



1930 FLEET Sport Scale

By **ROMEY BUKOLT** . . . Sport scale version of a very popular biplane from the 1930's era. An easy model to scratch build, and even easier in the kit soon to be released. See the ad elsewhere in this issue.

● I consider myself fortunate to be old enough to remember an era before television, jet planes, and mini-skirts, when it was commonplace to spend a lazy summer afternoon out at the local air patch a mile or so east of town, watching a familiar red biplane performing an aerial ballet of loops, Immelmans, Cuban eights, and spins, in one continuous strand of imaginary yarn tossed freely across the deep blue sky. The plane was a 1930 Fleet Biplane, powered by a five cylinder radial engine, and dressed in bright red fabric which was accented by large white letters and numbers on the wings. It belonged to an old barnstormer who earned his wings during World War I. He flew every chance he could get, and spent his week-ends picking up enough money to pay for his gas and oil by giving the more carefree townfolk a \$3.00 birdseye view of the courthouse, river, and water tower. These are among my fondest childhood memories.

Now, all you biplane nuts, who cherish similar moments, and even you younger "Double winger" enthusiasts, whose only exposure to barnstorming comes from the current film, "The Great Waldo Pepper," have the opportunity to recount those memorable days. The National Sport Pattern Association was formed for you people. Its objective is to duplicate full scale aerobatics in a *realistic* manner with models which are realistic replicas of biplanes that have been built and flown. The idea is to get away from the slick, crisp, high speed, unreal pattern maneuvers of the preci-

sion hi-speed, hi-performance pattern ship, and recount the nostalgic days of the smooth, easy-going graceful airshow sequence.

In contrast to the racy Aeromasters, Pitts Specials, Acro-Sports and Acro-Stars, we bring you the "Barnstormer," a stand-off scale model of the vintage 1930 Fleet Biplane.

The Fleet, named after a Major Reuben Fleet, was an outgrowth of the Consolidated Aircraft Company, under the direction of Lawrence D. Bell, who later was to gain fame as the founder of Bell Aircraft. The first model was granted A.T.C. No. 122, in May 1929. Some instability was found in the earliest models, but was corrected with changes in fin and rudder area. Several models were fitted with the five cylinder radial Kinner K5 engine. The Model 8 had a wide fuselage to accommodate three people. The model 10 carried a D.H. Gypsy Major engine for overseas use. A Fleet factory was built in Ontario, Canada and a winterized version was built there with an enclosed cockpit. The R.C.A.F. version was called the Fleet Fawn, and the civilian version was called the Fleet Finch.

In 1930, the famous movies stunt pilot Paul Mantz broke the record for consecutive outside loops by executing 49 in a Fleet, however, the judges discounted three because they claimed he lost heading on them.

A number of Fleet Bipes are still in operation in the hands of collectors, and can sometimes be seen at Antique Fly-ins or perhaps at the big E.A.A. fly-in at

Oshkosh each summer.

The Barnstormer has a number of features designed into it to make it an easy-to-build, easy-to-fly, nearly fool-proof aircraft. I say "nearly" because I know of modelers who can begin with an ARF airplane kit and end up with a locomotive. I do not claim credit for this design in its entirety. Many of the features are tried and proven, such as the Ugly Stick wing assembly and the Acro-Star cabane struts (*which came from our T'Winger. wcn*).

The fuselage is basically built around a box made up of two fuselage sides, the F-2 and F-3 formers, and the cockpit floor.

The tail surfaces are simple sheet construction, with no complicated compound curves at the base of the fin.

All four wing panels are basically identical in span and chord, and rib spacing, and are constructed in the same manner, with minor modifications made after the basic construction is complete. All the ribs are cut from one template, and the wing requires no bent sheeting or rib capstrips.

All four cabane struts are identical, simplifying installation, and wing alignment.

Tried and proven biplane design parameters are incorporated, insuring stability, performance, good stall characteristics, and ease of flight trimming.

PRIOR TO CONSTRUCTION

At the end of the text you will find a complete list of the materials required for construction of the Barnstormer.

While every scratch builder has his own pet way of doing things, I'll suggest the sequence of steps I followed to get the model together quickly and easily, and you can take it for what it's worth.

First of all, I like to cut out all or nearly all the parts, so that in effect, I can then, begin with a "kit." A most valuable asset to transferring shapes from the drawing to the wood is a large sheet of acetate plastic (frosted on at least one side) of .005 to .010 thickness, found in most stationery or art supplies stores. Lay the plastic over the part, trace the outline, scoring the sheet with a sharp Uber Skiver knife, bend on the score mark, and the plastic template will snap out of the sheet. Trace around the template on the wood, using a fineline ball-point pen such as the yellow-barreled "Bic" pen. Simple and quick, it saves the plan and provides a reusable template for duplication of pieces, should you need to replace damaged parts or want to build another model.

Some of the parts are cut from standard dimension stick stock and others, such as the formers, are dimensioned so that they can be drawn on the wood using a ruler, triangle, and a compass.

If you own a bandsaw or a Dremel saw you can stack cut a number of ribs at a time.

The model requires twenty 1/8 x 1/4 hard balsa or spruce sticks for wing spars and fuselage stringers. What you use is up to you, but balsa is generally cheaper and easier to come by, and with shear webbing between the main spars in the wing, balsa provides all the strength you need. But, before chopping up three turtle deck stringers from one stick, note that you can get one stringer and one wing spar from each stick. Also, the cutoffs from the remaining wing spars will provide the necessary material for the N-Struts.

FUSELAGE

Prior to beginning fuselage assembly, trim off 1/16th inch from the front edge of the right fuselage half. This will provide the 2° right thrust when the firewall is installed.

Using a triangle, draw a line at right angles to the top edge of the fuselage side, at the front of the front 1/2 x 5/8 inch cutout. This line defines the position of the rear surface of the F-2 former. Then, using the cockpit floor piece or the wing saddle as a gauge, mark the position of the front surface of the F-3 former.

Cut, fit, and cement the three nose area braces from 1/4 x 1/2 stock, and align and cement the wing saddle in place, allowing an 1/8 inch space for the F-2 former. Repeat this procedure on the opposite fuselage half.

Cut battery plug and throttle push rod holes in former F-2 to suit your equipment, and push rod holes in former F-3, then install the two formers and the cockpit floor on one fuselage side,

using masking tape to hold everything together until the glue sets.

Install the second fuselage side and check to see that everything is square. Lay the fuselage on its back over the top view on the plan and pull the tail together, installing at this time the two F-4 braces and the 1/4 inch sheet triangular stabilizer support. Tape tail ends together while the glue sets, take your time, and align all the parts. Square alignment is very important throughout construction of the model.

Add the cabane strut mounts now, or they can be installed prior to adding the second fuselage side.

With the fuselage upright, install the cockpit cowl and turtle deck formers, F-2a, F-2b, F-3a, and F-4a.

Join the two cockpit cowl sheet halves with cement and hold with tape, then wrap over the cowl formers and hold with tape while the glue sets. Remember to leave half the thickness of the F-3a former exposed. See plan side view.

The F-3a former notches are equally spaced and cut such that the 1/8 x 1/4 stringers are flush with the top surface of the cowlings.

Plot the motor mount holes, fuel line hole, and throttle hole, and drill them prior to installation of the plywood firewall. If you're a purist and plan to have dummy cylinders placed on the engine cowl such that one cylinder will be in the twelve o'clock position as on the full scale aircraft, then you will probably have to mount your engine with the cylinder pointed approximately 30° below horizontal . . . that is if you wish to omit only one dummy cylinder.

Install the firewall, butting it up against, not in between, the fuselage sides.

Add the tank compartment top cowl, then the 1/4 inch sheet side cowl blocks. Notice that they extend to the front surface of the firewall.

Frame the fuselage sides along the top and bottom with 1/8 sq. strips, including the bottom wing cutout (none required aft of the bottom wing cutout). Use a piece of scrap sheet for the front curved portion of the wing cutout. See plan side view and sections for location of stripping.

Add the two side stringers. Plot the position of these pieces by measuring several points on the plan and marking the points on the fuselage side.

Before installing the ply landing gear plate, add the additional 1/2 inch triangle stock bracing to the fuselage assembly as shown on the plan.

If you do not have a means of cutting landing gear grooves in 1/4 inch ply, you can build up the plate by cementing 1/8 inch ply strips to a 1/8 inch ply base plate. Install the landing gear plate.

The battery compartment hatch is constructed of a 4 x 4 x 1/4 balsa sheet,

with two 1/8 x 1/4 side rails and 1/16 ply front hatch brace. The side rails overhang a 1/4 inch at the rear so that they catch on to the L.G. plate, and the hatch is secured by one No. 4 x 1/2 inch s.m. screw through the 1/16 ply, into a 3/8 sq. x 1 inch block mounted on the back side of the firewall.

If you plan to use flexible push rods, such as Sullivan Golden Rod, now would be a good time to install them prior to covering the bottom rear portion of the fuselage.

When covering the fuselage bottom, install the sheet with the grain across the fuselage, and allow the sheet to overhang on each side by at least a 1/16 to keep the covering material from adhering to fuselage side surfaces (see the section views).

All the engine cowl blocks can be cut from a single piece of balsa 2x4, 6 inches long, if you have access to a bandsaw. Otherwise, the four sides can be made up from a 1 x 4 x 12 inch plank. The four cowl blocks are faced with a circular 3-1/2 inch dia. x 3/8 thick cowl face, however, this piece can be made from 1/4 inch stock if you don't have any 3/8 sheet handy. Prior to installation of the cowl blocks, mount your engine temporarily and make the necessary cut-outs.

Mount the rear wing nut plate but DO NOT mount the front wing dowel plate at this time.

WINGS

All four wing panels are basically the same in their initial assembly, with one exception. Note on the plan that the rib positions are numbered from 1 to 11 starting from the center rib. Rib No. 3

on the top wing only, is cut from 1/8 inch poplar plywood, whereas the same rib on the bottom wing is 3/32 balsa. Prior to starting assembly:

Score the No. 1 ribs (all four), cutting partially through on both sides for the eventual cut out of the 1/8 inch slot for the center brace. This would be the vertical slot centered between the top and bottom main spars.

Drill 1/8 inch push rod holes in ribs No. 1 through 6, bottom wing only. See section details for both these operations. You might also want to mark the location of the bellcrank mounts between ribs No. 6 and 7 prior to assembly.

Below the full wing panel view on the plan, is a partial view of the opposite wing so that both right and left wings can be assembled, back to back, at the same time.

Start by laminating the 1/16 x 1/4 strip to one edge of the 3/32 x 3/4 strip for each of the four wing panels, to form the trailing edge stock.

Mount the trailing edge on the plan and hold in place with masking tape.

Prop up the bottom main spar on top of another 1/8 x 1/4 strip and position it over the plan, using a rib as a

gauge. Use masking tape to hold it in place.

Install rib No. 1 first, using the wing gauge to insure that the two top wing center ribs are vertical to the plan surface and that the two bottom wing center ribs are tilted 4° from vertical.

Install the No. 2 ribs. Remember, there is no webbing between the No. 1 and 2 ribs.

For the balance of the ribs in each wing panel, install alternately the 3/32 inch vertical grain webbing and the adjacent rib. To assure a strong wing, it is important that the top edge of the webbing is even with the base of the top spar cutout.

Before the wing panel is removed from the plan, all three top surface spars can be installed.

Remove the wing panel from plan, add the remaining two bottom surface spars, then install all the half ribs. Lastly, add the 1/4 inch square leading edge spars.

The wing tips can be added now. Use pieces of 1/4 x 1/2 strip for spacers between the No. 11 ribs and the smaller wing tip ribs. This completes the basic assembly of the four wing panels.

Top Wing Completion:

Install the four top wing mounting blocks flush with the bottom surface, in positions shown on the wing plan view and section view.

Cut out the center trailing edge portion of the wing and install the wing "cutout" pieces as shown on the plan.

Slot the previously scored center ribs, to accommodate the 1/8 inch ply center brace.

Install the "N" strut mounts flush with the bottom surface, in the positions shown between ribs No. 8 and 9. Notice that front mount has a 1/8 x 3/8 inch slot and the rear mount, a 1/16 inch drilled hole.

Sand the top surface of the trailing edge to a taper as shown in the wing section views, and finally, after carefully matching both panels together, join the two panels. The top wing has no dihedral.

Bottom Wing Completion:

Taper trailing edges with a sanding block.

With a razor saw, remove the aileron portions by cutting through the trailing edge along the outboard side of rib No. 3 and the inboard side of rib No. 11, then cut each rib along the back edge of the rear wing spars.

Using one of the 1/4 inch aileron end pieces as a template, mark and cut away, the front portion of each rib, then install the aileron ends.

Face both the front of the aileron ribs and the rear of the wing cutout ribs with 3/32 x 3/4 balsa.

Position and install the 1/8 x 1/2 ply bellcrank mounts between ribs No. 6 and 7 as shown on the plan and in sec-

tion. Install the aileron horn mount, also between ribs No. 6 and 7, flush with the bottom surface of the aileron. Add 1/8 inch sq. bracing to each of the mounts.

Sheet in the area along the bottom surface between ribs No. 6 and 7 from the bellcrank mount to the aileron frame.

Cut prescored slots between main spars in No. 1 ribs, carefully match up both wings, insert dihedral brace and join wing halves. The proper dihedral is 4° per wing panel, which is equivalent to 1-13/16 inch under each No. 11 rib.

Install the wing dowels, inserting the end in the holes in the dihedral brace and notching the leading edge if necessary, so that the dowels are approximately parallel to the chord line. Before the cement sets, slip the plywood leading edge mounting plate over the dowels to insure correct alignment.

Notch out the center ribs as shown in section, to accommodate the aileron servo base. Add servo plate and 1/8 inch sq. bracing.

N strut mounts are positioned flush with the top surface between ribs No. 8 and 9 this time, with the slotted mount to the rear and the drilled mount forward.

CABANE STRUT ASSEMBLY AND ALIGNMENT

Here's where you take your time and do a careful job, because the flight performance of the aircraft is very much affected by the alignment of all the flying surfaces.

Soft iron welding rod is available through any welding supply store or auto repair shop. Cut four pieces 8 inches long and bend a 1/4 inch I.D. eye in one end, then make the other two bends per drawing.

Next, from two 6 inch pieces, bend the angle braces. Clean all areas to be soldered with steel wool or fine sand paper. Insert, but do not cement, the four struts into the strut mounts. It may be necessary to clean out the holes with a 1/8 inch drill or small round file.

Attach the wire angle braces to the cabane strut by binding with fine copper wire. Solder only the upper front joint, not the lower rear connection.

Carefully draw a "T" shaped diagram on a large table or similar flat surface. Make sure the two lines are exactly perpendicular to each other. Place three pieces of masking tape on the upper side of the top line of the "T," about 20 inches apart, with the center piece located where the vertical line of the "T" meets the top. Place another piece of tape on the vertical line and 30 inches away from the tape at the intersection. Draw the vertical line on the two center tapes. Place top wing upside down on the table so that the leading edge lines up with the three front tapes and is centered on the middle tape mark.

Carefully place the fuselage upside down on the wing so that the cabane strut eyes line up with the wing mount-

ing holes. Prop the tail up so that the fuselage is approximately parallel to the table surface.

With the wing centered and lined up with the tape marks, and the fuselage tail in line with the mark on the back tape, adjust the four struts so that they line up with each of the holes. Bend or twist the eyes, if needed, so that they all seat flatly on the wing blocks. If they don't, when you tighten the wing screws, the wing will warp. Cabane strut alignment can be accomplished by sliding the unsoldered rear brace joint up or down the strut.

When everything is in perfect alignment, and the wing screws snugged down, solder the remaining angle brace connections.

With the structure still in position, place the bottom wing in its saddle. Carefully align the bottom wing so that it is square with the top wing. This can be done by standing a large triangle on edge so that the vertical side touches the leading edge of the top wing at the tip. Then measure the distance from the triangle edge to the leading edge of the bottom wing, and compare with the same dimension on the other wing tip and adjust as needed. Compare, also, the distance from each bottom wing tip to the table surface.

Make corrections for a good fit by sanding where needed from the wing saddles. When you can remove and reseat the wing in the saddle and it lines up with the top wing, then you're ready to secure the bottom wing.

Apply cement to the rear edge of the landing gear plate, slip the Leading Edge Mounting Plate onto the dowels and reseat the wing. Check the alignment once more and while holding the wing firmly in place, carefully slide the mounting plate up against the L.G. plate.

Estimate as closely as possible, the positions of the trailing edge screw holes over the holes in the mounting block and drill or cut out the holes in the trailing edge. With the wing in place and carefully aligned, cut away any material necessary from the holes, so that the bolts can be inserted without interference. The plywood wing reinforcement plate should be installed *after* the wing is covered.

With the wing and fuselage assembly still in place, assemble the two N struts over the plan. Bend four DuBro Gear Strap-on plates at right angles and screw into mounting plates on the wings, with the No. 2 x 3/8 s.m. screws.

Carefully insert the N strut assemblies and epoxy them to the strap-on plates.

LANDING GEAR ASSEMBLY
Bend the music wire struts per the drawing. The 5/32 main strut is 18 inches long and the 1/8 inch rear strut is cut 14 inches long. The optional 1/16 undercarriage struts are 9 inches.

Check alignment of wheel axles so that they are in line with each other.

An easy way to check this is to lay the strut on the table. It should come in contact with the table at all points. If you're pretty good at wire bending, you might improve ground tracking a bit by bending in a little "toe-in."

TAIL ASSEMBLY

Construction is simple and pretty self-explanatory. I find it easier to cover and/or finish all the tail components prior to mounting on the fuselage. Here again, it may be necessary to sand the surface of the stab support a bit so that when installed, the stabilizer will be absolutely parallel to the top wing. Needless to say, check vertical alignment when installing the fin.

COVERING AND FINISHING

Before covering the fuselage, carve or sand the engine cowl so that it transitions smoothly from the outline shown in the Firewall section, to the circular section at the cowl face piece.

I'm expert at finishing, so I always look for the fastest, easiest way, and to my knowledge this means the pre-colored iron-on plastics, or possibly the new Permagloss Coverite. This is where a biplane will cost ya! It takes a full sheet 26 x 72 to cover the wings, and most of a second sheet to finish the rest of the plane.

Cut the wing sheet into eight panels each 9 x 26. Cover the bottom tips, then the top tips, followed by the bottom panels, then the top panels, and finally the ailerons.

Cover the tail surfaces and the fuselage separately before assembly. The Fleet has no blending of the empennage into the fuselage, which simplifies the covering and is one of the reasons this model is easy to build.

When covering the fuselage, in order to get nice neat seams, I would suggest that the turtle deck and bottom be covered first, followed by the tank cowling, then the cockpit cowling, and finally, the fuselage sides. There are some compound curves on the fuselage sides, so be careful and do a good job of shrinking wrinkles.

I personally don't attempt to cover the engine cowl area. Instead, I prefer to seal the edges of the covering material with epoxy, and finish the cowl with several coats of wood filler and dope. **INTO THE HOMESTRETCH**

Cut the acetate windshield per the plan and install, using "Hot Stuff," plus one of the new trim tapes, such as Sig's Stripe Rite, or D J's Multi-Stripe.

These vintage pipes displayed their registration numbers on the upper right and lower left wings, and usually verti-

cally on the fin. The wing numbers are readily available in 3 inch decals at Hobby Shops, Sporting Goods Stores, and Hardware Stores.

After the wheels, engine and tank are mounted, check the balance point to see approximately where the battery pack and servos should be mounted. For initial test flights, it is O.K. if the C.G. (balance point) is a little forward of the point shown on the plan, but even if you have to add a half pound of lead in the nose, do not take off with the C.G. back of the point shown at least until after the plane has been flight tested.

The tank should be wrapped in foam and installed such that the tank's centerline (half full) is level with, or slightly below the center of the carburetor. Use foam and balsa scraps to secure the tank. There should be enough room below the tank to stow the battery pack. Wrap it too, in rubber or plastic foam, plus a "baggie," in case the tank springs a leak!

Use 1/4 x 3/8 spruce for servo rails, installed with adequate bracing at the fuselage sides so that they cannot jar loose.

OPTIONAL SCALE DETAIL

Many of the different models showed no headrest, so it is optional. The Fleet Model F-10-G was powered by an inline engine, so a clean cowl is in scale. But what really decorates this model is the five cylinder radial. Williams Bros.' 2 inch scale Wright J-5 cylinders fill the bill just fine. After assembling the cylinders from the plastic kits, cut off the bottom 1/2 inch, and carve or sand the base to fit the cowl. Fill the cylinder with a balsa plug and epoxy to the cowl. Remember, you are simulating a five cylinder engine with one cylinder missing because of the engine, so position them in "star" form.

Of course, nothing looks more ridiculous than a beautiful scale-like model flying by with two empty open cockpits (*Amen! wcn*). A 2 inch Williams Standard Pilot, (leather helmet and goggles) will solve that problem. On the other hand, a Barbie doll head is in scale too, and she's a whole lot prettier.

An instrument panel or two would look nice too. Use the 1/2 inch instruments commercially available, or go down to the news stand and check the latest issue of Flying. More often than not, Piper Aircraft runs a beautiful full color ad showing an instrument panel complete with switch panels and radios, and for a buck you get about 140 pages

of good aviation reading too.

Finally, no biplane should be without wing and tail wires. The simplest solution here is to go to any place that sells sewing materials. They'll have silver elastic thread. Cut the necessary pieces to about two thirds of the length needed, tie a small loop at each end and install when assembling the wings and N struts. Use the thread also, for tail bracing. When the thread gets dirty or stretched out it takes only minutes and pennies to replace.

Material list—

- 7 — 3/32 x 3 x 36 balsa
- 2 — 1/4 x 4 x 36
- 1 — 1/8 x 3 x 36
- 1 — 3/16 x 3 x 36
- 20 — 1/8 x 1/4 x 36
- 12 — 1/8 x 1/8 x 36
- 10 — 3/32 x 3/4 x 36
- 2 — 1/4 x 1/2 x 36
- 1 — 1/4 x 1 x 36
- 4 — 1/16 x 1/4 x 36
- 1 — 1 x 4 x 12
- 1 — 1/2 x 36 triangle
- 2 — 1/8 x 1/4 x 36 spruce
- 4 — 1/4 x 1/4 x 36 spruce
- 1 — 1/8 x 12 x 48 Siglite (poplar ply)
- 1 — 1/16 x 6 x 12 ply
- 1 — 1/8 x 6 x 12 ply
- 1 — 1/4 x 6 x 12 ply
- 1 — 1/4 x 12 dowel
- 2 — 3/8 x 5/8 slotted gear mount blocks
- 6 — 1/4 - 20 thd. maple mount blocks
- 1 — 5/32 x 18 music wire
- 1 — 1/8 x 18 music wire
- 2 — 1/8 x 36 welding rod
- 2 — 1/16 x 36 music wire
- 1 — 36" fine copper wire
- 6 — 1/4 - 20 x 1 nylon bolts
- 1 — Goldberg tailwheel bracket
- 1 pr. — aileron bellcranks
- 1 pr. — long control horns
- 1 pr. — short control horns
- 8 — DuBro Gear Strap-on w/screws
- 4 — No. 2 x 3/8 s.m. screws
- 1 — No. 4 x 1/2 s.m. screw
- 1 — set, engine mount screws & nuts
- Throttle, elevator & rudder push rods 2/fittings
- 2 — aileron threaded rods w/ links
- 2 — rolls, 26 x 72 covering material
- 1 — sheet acetate, .0075—.015 thick
- 1 pr. — 3 or 3-1/2" wheels w/ 5/32" collars
- 1 — 1" tail wheel
- 1 — roll 3/4" masking tape
- 5 min. Epoxy, Wilhold or Titebond
- 2 — 2 inch scale pilots
- 4 — 2 inch scale cylinders

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