MAGNUM 60

Back in late 1978, at the end of my second year of flying, I was looking forward, as most northerners do, to my third winter building season.

At the time I must have had three or four kits under my belt, and the time when a good day of flying was one on which I brought back my plane in one piece, was mostly behind me. I felt I was ready to tackle something new and different from the basic trainers.

The November '78 issue of RCM really struck a chord with its construction article on the "Magnum 40" by Dan B. Santich (plan #745). It was something new in the sense of building from plans and different from the conventional style of the basic trainers. Now, there was a plane from which emanated energy, spirit, sparkle and flash; in a word, it had "Pizazz."

To fly the "Magnum 40" was really a great thrill! Although at slow speed it was a real pussycat, honest and predictable, but when you pushed the action lever you had better know what you were doing to stay on top of that terrific "hot dogger."

I must confess that at times during the first few flights, with the throttle at full bore, I sailed into troubled waters, led by the speed and responsiveness of the "Magnum 40." That plane had the greatest speed differential capability of anything I had seen. It was a real kick to literally burn up the sky with high speed passes, snaps, loops, etc., and then throttle back and tool around at an almost walking pace. It was everything Dan had said and more.

As is most often the case, the "Magnum 40" was re-kitted as a result of a sudden and crushing encounter with some basic laws of physics.

After a bonfire, I went back to other projects that were on the building board, not to think again of the "Magnum 40" until the day I saw a picture of a "Magnum 90" in RCM. This picture brought back pleasant and nostalgic memories, and the idea of a new challenge. Since the "Magnum 40" was a real barrel of fun; how about a bigger barrel?

I present to you, for your enjoyment, the "Magnum 60."

The "Magnum 60" is, for the most part, a 61% blown-up version of the little brother, adjusted to take in account the usual wood sizes available on the market.

You may ask yourself, why a 61% enlargement rather than a 50%, 60% or whatever? The answer is quite

ABOUT THE AUTHOR

Serge Pierre, a forest engineer, 39 years old, is married and the father of two girls. He lives near Montreal, Quebec, Canada. He has been fascinated by airplanes as far back as he can remember. At one time he held a private pilot's license. He has been involved with R/C model airplanes since 1976. Since 1978, he has been a member of Club D'Aeromodelisme Lafayette Inc., a club dating back more than 20 years, where he has been flight instructor and chief flight instructor for a number of years. Serge's main interest is in building and flying R/C sport/aerobatic airplanes.

Serge's daughters, Caroline 8, and Isabelle 11, with the Magnum 60.

With the great performance of Dan Santich's "Magnum 40" (RCM Plan #745), Serge wanted a larger version. At 61% increase, the "60" will do it all.

By Serge Pierre **Color photos by Jacques Pierre**

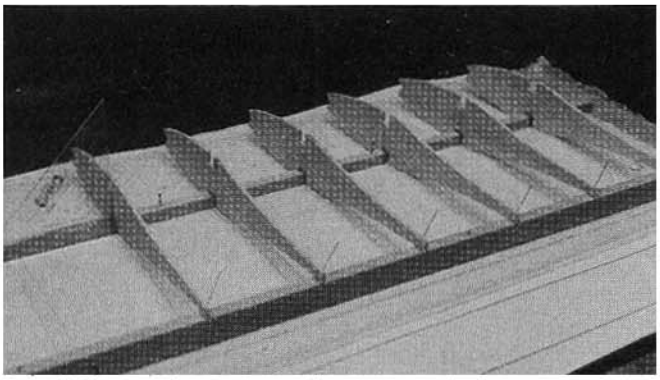
simple. Since I did not want to mess around with the original "coke bottle" wing airfoil of the "Magnum 40," I took the wing template to the office enlarging copier machine. A check of the print against a 10" square reference grid indicated an enlargement of exactly 61% with height and width, increased by a factor of 1.27.

MAGNUM 60

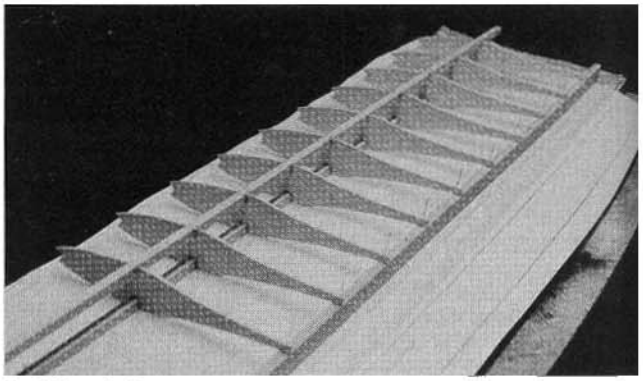
Original Designed By:
Dan Santich
Design Adaptation By:
Serge Pierre
TYPE AIRCRAFT
Sport/Aerobatic
WINGSPAN
70 Inches
WING CHORD
12 Inches
TOTAL WING AREA
840 Sq. In.
WING LOCATION
Shoulder Wing
AIRFOIL
Symmetrical Reflex
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
None
O.A. FUSELAGE LENGTH
51¼ Inches
RADIO COMPARTMENT SIZE
(L) 11½" x (W) 3" x (H) 2⅝"
STABILIZER SPAN
20 Inches
STABILIZER CHORD (incl. elev.)
8 Inches (Avg.)
STABILIZER AREA
160 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid Fuselage
VERTICAL FIN HEIGHT
7¾ Inches
VERTICAL FIN WIDTH (incl. rud.)
10½ Inches
REC. ENGINE SIZE
.60-.61 2-stroke
.90-1.20 4-stroke
FUEL TANK SIZE
13 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Elev., Ail., Rud., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply
Wing ..... Balsa, Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 128 Oz. (8 Lbs.)
Wing Loading ..... 21.96 Oz./Sq. Ft.

Being by nature a heavy handed builder, with all of my planes coming out tail heavy, I took the opportunity of this new design to slightly increase the nose moment for easier balancing. The slightly longer nose had the side benefit of allowing enough space to completely enclose a 13 oz. Kraft fuel tank forward of the wing, rather than protruding into the wing and radio compartment, as was the case with the "Magnum 40." This greatly simplified the construction of the wing center section. The increased height of the fuselage section also allowed the modification of the aileron linkage system, for which I substituted torque rods in place of the bellcranks originally found in the "Magnum 40."

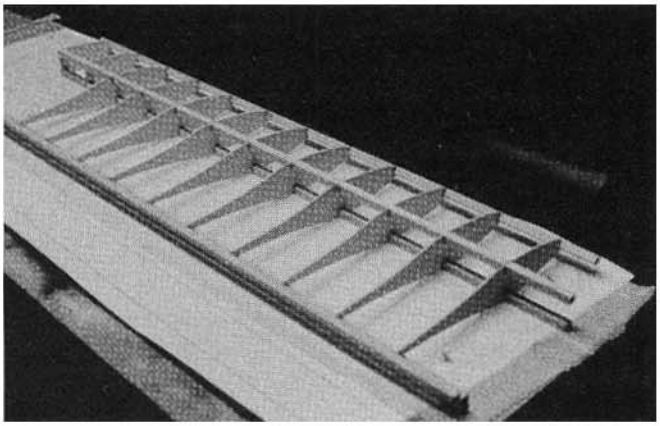
The "Magnum 60" with a Super Tiger Blue Head saddled up front, is about the size of a turn around job and on straight FAI fuel, looks about as fast. For those "serious and dedicated" fliers, the "Magnum 60" is a very stable platform from which to execute your dream choreography of aerial ballet. It is also an ideal subject for the now established trend toward the 4-stroke engines with a 90 or a 120 in its large engine section. For the 80% Sunday fliers of the modeling fraternity, the "Magnum 60" is nowhere close to a trainer in design or performance, but rather a highly predictable sport aerobatic airplane with the best overall combination of flying characteristics of any plane I have flown. "Hot doggers" beware --- the "Magnum 60" with a Schnuerle



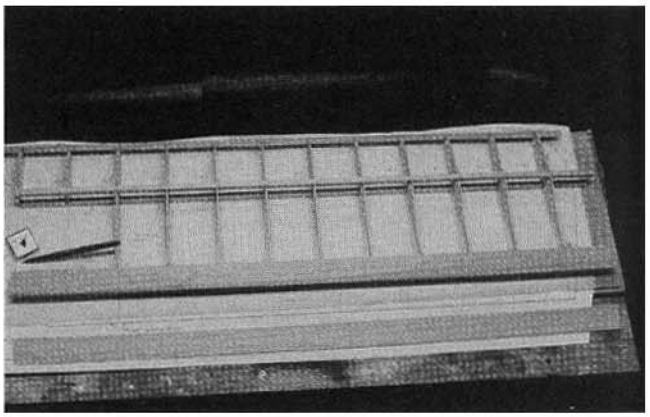
Install ribs over bottom spar. Square up and glue.



Install and glue upper spar.



Glue 3/8 sq. leading edge in place. Glue W-3 ribs in place.

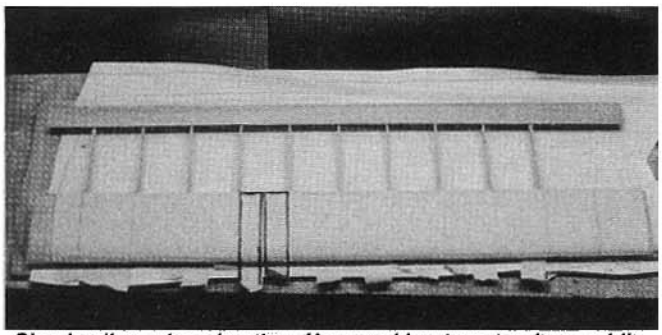


Glue trailing edge.

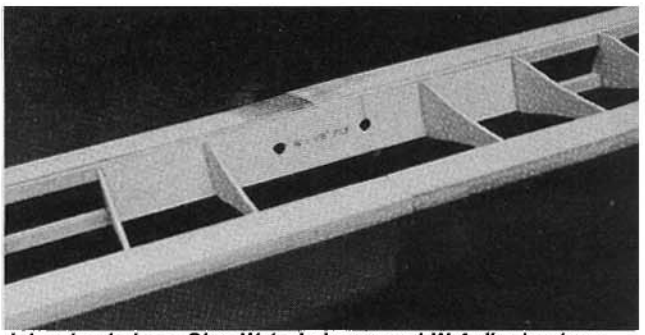
ported 61, can literally bore a hole in the sky. Also, from my personal experience, the "Magnum 60" is a crowd pleaser and an eye catcher.

CONSTRUCTION

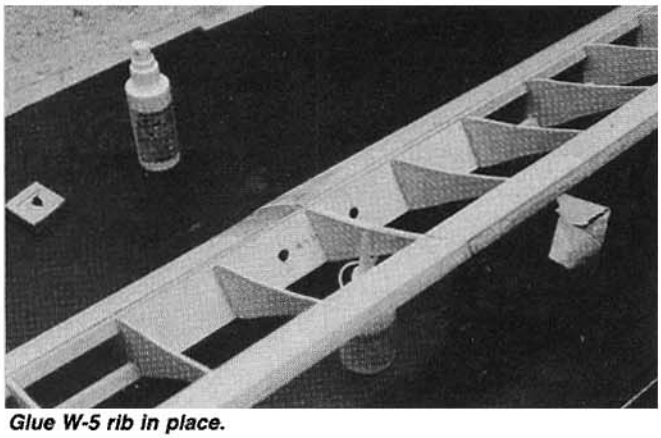
The use of Hot Stuff or equivalent is highly recommended throughout the construction as it greatly accelerates the building procedure; it is also almost essential to use on the wing capstrips since the reflex of the airfoil will want to let the capstrips lift up.



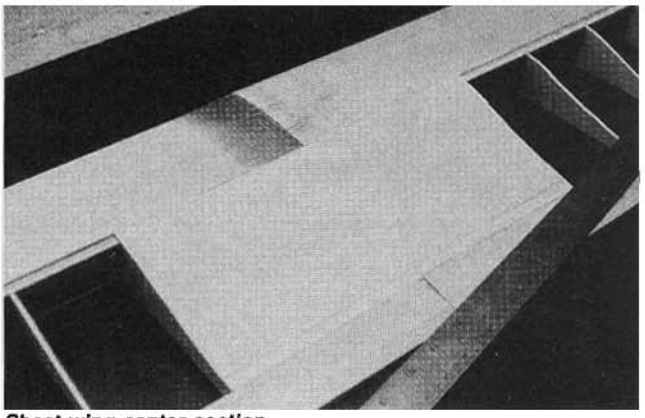
Glue leading edge sheeting. Use masking tape to clamp while glue cures.



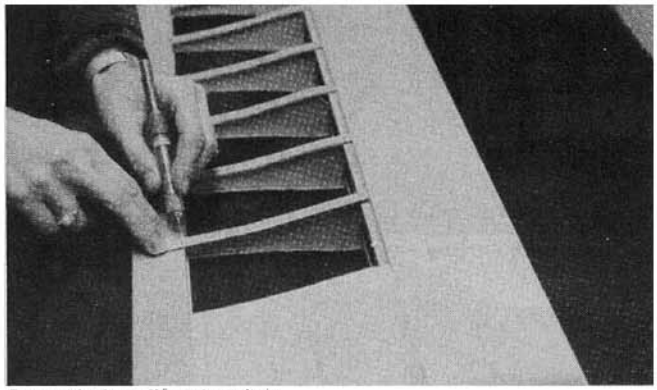
Join wing halves. Glue W-1 ply brace and W-4 ribs in place.



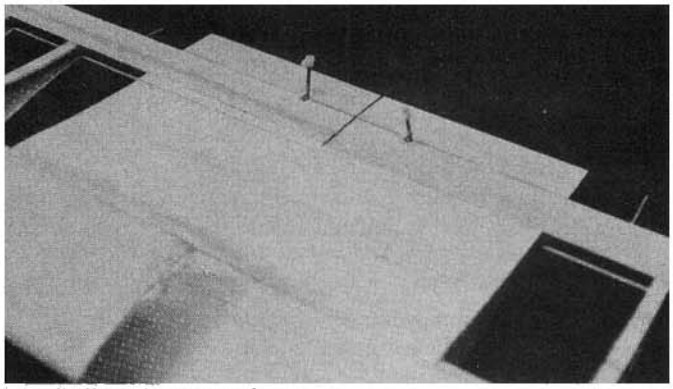
Glue W-5 rib in place.



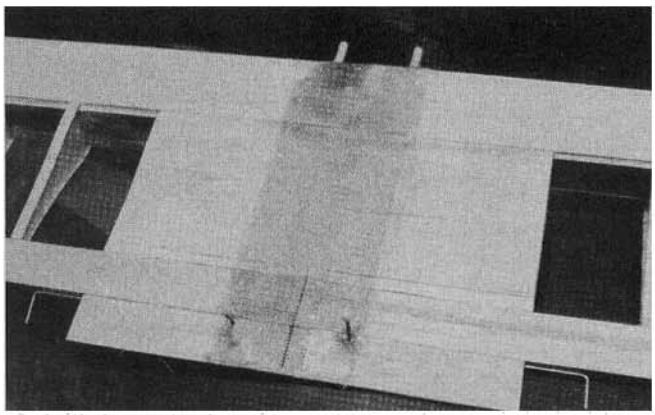
Sheet wing center section.



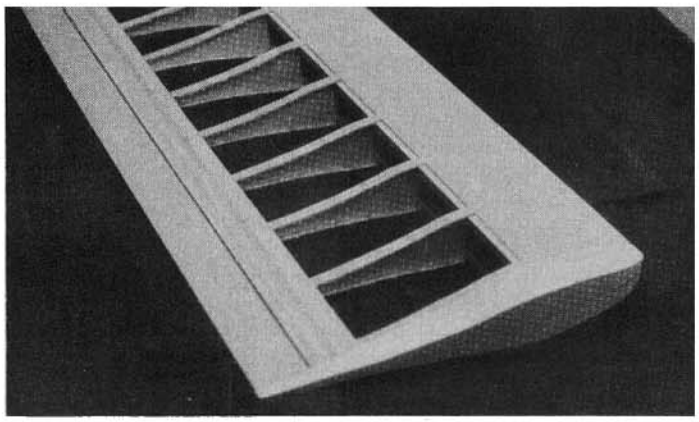
Cut and glue rib cap strips.



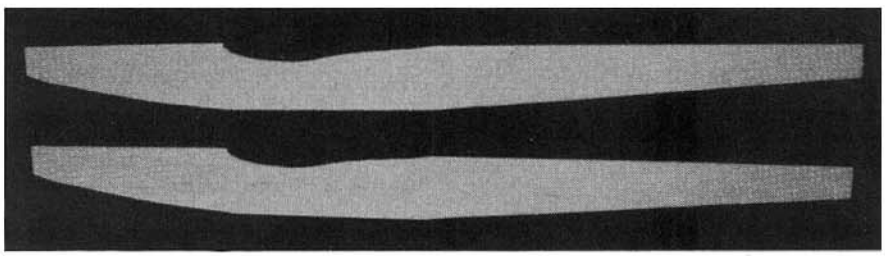
Install aileron torque rods.



Glass cloth center joint.



Rough cut wing tip blocks and glue in place.

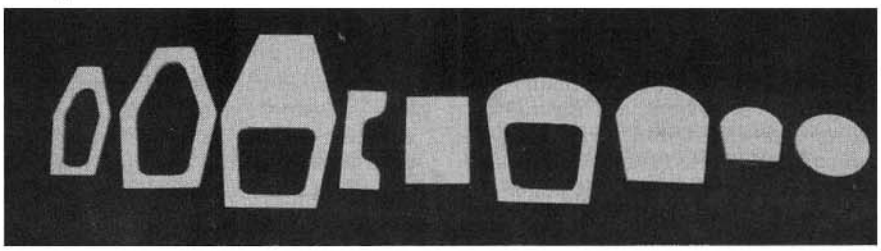


Fuselage sides.

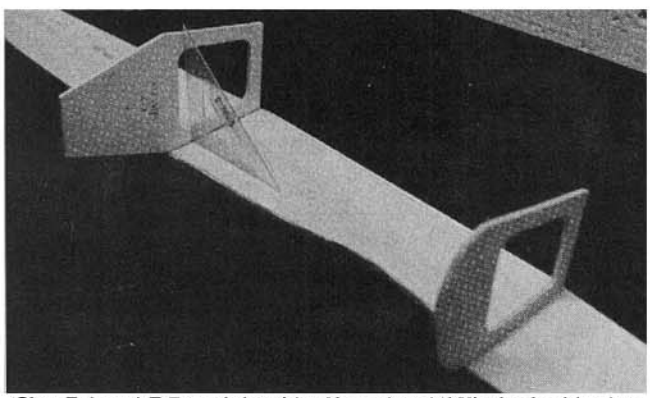
Wing:

First cut out W-2 or trace its shape on paper and glue to a piece of 1/8" plywood. Carefully cut outside the template line, then sand to the line,

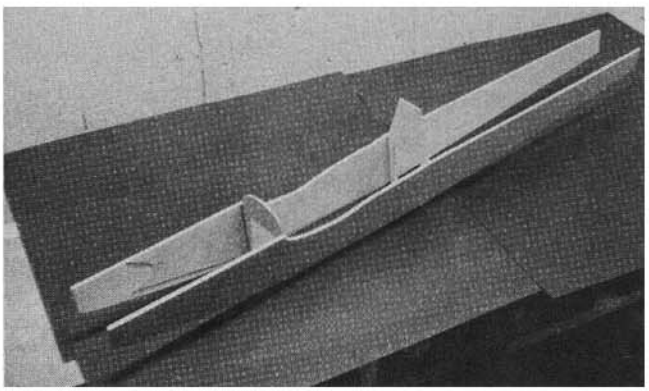
I would recommend starting construction with the wing since it establishes right from the beginning what the final product will be: an airplane! It is also easier to set the wing to the fuselage while the latter is being completed.



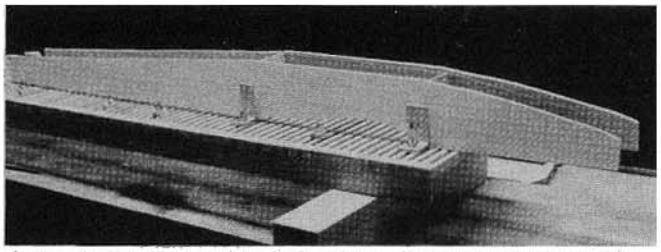
Fuselage bulkheads.



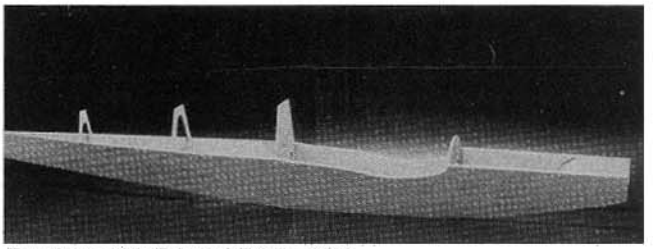
Glue F-4 and F-7 to right side. Note that 1/16" ply doubler has already been glued to side.



Glue on left side of fuselage.



Author built a jig to assist in fuselage alignment and assembly.

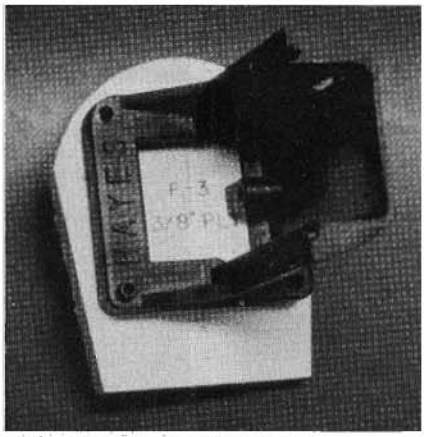


Fuselage with F-8 and F-9 in place.

being careful not to alter the airfoil outline. Transfer the wing curve to the 1/8" x 3" x 36" balsa sheets with a pen, and cut out 24 ribs. W-3, 4 and 5 can subsequently be cut from W-2.

Secure the 3/8" sq. balsa wing spar over the plan and pin two 3/8" sq. on top of each other immediately ahead of the trailing edge front line. This block of 3/8" x 3/4" will serve as support for your ribs during assembly.

Mount W-2 to the lower spar and add the top spar. Glue the predrilled W-1 ply braces to spars. Install the 1/4" x 3/8" trailing edge and glue W-3 and W-4 in place. Add the 3/8" sq. leading edge. W-5 can be mounted now if you keep it to the size of W-4. In this case it will be brought back to its right length later when you make the cut-out for the aileron servo. Split in two, a 1/16" x 3" x 36" balsa sheet and glue one piece over trailing edge.

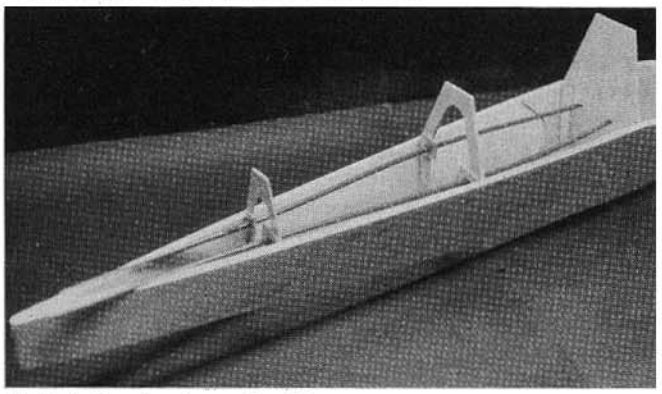


F-3 (firewall) with engine mount.

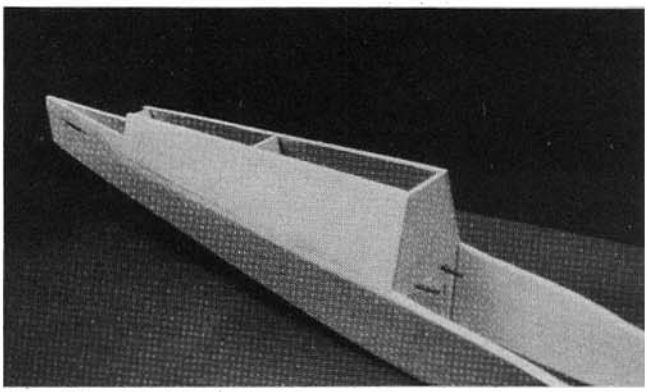
Sheet the leading edge with soft 1/16" x 4" x 36" balsa. Here is the only exception to the use of instant glue. The procedure I use is to Hot Stuff the sheeting on the spar and use white glue on the ribs and leading edge. The use of Hot Stuff secures the sheeting in place and gives you all the time you need to curve the balsa on the ribs and leading edge. I suggest the use of 1½" masking tape to hold down the balsa sheet while the glue dries. Masking tape has the advantage of applying a constant and even pressure over the entire surface of the sheet and will not dent your balsa. Turn the wing over to complete the sheeting operation of the leading and trailing edges and add W-5.

Remove your wing panel from the building board and repeat the building sequence for the second panel, but this time shim the bottom of the lower spar and the top of the rib support block with 1/16" balsa. This will allow a perfect match of the two wing panels on the building board when joined. The second wing section can also be built over the plan since its section is fully symmetrical. Prior to gluing W-3, 4 and 5 on the second wing section, glue W-1 in place by joining with the first wing panel.

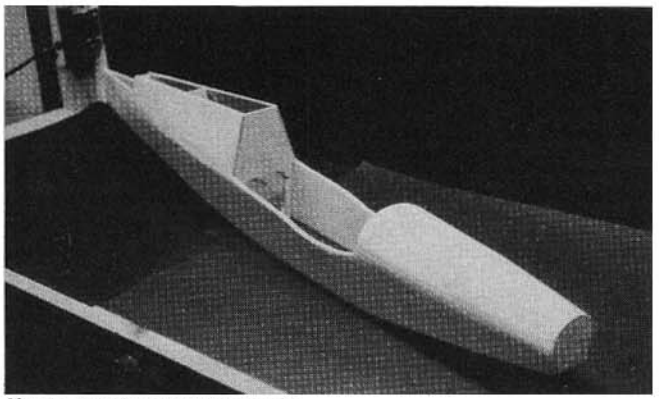
Before proceeding to sheet the



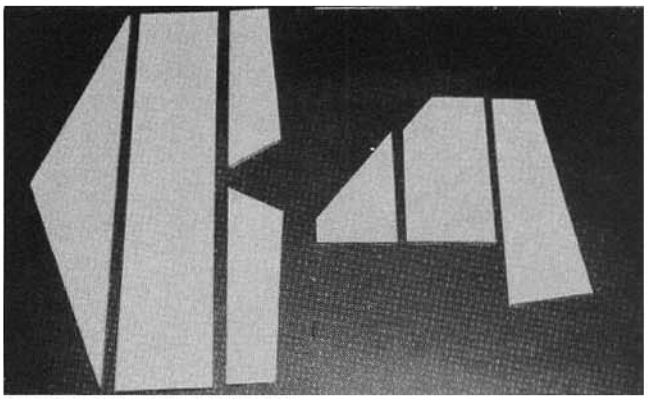
NyRods for elevator and rudder.



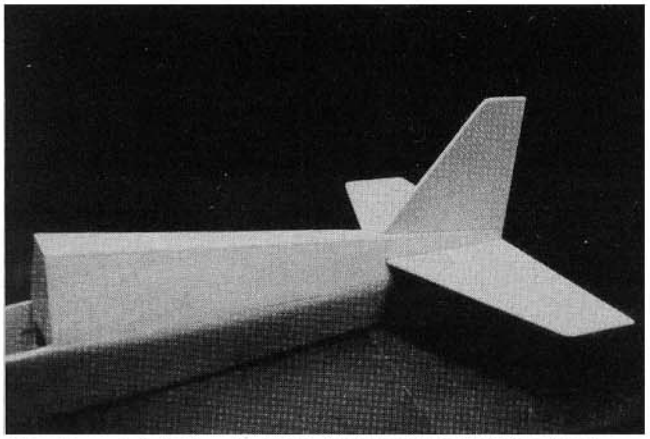
Top sides glued to aft fuselage.



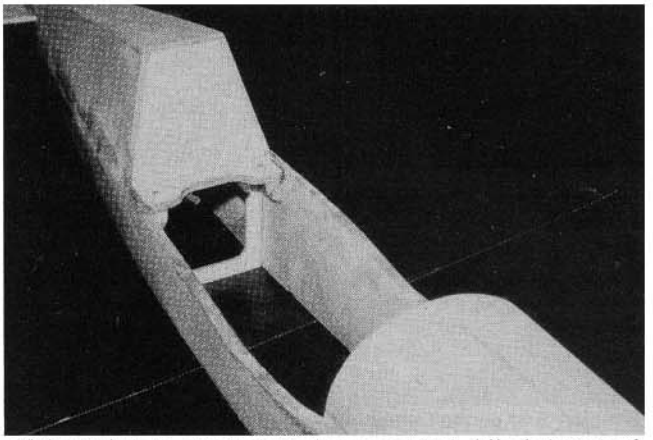
Nose sheeting glued in place.



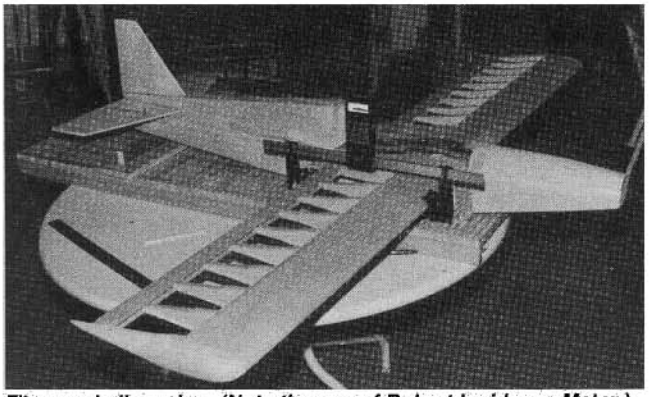
Empennage parts 1/4" balsa.



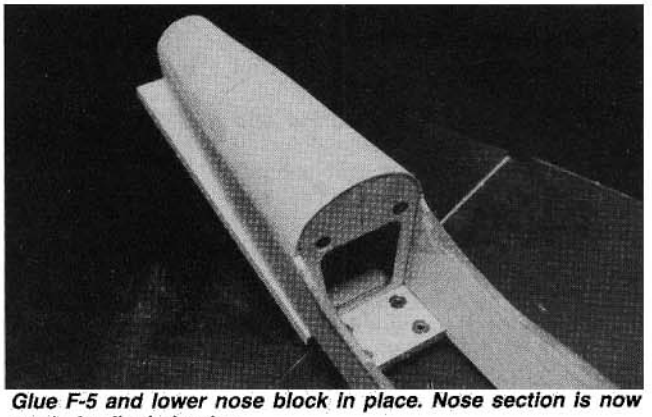
Glue fin and stabilizer in place. Glue on top of aft fuselage.



1/4" ply F-6 in place with holes drilled, blind nuts and reinforcement glued on bottom.



Fit up and align wing. (Note the use of Robart Incidence Meter.)



Glue F-5 and lower nose block in place. Nose section is now ready for final shaping.

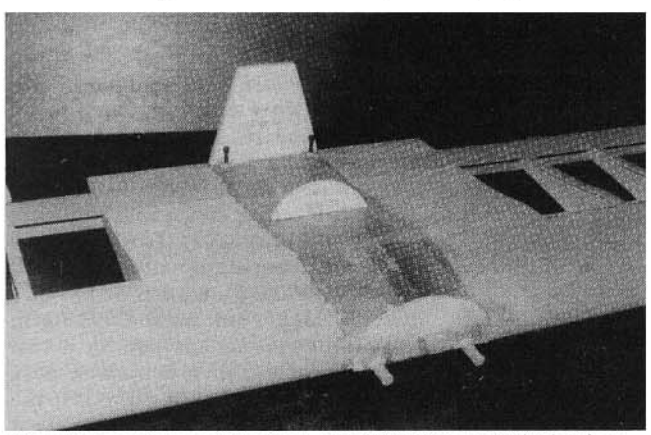
center section of the assembled wing, drill 5/16" holes in the leading edge, sand to shape and glue the dowels in place. After the center sheeting is done, make a cut-out for the aileron servo. Add the wing tip blocks and capstrips. Note that the grain direction on the capstrips is crosswise. Install the aileron torque rods and glue the aileron stock at the center of the wing. Notch the aileron stock as indicated on the plan behind the cockpit to give clearance for the wing removal, and glass the wing center. Slot the hinge line, fit the ailerons, and sand everything to shape.

Put the wing away for now as we will complete the fuselage next and finish the cockpit last.

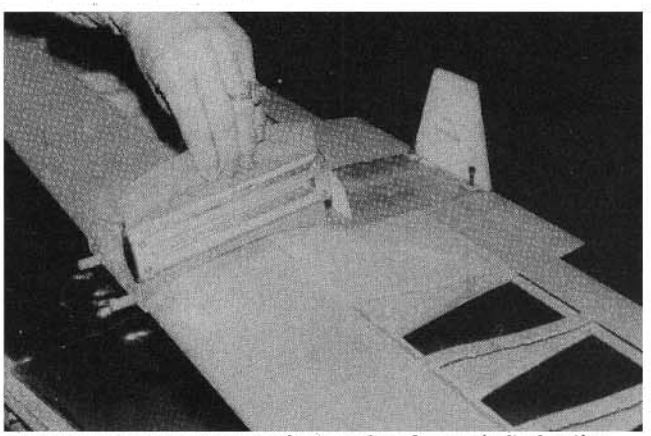
Fuselage:

Select two medium density 1/4" x 4" x 48" balsa sheets for the fuselage sides. Make sure these sheets have one edge straight and if not, cut it straight. Glue a 1/4" sq. x 12" scrap balsa on the straight edge of the balsa sheets to take care of the nose slant. This will, in fact, increase the width of the sheets to 4¼" on the first 12". Cut the fuselage layout on the balsa sheets taking care to add 1/8" to the bottom to compensate for the flat projection of the plan. Any excess at this point will be sanded off when the bulkheads are glued in place. Add 1/16" plywood doublers to the fuselage sides for strength. These doublers start ahead of the firewall and go back past F-7. While you are gluing your ply doublers don't forget that your fuselage has a right and a left side. You would not want to be elected your club's "dum dum" of the month. Mark the bulkheads and firewall location on the inside of the fuselage.

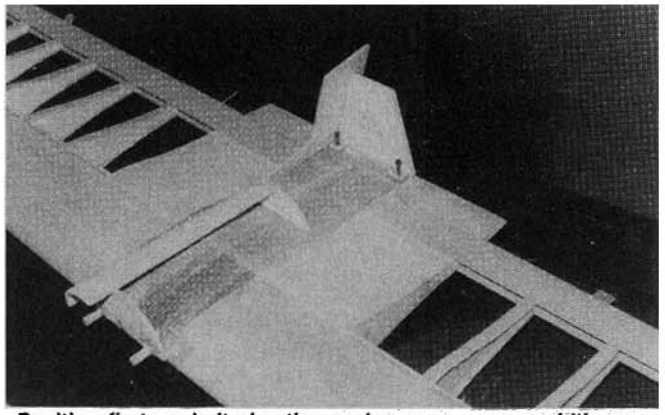
Cut all the bulkheads from the indicated plywood material. Glue F-4 and F-7 to one side of the fuselage using a draftsman's triangle. Join with the second side. Now sand a taper to the end section of the fuselage sides



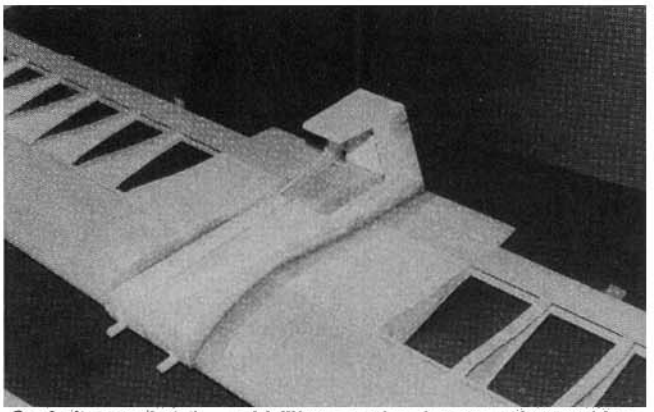
Fiberglass center section, then glue W-6, W-7, and W-8 in place.



Using contour gauge to make template for cockpit sheeting.



Position first cockpit sheeting and remove excess width over W-6 and W-7.



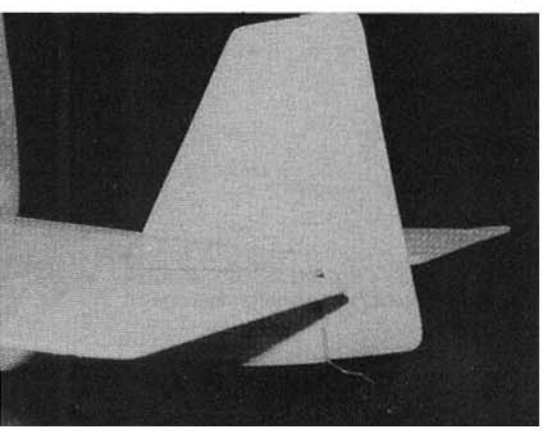
Cockpit completed — add fillets at wing for smooth transition.

to 1/8" thickness so when they are glued together they come up to 1/4". Glue the fuselage tail section together with perfect center alignment and reinforce the glue joint inside with scrap aileron stock. Mount F-8 and F-9.

Drill holes for the engine mount, fuel lines and throttle control in F-3. If you intend to go along with the 3° of right thrust as shown on the plan, drill your holes for the engine mount 1/8" off center to the left. Glue F-3 and F-2 in place, holding the sides with rubber bands and add reinforcements as indicated on the plan.

With the fuselage structure being completed and fully open, now is the time to install the NyRods. Make sure the NyRods are secured against the bulkheads all the way to F-7 with scraps of plywood to prevent flexing. Make an exception with the rudder control which should not be secured to F-7 to dampen the shocks of the tailwheel to the servo. Install the throttle control.

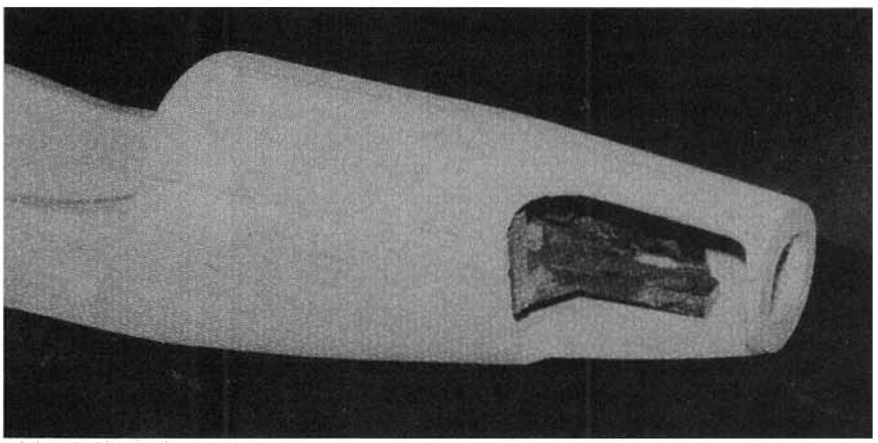
Cut a 1/8" balsa sheet for the top side of the rear fuselage from the plan layout and glue in place. Here, again, don't forget to cut oversize to compensate for the slant of the bulkheads and the curvature of the fuselage.



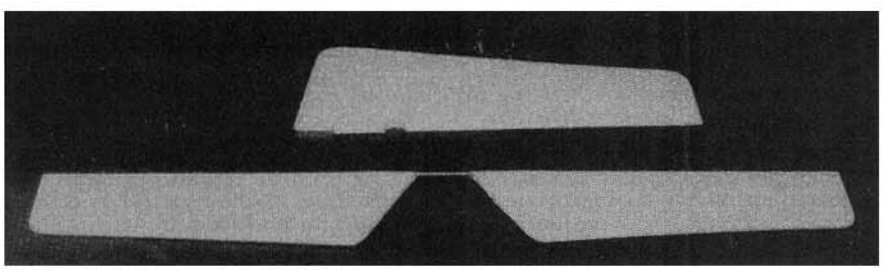
Install elevator and rudder. Note tail wheel strut.

Cut the fin, rudder, stab and elevator from 1/4" x 4" balsa sheet. Assemble the stab and fin. Mount the fin square to the stab with a draftsman's triangle and glue the stab-fin assembly to the fuselage tail section. This is a most important operation, so don't botch it. Take care to have the stab perfectly level with the wing saddle and with 0° of incidence to the thrust line. Mount the balsa filler over the stab and glue the 1/8" fuselage top in place. Join the two elevator sections with the 3/32" piano wire. Slot the hinge line to fit the rudder and elevator and temporarily mount the tailwheel assembly.

Glue F-6 in place and install the blind nuts. Drill the holes for the 5/16" wing dowels in F-4 slightly oversize.



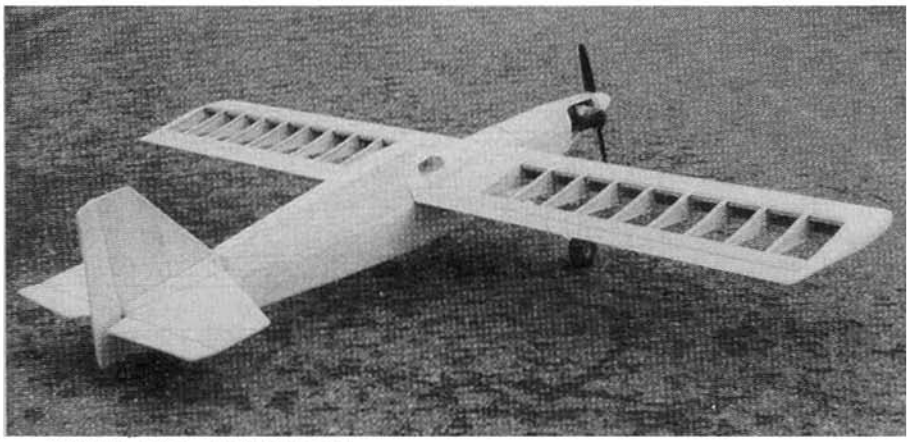
Cut out for engine. Sand to final nose shape.



Elevator halves joined and shaped.

File two 6-32 bolts to a fine point and screw in the blind nuts upside down in F-6. Mount the wing on the fuselage and tie it down. When satisfied that the wing is perfectly square to the fuselage, press down the trailing edge of the wing to mark the exact location of the holes to be made. Drill the holes in the wing for the 6-32 screws and glue W-10 in place. Secure the wing to the fuselage with the 6-32 screws and shim the wing on its saddle level with the stab and at 0° with a Robart incidence meter. When alignment is completed slip a one inch square 1/8" ply with a 5/16" hole in the middle over each wing dowel and glue to F-4 from inside the fuel tank compartment. Remove the wing from the fuselage and proceed to complete the construction of the fuselage.

Make templates for the nose sheeting from cardboard and trace onto two edge-glued 1/8" x 4" balsa pieces. Soak your nose sheeting in ammonia cleaner. If you skip this operation you will break sheet after sheet of balsa trying to curve it to the proper shape. Secure your nose sheet in place with masking tape and let it dry before gluing.



Well, here it is, ready to cover.

Hardware Required

Hinges — Du-Bro H-15
Horns (2) — Goldberg
Clevis (5) — Goldberg
Landing Bear B106-5 — Hallco
Wheels 3" — Du-Bro
Tailwheel Assembly — Great Planes
NyRods (2) — Sullivan
Windscreen — Sig .030 Butyrate
Blind Nuts (10) — Balsa USA
Allen Head Screws (10) — Balsa USA
Fuel Tank 13 Oz. R — Kraft
Fuel Line 1' — Sullivan
Spinner 2¼" — Du-Bro
Aileron Horn Set — Goldberg
EZ Connectors (5) — Du-Bro
Engine Mount "L" — Kraft
Propeller 12 x 6 — Master Airscrew

List of Materials

Construction	Balsa USA
2 — 2" x 2" x 12"	balsa
6 — 3/8" x 3/8" x 36"	balsa
2 — 1/4" x 3/8" x 36"	balsa
4 — 1/16" x 3" x 36"	balsa
4 — 1/16" x 4" x 36"	balsa
4 — 1/8" x 3" x 36"	balsa
2 — 1/4" x 4" x 48"	balsa
2 — 1/8" x 4" x 36"	balsa
2 — 1/8" x 3" x 36"	balsa
3 — 1/4" x 4" x 36"	balsa
1 — 1/2" x 4" x 12"	balsa
2 — 3/8" x 1½" x 36"	balsa
	aileron stock
1 — 3/8" x 3/8" x 12"	hardwood
	servo rail
1 — 3/32"	piano wire
1/16"	birch plywood
1/8"	birch plywood
3/16"	birch plywood
3/8"	birch plywood

Drill holes for the landing gear screws in F-5 and glue in place. Notch the 1/2" x 4" x 12" nose block for F-3 and glue in place. Glue the 1/8" x 4" fuselage bottom. Add the triangle aileron stock to F-5 inside the fuselage for strength. Note that the sheet aluminum landing gear on the plan is shown to project from the nose to the tail, whereas it should be the opposite with the wheels projecting forward. Mount F-1 to the front end and cut out the center of F-2. Cut out the right side of the nose for your engine, allowing clearance for the muffler. Install the engine with the spinner base plate and sand nose and nose block to shape.

Cockpit:

Mount the wing on the completed fuselage and glue W-6 to match F-4 but at a slight angle to the back of the wing. This angle will allow the wing to be tilted forward for easier installation and removal. Glue W-8 in a similar manner leaving enough clearance at the top between W-8 and F-7 for your covering material. Remove the wing from the fuselage and add W-7. Make a template for the cockpit sheeting. The cockpit is formed from two 1/8" x 4" balsa sheets joined in the middle over W-6 and W-7. Build each half of the cockpit separately. Cutting a template for the cockpit is made easier with the use of a carpenter's contour gauge found in any hardware store. The contour gauge will allow you to design a closer fit between the cockpit and the wing. Soak the balsa sheet in ammonia cleaner for ease of forming. Secure the sheet in place while it dries with rubber bands over W-6 and pins at W-7 and W-8. Remove the excess width of the sheet over W-6 and W-7. Repeat the same operation for the second half of the cockpit. As complex as the instructions may seem, it is nonetheless relatively easy to do with the use of the ammonia cleaner which allows the balsa to be most flexible.

Add the cockpit details at this point, then mount W-9. Put the wing back on the fuselage and sand to a perfect match.

Finish any minor details, then sand the whole plane with extra fine sandpaper. Cover with your favorite material and add trimming details. Add your windscreen at this point using Hot Stuff. If you use a heavy gauge clear plastic, preform the curve of the windscreen with the use of a heat gun. Fuel proof the engine and fuel tank compartment with thinned epoxy or resin.

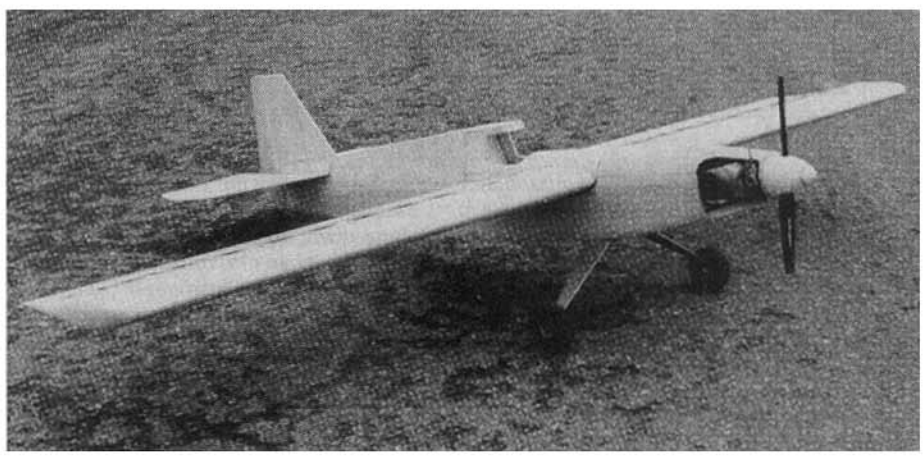
Mount your engine and install your radio gear to balance the plane as shown on the plan. Control travel should be set at 3/8" for the ailerons and 1/2" for the elevator, while the rudder should be allowed 1" deflection. After the flight test, control travel should be readjusted to match your type of flying.

Flying:

Range check your radio and make sure all the controls are unrestricted. Double check the C.G. and wing balancing while it sits on the plane. Make sure the ailerons move in the right direction. More planes have probably been rekitted on the first flight because of oversight of aileron direction than for any other single reason. Align all control surfaces to neutral. Adjust engine for a good idle and instant acceleration.

If you don't have experience flying pattern type aircraft, please do yourself a favor and request the assistance of an experienced flier so if you get in trouble somebody will have a chance to bail you out.

Line up the aircraft into the wind and advance the throttle. Keep direction of the plane as needed with very little right rudder. With the elevator in neutral, the tail will lift almost immediately. The aircraft will accelerate without any tendency towards taking off or tipping over. The newcomer to the world of the tail



draggers should have no difficulty taking off because of the aircraft's good maneuverability and ability to stay on the ground even at high speed. As the aircraft accelerates and starts to feel bouncy, slowly pull the elevator up until the aircraft takes off. As soon as the aircraft breaks ground, release some of the pressure on the elevator and establish an adequate rate of climb. Again, keep direction of the airplane with rudder and correct the wing position with the ailerons. Do not attempt to turn before you have reached a safe altitude. This may seem elementary to most of you but I have seen too many airplanes in a right cross wind take off on a left turn, stall and crash.

As soon as you have reached a comfortable altitude, throttle back to the average speed of the last airplane you flew. Remember that the "Magnum 60" has the ability to fly very slow while remaining very responsive and easy to fly, so if you have a hot engine don't let the speed get on top of you. Trim for hands-off flight and relax as you probably have just been through one of the most stressful experiences of your life (second to your wedding). Allow that precious moment to sink in, and marvel a little at the stack of lumber you brought to life with the birth of a new bird.

Once you feel comfortable enough, try one loop, one roll; don't get cocky. Try some really slow flying at a decent altitude to feel how the controls respond and stall the plane as this will give you an idea of how the aircraft will behave in the final approach. Full stalls should be shallow and straight without the tendency of a wing sinking into a snap roll or a spin. I actually had the opportunity of testing dramatically the slow speed flying characteristics of the plane once when I made a perfect three point landing on the runway after the elevator jammed with full deflection in a loop.

When ready to land, reduce throttle and establish a constant rate of descent. Control your glide path to the runway with your throttle. On the first pass you will probably overshoot the runway as the "Magnum 60" is a real floater, especially on three point landings. Try again. On short final, at about two feet over the runway, put the aircraft in a level attitude and let it sink to the ground without fighting it. To reduce the floating effect over the runway, and allow for a higher speed on landing, let the plane sink to the ground by slowly releasing some of the back pressure on the elevator and, as soon as the wheels touch the ground, let the elevator go back to neutral. Here, again, the airplane will show no tendency to tip over as it decelerates to a full stop.

The next step is simple; proudly taxi the plane back to the pit area to chew some fat and let the other guys eat their hearts out for not having built a "Magnum 60"; you've earned it. □

From RCModeler Apr. 1987