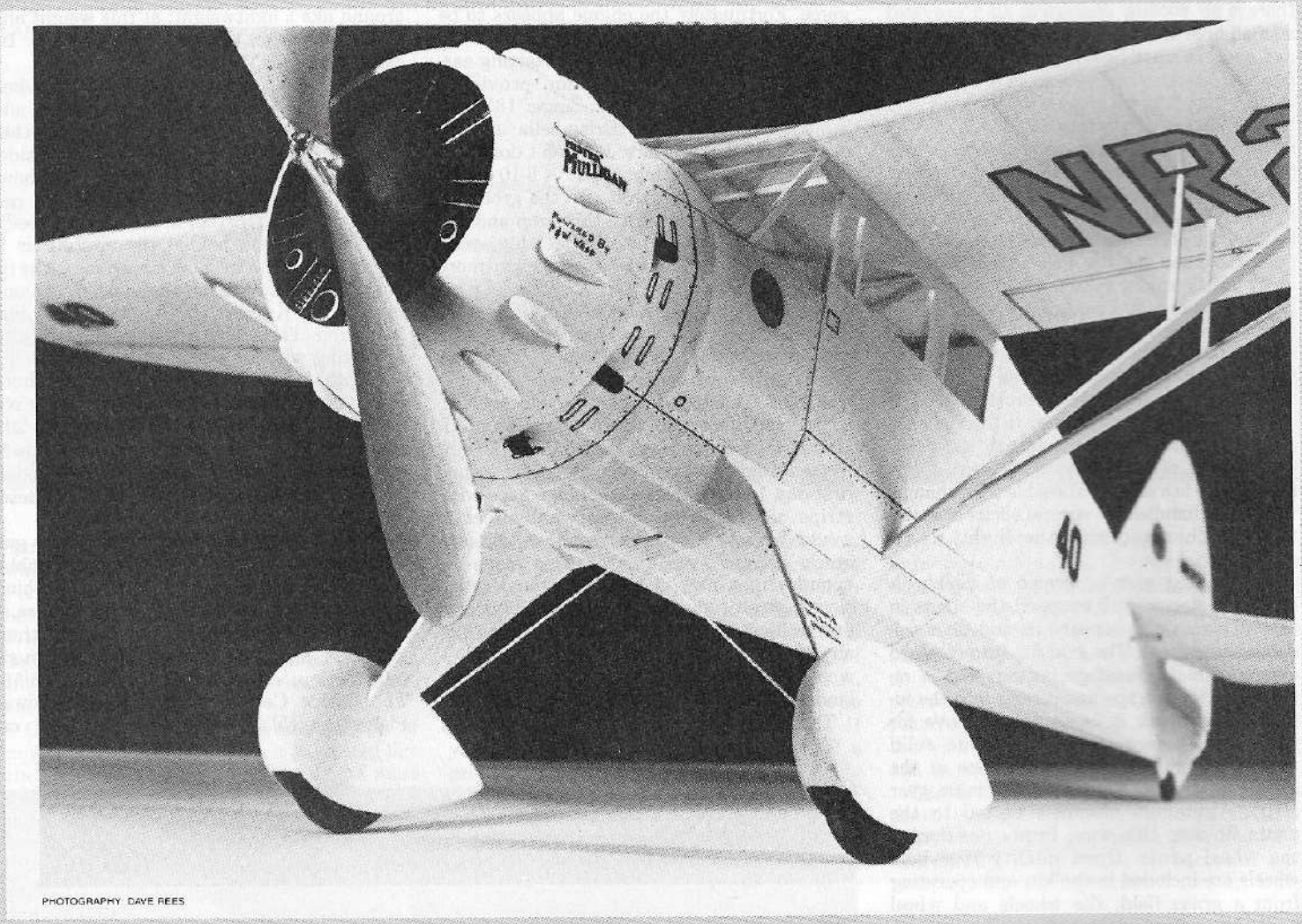
Mr. Mulligan

By Dave Rees

A classic racer from the 1930's with "that peculiar combination of flyability and just the right amount of realism". A winner!



PHOTOGRAPHY: DAVE REES

Even under close scrutiny, the details on Dave Rees' *Mister Mulligan* reveal the extra care taken in its construction. Planes flies very well.

In our present world of permissiveness, the very mention of something that is banned almost assures its popularity. Movies are banned, books are banned, Miss America's pictures are banned, and the owners of these commodities can't get a truck big enough to haul the money they make to the bank. This model falls into that category: perhaps it will also cause a "reverse psychology."

Actually, *Mr. Mulligan* deserves to be part of the FAC scale movement for a better reason than the result of inverse psychology: it is a very good flying model. The founding fathers of the FAC disbarred the *Mr. Mulligan* from entering the Thompson Trophy mass launch events (radial-engined racers only) because they felt it would have an advantage over the other types. This may have been true eight years ago when FAC scale was just catching on, but one look at today's event and the way airplanes fly makes us stop and think again. I believe the time is right to let the *Mulligan* race.

Meantime, while the FAC thinks it over, the *Mulligan* can legally compete in Golden Age mass launch and FAC scale events, albeit with a very low handicap in the latter. The problem is the lack of an up-to-the-minute design that fits the special needs of the FAC flying events. I looked up many while doing research for this plan, but they all lacked that peculiar combination of "flyability" with just the right amount of realism that works for FAC events. Many of the older *Mulligan* plans are badly out of scale, while the newer ones lean towards the other extreme, being heavily detailed and accurate, making them more suited to AMA rubber-scaled events where these things are rewarded. Finding there was no solution, I set about making up my own version.

Mr. Mulligan has a lot going for it as a subject and I believe it can be in that exclusive group of planes like the *Lacy, Cougar, Tailwind*, etc., which deserve to be part of every flyer's repertoire. It handles brisk wind beautifully, responds predictably and slowly to adjustments, and has no trimming vices. The airplane can be built light without sacrificing strength or appearance details due to the excellent original layout. The all-white color scheme is rare and makes the finish easy while somehow maintaining a unique beauty and charisma. The moments are great, the design is rugged, and there is room for an enormous rubber motor. The landing gear is not complicated and won't come off after many seasons of flying. Building this model should present absolutely no technical

problems to a person familiar with scratch building from magazine plans. I have chosen a 24 inch wingspan because it fits conveniently with available plastic propeller sizes, and just in case the FAC does relent, it will be already within their rules for racing airplanes (24 inch maximum span).

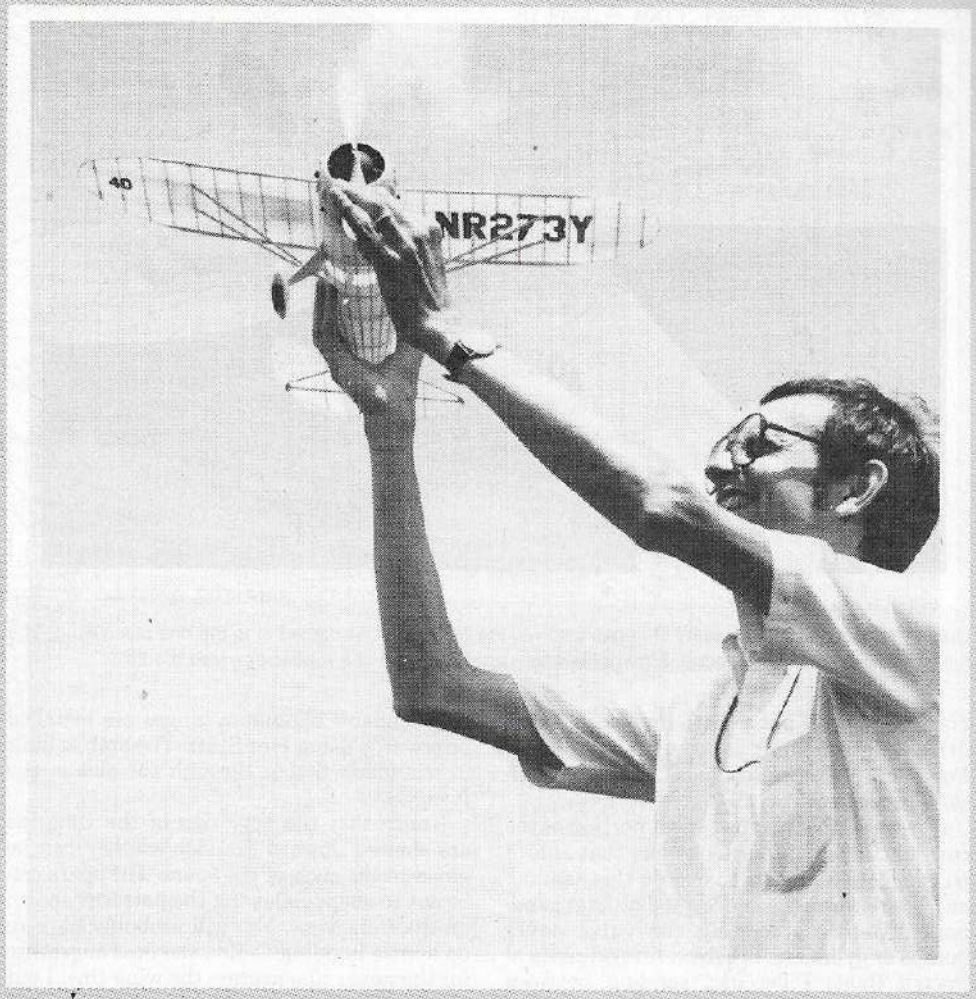
There are only a few things which have been changed from the original in the interest of providing good flying characteristics. The stab and rudder were slightly increased, but hardly noticeable. The rather elaborate fuselage stringers were omitted to save weight in the tail and make construction simpler. The principal change was the addition of five degrees dihedral to the original wing which had none at all. My experience with *110 Monocoupes* proved without much doubt that this configuration needed dihedral. The flat wing will not recover well in windy conditions and is nearly impossible to trim for flying in a circle smaller than the state of North Carolina. Your scale scores should not be adversely affected by these design changes.

Documentation: one source

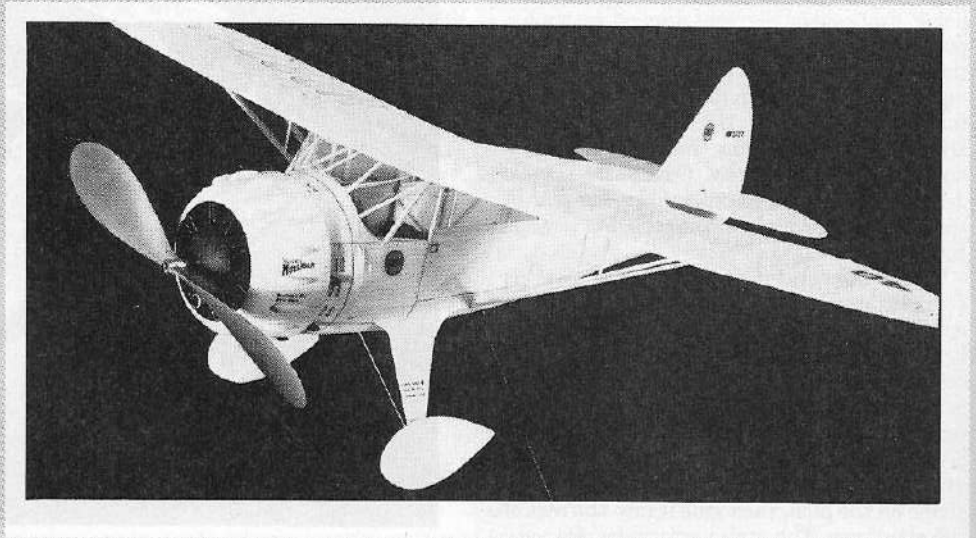
There are many excellent sources of data for *Mr. Mulligan* owing to its immense popularity in the thirties. The source I felt to be most reliable and used is the Paul R. Matt Historical Aviation Album, Volume 14, available from Historic Aviation, 3850 Coronation Road, Eagan, Minn. 55122. The last price I have is $7.95. In it you will find the entire story of Benny Howard and Mr. Mulligan which is so engrossing you won't be able to put it down. I believe I can safely omit the history on so well-known a subject. Buy the book and read it—we have an airplane to build.

Straightforward construction

Just about the entire structure of this *Mulligan* is the 1/16 inch square or sheet balsa except for the leading and trailing edges, so buy a couple of even-grained, 5 to 6 pound/cubic foot sheets; don't buy sticks. Strip them from sheet for lightness and uniformity. Begin with the fuselage sides, or you may build fuselage, tail, and wings all together as I often do to save time. Please don't let the side view confuse you. The side frames are shown projected flat so that when you bend them as shown in the top view, they will be the right length. This only occurs in very wide fuselages, and is insignificant in normal designs. Note that the frames are shown slightly long at both ends of the fuse. Build up the two sides one on top of the other. I used Ambroid throughout. Do not include any of the forward windscreen members, they are put in later. Also note that the window posts are different on each side because only one door is provided on the far side. When the cement dries, sand the outer surface smooth and slit the two halves apart using a double-edged razor blade. Gently crack the sides at the G bulkhead and Hot Stuff the joint until they match the top view angles. Now cut cross members to length from the top view and build up the fuse frame in conventional fashion. Cut out all the sheet formers while the frame dries and glue in place as shown in the various cross sections. Add in the stringers and the plywood firewall, sanding the whole structure smooth. Now put in the 1/64 sheet scuttle decking and the outer four windshield posts. Notice that the outer ones run between the wing platform bars and the top stringer, not the fuse main frames. Wet some soft 1/16 sheet and wrap the cowl area with several jointed segments. Bend up the wire for the landing gear per pattern and sandwich between the double G formers just below the first stringer using Hot Stuff. Cut the nose rings from soft balsa blocks so the grain is axial to the centerline. This makes the grain match the rest of the cowl and will sand easily to shape. The inner nose ring also uses axial grain direction and can be made from the part cut from the center of the outer cowl ring. It is faced with plywood (B) to prevent wear and provide a consistent nose block position. Take care when cutting out the 7/8 inch square hole and its matching insert block so the fit is good. The consistency with which the nose block goes back in, flight after flight, is absolutely crucial to a good flying airplane. Any wiggle during the heavy vibration in the motor run means that the thrust angle is also shifting. Glue the plywood disc (A) and the 1/4 balsa nose onto the insert block with Hot Stuff, sanding to the contour shown. Drill for the shaft wire and bush with brass tubing of .050 inch inside



Being tall has its advantages some times. Dave's height gives him a seven foot launch altitude, a decided asset in FAC Mass Launch events. The plane has competed in FAC Scale and Golden Age events.



Gordon Israel, the *Mulligan* designer, gave the aviation world a classic with his 1934 design. The lines are clean and the construction rugged. The extra detail work on the engine/cowl area enhance the appeal.

One of the subtle but necessary changes involved the addition of 5° diehedral to the one piece wing. The full size aircraft had no dihedral, a major flaw for stable recovery in a rubber powered model.

diameter. This is not easy to find, so you may drill a larger hole and use two Peck-Polymer's nylon nose plugs, one from each side, in place of the tubing.

Now sand the wrapped sheet portion of the cowl until the contour looks like that shown on the plan. It is easy to overdo this sanding and break through, so use #400 or finer sandpaper. Before attaching the valve cover bumps or cylinders, brush on several coats of Pactra Balsa Fillercoat, sanding between each coat. The cylinders are made from corks wrapped with button thread and may be glued in place next. You may make up the wheels, pants and legs from soft balsa, using the balsa fillercoat, but do not attach to the fuselage until after it is covered with tissue.

In my mind, there is no finer pure white tissue on the market than Micro X's top-of-the-line tissue. Believe me, it is worth the extra expense: it covers so easily and shrinks half as much as most other brands. I covered the bottom first, using several pieces because of the heavy curvature. Covering with the tissue wet helps pull out the wrinkles here. Next, spray or brush the window frame areas inside and out with white dope since they can be seen through the windows after covering. Glue the acetate side windows to the frames using Ambroid or Sigment applied with a hypodermic needle. Make a cutout in a piece of tissue exactly the size of the windows, working over the plan; then dope the tissue to the fuse side right over the acetate windows. Don't get any dope on the uncovered windows or it looks messy. Cover the scuttle decking and top of the fuse from the rear of the wing platform aft with tissue, but *not* the cowl.

The wing and tail structures are as straightforward as the fuse. All of the tips employ the hot-bent bamboo method because it is faster, stronger, and lighter than many others. If you haven't tried this method, now is the time. The elliptical curves are very difficult using sheet segments, while laminating is heavy and slow. Just bend the bamboo over a soldering iron until it matches the shape on the plan, then glue it into the rest of the structure. The stab and rudder are very simple and need no further explanation except that you will find covering the movable parts separately makes a better looking job. The bendable aluminum hinges are installed afterwards using Hot Stuff. The stab is built in one piece, fitting through the slot in the fuse.

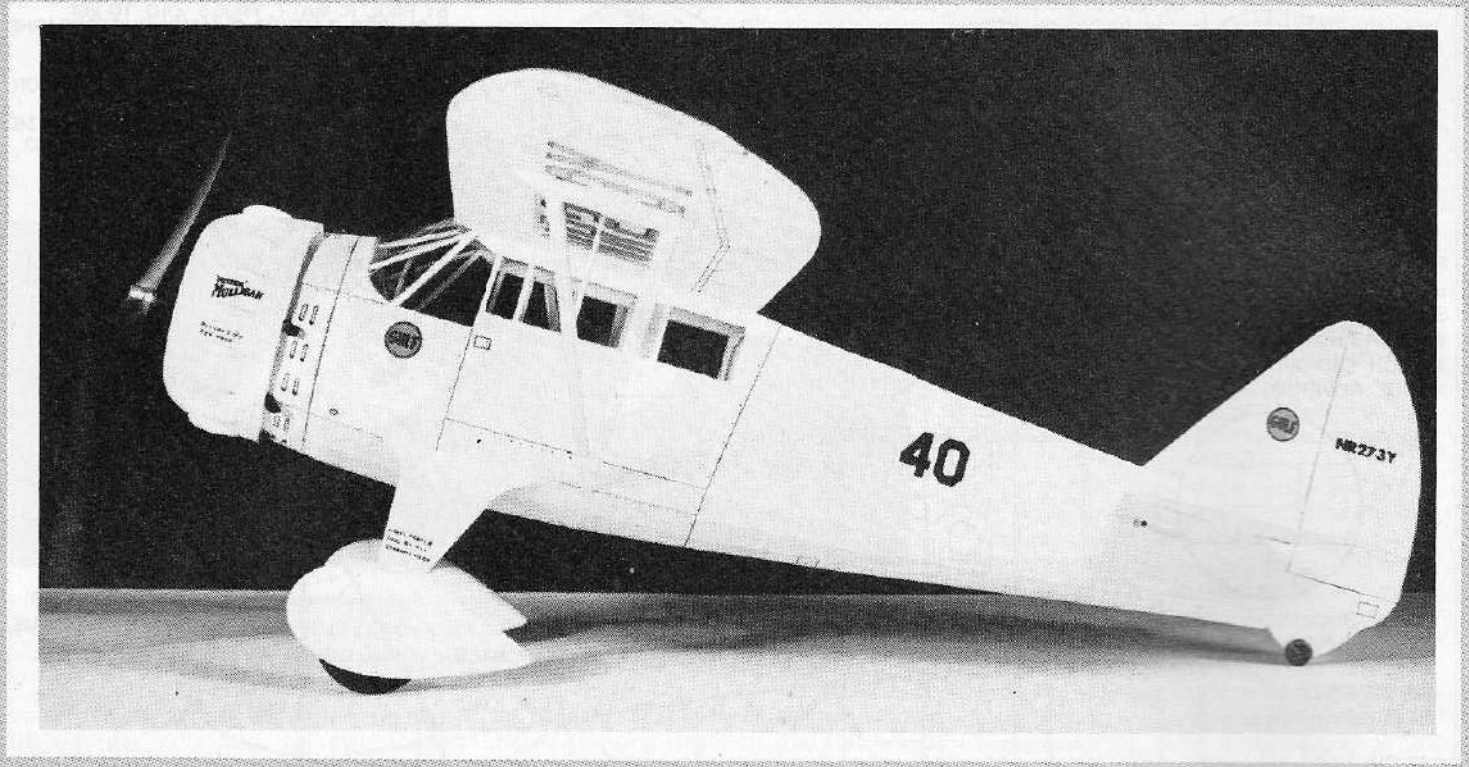
Notice that the very tips of the wingtips are slanted upward 1/16 inch so they can be glued to the ends of the spars. The spars can be cut to shape following the patterns shown on the front view. You will probably have to do a little juggling to find the best curvature for the upper ribs nearest the wing tips. I cut all ribs alike from the side view pattern, then trim off their ends as required as I approach the tips. Also, shape and sand both leading and trailing edges before gluing them to the wing, thus reducing the amount of sanding after the wing is completed when it is in its most fragile condition. Build the wing all in one piece and then cut and re-glue the dihedral joints. This wing will come out weighing an amazing six grams or less when completely covered!

I usually assemble the wing to the fuselage before anything else because I find the tail parts easier to adjust in position so they match the wing. Ambroid glue is my choice for the joint. Hot Stuff doesn't handle shock as well and a hard landing may surprisingly knock the wing loose. Add the tail members after checking alignment and adjusting position as needed. Note that there is no incidence in wing or stab: small decalage adjustment can be made with the adjustable elevators. Add in the incidentals: wheel pants and legs with cuffs, wing struts, and cowl bumps. A helpful tip given to me by my Maxicuter friends is to put a small piece of soft .015 diameter wire at both ends of the struts so the joints sort of plug into the wood. When in place, the Hot Stuff seems to flow down this wire and makes an unbreakable joint. Now for the painting.

The curved front of the windshield is still not in place - save that till last. Mask the side windows and the wheels and stuff a facial tissue in where the windshield goes so the spray can't get on the inside of the windows either. Normally, I would give everything one coat of clear dope and be done with it, but even though the tissue is white, it can look a lot whiter if you substitute white dope for the clear. Thin some Aero Gloss flat white (which has more pigment in it than Swift White does), at least 50% and lightly spray everything in sight. Don't spray heavily - just until the tissue starts to look damp and sag a tiny amount. If it looks wet, you've applied way too much. You're trying to just mist or fog on a light coat. The cowl and other exposed wood areas can be sprayed a bit more, at least until they look opaque. I next brush-painted the entire inside of the cowl with flat black enamel. Don't get any out on the white though. You may now install the windshield, gluing first to the side posts until dry, then glue the top to the wing center. Don't try to glue to the bottom edge of the windshield where it meets the decking; it will only look messy since the cement shows. Remove all masking.

The detailing of registration and racing numbers, Gulf emblem, and the *Mister Mulligan* cowl lettering can be done from scratch if you are experienced with these techniques. If

Underview of the *Mulligan* reveals detail of the wing struts, wing cuffs, and gear fairings. The registration number decal must be cut to clear the strut joint. Line details are done with a Rapidograph pen.



you are, you certainly don't need any help from me, but there is a set of decals easily available from SIG Manufacturing Co., Montezuma, Iowa 50171, that can save a lot of time. They manufacture a kit of *Mr. Mulligan* which is slightly smaller than this one and the decals are just a shade smaller, too. If, however, you check the accuracy against the documentation, you will find not enough difference to worry about. The only complaint I have is that the clear overcoat sprayed over these decals is not clear, but light yellow, which shows against the perfect white on the airplane. Trim as much of it off as you can before applying them. Spray the prop black and silver, as shown, using enamels; dope will not stick reliably to the smooth plastic. Be sure to follow the documentation carefully and use a waterproof ink such as Higgins T-100 when applying the ink lines. The white surface takes black ink applied with a Rapidograph pen very well.

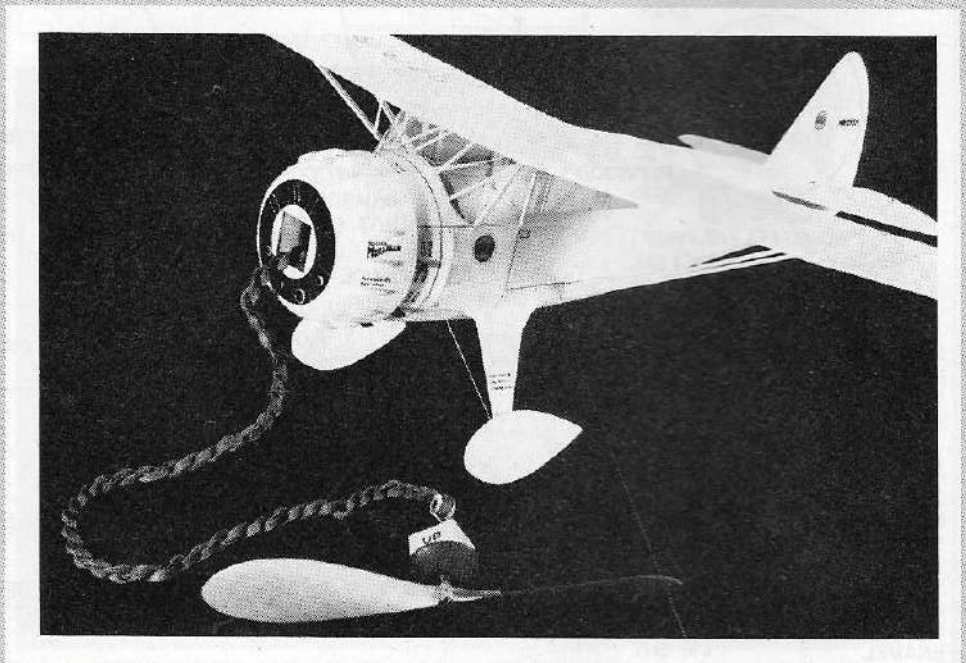
Very high flying

The rubber motor specs listed on the plan are what I have found to be most successful with the 8¼ inch prop shown and an overall weight of 43 grams (less motor). The *Mulligan* is a fast climber which results in quite a lot of altitude when the motor runs out of winds, so pay particular attention to the glide trim, or all that extra duration will be lost. The motor, which is quite long, must be braided to avoid bunching in the nose or tail and upsetting your trim. Flying a freshly built airplane for the very first time can be a traumatic experience. Many an airplane has been badly damaged right at this step, so go slowly. If you've followed the alignment items on the plan, you should be close to correct - closer than mine was at first. Benefit from my experience. Select a site with high grass, or even weeds, for the first few flights on a calm evening. Wind in 400 turns, kneel down, and launch the airplane. This is to reduce impact speed if it spins or dives. Make whatever adjustments are necessary in the tail surfaces until the airplane flies not necessarily well but *safely*. Try it a couple of times to make sure it repeats its pattern reliably, then go out to your regular field for fine tuning.

Begin increasing winds by 100 each flight and watching for any unusual characteristics which might result in a crash. When six or seven hundred winds are reached, *Mr. Mulligan* should be getting high enough for you to be able to observe the glide. I keep flying and adjusting or weighing at this point until the glide is free of small stalls or shallow dives, and reliably so. With the glide good, the only thing left are thrust adjustments for the flight profile under power.

Once more, increase winds by 100 per flight. Watch out for that left wing drop, indicating a torque-in is developing, or a strong nose-up tendency which may result in a power stall. Slight thrust adjustments by shimming will remove these tendencies, but go through the exercises cautiously. Things happen very quickly under the screaming power of 1500 winds. I generally begin using a winding tube at 1000 winds and above because the rubber is really beginning to be stressed in this region. My *Mulligan* gains altitude very fast, reducing the possibility of mid-air collisions in mass launch events, and providing maximum time above the ground effects. This is where the thermals are, and the probability of getting help from even little ones is directly proportional to the time the airplane is in this zone. Snagging a thermal is far less likely at 50 feet than at 150 feet, so save the low-powered flying for your indoor work.

I hope you get as much enjoyment from your *Mr. Mulligan* as I have from mine.



The rubber motor specs listed on the plan have proven the most successful to date for Dave. Braiding the motor shortens the loop which is three times the hook to peg length. Weight with motor and prop is 43 grams.