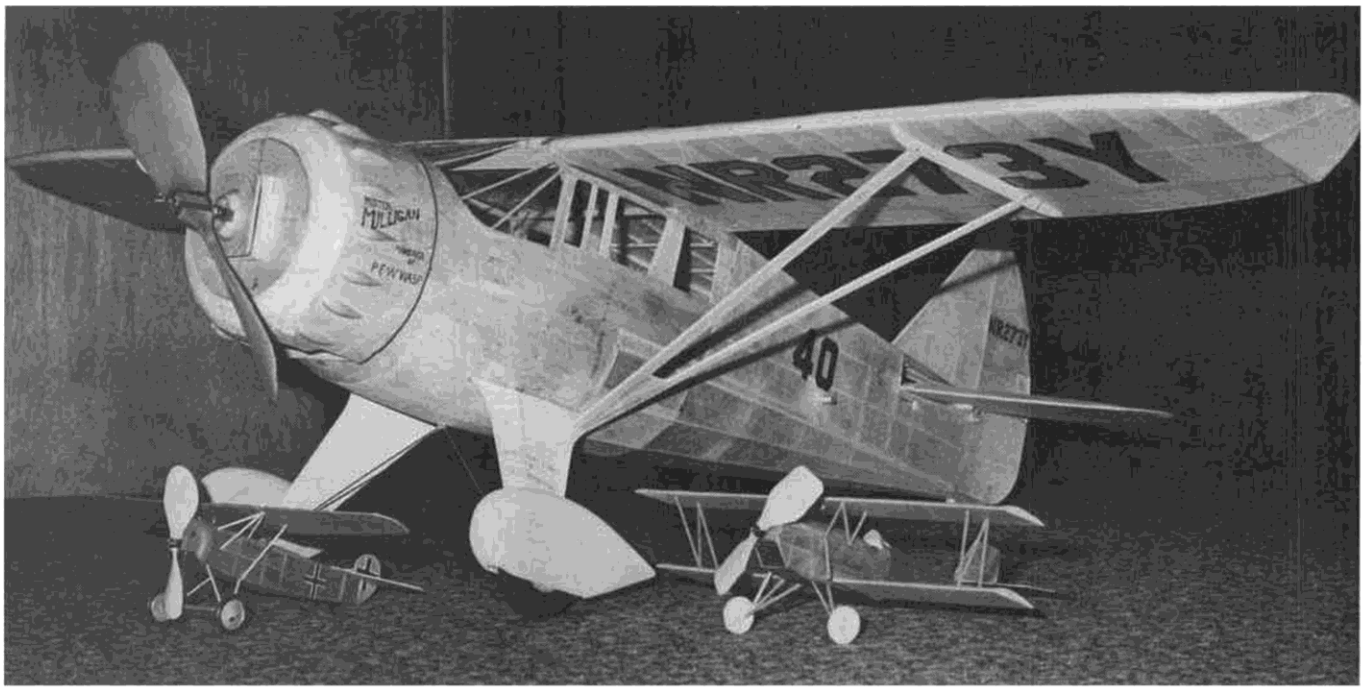


Jumbo scale Mr. Mulligan towers over a couple of Peanuts, like a mother hen over her brood of chicks. Knowing that the ship has been proved a good flier, future builders could add more details, such as the engine, provided the weight is kept to a minimum.

Ben Howard's Mr. Mulligan

A really JUMBO scale model of this famous racing plane, with a span of 56 inches. Scale is 1-3/4 inches to the foot. The ship has been extensively test flown, and makes beautiful air trips. **By TOM HOULE**

• It all started with an issue of R/C Modeler. I was leisurely perusing my stack of RCM's looking for nothing in particular (or was it rubber-powered R/C?) when I happened upon a set of Mr. Mulligan drawings which could be had full size (56 inch wingspan) from Harold Osborne.

In a moment of light headedness I saw myself designing a suitable structure, adding a .40 for power, and flying off into the wild blue yonder . . . images of Bendix trophy dancing in my head.

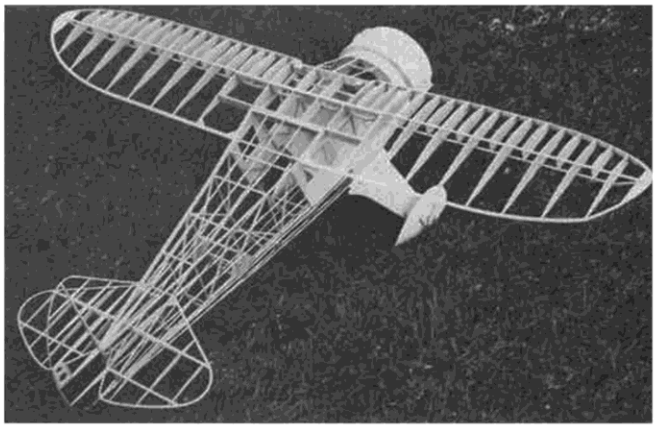
Well, I did order the drawings and what seemed like a 10 pound package came in return for my three-and-a-half bucks. The 10 pound package turned out to be a detailed set of Mulligan scale drawings which could easily be converted to a set of working plans.

By now you're probably wondering if and when the R/C Mulligan was ever built . . . It wasn't . . . Half way through the plan drawing stage, I suddenly realized: 1) it would cost a fortune in balsa to build an R/C Mulligan, 2) I did not have a suitable radio, and 3) I didn't have the bread to satisfy items 1) and 2). So the project was shelved along with my model building for a couple of years.

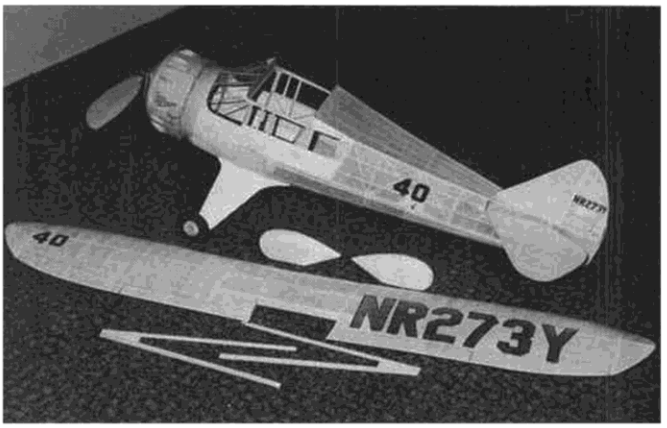
Enter MODEL BUILDER. Gee whiz and no kidding. MODEL BUILDER was a distrinctly fresh breeze in the field of model airplane pub's. Look. After reading two issues, it got me going again full steam in aero modeling. Modelers like Fernando Ramos, Hal Cover, Walt Mooney, Clarence Mather and Bill Hannan have (in my estimation) made great strides into the so-called Sunday afternoon relaxed flying thing.

These guys have shown the lesser knowledgeable people like myself, how to build and fly low cost rubber powered sport and scale aircraft. And, gentlemen, with the cost of building materials escalating as it has, I maintain that these guys (and MODEL BUILDER) have made one hell of a contribution to the hobby.

The upshot of the whole thing was



Structure is light weight but strong. Flight tests gave final settings of; 5° right, 1° down thrust, stab -5°, wing +1°. Right-left pattern.



Though ship is quite stable in flight, Tom suggests that an extra half inch of dihedral per tip might make it even better.

that after reading several Ramos, Hannan, Mooney, Mather and Cover articles, I was convinced that I could build a rubber powered Mulligan from scratch . . . light enough to fly, i.e., 10-15 oz.

I shot for 10 oz. but ended up with 13 oz., less rubber. This was my fault because I didn't cut lightening holes anywhere, and I used reasonably firm wood throughout except for the wing ribs, which were super soft. In fact, so soft that several began to buckle when the covering was shrunk!

Just a few hints before discussing the actual building. Use an alphatic resin glue such as TITEBOND or SIGBOND throughout for maximum strength. If you can't get 1/8 inch spruce squares, I'd suggest using hard 1/8 x 3/16 balsa, or better yet, 3/16 square hard balsa longerons with 1/8 x 3/16 uprights. Remember, this is a big airplane and the rubber load and landing stresses are amplified accordingly. And be patient! The Mulligan is a lot of airplane and will not go together overnight.

Also, like most scale models, you must keep the rest of the fuselage light. Choose your wood carefully here . . . light yet firm.

For the judges in the audience, the model is exact scale, with the exception of the wing and stab airfoils, wheel pant and tire width, and the strut attachments. In fact, my wing struts were added mostly as an after thought, since my Mulligan was intended for sport flying. We have no jumbo rubber scale contests in Wisconsin!

STABILIZER CONSTRUCTION

Cut all stab ribs from firm 1/32 sheet and notch per the plan. Next cut out either a full stabilizer outline or 1/2 stab from corrugated cardboard (balsa is too expensive). Cover this outline with Saran Wrap and pin to your building board.

This outline will serve as a mold for wrapping four 1/32 x 1/8 water soaked and glued balsa laminations around the form. The Saran Wrap makes it easy to remove the laminations from the form after the glue sets. Let the pinned bent strips dry overnight before removing from the cardboard form.

Once dry, remove stab and build up in a conventional manner over the plan. Dope the stab outline and center section, let dry overnight, and then cover the bottom of the stab with your favorite light white tissue. I used Marlowe Engineering's white tissue. Water shrink and pin to board while drying. Next dope tissue with one 50/50 thinned dope coat and allow to dry.

Cover the top of the stab in the same way except do not cover until you've doped the bottom at least once. This procedure eliminates potential warping. You'll be amazed at the covered strength of the stab and fin.

RUDDER CONSTRUCTION

The rudder outline is formed, as the stab, around a cardboard, Saran Wrap covered form. However, due to the symmetrical ribs used, it must be built on the airplane. The easiest way is to wait until the fuselage is finished, stab inserted in its slot, and then cut and glue the rudder post and molded outline to the fuselage. Then build up the fin from there. Make sure the rudder ribs are square to the post. DO NOT glue on the rudder post until after the stab is inserted for the last time. Once the post is in, the stab is locked in.

WING CONSTRUCTION

The wing, unlike the real Mr. Mulligan, is built with dihedral and a flat center section. Start with one outboard panel . . . right or left . . . on an absolutely flat building surface at least 40 inches long and 12 inches wide. Pin down the bottom 1/8 square spar and the straight inboard section of the T.E. Notch the end of the T.E. that joins the laminated portion as shown on the plan to ensure a strong joint.

Now install all ribs in that panel. Make sure that all ribs are glued in vertically and that the bottom 1/8 square spar runs straight and true. Also install the 2 dihedral braces, fore and aft, and allow to project beyond the panel. You can make these two braces from either rock hard 3/32 balsa or 1/16 plywood. I used hard balsa and have had no

No, Tom is not a midget, that Mulligan has a 56 inch wingspan! Ship was designed directly over Hal Osborne's 1-3/4 inch-to-the-foot scale drawings (March/April '72 MB).

Phil Bernhardt revised Tom's drawings to show the scale wing tips, which tapered upward from the bottom. In effect, this added some tip dihedral. Scale stab offered no stability problems.

structural problems.

At this point, you can install the laminated portion of the T.E., the laminated L.E., and the 1/8 sheet wing tip. Strip three 1/16 x 1/8 balsa strips from 1/16 sheet balsa stock and soak in hot water for a few minutes. These strips are then laminated and glued to the aft end of each rib and the notched portion of the solid T.E. piece. Cut and fit the tip piece to fair into the three laminated strips.

Three 1/16 x 7/16 strips need to be stripped from balsa sheet stock, laminated, and then glued to the front edge of each rib. I found that pin pressure alone was sufficient to hold the wetted and laminated strips to the ribs and still maintain the 1/8 inch or so space between the building board and the bottom of the L.E. Space your pins about every inch and you will not have a problem.

Install the top spar (1/8 square spruce), the diagonal webs, and all gussets next. Allow the whole works to dry overnight with the spruce spar extending beyond the wing tip. When dry, cut the tip where shown on the plan, sand in the required angles on the L.E. and T.E., and glue back together with the tip raised to fair into the 1/8 inch square spruce top spar as shown on the plan.

(Note: We took the liberty of slightly modifying the tip section of the wing, using tapered depth ribs, to avoid the break in the smooth line of the leading and trailing edges which can be seen in several of Tom's photos. wcn)

Build the center section next, starting with the two dihedral braces pinned securely onto the board. I blocked up the finished panel to take the load off the center section. When the center section is pinned down, ensure that the already assembled panel is absolutely parallel to the center section. Add ribs, L.E., T.E., gussets, wing hold down dowels, etc., and again allow to set overnight.

Next build the other outboard panel, tying it in to the dihedral braces extending from the completed center sections. At this point I got in trouble. I found that in checking dihedral on the completed wing that one panel had more dihedral than the other. I had to completely remove the bad outboard panel and reglue it! Now if you have ever tried to dissolve TITEBOND alphatic resin you'd know it hurts! Don't duplicate my mistake!

You are now ready to cover your wings. I did so by block sanding everything first, tapering the T.E., removing glue blobs, etc. Next, I applied a thick coat of dope to all surfaces to which I would stick the tissue. This does not include tops and bottoms of ribs except at the dihedral breaks. Then dry, tissue was applied by putting on another coat of dope and sticking the tissue to it. I've never tried the thinner method, although the white glue method should

work well, particularly in light of the large surfaces required to stick the tissue.

By the way, I used five large sheets of Marlow Engineering's white tissue to cover my Mulligan. So buy enough to start with, or you'll end up trying to patch holes with two different tissue weights.

Do not forget to glue and gauze in two wing hold-down hooks to the T.E. strip in the center section. If you do forget, and cover the center section (like I did), it's no great shake to remove the bottom center section covering, install the hooks and re-cover.

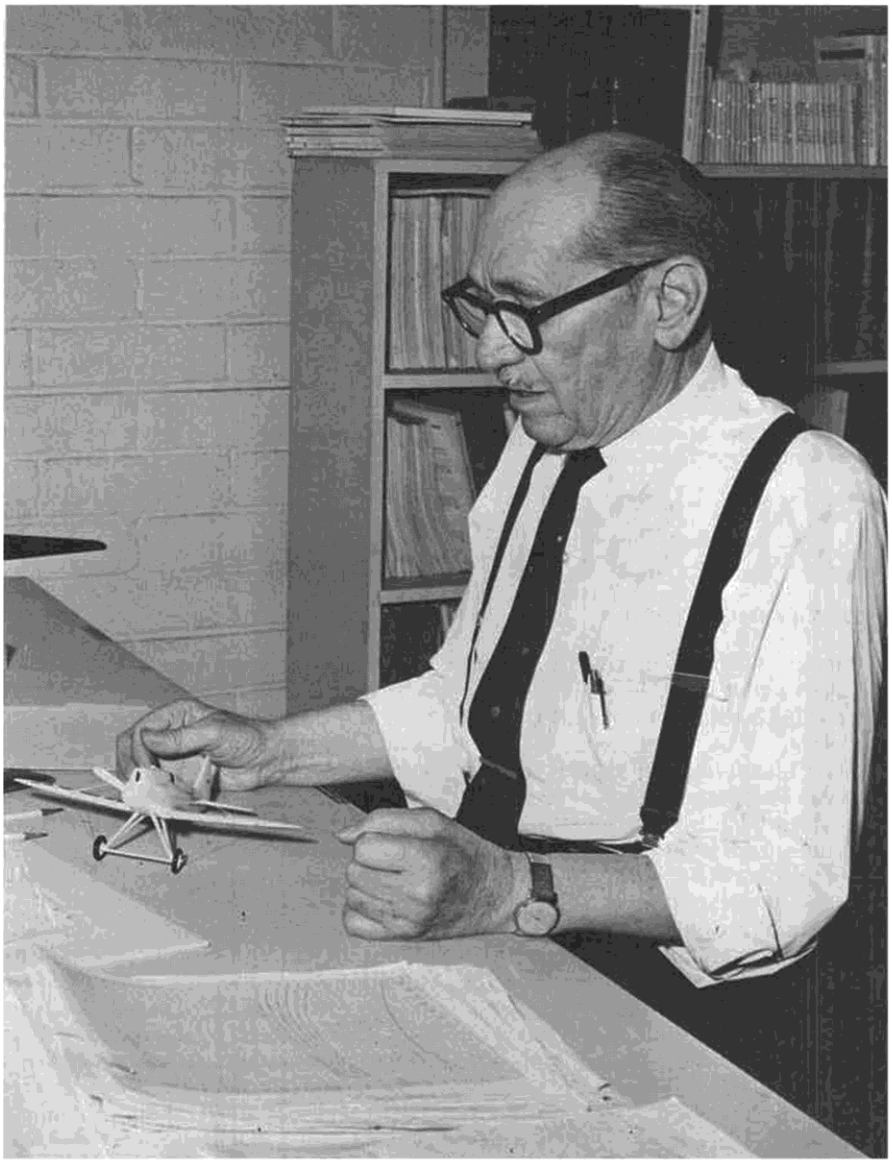
If you like to play with wing incidence on your scalers, then reverse the positions of the holding dowels and hooks. With the hooks at the front under rubber band tension, you can easily shim the L.E. to increase positive incidence. I felt my way was a bit stronger but take your pick and don't forget that the stab is adjustable too.

FUSELAGE CONSTRUCTION

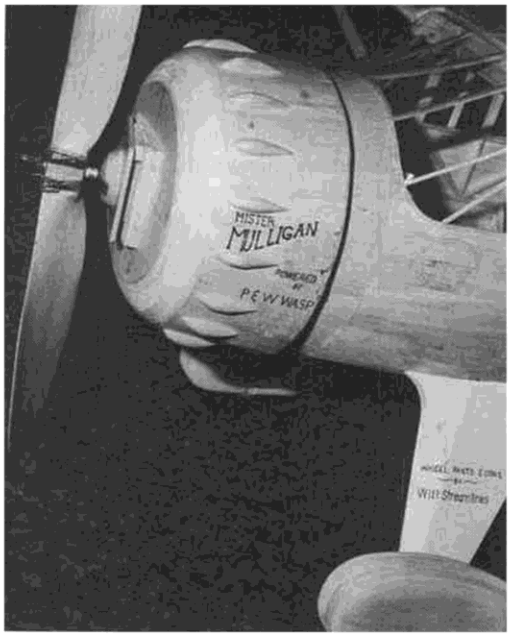
I thought long and hard about the best way to build a fuselage that in the C.G. area was roughly 7 x 8 inches in cross-section. I was very apprehensive about being able to design a structure strong enough to handle the fully wound rubber load and still be reasonably light. The structure shown on the plans is slightly modified from my first effort, but it is a replica of the fuselage I am using after a season of flying. In other words, don't try to reduce wood sizes or pieces. It won't work. If anything, you might want to add a few more cross-pieces and gussets. The problem lies in the tremendous width of the fuselage. Even at the rear peg the fuselage is about 4 inches wide!

Start by laying out the two fuselage upper sides, using 1/8 square spruce

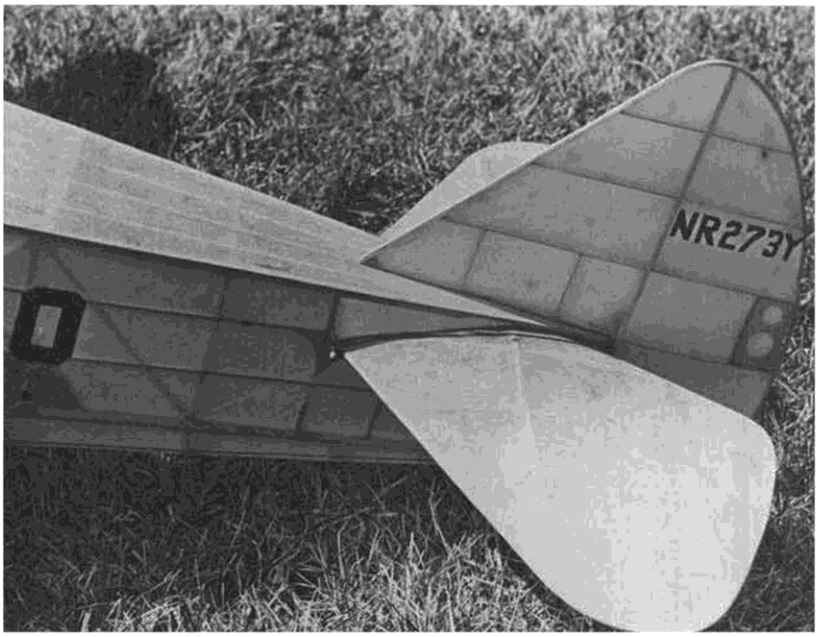
Continued on page 74



Tom Verzy presented Ben Howard with a hardwood solid model of his famous "Pete" and then took this photo, just a few months before he passed away, in the early 1970's.



Simplified cowling can be built with more detail, if desired, since the flying ability has been proven.



Opening in fuselage permits wide adjustment of stab incidence. Glue it in place after trimming, if you so wish, but rubber bands provide flexibility . . . just in case . . .

longerons and 1/8 hard balsa uprights. I highly recommend that you use spruce as specified. Do not install the wing saddles as yet. Install the rear peg gussets as shown and after the two sides are dry, add the 1/16 plywood inner rear peg facings. Note that these go on the inside of the fuselage, right and left sides. I feel that it's a lot easier to drill the 1/4 inch holes for the rear peg at this time rather than completing the fuselage and then drilling.

While the sides are drying cut the cross-member sets and all former pairs. Glue up the former pairs and add a 1/16 x 1/8 cross-member to each former. This cross-member keeps each former true and aids in psoitioning each former in the fuselage.

Pin the two sides upside down on the plan top view, allowing for the 3/32 square outside stringer thicknesses. Add all cross-members and formers. I installed a couple of temporary cross-members in the cockpit area to facilitate a true finished fuselage. Make sure the sides are square to the building board, using a drafting triangle or small square. If the formers don't exactly coincide with the uprights, shift them back and forth slightly until they do. It really won't be noticeable in the finished product.

Install the 3/32 square balsa bottom stringer from the rear post to F-3 and extend a 3/32 spruce square from F-3 to 1-1/2 inches beyond F-1. You can now bend and install the complete landing gear system . . . all three pieces are 1/16 music wire. Thread, bind, and heavily glue the front and rear struts to 1/8 square spruce. I did not show the rear strut since it will probably vary slightly from model to model and it's easily fitted once you have the front strut in place. The center shock strut passes through a 1/32 music wire eye epoxied to the bottom 3/32 spruce stringer at F-2.

I used silver solder at the eye and the juncture of the front and rear struts (this point was first wrapped securely with soft wire). You might wish to make F-2 and F-3 of 1/16 plywood. I cannot stress enough the strength required of the landing gear. The all up flying weight is close to one pound with rubber. Somehow the landing gear must transmit the landing loads up to the spruce longerons, the backbone of the fuselage. I did it with gussets and the 1/16 sheet skin over the belly area.

The former just behind the cowl (F-0) hangs in space during assembly. It's initially attached to the two spruce longerons and the bottom 3/32 spruce stringer. From there you add a short 1/8 spruce square from the top of F-1 to F-0. Following this, and ensuring that F-0 is square to F-1, 1/8 x 1/2 strips are cut to length and glued to the outside of F-0 and F-1. Allow a 3/64 or so shoulder at F-1 to enable 1/16 sheeting of the belly area.

You can now take soft 1/16 sheet cut into 1 inch wide strips and plank the belly area and fuselage sides. Also install the 1/8 sheet wing saddles, 1/16 sheet over this, and the window uprights. Check your wing saddle openings to ensure adequate clearance for your wing.

Build up the cowl by laminating the front pieces and cutting out the 1/16 sheet aft cowl former. All cowl formers are perfect circles. Install the 3/16 square framing pieces between the front and rear pieces. This framing transmits rubber loads from the nose plug to the spruce longerons. Rocker arm fairings (18 required) are carved from soft 3/8 sheet and added after covering the cowl with 1/16 sheet. When the cowl is completed, glue it to F-0, making sure it's centered.

I used 3/32 square balsa outside fuselage stringers spaced about 1-1/2 inches apart all the way around the fuselage. Scale spacing is about 1/2 inch apart, which I felt would be too heavy. I'll leave that one up to you. If I had access to 1/16 square spruce, I would have used them and the 1/2 inch spacing.

As for the landing gear strut fairings, after trying several ways, I ended up with what's shown on the plans. The Bristol stock is light and flexible and it can't crack . . . which is what happened to my 1/16 sheet balsa fairings. I made my wheel pants removable for flying (also the wing struts) by epoxying a 1/8 brass tube to the inside face of each wheel pant. The shock strut is bent upward where it meets the axle and simply plugs into the wheel pant. You'll have to keep your wheel axles short enough to enable the wheel pant to slip all the way over the wheel. I cut a notch on the inside of the wheel pant to clear the axle.

The 1 inch balsa tail wheel and fairing are glued to the fuselage and bottom of the rudder after cofering.

You can now cover the fuselage, after first giving the entire framework a good sanding, ensuring that the 3/32 stringers are tapered into the 1/16 sheet fuselage skin.

FINISHING

As to painting the entire model white, it's up to you. I didn't because of what I thought would be a weight penalty. My lettering was all hand painted, using Testors gold and flat black PLA paints. I first lightly drew in all outlines, using a soft dull pencil and straight edge. Take your time and from five feet away you'll swear it's a decal. Apply three or four coats of 50/50 dope before painting any lettering and allow the dope at least a few days to set up.

Do not apply clear dope over your hand-lettered license numbers. The dope will loosen and smear your lettering.

FLYING

I used a 16 inch prop with freewheeler and 16 strands of 1/4 inch Pirelli (Fellati) 30 inches long. The Mulligan seems to fly equally well to the right or left, but just to be safe I cranked in quite a bit of right thrust. It flys well to the right in flat, 100 foot circles.

Discussions with the local experts have led me to believe that 18-22 strands would be more appropriate. However, in the interests of keeping the model on the field I have held down the power. As you up the power, however, watch the downthrust. Start with limited turns and preferably ROG the model.

I'ts a fact of life that if a model of this size comes in for anything other than a 2 or 3 point landing *(those points being the landing gear . . . wcn)* it means bent airplane, no matter how strong you build it. I found this out the hard way . . . believe it or not, this model cannot or should not be hand glided. It's just too damn big and awkward to glide it easily to a spot 50 feet in front of you. I split the cowl and tore out the landing gear before I finally realized that powered test flights are to be preferred.

Set the balance point where I've shown and shim the stab for best glide *after* motor run. If you're fortunate enough to have a paved or salt lake type flying surface, use 150 turns and ROG takeoff for your first flights. If you don't have such a site, use 100 turns and hand launch. Work up slowly to full winds (500 turns on the motor above).

I found my best hand launches consisted of holding the fully wound prop in my left hand and holding the fuselage from underneath with my right hand at the rear peg. Once you've got this down pat, you break into a fast trot holding the airplane high and parallel to the ground. Next release the prop and a second later (you're still running) heave (and I mean heave!) the model straight out in front of you. With this launch technique the model will climb right from release.

You have got to see a 56 inch wingspan Mr. Mulligan in flight to believe it. It is an absolutely majestic sight. You would swear that Benny Howard's ghost is flying by again. If you have any questions on building or flying your Mr. Mulligan, write me: Tom Houle, 11333 Lake Shore Drive, Mequon, Wi. 53092.