

REX "GORDON BENNETT RACER"

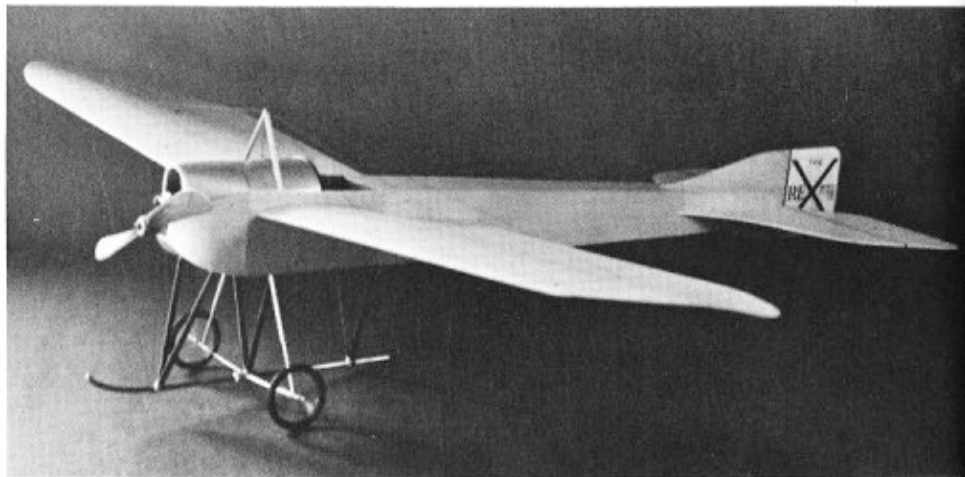
By W. C. HANNAN

Have you forgotten how to build a "model airplane?" For a change of pace and escape from multi bombs and logs on wires, this altogether charming little free-flight with thrust-limited .010 is a slow, relaxing flier. It survives all those mishaps, too!

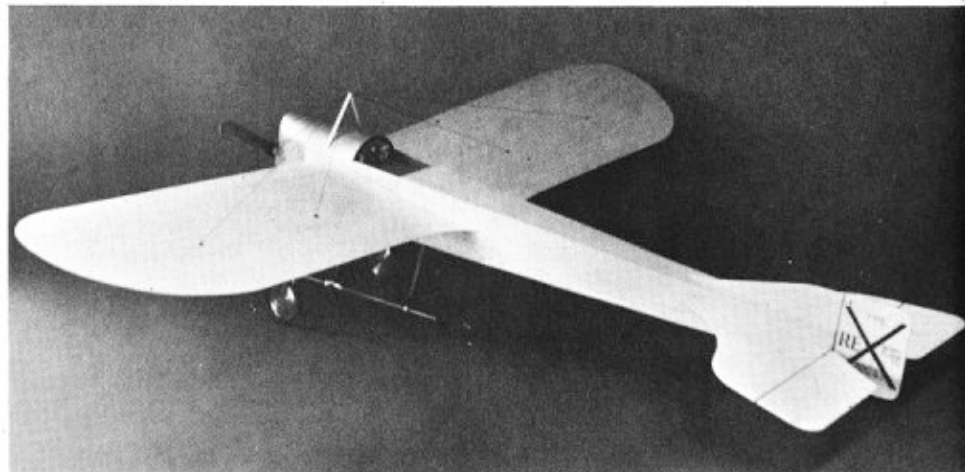
During May of 1912, an aeronautical exposition was held at the Grand Central Palace in New York. While this sort of show was fairly common in Europe, the New York show represented the first major U.S. attempt to assemble the products of a large number of airplane manufacturers for public viewing.

One of the most interesting machines on display, was the Rex "Gordon Bennett Racer." Its clean lines and progressive features made an immediate hit with the visitors. To fully appreciate the advanced design of the Rex, it should be recalled that the 1912 Wright Brothers' Biplane, which was also in the show, had a general appearance quite similar to their 1903 "Flyer." The Rex, therefore, reflected rather radical thinking for the era.

Among its noteworthy features was a streamlined fuselage with complete engine cowling (remember that most machines of the period still had their powerplants "out in the breeze"). The Nieuport-type of landing gear was equipped with telescopic shock absorbers in addition to rubber-cord suspension. The wing was notable for its highly reflexed airfoil, used to minimize center-of-pressure travel, thereby reducing stalling tendencies. According to theory, this principle works well, but



In box-kite days, streamlined Rex was hit of 1912 Aeronautical Exposition.



All sheet-balsa construction avoids complicated framework typical of scale. Simulated spoke-type wheels described in text.

reduces the overall efficiency of the wing. In planform, the wing appears rather unusual today, because of the wide chord near the wing tips. This was intended to improve lateral control, by making the wing-warping more effective (same effect as larger ailerons).

Although the Rex was meant to be a contender in the Gordon Bennett Race, it never made the line-up, and its eventual fate is unknown to the author.

The Model: Most avid scale modelers have a huge backlog of aircraft that they plan to build "some day." Unfortunately, really scale "Nats-type" models take months to build, and it is often difficult to stay interested in a given subject for that length of time. In

addition, structural information is not always available for some otherwise highly appealing airplanes.

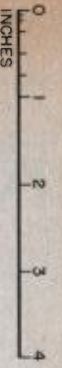
The all-sheet approach to scale modeling enables one to retain scale outlines, without the tedium of constructing complex, time-consuming internal framework, and offers a refreshing change-of-pace from the super-detail projects. It is surprising how pleasing even a relatively simple model can be made to appear, by paying proper attention to the execution of external details. Put a little fun in your scale modeling, try an all-sheet!

Fuselage: The bulkheads are made from fairly hard 1/16-in. sheet balsa, with the

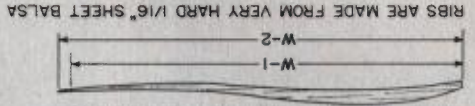
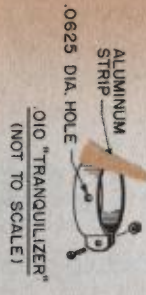
(Continued on page 65)

AMERICAN MODELER

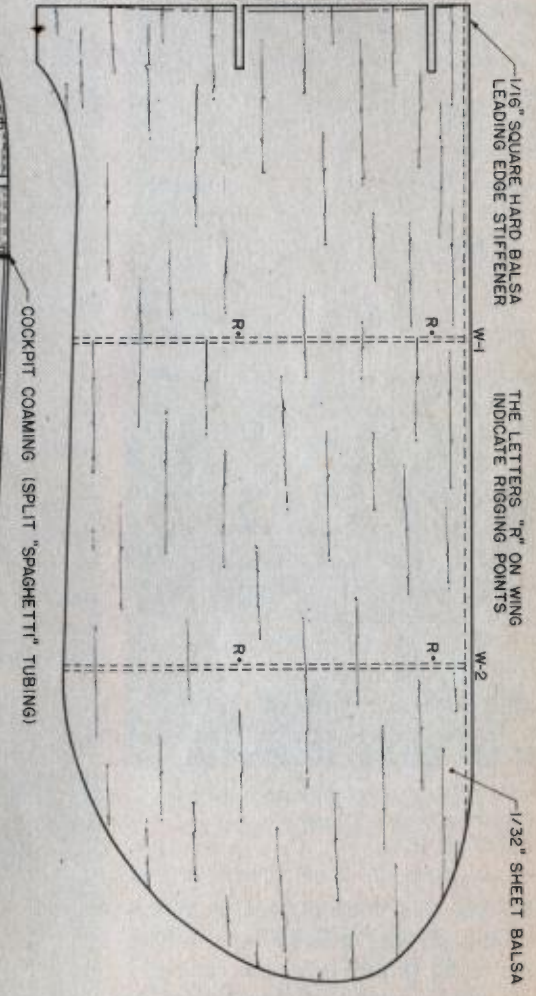
Unique is an illusion of a super-detailed construction. Cowl is silver MonoKoted.



SECTION VIEW AT A-A



WING MUST BE TRIMMED TO FIT SNUGLY AGAINST OPPOSITE WING BY TRIAL. A STRIP OF SILK IS GLUED OVER THE JOINT DURING ASSEMBLY.



1/16" SQUARE HARD BALSAL LEADING EDGE STIFFENER

THE LETTERS "R" ON WING INDICATE RIGGING POINTS.

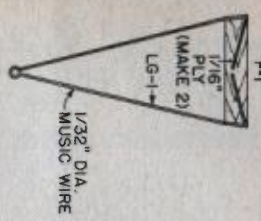
1/32" SHEET BALSAL

DIHEDRAL: 1" EACH TIP

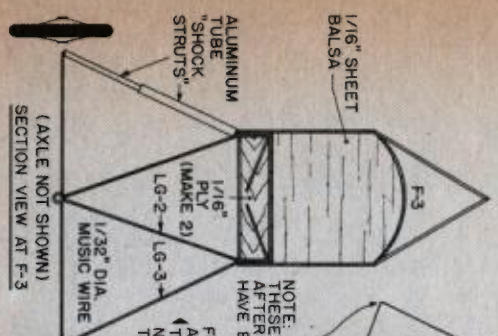
1/16" SHEET

BALSAL SPACERS

REFERENCES:
AERO MAY 18, 1912
AERO JUNE 1, 1912
(COURTESY OF WM. N. FLEMING, N. J.)
AIRCRAFT JUNE, 1912



TOP VIEW, AXLE (1/32" DIA. MUSIC WIRE)

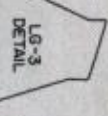
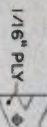


NOTE: THESE BENDS ARE MADE AFTER ALUMINUM TUBES HAVE BEEN INSTALLED.

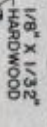
FOR CLARITY, ALUMINUM TUBES ARE NOT SHOWN ON THIS SIDE.

(AXLE NOT SHOWN) SECTION VIEW AT F-3

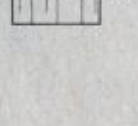
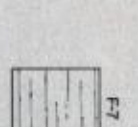
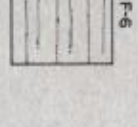
REMOVABLE BALSAL BLOCK UPPER COUPLING



WALNUT VENEER F-4



FUSELAGE SIDES, TOP AND BOTTOM ARE 1/32" SHEET BALSAL FUSELAGE FORMERS F-6 THROUGH F-9 ARE 1/16" SHEET BALSAL



BALANCE POINT

LG-2 FITS IN CENTER OF LG-3 (SEE SECTION VIEW AT F-3)

1/8" X 1/32" FAIRINGS (TYPICAL ON LG-1, LG-2, LG-4)

1/16" PLY

1/32" DIAMETER MUSIC WIRE

ALL WIRE LANDING GEAR COMPONENTS ARE BOUND AND SOLDERED TO SKID

SEE TEXT FOR INFO ABOUT PSEUDO-SPOKE WHEELS



1/32" DIAMETER MUSIC WIRE

1/32" SHEET



the REX mono

* Drawn by W. C. Hannan *

exception of the firewall and landing gear mounts, which are made from 1/16-in. plywood, Select a medium hard sheet of 1/32-in. sheet balsa for the fuselage sides. Note that the forward (cowling) portions of the sides are separate pieces, with the grain vertical to ease the job of bending them around the rather tight nose radius. Be careful when cutting the slots for the wings and stabilizer to insure exact alignment in the two sides. Starting at the rear, install the spacer blocks and then the bulkheads, checking the assembly for squareness with a triangle. When all of the bulkheads are installed and dry, cover the bottom of the fuselage from F-5 to the rear with 1/32-in. sheet balsa. The remainder of the bottom and top are left uncovered until later.

Landing Gear: This is the most complex feature of the model, and the wire parts must be bent carefully to secure good results. Note that the aluminum tubing which represents the "shock struts" must be installed prior to making the lower bends on LG-3. While it would be possible to make operating shock struts, ours are "for looks" only, and springing is achieved by leaving the ends of the axle free to flex upward in front of the shock struts. (Sneaky, what?)

Install the vertical members of the landing gear between the 1/16-in. plywood "sandwiches", and glue generously. Slide the 1/16-in. diameter music-wire skid through the lower openings in the landing gear legs to hold them in line while the glue dries. When thoroughly dry, wrap a few turns of fine copper wire around the skid at the junctures of each landing gear leg and solder. Next, bind and solder the music-wire axle to the skid, immediately forward of LG-2.

The remainder of the fuselage bottom sheeting now may be installed. A good approach is to cut paper patterns to determine the size needed for an exact fit between the landing gear legs, and then to cut 1/32-in. sheet balsa to match.

Wheels: Much of the charm of any vintage model is created by spoke wheels. However, the task of fabricating genuine wire wheels is a demanding one, and consumes more time than many of us care to spend. We therefore suggest that you try "pseudo-spoke" wheels, which are quite easy to make, and yet give a realistic effect. The tires for our wheels are from an Erector set, and feature a nice tread pattern. The real key to their adaptability is the groove on the inside of the tire (see cross section on the plans). This enables them to be a secure fit when stretched tightly over the wheels.

The wheels may be made in either of two ways; if you have access to a lathe, they may be turned from clear plastic rod to the shape shown in the cross section drawing on the plans. Some fine polishing compound will restore the transparency of the plastic, after the turning operation. The other approach, is to make a wooden mold of half of the wheel, and use it to vacuum-form wheel halves from clear plastic sheet. We used a Mattel Vac-U-form

toy for this, and achieved good results. If you wish, you may draw spokes on the inside of the two plastic halves of each wheel, with a ruling pen and silver paint. However, the effect is quite realistic even without them. Small brass eyelets are glued into both sides of each wheel to serve as bearings. While you may prefer to glue the wheel halves together, we just let the tight-fitting tire serve the purpose.

If the above methods still seem like too much trouble, you might hunt around for a suitably sized set of spoke wheels from a plastic car kit! Incidentally, do not try to retain plastic wheels to the axle with solder. The heat of the soldering iron will melt or distort them.

Wings: Select a 5-in.-wide sheet of medium-hard 1/32-in. sheet balsa for the wings. After cutting the panels to shape, glue on the 1/16-in. square hard balsa leading edge stiffeners. When the leading edges are thoroughly dry, the wing ribs, which are cut from very hard 1/16-in. sheet balsa, may be added. Pre-gluing of the ribs is recommended to increase the strength of the joints. Our wing ribs were hand-held while they were drying—a slow process, but one which leaves the panels free from pin-holes, etc.

The rigging points, indicated by the dot marks near the "Rs" on the wing drawing, should be carefully pierced with a needle. Be certain to apply a spot of glue top and bottom of each opening where the rigging will be. For extra reinforcement, tiny eyelets may be inserted in the wing, or cloth patches may be used. The object of all this is to keep the thread rigging from slicing through the balsa wood wings during hard landings.

When the wing panels are dry, cautiously slide them into the slots in the fuselage sides. It will be necessary to trim and sandpaper a slight concavity into the wing roots, by trial-and-error, until the panels butt snugly together in the center of the fuselage. Also check to see that the dihedral angle is correct. When you are satisfied with the fit and alignment, glue the wing in place, adding a strip of silk over the center junction. The fuselage top sheeting may now be installed.

Tailplanes: The stabilizer is cut from light but stiff 1/16-in. sheet balsa. Note the direction of the grain, which contributes greatly to the strength and warp-resistance of the unit.

The fin and rudder are made in one piece from medium-hard 1/32-in. sheet balsa. When installing the tailplanes, check the alignment critically, and make any needed corrections. Note that the music wire tail skid fits *alongside* the rudder so that its lower portion is free to flex rearward.

Engine and Cowling: The upper engine cowling is carved from a balsa block, as shown on the plans, and may be held in place with your favorite system. Frankly, I'm still looking for a completely satisfactory answer to this problem, having rejected rubber-bands, dress-snaps, etc. A wire clip is grudgingly doing the job on the proto-

type model. The upper cowling is removed for fueling and starting operations, in preference to drilling unsightly holes for fuel hoses and glo-plug wires. Do however, drill a couple of small holes in the lower cowling, to permit the "bilge" to drain.

The instrument panel details shown are strictly guess-work, but represent a tach, oil pressure gauge, and roller-map, which is typical of the equipment carried by many aircraft of the period. A dummy pilot would also make a pleasing adjunct.

Finishing: Apply three or four coats of thin, plasticized clear dope to the entire model. What we are after here, is a lightweight, fuel-proof sheen, rather than a glossy "concourse" shine. The fuselage from the rear of the cockpit to the front is covered with tissue to fill the balsa wood grain, then painted aluminum. The new MonoKote covering, which is available in silver, might find application here. Next cut small notches on both sides of the upper fuselage covering over F-3, to accept the pylon which supports the upper rigging. Installing the pylon earlier would have complicated the sanding and painting of the upper fuselage.

The cockpit interior is painted a flat medium gray to add visual depth. The Rex "commercial" on the rudder may be drawn with a pen and black ink on thin tracing paper. By covering the entire rudder with the tracing paper, a clean, neat job will result, with much less effort than trying to use decals or hand painting. A coat or two of clear dope will protect the lettering.

Rigging: The wing rigging is made from black silk thread, and is functional in that it contributes to the rigidity of the model. An advantage to rigging is that it may be used to correct small warps that may have occurred in the wing panels. Merely hold the offending portion of the wing a little beyond the desired position, and apply a drop of glue at the appropriate spot where the rigging passes through the wing, and hold until dry.

Flying: Add clay as required, until the model balances at the point shown on the plans. Wait for a calm day for the test flights, as this model has a low wing-loading, and is really tossed about by gusts of wind.

Hand glide your Rex over the proverbial "soft landing area", making minor adjustments until a smooth descent is achieved. In order to obtain slow, realistic flights, we

(Continued on page 68)

installed an exhaust restrictor on the Cox .010. This is simply a thin ring of aluminum clamped around the cylinder, in order to cover the exhaust ports. The total area of the new exhaust outlet then consists of a 1/16-in. diameter hole (plus leakage, of course!). With this modification, taken from the pages of *Aeromodeler* magazine, the power output is reduced to about that of the old K & B Infant (which is not much!—Editor) We also put the prop on backwards. The outcome is really slow, relaxing excursions. At this speed, it becomes rather unimportant if the model is slightly out of trim—at least when it comes down, you will have something left to adjust! Oh yes, if you should happen to suffer a "prang", white glue will provide a quick, nearly invisible field repair.