

*If you want to build an airplane
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"PT Something-or-Other",
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down at the field, try . . .*

LARRY ROSENBERG'S

AEROBAT

PHOTOS BY REED PACKARD

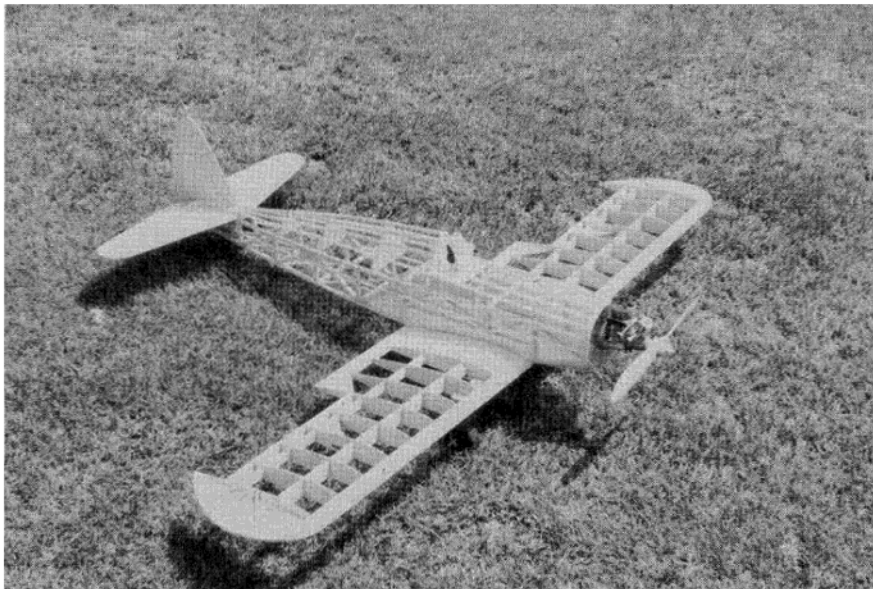
If you want to build an airplane that flies well, looks good, gets by on a six ounce tank, will take either the new small radio gear or the older "big" stuff (I don't know about the rest of you, but it is awfully expensive to try to keep up with the latest), and is a real attention getter down at the field, try the Aerobat. I have never had a ship attract as much attention at the field as this one does! Everybody that sees it is reminded of their favorite PT-something or other. Although scale-like in appearance, it is not a scale model but is merely my idea of a stunt ship concealed in a between-the-wars configuration.

A few years ago I decided to try my hand at designing my own airplane and the result was the Kwiksilver, which was published in the Nov. '66 RCM. The most important thing that I learned from the Kwiksilver was the fact that it is a tremendous thrill to watch an airplane of your own design take to the air and fly. I have only built one kit airplane since that time, kits just aren't any fun any more! I find that like most flyers, I haven't the practice time, money for equipment refurbishment, or travel time, necessary to be a top contest flyer. (I don't know about the rest of you, but I find that I haven't the talent either.) Believe me though, you can really get your kicks out of trying your hand at designing and building your own airplane, it's great therapy.

My latest ship, which is presented here, was designed to fit into the semi-scale type of stunt ships that are just beginning to become popular. I feel that this area of design is going to develop quite a bit in the next year, and the Aerobat is my offering to you for this type of aircraft.

The Aerobat was designed to fit my preference in maneuver style. There are two basic methods for flying the pattern maneuvers: The big, smooth, fast maneuvers such as a military jet might perform; or the tight, slower, low-level maneuvers such as the free-style or aerobatic pilots perform. I prefer the latter and the Aerobat was designed specifically for that type of flying. I decided that a 4½ to 5 pound airplane with a healthy .45 in the nose, lots of drag, not too much wing area, and lots of fuselage side area was just the ticket. As for looks, I have always had a soft spot for the between-the-wars type of airplanes, hence the general configuration. Everyone that looks at the airplane (and believe me, it

*The author
and his Enya .45 powered
Aerobat. Clear
doped yellow
and blue silk over
an open framework
is quite a
contrast to the
popular slab-
sided plywood and
balsa machine.
A beautiful sight
in the sky, there
isn't a maneuver
the Aerobat
won't do, and
do well.*



attracts lots of attention) says that it looks like some airplane that they have seen, but none can quite place it. The tail dragger style was mandatory for me as once you have learned how to handle one, it is truly the only way to fly. When this ship taxis out to take-off, or taxis back after landing, with the good old Enya .45 popping away in that aluminum cowl, it is as realistic as can be. My Enya is the old .45 with two needle valves, no exhaust baffle, and no exhaust cutout in the cowling. Sounds just great.

The structure, as you have probably noticed by now, is all open ribs, stringers, and what have you. It is NOT tough to build. The structure is specifically designed to be reasonably fast building and I'll bet that this will be one of the few multi RC jobs that you ever build with a true fuselage. My ship is covered with blue and yellow silk and finished with clear dope. Costs less, weighs less, and I like to see the sun shining through the silk. The Finishing Touch decals really do add the finishing touch to the airplane, although it would be nice if the stars and the lettering were available by the piece, rather than buying an entire sheet and using just part of it.

The flying characteristics of the airplane are excellent. I make it a point to give other people an opportunity to fly my new designs, after I have test flown and trimmed them, in order to get some unbiased opinions of how the airplane really performs. I haven't had any bad comments on this ship yet. As the acid test, I may let the Valley Flyer's Les Kesner try this one out. (He is our local expert at returning ships to kit form and his newest maneuver, the inverted immesplatt, has to be seen to be be-

lieved!)

I can still remember the first test flight on this ship. It was sitting in the pits at the Sepulveda Basin, right next to a beautiful, bright red Fokker DVII. I cranked up my faithful Pratt and Whispany, Snoopy cast a glance at the Fokker, and we taxied out to take off. I lined the ship up on the runway, took a deep breath, prepared for a siege of ground looping, and slowly advanced the throttle. The "Bat" started its roll as the throttle crept open, staying in a perfectly straight line. I was so surprised that I inadvertently let out the right rudder that I had fed in prior to starting the take-off roll. This made no difference to the airplane and about the time I hit $\frac{3}{4}$ throttle the tail popped up. The ship just rolled merrily along on its main gear until I eased it off the runway. The climb-out was good and away we went.

After zooming around for a while I decided that this was about the best first flight that I had ever had with a new airplane. I also decided that it was about time for a landing. As I set the airplane up for the approach, the wing began to look smaller and smaller. I lined up on final and just stood by and watched as the small stab allowed the tail to sink and the ship greased in on all three. I then taxied back to the pits, parked next to the Fokker, killed the engine and nonchalantly lit up a cigarette. "Flies great", I said to the gang, "Just as I knew it would." All the while my knees were still shaking.

The Fokker was not about to take all of this quietly, so while Snoopy was getting his goggles wiped off, the Big Daddy Enya .60 barked to life and the DVII taxied out and took off. After a fairly short flight, it came in for a

beautiful 4 point landing (the glo plug, top wing tips, and the fin). Snoopy chuckled all the time he was getting gassed (up).

Seriously though, this really is a fine flying airplane. I haven't found a maneuver that it won't do well. I have taken it off and landed it in 90° crosswinds with no problems. The rolls are good with very little down elevator required when inverted. The four pointers are particularly good and the eight point rolls give me more trouble than they do the airplane, a competent pilot (not me) does them well. The knife-edge is good due to the side area of the fuselage. The loops, be they insides or outsides, are again one of the airplanes better maneuvers, but you cannot just pull in elevator and hold it, you must work the stick on the way around (just like the real airplanes do). I have done 5 consecutive outside loops with no aileron or rudder correction and the airplane has come out straight and level. (Of course I lined up with the wind!!) On the outside loops you will find that you are almost at neutral elevator going over the top.

If you like snap maneuvers, step right up. This baby snaps well and will drop into a very fast, very tight, spin after about two snaps. The normal spins are also good. The rudder IS effective and really helps in a slide slip. Maneuvers such as the Rolling 8 or the Cuban 8 are aided by the rapid roll rate possible with the low aspect ratio wing.

The airplane is very close to a constant speed machine, which is what I was after, and it seems to go up almost as fast as it comes down. It is sensitive to the controls but it is not jumpy and can be handled by anyone with some multi experience. The two critical periods of flight occur during take-off and landing and even though the pictures show what appears to be adequate wing area, they are deceptive. That wing is really quite short. On a calm day it is advisable to come in with some power on. Do not try to stretch the glide, it won't do it. However, neither will it snap roll in on a stall. The stall characteristics are amazingly gentle, she just mushes forward and the nose falls straight through. The airplane seems to automatically seek low altitude, tight maneuvers and these really show it off at its best.

Design-wise the airplane is pretty conventional. Approximately 490 square inches of wing if you count the centersection and about 446 inches if you don't. The wing loading is then about 22 oz per square foot or 24 1/2

oz per square foot. I never have been able to decide if the wing centersection that is blocked by the fuselage, should be counted as wing area. It doesn't seem to bother the airplane though, so take your pick. The stab is smaller than the normal 25% of the wing area and is of a bit higher aspect ratio than is usual. This, coupled with a slightly forward C.C. seems to make these smaller ships groovier. Although the fin and rudder look small, the fuselage side area more than makes up for it. My prototype weighs 4 3/4 pounds with a .45 in the nose swinging an 11-5 prop. This seems to be the right combination. If you have one of the newer, lighter, radio rigs, the weight will drop by 4 to 6 ounces and a little more propeller pitch would probably be called for.

The cowling on the original is a 5 inch diameter, spun aluminum cowl that I picked up in the local hobby shop for \$1.98. This diameter leaves a gap all around the cowl where it fits over the nose and allows the exhaust to escape. No overheating problems have been encountered. I really think that a fiberglass cowl would be a better choice and well worth the work, for my aluminum cowl has already begun to crack from vibration.

Sooooooo, if you want a ship that presents a little challenge building wise, is a great attention getter at the field, and flies like a dream; try the Aerobat. I think that you will really like it.

CONSTRUCTION

WING: The wing on the original is a much modified Falcon 56 wing. There is enough information on the plans to scratch build the wing, but you would be hard put to duplicate the nicely machined leading edge that comes in the wing kit. The span is reduced to 45 inches plus tips. Begin construction by laying out the parts required, ribs, etc. You will need six ribs trimmed down 1/16" for the planked centersection. Cut out the 1/4" thick center rib and the two rib doublers, then epoxy these three parts together. Cut out the 1/16" ply landing gear mount doublers, the 3/32" ply aileron bellcrank mounts, the 1/8" balsa gussets, and the 1/4" balsa wing tips. Notch the tips to allow the spars to slip in 1/2". Now build the two wing halves following the directions on the plans. Cut out the three dihedral braces, trim the spar slots, and join the two wing halves at the proper dihedral angle. Add the tips, tip diagonals, bellcrank mounts, landing gear mounts, torque blocks, and the ply landing gear doublers. Now cut out the ailerons as

shown on the plans. The aileron cutout will leave a small piece of trailing edge stock on the trailing edge of the wingtip, leave this piece on the tip. Glue in the 1/4" X 7/8" aileron facing to the rib ends at the aileron cutout. The ailerons are now built up of 3/32" ribs with 1/8" facing and 1/16" sheeting. Glue a piece of scrap trailing edge stock in each aileron at the tip end.

No servo installation is shown on the plans due to the wide variety of equipment in use today. Gimmick up your favorite servo mount and pushrod arrangement and hook up all of the linkage. Sheet between the ribs (bottom of wing only) where the aileron pushrod exits. When you are completely satisfied that all linkage works well, sheet the centersection. Sand the wing well and fiberglass the center 4 inches.

EMPENNAGE: The fin and rudder are cut out of medium 3/16" sheet. Sand well and hinge using sheet nylon hinges pinned with toothpicks. I still haven't found a better hinge.

The stab and elevator are cut out of 1/4" sheet, medium. A good trick to use on these split elevators is to take a sheet of 1/4" balsa long enough for both elevators. Then, before cutting the elevators out, inset the wire joiner and epoxy and fiberglass in place. NOW cut the outline. This is the best way that I know of keeping the two halves of the elevator perfectly in line. Again, hinge with nylon and toothpicks. Sand well and epoxy the rudder assembly in place on the elevator/stab assembly. Do not dope this assembly yet.

FUSELAGE: Now the fun begins. The fuselage structure looks quite impressive but believe me, it really is a snap to build. Just follow the sequence as given here.

First build up two fuselage side frames (yeah, one at a time) over the plans. The 1/4" balsa wing saddles should be cut out very carefully to maintain the 0° incidence shown. It is of prime importance to cut and fit all of the pieces of an open framework structure very carefully, the better the fit, the stronger the joint. The top 1/4" square longeron and all members forward of the wing trailing edge are fairly hard balsa, the remainder may be medium. Next add the 1/8" balsa fuselage doublers to the inside of each side frame. Be sure to make a left and a right side. Now, invert the sides over the top view and pin down on the plans. Add the 1/4" square cross braces where shown, draw the tail together, add the 1/8" ply tailwheel mount, the lower rear 1/8" sheeting, and the 3/16" square diagonals to the fuselage bottom. Note that since you are assembling the fuselage box upside down, the 3/16" square diagonals will run in the opposite direction to that shown on the plans. The bottom stringer (1/8" x 3/16") can be added now, as well as the two F11's at the wing trailing edge. These give you a place to glue the silk down. While all of these sticks are drying, cut out the formers, firewall, etc. I used a 1/32" aluminum firewall shield behind the engine mount, to protect the firewall from fuel, etc. Drill the mounting holes for your Tatone engine mount, keeping the engine off-center to the left (when viewed from the tail) about 1/8 inch. When the engine is installed with the proper sidethrust, the spinner will be centered. Install the blind nuts for the engine mount.

The fuselage box should be dry by now so remove it from the plans and





add the formers, firewall, etc. Next add the top, rear, stringer (3/16" square). When dry, add another 3/16" square stringer directly on top of the first one. This doubling will keep the silk from pulling in the top stringer and spoiling that nice S curve. The next stringer down on each side fits into the top stringer at F7. The next (second) stringer down on each side butts into F8. The forward stringers should be left long enough where they enter the cockpit area to be trimmed off with a razor saw when the instrument panel (F3A) is added. Add the cockpit floor. Add the 1/8" x 3/16" side stringers and the lower nose block. Epoxy F2B in place. The 1/4" square cross braces from the cockpit forward can now be cut out to permit equipment and tank installation, they are no longer necessary. Assemble the two F9, ply doublers and the birch or maple "nuts" and epoxy in position. Add the two F10 fillers (one on each side) to the rear of the fuselage. These are again placed to provide a glue-down point for the silk. The rearmost, upper portion of the fuselage sides from F8 back and from the bottom of the stab to the top of the side stringers, are sheeted with 1/16" balsa and slots are cut in these for pushrod exits.

Now sand the whole mess well, beveling the edges of the firewall to match the fuselage shape at the nose. Epoxy the stab/rudder assembly in place, not forgetting the bottom rudder hinge. Carve the two filler blocks for the stab/rudder junction and cement in place. The fuselage is now complete. See, that wasn't so bad. Sand well and give about 4 coats of Sleek to the entire structure.

One comment here, the fuselage could probably be built of 3/16" square spruce, rather than balsa, but would you believe that the gluing surface area of a 3/16" x 3/16" joint is 44% less than a 1/4" x 1/4" joint? Yup! If you do use spruce, better use 1/32" ply plates on all of the joints.

EQUIPMENT INSTALLATION:

Now is the time to fit all of your gear in, the tank, pushrods, etc. With the open framework, this is really a snap. I have not shown any equipment installation of the plans. There are so many rigs on the market now that it would be impossible to depict an installation for each type. Follow your radio manufacturer's instructions **TO THE LETTER!!!!** My ship has my trusty old (3 years + old) Micro Avionics installed with the "large" servos. It fits in well and any of the new, smaller, rigs will be lost in the fuselage. I used a six ounce tank installed high in the nose, as my .45 has a rather high intake. Lately, I have gone to using 3 tube tanks on my airplanes and I really believe that they work better. On a ship such as this, with most of the engine cowling, a three tube tank makes fueling up much easier.

I imagine that it would be wise to sleeve all metal to metal contacts with nylon tubing. Most rigs are touchy about this. My Micro seems to be completely immune to any problems in this area but I still try to sleeve where applicable. My pushrods are 1/4" square balsa with music wire ends. Not too sophisticated, but extremely reliable.

ASSEMBLY: Might as well get all of the pieces fitted together before covering, it's much easier. Tape, rubber band, strap, or what-have-you, the wing into its proper position on the fuselage. I left the 1/4" diameter hole in F2B small and filed it out at assembly to get exactly the incidence that I wanted on the wing. The 1/4" dowel leading edge retainer fits into the wing from the leading edge clear back to the dihedral braces. It is plenty strong. When the wing is seated properly, and squared away with the fuselage centerline accurately, drill the two mounting screw holes using a number 25 drill. Remove the wing, tap the two "nuts" no. 10-24 and drill the holes in the wing out to about .200 inch.

Take the two landing gears that you have bent and bend the wheel mounting leg to give about 2° toe-in. This really does wonders when it comes to eliminating ground loops. Also helps to slow the ship down on the landing roll-out. Try it. Now you are ready to cover and finish.

COVERING AND FINISHING: Here we arrive at a real builder's choice. The prototype is covered with dyed silk and finished with clear dope. The fuselage is blue, wing and tail are yellow, and the only color doped portion of the airplane is the striped rudder. I first gave the entire structure about 4 coats of Sleek, sanding lightly between coats, then wet silked it.

One of the newer covering materials could be used on the fuselage, but I wouldn't recommend it on the wing. The open structured wing requires a covering that will add torsional rigidity. Most of the plastic materials that I have tried do not add this property. Take your pick but please use silk or silron on the wing.

I used the Finishing Touch between-the-wars decals and they really do dress the airplane up. This airplane just seemed a natural for U.S. Army markings.

TRIMMING AND FLYING: Set up all of your control surfaces with the amount of throw called out on the plans. Zero trim settings should be neutral control surfaces. **DO NOT OMIT THE SIDE AND DOWN THRUST SHOWN ON THE PLANS.** Too many people seem to avoid putting side thrust in a tail dragger airplane and then they wonder why the airplane goes around in circles on the take-off run. The two degrees of side thrust shown, coupled with the 2° toe-in of the main gear and a gentle hand on the throttle, will result in beautiful take-offs. **DO NOT** slam the throttle wide open, ease it open.

Allow the airplane time enough to build a good head of steam up before lifting off, the wing is small. When flying on a windy day, do not proceed to make a 180 immediately after take-off. I have seen many a ship go in due to this maneuver and there is no need for it to happen. Our models, just like a real airplane, require a certain minimum velocity **RELATIVE TO THE AIR THEY ARE FLYING IN** to stay airborne. If your airplane has a stall speed of 25 mph and you do a 180 immediately after taking off into a 25 mph wind, it is going to fall out of the sky. Give the ship time to build up some airspeed before bending it around the corner.

For the first few landings you would do well to come in with a little power on until you get the feel of the airplane. As I have already mentioned, the stalls are very gentle and are straight ahead, but that won't help if you stall out five feet off the ground! A run-off the

runway and into the weeds rarely hurts a model, so let it come in hot if you have to.

That about does it for now so try this airplane out, I think that you will really enjoy it. If you have any questions, or any comments concerning the airplane, contact me in care of this magazine. Good Flying.

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