

NEW GIANTS *for the* AIR LINES

IMAGINE a rubber tire as high as an automobile and so heavy that three men can hardly lift it. Tires that size are being tested today for the giant four-engined passenger transports to be launched this spring. Each tire weighs 360 pounds, exclusive of the forty-five-pound tube. A pair costs nearly as much as a new car.

The size of the tires alone will help give you an idea of how large these new planes are going to be. The four engines will develop nearly twice the power of the average passenger locomotive and each plane will carry up to forty people in ad-

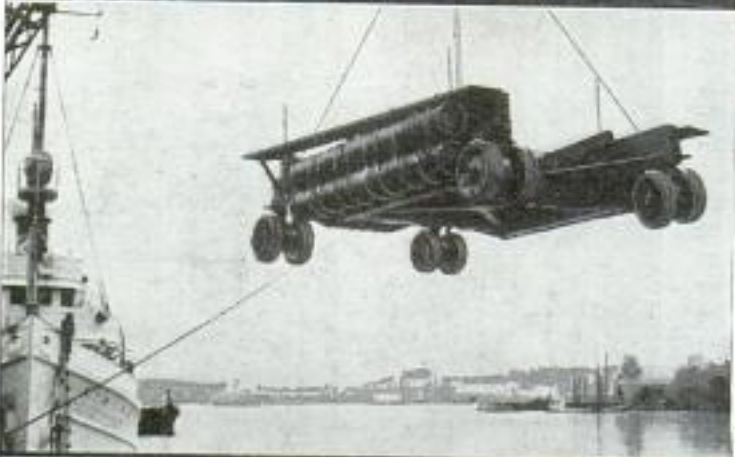
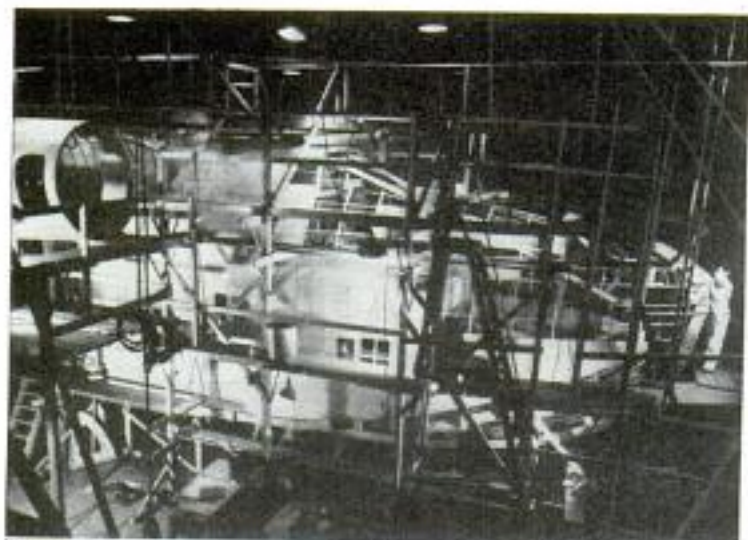


Top, pilots and engineers studying mock-up of cockpit instruments and controls of the giant four-engined transport. Bottom, part of ladies' dressing room on planes being built for TWA



dition to almost two tons of mail and express, which alone is more than the entire payload of most transport planes now in service.

"Nineteen thirty-eight will mark the beginning of the four-engined era in overland air travel," says C. L. Egtvedt, president of the Boeing Aircraft company. "The Model 307 land passenger transports under construction for TWA and Pan American have been preceded by the 'flying fortress' type of bomber adopted by the army air corps. Many of the lessons and engineering principles learned in developing



the big fighting planes are being incorporated in the new passenger transports."

Boeing is building eight of the super-transports and Douglas is at work on the first of a similar series. The Douglas will be the first large transport to have level landing characteristics, a nose wheel permitting the plane to land level with the ground so that sleeping passengers will not be disturbed at each landing. At the same time, Boeing is building half a dozen tremendous flying boats far larger than the land planes. These will be veritable ocean liners of the sky.

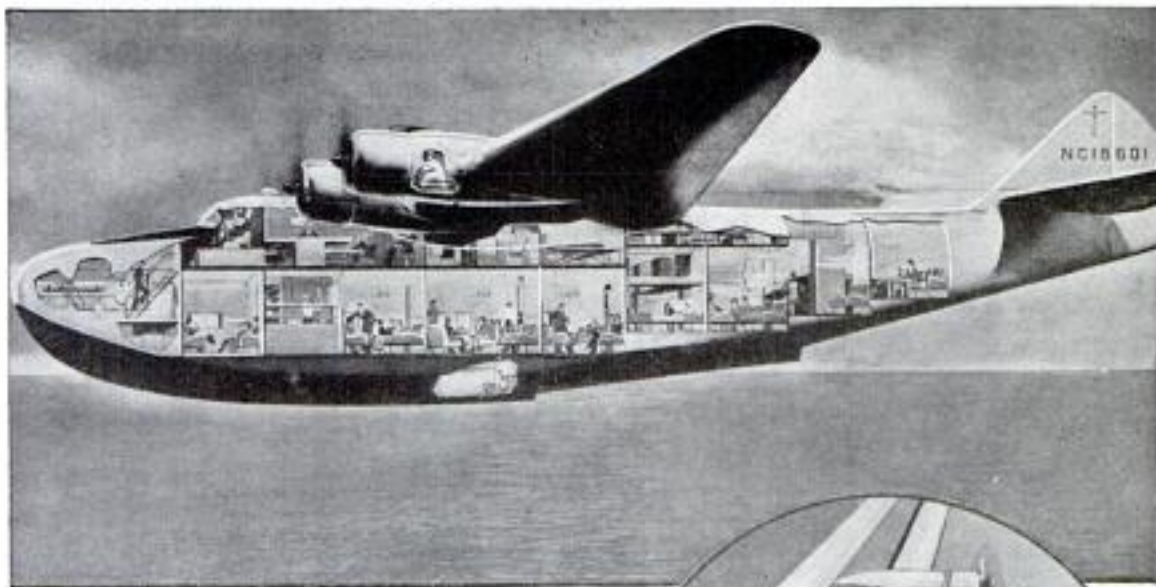
At the Boeing factory in Seattle, where work on everything except four-motored airplanes has been discontinued, mechanics are swarming around huge hulls and are assembling gigantic wings that stretch from wall to wall. In other parts of the factory you find wood, metal, and cloth "mock-ups," full-scale facsimiles of the finished airplanes. One huge mock-up shows exactly what the exterior appearance of the new

land transport will be. Another, looking like an unfinished motion-picture set on the outside, contains the complete cockpit and chart room of the new flying boat. A third represents a typical passenger compartment of the new land transport. Engineers, pilots, and department of commerce inspectors spend day after day in each of these structures, sitting in the seats, reaching for the controls, studying visibility, and suggesting minor changes.

The new overland passenger transports, which probably will go into service late in the summer, are to be all-metal low-wing monoplanes equipped with retractable landing gear and tail



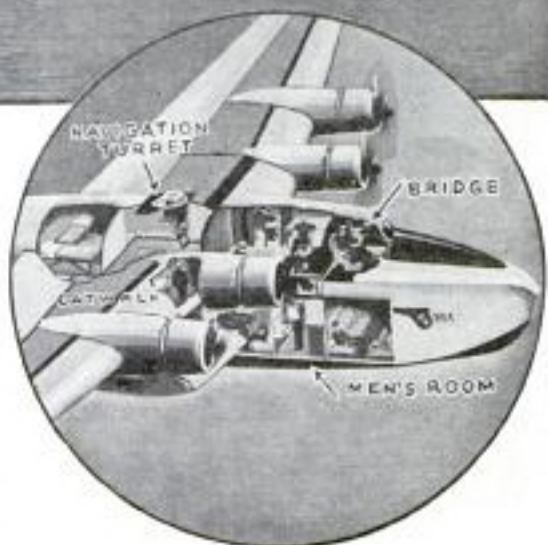
Top, scaffolding allows craftsmen to work on hull at five levels. Center, Clipper's launching gear. Bottom, 600-gallon wing tank



wheels. Perfect streamlining of the fuselage will give the planes the appearance of Zeppelins equipped with wings. Each plane will have a gross weight of 42,000 pounds, a wing span of 107 feet, a length of seventy-four feet, and will stand seventeen feet high. They will be powered with four 1,100-horsepower G-100 Wright Cyclones delivering a total of 4,400 horsepower.

In addition to a crew of four or five the transports will have accommodations for thirty-three passengers, or the interiors may be rearranged to carry twenty-five passengers on night flights, with sixteen passengers in sleeping berths and the others resting on reclining chairs. Behind the enlarged cockpit and auxiliary control room is a passenger baggage compartment accessible in flight, and beneath the floor are large cargo compartments. A men's washroom is provided forward of the main passenger cabin, with a ladies' room and galley at the rear.

At first appearance the cockpit of one of the new planes seems more complicated than ever before, but the instrument panels are arranged so that the pilot may control his plane with maximum ease. A compact group of flight instruments in front of the chief pilot's controls is duplicated by a similar set in front of the co-pilot. Between these two instrument groups is the automatic pilot panel with dials indicating the angle of the plane to the horizon and its



Two sketches showing various details of the clipper ship. Circle, note catwalk permitting servicing of engines in flight and the turret in which navigator may make observations

direction of flight. Between the two pilot seats is a pedestal on which are mounted fuel and other engine controls and the controls that govern the automatic pilot.

The pilot may operate all four engines, either pair in the port or starboard bank, or any one engine individually, by means of hand controls. Overhead, above the cockpit's forward windows, are the ignition switches, light switches, and dials that show the position of the landing flaps and wheels. The radio operator will sit behind the chief pilot on the left side of the cockpit, reaching across to his instruments behind the co-pilot.

These great airplanes are to be the first to be provided with sealed cabins for sub-



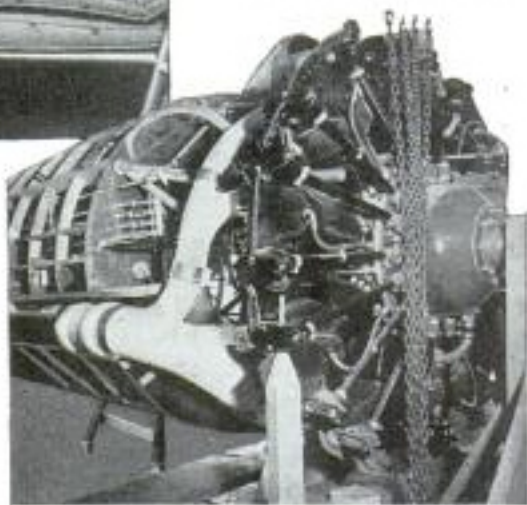
stratosphere operation. Transports today have a passenger comfort ceiling of less than 14,000 feet. That confines them to altitudes containing rough air and dangerous mountain peaks. The new Boeings will be able to fly at 20,000 feet, far above rough air and the highest mountain peaks in continental United States, with the passengers enjoying the same comfortable air pressure that they would at altitudes of 8,000 to 10,000 feet. Two of the new planes will be equipped for this type of operation at the outset while the balance are being built so that the auxiliary pressure equipment can be installed at any time.

All passenger and crew compartments inside the planes are being sealed through the use of a pressure-tight skin, reinforced windows, and pressure doors. The sealed plane can withstand a design pressure of six pounds to the square inch, although an operating pressure of only two and a half pounds to the square inch between inside and outside pressures is all that will be required. Two newly developed mechanical superchargers, each operating on a fraction of the horsepower of one engine, will draw air in through intake valves far out along the leading edges of the wings to build up air pressure inside the cabin. Ducts will distribute the air uniformly throughout the cabin and the air will be drawn off into an anti-pressure chamber at the rear containing exhaust valves. In upper level operation cruising speeds up

to 250 miles per hour will be possible because of the extremely low outside air pressure.

Since building its first four-engined bomber in 1935 Boeing has turned out nearly a score of these flying fortresses. Having slimmer fuselages than the coming transports, these great fighting planes can fly even faster than the passenger transports will.

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Top, passenger compartment, as seen from center aisle. Center, one of the giant engines installed in a wood and metal mock-up of nacelle. Bottom, engineer checking size of berth compartment



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With partial load they are able to cruise and maintain altitude on only two of their four engines. Nine men, including crews for manning five different machine-gun nests are required to operate the plane and its equipment. Each bomber can carry several tons of bombs.

Late in 1937 Boeing tested out its latest secret development, a thirty-ton big brother of the flying fortress, having a wing spread of 150 feet. This super-bomber contains heated living and sleeping quarters for the crew, a galley, and even two auxiliary gasoline engines inside the fuselage for driving 110-volt alternating-current generators that supply current over the more than seven miles of wiring which the plane contains. This plane, instead of ordinary landing gear, has double truck landing gear consisting of four huge tires as well as the usual tail wheel.

Huge as it is, not even this latest plane compares with the six "clipper" flying boats that Boeing is building for Pan American. These ocean-flying giants will weigh forty-one tons. Each boat will be powered with four 1,500-horsepower twin-row radial engines that so far have been used only in secret military operations. They will be able to carry seventy-two passengers in daylight flights, or provide berths for forty passengers. Two and a half tons of air mail and freight will form part of the cargo and with full load each boat will have a cruising radius of 5,000 miles. The engines will consume one gallon of fuel per mile and fifteen tons of gasoline will be carried in the wings and the small hydro-stabilizer stubs that help to balance the boat in the water.

These flying boats are so large that they are being constructed just like regular steamships. Engine nacelles stand thirty-five feet above the factory floor and the hull is surrounded by a half mile of construction platforms, on which workmen assemble the boat while working on five different levels. Three and a half carloads of lumber were required for scaffolding and jigs. The wing of one of these monsters is 152 feet long. The airfoil tail surface is forty-eight feet long, large enough to be used as the wing for a ten-passenger

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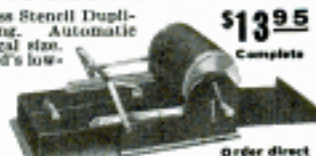
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(Continued from page 160A)

plane. More steel than ever before is being used in the structural parts. When completed each of the boats will be launched down ways into the water from the Seattle factory.

The hull will contain two complete decks, with passenger accommodations on the lower deck and operating quarters, crews quarters, and cargo compartments on the upper deck. To reduce glare the two-man cockpit bridge is painted dull black inside, as are the reflecting surfaces of the two inboard engine nacelles. Sun visors similar to those used on automobiles swing down from overhead in the cockpit. Behind the cockpit is a navigating and chart room as large as an ordinary kitchen, containing a large chart table, the radio operator and his equipment, the flight engineer and his control and instrument panels, and the captain's office. A door beside the engineer's desk leads out into the wings so that the engines can be serviced in flight. There is plenty of space inside the engine room behind each engine for a mechanic to stand comfortably. A navigation turret in the roof of the compartment behind the chart room will enable the navigator to make observations during flight. The cargo hold is located in and below the center section of the wing, with crews' quarters and baggage compartments farther toward the stern.

On the lower deck, reached by a spiral staircase, are various passenger compartments, a full-sized galley, a special dining lounge, and a de luxe "bridal suite" apartment at the stern. The bow of the boat is taken up by an anchor and gear room in which lines, anchors and sea anchors, and other gear are carried.

Passengers will have hot and cold running water at their disposal and will use dressing rooms just as large and comfortable as those on sleeping cars. Furniture is made of light duralumin metal and cabin walls are covered with removable tapestries especially selected for their sound-deadening qualities.

The first boat of this fleet is to be test flown early in 1938. It is the largest airplane ever built in the United States and is one and a half times the size of the present China Clippers. Pan American may use them either on the Atlantic or the Pacific or both.

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