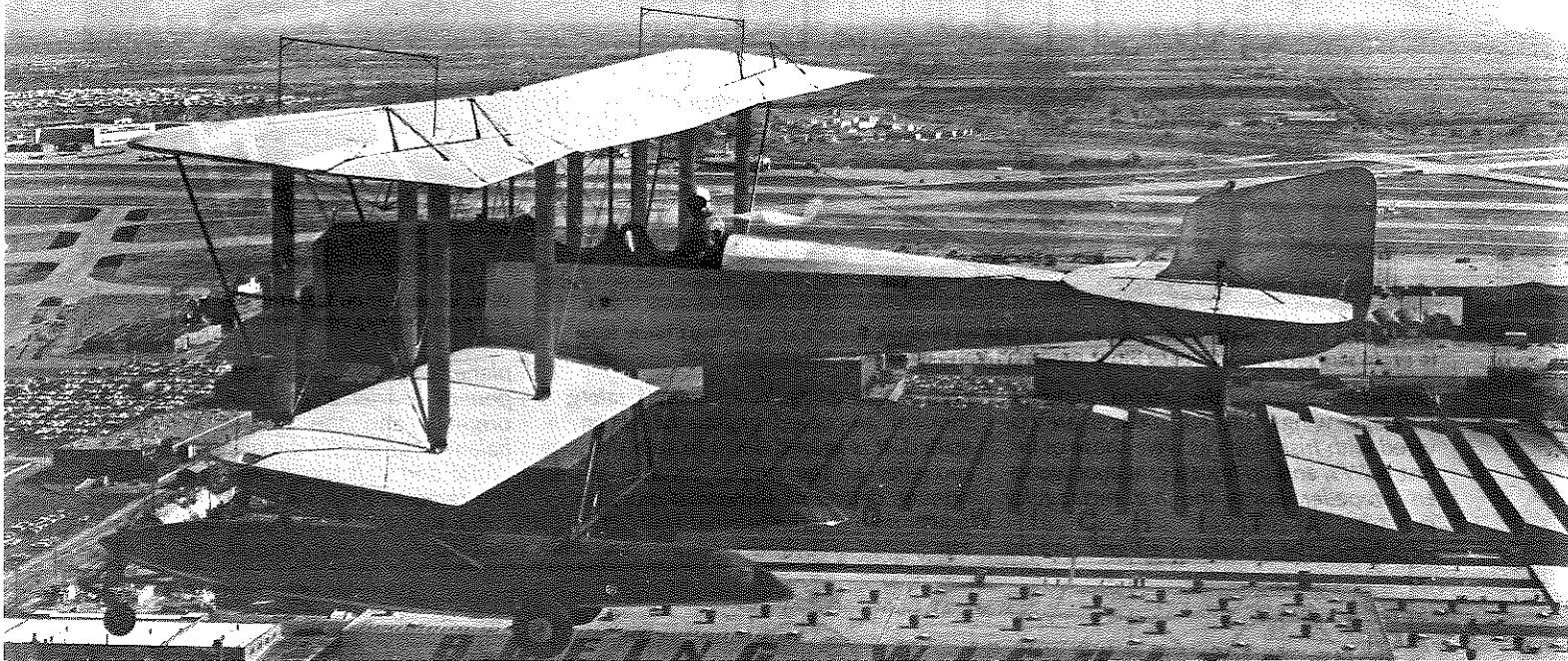


# B & W - 1



By JOHNNY LITCHENBERG . . . Between doing sketches of his favorite little cartoon character, "Mr. L.", our author/designer has found time to complete this replica of aviation history . . . the first Boeing aircraft.

• It was 1914, when a round-faced young naval officer by the name of George Conrad Westervelt met up with a young businessman named William E. Boeing. Westervelt was assigned by the Navy to oversee ship construction at the Seattle Construction and Drydock Company, when he met Boeing. Boeing was interested in building an airplane, so, Lieutenant Westervelt designed it for his Seattle friend. The plane was called the B&W (for Boeing and Westervelt) and not only was it the first Boeing plane, it was also the first airplane Westervelt had ever designed! Two B&W's were built, the genealogical forebears of all Boeing aircraft. The airplane finally flew in 1916.

Fifty years later, in 1966, The News Bureau of the Boeing Company, Seattle, Washington, released the following news release.

**"A FLYING MACHINE FOR A GOLDEN ANNIVERSARY.** The Boeing Company has

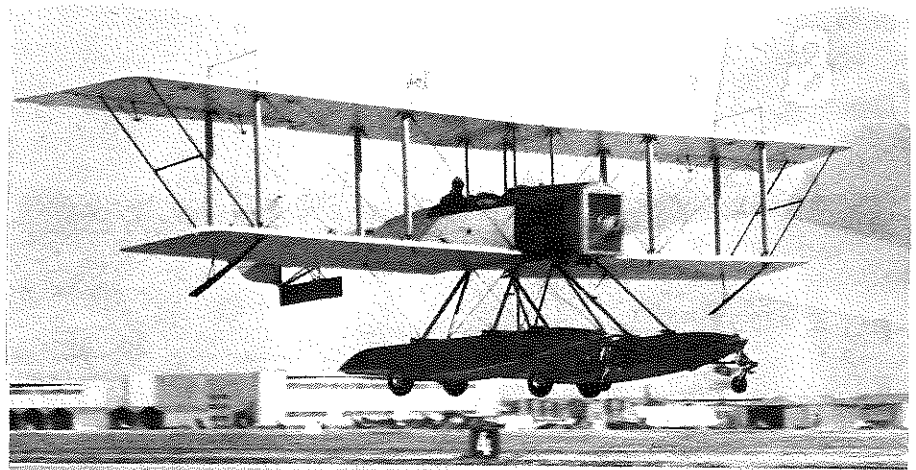
standards, of the original Boeing airplane which first flew in 1916. Two were made then, and sold, but the new one isn't for sale. It was built to commemorate the 50 years of progress which has seen Boeing grow from 21 men working in an old boat-house on Lake Union in Seattle, Washington, to the world's largest aerospace firm.

"And it flies. Oh, man, does it fly! The Federal Aviation Agency attests the fact . . . they've licensed it for experimental-exhibition use, within glide range of water. The first two were not FAA certified because there wasn't any FAA then.

"On Boeing's 50th birthday, July 15,

1966 the fabric-covered B&W will soar over Seattle to open a year-long observance of the anniversary, piloted by Clayton Scott, long-time Boeing chief of production flight test. Scott, who recently retired from the company, also built the plane in his jobmaster hangar at Renton Municipal Airport, in the shadow of the vast plant which turns out Boeing jetliners.

"The job wasn't easy. Original detail drawings of the B&W vanished into limbo. There was a three-view drawing, but the three-views did not agree exactly with each other. There were also faded



The replica B&W-1 on a landing approach at Boeing-Wichita. Plane has to be kept fairly level to avoid scraping rear of floats. Slow, nose-high touchdown is not recommended!

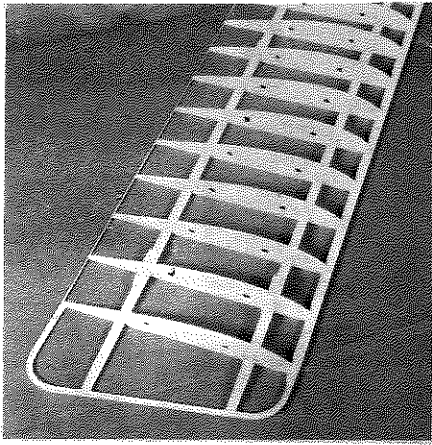
## THE WING

Choose your wood with care! . . . but that? . . . ells the

Having cut the ribs, make the template which lines up with the leading edge of the ribs, and locates the spar notches so they can be cut accurately and in the right position (the leading edge and the spars are all parallel to each other). Also cut the notches for the aileron spars at the same time. Build the wings on the plan in the

Speed-top: 70 mph  
Cruise: 67 miles an hour  
Range: 120 miles

"It's a flying replica, built to modern



Wing construction features use of aluminum weld rod trailing edge, described in text.

pictures of the originals, and a group of Boeing engineers pitched in and designed a plane which duplicated the externals of the prototypes. For added safety, they specified welded steel tubing for the frame, but the wings are sparred and ribbed in spruce obtained from the same firm which supplied the original material. Fuselage, wings, and tail surfaces are covered with Irish linen as were those of the first B&W's, and up front a nine-foot wooden propeller fronts the big rectangular radiator.

"Actually, the radiator is all grill and no core because, again for added safety, a modern air-cooled engine has been installed. It is geared down to spin the long propeller at the proper revolutions-per-minute, delivering somewhat more horsepower than did the original Hall-Scott 125 Hp in-line six-cylinder engine. The new plane, with its steel frame, is about 400 pounds heavier at gross weight than the original, and the weight and power balance out nicely: the plane's top speed, cruise and stall speed are almost exactly the same as those of the 1916 originals.

"All trace of the two original B&W's was lost after they were retired, still in flying condition, in New Zealand many years ago. Duplicate instruments for the two cockpits were not available, so one Boeing engineer took the problem to his home workshop and duplicated them as mockups, working from photographs. For

flight purposes, modern flight instruments are recessed into the pilot's instrument panel and covered when the plane is on static display.

"There's a self-starter on the new model, too. In the originals, if the engine stalled on the water, the man in the front cockpit had to crouch down and swing a ring of tubing, clutch-coupled to the crankshaft. They must have been miniature giants in 1916!

"Back in 1916, Herb Munter, one of the original pilots, said of the B&W that it was a 'general overcast of a flying machine.' Scott says that he may not understand precisely what Munter meant, but he agrees with him. 'It flies like a 1916 airplane,' Scott says. 'It handles well. I had it up to 5,000 feet... took half an hour to climb there, but it made it without trouble.'

"The new B&W was rolled out on May 23, 1966. Its christening sponsor was Mrs. William M. Allen, wife of Boeing's president. Two days later it took off from Lake Washington to start its certification trials, its gleaming mahogany pontoons sending up clouds of spray."

This release from Boeing was dated July 5, 1966. Immediately after the flights around the Seattle, Washington area, the B&W was shipped to Wichita, Kansas, where it was fitted with a set of dual wheels in the center section of the pontoons and a small swivel wheel in front of each pontoon. This innovation allowed the replica to now be flown inland away from the vicinity of water as originally required by the FAA.

Late in 1966, Harold Showalter, Boeing Wichita test pilot, lifted off the runway to the delight of thousands of employees and made flight after flight around the Wichita area to complete the 50th anniversary celebration for the Boeing Company all over the world. Photographer Thomas F. Cusick, chief photographer for the Boeing Wichita Div., flew along with him on many of the flights in a chase plane and made the striking shots shown herein.

I was working for the Boeing Company at the time all this happened and was very honored to have been involved in many of the activities surrounding the flying of the replica B&W. Now it's even more fun to bring the B&W out of limbo to the modeling fraternity.

The model, like the replica, has been slightly changed to allow the use of material commonly available to modelers. One major change in the airframe is to the vertical fin. As shown in the photos of the original, the vertical fin was very tiny and contributed to the tendency to instability in lateral control and a pronounced "dutch roll." The model showed this same characteristic until the fin was enlarged. (I can hear the scale nuts now. "Leave it the original size so it'll have exact scale flight characteristics!" wcn) All other outline dimensions are still accurate as taken from the original three-view drawing mentioned in the News release.

Building this model is a real joy. As each item is completed the nostalgia builds equally. I started with the fuselage, mostly because most authors state that they start the wings first. I like to build fuselages, so that's where we'll start now.

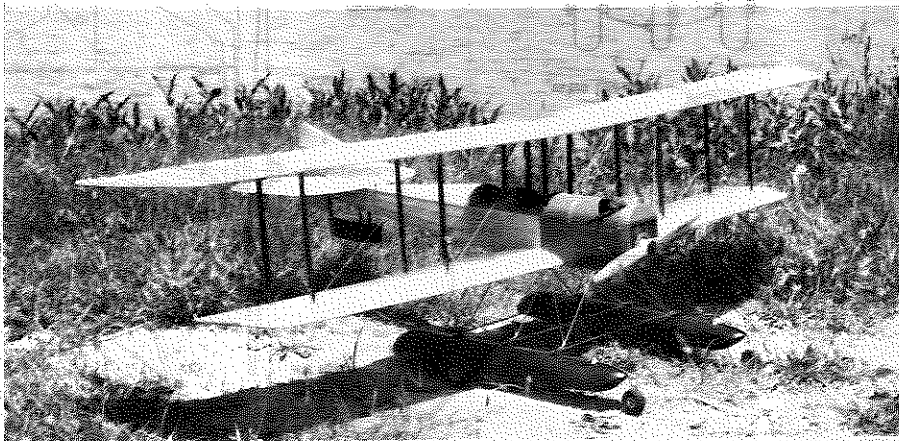
### CONSTRUCTION

This model is a little more complex than the sheet balsa construction modelers are currently familiar with, so take the time now to completely familiarize yourself with the drawings and the design. Not only does the fuselage have a few surprises to snare you, but the wings are really unique on the tips.

OK, start the fuselage by cutting out the three front bulkheads and the motor mount beams. Then assemble them over the plans with the bulkheads perfectly square with the building board. Next start the fuselage sides by picking out four of the very best, and matching 1/4 sq. spruce strips for the longerons. Soak the front 8 inches of the two bottom strips and, with small brads on each side, form them to the contour of the bottom of the fuselage, when they are securely held in place, dry thoroughly with a heat gun or hair dryer. Build the right side complete, notice the difference in thickness of the longeron and the 1/8 ply front section, so be sure to position the ply panel to be flush with the outside of the fuselage. After the right side is completed and exactly the way you want, place a sheet of saran or other mylar material over it, so when you build the left side over the right they won't stick together. While the sides are drying, you can be cutting out other parts of the aircraft.

Now join the sides to the motor mount unit by blocking up the sides to be perfectly square and the tail posts meet exactly in the center. Next add the cross braces so the fuselage is straight and matches the top view of the plans. Add the turtle deck bulkheads, then the aft stringers, and extra pieces of 3/16 ply for the landing gear attachment; fit the center struts to comply with the drawing. Be sure to keep the down thrust and the wing incidences exactly as shown on the drawing for the best takeoff and landing setup for wheel use. If you are going to use the aircraft exclusively for water flying, you may have to increase the wing incidence a little.

Cover the cowls and underside of the nose with the material indicated, and build the radio compartment hatch. Now



The model is a close reproduction of the flying replica of Boeing's first aircraft. It may be flown from land or water. Rudder was enlarged to improve stability.

is the time to arrange the installation of the basic on-board radio and electronic equipment, such as servo mount and push rod braces and holes through bulkheads, etc. Fit and install motor, fuel tank, and related accessories. DO NOT install the top of the fuselage yet.

I completely water seal the hatches and other openings into the fuselage by using foam strips and very thin rubber sheet around the push rods. These rubber sheets around the push rod openings don't stop the water completely, but the wiping action is sufficient to stop most of the water from getting to the radio compartment. At this time I built the horizontal stabilizer and elevator, complete with hinges and hardware.

#### NOW FOR THE TAIL FEATHERS

I hope when you cut out all of the parts to make a "kit" you didn't forget the tail parts! OK, OK, so you didn't. Shape the leading and trailing edges per the plans and sand everything very well. When the surfaces are good and smooth, coat all the parts with a good coat of Balsarite. This is a product marketed by the Coverite Co. and, in my estimation, is indispensable in the process of model airplane building. Set the fuselage up in the upright position similar to how you set it up to join the ends. Then temporarily pin the horizontal stab in position and by trimming, align the stab and vertical fin. Now you can complete the routing of all push rods, complete everything in the aft part of the fuselage, and install the top. Remove the tail parts and complete the fuselage by fitting all switches, plugs, and hatches, then do the shaping, sanding and priming.

Next, permanently mount the horizontal stabilizer to the fuselage as a guide to align all the rest of the flying surfaces and float structure and struts. This does make covering a little more complicated, but with the old timer aircraft like, this a few wrinkles here and there look pretty darn good. Complete the rudder assembly and join it to the fuselage. If you are going to rig your model with flying wires and bracing, fit the tail assembly with these points now for rigging after covering.

#### BUILDING THE WINGS

Get out the plans for the wings, and, like I suggested for the fuselage, get acquainted with the construction before starting. Notice that the tip ribs are all of the same height, but get longer closer to the tip. This design is prone to tip stalling and a few nasty snap rolls on takeoff, so be sure to rig in some wash-out later on. Another small innovation in wing building that I use, is the construction of the trailing edge. I like my aircraft to look a little like the real thing, so I started using the wire trailing edge method quite a few years ago and have been very satisfied. It is quite as strong as the tapered trailing edge balsa system we have all used so long, and is certainly a lot easier to build.

Start by cutting out all of the ribs and parts to size. . . make a wing kit of parts. Next lay the front and rear spars on the plans and glue on all ribs. Decide on the type of wing tips you want, form or build

them, and install on the wing. Fit the 5/16 dowel leading edge in place and hit each rib with a spot of CA on all ribs and spars. Next carefully cut the 1/16 aluminum welding wire (this wire can be purchased from your local welding shop in 36-inch lengths, and if you tell the welding shop clerk what you are going to use them for he will help pick out all those that are straight and clean). I use this wire for many things in modeling, so you won't be wasting any money if you buy a pound at a time. Align the wire on the trailing edge of the ribs with shims, pins, or anything that will do the job, then, when everything is lined up, go over each rib and wire contact with thick CA until a very smooth fillet of glue is applied. This will be more than strong enough for the job, and after the covering is in place, the structure will be as strong as can be and look terrific.

After all wing panels are completed, build the top center section, then align and fit the wing rods and tubes in place. Set the fuselage upside down so the main longerons are parallel to the work surface, then fit the bottom wing with rods and tubes to the fuselage. The front tube is mounted above the longeron and the aft tube is below. Adjust these tubes with spacers until the bottom wing assembly is at precisely the correct incidence. Now place the fuselage in an upright position and attach the top wing center section to the cabane struts. Again use every method possible to align the incidence with the drawing specs. Fit the upper wing outer panels and temporarily assemble all struts and rigging wires. After the main airframe is completed ready for covering, install all radio, and control equipment. Be sure to waterproof the switches and charging jacks. Now fit and install the engine and fuel system (a pressurized fuel tank is advisable to keep water from being sucked into the fuel tank vent).

#### CONSTRUCTION OF THE FLOATS

The floats are a delight to build, but there are two different versions and you will have to be the judge on which type you will need. Let's back up and talk about the model of the B&W a little more. As I stated at the beginning, this is a stand-off or sport scale version of the replica airplane, so the floats have been changed considerably to support the model design requirements. I doubt the original scale dimensions would be sufficient for the model version to even float, let alone keep the frame in takeoff attitude. Next, the most important decision you must make is the method of construction. The plans show a "boiler plate" design that will take quite a beating on the landings, but is heavy as the very devil. You can leave out the main ply spine and reduce the thickness of all components and cut the weight almost in half. If you are a good pilot, the lighter version will be more than enough for a lot of ground landings. The wheel arrangement has worked well for the type of flying I've done with my B&W; I merely have to be a little careful in lining up the ship with the wind when I set up for

takeoff. Once you get some speed up, the rudder is effective enough to give you a little steering. In the water, the rudder and prop blast give you all the steering control you would ever need.

Like the other components of the airplane, start by cutting out all the parts. Glue the 1/4 sq. back bone stringers on to the main spine, then add the bulkheads. Next fit one-pound density foam to the float frame; be sure to use epoxy in all phases of the float construction. Hot-wire cut the foam to the bulkhead shapes, fit the nose and transom blocks into place and carve to proper contour.

Sand everything, then vacuum the surfaces very clean, cover the floats with balsa on the top and ply on the bottom. You might want to glass strategic spots for abrasion and stress support, but I found that addition to be unnecessary on my model. I used 1/8 brass welding wire for the struts on my plane and it has taken all the abuse I have given it. I do have to bend it back into shape occasionally, but that isn't much of an inconvenience.

To install the gear structure, start by bracing the fuselage up to the proper height with anything that will work. Align the main longerons to be exactly parallel to the work surface, then fit the aft strut from the fuselage to the floats. Then align the top of the floats to be exactly parallel with the main longeron. Bend and fit the middle and front strut while the fuselage and floats are all braced and held in place, complete all wire bracing with wire, wrap, and solder.

You should now disassemble everything and fill and sand all the nicks, dings and holes to make your airplane very smooth.

I used Coverite antique for the covering on my B&W, and it came out as a prize winning finish, however, you may use any covering material you are most comfortable with. I have a Saito four-cycle 40 in my B&W, and it is terribly underpowered. But so was the original airplane, consequently the model swims around forever before becoming airborne and it takes an hour and a half to reach a hundred foot altitude (or so it seems). Actually, the model flies so much like the full size airplane, it's almost eerie. . . really looks terrific.

As I have stated before, with the front wheels locked in place, you have to set the model straight into the wind for takeoffs, and with the slow climb-out on takeoff be sure you don't pull the nose up to force the climb or you'll have a first class stall, and this airplane won't recover straight ahead. I have managed some very weak loops with it, but nothing else. The B&W-1 lands straight and level, you can't flair it in on the rear wheels or you'll drag the aft part of the floats and when they touch, the model will slam forward hard enough to collapse the floats.

This model is not easy to adjust for flight, but with careful attention to thrust angles and incidences, plus the float arrangements, you will be very satisfied with the final results. When trimmed she flies like a pussycat and looks like a winner in the air, on the ground, or on the water. . .