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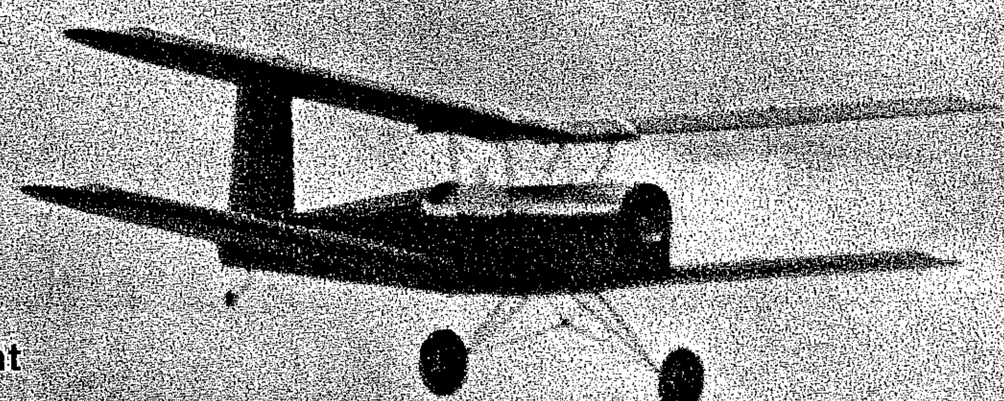
U.S. MALE

Big RC models are a turn-on for a lot of people, though there's a worry about overly heavy and powerful types. This one is huge for a bipe (80 in. span, about 1,800 sq. in. wing area), but with flying weight of 14 lb. and a .60 engine, its flight qualities are like those that got the "big" movement going. Making use of lumberyard and sewing shop materials, it's economical to build. Controls for elevator, rudder, and engine.



Throttled back, the U.S. Male starts its landing approach. Both wings are exactly the same, which makes construction easier and quicker.

■ Clarence Haught

UPON ARRIVAL at the local flying site you see a group of people huddled together. You can bet they are gathered around the latest Quarter Scale, Giant Scale or big airplane to appear on the scene. Modelers and spectators alike are attracted to these "new" models like flies to honey. Did I say new? Perhaps I should say latest generation or current breed (or any other such descriptive word). No, big models aren't new. In fact big models have dominated the hobby since the introduction of the "gas" engine. Back when Bill Brown (Brown Junior engines) and Maxwell Bassett revolutionized model aviation, "big" was the order of the day.

Author Clarence Haught poses with the U.S. Male. He wanted a big model that was lightly loaded and modestly powered of the type that got the "mammoth model movement" going.

Eight and 10-foot wingspans were the norm. Just look at today's entries in Old-Timer RC. Seven-foot wings and longer are common. Some modelers are even scaling up old favorites like the Lanzo Record Breaker (an eight-foot model) as much as 25%. Miniature Aircraft's nine-foot Taylorcraft kit was the envy of every Scale builder in the Forties. Given a small well-built model and a large crude one, the crowd will gather at the larger model every time. Not that this makes it right. It's just our nature. We like big models, big cars, big buildings, big anything. Well, almost.

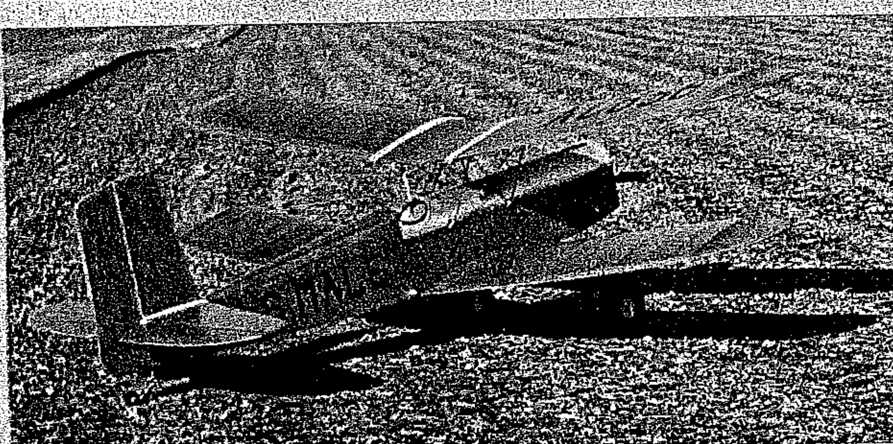
From the modeler's point of view, big models have a lot to offer. They are very realistic in the air, and they tend to fly at scale speeds. This is made possible by more favorable wing loading and more efficiency due to larger airfoils. There are no "scale" air particles, thus big wings are more efficient than small ones according to the aerodynamicists and their Reynolds number principles. Slower flight speeds also allow more thinking and reaction time, making most larger models easier to fly for new modelers. Fuel economy also enters the picture when gasoline engines are employed rather than the usual glow engines. The price of a gallon of glow fuel will purchase 10 gallons of gasoline-oil fuel mixture for a more fuel-efficient engine than we are used to. Big models are not so fussy about flying field conditions. Their big wheels tend to roll right over small hazards that would trip a conventional model. Grass-field operation is pure joy!

There are, however, some other factors to consider. Giant models are a new ball game and present some unfamiliar problems. One such problem is the servo load imposed by large control surfaces with their proportionately greater control deflections. Many existing radios are not up to this challenge. Some builders double up servos on elevators and ailerons, often using a servo on each aileron. Rudder and throttle functions are usually less demanding. New servos are available designed specifically for big models and are good insurance against control failure.

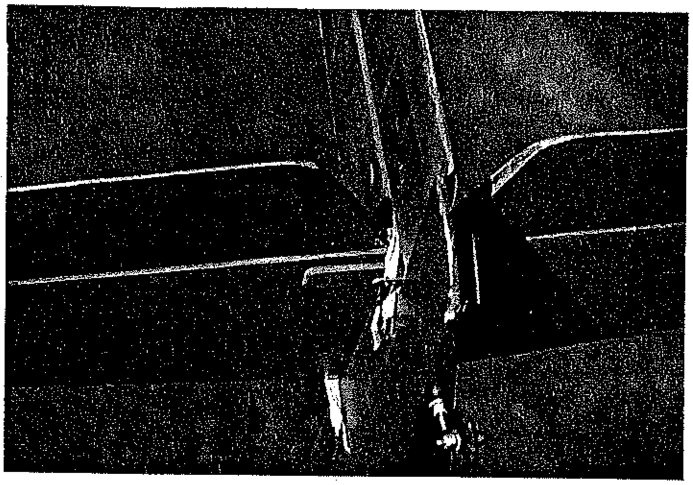
Typical power plants being used for the big birds are converted from other uses and produce more vibration than the typical model airplane engine. This presents new mounting problems as well as shortening radio/servo life and battery duration due to extra vibration. Conventional glow engines are better in this respect, and

Broad landing gear and large wheels allow operation from grass fields. Brace wires are joined in center by rubberbands wrapped to provide shock absorption during rough-field operations. Big wing area makes for soft landings.

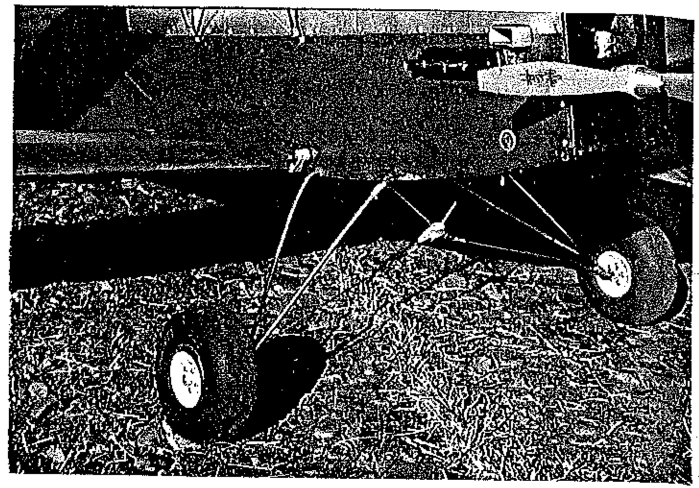
Large tail surfaces mounted on a long moment arm provide smooth, positive control. It's a docile flier. Designed for .60 to .90 engines, it's an ideal "big airplane" for novice fliers.



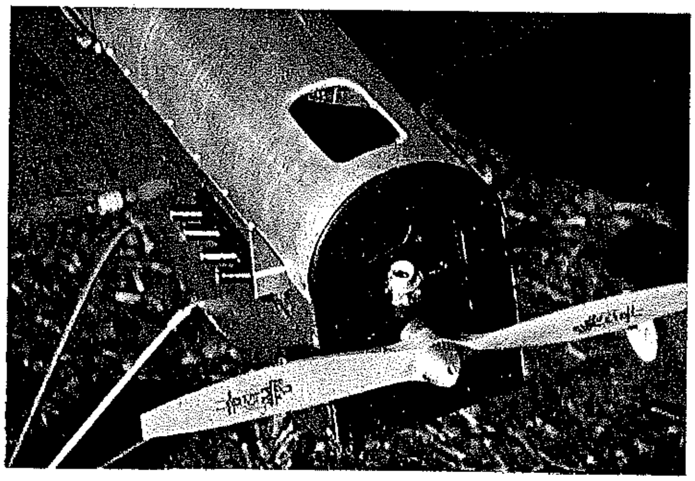
Model combines a degree of realism with simplicity. Low-cost materials ar extensively used. Finish is clear dope over colored fabric. Japanese tissue trim applied between coats of dope.



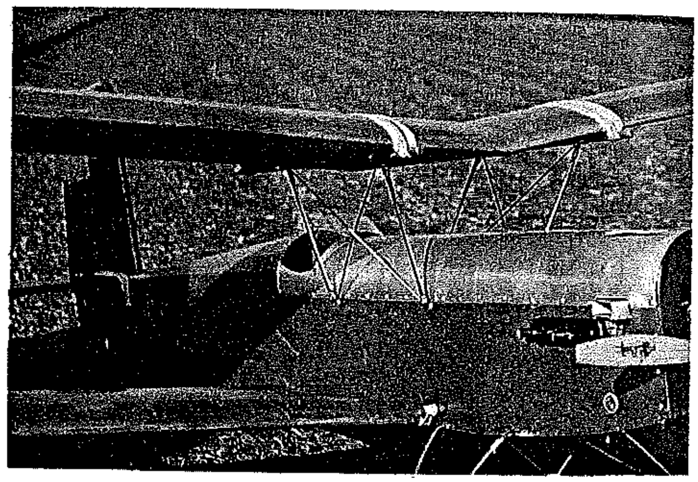
Plywood rest provides a solid base for the stabilizer. Wire rubberband hooks pass through the fuselage and provide a self-aligning effect. Tail wheel is steerable to assist in ground handling.



To get a feel of how big this model is, those are 5-in. wheels! Gear is 3/16-in. music wire with 3/32-in. bracing. Note how rubberbands provide shock-absorbing action to the landing gear.



The engine cowl is separate from the rest of the fuselage top, and it incorporates a cooling air exit. Dummy exhaust is only for looks. The plywood fuselage front also is completely removable.



Forward fuselage top is made from .020-in. aluminum cut from a clothes dryer vent pipe. It's secured by No. 2 screws of ⅛-in. length. The sheet metal didn't interfere with radio reception.

Cockpit area is trimmed to size and then outlined with split fuel tubing. Windshield cut from plastic sheet, framed with scrap aluminum, and screwed to fuselage. Radio switch and charging jack are visible.

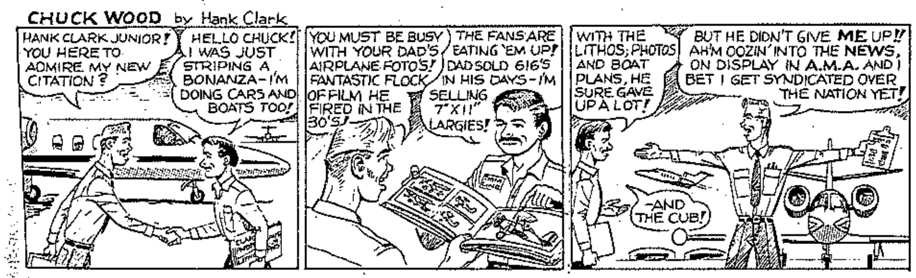
prop speed reduction drive units and multiple engine drive units have been developed for use in larger models. However, these systems do not offer the fuel economy advantages of gasoline engines.

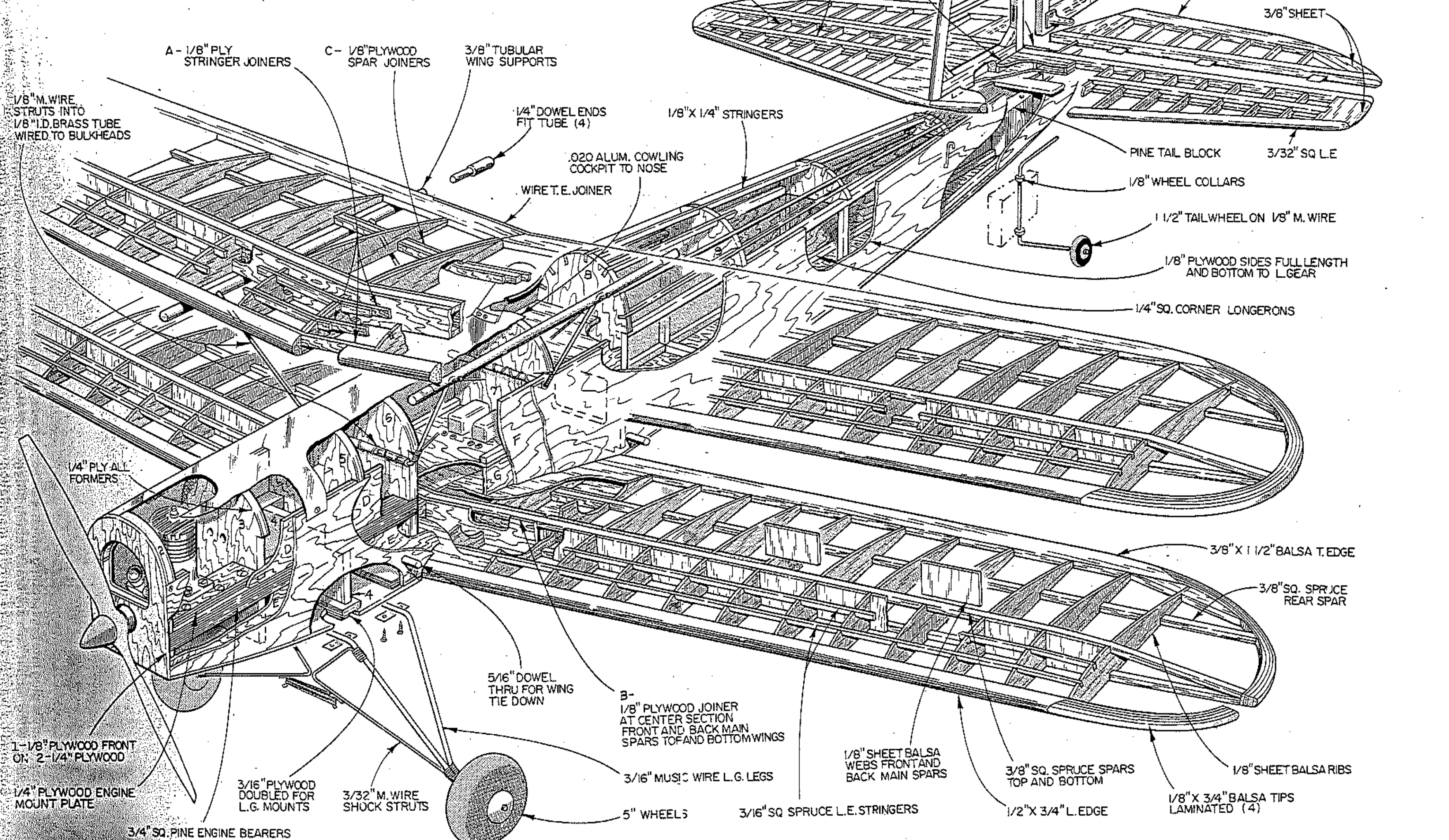
The designer of a conventional model can rely on time-honored rules-of-thumb to produce a model of sufficient strength and rigidity-flexibility to withstand anticipated air loads during projected maneuvers. Because of the increased size and vibration factors of gasoline engines, the designer of the large model is faced with new problems to solve. The typical result is an overly strong (read *heavy*) structure that is more than adequate for the job or, on the other side of the ledger, perhaps has a built-in structural weakness which may be revealed at an inopportune moment.

This type of experimental engineering can lead to some costly lessons both in time and material, to say nothing of the potential for these models to cause damage. "The bigger they are, the harder they fall" has implications in this hobby, and this is further complicated by the speed factor. One could also say, "The faster they fly, the harder they impact."

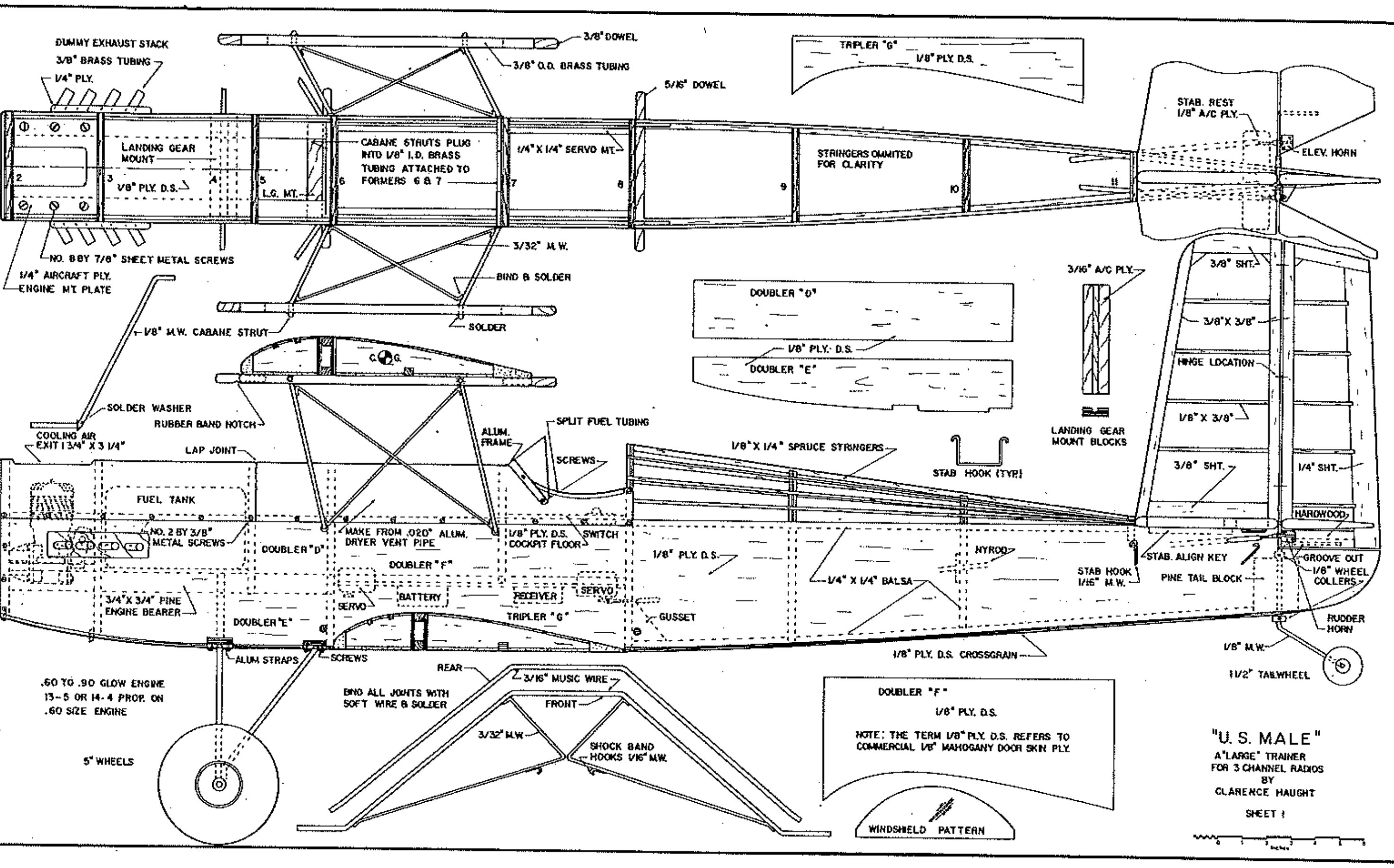
The original concept of the Quarter Scale or Giant Model Movement as advocated by Bill Northrop was to build big but to build light. He reasoned that real airplanes are built structurally light but strong, and they are not built to be crash-proof. Functional struts, wires, and braces can reduce the structural weight considerably. I interpreted his thoughts as suggesting models built somewhat like Old-Timer Free Flight with Radio Control. Some models have been designed around this criteria. Others have become scaled-up versions of typical RC models, resulting in high wing loadings and airspeed.

I wanted to get in on the fun like everyone else, but the thought of "starting over" with the purchase of a gasoline engine and a heavy-duty radio was distressful. I already had a considerable inventory of "standard" modeling gear. Thus, the thought of designing something that would be big but flyable on a standard .60 engine with my existing radio excited me. It also occurred to me that newcomers attracted to modeling by the large machines shouldn't have to start with a small trainer. Why not design a simple docile big bird that could serve as a trainer while letting the neophyte in on all the fun? Remembering my own first powered RC model, an Old-Timer Powerhouse, and the ease with which it taught me the fundamentals of RC, clinched it. The final criteria: low cost. Much of the materials should come from the local lumberyard, the covering from the sewing shop, and the finish ordinary clear butyrate dope from the airport


CHUCK WOOD by Hank Clark
HANK CLARK JUNIOR! YOU HERE TO ADMIRE MY NEW CITATION?
HELLO CHUCK! I WAS JUST STRIPING A BONANZA-I'M DOING CARS AND BOATS TOO!
YOU MUST BE BUSY WITH YOUR DAD'S AIRPLANE FOTO'S! FANTASTIC FLOCK OF FILM HE FIRED IN THE 30'S!
THE FANS ARE EATING 'EM UP! DAD SOLD 616'S IN HIS DAYS-I'M SELLING 7"X11" LARGIES!
WITH THE LITHOS; PHOTOS AND BOAT PLANS, HE SURE GAVE UP A LOT!
BUT HE DIDN'T GIVE ME UP!! AH'M OOZIN' INTO THE NEWS, ON DISPLAY IN A.M.A. AND I BET I GET SYNDICATED OVER THE NATION YET!
-AND THE CUB!


3/8" SHEET TIPS
3/8" SQ. L. EDGE
1/8" I.D. TUBE FOR 1/8" WIRE IN ELEVATORS
1/8" X 3/8" RIBS
1/8" X 3/8" SPARS
FIN CUT IN
1/4" SHEET T. EDGE
3/8" SQ. BALSA FIN AND RUDDER POSTS
1/8" X 3/8" RIBS
HARDWOOD BASE GROOVED FOR TAILWHEEL
1/4" SHEET T. EDGE
3/8" SHEET
PINE TAIL BLOCK
3/32" SQ L.E
1/8" WHEEL COLLARS
1 1/2" TAILWHEEL ON 1/8" M. WIRE
1/8" PLYWOOD SIDES FULL LENGTH AND BOTTOM TO L.GEAR
1/4" SQ. CORNER LONGERONS
A - 1/8" PLY STRINGER JOINERS
C - 1/8" PLYWOOD SPAR JOINERS
3/8" TUBULAR WING SUPPORTS
1/8" M. WIRE STRUTS INTO 1/8" I.D. BRASS TUBE WIRED TO BULKHEADS
1/4" DOWEL ENDS FIT TUBE (4)
1/8" X 1/4" STRINGERS
.020 ALUM. COWLING COCKPIT TO NOSE
WIRE T. E. JOINER
1/4" PLY ALL FORMERS
3/8" X 1 1/2" BALSA T. EDGE
3/8" SQ. SPRUCE REAR SPAR
5/16" DOWEL THRU FOR WING TIE DOWN
B - 1/8" PLYWOOD JOINER AT CENTER SECTION FRONT AND BACK MAIN SPARS TOP AND BOTTOM WINGS
1-1/8" PLYWOOD FRONT ON 2-1/4" PLYWOOD
1/4" PLYWOOD ENGINE MOUNT PLATE
3/4" SQ. PINE ENGINE BEARERS
3/16" PLYWOOD DOUBLED FOR L.G. MOUNTS
3/32" M. WIRE SHOCK STRUTS
3/16" MUSIC WIRE L.G. LEGS
5" WHEELS
1/8" SHEET BALSA WEBS FRONT AND BACK MAIN SPARS
3/16" SQ SPRUCE L.E. STRINGERS
3/8" SQ. SPRUCE SPARS TOP AND BOTTOM
1/2" X 3/4" L. EDGE
1/8" SHEET BALSA RIBS
1/8" X 3/4" BALSA TIPS LAMINATED (4)

FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 164



Being a biplane, the resulting U.S. Male is quite large. The wingspan is 80 in., giving a total wing area of around 1,800 sq. in. Finished weight (with ballast to bring in the center of gravity) is 14 lb. That figures out to a wing loading of roughly 1⅛ lb. per sq. ft. Compare that to the typical 25-lb. 1,000 sq. in. model at over 3½ lb. per sq. ft.

A flat-bottom airfoil coupled with typical Old-Timer Free Flight moments produces a model that basically will fly itself. In fact one day when I was having some radio problems, the model did land by itself a quarter mile away! It will recover unassisted from unusual attitudes by simply releasing the controls—given reasonable altitude. Three-channel control was chosen to simplify initial flight training, and that accounts for the generous dihedral. The U.S. Male is not a Scale model, but it was designed in the spirit of the 1930 mail planes.

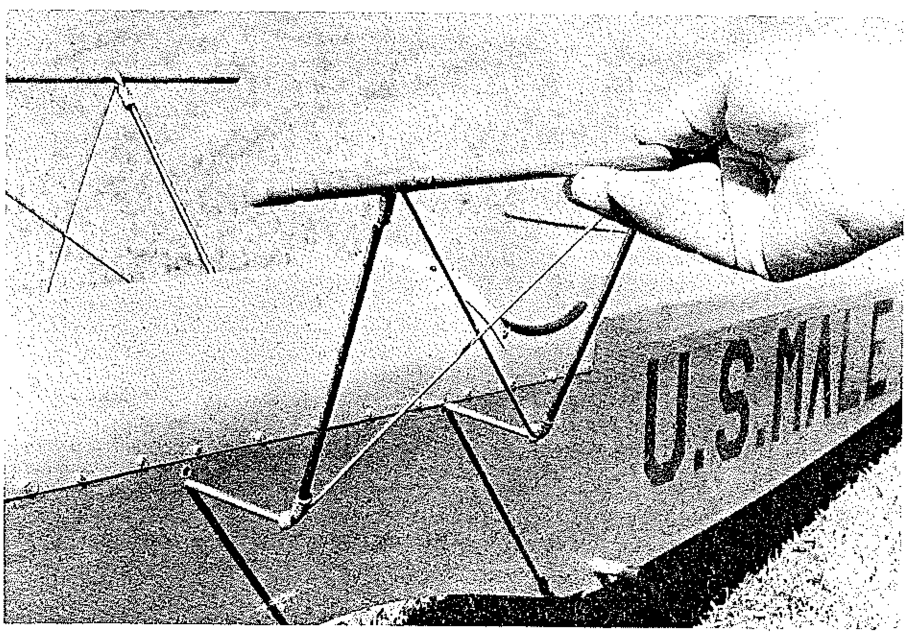
I mentioned non-traditional building materials as a means of reducing construction cost. The plans call for spruce or fir wing spars. Spruce is readily obtainable at a hobby shop, but if you have access to a table saw, one clear fir 2 x 4 from the lumberyard will yield more than enough spar stock for about a buck. Some lumberyards and discount stores handle trim strip already cut to usable sizes. Common fir plywood is used for fuselage formers. Fuselage sides and doublers are cut from ⅛-in. mahogany door skin available in sheets 7 ft. long and 30 to 36 in. wide, from the local lumberyard for under $10. This material is light, strong, works easily, and glues well with contact cement and white glues.

Construction should begin with the wings, as you will need a finished wing to fit fuselage sides to later. Start with the laminated wing tips, as you may cut out other parts while waiting for glue to dry. A tip form is cut from ¼ plywood. Wax edges of form with a crayon. Soak four strips of ⅛ x ¾ in water for 30 minutes. Pull and bend around form one at a time, using white glue for adhesive and rubberbands for holding in place. Tips need to dry overnight before removing and laying up the next tip. Two forms will speed progress but are not essential, as both right and left tips can be made from the same form.

Ribs are cut from ⅛ balsa sheet. Every third rib could be cut from the ⅛-in. mahogany door skin, if desired, for additional strength with little gain in weight. Ribs are easy to stack-cut on a bandsaw if you have one.

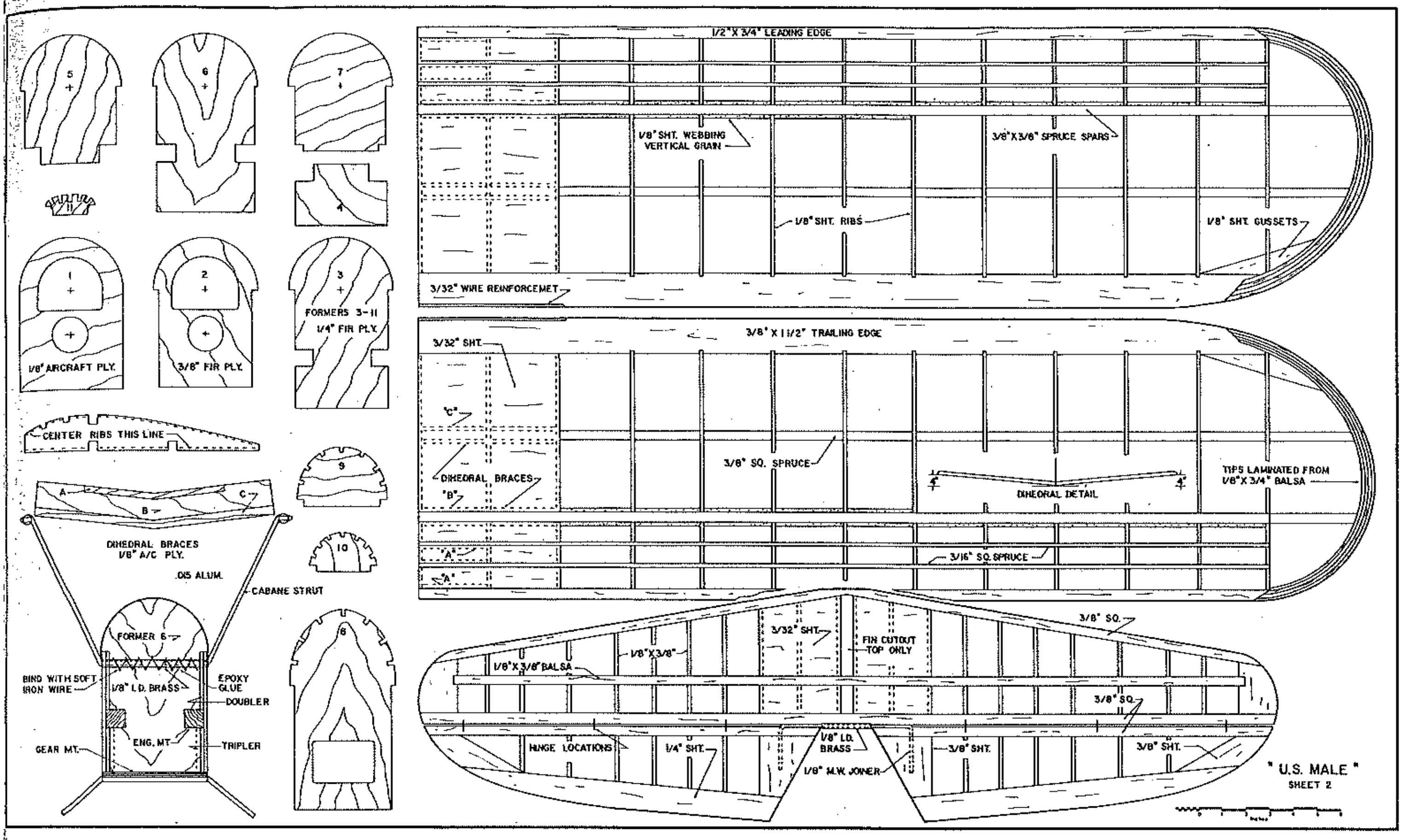
Preshape leading edge and laminated tip, using block plane and sanding block, to approximate final size—leaving some stock for finish sanding. Prenotch trailing edge stock for ribs.

Cover plan with kitchen wrap, and lay down the leading edge, bottom spars, and trailing edge. Install bottom center section sheeting and laminated tip. Add ribs, omitting center and next rib for now. Install top main spar and vertical-grain spar webbing. When dry, sand butt ends of wing for dihedral angle, and join wing halves with dihedral braces. Trim center ribs to clear dihedral braces, and cement in place. Add 3/16 sq. multi-spars and top center section sheet. Gussett



Cabane struts plug into brass tubing which is laced to fuselage formers with wire. Diagonals provide rigidity. Wing mount rails are brass tubing plugged with wood dowel and soldered to the wires. Soldered-on washers assure uniform installation of the struts at the fuselage sides.

FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 164



trailing edge at tips. Give wing a final sanding, and add wire reinforcement at trailing edge center. Both wings are identical.

Stabilizer, elevator, fin, and rudder are straightforward structures. Ribs are simply ⅛ x ⅜ balsa stock sanded to shape after assembly. Make your own elevator joiner from ⅛-in. music wire. Don't forget to slide brass bearing tube over the wire before bending. Fit a set of good heavy-duty pin-type hinges. Du-Bro makes some good ones with cotter key pins. Note the notch in the bottom of the rudder for the tail wheel steering arm. This piece is made from hardwood. Also note the triangular balsa key on bottom of the stabilizer for alignment purposes. This will need to be closely fitted to the fuselage later. The base of the fin is notched to clear the top stabilizer spar.

Fuselage construction begins with cutting basic sides and doublers from the ⅛ ply door skin. Cut Formers 3 through 11 from ¼ fir plywood. Former 1 is cut from ⅛ aircraft plywood and No. 2 from ⅜ fir plywood. Fuselage sides should be clamped together while sanding to final size and fitting the lower wing cutout to the finished wing.

Lay out sides with top edges together to ensure making one right and one left side, and locate ¾-in. sq. pine engine mount beams using doublers and Formers 3 and 6 for alignment. Note that Formers 6 and 8 bear on the fuselage sides while all others rest on doublers. Glue engine mounts to sides with white glue, and allow to dry. Adhere doublers with contact cement. Ensure space for Former 6. Adhere tripler to wing saddle area. Glue ¼-in. sq. and gussets to rear fuselage area. When dry, clamp fuselage sides together outside-to-outside, and drill wing dowel holes.

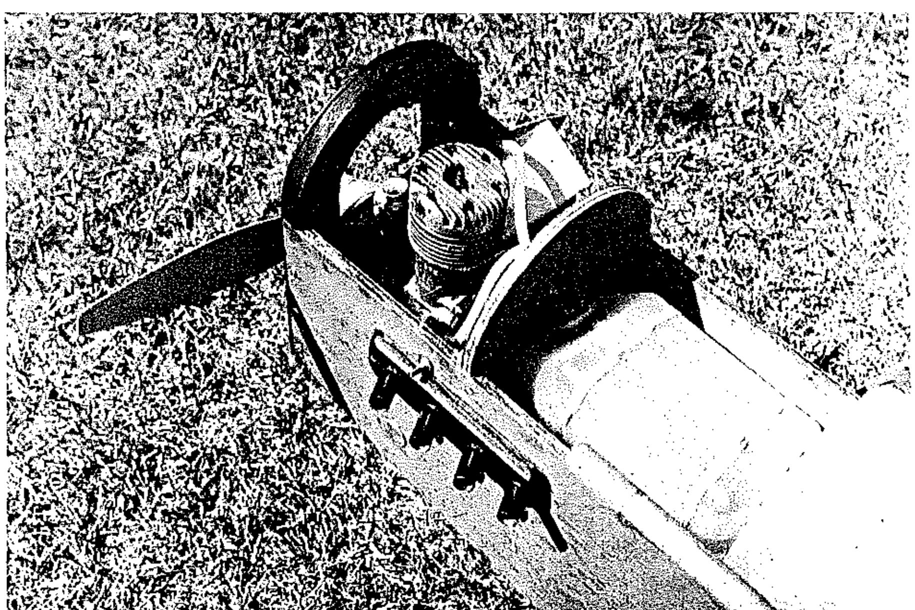
Join fuselage sides, using Formers 3, 6 and 8 and the tank compartment floor to aid in alignment. Small nails or brads are helpful and may be left permanently in the structure. When dry, install tail post block and remaining formers.

Accurately locate holes for cabane strut tubes in fuselage sides and adjacent to Formers 6 and 7. Drill to accept ⅛-in. I.D. brass tubing. Install tubing flush to outside of the fuselage, and secure to formers with wire lacing and epoxy glue.

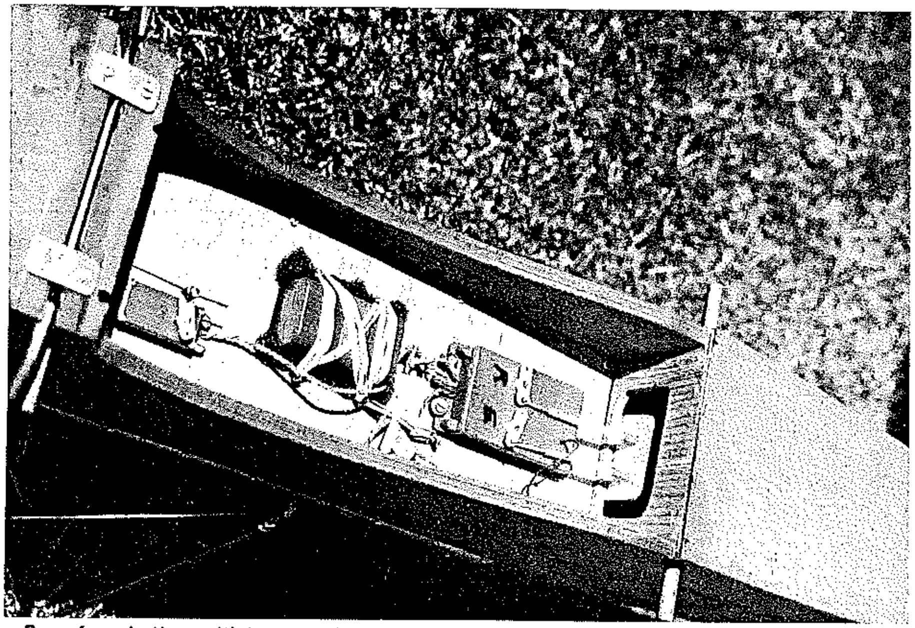
Fabricate landing gear mounting blocks from 3/16 aircraft plywood, and install in notches provided in the fuselage sides.

Install spruce stringers aft of cockpit. Add cockpit floor and servo mount rails on top of fuselage Triplers G. Cut engine mount plate from ¼ aircraft plywood, and screw to engine bearers with six No. 8 by ⅞-in buttonhead sheet metal screws. Temporarily install engine. Glue Formers 1 and 2 together, and fit to front of the fuselage with screws, trimming for engine clearance as needed. Mount stabilizer rest, and fit triangular-shaped stabilizer alignment key to bottom of the stabilizer. Secure tail surfaces to fuselage with rubberbands.

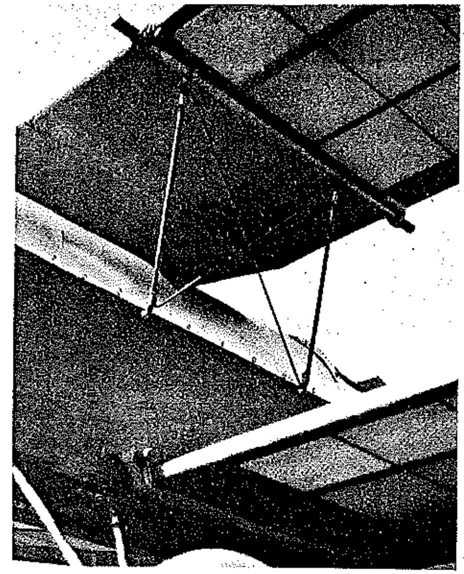
Temporarily install radio gear and install Nyrods (or equivalent) for elevator, rudder and throttle controls. Support control rods along their runs to prevent undesired buckling and flexing. Provide for 1¼-in. rudder travel and 1-in. elevator travel in each direction as measured at the trailing edges. Remove engine and radio to



Removal of the cowling exposes fuel tank, plumbing, and complete engine installation. Engine mounts to ¼ ply plate which screws to beams in fuselage. Makes changing engines easy.



Seen from bottom with bottom wing removed, there's ample room for any radio installation. All components are shock-mounted. Support control pushrods at regular intervals to prevent flexing and buckling. Landing gear retained in mounting blocks with sheet metal straps and screws.



Split dowel keys give perfect alignment to the top wing every time it is installed. Secure wings with three No. 84 rubberbands each side.

proceed with construction. Sheet fuselage bottom with ⅛ plywood door skin cross grain.

Bend four identical cabane struts from ⅛-in. music wire. This is best done simultaneously with the aid of a vise. Tape four pieces of wire together side-by-side, and mark bend locations on each end. Length is not critical as long as all pieces are equal. Clamp wires in vise, and bend to the proper angle by hand. Reverse wires, and bend the other end to proper angle.

Prepare brass tube wing mount rails by installing dowel plugs and drilling mounting holes. These holes must have spacing identical to the fuselage wing mount tubes to ensure zero incidence of the top wing.

Place fuselage on a flat surface and slide cabane wires into their mounting tubes. Slip wing mount rails over wires, and support them with temporary blocking. Check alignment from front, side, and above. When satisfied, solder cabane wires securely to the brass tubing. Bend the 3/32-in. music wire diagonal braces; bind joints with soft iron or copper wire, then solder. A stop washer should be soldered to the bottom of each cabane wire to ensure uniform alignment each time the cabane strut assemblies are installed.

The fuselage top from the cockpit forward is formed from .020-in. aluminum. Obtain a length of 4-in. dryer vent from a hardware or building supply store. This material is easily cut with tin snips. Make one piece to fit from Former 5 to Former 8, enclosing the fuel tank compartment.

Cut out cockpit opening, and file off all burrs.

Continued on page 76

most of his plans customers insist on aerobatics with everything, even a Wright Flyer if there was one. Sure, we understand flight realism—and no one can build anything to fly at scale speed—but the Moustique had to have zip. Oh death, where is thy sting? So here it was with a Ross Twin .60, a span of 80 in., and 14.5 oz. wing loading for 8 sq. ft. of area and 7¼-lb. weight. A floater, of course. My big Aristocrat almost floats at 38-oz. loading.

Norm's Moustique took off in three feet (zero in a breeze), and it recovers from a complete stall in about its own length. He flies flat, unbanked 360s by crossing controls. Now he tells me it would be better with a .35 to .45 sport engine! He thinks a .30 4-cycle Saito FA-30 would be ideal. Old Norm will be right-on with those "sport" engines—too bad his Farman is just a plan and not a kit. If a kit, I'd have to sit on yet another tantalizing fantasy.

"The photo of my (Turbulent) in the September issue is really a Jodel D-9, which you probably know," writes Dick Konkle. "Just can't resist poking a little fun." Since only two guys wrote about that glaring "error," I thank you all for realizing it was the gosh-awful typewriter that did it! I know the difference. Dick has more info.

"A little history on my D-9. A group of us bought plans for the full-size plane around 1958—I fell heir to the plans. When I bought a Gemini Twin I looked around for a design that had an exposed two-banger and also was reasonably aerobatic—the Jodel was my choice. Structure is all scale, including the sprung landing gear. The scale is 30%, wingspan about 88 in., weight 13½ lb. She has done well in contests, usually first or second."

In the caption two issues back (Turbulent) I extolled the flying qualities of the Jodel. The same is true of the Turbulent. Both are magnificent subjects for Rubber, FF Gas, CL, or RC in any size.

By now, your editor is screaming for my frequency pin!

Bill Winter, 4426 Altura Ct., Fairfax, VA 22030.

U.S. Male/Haught

Continued from page 28

Attach to fuselage with No. 2 x ⅜-in. sheet metal screws spaced as shown on the plan. Cut engine cowling portion to length. Provide engine cooling hole 1¾ x 3¼ in. as shown. Also cut clearance for muffler or exhaust extension. Cut windshield from plastic sheet. Frame bottom edge with scrap aluminum, and bolt to the fuselage.

The landing gear is fabricated from 3/16-in. music wire with 3/32-in. music wire bracing. Fix front and rear components to fuselage with straps and screws. Bind parts together with soft wire, and solder securely while assembled to fuselage. The tail wheel gear is installed after covering the fuselage. Remove all metal parts and give fuselage a final sanding.

Covering. Any of the popular covering techniques can be used. In addition to the flying surfaces, I prefer to cover the entire fuselage, as I feel a lighter-weight finish may be obtained in this way. In keeping with a commitment to a low-budget model, the original was covered with polyester dress lining from the local sewing shop. This material comes in a myriad of colors, is strong, cheap, and heat-shrinkable. Proceed as follows.

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built into the rotor system.

Blade incidence. The chord-wise angular setting of each rotor blade. Although full-size giros employ slight positive incidence, model giros required *negative* blade incidence (leading edges lower than trailing edges).

Rotor disc incidence. The angular setting of the entire rotor system. In model form, the disc is generally tipped slightly rearward.

Disc area. In full-size giro engineering computations, the entire area swept by the rotor blades is considered lifting surface.

Solidity factor. The total area of the rotor blades relative to the disc area. It would appear that the area of the blades is of much greater importance in model giros than in full-size practice.

Model objectives. The development of successful model giros in which the following goals are met:

1) Stability and lift is obtained from unpowered rotor systems.

2) The craft should be stable in all conditions of flight.

3) It should be consistent in performance, with a predictable pattern of flight.

4) Duration should be ample for adequate flight evaluation.

5) Model should be relatively easy to construct and adjust.

6) Models should be easy to repair. (They *will* crash!)

Suggestions: 1) Start small; 2) Stay simple; 3) Build light; 4) Be patient and persistent; 5) Keep records.

Power. Dependability will greatly simplify experiements. Here is our order of preference: 1) Rubber; 2) CO-2; 3) Electric; 4) Diesel; 5) Glow.

Suggested design parameters.

1) Models employing two separate rotor systems are easier to fly, but single-rotor-system models are more challenging to the imagination! Also, the vast majority of full-size giros have employed a single-rotor system.

2) Short rotor diameter relative to overall model length seem easier to adjust and fly.

3) Although stiff rotor systems can be made to work, flexible or hinged systems are most frequently employed.

4) Flat or flat-bottom-airfoil rotor blade airfoils are suitable. (Small models can employ simple sheet balsa blades.)

5) Four-blade systems are easier to fly than three-blade layouts; three-bladers are much easier to fly than two-bladers.

Mechanical considerations.

1) Design to permit ease of adjustments.

2) Arrange for easy parts replacement, especially rotor components.

Initial force setup. Virtually any model giro will undergo adjustments before it will fly satisfactorily (some never do!). But these "ball park" settings may serve as useful starting points:

1) Rotor blades 2° to 4° negative incidence.

2) Rotor mast axle angle 4° to 10° aft of vertical (2° to 3° of side tilt may also be employed in some instances).

3) Center of gravity located at or near a line projected downward along rotor axle axis.

4) Stabilizer set at 0° or slight "down elevator" (a lifting section stabilizer is sometimes employed).

5) Propeller thrust line at 0° or 2° to 3° downthrust. If rotor turns clockwise (as viewed from the top), adjust model for right-hand flight circle. If rotor turns counterclockwise, adjust model for a left-hand flight circle. Although some builders feel strongly one way or the other, we have successfully flown models of both types.

Testing (relatively small models only). Start a test glide by walking into the wind (if any) with the model's nose held hight. When rotor has reached high rpm, level the model and drop it (don't throw). It should settle nearly vertically. For power tests, start with fairly low power, walk to bring rotor up to flying speed, level model and *gently* launch. Rotor must have sufficient rpm to generate proper lift and roll resistance. Rise-off-ground starts are difficult even when the model has been properly adjusted—very unlikely to be successful in an untrimmed model.

Possible adjustments. To increase rotor rpm, try: 1) more negative blade incidence; 2) greater mast angle; 3) different blade airfoil.

Thrust-line offsets and rudder angles may be used to assist turn-circle adjustment, although in some designs rudder adjustment may have little effect. Elevators may be used as ailerons to help resist roll and to help adjust model's turn circle.

Changes in propeller diameter and pitch can have profound effects on both stability and performacne. Low-pitch props are generally preferred.

Center of gravity changes can be useful "cures," including offset weight, such as ballast added to a landing gear leg, to assist turn.

Important. Not all "experts" agree. Often there are several possible solutions to a trim problem, so don't be afraid to experiment! But make only one adjustment at a time. Cures which work for your conventional models may not always do the job with giros. And contrary to some expressed opinions, giros *can* stall and spiral dive. Above all, try not to become discouraged . . . failures can be educational, too. there are many "question marks," contradicting theories, and "missing links" in the model giro field.

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We hope that some of you readers will respond to the challenge, produce some fresh answers, and let your comrades in the whirly world of giros know of your successes and failures. Come, let us go forth and break blades together!

U.S. Male/Haught

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Coat all wood surfaces coming into contact with the covering with two coats clear nitrate dope, sanding between coats to smooth any raised grain. Cut a piece of the polyester to approximate size, and lay on structure. Spray with water from a household cleaning sprayer. (The water doesn't shrink polyester, but it sort of "relaxes" it, and makes it cling to the structure while wrinkles are smoothed out.) Lift edges of the fabric, and apply dope. Smooth cloth back in place, and trim excess with a sharp razor blade. Allow dope to dry thoroughly. (Covering may still be damp.)

Shrink fabric with a household iron set on "wool." When satisfied, apply one coat of clear nitrate dope as a primer coat. Finish with five brushed coats of clear butyrate dope. Apply trim as desired with pigmented dope or with colored tissue affixed with thinner before second and third coats of clear dope. If finish is to be sprayed, build up sufficient coats to properly seal fabric from fuel and oil residue.

Miscellaneous. Fabricate tail wheel assembly by bending ⅛-in. music wire to a right angle to fit grooved rudder base, and slip upper wheel collar in place; tighten securely. Insert into hole in tail post block; add washer and bottom wheel collar. Bend sweep and axle, and install tail wheel.

Bend stabilizer hold-down hooks in place on the fuselage from 1/16-in. music wire. Install lower wing hold-down dowels. Assemble main landing gear to the fuselage with straps and screws. Install engine, fuel tank, radio, and all associated hardware. Screw aluminum cowl parts in place. Make up dummy exhausts, and epoxy in place.

Mount the tail assembly, and check for alignment. Trim or build up stab key as required to assure alignment. When satisfied, paint small witness marks for matching up alignment at subsequent assemblies. Install top wing. Check alignment with fuselage and lower wing, including equal gap at wing tips. Springing cabane strut assemblies will assist in this effort. Finally, install split dowel wing alignment keys to bear against wing mount tubes.

Check balance point (it should be at 50% of the top wing chord). Add lead ballast in the compartment beneath the engine if necessary. Do not attempt to fly any tail-heavy model. A slight nose-heavy condition is acceptable. Make final check of control travel.

Flight testing should be done on a calm day or at least one with light winds. I prefer to start the takeoff roll with about 25% to 30% of up-elevator. This holds the tail down for good directional control. The ship will fly off in the tail-low attitude. Relax the up-elevator, and allow the model to climb at a shallow angle to about 50 feet and gain airspeed before starting your first turn.

This airplane flies quite slowly and has very docile stall characteristics, but one should be wary of stalls until some are practiced at high altitude. When reducing power, the model slows quickly due to its having so much drag.

In the event of a dead engine, get the nose down and maintain flying speed. Landings are pure joy. Just flare out, and let her settle in.

Help keep the U.S. Male moving!

Radio Technique/Myers

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pushrod (see the photo).

On balance, I don't like the ABC engine for a Helicopter, because the interference-fit between the piston and cylinder is absolutely intolerant of any contamination. You *must* filter both the fuel and the incoming air, because *any* trash in the engine will cause it to bind. The engine would be better suited for this Helicopter if the piston were modified for a low-tension Dykes rings. (Perhaps K&B will consider making such an engine, if the market develops.) In addition, the Baron 20 uses a belt starter, and this engine has never been easy to start, so it takes a lot of the fun out of the situation. Too bad!

In order to proceeed with the rest of the testing listed, I replaced the Circus Apollo system with a Kraft flight pack composed of the SR 900 mAh battery (*not* a Kraft item), the Kraft Super Gyro, and five Kraft KPS-24 servos, controlling same with my Ace Silver Seven transmitter (see my columns for August and October 1980 and February 1981). The Watson RC-037 was obtained by exchanging the RC-036 (described here in September 1982), and it was installed in a KPS-24 modified for the purpose.

Taking the easy parts first, the Kraft Super Gyro and KPS-24 servos (June 1982 column) worked beautifully. There's really nothing to say beyond the fact that I plugged them in and they worked perfectly, right from the start. Likewise, the SR 900 mAh battery showed all the power it

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