

# MODEL BUILDER

APRIL 1974

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ONE DOLLAR





Painted and decorated in the colors of the Air Force Aerobatic Demonstration Team, this model of the F4 Phantom glides through the air at speeds that make it look very much like the full size jets in action. Find yourself plenty of open space to fly these beauties!

## SLINGSHOT THUNDERBIRD

Here's a project that will transition your young modeler from sheet balsa gliders into built-up construction and tissue covering . . . yet it's still a glider, but with a different method of launching. By DENNIS NORMAN.

● One of the most beautiful and inspiring sights in aviation today is the formation flying done by America's aerobatic teams. Both the U.S. Navy's "Blue Angels" and the U.S. Air Force's "Thunderbirds" have thrilled millions with the speed and precision of their flying. This project was designed to recreate the excitement of watching a "Thunderbird" streaking overhead in a low pass. Flight time is always in seconds, but the model's sturdy construction will give you hundreds of flights as rapidly as you wish.

Construction is pretty much elementary, but special attention should be given to the tail surfaces which are made adjustable by the use of aluminum tabs. The wings and fuselage are built entirely from 1/16 inch sheet balsa. A simple profile fuselage may be constructed by laminating three sheet balsa profiles (this was done in our first test model and proved quite satisfactory). The "built-up" fuselage takes more time, but adds considerably to the model's appearance.

### WING CONSTRUCTION

Begin by tracing the wing tip patterns onto medium hard 1/16 balsa sheet, making sure that the grain runs parallel with the leading edge. Next, trace the triangular front portion of the wing's center section onto 1/16 sheet balsa, arranging it so that the grain runs from tip to tip. Similarly, trace the rear portion of the wing's center section onto 1/16 sheet balsa.

Having cut the four wing pieces, place

the two large center sections over the wax paper covered plan and glue together, forming one large triangular unit. When this dries, remove the center section from the plan and sand an air foil by rounding the leading edge and tapering the trailing edge. In doing this, be especially careful with the trailing edge tips, since the wood grain will make them very brittle and easily broken. In similar fashion, sand an air foil shape into each of the wing tip pieces.

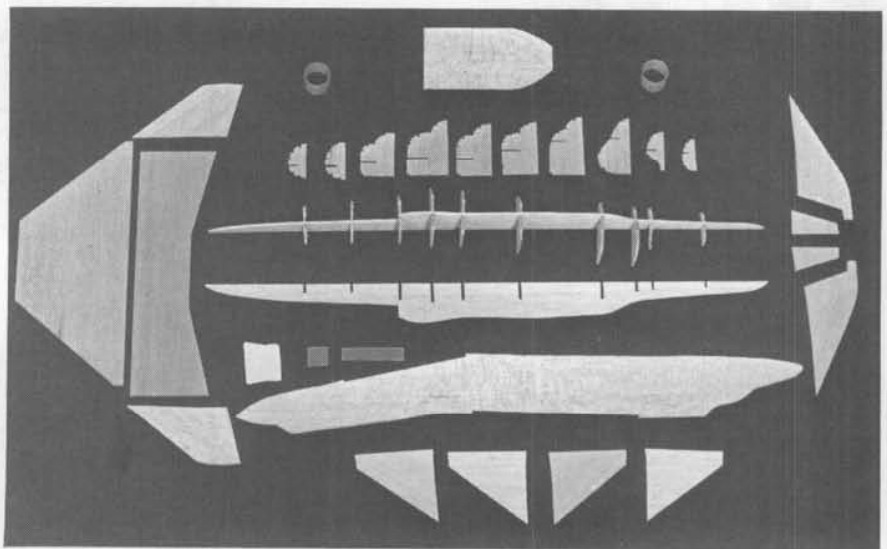
Having sanded air foil onto the wing, place the center section back on your workboard and pin it in place. Next, take your sanding block and lightly bevel

the side of each wing tip which will be joined with the center section. Having done so, glue each wing tip to the center section, making sure that each is propped up 1/2" for dihedral. Construction of the wing is now completed and it should be set aside to dry thoroughly.

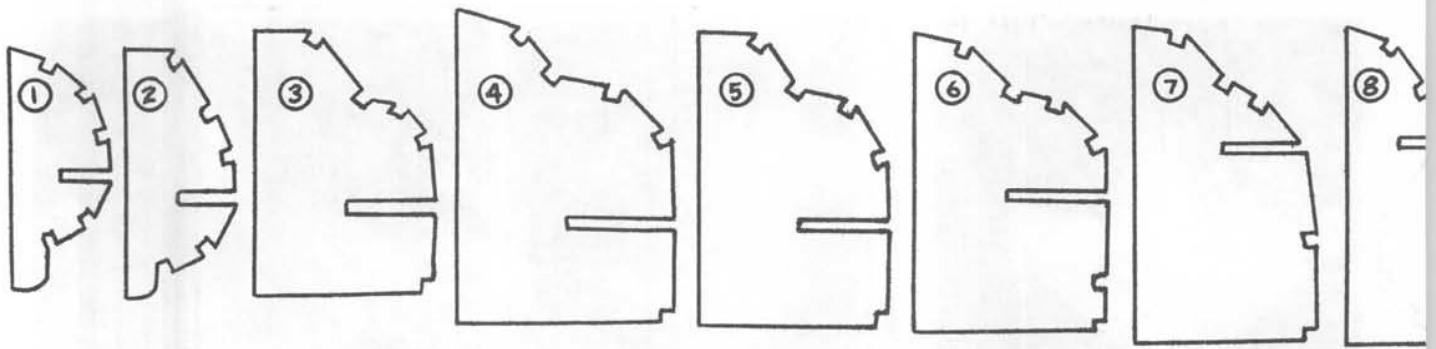
### FUSELAGE

As mentioned earlier, the fuselage can be built in one of two ways. If you want to simplify things, cut the fuselage's profile from a sheet of 3/16 inch balsa. Having done so, simply round the edges and your fuselage is completed.

To make a more realistic looking model, you need to build up the fuse-



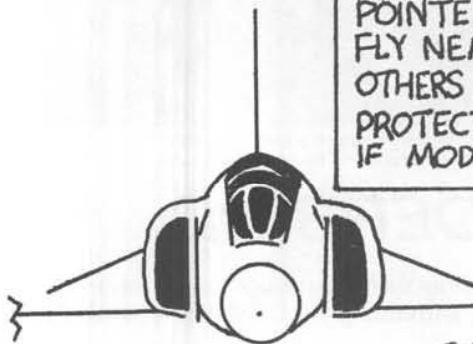
One good way to build this model is to make yourself a pre-fab kit, as shown above. As a class project, many such "kits" can be prepared before construction is actually started.



• **WARNING** •  
 THIS MODEL FLIES VERY FAST AND HAS A HARD, POINTED, NOSE. DO NOT FLY NEAR CROWDS. WARN OTHERS BEFORE LAUNCHING. PROTECT EYES AND HEAD IF MODEL FLIES AT YOU.

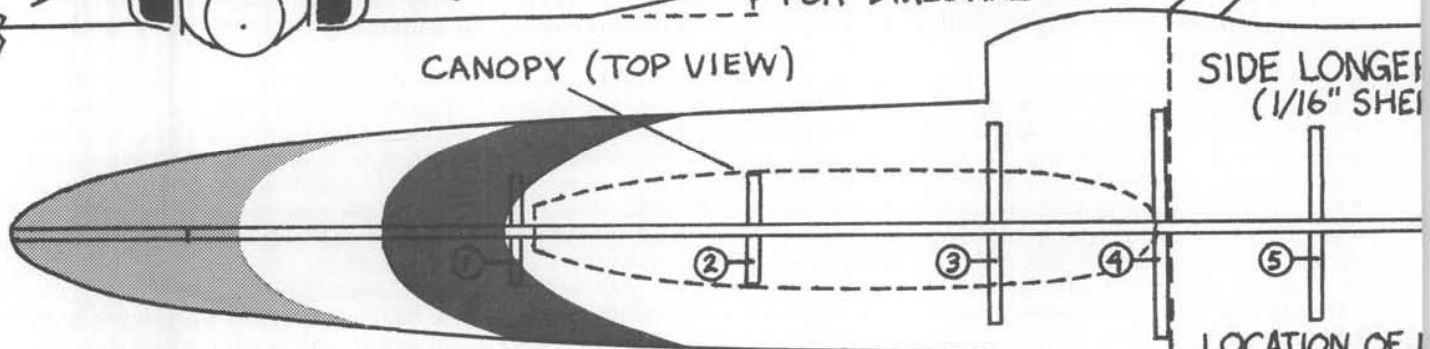
ALL FUSELAGE AND WING ARE CUT FROM 1/16" SHEET

WING PATTERN OUTLINE (FRONT)



CANOPY (TOP VIEW)

PROP UP WING-TIP 1/2" FOR DIHEDRAL



SIDE LONGER (1/16" SHEET)

LOCATION OF FORMERS ON

POWER: ONE 20' LOOP OF 1/4" FLAT RUBBER AT TOP OF A 6' LAUNCHING POLE

AIR INTAKE RAMP (MAKE FROM STIFF PAPER)

1/4" BEAD FOR PILOT'S HEAD CANOPY MAY BE CARVED FROM BLOCK OR VACU-FORMED

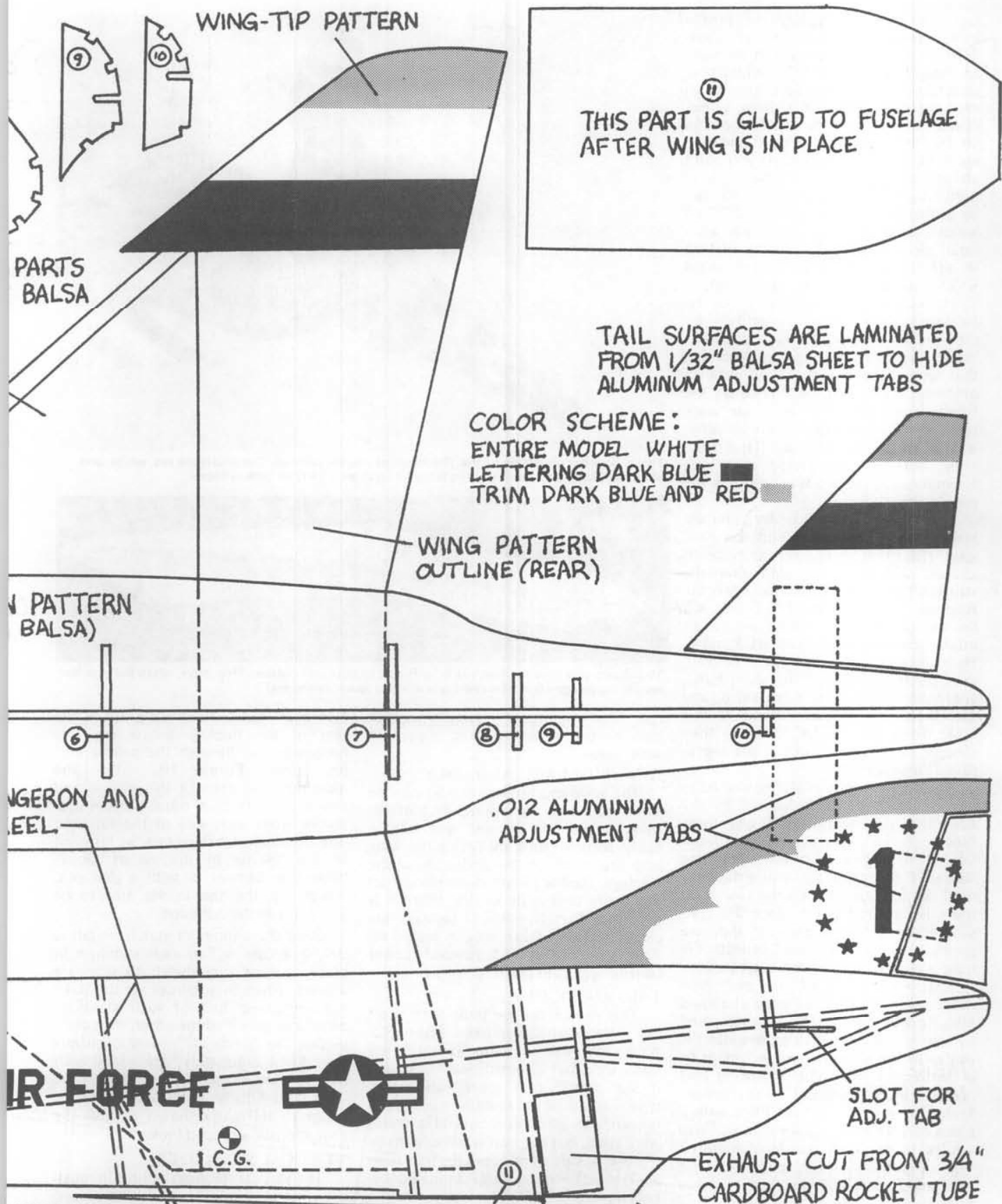
FUSELAGE KEEL PATTERN OUTLINE (1/16" SHEET Balsa)

MAKE TIP OF NOSE FROM 1/16" PLYWOOD

U.S.

1/16" HAR LAUN

FILL IN THESE AREAS WITH Balsa BLOCK AND CARVE TO SHAPE



THIS PART IS GLUED TO FUSELAGE AFTER WING IS IN PLACE

TAIL SURFACES ARE LAMINATED FROM 1/32" Balsa SHEET TO HIDE ALUMINUM ADJUSTMENT TABS

COLOR SCHEME:  
 ENTIRE MODEL WHITE  
 LETTERING DARK BLUE  
 TRIM DARK BLUE AND RED

U.S.A.F. *Thunderbird!* F4C PHANTOM II  
 APPROX. 1:48 SCALE DENNIS O. NORMAN 2-22-74

lage. Do this by cutting the profile keel, side longerons, and formers, from 1/16 sheet balsa. For maximum strength, an "egg crate" type of interlocking construction is used. The deep grooves in each piece are cut with a sharp, single-edged razor blade. The smaller notches on the formers are for stringers and may either be cut or sanded out. If you don't already have one, you can make a very useful tool for sanding stringer notches by gluing a 1/16 wide strip of medium weight sandpaper onto the edge of a small piece of 1/16 sheet balsa, making in effect, a very small emery board which will "notch" neatly and rapidly.

Having cut and prepared all of the fuselage pieces, begin assembly by slipping the formers for each side onto the appropriate side longeron. Assuming that you have cut the deep grooves properly, you should be able to lay the finished assembly flat on your work table so the inside edges of the longeron and all of the formers are flat on the table. Having completed each side assembly, glue them one at a time to the profile keel.

Once this assembly is dry, you are ready to add the stringers in the usual way. The Phantom is a very curvaceous aircraft and you will find that the stringers bend and dip gracefully over the fuselage. The only area of difficulty will be the sharp curves found in the air intake space between Formers 3 and 4. Here stringers will not work. Instead, take pieces of scrap 1/16 sheet balsa, approximately 1/4 inch in width, and glue them between the notches in this area. When they're dry, you can then sand or carve these pieces to the appropriate curved shape.

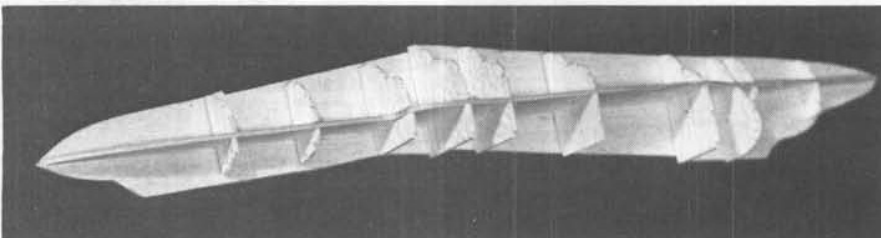
The nose is made by gluing four balsa blocks into the spaces formed by the keel and side longerons. When these blocks are dry, they can be carved and sanded to the appropriate streamline shape. In doing this, make sure that you hold the fuselage only on the keel or on the side longeron pieces, since the 1/16 square stringers will break if they are gripped too hard. The pod beneath the nose is also built up from balsa blocks.

Extensive flying of the prototype model showed that its nose flattened after several flights. This was remedied by sawing a vertical 1/16 groove into the center of the nose. The cut was made to a depth of 1 inch, thus removing that portion of the original balsa fuselage keel. This groove was then filled with a piece of 1/16 plywood sheet, which was sanded to shape. A couple of hundred flights have since been made with the reinforced nose, and the flattening has not recurred.

With the nose completed and the stringers in place, you should next take your sandpaper block and lightly sand down the entire fuselage, making sure that any portions of the formers protruding beyond the stringers are sanded



This is how the underside of the Thunderbird jets are painted. The colors are red, white, and blue, naturally. You can also "Go Navy" or put on Viet Nam camouflage!



This shows you how the fuselage is built sort of egg-crate fashion. Hey, guys, when did you last see a genuine egg-crate? Everything is molded foam nowadays!

flat. This will insure a much smoother look to the model when it is covered with tissue.

#### WING/FUSELAGE ASSEMBLY

The wing and fuselage should now be glued together. Assuming that everything is properly aligned, this will be easily accomplished by fitting the wing into the notch on the underside of the fuselage. Having joined these pieces, set the entire unit aside to dry. When it is dry, glue Part Number II beneath the center section of the wing as indicated. Also glue the 1/16 hardwood power launching pegs in place.

#### TAIL SURFACES

This model can be built with sheet tail surfaces which are fixed. The prototype glider was built this way and flew fairly well, but alignment was tricky and it was found that more satisfactory results could be obtained by making the tail surfaces adjustable. Several methods were tried, but the best was found to be the use of soft aluminum tabs (cut from .012 sheet) which were laminated between pieces of 1/32 sheet balsa.

Begin by cutting four horizontal stabilizer pieces from 1/32 sheet balsa. As with the wing tips discussed earlier, make sure that the grain of the balsa is parallel with the leading edge of each piece. Cut a 1/2 X 2 inch strip of .012

aluminum sheet. Next cut a slot in the rear of the fuselage below the side longerons and through the profile keel just behind Former 10. Slip the aluminum tab through this groove and center it so that an equal portion protrudes from each side of the fuselage. The aluminum tab itself may be fastened to the fuselage by the use of epoxy, household cement or with a glue gun. Rough up the tab in the area to be glued, for better adhesion.

Once the aluminum stabilizer tab is dry, glue one half of each stabilizer in place, making sure that both sides are aligned. When these pieces are dry, take the remaining half of each stabilizer piece and glue it to the other, thus completing the "sandwich". After stabilizers have dried thoroughly, again sand each to an airfoil shape as you did with the wing tips. Finally, bend each stabilizer down to the angle shown to give the characteristic drooped look.

#### VERTICAL STABILIZER

The vertical stabilizer is built in much the same way as the horizontal stabilizer. The principal difference is that the aluminum tab is sandwiched between the fin and rudder, making the latter adjustable as needed. Again, the pieces are cut from 1/32 balsa sheet and the

*Continued on page 65*

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In an informal conversation after the meeting, Mr. LeVier, who is soon to retire, revealed that some of his fondest moments in flying were spent in the cockpits of tiny racers, and that he will shortly be writing a book concerned with one of them, the Keith Rider "FIRECRACKER." We can all look forward to that volume!

## PIN-DOWNS . . .

. . . is the very logical name given to a series of new products aimed at builders of small models. These construction aids, designed by Keith Sterner, are injection-molded from polyethylene plastic, which is glue resistant. In many instances, two or three PIN-DOWNS will serve the purpose of a dozen or so regular straight pins usually needed to secure parts to the building board. In addition to allowing more precise alignment, PIN-DOWNS eliminate the dents often caused by pins, which can both weaken the wood and detract from its appearance.

Available in several styles to serve different purposes, type number 102 is illustrated in our photos. These can also serve in warp-prevention, by holding components such as tail surfaces suspended evenly above the work surface, while shrinking or doping operations are in progress. A set of eight No. 102 PIN-DOWNS, including washers retail for \$1.50. We tried 'em and we like 'em!

## DELTA DARTNIK

Frank Ehling, designer of the famous "Delta Dart" (AMA Cub, Racer, etc), has been paid the highest form of flattery, in that his idea has been reinvented in Russia! Our illustration shows how similar is the outline. Several interesting changes have been made, the most notable of which is an increase in size. The plastic propeller and prop hanger assembly are not incorporated, probably for lack of a suitable equivalent in the Soviet Union. An alternate configuration is being flown as a towline glider, in addition to the prop-driven example.

One definite improvement has been made: The weakest link in the Delta

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Dart, as in most simple models, is the dihedral joint. If correctly fitted, glued, and allowed to dry properly, it will do the job. Unfortunately, the typical youngster seldom has the patience to let glue dry, let alone the skill (or interest) to make the joint accurately. Thus, a catastrophic failure at the wing center-line is an all-too-common occurrence (ask anyone who has helped conduct a beginner's building session). The Russians circumvent this situation by using bent music wire joiners at both the leading and trailing edges, bound in place with thread as well as glued. Also, an undercambered airfoil is used in place of the standard flat section of the Delta Dart. Still, we think the adaption of the design represents a compliment of the most genuine sort!

## POET'S CORNER

Ralph E. Scott, Sacramento, California sez:

"Dear Bill, There ain't no scarcity of corn . . . in or out of Kansas." And he proceeds to prove his point with the following:

"Ma . . . I broke my rubber band!!"  
I folded my freewheeling prop  
I bent my tail  
Picked up the wreck with a wail  
Then solaced my sorrow with thought  
Didja see that!!  
It sure FLEW . . . Before it blew!  
Get another one . . . In fact, get two!!

**Phantom . . . . Continued from page 50**

aluminum tab (see plan) is cut from .012 aluminum sheet. The unit is best built flat on your work table. When it is dry, remove it and again sand an air foil by rounding the leading edge and tapering the trailing edge. When this is completed, glue the vertical stabilizer to the fuselage, making certain that the rudder is left free so that it can be moved as needed.

## COVERING AND FINISHING

Having completed the basic model, we are now ready to concentrate on covering and decoration. The fuselage was papered entirely with Japanese tissue. If this is not available, a light grade silk span will also do nicely. The amount of curves involved made it necessary to cover the fuselage by using small pieces.

Generally, the tissue was cut to widths no wider than the space between two stringers and was often no longer than the distance between two consecutive formers. This will be time consuming, but will produce a handsome result if the time is taken.

One area where tissue is not used is the space below the side longerons extending from Former 8 to the rear of the fuselage. This area, immediately above and behind the exhaust pipes, is covered by the use of four pieces of

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plain white bond paper. No patterns are provided for this as it is really a matter of cutting and fitting as you go . . . but the first portion should run from Former 8 to Former 10, extending from the side longeron to the profile keel. This is duplicated on the other side and then in a similar fashion, the space between Former 10 and the tip is covered.

Incidentally, the finished model was found to be quite nose heavy and, instead of using bond paper in this area, you might want to use balsa blocks as you did in making the nose. One final note on the fuselage is the addition of the air intake pieces which should be cut from card stock and glued in place as shown on the plan.

With the fuselage completed, you are now ready to begin painting. It took four coats of sanding sealer and a couple of coats of clear dope to thoroughly seal the wood grain. About four coats of clear dope were applied to the fuselage. You may be gasping at the amount of dope put on this model, but weight was really no object, and, as a matter of fact, even enhances the flying characteristics of the finished model.

The Air Force Thunderbirds are basically white and the model was sprayed with two coats of Aero-Gloss "Swift White". Next, the underside Thunderbird marking was painted with

Aero-Gloss "Corsair Blue" and trimmed in "Stearman Red". Similarly, the nose, wing tip and tail flashes were also painted. The inboard leading edges of the wing and the area around the intakes was painted silver. The intakes themselves are painted black.

The lettering, "Thunderbird" marking, flag display and national insignias were all taken from the decal sheet of a Lindberg 1/48 plastic kit of the F-100 version of the Thunderbird. The area above and behind the exhaust pipes was painted with Pactra "Steel" enamel, as were the inner portions of the horizontal stabilizers.

The exhaust pipes were cut from pieces of 3/4 inch rocket body tubing and were sprayed flat black and then glued into place. The canopy was made by carving a wooden mold from block balsa and then using a Vacu-form toy. If you do not have a Vacu-form and you do not wish to attempt a molded canopy, a fairly nice result may be had by carving the canopy from block balsa and painting it either light blue or black and gluing it in place. If you make a transparent canopy, you might want to simulate the pilot's head by placing a large white bead in the pilot's position. The interior of the cockpit should also be painted flat black. Once the canopy, however made, is in place, the white framing around it should be added by either painting it directly on to the canopy or by cutting it from white tape or bond paper and fastening it in place. A particularly neat effect is obtained by seeing that not only the framing over the canopy but also, the framing around the edges of the canopy, is added to the model.

#### FLYING

As noted, this is a "slingshot" slider. It is fairly heavy (our model weighed 1-1/2 ounces when finished), and will not fly well unless substantial power is used. We found best results were obtained by using a six foot pole with one loop of 1/4 inch flat rubber anywhere from 20 to 50 feet in length. As mentioned, the model was initially nose

heavy and a considerable amount of modeling clay had to be placed in the tail pipes to get it to balance. If you balance your model at the CG shown on the plan, it should give a fairly long, flat, glide. As always, it is best to trim the model on a calm day over tall grass. If pitching is encountered, adjust the horizontal stabilizers by lifting their leading edges slightly. In doing this, make sure that both stabilizers are moved together, as a difference in their incidence will cause the plane to spiral.

Once consistent small glides are obtained with hand launching, you are ready to proceed with a sling launch. Place the rubber loop on the second (rear) peg and pull until the rubber is fairly tight, but not stretched to its limit. Release the model into the wind and again, check its flight. If the model shows a tendency to roll on its back, the horizontal stabilizers may be a bit out of line. Adjust them until you obtain a level flight. Having done so, offset the rudder a few degrees to the right or left, depending on your preference, and launch the model again. When properly trimmed, you should have flights which see the model climb rapidly into the wind and then turn in the direction desired for a long, flat, glide.

A final word about safety. As noted on the plan, this model has a hard, sharp nose which makes it potentially dangerous. Never fly near a crowd. Always warn others in the area before you launch. If the model flies at you, cover your eyes and head. Hate to end on such a serious note, but a little caution could save a lot of grief. Happy Landings! ●

#### Plug Sparks . . . Continued from page 17

Champs) became a reality, and in no uncertain terms, with three days of flying, 12 events, and simply gorgeous trophies.

When McNorgan left SAM to indulge in his other favorite hobby, hunting, he left a hole that the writer found difficult to fill as Interim Director. Bud was a tough act to follow!

Getting back to the contest, this was