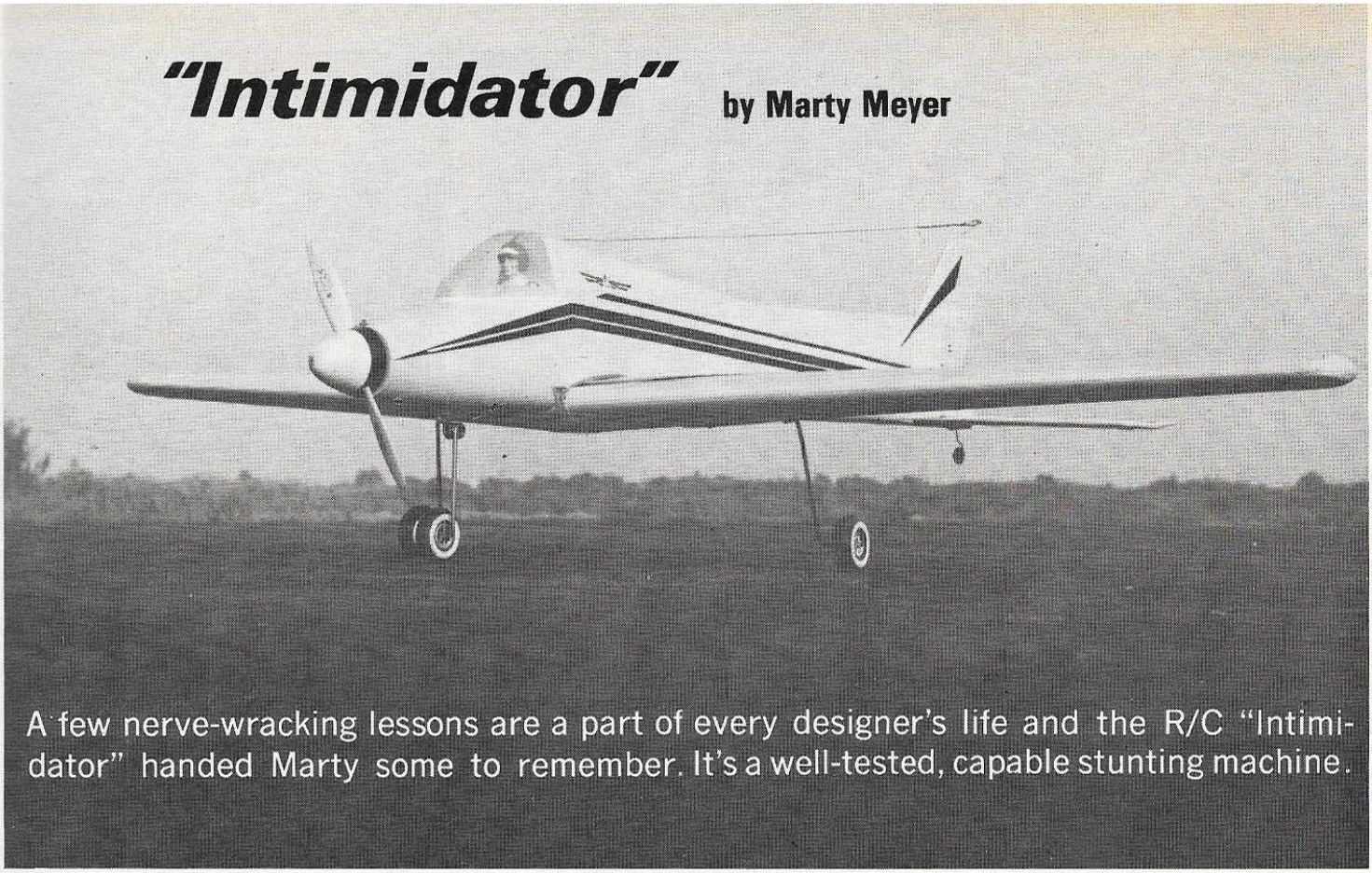
"Intimidator"

by Marty Meyer



A few nerve-wracking lessons are a part of every designer's life and the R/C "Intimidator" handed Marty some to remember. It's a well-tested, capable stunting machine.

When I first started working on this design back in 1969, I had but one thought in mind. I wanted it to look sleek, yet built from a minimum number of parts. I wanted to get away from that usual boxy square look that you find in so many of today's multi airplanes. I was striving for a durable, light and fully acrobatic airplane that would perform the entire AMA pattern. I wasn't looking for a fancy job covered with dozens of fillets, fairings, and cowlings which add absolutely no functional purpose to the aircraft, except exotic looks and excessive weight.

It took me about four weeks to draw up the plans and complete the entire plane. I first tested the design at The Rockland County R/C club's field. There were at least six modelers present at the time and I must admit I had a little jelly in my knees at that moment, for there was no backing down. The weather was perfect and the engine was howling. I had no legitimate excuse for aborting the test, so down the runway she went. The takeoff was almost perfect and to my surprise, it required very little trim. It flew right off the board you might say. Roll rate was just perfect and they looked as if they were machined to order.

The design flew much faster than I had anticipated with the thick wing, but the flight did point out one fault which I corrected easily. During the construction I thought it would be cleaner if I could conceal all the pushrod linkages within the fuselage itself. The elevator gave me no problem whatsoever, but I goofed on the rudder. I had connected a piece of .075 dia. music wire to the articulating hinge area, which was connected to the rudder. The wire proceeded to extend down through the top of the fuselage and onto this extended wire I had silver soldered a control horn.

A "still life" scene. That is, until the engine fires up. Once the wings develop lift on take-off run, airplanes become sensitive and living things. Forces in delicate balance with nature.

The entire system looked beautiful except for one thing, it didn't work. With a rudder as large as this, I should have known better. I had no leverage at all with this .075 dia. wire exactly on the hinge point. As the plane was flying at the higher speeds, it picked up such a tremendous rudder flutter that I had visions of the entire tail section being torn off.

After my second flight, I was convinced that I had enough for the day and went home to make the necessary changes. I mounted a rudder control horn directly to the rudder in the conventional manner, but I mounted it about 3/4" to the rear of the hinge point. I mounted a link (outside the fuselage) to this horn and this gave me all the leverage I needed. I flew the ship again, and the problem I had encountered was now solved. This ship performs exceptionally well in all kinds of wind conditions, without the slightest tendancy of emphenage yawing. The plane will stay in the position you place it in. You must fly it all the way, but you have the sensation that you are really the pilot in the plane itself.

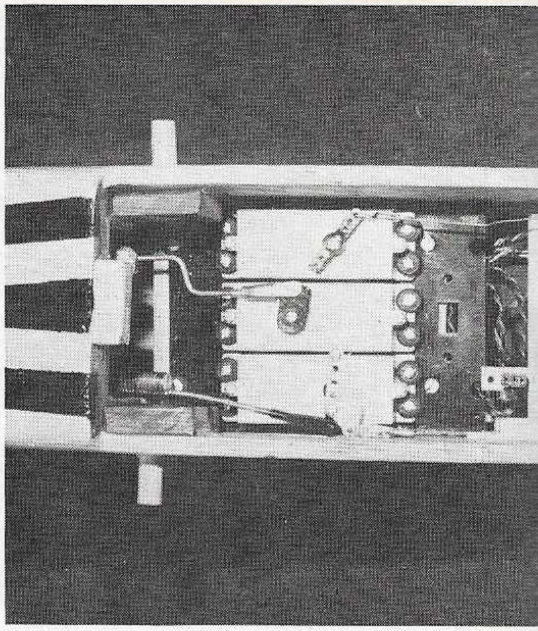
After building three of these ships I was being hounded by dozens of modelers who saw it in flight and wanted a set of plans. There are over thirty six in the making at the present time, fifteen are in the Blue Angels Club alone and several have hundreds of flights on them. They all vary in weight of course, but seem to fly the same. Some weigh in at six pounds and other builders go up to 7-1/2 pounds. It is all up to the finish the builder chooses.

I don't claim this to be the ultimate model of all time and I doubt any modeler has the right to say that. As time marches on, so does the R/C equipment, the pattern becomes tougher, and the design of the plane must also advance. No one can say what the model plane will look like two years from now. It may even have the tendency to look wingless like some of our fighter jets of today. It wasn't too many years ago that a high wing cabin type airplane won the Nationals and every modeler yearned for that plane. Today, we would consider that design just a heap of lumber, and we wouldn't even consider it for a trainer.

This airplane has the ability to fly at quite a high rate of speed, yet when you throttle her down, it can be flown to almost a standstill. I am often asked just how slow it can fly before it stalls out? I honestly can't say, because of all the "Intimidators" flying in this area, no one has ever seen one stall. I would like to mention at this time that I didn't copy this airfoil from any known one when I drew up the plans. I just picked up a french curve and drew out what I wanted. I'm sure that if I did any research, I would probably find a duplicate somewhere along the line.

The airfoil is just shy of 2-1/2" thick at the root rib, and tapers down to 1-3/8" at the tip. The wing has a sweptback leading and trailing edge which gives it stability and good wind penetration. The other feature of this plane is its drooped nose which in reality gives it the look of an SST.

The wing has been constructed in three different ways so far. The first plane I made was built up of spruce spars with balsa ribs and then covered with Silron. However, on my next two wings I switched to foam and covered them with Marvelite, which is a thin plywood of 1/64" total thickness. The wing comes out about two or



Autopsy reveals brains, muscles in good order. (Not your's, the plane's.) R/C access is about standard, easy and accessible. Fuselage offers ample room, balances easily, with equipment so deployed. Keep wiring neat, braided, inspected.

At left: An Orbit system in the "Intimidator." Marty is an active, experienced contest flyer.

three ounces heavier, but the strength you pick up more than makes up for it. It is also much quicker and easier to make a wing of this type. The third wing is also a foam core, covered with 1/16" balsa and MonoKote for a finish. This is by far the lightest, and the strength is sufficient. Due to the great thickness of the wing, we have never had one fold yet. The latter wing I just mentioned will save you about 8 ounces.

The MonoKoted versions come out with a 6 pound flying weight. Put a .60 engine on these and you've got yourself a going machine. With the Marvelite wings and a good painted finish you come out about 7-1/2 pounds, but the funny thing is that you don't notice any real difference in the plane's flying characteristics, except in one maneuver, the victory roll. The lighter ship will climb right up and do three without any exertion. The heavier ship may just deliver two, but why worry about that when the maneuver isn't even in the AMA pattern?

The airplane is extremely stable and I mention this to you because it has proven this on two occasions already.

The first incident happened with a head-on collision which was a sight to behold. The other ship I collided with went home in a shoe box. *The "Intimidator"* kept on going as if nothing ever happened and even my trim didn't change. I didn't want to push my luck any more than I had to, so I made a traffic approach, chopped the engine and just before it reached the landing strip, we all were amazed to see the entire vertical fin and rudder were gone. But this was all that happened to the plane and if it weren't for the enormous side lateral area in the fuselage, I may not have been that lucky. I built this amount into the ship for the purpose of doing a good knife-edge. I had no idea I had built in enough to fly without a fin and rudder.

The second event happened on my next *"Intimidator."* Until this time, the plane didn't even have a name yet. I decided to keep the weight of this second plane down a little, so I built the entire stab of the lightest balsa I could find. I didn't bother to silk it in order to save weight. I noticed this plane was flying faster than the first one and I wanted to see if there was any aerodynamic change if I opened her up full bore. I decided to get the plane up to about 400 feet of altitude, made a split-S maneuver and started diving down at about a 45° angle. The ship picked up so much speed it even started to whistle. The plane was all blue in color, covered with WW II German markings, and the sight of this screaming machine caused one of my sole brothers to call it the *"Intimidator"* and the name stuck. The plane was performing as I expected it would, except when I finally leveled it out, we all heard a horrifying cracking noise and one half of the stab let go. When a thing like this happens about twenty feet over a concrete runway, it can really shake you up. Much to the amazement of everyone, the plane kept right on going as if nothing had happened. It didn't even realize it was now flying on a half a stab. I made one more pass around the field and came in for one of my smoother landings.

It was only the day before that a fellow modeler noticed that I had installed two elevator pushrods with a separate horn for each half of the elevator. He asked me why I had two connections and I replied that some day one might let go and I would still have the other one to save the plane. I had no idea that the event would happen the next day and he happened to be there witnessing it. If I didn't have that second elevator horn, we would have had one more plane added to the graveyard. After that close one I decided not to build with balsa that mushy ever again.

Enough said on the history of the design.

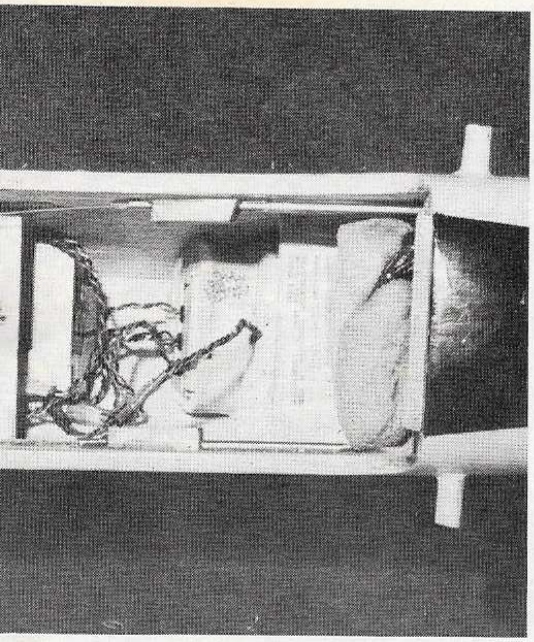
The Fuselage

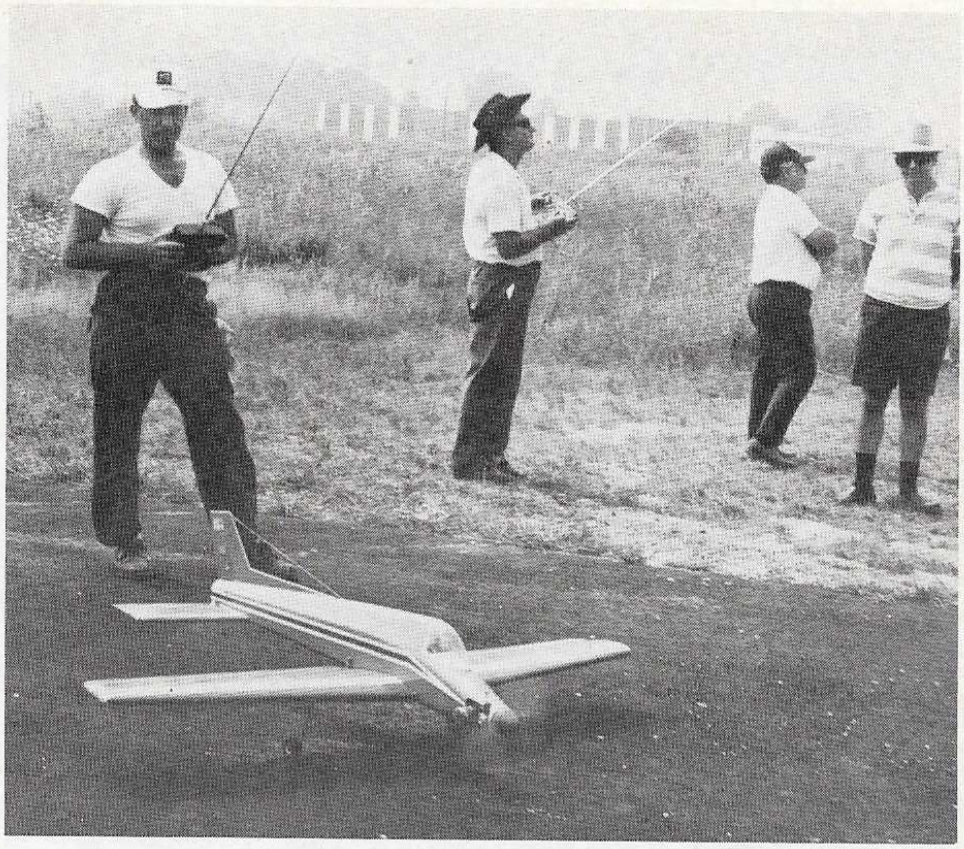
The lower sides of the fuselage are cut from 3/16"x4"x48" stock. Make sure that both sides are of matching weight and grain. This latter suggestion is for the purpose of having both sides of the fuselage bend equally, when you pull in the nose and tail sections. Cut out the 1/16" plywood doublers and glue them to the balsa sides with Titebond or Elmers glue. Install the 1/4" square longerons along the bottom of the fuselage. While this is drying, cut out all your plywood formers from F-I to F-7 and also the nose former N-I. Draw a centerline from top to bottom on each of these formers.

If you want a straight fuselage, follow these instructions. Build the entire fuselage on a straight board, about 12" wide and 48" length in the following manner. Draw a pencil line parallel with the edge of the board for the entire length and about 6" from the side. With a T-square, mark off all the former stations from the nose N-I to the tail F-7. You now have eight perpendicular lines crossing your original centerline. This eliminates drawing any bulkhead locations on your fuselage sides.

Proceed to nail all your formers to the building board (using thin finishing nails). Make sure they are absolutely perpendicular to the board and also that the centerline on each former lines up exactly with the centerlines you drew on the board. In this manner, each former is perpendicular to the board, and also parallel to each other. The worst is over. You can now attach the fuselage sides and glue them to formers F-2 and F-3 only. When this glue has thoroughly dried, you can pull in both sides of the tail section and glue them to the formers. Pull in the nose siding of the fuselage and install formers F-1 and N-1.

Your next step is to install the upper 3/16" fuselage siding. Take one and butt it to the side that you have already adhered





Photos by the Author

Marty checks out the controls and all is in order. The last minute pre-flight before you drive the throttle home can save the day if you've got loose linkages or frayed wires. The design is to generally proven concepts, tracks well in the air in all attitudes. A good bird.

in place, but don't glue it as yet. Hold it in position with scotch tape, all along the butted seam and also hold it against all the formers by applying more scotch tape. Scribe a line from the inside of the fuselage to give you the height of each and every former. When you have this accomplished, remove the 3/16" upper fuselage and connect all your scribed stations. You must remember to add on about 1/8" extra to give you material for the angle where these sides butt together. This must be sanded in before you attach the upper half in place.

Check the piece again by butting it in place and observe all your station points for height. If it looks good, cut along the line you drew which connects the formers' station points. Try and leave a little extra so that when you have both sides glued in place, you can sand the entire top down to the correct fit by using a long sanding block. After you have your upper fuselage sides cut to satisfaction, glue them in place. When they have thoroughly dried, sand them down to meet the tops of the formers. While this structure is still nailed to the board, glue on the 1/2"x2"x39" top fuselage block.

Add the upper 1"x4" noseblocks, located just to the front of the canopy. While this is still on the building board you can round off the top block of the fuselage, and also the two 1"x4" nose blocks in front of the canopy. Assuming that you have used the thin nails we mentioned before, you are now ready to remove the fuselage from your building board. I do this by squeezing a long thin bladed knife under each former and gently lift upwards.

Where the upper and lower fuselage sides meet, you now have a sharp edge. Round this off to a radius for the entire length of the fuselage. Tack-glue the lower nose blocks in place and shape to meet the formers N-1 and F-1. Hollow out the nose blocks to receive the engine you are using and also cut out the area for the side mount on the fuselage side. Remove the blocks you have tack glued and install your nose wheel bearing. I don't show much in the way of wheels on the plane because many will prefer to use retracts of one brand or another. However, if you do decide on using the nose wheel bearing I mentioned before, do it now and install a Tatone motor mount. After this, glue your nose blocks in place permanently. Don't sheet the bottom of the fuselage as yet. Instead, start building the stab.

Stab Construction

With the stab, two different types have been successfully used. Your first choice is to make the entire stab from solid 3/8" medium balsa. Don't be afraid of the plane coming out tail heavy, because I guarantee it won't. This is the quickest and simplest way. The other method is to build the stab right on the plan. Pin and glue all your 1/4" leading edge, trailing edge and the diagonal pieces in place. Join the two halves of the leading edges with a piece of 1/4" scrap balsa. When all this has thoroughly dried, sheet the entire stab with 1/16" balsa, while it is still on the building board. Remove from the board and sheet the remaining side, then sand the tips and add the front 1/4"x3/8" extra leading edge as shown on the plans. Round off this leading edge to match your tips and the stab is completed.

Attach the stab to the fuselage and when this has dried, cut out the elevators and attach them along with the control horns. I usually install my elevator hinges at this point. When your elevator is thoroughly glued in place, you can sheet the entire bottom of the fuselage with 1/8" sheet balsa, running the grain lengthwise. This sheet crosses over your stab and locks it permanently in place.

Vertical Fin and Rudder

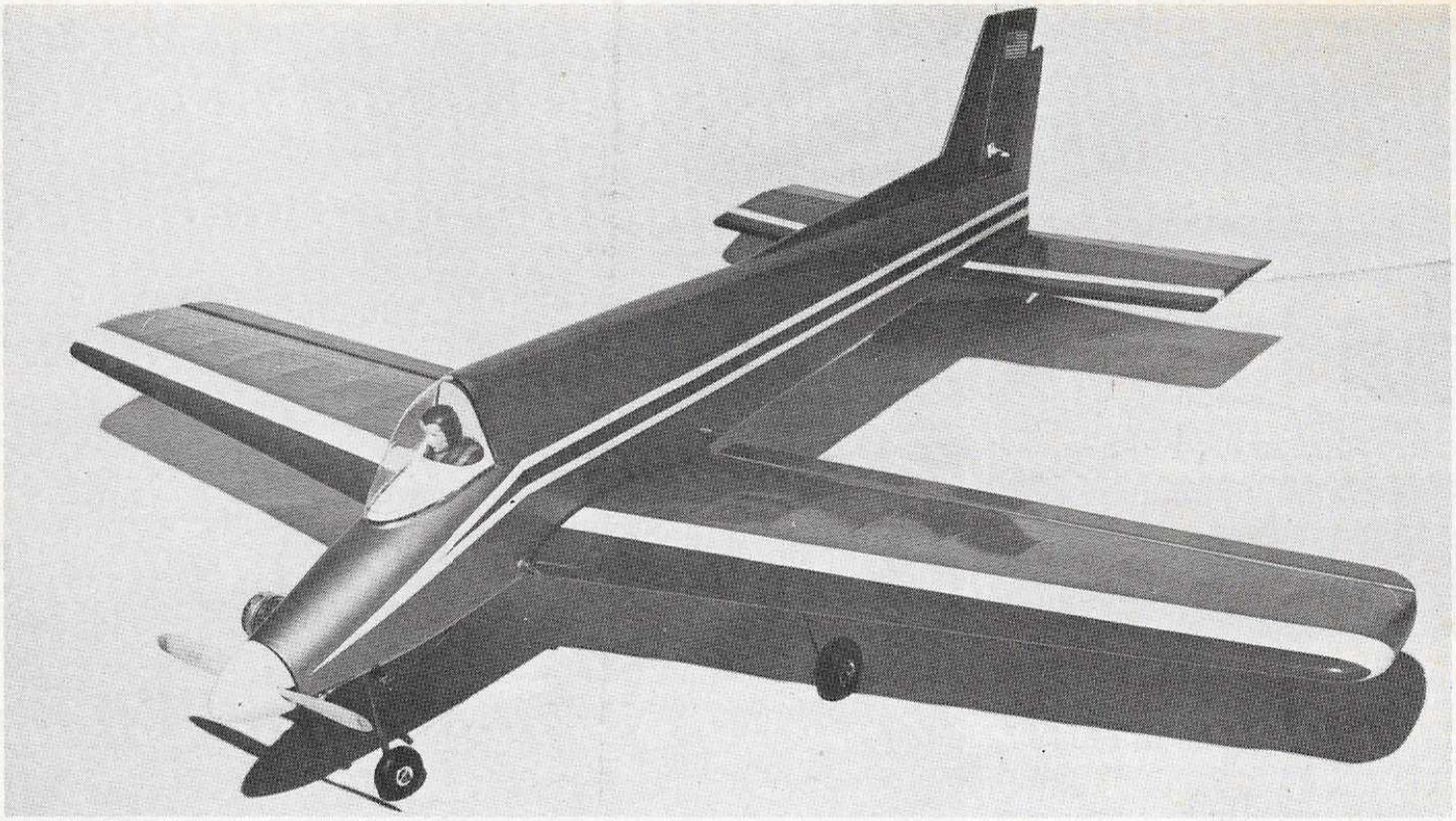
Cut the vertical fin from 1/4" sheet balsa. Locate the fin on the fuselage and draw a pencil mark around it. Gouge out the fuselage top completely through the 1/2" block. You may now install your fin in position. Cut out the long dorsal fin and attach it to the fuselage and fin. You need not gouge out the fuselage top to receive this dorsal. When all this has dried, sand to shape and round off all leading edges. Leave the rear of the fin squared off. Cut out the rudder from 1/4" sheet balsa and fit it to the fin.

Wing Construction

The wing is built in an upside down position. Start out by pinning down the 1/4" spruce spar to the plan. Cut out all the ribs from 3/32" sheet balsa. Draw a centerline through each and every rib. This must be done pretty accurately. Place all the ribs in position by pinning them only. Make sure they fit snugly against the 1/4" spruce spar and that all centerlines you drew on the ribs are parallel with the building board.

Place balsa shims under the leading and trailing edges of each rib. Use a good ruler to make sure that the centerline of the rib is equal and parallel to the working surface. If all your centerlines were drawn perfectly, you should be able to eyeball the wing along the trailing edge of the ribs and it should be straight. If ribs W-1 and W-11 are not parallel to the building board, you will wind up with a warped wing. This is extremely important, so take a little extra care with it. If your viewing shows a straight wing, glue all the ribs in place with Titebond or Elmers glue. Leave in your shims for the present.

When this glue has dried completely, attach the 3/32" square trailing edge and the 1/4"x1-1/4" leading edge. You may now install the remaining 1/4" spruce spar. As you look at your wing on the board you



Wing section is thick, good for aerobatics and margin for safety in slow flight. Ship's side profile is ideal for knife-edge maneuvers.

are looking at the bottom of the wing, not the top, so keep this in mind. Install the plywood landing gear supports along with the maple braces. Sheet the leading and trailing edges of the wing and also the center sheeting, using 3/32" balsa. Add in all the capstrips and remove the structure.

Trace the plan (against window glass) so that it will be visible from the other side. Repeat the same building instructions to match the first half. Since the wing has very little dihedral, the braces can be almost straight. Attach both halves together, using dihedral braces on the leading edge, spruce spars, and trailing edge. I used a 3/4" spacer block at the center to give me the proper dihedral angle. Please note that the 3/4" is measured from the top of the wing and not the bottom. Since the wing is built upside down, there is actually more dihedral on the bottom of the wing than there is on the top.

After these braces have thoroughly dried, finish the sheeting. This includes the leading edge, the trailing edge and the center section. Install the capstrips and place all the 3/32" sheet webbing in between the front part of the trailing edge. Add the wing tips and sand to shape. You now have a wing that will not twist at all, so if you built it with a warp, it's there to stay. Cut out the strip ailerons and fit in place.

Radio Equipment

The installation of your R/C equipment is extremely important. Unless you follow these instructions, you will come out nose heavy. There is ample room in this compartment, you won't have any squeezing to do. Place all three servos as far to the rear as possible. I found it necessary to wrap my battery pack in foam and locate the pack directly under the three servos. You need this weight at this location. The receiver can be wrapped in about 1" of foam and placed just in front of the servos. If you wish, place a plywood bulkhead to separate the receiver from the servos and the nicad pack. This will protect your receiver in the event of a crash. Of all the ships that have been built so far, none have come out tail heavy. Some were nose heavy and we wound up with two ounces of lead in the tail, which we had to attach at former F-7.

Flying Instructions

Give both the rudder and elevator maximum throw, just in case you need it for trimming the plane out. The one thing you don't want is too much aileron. If you give this plane the full throw on the ailerons, you'll get the surprise of your life. 1/2" up and down at the trailing edge of the aileron, will give you more than you need to trim out the airplane. After the first few flights, can change the trim to suit yourself. You should have no worries on the takeoff, because it tracks straight out, in a gradual climb. Fly it safely!

Marty's "Intimidator" utilizes a thick section with a swept leading edge. This increases ship's effective nose moment and eases the balancing.