for Rubber Scale . . .

a Miles M.5 Sparrowhawk

By Larry Kruse

Sleek and graceful lines of a prestigious race plane helped capture 2nd place at the 83' Nats.

PHOTOGRAPHY: LARRY KRUSE

You don't have to look at the Miles M.5 *Sparrowhawk* very long to realize that someone with excellent aesthetic taste was involved in the overall design process. From its sleekly cowled engine to its gracefully tapered rudder to the wrap-around wheel fairings that give it such a unique appearance, the plane exudes class and style. The arbiter of the *Sparrowhawk's* class and style was none other than Blossom Miles, the wife of aircraft manufacturer F. G. Miles, who undertook to prepare the necessary drawings that would produce the aircraft just eight weeks before it was needed for the prestigious King's Cup race in 1935.

Altogether six *Sparrowhawks* were built. Subsequently, Blossom Miles' beautiful design enjoyed racing success from its inception through 1957, when the prototype G-ADNL, presented here, was converted to the M.77 *Sparrowjet*. The 22 year old aircraft, then powered by two Turbomeca Palas turbojets, became the first jet powered aircraft to win the King's Cup at a speed of 228 MPH. Sadly enough, after a long and useful career, the ship was ultimately destroyed in a hangar fire in 1964.

Its timeless beauty is still with us though, and it was this visual appeal that prompted me to select it as a rubber scale project for the 1983 Nats. With the good and timely help of Allan Schanzel, the maestro of "Max-Fax", I was able to obtain the necessary documentation for the aircraft. Only the stabilizer area and a slightly increased dihedral deviate from the 3-view presented in Don Brown's *Miles Aircraft Since 1925*.

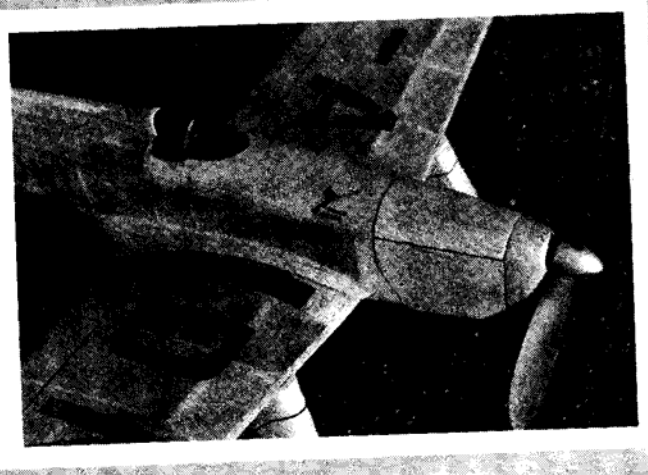
Construction notes

While construction is much as you would expect of a scale freeflight design, I did elect to make the wings removable in order to ease packing problems during our Nats trek from Kansas to Massachusetts and back. The removable wing is shown, but you're certainly not committed to build it that way. Just omit all the 1/16" fastening cross members in the wing center section and the fuselage bottom, substitute 1/16" square cross pieces for them and glue the wing into the fuselage saddle after both wing and top of the fuselage are covered. You'll probably even save a bit of weight by omitting the removable feature.

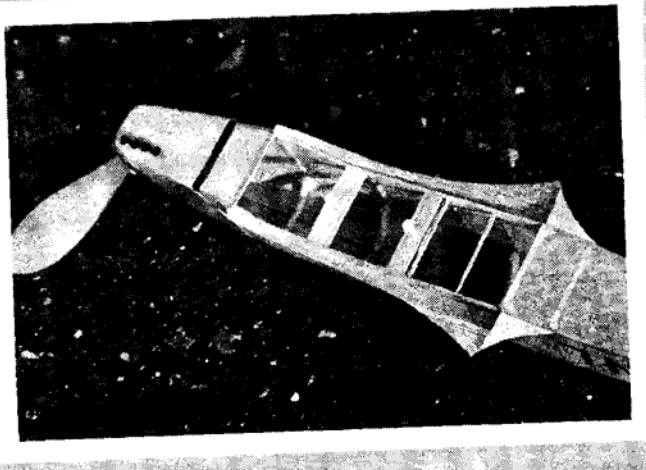
Cutting wood begins with pre-forming the wing tips and rudder outline prior to gluing anything to anything. Although the prototype used built-up wing tips and rudder outline, laminated tips could be used. A minimum of three layers of 1/32 x 1/8 inch balsa will be needed to allow enough material to sand to contour prior to the finishing stages.

Fuselage and flying surfaces

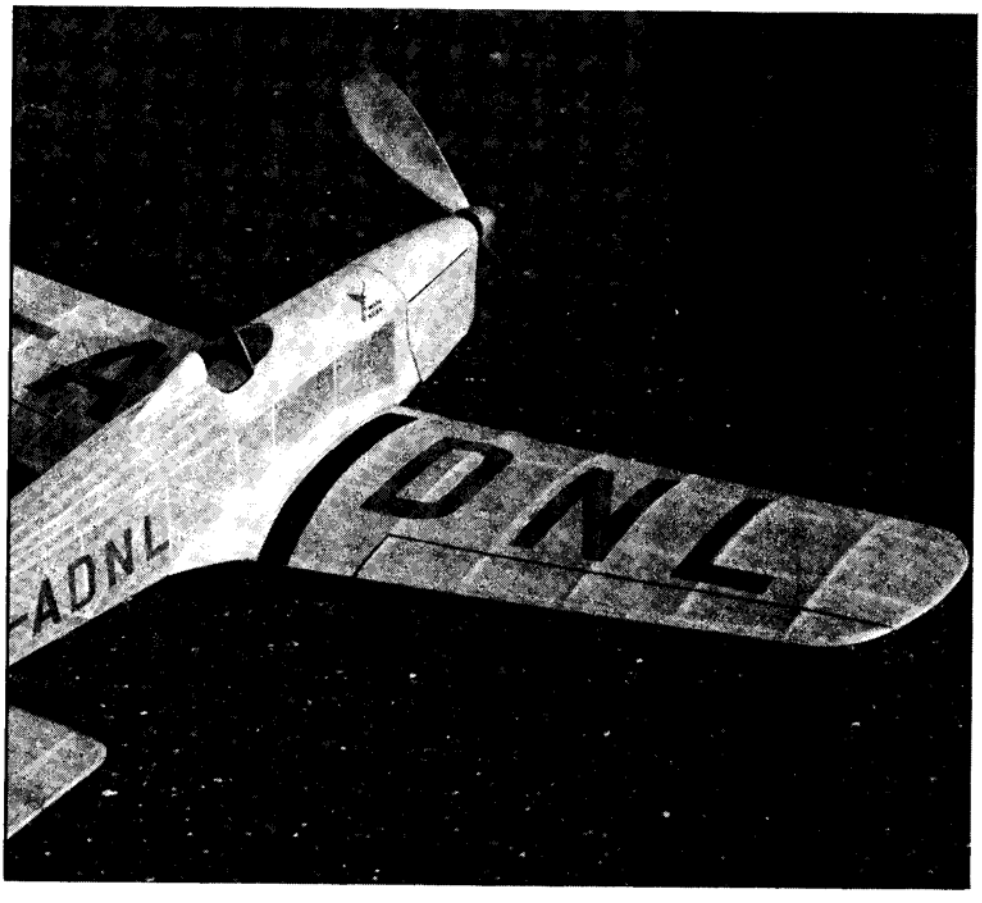
As the wing and rudder pieces dry, you can frame up the fuselage. Obtain four evenly matched pieces of 1/16 inch, square basswood from your local model railroad supplier to be used for fuselage longerons. If basswood in various sizes is not part of your wood bin, it certainly should be. It offers tremendous strength to weight advantages over balsa in certain applications such as this. An equivalent size balsa longeron on this plane simply



Hand lettering and tissue trim dress up the model and make it come alive. Cowl is of 1/32 balsa sheet, wrapped around structure.



Prototype was built to have removable wings to minimize transportation damage. View shows nylon bolts and hold-down crosspieces.



would not have sufficient strength to handle either motor requirements or the shrunken tissue covering.

Fuselage sides can be built one on top of the other. Notice that all fuselage pieces other than the longerons are "C" grain balsa. Make everything light, aft of the wing saddle to avoid unnecessary clay ballast in the nose later. After the fuselage "box" is formed, add formers 1 through 10, sheet the cowl/cockpit area, and glue the aft stringers in place. Go slowly at this process, starting with the center stringer and then alternating stringers on each side. Be very conscious of any twisting that might occur during the procedure and correct it by removing the errant stringer. If you're a Hot Stuff™ fan, this is a good place to set it aside and use Ambroid or a similar cement which allows some adjustment and alignment time.

The noseblock can be laminated as shown. Hollow out the air intake for realism, install the small aluminum tube that's just visible inside the intake and drill the noseblock to accept the prop bearing assembly. That two piece assembly is of .040 aluminum shaped with jeweler's files. Drill out the holes for the shaft in both pieces and bend the front plate as shown. The hole for the set screw should be carefully drilled with a bit smaller than the screw size you're using. The screw is then turned into the hole as far as it will go, backed out, and the hole filled with Hot Stuff. The Hot Stuff will solidify the screw threads set into the wood and keep you from stripping the thing out later. Be sure the Hot Stuff is *dry* before replacing the set screw in the hole. Properly set up, this assembly offers precise thrust adjustments without the use of thrust wedges or shims of any kind. Check it periodically to make sure it hasn't been jarred out of position by a hard downwind landing.

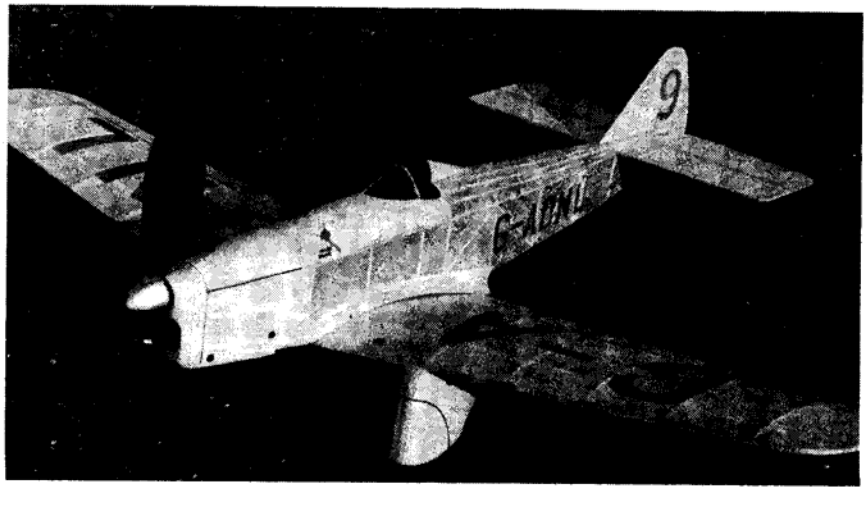
The wing is built around two pre-cut spars, one panel at a time. Pin down the 1/16 inch, square bottom rib pieces, the leading and trailing edges, and the wing tip pieces of either wing. Shim the tip pieces to the appropriate height to allow for the tip taper. Pin the front and rear spars into their respective locations and secure them with a small drop of Hot Stuff at each rib location. The solid ribs can then be added as per the plan, and then the strip ribs should be cut to length and glued in place. Cut off the back of each rib in order to get it to length. This procedure will provide automatic tip wash-out for each panel.

Unpin the finished panel when it's dry, lift it up, and repeat the above procedures for the second panel. Build the center section when both main panels are complete. Carefully sand the leading and trailing edges to shape. Use a template for the leading edge, if necessary. The resultant structure is both light and strong and is now ready for covering as soon as the landing gear wires are installed. Do not install the wheel fairings until the wing panels are covered and doped. The exact installation procedure will be explained later in the text.

The rudder and stabilizer are built flat on the plan. With such a long tail moment, the *Sparrowhawk* must be kept light, in these areas, so choose some of your best light "C" grain. While hinging the tail surfaces with soft copper wire is not mandatory, it is certainly recommended for ease of adjustment. Using the thrust bearing shown and hinged tail surfaces, there should be no need for shimming or warping any of the surfaces. The only add-on element on the prototype was a small bond paper tab glued to the bottom of the left wing panel to keep it up during the left-hand power pattern.

All structures should now be sanded carefully and thoroughly with 320 grit paper to eliminate glue bumps and any other trash collected during the construction process. Brush three coats of full strength dope onto the bare wood framework and allow each coat to dry completely. Lightly sand the framework again after the third coat of dope is dry to remove all the balsa fuzz.

A 50-50 mixture of white glue and water is the best covering adhesive I've found, but you may want to use the more traditional thinner and dope method. Cover all surfaces with light weight tissue. I used an off-white from Peck-Polymers. To me, off-white is just as close to the cream color of the original G-ADNL as is the yellow used by some modelers on their Peanut scale versions of the *Sparrowhawk*. I suppose it's academic whether you miss accurate color replication from one end of the color spectrum or the



Three quarter front view shows the light, well-stressed construction. Markings are simple but effective and the hollowed-out spinner and the landing gear fairings serve to help the aesthetic appeal.

other.

Shrink the tissue by misting rubbing alcohol through an atomizer of some type, not directly onto the covered surfaces, but across them, letting the spray fallout do the actual wetting of the surface. Three coats of nitrate dope thinned 60-40 will seal the tissue and give it some sheen.

Wheels are laminated from 3/32 inch balsa laid up cross-grained with cardstock circles used to simulate the metal wheel itself. Testor's "Rubber" was brushed on to simulate the rubber tire portion. Wheel fairings are of 1/32 inch balsa. Cut out two blanks as shown and let them soak in hot tap water for about 20 minutes. Glue the 1/16 inch fairing formers in place on the bottom of the wing, install the wheels, and then carefully wrap the fairings around the fairing formers, spot gluing as you go. When you've come full circle, so to speak, the trailing edges of the fairings should be glued together, trimmed to shape, and sanded lightly. For the sake of strength and flexibility, I did cover the fairings with tissue since they do take considerable abuse in landing. While I've had no real problems with the fairings, I have thought several times that they might have been more attractive and less trouble made of light cardstock. Choose your own method.

If you want to be perfect in the color department, lightly airbrush an almost dry coat or two of thinned Aero-Gloss cream dope over all surfaces at this point. Registration numbers, the tiny logo *Sparrowhawk*, and the wing walk were all done with tissue. Panel lines were done with a steel straight edge and a black "Sharpie" pen.

The remaining items include the windshield, cockpit coaming, headrest, and all control horns. Make up and/or install each as per the plan and your *Sparrowhawk* is complete.

Flight trimming

Make up a motor of four strands of 3/32 inch FAI rubber approximately one and one half times the length of the fuselage and braid it to keep it from flopping around as it unwinds. After the motor is installed, balance the model at the point shown by adding clay to the inside of the lower cowl. Test glide the ship over as soft and forgiving a surface as you can find. The glide should exhibit no tendency to dive or stall after you launch it, but should settle gracefully on its wheels 25 to 30 feet from you after a shoulder high launch. If it does dive, bend the elevator up slightly; if it stalls and you've balanced it correctly, bend the elevator down a bit.

Begin power flights by setting the thrust bearing for about 3° down and 3° right thrust. Bend in no more than 1/16 inch left rudder and wind in about 200 turns by hand. Follow the same process you did in glide trimming. Release the model with the nose slightly down. It should climb slightly and turn to the left a bit. Add another 100 turns and try it again. The only thing you have to watch for is a tendency of the left wing to drop as the number of turns are increased. If it does, add a bond paper tab to the bottom of the left wing as I did with the prototype.

I've had many positive comments from fellow modelers about the *Sparrowhawk's* flat turns and stable flight characteristics. The secret is all in the trimming. Go at it slowly and methodically, making one change at a time. I have been able to obtain reliably repetitive dead air flights of over 75 seconds ROG with a four strand motor of 1/8 inch FAI rubber cranking in 1400 turns. By all means, use a winding tube as you build turns, even if you don't plan on winding to the max. I've had many a motor let go just barely half wound.

I hope the *Sparrowhawk* pleases you as much as it has me. Aesthetically and in performance terms, Blossom Mile's little airplane will be a fine addition to your stable.

Author's wife Cel, pretties up the *Sparrowhawk*. The full scale plane had a long and impressive life and was ultimately converted to a jet powered racing plane. It met an ignominious end in a 1964 hangar fire.

References:

Don L. Brown, *Miles Aircraft Since 1925*, Putnam and Co., London, n.d., pp. 89-94.

D. M. Collin, "Miles M.5 Sparrowhawk", *Aeromodeler*, Jan., 1971, pp. 16-17.

H. J. Robinson, "Miles M.13 Hobby", *Aeromodeler*, April, 1970, p. 211.

Smithsonian photo files courtesy of Allan Schanzle.

The *Sparrowhawk*'s planform is perfect for rubber power. Ample wing and stabilizer area assure rewarding and enduring flights. The secret is all in the trimming. Do it methodically, one change at a time.