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F-PPEZE

PILOT'S CHIEF

F-PPEZE

a Rubber Scale:

Dalotel DM-165

By Larry Kruse

Discovered by the R/C brethren,
this French aerobat translates
into a nifty scale freeflight

Existing for a number of years now as a popular subject for R/C turn-around pattern flyers and even some sport scale enthusiasts, the *Dalotel DM-165* is little known in freeflight circles. As I began trying to gather data for my scale presentation prior to beginning design and construction work, I stumbled into roadblock after roadblock. Many of my usual sources were not even familiar with the airplane, despite its R/C exposure. Even after the model was completed and entered in contests this past season, many people came up to me asking what it was, or hazarding a guess that it was some variation of a Zlin.

While there is some superficial resemblance to a Zlin *Akrobat*, the little *Dalotel* has a unique charisma of its own and makes a

charming and competitive rubber scale model. Originally designed by M. Michel Dalotel as a tandem two-seat advanced trainer and aerobatic aircraft, the first *Dalotel* (F-PPZE) was produced by the French Societe Poulet Pere Et Fils Arl in April of 1969. It was intended to be a low-cost production aircraft easily broken down and transported by road when necessary.

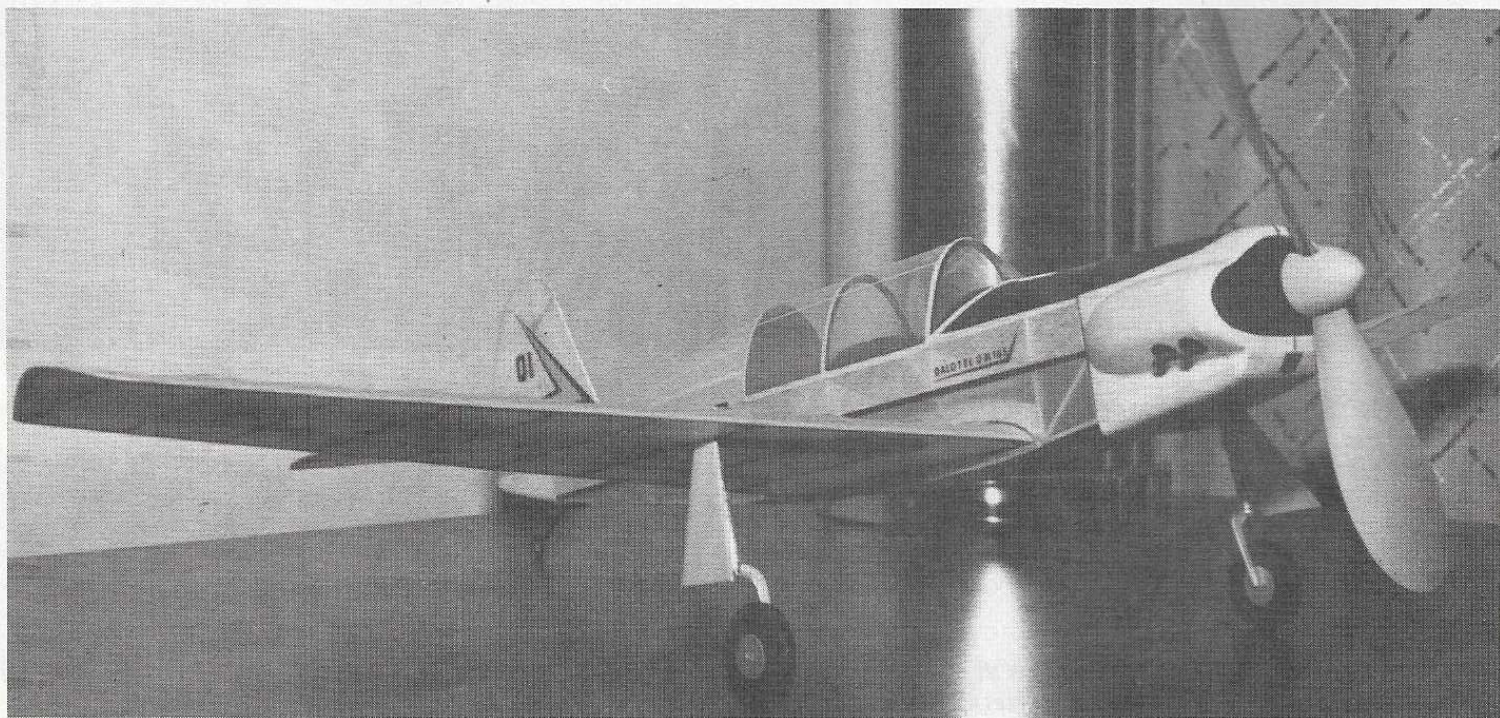
Documentation for the model, after several fruitless searches up blind alleys was ultimately provided by three sources. Dick Hanson, of Dick Hanson Models, who kits an R/C version of the craft, was helpful in providing a flight photo of the prototype. *Jane's All the World's Aircraft 1972-73* and *1973-74* gives a brief technical description of the plane and two static photos. The bulk of my material,

however, came from the collection of Tom Schmitt of the D.C. Maxcuters, who was kind enough to lend me a copy of the French model publication *MRA: Le Modele reduit d'avion*, No. 516, dated November of 1982. For Tom's help I am deeply indebted.

Based on the above documentation, the model follows the structural outline of the *MRA* 3-view which was enlarged photographically. Since the full-scale craft is covered primarily with a stressed plywood skin, the 3-view did not include such structural details as rib placement, cross-member locations, or fuselage interior structure. Therefore, I cannot make any statement as to the accuracy of duplicating interior structural features. The plane was engineered for lightness and structural integrity. At an all-up

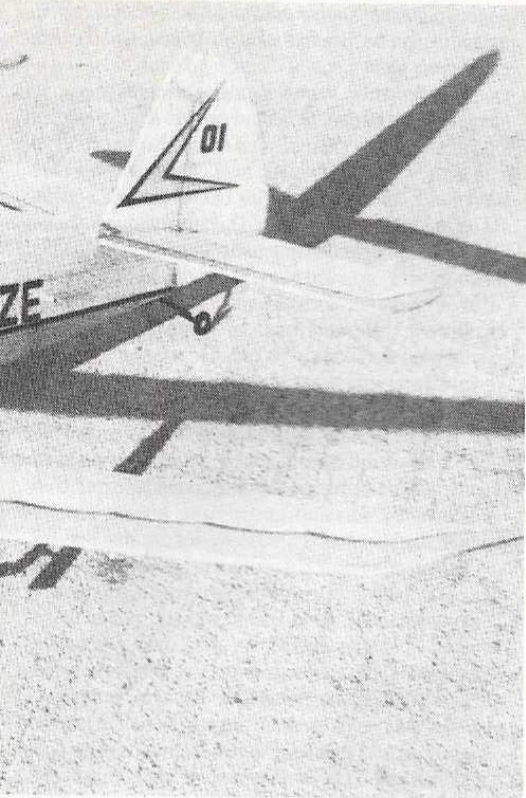


PHOTOGRAPHY: LARRY KRUSE



In radio control circles, the French *Dalotel* has become increasingly popular and proven itself as a competitive and airworthy design. Author Kruse has

translated that capability into this little free flight design. The lines are angular but pleasing, very reminiscent of the Czechoslovakian *Zlin*.



weight of $\frac{3}{4}$ ounce without the rubber motor, it has been successful on both counts.

The only scale deviations consciously intended were the enlargement of the stabilizer (approximately 15%) and an increased dihedral angle which places the wing tips at the same level as the mean thrust line. Years of

experience have shown me that such a practice makes trimming a low-wing ship much less aggravating.

As indicated in the *MRA* color photo, the craft features a white and yellow paint scheme, accentuated by black trim lines. The model holds true to the prototype's color scheme by the use of white, yellow, and black tissue. In all, it's an attractive little craft and one that's relatively easy to build.

Construction sequence

Since weight, or more properly lack of it, was a concern throughout the design process, wingtips and rudder and stabilizer outlines were laminated around balsa forms using three $\frac{1}{32} \times \frac{1}{16}$ inch balsa strips. Cut several such strips from a sheet of lightweight A-B grain wood and soak them in hot water laced with ammonia for about 30 minutes. Select a pattern form and cover it with Saran Wrap, then apply Elmer's Glue full strength to one side of one of the strips. Now carefully *pull* the strip (glue side out) around the form and pin the ends in place. Pull a second strip around the first, add glue, and pull the third, using straight pins at $\frac{1}{4}$ inch intervals to keep all three strips in contact and pressed against the form. Repeat the operation for all other laminations and let them dry at least 48 hours.

While the laminations are drying, you can begin laying out the $\frac{1}{16}$ inch square fuselage sides. Note that the fuselage longerons are of basswood. Do not substitute balsa in this critical area. Select four closely matched basswood strips and pin two of them down to the plan. Add the necessary uprights, wing

mount saddle, and sheet fill to complete one fuselage side. Remove all pins, cover the first side with Saran Wrap, and build the second side directly on top of the first, re-positioning the pins in the holes from whence they came.

After the second side is dry, take them both from the board, trim them a bit to remove any excess gobs of glue, and form up a box with the center cross-pieces shown on the plans. Making certain the box shape remains square, pull both the nose and tail sections together and add the remaining cross-pieces and sheeting to complete the basic fuselage structure. Add the superstructure formers and sheet the area ahead of the cockpit. Turtledeck stringers are $\frac{1}{20}$ inch square and are installed by eyeballing them to keep the assembly straight. It's probably easiest to set the top stringer in place first, then alternate subsequent stringers down the sides of the formers. Taper all stringers at the rear to effect a smooth fit.

The noseblock and cheek cowls need to be sawed and carved to shape next. Make the cheek cowls from light, soft balsa, and hollow them out for additional weight reduction. The thrust bearing arrangement shown on the plan will allow an infinite range of adjustment; however, you may use a large Peck-Polymer's nylon bearing set at 4° right thrust and 3° down, if you prefer. I like the adjustable bearing arrangement best because it avoids unsightly and unreliable external shims. For that same reason, the rudder and stabilizer are built as hinged components.

The canopy is actually quite simple and requires no molding. It is comprised of two



"Let go, did you say Larry?" Cel Kruse, the author's lovely helpmate ponders the wisdom of such advice at this critical moment in the winding procedure. As will be seen, her concerned query is well-founded.

pieces of light celluloid - one for the windshield and one for the rear portion. Both are attached to two canopy bows which can be sawed out of $\frac{1}{32}$ inch plywood and epoxied in place. It's probably easier to install the instrument panels (front and rear) first before gluing in the bows. Wait to install the celluloid until after the plane is covered with tissue.

As the plan shows, the wing has a tapered leading edge and a straight trailing edge. Again, for ease of construction and weight savings, I elected to use $\frac{1}{20}$ inch strip ribs and two internal spars. Such a structure is both lightweight and tidy in construction. The only solid ribs are those at the landing gear location and the root ribs at the wing saddle.

Cut out the solid ribs and strip half-a-dozen more curved rib tops than you think you'll need out of $\frac{1}{20}$ inch "C" grain. Cut the spars out of similar weight and grain $\frac{1}{16}$ inch sheet. Check the spars after cutting them out to make sure they didn't stress-relieve excessively. The wing will only be as straight as the spars are. Pin down the leading and trailing edges for one wing panel. Follow that by pinning down the $\frac{1}{20}$ inch square rib bottoms. We now have a platform for gluing both spars in position. As you pin each spar down at 90° to the work surface, one end will be sticking up in the air. It's awfully easy to hook those suspended spar tips with a shirt sleeve or bump them with a forearm, so do be conscious that they are there.

Install the solid ribs and the curved rib tops beginning at the root of the wing and working out toward the tip. Cut the curved rib tops off at the trailing edge as the wing chord gets smaller. Installation of the tip piece will complete the panel.

Remove the pins from the completed panel and repeat the construction process for the second wing panel. It is imperative that the spars again be placed at 90° to the building board or you'll build in a torsional warp which will doom your *Dalotel* to the dumpster. After the second panel is complete, sand the entire wing carefully and install the .015

landing gear wires. Gear doors and strut fairings can be left until after covering, as was the canopy.

Tail surfaces are self-explanatory and are built flat on the building surface. Both the rudder and stabilizer make use of numerous gussets which should be rounded out with a jeweler's file to conserve weight and improve appearance. I like the double-sparred surfaces shown for ease of flight adjustment. If you can't find the soft copper wire needed for the hinges, the wire from a sandwich bag twist-tie can be used. Another alternative, of course, is to omit the double spars and build a single spar structure, in which case you

would want to lengthen the crosspieces accordingly to bridge the gap created by the missing spars.

The spinner, wheels, and exhaust pipes are the only structural features left and are made from balsa. Wheels can be laminated as shown with hubs prepared from card stock. Wheel bearings are .015 ID aluminum tubes. The spinner was spun (heh-heh) on my drill press using an $\frac{1}{8}$ inch dowel for a mandrel. When the outside was brought to shape, the dowel was sawed off and the inside of the spinner hollowed out to allow the prop to free-wheel. Exhaust pipes were made by rounding a piece of $\frac{3}{16}$ inch square balsa down to about a $\frac{1}{8}$ inch diameter and sawing off pieces at the angle needed. Floquil model railroad paint worked well for all three sets of components - black for the exhaust and tires, yellow for the spinner, and silver for the wheel hubs.

When all open framework is complete, prepare it for covering by a final sanding and an application of two full-strength coats of nitrate dope sanded carefully between coats, and after the second coat. Base tissue colors are white on top, yellow on the bottom. I used Micro-X tissue throughout, attached with thinned white glue. Notice that the fuselage requires the same sort of treatment that the flying surfaces do. The tissue break is at the stringer line. Cover the top half of the fuselage with white tissue attaching it to the stringer along the fuselage center line, then cover the bottom half with yellow in the same manner. Don't worry if the tissue separation line isn't precisely even, because it will be covered by a black trim line which runs the full length of the fuselage.

The flying surfaces are done in a similar fashion; however, you should cover the bottom half of the surfaces with yellow tissue first. Trim the tissue flush with the edges: do not wrap it around the edges of any of the surfaces. Now cover the top half of the flying surfaces with white tissue and *do* wrap it around all edges approximately $\frac{1}{16}$ inch.



Not sure whether to say "Aaaahh" for the camera or launch the airplane, author Kruse creatively solves his unique dilemma by doing both at the same time. This is the very stuff of immortal greatness.

This allows the wood to be covered, but does not flash an unsightly yellow edge when viewed from the top. Do not apply any trim or trim lines at this point.

Shrink all tissue by spraying it with isopropyl alcohol. Hold the surface to be shrunk out horizontally, then shoot a mist of alcohol over the top of it parallel to the horizontal surface. Only the fall-out from the mist should land on the tissue. This practice gives a good control of the shrinking process and minimizes warping tendencies.

When all tissue is shrunk, check for warps in the surfaces. If any are present, take them out by using steam from a tea kettle. Be careful not to over-correct. After all surfaces are determined to be warp free, brush on approximately six coats of thin nitrate dope on the wings and fuselage (70% thinner - 30% dope). Brush four coats on the tail surfaces, checking for warps between each coat. If warps appear, take them out by using steam again.

Apply all trim lines, second colors (such as the yellow on the wings, rudder, and stab), lettering, and landing gear wells using tissue cut precisely to the shapes needed before assembling the various components. Position each piece of tissue at its required location and then brush thinner over it. It may be necessary to work any wrinkles or bubbles out with your finger, pressing down carefully on the piece to get it to stick to the softened dope underneath. Brush on two more thinned coats of dope to seal everything.

Now glue the wing into position against the wing saddle and build and cover the substructure under the wing, fairing it smoothly into the rest of the fuselage bottom. Shrink it with alcohol and give it several coats of thinned dope as you did the rest of the fuselage.

Add the landing gear struts, as shown on the plan, wheels, and the landing gear doors. Slip the stabilizer into its slots, aligning it carefully in respect to the wing before gluing it in place. Position the rudder with the same care, and glue it at 90° to the stabilizer. Installation of the tail wheel at the rear, the spinner, and the exhaust pipes under each side of the cheek cowls will complete the assembly of the aircraft, with the exception of the cockpit glazing.

The windshield and canopy are cut from light celluloid (Micro-X). Test fit the windshield and trim as needed so that it attaches to the front canopy bow neatly and with no overhanging edges. Fasten it in place using R/C-56 glue applied only to the canopy bow, not the cowling. Wipe off any excess glue before it dries using a Q-Tip dipped in water. Fasten the canopy in the same manner. Spread a very thin line of glue on the front canopy bow and rear former only - don't put any glue on the center canopy bow. As the R/C-56 dries it will turn from milky white to clear. After the glue is completely dry, $\frac{3}{32}$ inch yellow striping tape can be used to trim the canopy outline in an attractive fashion.

Balance the model as shown with a 15 inch loop of $\frac{3}{16}$ inch rubber installed and prepare yourself psychologically for test flying.

Flight notes

Test glide the model over as soft and puncture-free a surface as you can find. Launch it gently from shoulder height with the prop free-wheeling. It should glide forward about 15-20 feet with its nose essentially level and settle onto its wheels. If it dives, bend the elevator up about $\frac{1}{32}$ inch. If it mushes or stalls, bend the elevator down a



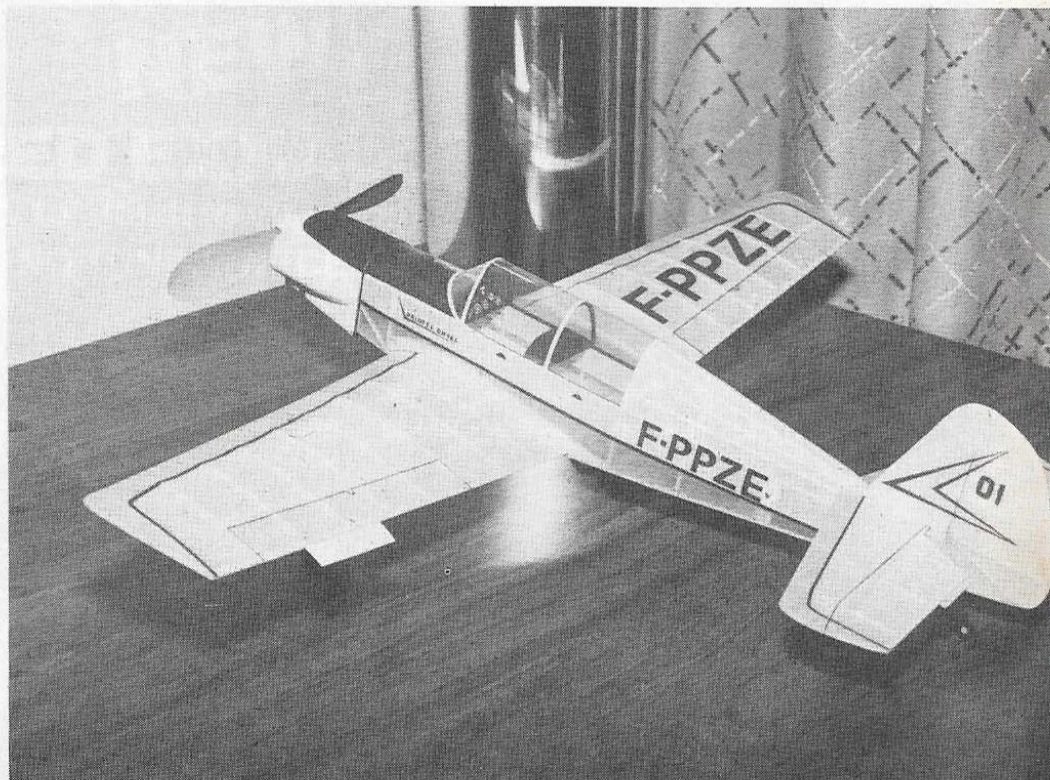
To enjoy the flight of the *Dalotel* will take some patience in the form of waiting for stripwood laminations to dry. This method of construction was chosen in the interest of saving weight on surface outlines.

like amount.

First powered flight should be accomplished with about 200 turns hand wound into the rubber. The prototype was trimmed to fly to the left, with torque. Watch for a tendency of the left wing to drop. If it does, either wash in about $\frac{3}{16}$ inch into the left wing panel, or add a bond paper trim tab like that shown in the photos. Add turns in increments of 100, using a winder as long as the power pattern looks safe. If left rudder is needed to get the plane to turn to the left, go at it carefully. The *Dalotel* carries an awful lot of sur-

face area in the rudder, and is a tad touchy in that respect. The long tail moment also contributes to the sensitivity, so don't make any gross adjustments. If the turn is too tight to the left, but the plane appears essentially stable, open up the power pattern with additional right thrust via the adjustable thrust bearing in the nose.

Over this past contest season, the *Dalotel* has been one of my favorite entries. It's just different enough to excite comments whenever it's flown, and pretty enough to look terrific in the air. What more could one ask? ☺



Using 15 inches of $\frac{3}{16}$ inch rubber will provide ample power for the *Dalotel*. The bond paper trim tab seen here was used to keep the left wing from dropping. More trimming suggestions are found in the text.