



STEARMAN PT-17

A MAGNIFICENT 2" = 1' MODEL OF THE
VENERABLE LADY OF YESTERYEAR,
CHARLES LITZAU'S SCALE VERSION OF THE
FAMOUS WW II TRAINER — FLIES EXACTLY
LIKE IT'S FULL-SIZE COUNTERPART



BY
CHARLES J. LITZAU



During the winter of 1964, I was bitten by the bug to build a scale PT-17 for R/C, since this has always been one of my favorite airplanes. I will not go into detail about the history of the PT-17 as there has already been much written on this subject. I will only say that a great many WWII pilots were trained in the Stearman and, today, it is a much sought after collector's item.

In order to get started on my project, I sent away for some of the existing plans on the PT-17 that were designed for U-control, having considered enlarging a set of plans to a scale of 2"=1'. However, after I obtained several different sets of these plans, I noticed that they did not agree in many major respects. The question was, "who was right?"

Since there was little information available on how to design and fly an R/C biplane, I had to find a method of determining proper C.G., incidence, dihedral, airfoil, etc. I searched back through the model magazines to see what the average non-scale R/C biplane utilized. As a result of this study, I evolved a pretty good average of the statistics I needed to know. At least, it was a place to start!

The next step was to lay out the plans. I was able to obtain a set of AIR PROGRESS plans of the PT-13. These plans are of the real aircraft and it is from these that I worked. In order to blow them up to 2"=1', I took my

35mm camera with a telephoto lens and took colored slides of the plans. I then projected them onto the wall to where the scale was 2"=1'.

It was at this point that I decided to build a test model to make sure that everything worked before going 'all-out scale'. Since strength was of prime importance to me, I decided to experiment with styrofoam wings and elevator. On this first model, I did not bother to duplicate the wing ribs. Also, I held the wings in place with rubber bands, while the 'N' struts were secured with toothpicks acting as shear pins.

Then came the day for the first flight and I was suddenly quite happy that I had proportional radio! The plane took off by itself and started into a stalling attitude. (By the way, I was flying the plane with a Veco 45.) After managing to get it back for a reasonably good landing, I made adjustments to the elevator and added weight to the nose. This corrected the situation, but it was still a little underpowered. At this point I changed to a .60 engine.

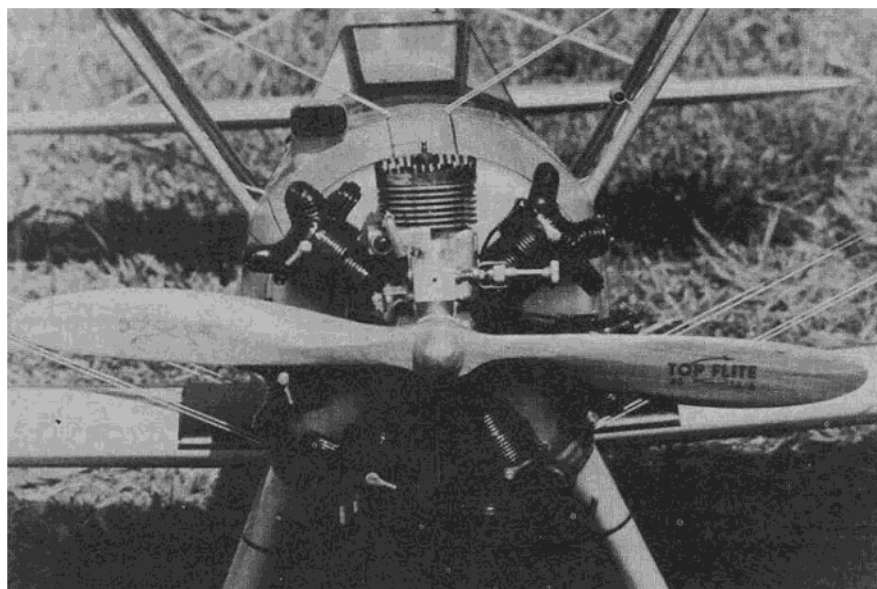
To date I have over 400 flights on the prototype model with only four major crashes — all four occurring during gusty winds, dead stick, and going down-wind. From these crashes, I was able to locate the weak points in the fuselage and correct them in the final design. In all these major crashes, neither the wing nor elevator was even

damaged or broken. There were only a few dents even though the wings were torn from the fuselage!

I was now satisfied with the design and quite happy about the way the styrofoam wings worked out, so I decided to get started on my 'all-out scale' PT-17. The question was, "how scale is scale and how far did I want to go?" The main objectives for this design were:

1. Strength — be able to take bad landings, ground loops, and minor mishaps and still be able to fly.
2. Styrofoam wings — but still be able to duplicate all ribs and details.
3. Solid landing struts with workable shocks.
4. Scale 4" tires — made from two sets of Trexler (4½") tires, giving tire and tube, and inflating them to 4" for scale.
5. Wings to be fastened on exactly like the real aircraft.
6. Model was to be built without having to have a machine shop.

With these points in mind, I began to build. I finished it (other than interior detail) in the summer of 1967 and you can imagine what a blow it was when I read that Sterling Models was coming out with a kit of the PT-17 in the same scale! I thought to myself, "If they had come out with it a few years earlier, it would have saved me all this work!" After thinking it over, however, I was glad they came out when they did with their kit for two



reasons: (1) Their dummy engine of the Continental solved a big problem for me since I could use it as a mold; (2) I would never have had the experience and opportunity to really know what a great and wonderful sport and hobby this really is. This project would have been impossible without the aid, encouragement, and advice of the people involved in this sport/hobby. I've yet to meet a scale modeler who had a secret way of doing something that he wouldn't share, or one who wouldn't help with all the information and encouragement he could give. It has been a great experience and I want to thank everyone who has aided me in this project, especially the informal U-control Scale Club in the St. Louis and East St. Louis area. They set a fine example that's hard to beat!

CONSTRUCTION

This plane can be made either as a PT-17 or PT-13, for both are basically the same except for instrument panel and dummy motor, as explained on the plans. I've tried to make the plans as simple and as detailed as possible and still be scale. It is not as hard as it looks at first glance. Why don't you try it? The following are some of the high points of construction:

Fuselage

The fuselage is designed to go together somewhat like a jigsaw puzzle. It can be almost completely assembled (with the exception of a few stringers and sheeting) without a drop of glue. It is held together by a few pins and rubber bands. In fact I would strongly recommend fitting it together in this fashion as far as you can go, to make sure everything is

properly aligned.

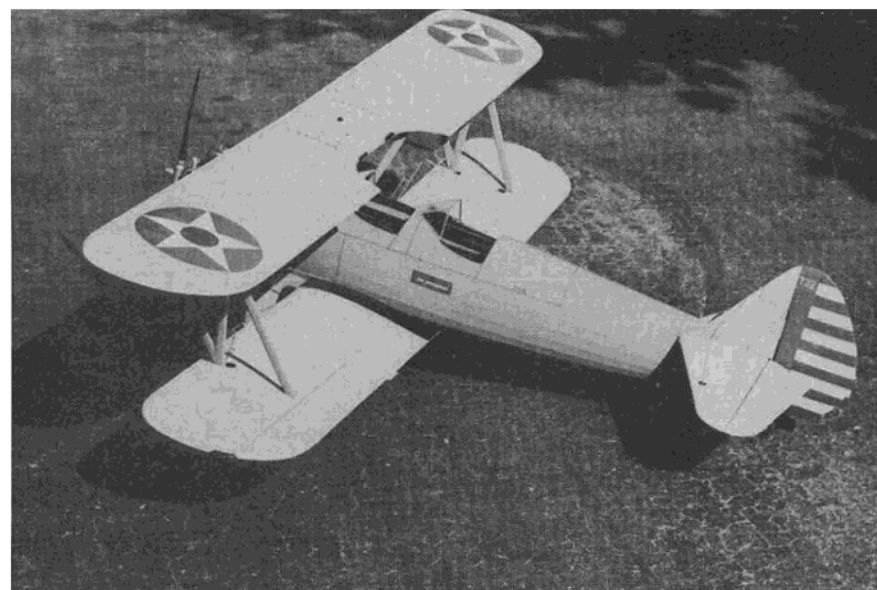
Cut out all bulkheads and glue the halves together. The best way to do this is to spot glue two thicknesses of the proper sheets of balsa (or plywood) together with rubber cement. Cut out the bulkhead halves giving you the symmetrical halves with one single cut. Glue the halves together. Slide the bulkheads onto the guide rails for proper position. Fit the top keel, lower wing saddle, cabane struts, landing gear, compartment saddle rails, and servo/motor rails in place. Install the necessary balsa blocks and some of the stringers at this time. If everything looks good, glue it all together. Carve the proper balsa blocks to the shape of the bulkheads. Groove the wing saddles and lower balsa block behind the wing to accept the lower sides and bottom stringers, leaving the stringers 1/8" higher than the balsa blocks. Sand down the stringers where necessary to accept the sheeting. Install the cockpit bulkheads and apply sheeting, with the exception of the compartment cover. Build up the compartment cover by installing the compartment bulkheads and the shorter compartment saddle rails and then sheet.

Shock Gear & Wheels

The shock gear is made from stainless steel tubing silver soldered together using a borax flux. The links are made from 1/4" sheet aluminum and are sawed, drilled, and filed to shape. The 1/16" bolts and nuts holding the linkage together are obtained at your local hobby shop in the train department. I would strongly recommend using the shock gear as they really work and aid greatly in making smoother landings.

After the shock gears are made according to the plans, they are fitted and epoxy puttied into the 1/2" (two 1/4" plywood epoxied together) landing gear strut, making certain to keep the epoxy out of the slot for the pin. After the epoxy is dry, sheet both sides of the gear with 1/8" sheet balsa and carve and sand to shape.

The wheels are made from walnut drawer knobs from the hardware store. Drill and bolt two knobs together with the bolt long enough to fit in a 1/4" drill. Mount in the drill and sand to shape while the drill is running. The tires are made by using two sets of 4 1/2" Trexler tires. Cut the center out of one set which then becomes the tire. The other set becomes the tube. The tire and tube sets are installed on the wheel hubs



before fastening the two halves together.

Wing

'Styrofoam for scale' — to me that sounded great with all its apparent advantages, and it really proved itself out on my test model. However, now came the time to use it for scale, and the problem involved was the duplication of the ribs and all the other pertinent details. After some thought, I decided to cut the cores 1/8" smaller than the full wing rib. This would allow me to sheet the wing with 1/16" balsa sheeting and double sheet it in the 'solid areas' and duplicate the ribs with 1/16" x 3/32" strips.

The steps of construction are as follows:

1. Cut four 30" styrofoam panels (Armstrong Armalite) using the templates shown on the plans. There have been several good articles on how to cut styrofoam wings in past issues of model magazines. For one of the most recent and one of the best, see R/C Limited, Summer 1968, published by R/C Modeler Magazine. Also, you can trace the template and send it to several firms that will furnish the material and cut the cores for you at a very nominal cost.

2. Sheet all four cores with the first layer of sheeting. Be careful when wrapping around the leading edge so that it does not crack. This can be prevented by wetting the outside of the sheeting as you come around the leading edge.

3. Install the second leading edge sheeting, taking the same precautions.

4. Install the center section, sheeting, trailing edges, and rib effect strips.

5. Cut the proper dihedral angles and epoxy the halves together.

6. Cut the wing tips off to their proper length and groove each tip to accept the wing tip platform.

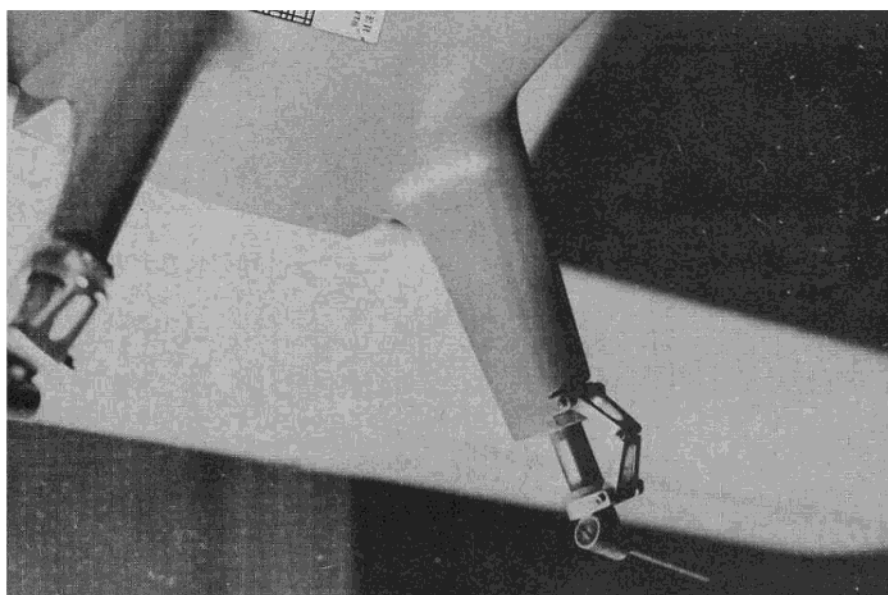
7. Install the wing tip platforms. Build up and sand to shape, making certain not to go below the level of the rib effect strips.

8. Cut out the rear center section of the top wing and build up and shape according to plans.

9. Cut out the ailerons on the lower wing. Frame the recess sections and ailerons as indicated on the plans.

10. Cut out the servo box to fit your servo and fit the aileron hinges and torque rods. There are so many types of hinges that I am leaving this up to you.

11. Caution — when doping the wood areas of the wing before covering, be careful not to dope the areas



between the rib effect strips. Remember, you have only 1/16" between the silron covering material and the balsa sheeting. You do not want the silron to get stuck in these areas when doping!

Elevator and Rudder

Build the rudder and elevator on the plans as usual; however, keep the fin and rudder pinned together and the stabilizer and elevator pinned together as individual units. The tips of the elevator are not cut until the very last. The ribs are rectangular pieces of balsa that are sanded to proper airfoil, after these units are dried and taken from the plans. After the airfoil is sanded, apply sheeting on the elevator by recessing into the ribs. The fin is then mounted onto the stabilizer and is built up as a removable tail section.

RADIO GEAR

At this point I would recommend that you install your radio gear - keeping everything as far forward as possible. Make sure that everything works freely. Remove the radio gear and prepare the model for covering.

COVERING

Clear dope all the areas with which the silron will come into contact, using two coats, then sanding lightly. When you are satisfied that all the nicks are filled and there are no rough spots, give it all another coat of clear dope. Check once more for rough spots, but try not to sand this coat unless absolutely necessary. This final coat, before covering, is to seal the balsa from the moisture in wet covering.

I used SILRON because of its cost,



and sprayed over lightly with clear dope. Do not brush over them with dope as they will smear.

The metal panel separation lines are accomplished with 1/16" and 1/32" black trim tape, also available from your art dealer. Make sure the surfaces are clean, and then install the trim tape and seal with several coats of sprayed on clear dope.

After the model is completed and all the details are added, spray the whole model with two coats of clear dope and give it a final rubbing out. Now apply several coats of good wax.

DUMMY ENGINE PT-17 (7 CYLINDER)

This I left to last because I was going to have to take some time to form a mold from which to make my Continental engine. However, at this point Sterling came out with their kit and their plastic engine of the Continental. I looked this over and saw that the sharpness of the cylinders was on the inside of the plastic engine. (You can get this plastic engine through your hobby shop or by writing to Sterling.) I decided to use this as a mold and make my engine out of epoxy mixed with lamp black. This is how to do it:

1. Block up the entire sheet in which the engine comes.

2. Take a frozen orange juice can and stand it in the center back part of the engine.

3. Make a cone out of metal, or heavy cardboard, and put this in the center front part of the engine, leaving 3/16" clearance between the cone and mold.

4. Use a release agent, or wax, and coat the interior of the whole mold, as you will make all the parts.

5. Mix about 2 sets of the large tubes of HobbyPoxy Epoxy with lamp black.

6. Pour a small amount into molds and work into all corners, etc., making sure there are no air bubbles.

7. Now slowly pour in the balance of the epoxy.

8. After it has set overnight, remove from the mold. This must be done with time and patience. Holding it over a lamp will help. Of course, if you are in a hurry you can destroy the mold by cutting.

9. Cut out the back part of the crank case and epoxy the 1/4" plywood disc in place as shown on the plans.

10. Sand the inside halves of the

engine flat and fit them together. You will notice, here, that some of the cylinders do not line up perfectly. Line them up the best you can and, later on, you can file in the cooling fins where needed.

11. Anchor the two halves together by drilling a hole all the way through the cylinder heads at the point where the spark plug is to be located. Thread the holes and bolt the halves together. These bolts will also act as the spark plugs.

12. Sand the top of each cylinder flat where the valve covers are to go. Sand the front half 1/64" lower.

13. Epoxy the valve covers onto the rear half only. This now will allow you to remove the front half and fit the .60 engine. Cut out the top cylinder and fit the engine as needed. My best performance was achieved with the Enya .60.

14. The back half of the engine is epoxied to the firewall at the very last after all detail work on the engine is completed. The intake pipes are epoxied to the back half of the engine and firewall but the exhaust pipes are epoxied to the firewall only. This allows the front half of the dummy engine to be removed so you can get to the Enya .60 for service.

DUMMY ENGINE PT-13 (9 CYLINDER)

To make this model into a PT-13, it is necessary to make a 9 cylinder Lycoming engine. I recommend using the Williams Bros. 2" scale cylinders of the Pratt & Whitney "Wasp Jr." and modify these for the 220 HP Lycoming.

FLYING

Ever since I completed my proto model of the PT-17, early in 1966, and started to fly it, the biggest thrill I get is from the reaction of the men who have flown the real one. It is surprising how many men say they trained in it for World War II, remarking that the model flies so scale-like, that it really brings back memories.

In order to do rolls and loops, I have to dive the model to pick up speed, and that is exactly what the real aircraft had to do with the 220 HP engine. In order to get this effect, it is necessary to power the model with a .60 engine. If you power it with a .80 engine you will no longer have the flying characteristics of the PT-17 or 13, but the flying characteristics of a crop duster or stunt plane which uses the 400 to 450 HP engine.

I fly the model in wind conditions as if I were going to be in it. Therefore, I do not fly it in 20 to 30 MPH or gusty winds. Not only is it no fun to fly with these conditions, but, also, your heart is in your throat, as you are risking many hours of work and endangering the spectators.

The plane is a real pleasure to fly in 0 to 15 MPH wind and can do everything the real PT-17 can do in a scale-like manner. The ground handling is good - just hold slight right rudder on take-off and it will lift its tail and take-off by itself. Before take-off, trim the elevator down to where the bottom of the stabilizer and elevator look flat. With slight right aileron trim it should fly perfectly.

Three-point landings are easy to accomplish. Come in with about 1/3 power, gradually feeding in up-elevator. At about 3 feet from the ground, cut the engine and let it sink in while pulling back on the stick. In a wind of 12 MPH and up, it is best to fly it in for a two-wheel landing.

Lots of luck and good flying! Warning: When you go flying, bring along some rope to keep the spectators away from your model. You'll need it! ●

**From
RCModeler
Jan. 1970**