLIPPER, stripped of its warpaint but without painted-on name or flags, at the dock in July, 1945. (Gordon S. Williams)

2. ANZAC CLIPPER was drafted into the Army, transferred to the Navy, and was returned to Pan Am for airline use on November 30, 1942.

3. HONOLULU CLIPPER operating in the Pacific after Pearl Harbor. Even though the plane was now owned by the Navy, it was turned back to Pan Am for airline use and carried the Pan Am lettering over the camouflage.



standard Naval designation was assigned. The planes operated as B-314s (B-for-Boeing). Unlike the Army, the Navy drafted only a few civil airplanes and operated them under their original designations.

The Navy's Clipper operations were like the Army's, with Pan Am crews flying them for the Navy under civil registration. Some were left with the airline for its own continuing use when necessary. For a while, the Navy Clippers flew in their original silver finish, but by late 1942 were in standard Navy camouflage, albeit with big American flags as used on the airline and still with civil registrations.

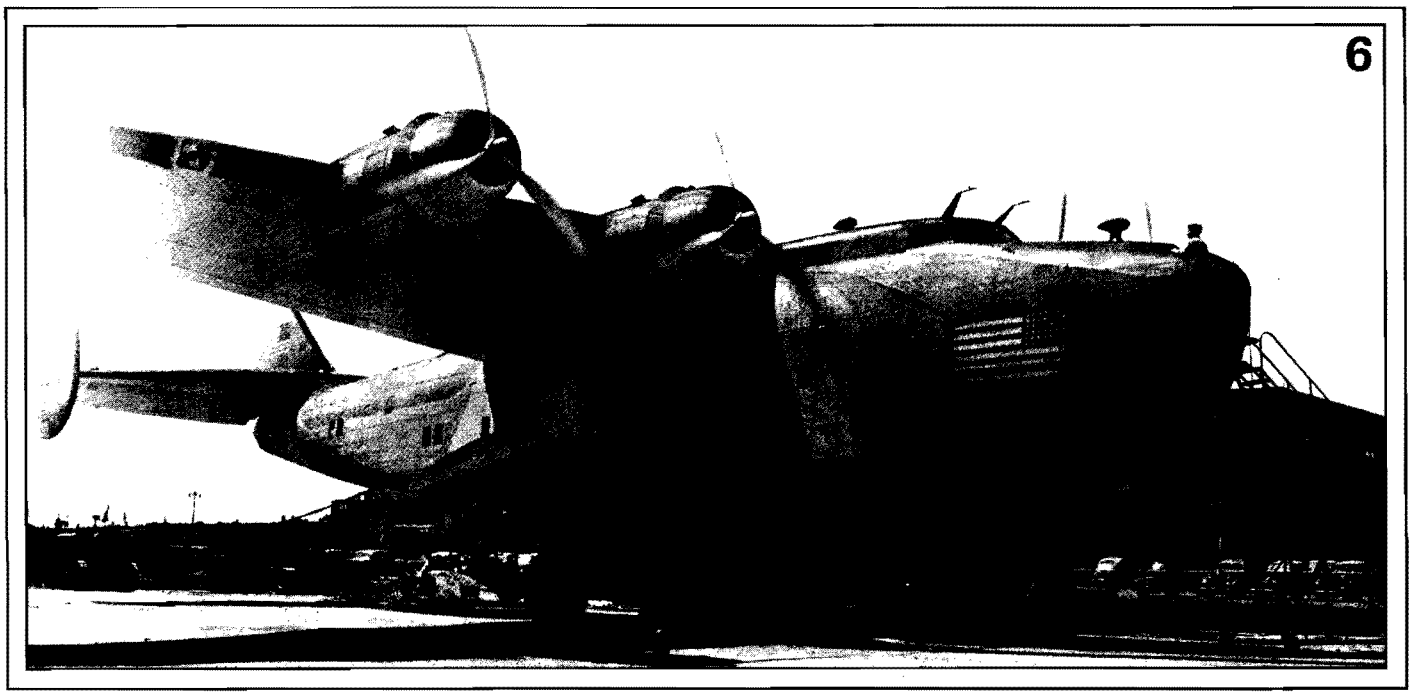
When the Army transferred its four C-98s to the Navy in August and October, 1943, they were given Navy serial numbers 99081 through 99084. The Navy retained title to all nine until after the war. When Pan Am didn't want to buy them back, they were turned over to the War Assets Administration (WAA) in 1946 for sale as surplus and were flown to San Diego for open-air storage in that benign climate.

Civil Operations — Pearl Harbor had a major impact on Pan Am's operations. The ***Pacific Clipper***, NC18609, was in New Zealand at the time. Because of uncertainty as to the disposition of Japanese forces in the Pacific, it returned to the U.S. by flying on westward via Africa and South America. The ***Anzac Clipper*** NC-18611, was an hour out of Honolulu westbound when the attack came. It was diverted to Hilo, an alternate terminal some 200 miles south of Pearl Harbor, discharged its passengers, and returned to San Francisco. For the duration, Pan Am's Pacific route was limited to the San Francisco-Hawaii leg, using two Martin 130s, two Sikorsky S-42s, and one Boeing that the Navy allowed it to keep on the route after the takeover (The Navy also acquired the Martins). For this and other wartime operations, the gross weight of the Boeing A-314 was increased by 3000 pounds to 87,000.

The Atlantic division was practically on a war footing by Pearl Harbor time, but strictly civil operations were reduced still farther. The only crash of a Boeing 314 took place at Lisbon on February 22, when ***Yankee Clipper***, NC18603, hooked a wingtip on a low turn during a landing approach. Of the 39 aboard, 24 died. This crash lingered longer in public memory than most because of one of the passengers — singer Jane Froman. Her long convalescence and eventual return to singing was the subject of a major motion picture, "With a Song in My Heart", starring Susan Hayward.

Postwar Activity And The End Of An Era

When World War II ended, both Pan Am and BOAC put their Boeing Clippers back on regular passenger runs, but the Navy owned them. Pan Am was given the opportunity to buy them back, but refused. The airline now had Douglas DC-4 landplanes, so why buy obsolete flying boats that would be retired in a very short time?



4. Compare the camouflage details of CAPE-TOWN CLIPPER with those of other Clippers in warpaint. Deletion of letter C in registration anticipated FAA change from NC to plain N-and-number by nearly six years.

5. AMERICAN CLIPPER taxiing in after a postwar flight, still owned by the Navy but used by Pan Am for civil operations. Postwar lettering on the airplanes read PAN AMERICAN WORLD AIRWAYS instead of the earlier PAN AMERICAN AIRWAYS SYSTEM. (National Air Museum)

6. Camouflaged YANKEE CLIPPER runs up engines ashore. Note tail line attached to tractor. YANKEE crashed at Lisbon Feb. 22, 1943, the only one of the 12 Clippers so lost.

Pan Am lost ***Honolulu Clipper***, NC-18601, on a flight from Hawaii to San Francisco in November, 1945. It suffered a double engine failure and made a safe landing on the ocean. The passengers and crew were taken off by a Navy rescue ship. Attempts to tow the crippled plane were frustrated by winds and high seas. After slacking the towrope and ramming a Coast Guard ship, the Clipper was sunk by gunfire five days after it landed. Much was made of the fact that it took 1300 rounds of 20mm cannon fire to sink it. How much of this was simple target practice and how much was a serious effort to sink a derelict hazard to navigation is anybody's guess, for a few well-placed shots in the double bottom would have done the job.

Pan Am's last Clipper flight over the Atlantic took place on December 21, 1946 when ***Anzac Clipper*** NC18611 left Lisbon, landing in New York on the 23rd (other sources say January 6, 1946, but that may not have been the Lisbon flight). DC-4s had taken over the Atlantic run starting on October 27, 1945.

The final Pan Am Clipper flight in the Pacific ended on April 9, 1946, when ***Pacific Clipper*** NC18609 reached San Francisco from Hawaii. It was replaced on that route by the Lockheed "Constellation", another prewar landplane design that had been appropriated by the Army and did not become available to civil users until after the war.

Since it held title to seven Boeing 314s that Pan Am did not want to take back, the Navy turned them over to WAA. The first postwar year was one of optimism for a rash of new "non-scheduled" airline companies, and the surplus Clippers soon found a buyer, Universal Airlines. This organization refurbished them for the hopefully prosperous tourist trade, although one, NC18609, was scrapped for spares needed to get the others airworthy.

Universal went broke within a year, and the six remaining Clippers got a new owner, American International Airways, which paid $500,000 for the fleet. This time, ***Atlantic Clipper*** NC18604 was cannibalized for spare parts.

American International lost one in October, 1947, in a near-duplication of ***Honolulu's*** mishap. Now renamed ***Bermuda Sky Queen***, the former ***Capetown Clipper*** NC18612 was returning to New York from a charter flight to England when it ran out of gas bucking headwinds and had to put down in the open sea. Again, all occupants were safely evacuated and towing was frustrated by wind and sea conditions; again, the flying boat rammed a rescue ship and had to be sunk when it couldn't be salvaged.

BOAC took the camouflage off of its Boeings in July, 1945, and settled back to relatively routine England-U.S. flights. However, BOAC, too, was able to acquire long-range landplanes that soon put the big boats out of business. The last transatlantic revenue flight by a BOAC Clipper was on March 7, 1946, with 55 passengers. After that time, all three were put on the Baltimore-Bermuda run, where they served until 1948. They were then sold to a brokerage firm, General Phoenix Corporation, which in turn sold them to a new airline that had been formed in 1948, World Airways. World also bought the four surviving Pan Am ships. This dwindling fleet lost money, however, and World was bankrupt within a year.

The Clippers that were not scrapped immediately were flown back to San Diego, where they were beached for more outdoor storage. The last flyable example was NC18607, the former BOAC BRISTOL. This had two other owners after World, and was afloat in Baltimore Harbor in 1951 when it sank in a sudden storm. So ended the 12-year career of one of the world's all-time great flying boats and airliners.

By this time, the 314 was an anachronism; the era in which the big flying boat was a significant element of the air transportation system had already ended.

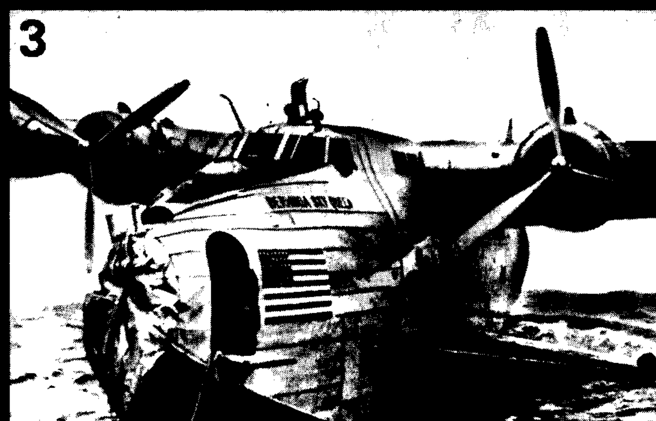
Markings And Coloring

As built, the 314s were finished with silver lacquer on all external metal surfaces and silver dope on fabric surfaces. The notable exception was black on the bottom of the hull and hydrostabilizers and up the sides of the hull to the water line. For increased visibility from above, international orange was added to the top of the wing ahead of the rear spar. Registration numbers, Boeing trademarks, and airplane names were in black, and Pan Am airline lettering was blue.

For a while, prior to delivery and approximately a year thereafter, the first six Clippers had Pan Am numbers from 17 to 22 painted on each side of the bow and the center fin. The number 19 was not put on 18601 until the airline markings went on late in 1938. They soon disappeared from the first six and were never applied to the second six.

After a short period of service, Pan Am removed the exterior paint and

(Text continued on page 46)



THE GREAT CLIPPERS

gained a significant weight saving. The corrosion problem, always serious on seaplanes and particularly so for those operating on salt water, was not expected to [illegible] worse; the aluminum skins of the 314 had an anodize finish applied before metal was cut. However, since the finish was not uniform on all the skins, the unpainted airplanes had a very "patched" look about them.

The three delivered to British Airways were ferried to Baltimore in their original silver finish and U.S. registrations, and were put into standard British camouflage in Baltimore.

When the Army took over its [illegible] it did not apply either camouflage [illegible] itary markings. The Navy did not [illegible] camouflage immediately, either; [illegible] of camouflaged Clippers show [illegible] graduated blue-gray to white scheme [illegible] was not adopted until late 1942. [illegible] applied a little more artistically [illegible] of the Boeings than on other Navy [illegible] boats, and there were sharp lines [illegible] ing changes rather than the usual b[illegible] After the war, the camouflage was [illegible] from all the 314s, including the Brit[illegible] and they flew again with patchy-look[illegible] anodize finish.

Flying The 314

Coming up with a meaningful appr[illegible] of the flying characteristics of an airpla[illegible] like the 314 more than 30 years after [illegible] went out of service is almost impossib[illegible] There are two points of view, with [illegible] middle ground. Pilots who flew them ca[illegible] from memory, compare them to the earlier flying boats that they flew and in this respect the 314 comes up roses. It was superior to its predecessors in every way — the result of airline and manufacturer experience, research, and state-of-the-art advances. Pilots who continued beyond the 314 to modern designs right up to the Boeing 747, like retired Pan Am pilot Scott Flower, to whom we are indebted for these comments on 314 flying, can look back on it with a certain amount of nostalgia but have to admit that flying it

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1. HONOLULU CLIPPER was forced down in the Pacific in November, 1945 and everyone was evacuated safely. Salvage was hampered by heavy weather for several days, so the faithful old boat was sunk by gunfire. (Courtesy Jim Sullivan)

2. The old makes way for the new — CAPE TOWN CLIPPER and a sistership, in background, ride at anchor while a Douglas DC-4 takes off from La Guardia to inaugurate Pan Am's landplane service across the Atlantic, October 27, 1945. Prior to that time, military versions (C-54s) had made 79,642 ocean crossings, with a loss of only 3 aircraft.

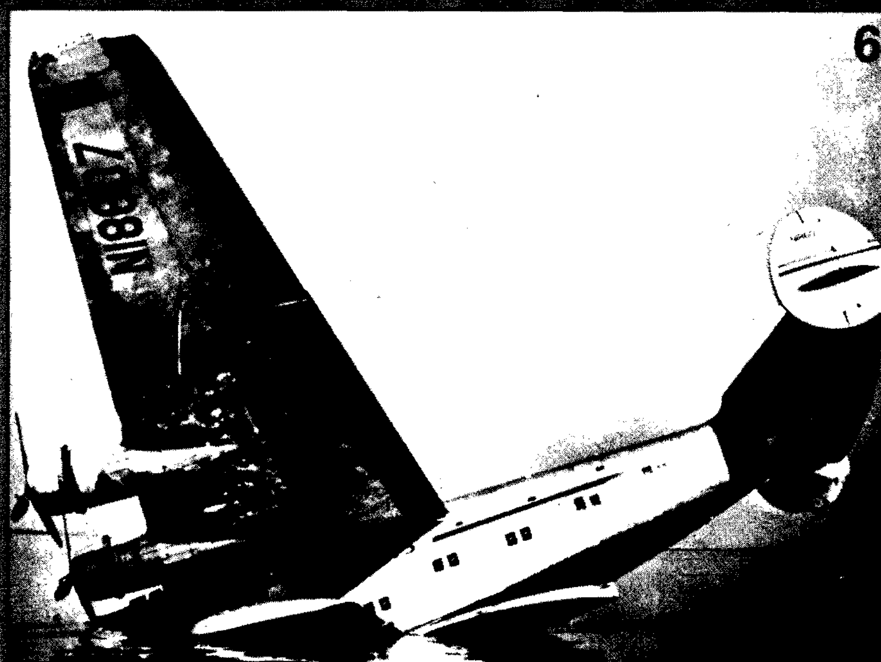
3. After the war, CAPETOWN CLIPPER was acquired by new owners, renamed BERMUDA SKY QUEEN, and used for charter work. It came down in the Atlantic in October, 1947, after running short of fuel and had to be sunk when it couldn't be towed home. (Photo courtesy Henry Palmer)

4. After the Navy and Pan Am returned them early in 1946, the Clippers used on the Atlantic were pulled ashore at the Navy's Floyd Bennett Field in Brooklyn prior to being flown to San Diego for storage. PACIFIC CLIPPER is nearest the camera. (National Air Museum)

5. An unusual perspective. B.O.A.C.'s BERWICK ashore at Baltimore as another Clipper comes in for a landing. This was the last route flown by the British Clippers before their retirement.

6. The last Clipper to fly was N18607, the former British BRISTOL, which reverted to original American registration after being sold by B.O.A.C. It was airworthy and afloat in Baltimore Harbor when it was sunk by a storm in 1951. (Courtesy John Taylor)

7. End of the line. Although not airworthy, some of the Clippers survived into 1952 at Lindbergh Field, San Diego. The former [illegible] CLIPPER shows the [illegible] of [illegible], [illegible] stripped wing fabric and other missing parts. (Gordon S. Williams)



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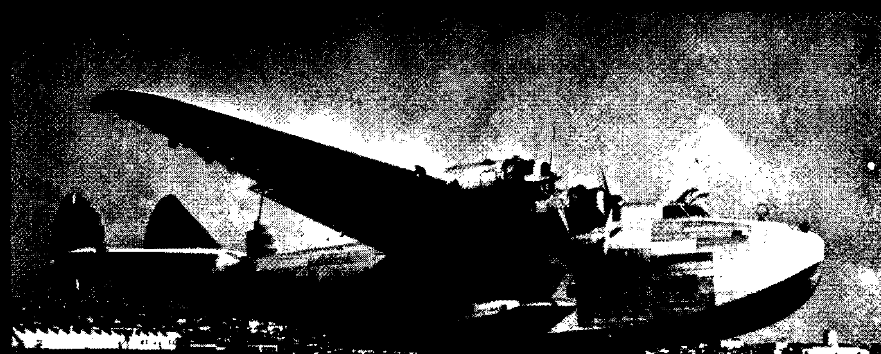

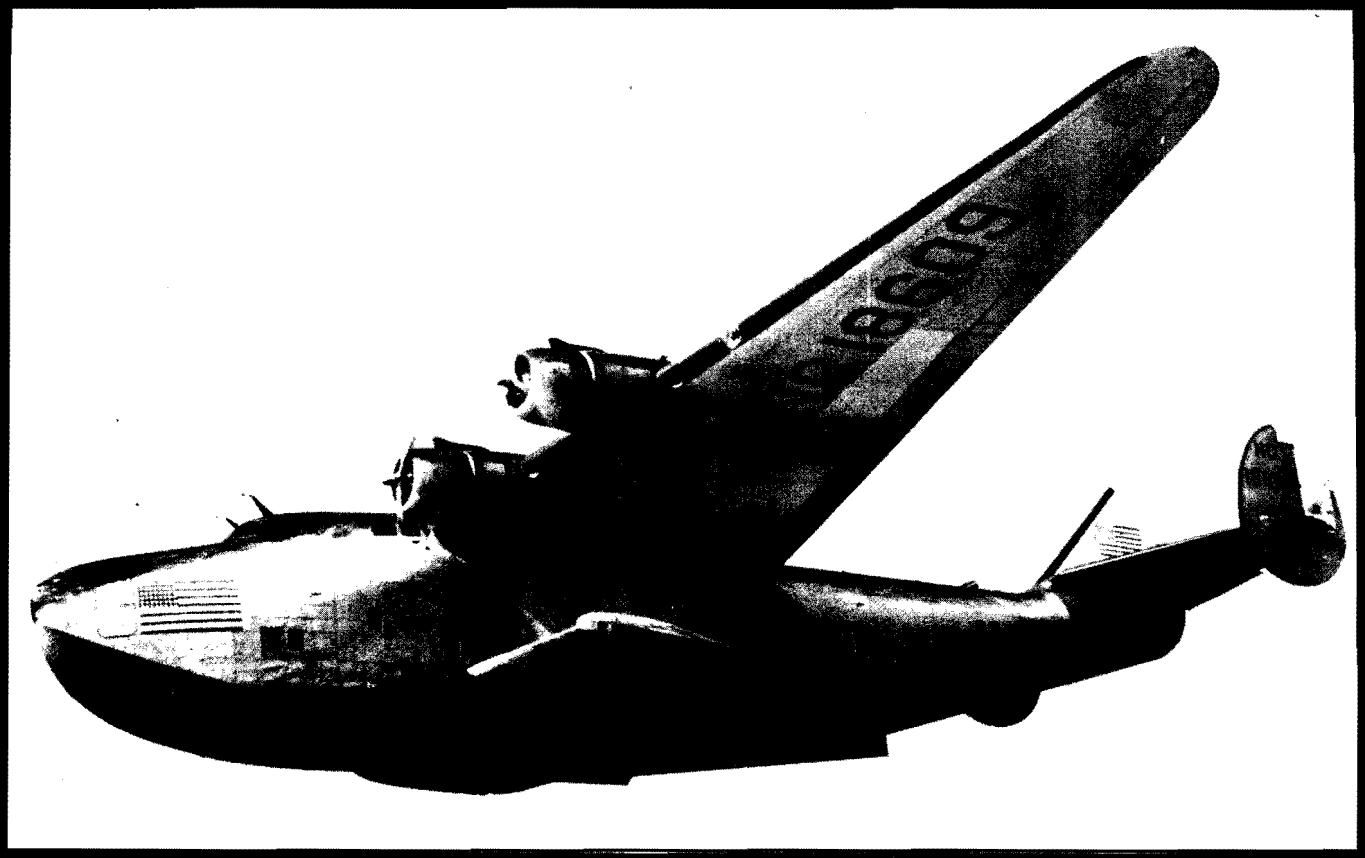

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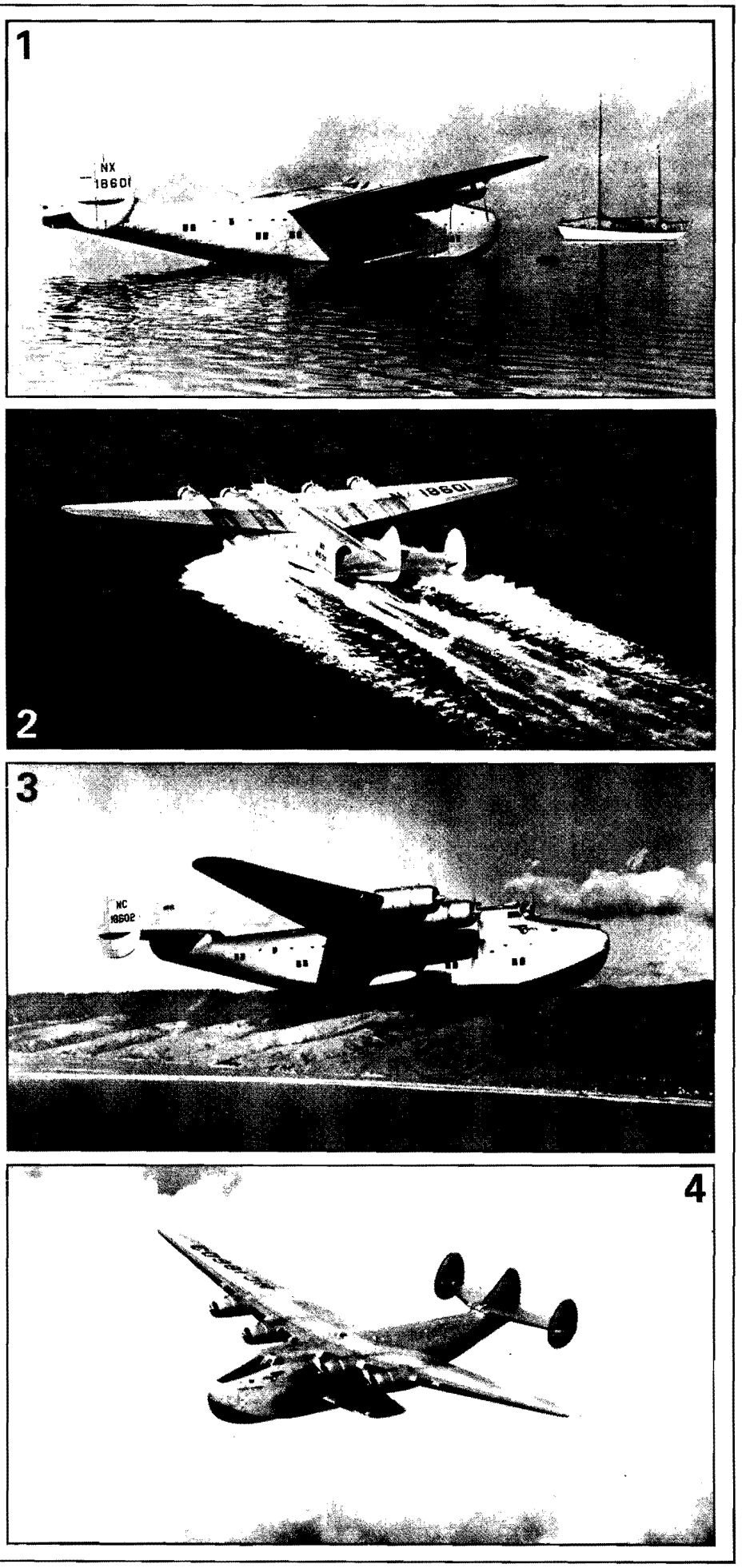
INDIVIDUAL BOEING CLIPPER HISTORIES

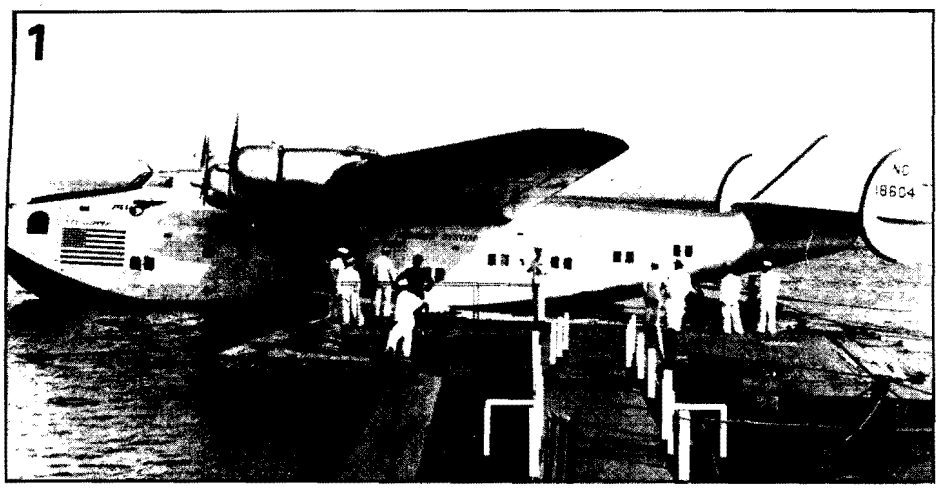
Listed in sequence of Boeing serial numbers, called c/n's for constructor's numbers.

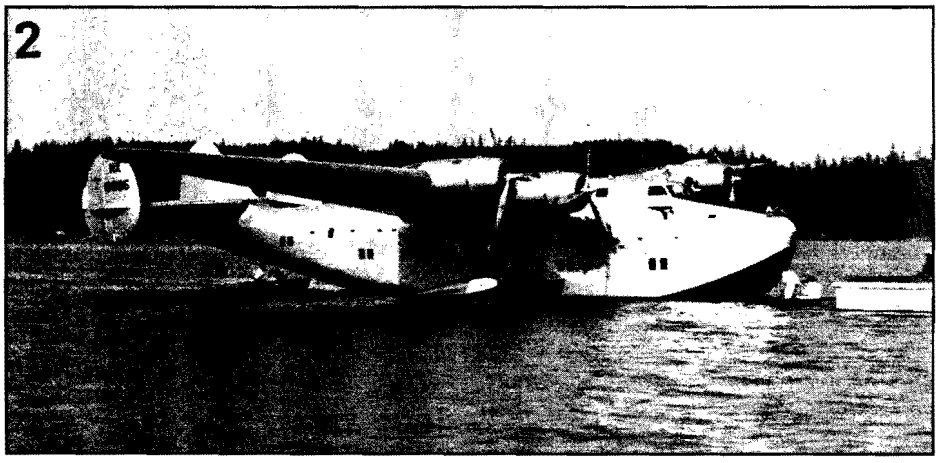


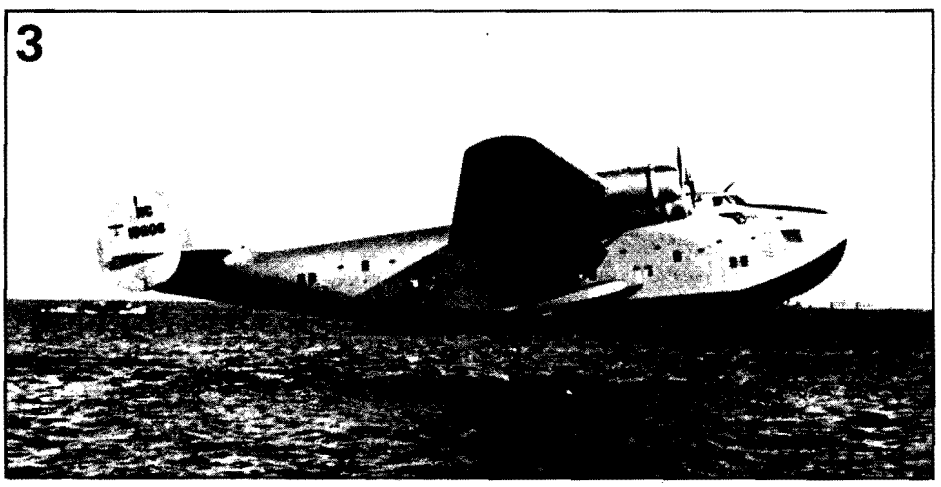
1&2. Airplane No. 1 C/N 1988. NX, NC18601. The prototype, launched May 31, 1938, with original single tail. First flight June 7. Converted to twin tail in September, later to triple tail. Delivered to Pan American Airways (PAA) February, 1939, as PAA No. 19 and assigned to Pacific runs. Christened HONOLULU CLIPPER in Hawaii April 26. Sold to U.S. Navy, December, 1941. Assigned Navy serial number 48227 but not given Navy designation. Continued operation by PAA as only Boeing Clipper on SF-Honolulu run after Pearl Harbor. Forced down at sea by double engine failure in November, 1945; all aboard saved but airplane sunk by gunfire after five days of salvage effort failed.

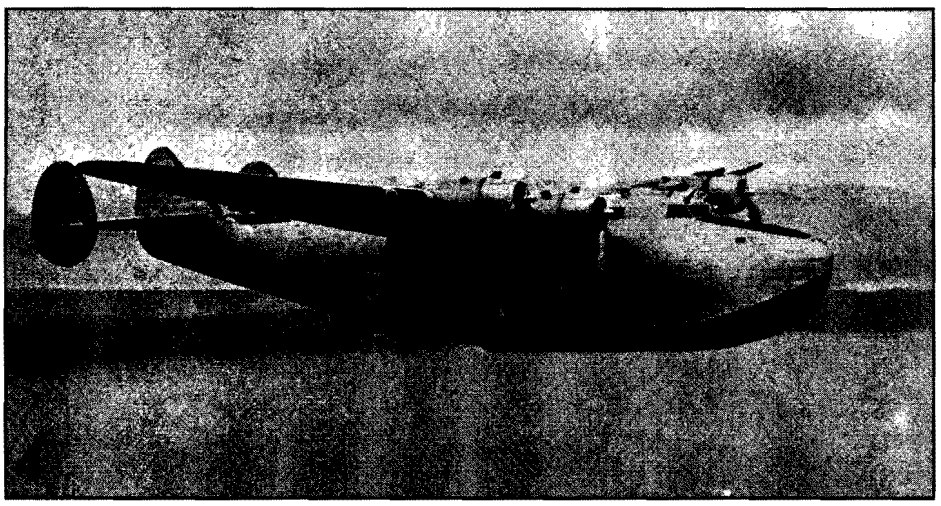
3. Airplane No. 2 C/N 1989. NX, NC18602; PAA No. 18. Built with triple tail. First flight January 13, 1939, delivered to PAA January 29, 1939 for Pacific runs. Christened CALIFORNIA CLIPPER in San Francisco April 25. Survey flight to New Zealand August, 1939 and later to Singapore. Sold to U.S. Army as C-98 in December, 1941, Army serial number 42-88632; transferred to U.S. Navy with serial 99084. Surplussed to War Assets Administration (WAA) and sold to Universal Airlines; later to American International Airways and then to World Airways. Scrapped in 1952 with a total of 11,507 flight hours.

4. Airplane No. 3 C/N 1990. NX, NC18603; PAA No. 17. First flight January 24, 1939. Delivered to PAA for Atlantic runs in February, 1939. Christened YANKEE CLIPPER by Mrs. Franklin D. Roosevelt at Washington, D.C., March 3. Survey flight to Europe March 26, first mail flight New York-Marseilles May 20-22. To U.S. Navy with serial 48224, but continued in special passenger operations by PAA. Destroyed in landing accident at Lisbon, February 22, 1943; 24 casualties among 39 aboard were the only ones in entire 12-year Boeing 314 operation.









1. Airplane No. 4 C/N 1991. NX, NC18604; PAA No. 20. First flight March 6, 1939, delivered to PAA in April for Atlantic runs. Christened ATLANTIC CLIPPER at Baltimore, Md., April 25. First passenger flight (non-revenue publicity) over North Atlantic route June 17. To U.S. Navy with serial 48225. Sold by WAA to Universal Airlines; later bought by American International and scrapped for parts to keep others flying.

2. Airplane No. 5 C/N 1992. NX, NC18605; PAA No. 21. First flight April 28, 1939. Delivered to PAA for Atlantic runs in May, 1939. Christened DIXIE CLIPPER June, 1939, inaugurated paying passenger service over North Atlantic June 28. Navy serial 48226, Carried President Roosevelt to Casablanca Conference and back, January 1943. To WAA, Universal Airlines, American International, World Airways. Grounded by bankruptcy 1949, scrapped 1952.

3. Airplane No. 6 C/N 1993. NC18606; PAA No. 22. First flight June 9, 1939, delivered to PAA for Atlantic runs June 16, 1939. Christened AMERICAN CLIPPER at Los Angeles, Calif., July 6, prior to flight to New York. U.S. Army C-98 42-88632, transferred to U.S. Navy as 99083. To WAA, Universal Airlines, American International, World Airways, scrap.

THE GREAT CLIPPERS

Docking And Mooring

For normal passenger and cargo loading and debarkation, the Boeing Clippers were moored to a dock. In tidal areas this was usually a floating affair, rather like a barge. Gangways that could flex with the tide connected the floating dock to the shore, while shorter gangways had one end laid on one or both of the hydrostabilizers to allow passengers to come aboard.

Normal departures were made by starting the engines at the dock, after the passengers were aboard, and then taxiing out to the takeoff area. This could not always be done, and it was sometimes necessary to tow the airplane out of narrow areas with a launch. Normal procedure following landing was to taxi to a buoy, then be towed into the dock by a boat or be winched in.

Making a buoy in crosswing conditions in a narrow channel, like that at La Guardia, could sometimes take more than half an hour of maneuvering with power, drifting backward to a new approach position, more maneuvering, etc. Sometimes pilots would even cut the switches momentarily to reduce thrust when the engines were at idle speed; the luxury of reverse-thrust propellers as an aid to water maneuvering was still in the future and the water rudders had been eliminated from the 314s as virtually useless. For all their weight, the big Boeings presented a terrific amount of sail area to the wind and were

seriously affected by it, as are all seaplanes and flying boats. The sailing skills required, as experienced seaplane pilots can well attest, were and are quite independent of flying skill. Wind and water problems, added to each end of a transoceanic flight, often meant that the crews were aboard their airplanes for more than 24 hours. Thus the requirement for two full crews on long flights.

The Clippers were put in and out of the water on special dollies built to fit their V-bottoms. At most bases, these were rolled down a ramp under restraint of a steel cable secured to a big caterpillar tractor. The tractor did the work on the haul-out after the flying boat had been floated into position over the submerged dolly.

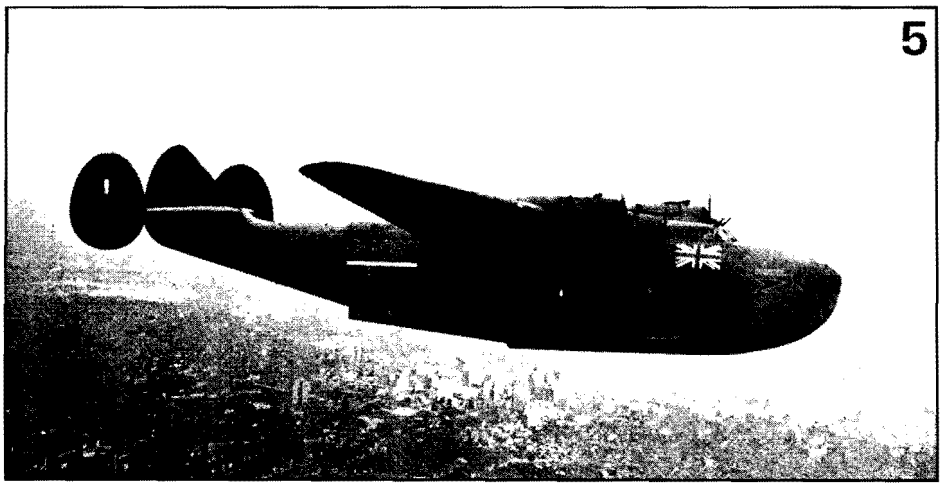
At some bases where the maintenance area was high above water level, as at San Francisco's Treasure Island, the dolly was put in the water on a marine railway. The dolly was rolled onto the level top of a special "car" that had its wheels angled to the slope of the track (See photo of *California Clipper* at Treasure Island.)

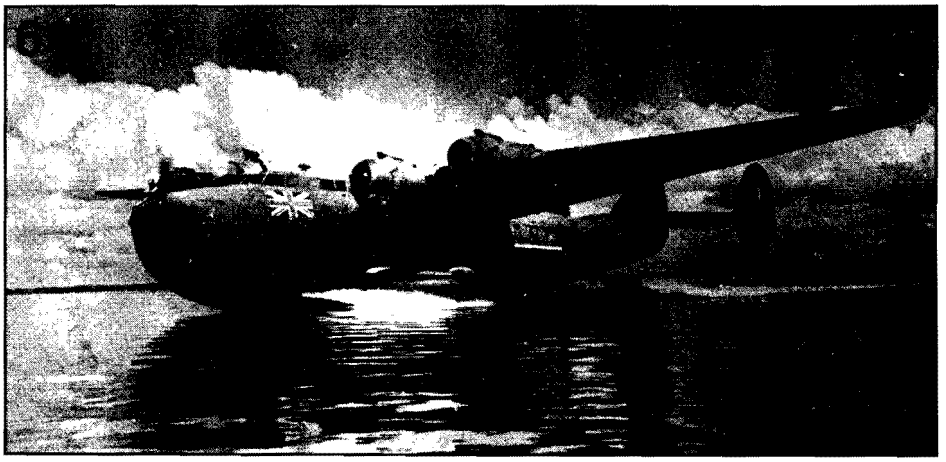
4&5. Airplane No. 7 C/N 2081, NX, NC18607, G-AGBZ, N18607; first A-314. First flight March 19, 1941. Sold by PAA to British Purchasing commission for British Airways before completion. British registration applied after delivery to British terminal at Baltimore in May; christened BRISTOL and arrived in England May 23. Used for Britain-Africa and transatlantic service during the war with a transatlantic round trip for Winston Churchill in July, 1942. Baltimore-Bermuda flights after war until January, 1948. Sold to General Phoenix Corporation who resold to World Airways. Non-scheduled operations into 1949, when World failed, then to unknown owner. Later sold at sheriff's sale. Last flyable Boeing 314; sunk in storm in Baltimore harbor, 1951.

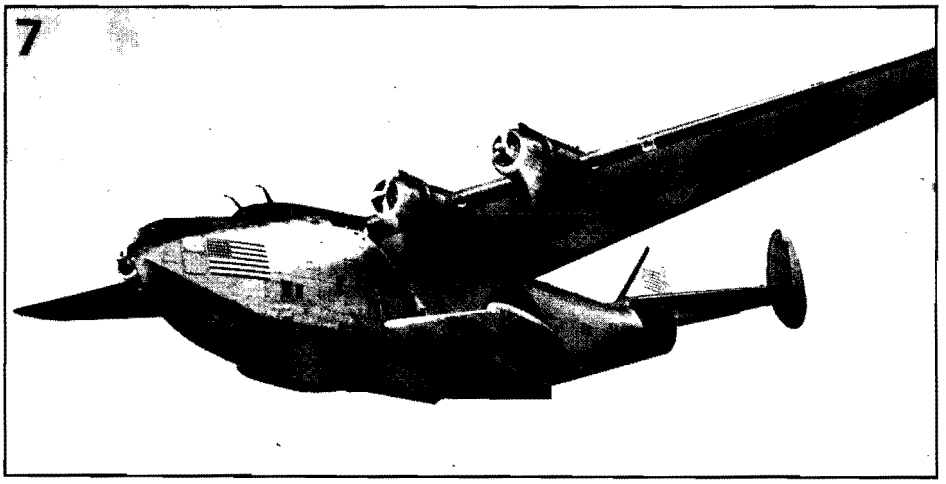
6. Airplane No. 8 C/N 2082. NC18608, G-AGCA, N18608. First flight May 11, 1941, delievered to British Airways. Christened BERWICK and reached England in June. Service to 1948 same as BRISTOL. Flew Winston Churchill from U.S. to England in January, 1942. Sold to General Phoenix and World Airways. Scrapped after bankruptcy of World.

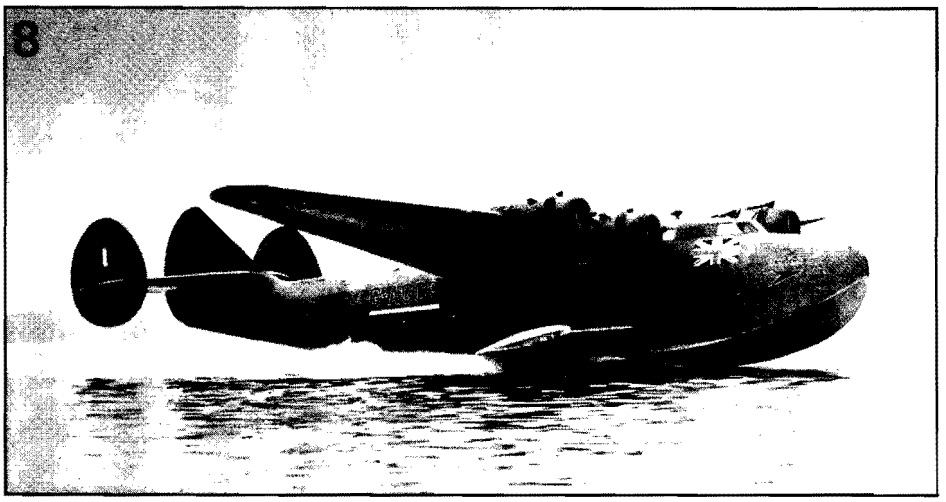
7. Airplane No. 9 C/N 2083. NC18609. First flight June 6, 1941, delivered to PAA for Pacific runs and christened PACIFIC CLIPPER. Caught in New Zealand on December 7, 1941, and returned to U.S. by westward flight around the world. U.S. Navy serial number 48228, turned back to PAA for airline use in late 1943. Made last flying boat flight for PAA with Honolulu-SF run that ended April 9, 1946. To WAA, Universal Airlines; scrapped for parts in 1946 with 8505 hours' flying time.

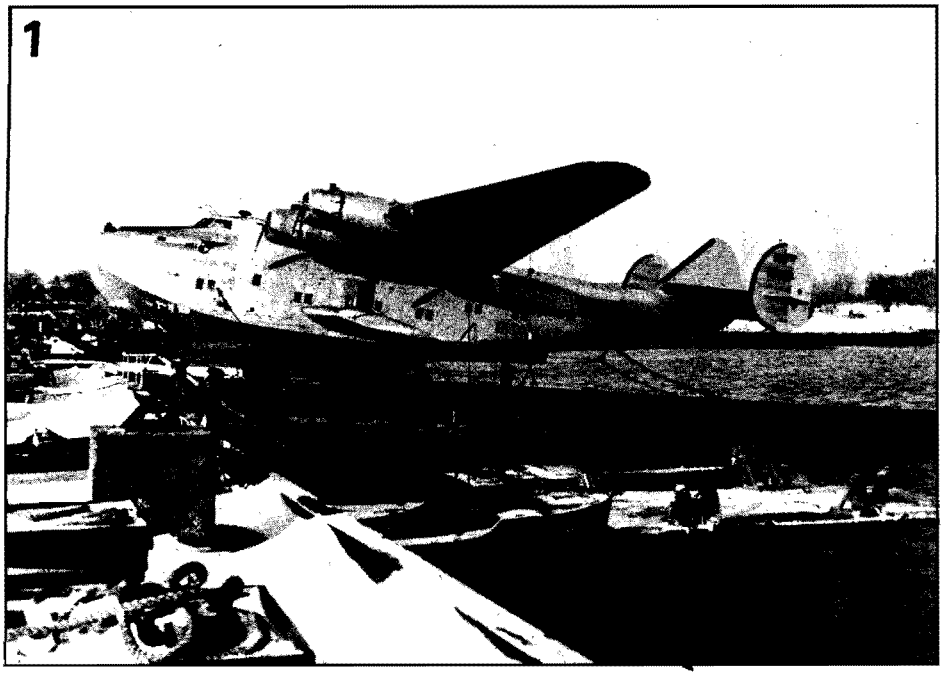
8. Airplane No. 10 C/N 2084. NC18610, G-AGCB, N18610. First flight June 6, 1941, delivered to British Airways July. Christened BANGOR. Service to 1948 same as BRISTOL and BERWICK. Sold to General Phoenix, World, and scrapped.





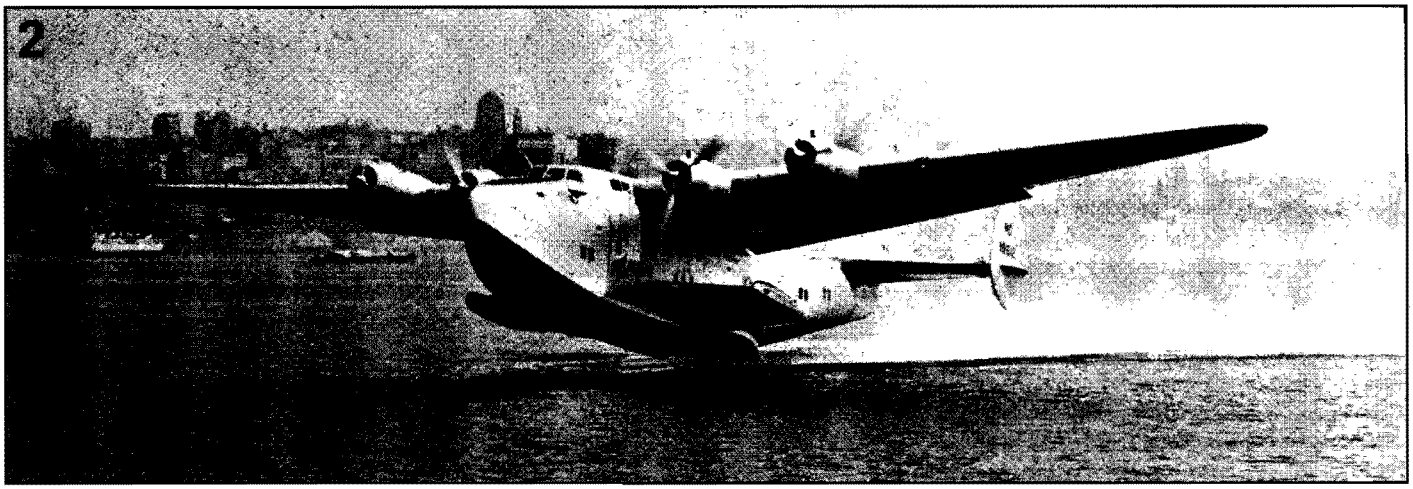


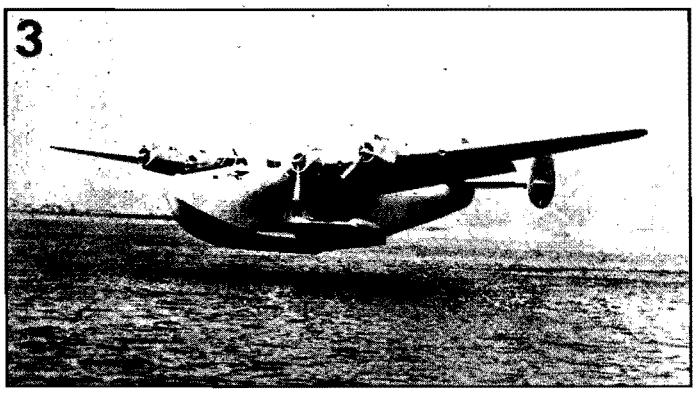


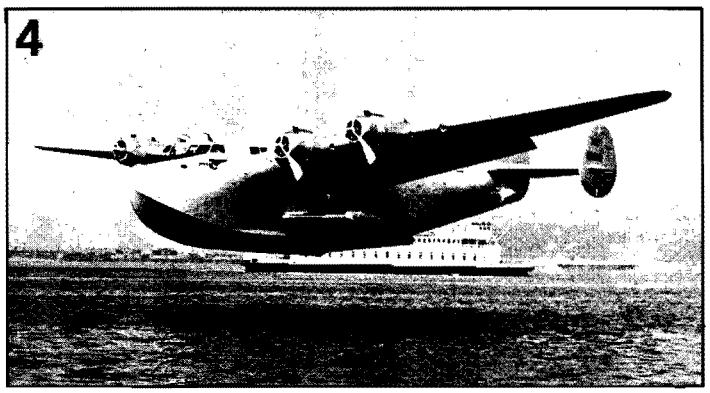


1. Airplane No. 11 C/N 2085. NC18611. First flight June 30, 1941, delivered to PAA for Pacific runs. Christened ANZAC CLIPPER. Nearly caught in Pearl Harbor raid; returned to U.S. and transferred to Atlantic runs as Army C-98 42-88630, Navy 99082. Returned to PAA for airline operation November 30, 1942. Last PAA boat flight on Atlantic, Lisbon to New York, December 21-23, 1945. To WAA, Universal, American International. Scrapped for parts 1947.

2,3&4. Airplane No. 12 C/N 2086. NC18612. First flight July 28. 1941, but not delivered until January 20, 1942. Christened CAPETOWN CLIPPER. Quoted delivery date in conflict with other records showing U.S. Army acquisition as C-98 42-88622 on September 22, 1941. Transferred to Navy as 99081. To WAA, Universal, American International. Renamed BERMUDA SKY QUEEN, the last Boeing 314 built was forced down in the Atlantic short of fuel in October, 1947, and was sunk when it could not be salvaged.







SPECIFICATIONS AND PERFORMANCE
BOEING A-314
89 Place Cabin Monoplane Flying Boat
licensed under approved type certificate A-704, May 2, 1941

Wing span	152 ft.
Length overall	106 ft.
Height overall	27 ft. 7 in.
Wing area	2867 sq. ft.
Hull Beam	12 ft. 6 in.
Hull Depth	19 ft.

Powerplant — 4X Wright "Cyclone 14" 579-C14-AC1. 1600 h.p. @ 2400 r.p.m. for takeoff (two minutes). Maximum except takeoff: 1350 h.p. @ 2300 r.p.m. Normal 1200 h.p. 2100 r.p.m. @ 6200 ft.

Propeller — Three blade Hamilton standard full feathering constant speed 14 ft. 9 in. diameter.

Empty weight	49, 641 lbs.
Gross weight	84,000 lbs. (87,000 wartime)
Wing loading	29.3 lbs. 1 sq. ft.
Power loading	13.1 lbs. 1 h.p.

Cargo compartments — Two 164 cu. ft. in wings Two 67 cu. ft. amidship. Two 87 cu. ft. amidship. Total 1036 cubic feet.

Fuel capacity — 2 wing tanks 600 gal. ea. 2 inboard hydrostabilizer tanks 960 gal. ea. 2 outboard hydrostabilizer tanks 1164 gal. ea. Total 5448 gallons 100 octane fuel.

Oil capacity — 2 outboard nacelle tanks 50 gal. ea. 2 inboard nacelle tanks 53 gal ea. Total 206 gallons.

Top speed (level flight)	199 m.p.h. @ 84,000 lbs.
Cruising speed	184 m.p.h. @ 84,000 lbs. @ 2000 ft.
Landing speed	70 m.p.h.
"Red line" speed (glide or dive)	212 m.p.h.
Maximum flap speed (40° or less)	121 m.p.h.
Maximum flap speed (over 40°)	105 m.p.h.
Service ceiling	19,600 ft. @ 80,000 lbs.
Initial rate of climb	930 ft. 1 min.
Range	5,200 statute miles