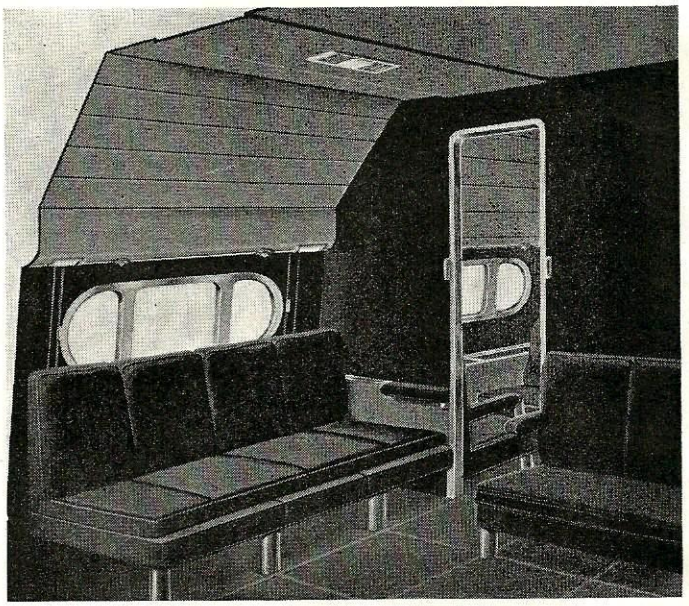
VOUGHT-SIKORSKY VS-44 LONG-RANGE FLYING BOAT



Artist's drawing of proposed arrangement of one of the passenger compartments in the VS-44 Flying Boat built for the American Export Airlines service

● Newest in a long and successful series of long-range Sikorsky flying boats, the VS-44 was shown publicly last month for the first time at Stratford, Conn., by officials of the Vought-Sikorsky Aircraft Division of United Aircraft Corp., and American Export Airlines for which it has been developed.

To be used in the airline company's CAB-certificated transatlantic service between New York and Lisbon, the first of three flying boats of this design is rapidly nearing the water testing stage and probably will be flown this month if weather and other conditions permit. The other two aircraft are in various stages of construction, with indications being that all three will be delivered to American Export within the next few months.

Combining long range, reasonably high speed and heavy load-carrying ability, the VS-44 incorporates many novel design and construction features combined with extensive attention to details aimed at passenger comfort.

Hull is of aluminum alloy semi-monocoque two-deck construction having a flush riveted bottom and standard brazier head rivets elsewhere. Six watertight bulkheads enable the isolation of any one of the 12 compartments, with hinged sections of the floor comprising the watertight doors for the bulkheads. Should the bottom strike a floating object to flood a compartment, the water would rise approximately halfway up the cabin. For this reason, the flood doors extend only a short distance above this flood water line, and it is thus impossible for personnel to be isolated in a partially flooded compartment. The hull is so designed that any two compartments can be so flooded and the ship remain on a reasonably level keel.

Besides the main entrance door, the hull has six openings—a mooring hatch in the bow, a bow cargo hatch, two pilot hatches, a wing hatch just aft of the rear spar, and a stern cargo hatch in the extreme rear end of the hull.

The forward end of the hull houses the crew, and includes separate sleeping accommodations for five crew members, the galley, mooring equipment, baggage storage space, and two men's rooms. The center portion is for passenger accommodations while the stern portion includes a ladies' powder room, baggage storage, and accommodations for a stewardess. An interphone system permits the pilot to communicate with a member of the crew, whether he is at the bow, at the mooring hatch, or at the stern of the hull.

Passenger accommodations include individual seats 40″ wide and having adjustable cushions; full view windows, individual reading lights, a complete heating and ventilating system, and a lounge. Seats are quickly convertible into comfortable beds, the upper berths having windows and reading lights. Men's lavatories and ladies' powder room are equipped with hot and cold water and complete toilet facilities. Accommodations are provided for 40 passengers in daytime operations or 16 passengers at night during the transoceanic hop.

Heating and ventilating systems are built to maintain a temperature of 68° F with the outside temperature 20° below zero. The source of heat is a "stove" built about the exhaust stacks of the two inboard engines. Temperature is thermostatically controlled. An automatic air sampling system protects personnel from carbon monoxide by closing the hot air ducts and opening the cold air ducts. In addition, a visual system at the flight engineer's station warns of the presence of carbon monoxide.

An air scavenger system, with ducts opening into each compartment, is built into the ceiling. There is also a separate cold air system with individual valves controlled by the passenger.

Windows are exceptionally large, and there are two of even larger size in the forward compartment, one on each side, which can be pushed out and used as a

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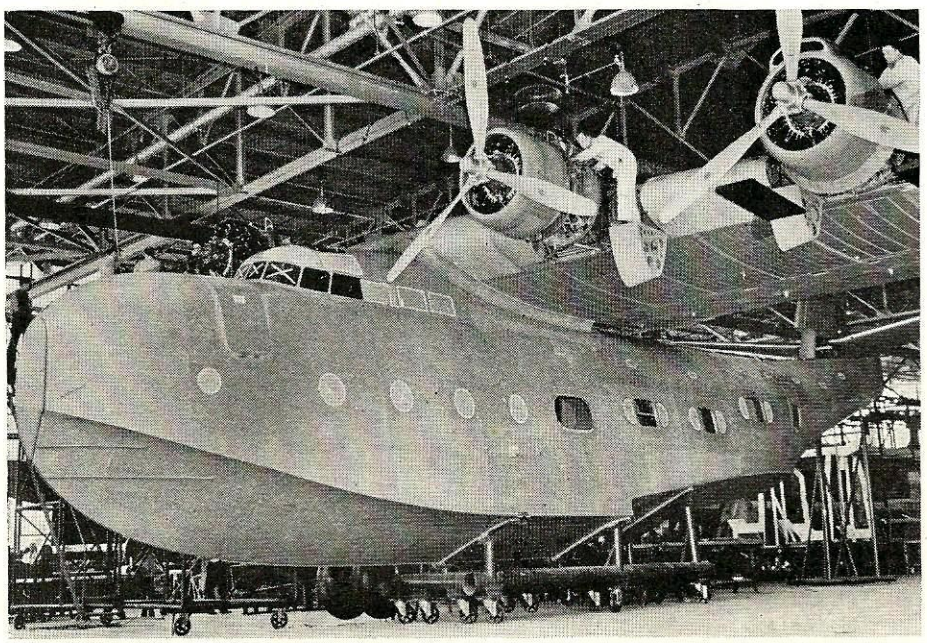
One of the three VS-44 Flying Boats for American Export Airlines nears completion



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means of escape in an emergency.

A complete galley is located just below the flight deck where full course hot meals may be prepared in flight. Included in the equipment is a 7½ cu ft refrigerator, a sink with hot and cold water, an electric stove with two hot plates and an oven, and ample storage for dishes, pots and pans, and food.

The flight deck houses the pilot and co-pilot, navigator, radio operator, and flight engineer. An auxiliary power plant generating electricity for the many electrically operated units in the airplane is located directly aft of the radio operator on the starboard side opposite the flight engineer.

Radio apparatus, designed by American Export Airlines' engineers, includes code and radio telephone equipment, plus an emergency code set.

Wing and Tail Construction

The wing is a full cantilever type consisting of three sections—the center section and two outboard panels.

The center section is a two-spar design having trussed ribs and metal covering from the leading edge to the rear spar, and three integrally built fuel tanks carrying approximately 4000 gal of fuel. There is space between the center tank and the outboard tanks for baggage, mail, or additional fuel tanks. Two flares are housed in the center section and the four engine nacelles are faired into its leading edge. The trailing edge, flaps and ailerons are covered with fireproofed fabric.

Structurally, outer panels are essentially of the same type as the center section from which they are readily detachable by the removal of four hinge pins. Deicer boots cover the entire leading edge of the wing, fin and stabilizer.

Tail surfaces are full cantilever construction, structurally similar to the wing. The fin and elevator are metal-covered, the rudder and elevators fabric covered.

Power Plant

Power is supplied by four Pratt & Whitney *Twin Wasp* engines, developing a total of 4800 hp for take-off. The engines are equipped with 3-bladed Hamilton Standard Hydromatic quick-feathering propeller with blades of the new laminar-flow section.

Nacelles are divided into three compartments by two stainless steel firewalls. The forward compartment houses the engine cylinders, the center compartment contains the carburetor, magnetos, fuel pump, generator, and other accessories, and the oil tank is in the after compartment.

The engines are shock-mounted in rubber. Quick-disconnect electrical plugs and pin-jointed steel tube engine mounts enable four mechanics to change an entire engine assembly in four hours. The engine fire-control system is of the latest type incorporating a system of warning lights which informs the flight engineer of the location of a fire and enables him to direct the extinguishing CO_2 to the spot through 22 outlets in each nacelle.

The engine exhaust system incorporates the ball and socket universal joint at each cylinder exhaust stack which permits the servicing of this part of the engine without complete disassembly.

The fuel system is so designed that fuel can be directed from any one of three tanks to the engines. Water which may have collected in the tanks can be drained in flight, and fuel strainers can be cleaned in flight. In the event of failure of an engine-driven fuel pump, two electrically-driven pumps are available. Provision for dumping fuel if necessary includes a scavenging system to clean out the dumping line of all traces of fuel.

Specifications show a wing span of 124 ft, an overall length of about 80 ft, and a normal gross weight of 57,500 lb. Maximum design speed is 235 mph; cruising speed with full load in long distance flights will be 175 mph. Maximum non-stop range, under special fuel and load conditions, is expected to exceed 6000 miles, but carrying 40 passengers by day it has a range of 3000 miles at 200 mph cruising.

TUNNEL MODEL MOTORS

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brought to speed. However, since an adjustable-frequency supply is used, the proper procedure is to reduce the frequency to the lowest convenient value, and connect the motor directly to the line. After the motor has accelerated to the minimum or normal operating slip, the frequency may be increased to the desired operating speed, without raising the rotor losses above the normal operating value.

Since the wind-tunnel models are usually supported on sensitive scales, from which the characteristics of the plane are determined, consideration must therefore be given to the motor leads. Care is to be exercised to see that only flexible cable is used, and that its size is held to the minimum possible value, in order to prevent faulty scale readings. A satisfactory practice is to use properly insulated braided cable, with a sufficient number of lengths in parallel to carry the current required. Also the bearings on these high-speed motors require careful attention. It should be remembered that too much oil in a high-speed bearing is as harmful as not enough, and perhaps more such bearings have been damaged or destroyed because of an over-abundance of lubricant than have been damaged through lack of it.

The above is based on an article appearing in the *General Electric Review*.

NAVIGATION TRAINING

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tire flight in order to maintain his schedule at all check points.

(4)—The student's ability to read land marks; this also is obviously important, and again is something that only can be acquired by experience. In his ground school work, the student has probably been trained in detail map work and types of problems in which the various land mark symbols on the map must be picked out. Since land marks as they are shown on a map differ from their appearance on the ground, it is only through associating the symbols with the land marks that the student can pick out the points he is looking for. Ability to identify these land marks must be developed by the student himself, and he should be instructed to make the most of his flying time in practicing such identification.

Group Training

The above are primarily the points which flight instructors should impress upon their students. In giving the cross-country navigation training it should be emphasized that the flight instructor should not put the student under the mental stress of his regular flight training. Should a student err in his navigation, or perhaps, because of concentrating his attention on his navigation, his flying work is not exactly what it should be, the instructor should not resort to close criticism. It will be found that a careful review of the errors made, on the ground after the flight, will do more good than getting the student unduly nervous in the air.

One suggested method, in the training of small groups of pilots as navigators, is to make available a 5- or 6-place airplane. Under these conditions, the students may give their full attention to their navigation work, and not worry about the duties of pilot. They can usually find and correct their mistakes while still in the air, usually on the same problems, thus getting greater benefit out of their own errors than they would from some one else's corrections on the ground after the flight.

It should be remembered that a student being trained for cross-country navigation should be given time to develop by easy stages. A flight instructor would never think of just telling a student "how" to fly and then solo him; he would prepare him gradually and methodically. So it is with cross-country flight training. Organized application of a standard method should be used, always coordinating with the ground instruction, so that during each flight the student may apply some point previously learned in class.