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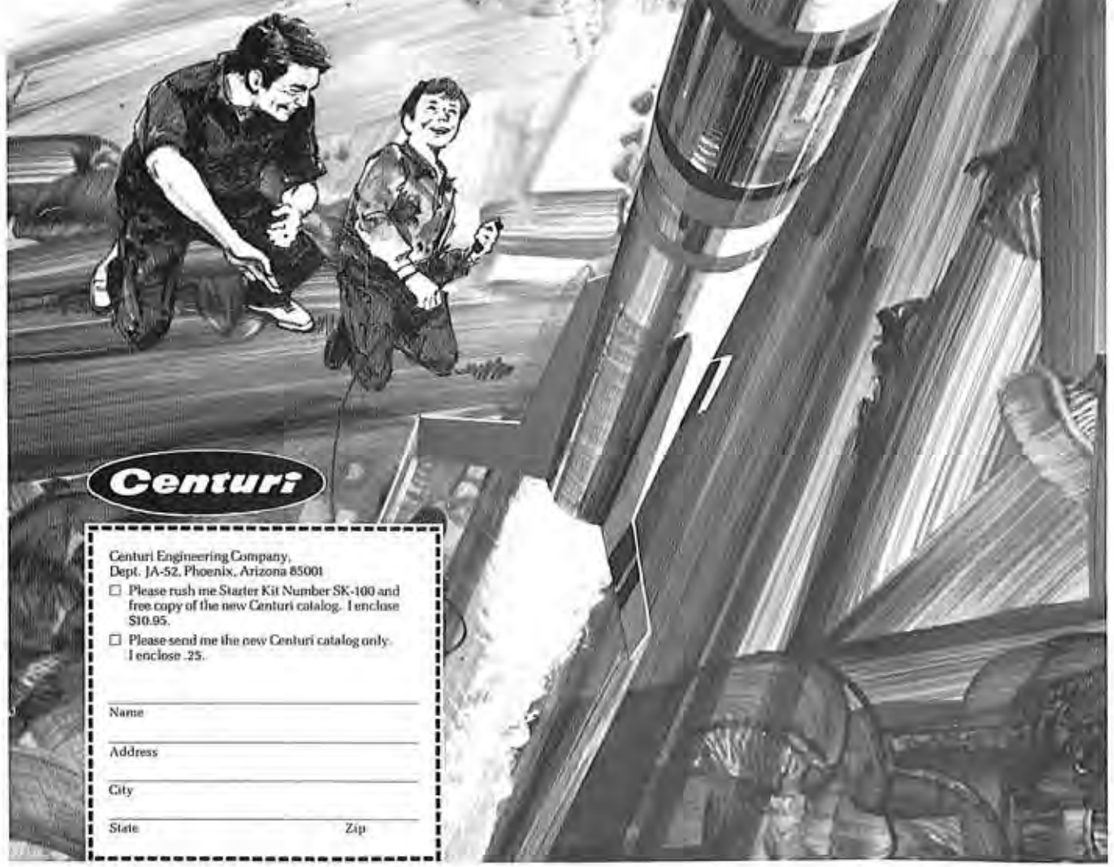

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JR American MODELER

THE HOW-TO-DO-IT MAGAZINE FOR THE BEGINNER AND SPORT FLIER.

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See page 24

See page 26

See page 44

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jam

It is a perfectly natural thing for any group of boys who build and fly model airplanes together to want to form a club. There are more than 800 clubs today which are affiliated with the Academy of Model Aeronautics, a non-profit organization with Headquarters in Washington, D.C. Since 1934, AMA has been the national governing body for model aeronautics in the United States. AMA establishes the rules by which we fly, promotes clubs, sanctions contests (including the Nationals), selects and sends abroad the various teams which compete in the world Championships. It is through AMA that we have obtained radio control frequencies approved by the Federal Communications Commission. And AMA does much more than that. Most AMA clubs are chartered—that is, all their members also are AMA members. Virtually all of these clubs, however, are large and well organized. Most of the members are mainly adults, and the majority of members are interested in competition. Individual membership, including AMA membership, provides the individual with his license to enter sanctioned competitions—and includes other benefits such as liability insurance and monthly copies of the American Aircraft Modeler magazine which publishes a regular section devoted to AMA affairs.

But beyond the AMA reach, or that of all the model airplane magazines, there exist tens, if not hundreds of thousands of boys who like model airplanes and who would be delighted to join some club, if one existed in their town. Many informal clubs and group activities are scattered throughout the land. Civic organizations frequently are interested in promoting clubs and activities of all kinds for young people. Such organizations as the Lions Club, Junior Chamber of Commerce, the Optimist Club, Exchange, the Y.M.C.A., American Legion, etc. have often sponsored model airplane clubs. This is not to say that every civic organization, in every town, will sponsor a club. Much depends on local, active modelers who are qualified leaders, people dedicated to making things go. They can carry the message to where it counts—sometimes it works, sometimes it doesn't. You do need one or more enterprising adults who will try to help. Many such adults feel they don't know enough about the problem—they don't know where to start. The AMA will help them (and you) get started by advising the whereabouts of the nearest AMA club, and by putting them in touch with experienced leaders in that club. (Write John Worth, Executive Director, Academy of Model Aeronautics, 806 15th Street, N.W., Washington, D.C. 20005.) It is reassuring to recall that the National Contests have been sponsored in past years by such organizations as the Exchange Club and the American Legion. (Since 1948, the United States Navy has hosted National contests.)

We'd like to talk this month about one of the many local activities, a very fine example which points up such opportunities. This is the East End Boys' Club, of Louisville, Kentucky. (1519 Story Avenue, Louisville, Kentucky 40206—Fred W. Schott, Director; a chapter of the Boys' Club of America.) The picture shows two of the boys working on a control-line stunt model. The club is called the Fly'n Tigers. (The East End Boys' Club is part of a United Appeal Agency sponsored in part by the Downtown Optimist Club of that city.)

The Fly'n Tigers began in the spring of 1966 with only six boys and one high school volunteer. Enthusiasm ran high and the club quickly grew in size until it had 30 members each year. Every member is a Junior (up to age 16) or Senior (age 16 to 20) and the only adults involved are six volunteers who devote an average of more than 50 hours a month of their time to help—this, not counting Edwin Wilson, who is the club advisor. The boys run the club and the adults only advise.

The boys themselves work at odd jobs and participate in fund-raising projects which provide more than half of the yearly operating budget of $1,000 plus. The rest of the money comes from the enlightened Optimist Club, which considers the values derived from the flying program to be the same as those of a Little League or Basketball League.

"I hope the concept of a program like ours will go far beyond the East End," writes Edwin Wilson. "I feel the future of our Juniors, and thus the hobby, is in a program similar to ours. As things now stand in our sport, there is no organized program of instruction beyond the AMA Delta Dart. If Dad doesn't know how to help, junior often is just out of luck. We must learn to reach more young people with programs which allow a boy to progress to more advanced and complicated stages while being supervised and instructed."

The Fly'n Tigers is more than a flying club. Its sponsors try to provide direction for individuals with a program that stresses individual fulfillment and group cooperation through a common interest. Meetings are held every first and third Thursday. Special activities held each month include skating parties, bowling, tours, and overnight camping trips. Dues are only 25 cents each month and this money is used to buy the boy his competition license and insurance (through AMA membership). Most of the money for this program comes in through the Annual Community Chest Appeal Drive. Major financing comes from the Downtown Optimist Club which buys all of the planes and engines used each year. The boys themselves raise $300 to $400 every year to pay for their contest expenses and special tools or equipment they require.

Most of the flying is done on Saturday mornings in a lot adjoining the Boys' Club or at the public flying field in

(Continued on page 57)

RAP Session

Keep 'em flying
Your new magazine is the answer to my dreams! I have two sons and a daughter, all of us AMA members, and am trying my best to keep them interested in model building and flying.

I feel models are very important to kids—they helped me many years ago as a youngster. The background also helped me in the Air Force as a pilot in World War II.

I think often of Goldberg, Struck and the Good Brothers—and all the other old-timers (of which I am one). Keep up your good work for the juniors.

Ed Coverdill, Beecher, IL

Glide Upward?
Your "Jam Session" comment about heavy models in water doing a sinking glide was interesting. May I suggest building lighter-than-water models instead. From the bottom of the pool, they glide up to the surface—buoyancy replaces gravity. I have made rubber-powered models with a six- to seven-inch span, also. These climb and glide in a fascinating way. The buoyancy is easy to adjust and the model relatively easy to recover. Just built to fly upside down.

Bill Kincheloe, Monte Sereno, CA

Gee, thanks!
I am so glad that somebody cares enough to put out a magazine for us beginners. Thank you, and keep up the great work!

Bruce Tashoff, Jamaica, NY

Key element: exposure
The new junior magazine is a fine idea. In connection with it, I would like to express a theory to which I have given a great deal of thought.

I think modelers are agreed that the best thing that could happen to modeling is to find a way to get every kid on the block hooked on the building and flying of planes. A new magazine for the beginner is great—but where are the beginners? A kid has to be *aware* of the existence of modeling before he can go to the best learning source on the subject.

Every youngster I've talked to has built a few dimestore plastic models for the shelf—fine up to a point. Why is there such a boom in plastics? Exposure.

This brings me to the point: when a major toymaker has a new product to sell, he tells the kids about it—on television. Millions of hula hoops, frisbees, slot cars, etc. were sold by TV. I realize this costs money and is perhaps out of the question. However, assume for a moment that money is no object: the primary thing to do is present a plane—maybe a Delta Dart—which is easy to build and, most important, one which will fly. The key is a plane so stable that even if a kid makes a few mistakes, it will still get into the air and make a few circles. If a first-timer doesn't have a little success with his flying model, he'll go back to plastics.

I speak from experience: I took up modeling during the war years when I was about 12 years old. My first kit was a stick and tissue job which was supposed to fly when finished and I couldn't wait to watch it soar. It flew like a rock. After a couple of these bombs, I switched to solid balsa models. Even if I had known of a book for beginners, I doubt if I would have bought it and taken the time to read it because I had already lost interest due to disappointment. If I'd been successful with the first venture, I would probably have been stimulated enough to go on to better things.

This experience illustrates my point: have someone come up with a well-designed plane, easy to build, that will fly beautifully—then give it so much exposure that the kids will see it in their sleep!

I can envision these planes flying around an entire neighborhood, just as I remember seeing kids up and down the street whirling hula hoops. Once this happens, a whole new modeling era opens up and this is where beginners' magazines really come into play. Everyone will want to go on to building bigger and more intricate models.

Ah, the question of expense: is it possible that the combined forces of the profession *could* afford a TV advertisement? Between AMA, kit manufacturers, modeling magazines, clubs and anyone else who wants to contribute, perhaps enough could be raised to produce such a commercial and test it in one area of the country for results.

No doubt someone else has submitted such an idea; maybe the pitfalls are obvious and have already been pointed out. Or, perhaps this will stimulate some thought in the right direction.

Richard Tarbrake, Sterling Heights, MI

We've expressed this concept in American Aircraft Modeler editorials, and to certain industry people. Nothing ever happens.

—Editor

RC simplified
Thanks to JAM and the new RC articles, I'm finally starting to understand how the magic boxes work.

My son and daughter particularly liked Bill Hannan's "Cheezie Racer" and I think they will build one.

Frank Scott, Dayton, OH

Here it is!
Best wishes for the success of your new magazine. Hope you will get a "letters to the editor" column going so that the youngsters can ask and tell. In your publication, the younger modeler could feel free to ask for and expect to get advice.

We're all looking forward to the next issue.

James Tamblyn, Mobile, AL

Endangered species?
I personally feel that JAM will probably—with a bit of time—become the most beneficial, interesting and educational magazine ever printed for model aircraft builders of any age.

The publisher and all other persons responsible for this project should be congratulated for the effort in promoting model aeronautics. I appreciate what you and others—Jim Walker, Carl Goldberg, Frank Ehling, Bill Hannan—have done to prevent the extinction of the greatest bird to fly anywhere, the model airplane.

Bob Pringle, Edmonton, Alberta

We'll try
I am just a beginner at building model aircraft. I have many problems and hope your magazine will give me hints on construction and how to build and design my planes. Please also tell us who has the best and most reliable equipment.

Barry Kohr, Ft. Lauderdale, FL

Barry, you don't say what kind of models are of interest to you. A letter to Dick Burkhalter, who writes the Q & A column, will be answered in the magazine, and we'll send you a photocopy of his reply in advance, so you can get started. Address your letter to the attention of the editor.

—Editor

(Continued on page 54)

Q&A

by DICK BURKHALTER

Q: I've decided I need a workshop. I've got such an accumulation of tools, supplies, leftover parts, half-completed and busted models, magazines, pop bottles, and just plain junk, that my parents threaten to make the cellar off-limits. Do you have any suggestions?

Joe Canno
Duluth, Minn.

A: Yep, first clean up the place and get rid of those pop bottles! Now, about that shop. There are simple shops, and complicated ones, little ones and big ones. In the January-February issue ("Enjoy!," page 7) there were pictures of an excellent foldaway shop constructed on a closet door. Something like that should be fine for small models. But since you sound very active—because you don't seem to have the time to clean up—you may want something that provides easier storage for materials and handy places for your tools and parts. For instance. . .

Two of the most valuable aids to the fight against Workshop Clutter are Masonite pegboard and open shelving. Pegboard is available in many sizes, up to 4 feet by 8 feet sheets. Often it is available at special sale prices at the larger hardware and building supply stores, so keep an eye out for sales. There is a virtually unlimited number of different types of pegboard hooks, the most common types being very cheap. A few bucks spent on pegboard and hooks will go a long way toward good organization.

Open shelving is great for making use of what is usually wasted wall space. I recommend the metal shelving units (such as those sold at Sears or Wards) which you put together yourself like a giant erector set. These are generally the least expensive, and are available in many widths. If you have the space, try to get at least 36". The reason for our preference for 36" shelving is that the most common length of sheet and strip balsa is also 36", and unless you build big R/C planes, this width is also sufficient to accommodate most kit boxes. You can then use these boxes to store leftover balsa, tissue, plans, and miscellaneous supplies neatly on the shelves. As an alternative to the metal shelving, you may also consider unfinished wood units. Or check around the used furniture and thrift stores for good buys. Since most of the stuff you use isn't heavy, you can use a lightweight structure as long as it is stable. Always put any heavy items on the lower shelves for this reason. Since your workshop is not in the living room, you probably won't have to be concerned with appearance, so look for the cheapest way to get the most storage space.

The old saying, "A place for everything, and everything in its place," is still as true as it ever was. Nothing is more frustrating than to spend hours searching for a 5 cent part, so when you design your storage area, think about making everything easy to find. If at all possible, try to develop some system for keeping like objects together. Use the smallest container you can for a given type of item. For instance, use small plastic boxes, film cans or baby food jars to store screws, nuts, and washers, then put all of these into a larger box such as a cigar box, for storage on a shelf. Another good medium for small parts storage is the common plastic ice-cube tray. Label all containers so you don't have to open them to find out what is inside. If you group things in some logical order, you will have to look in only one place for a given item, and if it isn't there, you haven't got it! Beware of large drawers, they hold too much. Invariably, the item you're hunting for ends up in some dark corner, buried under mountains of other stuff you hastily tossed in.

Q: Why do they put three-pin plugs on power tools? I have been saving up to buy a hand drill and I am puzzled about the plug I saw in a picture. It looks like it is made in two parts, as if one plug is inserted into another, which sticks into the socket. It has three pins. The socket by my workbench has two holes. Help, please!

Jerry Siegel
South Bend, Ind.

A: More and more electrical power tools and appliances are equipped with 3-prong grounding plugs. These plugs cost more to make than the old 2-prong type, and no manufacturer who wants to stay in business would spend money on foolish frills, so there must be a good reason for the change. In this case the reason is that every year, thousands of people are injured, and a few killed, by electric shock from ungrounded power tools. Take a hint from these manufacturers—who should know best about the dangers—and use the grounding plug. How can I do this when all of my electrical outlets have only two holes, you ask? Easily, say I, by the use of a simple device known as a "3-to-2 prong adapter." These little goodies, which sell for two bits or less, in hardware stores, have a green pigtail wire which is meant to be attached to the screw which holds the outlet's cover plate in place, or to some other good ground. Please connect it up.

Q: Boy, do I have questions! First you keep saying epoxy. I have been using Ambroid glue. Is this the wrong kind to use? Second, on your plans for the "Sassy" (issue number 2), you say to pin all the ribs together and cut them to the same size and shape. But how do you cut the notches for the spar while they are all pinned together? I have tried this but can't seem to get it to work. Last, what in the world is a dethermalizer, and how do you make one? I can see the hooks on the plans, but something seems to be missing.

Alan Woodcock
Baker, Oklahoma

A: First, let me say that there is nothing wrong with Ambroid or other model airplane glues. We older types were using these long before epoxy was ever thought of. However, modelers have found that other adhesives can often do a better job in some applications. Epoxy is the generic name for a whole group of hydrocarbon resin adhesives whose chief claim to fame is its fantastic strength. Other advantages of epoxy include the ability to join non-porous materials such as metal, a very low shrinkage, and its resistance to water, fuel or other fluids. Also, since epoxy cures (dries) by chemical reaction, it does not have to be exposed to air to work. The disadvantages of epoxy in model building are mainly its weight and expense. By using epoxy sparingly, however, and only where its strength and fuel-proofing qualities are needed, and using model airplane glue for general construction, we can have our cake and eat it too. There are literally thousands of brands and formulas of epoxy on the market today, those most common to modelers being manufactured by Hobbypoxy, Sig, and Devcon. These brands can usually be found at your local hobby shop. Devcon is also sold in many hardware stores. Regardless of which brand you choose, follow the instructions carefully.

Epoxy glues are packaged in two parts and must be mixed before use. Once mixed, they have a limited amount of working time, so you should mix small batches to avoid waste. Once the glue begins to harden or get rubbery, it should be discarded, and a new batch mixed up. The working time of most common epoxies is 15-30 minutes, and the so-called "quick-fix" types cure in as little as 5-10 minutes, so you can see that you must plan ahead when using them. Because there is no way to soften epoxy once it has cured, your joints had better be right the first time, so some extra care must be taken to insure everything is properly aligned. (Once cured, epoxy may also become a permanent part of your clothes, workbench or body, so be neat.) You can remove uncured epoxy from things with either denatured alcohol or MEK (Methyl-Ethyl-Ketone), so get it while it's wet or live with it forever! For additional information about epoxy and other adhesives used in model building, see the article "Sticky Glue Mess" by Howard McEntee in the first issue of JAM.

(Continued on page 52)

JAM bi-monthly

MODEL CONTEST

Dremel No. 261 Moto-Tool Kit featuring the Model 260 Moto-Tool and containing 34 accessories including high speed cutters, emery and silicone grinding wheels and points, wire and bristol brushes, felt and rubber polishing tips, sanding discs, drum sanders and sanding bands, mandrels, dressing stone, finger grip extension, collet wrench, 1/8", 3/32", 1/16", and 1/32" collets—all in a molded polyethylene case, shown above.

Dremel No. 572 Deluxe Moto-Shop, featuring the No. 571 Moto-Shop, 3 sanding discs with rubber backing pad and adaptor, 4 saw blades, 1 grinding wheel and guard, 1 cloth polishing wheel, 1 wire wheel, 1 adaptor, 1 polishing compound stick, 1 flexible shaft accessory with finger grip and a 12 piece accessory set, shown above.

Entrants should indicate their preference of prizes

JUNIOR AMERICAN MODELER is pleased to announce the **JAM MODEL CONTEST.** This contest is designed to encourage the beginner and novice alike to be meticulous and exacting in the preparation and building of a model. This contest is open to kit-built and scratch built models. The contest is for both boys and girls. Come on girls! Show your brother!

Every two months **JAM** will award either a **Dremel Moto-Shop No. 572,** or a **Dremel Moto-Tool Kit No. 261,** the choice being that of the winner. Second and third place winners will receive a one year subscription to **JAM,** or if the winners are already subscribers, then their present subscription will be extended by one year past expiration date.

The following are the rules governing the **JAM MODEL CONTEST.** Strict adherence to these rules is necessary.

A. **Model Origin:**
Any kit that had its origin from a wood, plastic, metal, etc., kit is eligible.

B. **Categories:**
All types of models are eligible, i.e., planes, boats, cars, etc.
1. Boats
2. Cars
3. Tanks, etc.
4. Planes
   (a) Glider
   (b) Rubber-powered
   (c) Free-flight
   (d) Control-line

C. **Entrants to submit:**
1. Black and white glossy photos no smaller than 4 x 5 showing various views (minimum of 4). Polaroid pictures are acceptable.
2. Color photo or slide (OPTIONAL)
3. Close-up photos of detailed work may be supplied if desired.
4. A short write-up on the origin of the kit and any special techniques used in the building of your entry.
5. A statement that:
   (a) The submitter was the sole builder of the model.
   (b) The original kit is available at any hobby shop.
   (c) The photos taken and supplied were taken by the submitter.
   (d) The submitter is no older than 16.

D. **Judging will be on:**
Neatness
1. Workmanship
2. Quality of finish
3. Attention to detail

E. **JUDGING:**
Judging will be done by the staff of Potomac Aviation Publications and Academy of Model Aeronautics.

F. **Persons not eligible:**
1. Members and employees of Potomac Aviation Publications or any other model magazine.
2. Members and direct or indirect employees of Dremel Manufacturing Co.
3. Members and employees of any manufacturer of hobby kits, hardware, or supplies
4. Anyone engaged in the wholesale or retail distribution of hobby kits, hardware, or supplies.

G. **Models not eligible for submittal are:**
1. Models that have been submitted for judging of workmanship at any contest that placed 1st, 2nd, or 3rd in that judging.
2. Models that have won similar awards in other publications.

H. Entrants who have models that qualify under these conditions are eligible to enter the JAM Model Contest.

I. **Prize information:**
1. A Dremel kit will be awarded to the bimonthly first place winner. An illustration of the Dremel kit along with the winners picture, name, address, and description of the winning model will be published in **JUNIOR AMERICAN MODELER.** The second and third place winners of the bimonthly contest will receive a one year subscription to **JAM.**
2. Dremel Manufacturing Co. will be notified of the winners name and address so that the prize indicated may be sent.

J. All contest entries must be submitted along with the data required, to:

JAM MODEL CONTEST
Junior American Modeler
733 15th Street, N.W.
Washington, D. C. 20005

K. All photographs and materials sent by the contestant will become the property of **JUNIOR AMERICAN MODELER** and none will be returned or acknowledged.

This contest will be null and void in any state or locality where specifically prohibited by law.

From Southeast Asia comes the sound of aerial battle, the singing of the wind on a taut cord, and the flutter of paper in the gentle breeze. This is a battle of kites, fought by adults as a game.

Thailand, once called Siam, and not too far from Vietnam, is a country in which the flying of kites is serious sport for the adults. While the grownups do battle with the great "chula" and nimble "pakapao" kites, the youngsters must keep their ever present flying serpents out of the way.

This kite of the young Thai's seems to be unique to that country. It provides a most unusual appearance and is very easily built and flown. Notice that this kite is really rather small—it is the tail which is so large.

The materials used in Thailand are not common here, but that is of no matter, for we have redesigned the kite to use easily obtained supplies. In Thailand the native bamboo is split into very thin strips. For our domestic kite, somewhat thicker balsa will do (unless there is an old bamboo placemat around your house, which would serve very well).

by FRANK H. SCOTT

THAI KITE

Jeanette and Chris Scott are all smiles with their happy-face kite. Put "Jr. Modeler" on yours and you will make us happy! In bottom picture Chris discovers that a kite and a plane are cousins—the wind is the engine.

Begin by soaking a fairly limber strip of 1/8" square balsa in hot water until you can easily bend it around a bucket or some other circular form about 9" in diameter. Secure this wet wood to the form and allow it to dry.

When this curved strip has dried and will hold its shape, the frame may be glued together (Elmer's White Glue, for example) in much the same manner as a model airplane part. However, on this, the gusset may be simply glued on the upper surface of the frame. If you do not have any thin balsa or plywood on hand for these gussets, thin cardboard will do. In any case, do not omit these braces. When the glue has dried, the frames will be complete, and unlike an airplane part, you don't even have to sand it smooth.

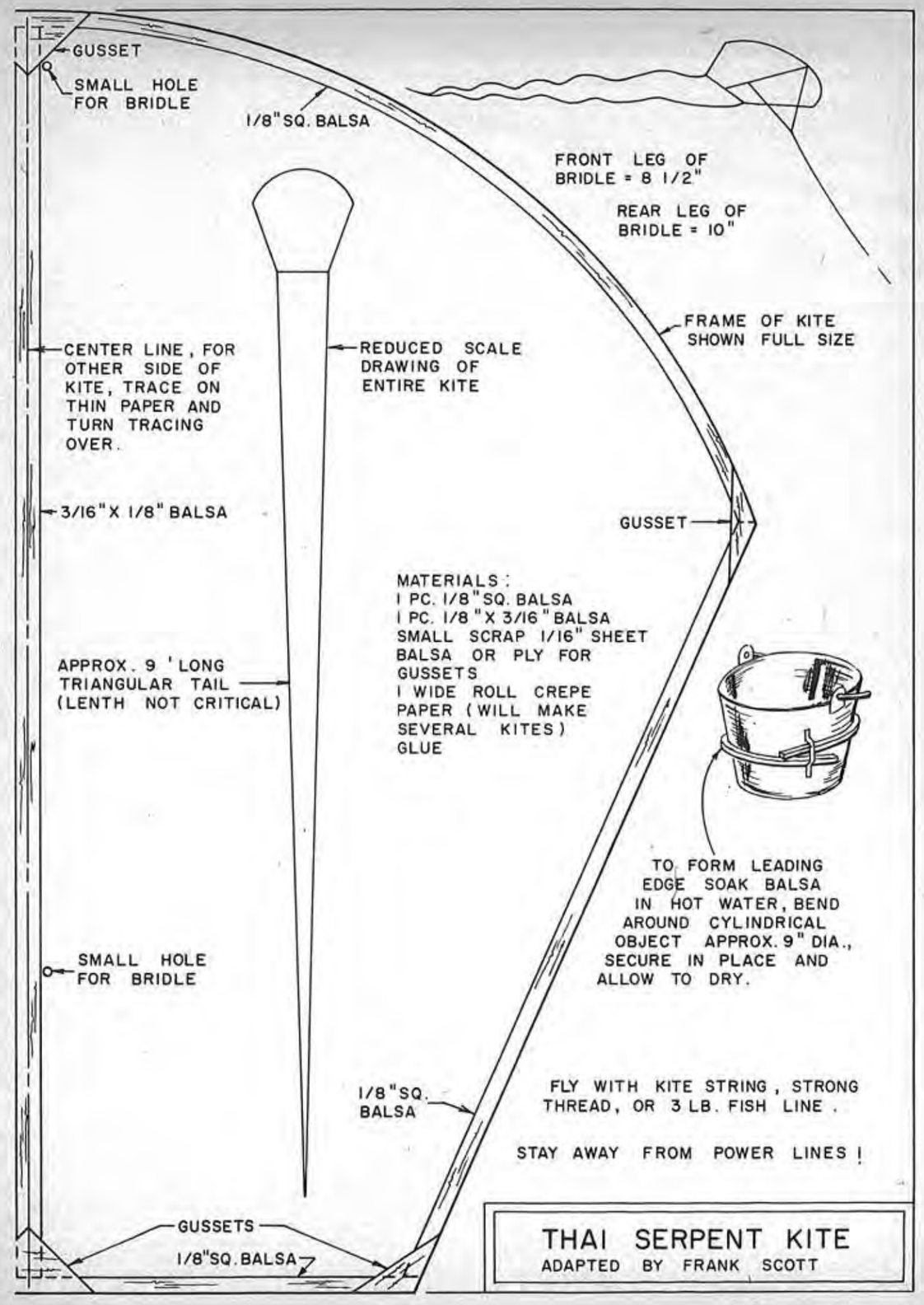
To cover your kite frame you need only to unroll one end of your roll of crepe paper and place the end over a newspaper. (In case some of the glue soaks through the covering, you don't want to find your kite part of the furniture.) Now apply glue all over one side of the frame and carefully place it, sticky side down of course, onto the crepe paper. When the glue dries, you need only to cut around the curved top and sides of the frame, using scissors, and carefully cut the long, wedge-shaped tail. If you have planned ahead, you will find that there will be ample material left for more kites. Crepe paper offers the advantage of coming in sufficient lengths so you won't have to piece your kite's tail together; also, it is available in nice colors and is much tougher to tear than tissue.

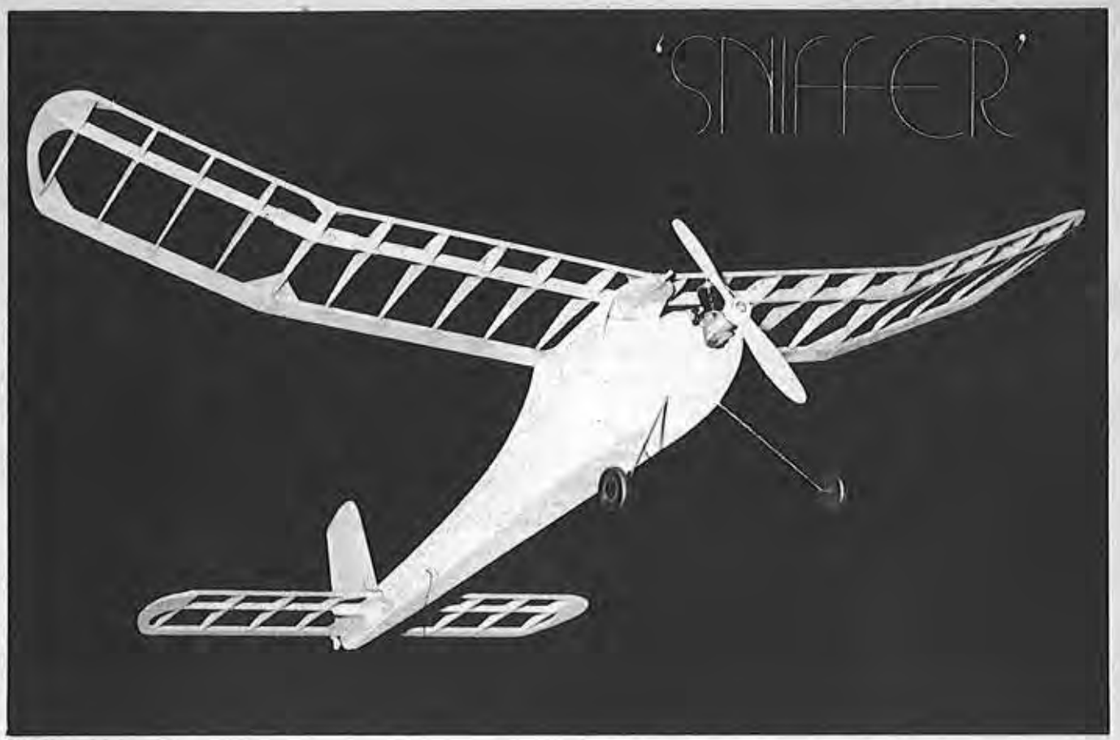
You may decorate your kite to resemble your favorite snake with suitable felt-tip markers. To prepare the bridle, carefully poke small holes in the kite cover where indicated and tie lengths of kite string at each place. Carefully tie the ends around the center stick and make a loop for the flying line. This will complete your kite.

To carry, it is easiest to carefully wind the tail of the kite up around its head. When at the park, or wherever you may choose to fly your kite, unwind the tail laying it out on the ground so that the tail points into the wind, and the head away from the wind. (All this, of course, with the kite upside down.) Now attach the flying line to the bridle. To launch into the air, simply let out enough line so you can stand by the rear most point of the tail and smoothly jerk the head into the air. As you run into the wind it will rise, lifting the tail as it is able—which is much more satisfactory than laying the tail out down wind and dragging it through the weeds and brambles. If you are lucky enough to have a helper, he is most welcome to launch the kite for you in the usual manner.

Use kite string in flying this kite and stay away from overhead wires. Don't fly in the rain either, for not only will your kite come apart, but if there is any lightning around you may come unglued yourself!

This is not a high performance kite, but it is a very colorful one, easy to build and fly and generally a lot of fun. So—have fun!





When R. G. Schmitt designed and Midwest Products Co. introduced the "Sniffer" to model airplane builders many years ago, I am sure they must have had a crystal ball. The "Sniffer" is as well known to modelers as baseballs are to baseball players. Modelers, young and old, have and still are building "Sniffers."

Why? Because it looks like a plane—it flies with the champions—it is easy to build—and it's fun.

You ask a modeler if he has built a "Sniffer" and he will usually say "two or three"—then you ask how it flew, and he says "Great, except it flew away." That is probably why they named it the "Sniffer." It sniffs out the thermals. The early modelers did not use what is known as a dethermalizer, but we do now and it is highly recommended. The plans and pictures show you how to use one so your "Sniffer" does not fly away.

The plans show the engines originally used, known as the Anderson "Spitfire" and OK "Cub." You will have a hard time finding these, so we will use a later design that you can find in most any hobby shop, the Cox .020. We will discuss this further when we get into engines and flying.

Building the "Sniffer" kit is a pleasure. There is one basic mistake on the plans that is easy to correct, will make it easier to construct the recommended dethermalizer, and easier to trim for flight. If you measure the width of the stabilizer, you will find that it is 3/16" wider than shown on the fuselage. Since the plane usually builds tail-heavy, I recommend that you move former F-9 forward at least 3/16" and notch stabilizer slots on fuselage to allow stabilizer to fit next to F-9 in its new position. Otherwise the parts all fit as designed.

Building by the pictures is easy, but any good modeler will tell you that sandpaper makes the plane fly. Sand all parts smooth, sand all for good fit, sand to shape as shown. Do not force any parts; they break easily and may cause warps that will make it difficult to trim for flying.

A lot of glue will only make your model heavier, not stronger. If you apply the glue on each part so that it is just barely visible, this is usually strong enough. Areas around the landing gear, engine mounting, dihedral joints, hold-down dowels and dethermalizing area should have at least two good coats of glue.

Building requires an area about 24" x 36". Make sure it is flat so you don't build in warps (twists) in your wing or stabilizer. I like to work on Celotex. It is easy to get pins in and out of. Linoleum, soft pine, or two or three layers of cardboard can be used, but Celotex is what you should try to find.

Reading plans can be tricky sometimes, but this one is easy. Remember the solid lines are what you can see; the broken or dotted lines indicate a part that is behind something. It is kind of like looking at a cupboard with a solid door on it. If the door is closed, you can't see the shelf on the other side. If you were to put on a glass door, you could see the shelf. That is what the dotted line is—it's like looking through the front or top to see what is behind.

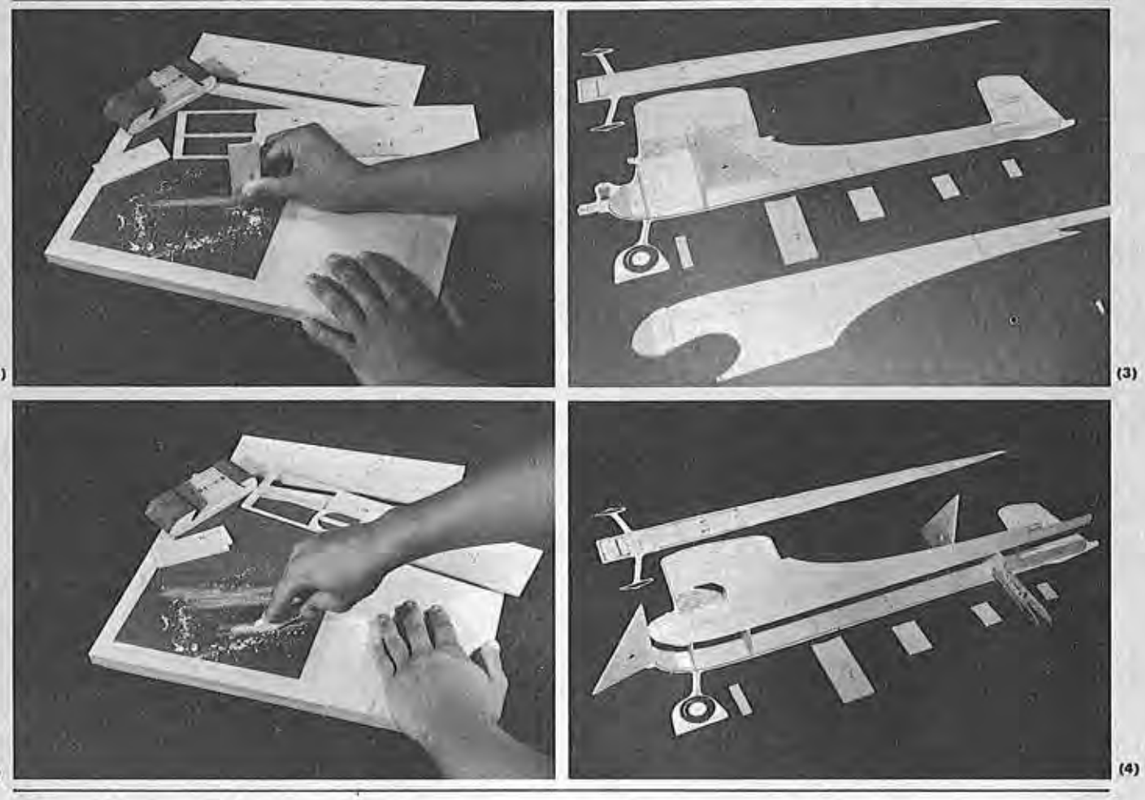
The die-cut parts should be checked and sanded as needed. (I save the punched-out sheets as well as plans. These make good patterns for new parts and repairs.)

The fun of building is learning and doing it yourself, but do not go on blindly if you do not understand something. Read the instructions again and look at the pictures. If you are still stuck, ask a local modeler or your hobby dealer. You will find that most modelers enjoy helping each other. I also recommend you build with a friend so that you can learn together, and the *most* fun of all is to fly together.

See you next issue on how to cover and fly your "Sniffer."

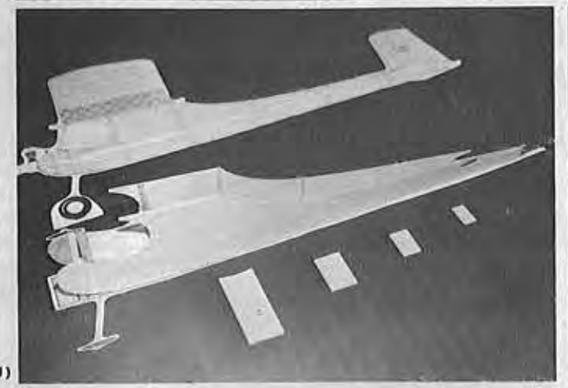
HANDY HINTS

by ROBERT HARRAH



(1) Glue or tape fine and course sandpaper to a flat piece of wood. Sand the ends of the wood after cutting for snug fit by drawing wood along the sandpaper—this insures a flat edge. (2) The sanding block—made in Fig. 1—also may be used for sanding rounded edges. In this example, the curved pieces of wood are drawn across the sandpaper, rotating the work slightly as you go, to avoid flat spots. (3) Cut out profile and top view of plan from drawing, glue surface material to work board. After putting down sides—marked for bulkheads—use a triangle to insure alignment of bulkheads as they are glued in position. (4) Accurate placement of the other side of the fuselage is necessary for exact alignment of wings, tail and engine. Author used temporarily an extra maximum-width bulkhead, held with clothes pin, to separate sides toward rear, while the side is glued to the forward bulkheads. Note use of two triangles to insure alignment of both sides in two directions.

(1)



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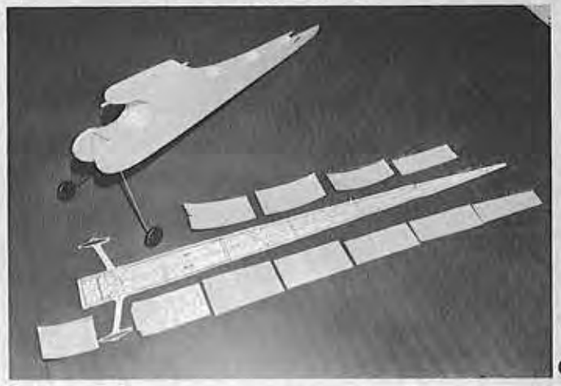
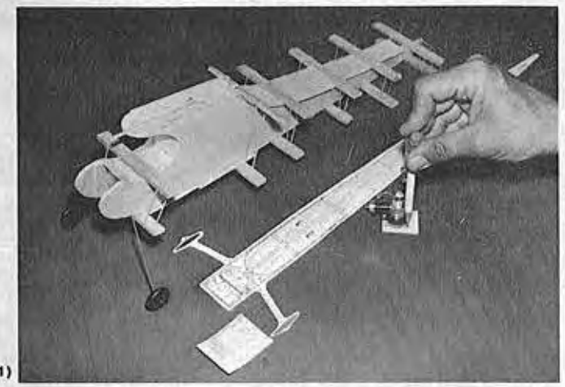
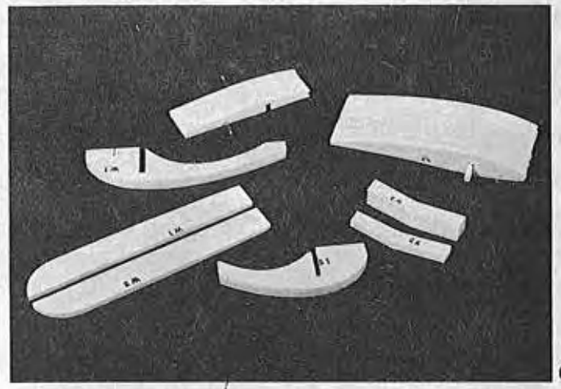


(4)

(1) Now place the joined sides upright on the top view plan which has been glued to your work board. Hold rear ends together for gluing with lightly loaded clip—hair clip for example. Cross piece at front of windshield glues in place. (2) Still using top view plan, glue in place the remaining bulkheads. Pieces of wood and rubber bands make convenient clamps. (3) Preformed landing gear (and F-10 brace from kit) now glue in position. Hair clips and rubberband clamps hold in place and keep gear off work area while drying. Wing hold-down dowels and wing supports W-1 and W-2 (from kit) are also glued in place at this time. (4) Sheeting for top and bottom of fuselage are rough cut. By wetting one side, intentional warp results to help match pieces to fuselage curvature. Note notches cut for wing hold-down dowel and the landing gear.

(1)





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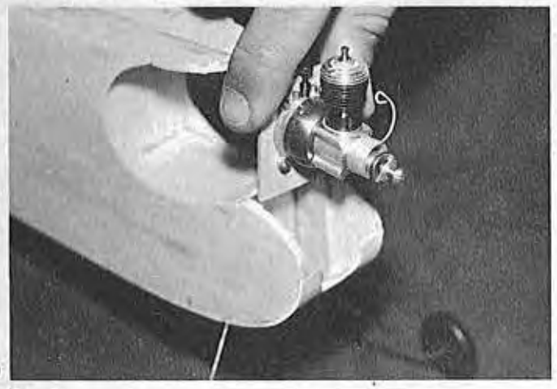
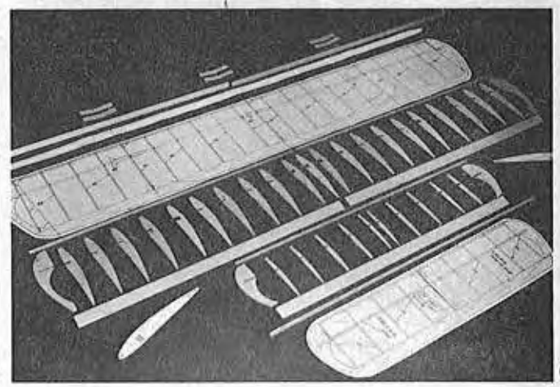
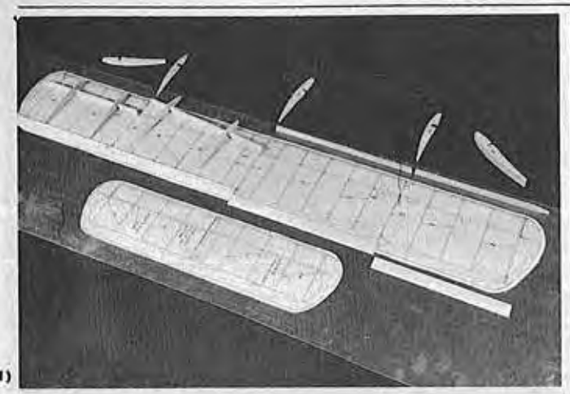




(4)

(1) The top and bottom sheeting is clamped in place with hardwood pieces and rubberbands. The picture also shows marking of the motor mount holes on the 1/16" plywood engine mount. (2) Engine on its mount can be slid in and out of its location so the nose cowl sheeting can be mounted and cut out to fit properly around the engine. (3) Various identical parts which must be sanded to identical shapes are pinned together. By use of sanding board, you can be sure they are smooth and of equal size and length. Wing ribs, stabilizer ribs, wing tips, dihedral braces are among the parts shown. (4) Cut out wing and stabilizer plans preparatory to gluing to work board surface material. Picture shows how parts are arranged for assembly. At this point nothing has been glued or fastened in position.



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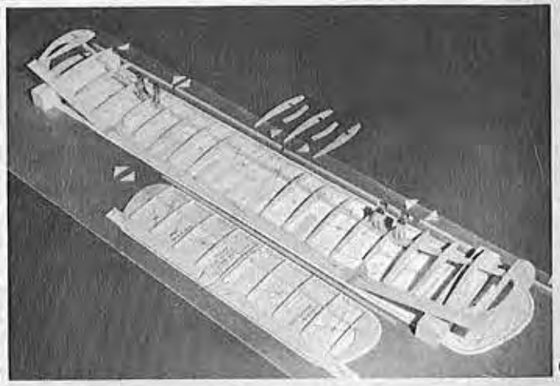

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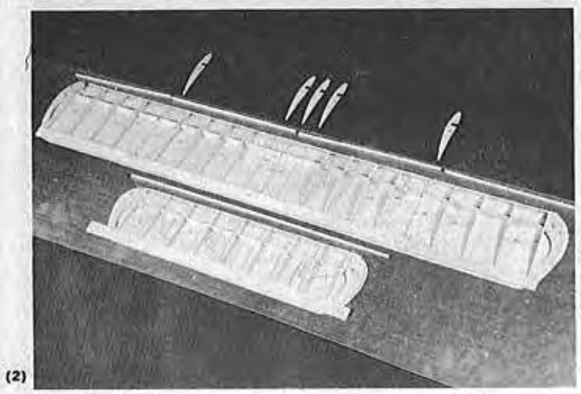

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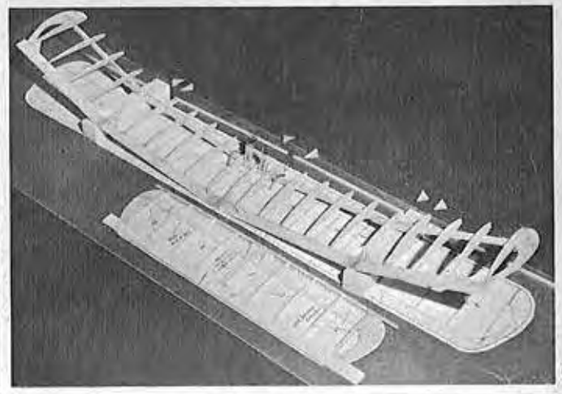
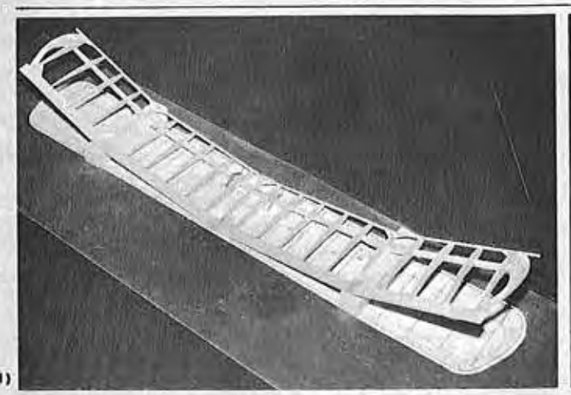


(4)

(1) Trailing edge parts are cut to size, placed in proper position. Note that trailing edge is blocked up with 1/32" pieces to maintain wing undercamber. Main spar (at left) pinned down using ribs for snug fit. Pins driven through T.E. at an angle to lock down firmly; pins on each side of, but not through, spars. Pins weaken spars. (2) Shown glued in position are trailing edge parts, spar parts, ribs, and tips. Leading edge pieces and ribs located at dihedral breaks have been left out at this point. Stabilizer is complete, similar to wing, and leading edge still is not attached. (3) Wing tip sections are blocked up for dihedral, Hair clips clamp dihedral braces in place while drying. Note triangular gussets glued in place at dihedral breaks to help maintain position of panels after drying. (4) While wing tips dry, glue leading edge on stabilizer. Center dihedral wing now incorporated. Use hair clips to hold dihedral braces in position while gluing. Note how pins on each side of spar near center are joined with rubber bands to hold spar in place on board. Also note the triangular gussets at center to help maintain the angle after drying.



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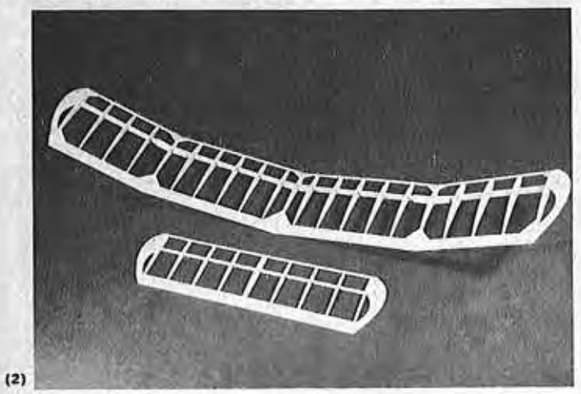

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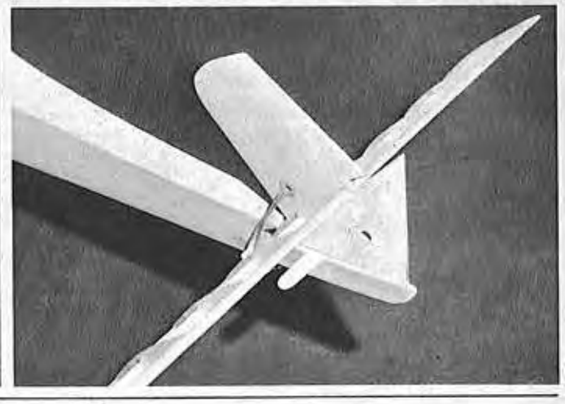


(4)

(1) Leading edge and the remainder of the triangular braces are added as shown on the plans. Reglue all dihedral joints and allow to set overnight. Stabilizer now may be lifted from plan and sanded. (2) Finished wing and stabilizer ready for final sanding. Use hand-held sanding block for even contours of ribs, and small scraps of sandpaper held in hand to round off edges. (See last month's Handy Hints: Sandpaper.) (3) Rudder is cut out, sanded, set between stab ribs to check fit. Cut out fuselage as shown to accommodate de-thermalizer action of pop-up stabilizer. Hole in rudder reinforced with glue. Stab hold-down dowel in place, stab support cut to size. Cut to size now, but glued in place after covering is done (next issue). (4) A 45-degree triangle is used to check angle of stab in pop-up position. Important to cut out fuselage area a bit at a time so that stab goes up, and stops at proper angle. Note rubberband action.

Apple Bipe

by DAVE THORNBURG

WOOD FROM AN APPLEBOX, COAT HANGARS FOR STRUTS, A STRING FOR POWER, AND OFF YOU GO.

Left: Shooting landings with this little biplane is a cinch. Above: Prop revving in the breeze, the "bailing wire" mailplane gets set to brave "the graveyard of the Alleghenies." Stunt pilots have been known to whip a deadstick craft through almost all the pattern maneuvers.

The first time we took the **Applebox Bipe** out to the flying field, we immediately met The Heckler. You've probably met The Heckler yourself: he's the guy who knows a little bit about model airplanes, but is too lazy to build them—he'd rather just hang around the real modelers and criticize everything he sees. This Heckler lost no time in making himself obnoxious.

"Hey, where's the motor on that thing?" was his first question.

"There isn't any. It's a 'whip control'—that means you fly it by swinging it on a string. The prop spins as it flies and makes that motor sound you heard."

Hecklers can never admit to learning anything. "Yeah, yeah, I know all that. But whadd'ya mean it *flies*? I could tie a rock to a string and swing it around like that."

"Think so? Try flying it without the noseweight, then."

The Heckler couldn't resist a challenge, as long as it was simple; besides, I could see he'd been itching to fly the little plane. He took a screwdriver and removed the bipe's two dummy cylinders (really stacks of heavy washers held in place with wood screws). Then he picked up the string and held it up close to the plane and began swinging it around his head, as he'd seen me do. But the little bipe just rolled and flopped like a dead fish at the end of the line. Even he could see there wasn't any use in letting out the rest of the string—it wasn't going to fly. It was my turn to do some heckling.

"Hey, man, looks like your center of gravity's too far back. You see, the plane has to balance about an inch and a half back from the leading edge of the upper wing if it's going to *fly*. Now I just happen to have some heavy washers here. . ."

"Awright, so never mind," The Heckler mumbled. But you could see he was getting interested. "How much that thing cost'ya ta build?"

"Just the price of a pair of wheels—I pirated the plastic prop from an old Sleek Streek."

"Well, that's cheap enough," he admitted, "but I ain't got the time to build a neat model like that."

"Why not?" I challenged. "It only takes a couple of hours. Just salvage a wooden apple box from the grocer's and a couple of coathangers from the closet. You can put the whole thing together with white glue and finishing nails. Ask your Dad to help—he'll be overjoyed. The only tricky part is bending the landing gear and wing wires: you have to paint the fuselage first, and then insert the wires through the 1/8" holes and bend them right on the plane. Oh, yes, you've also got to be sure that the whole plane is put together solidly, because it has to be able to stand a lot of "g" forces when it flies. One of mine came apart in the air and almost hit a Heck. . .I mean a spectator. I didn't have the top wing bradded to the wing mount solidly enough."

"You coulda run the string through that hole in the wingtip and on in to the wing mount before you tied it off," the Heckler observed.

"Say, that's a good idea," I said, trying not to sound too surprised. "Why don't you build one and we'll fly some formation flights together."

"Mebbe I will, mebbe I will," he said. "By the way, is that dope or just paint?"

"The yellow on the wings is house paint," I admitted "but the black on the fuselage is dope. You can use whatever you have handy, since weight isn't a problem. But the finish you get depends on the sanding you do beforehand. I round the edges of all the flying surfaces with heavy sandpaper, then smooth them with a sanding block and fine paper before painting. The decals are just colored paper glued to the plane with model cement."

"Well, I dunno about all that sanding. I hate to sand much. How about using an electric sander?" he asked.

"Fine, if you've got one. But it really doesn't take that long to do it by hand—and the nicer the finish, the nicer the plane."

"Yeah, well, I dunno—I think I'd rather have a World War I plane, maybe an S.E. 5."

"Great," I said. "You don't have to follow these outlines. The model books are full of three-views. I've got a twin-engine B-25 at home, built the same way. You ought to hear the roar of two propellers!"

". . .Or mebbe a Dornier flying boat, one of those that has 12 engines," The Heckler muttered.

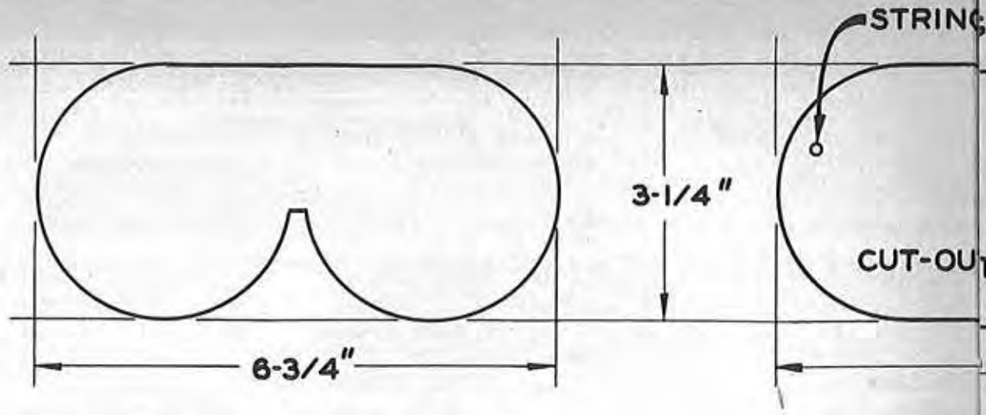
"Good, good," I said, beginning to swing the bipe again. "Why don't you hustle home and get started on it?"

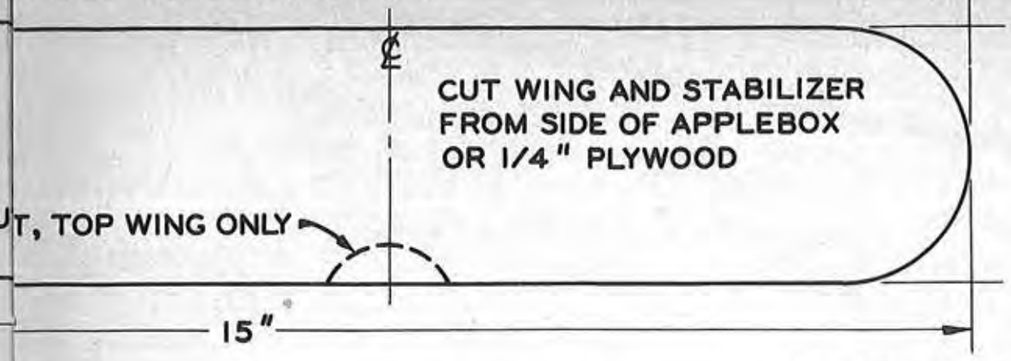
"Mebbe I will, said The Heckler, "mebbe I will."

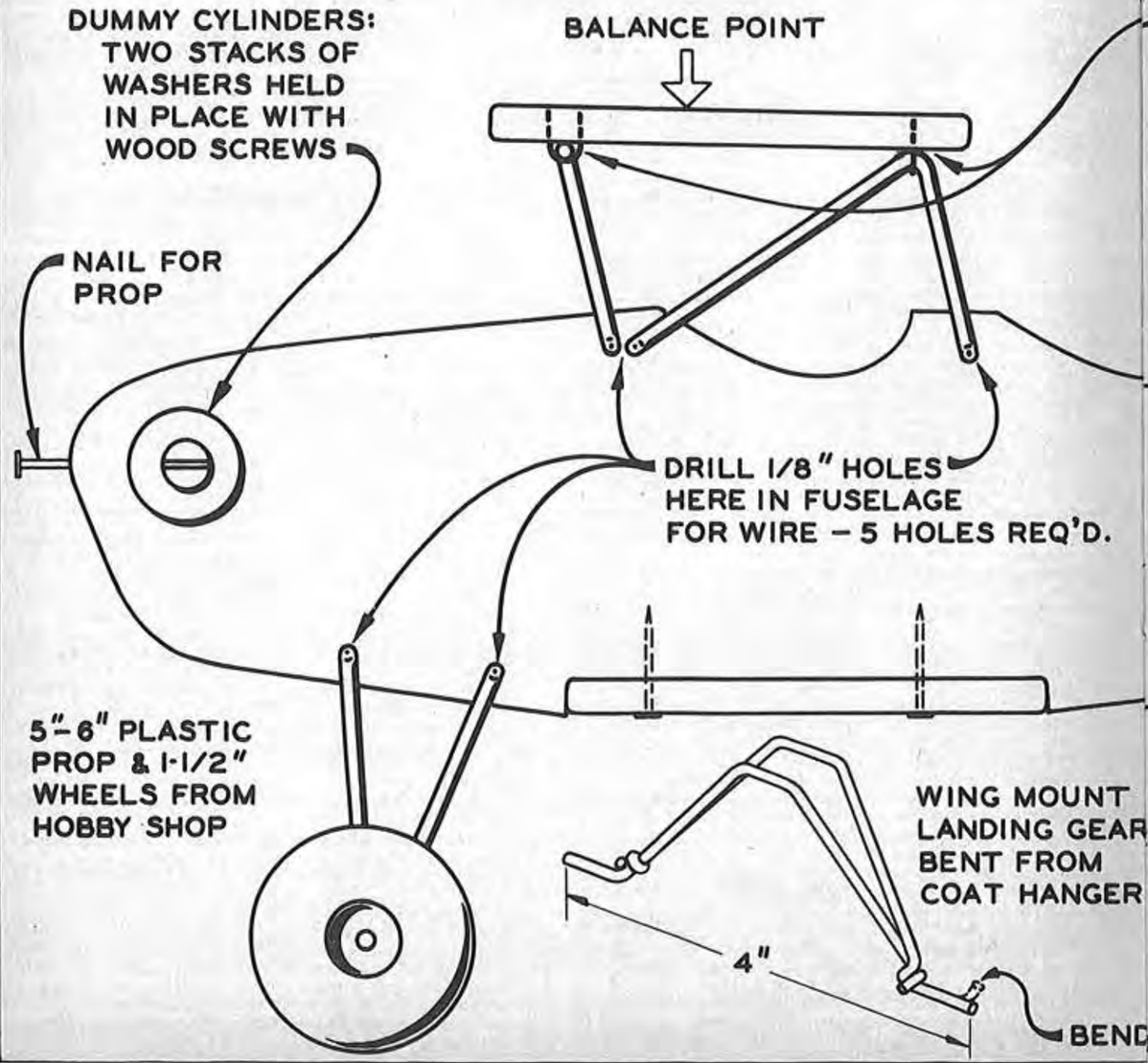
(Editor's Note: Although this "crate" may catch the fancy of older modelers, too—it is pure Freddy Flintstone—it was designed especially for younger readers who want fun flying. The more advanced builder can substitute appropriate sizes of balsa, add an engine, and a control-line system. That calls for some sharp redesigning, of course. For guys who thrive on challenge, there's **Pennyplane** and, stiffer yet, **Feather**, also in this issue.

(additional artwork for APPLE BIPE—See page 51)

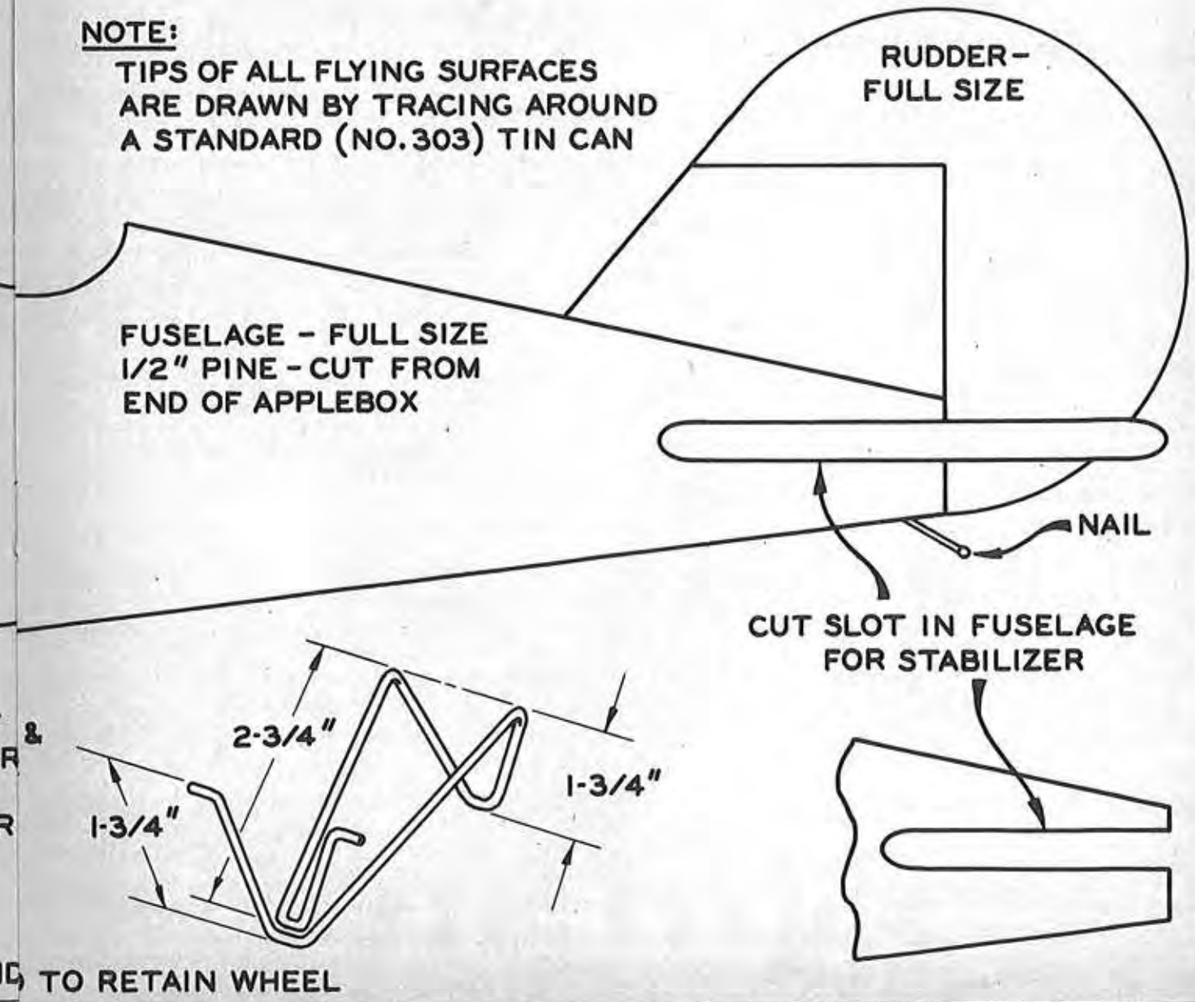
"APPLEBOX BIPE"





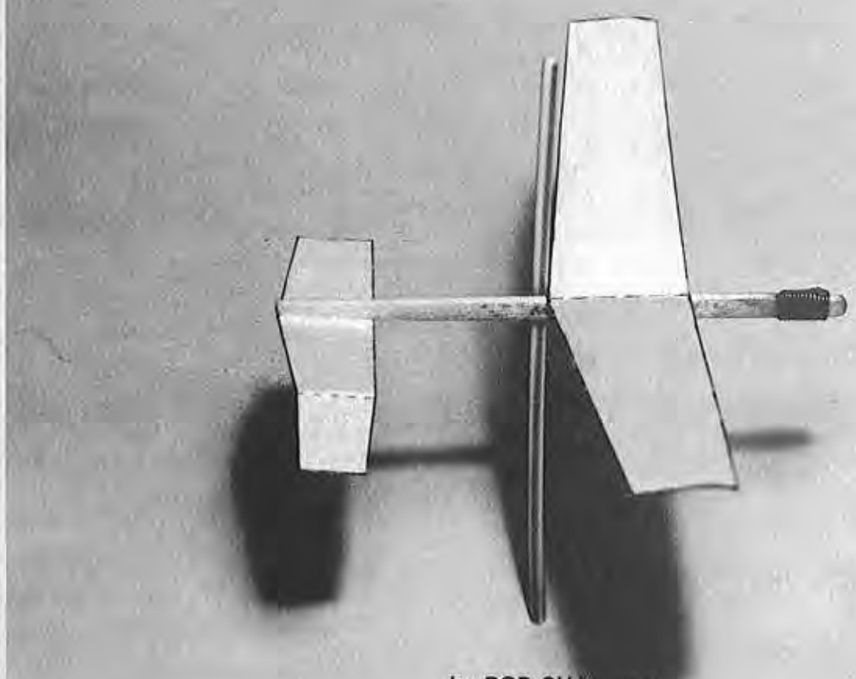


NOTE:
TIPS OF ALL FLYING SURFACES ARE DRAWN BY TRACING AROUND A STANDARD (NO. 303) TIN CAN



Paper Circus

by BOB CHARRON



This **Paper Circus** is certainly one that the famed Red Baron would not recognize. However, his arch rival "Snoopy" would recognize it, I'm sure. These gliders have provided me with many hours of fun, all on very short notice. A rainy afternoon could be used to build a whole squadron or your own flying circus, what's more, they fly pretty well, even inside the house.

BUILDING MATERIALS: Let's begin by finding a supply of the proper type of cardboard or stiff paper needed for the wing and tail. Where to look? Start by digging out that stack of old Christmas cards stowed in the hall closet. Maybe Uncle George works in an office, he could bring home some of those old file cards and folders that are usually thrown out. Check the magazines around the house (the covers of some are made of stiff paper and many contain subscription cards that are just right).

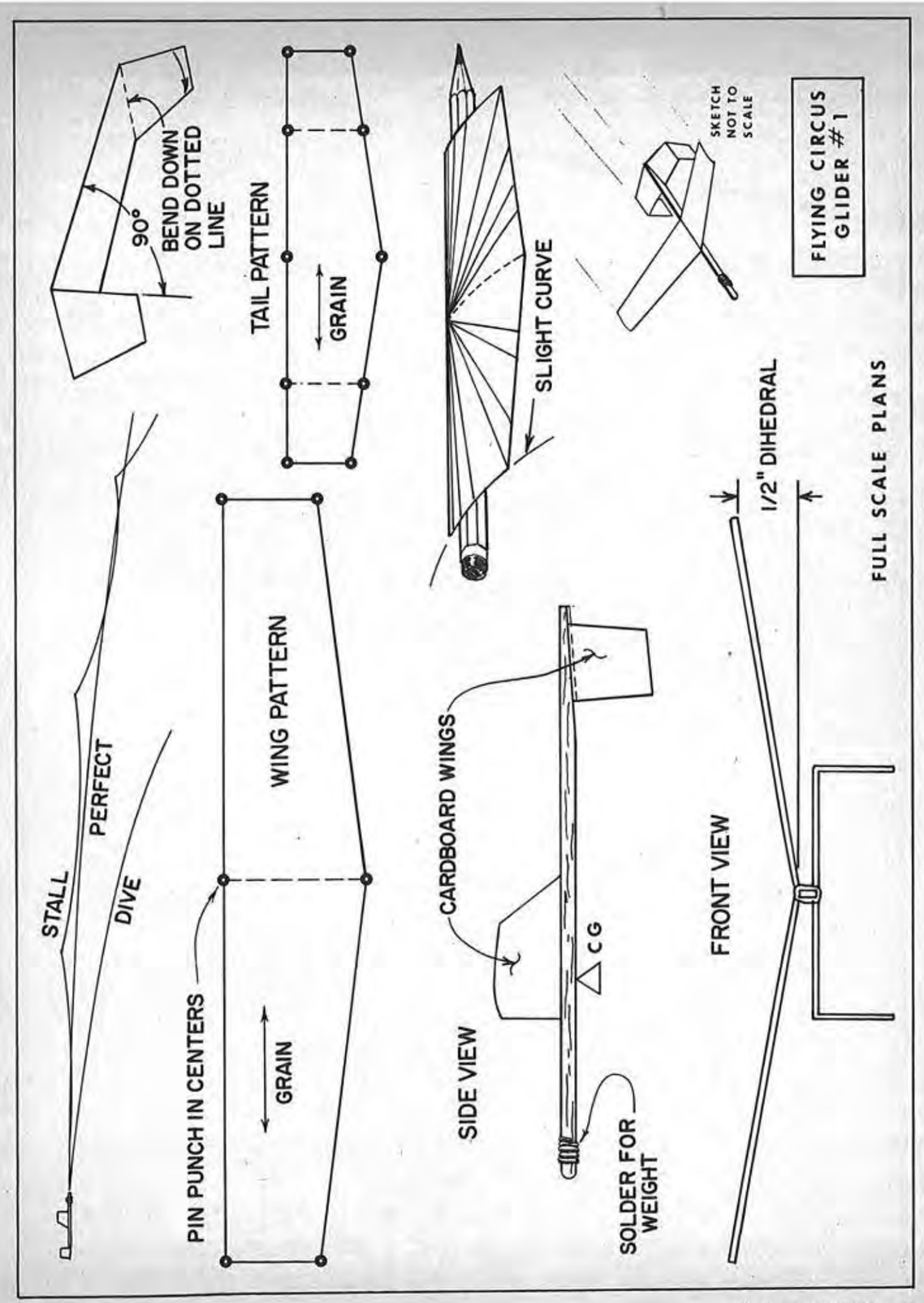
Got your cardboard? O.K., next we need some glue. The white liquid glue is perfect. This comes in many brand names. Elmer's Glue-All, Sear's Craftsman, and Titebond are some names that come quickly to mind. The regular model airplane cements will work just fine even though they do smell up the house. The cements made for plastic models are probably a poor choice. If in doubt, just give it a try.

Now we need some wood for the body or fuselage. A nice clean popsicle stick or a tongue depressor will supply enough stock for two or three gliders. Balsa wood can be easily sanded to shape, but my favorite is a strip or two of spruce from the local hobby shop. Just one thing more—we need some ballast or weight for the nose. The old standby is a glob of clay. I like to wrap a piece of solder around the nose. No clay or solder handy? Well you could use a bobby pin or maybe a wire brad could be held in place by wrapping it with thread and glue. Be careful though or your glider could become a dangerous dart. Always keep the nose well rounded. Safety first of course.

BUILDING INSTRUCTIONS—STEP NO. 1: It is important to keep the grain of the cardboard in line with the arrows on the plans. There is a simple way to check which way the grain runs in a piece of cardboard. Fold the cardboard. A smooth crease or fold means that the grain runs in the direction of the fold. A rough crease shows that the cardboard was folded *across* the grain instead of with it. Mark the cardboard with an arrow if you like.

STEP NO. 2: Place the cardboard under the pattern for the wing. With a straight pin, punch little holes through the wing pattern into the cardboard. Mark each corner and the center line. These holes can now be connected using a ruler and a pencil to draw the wing outline. Cut out the wing. Don't cut the center line. The dashed line shows where to fold the wing. The tail is made the same way. This method is a good one for transferring patterns of any future models.

(Continued on page 55)



something FISHY

by PAT MARCH

For something different, try modeling a creature instead of a machine.

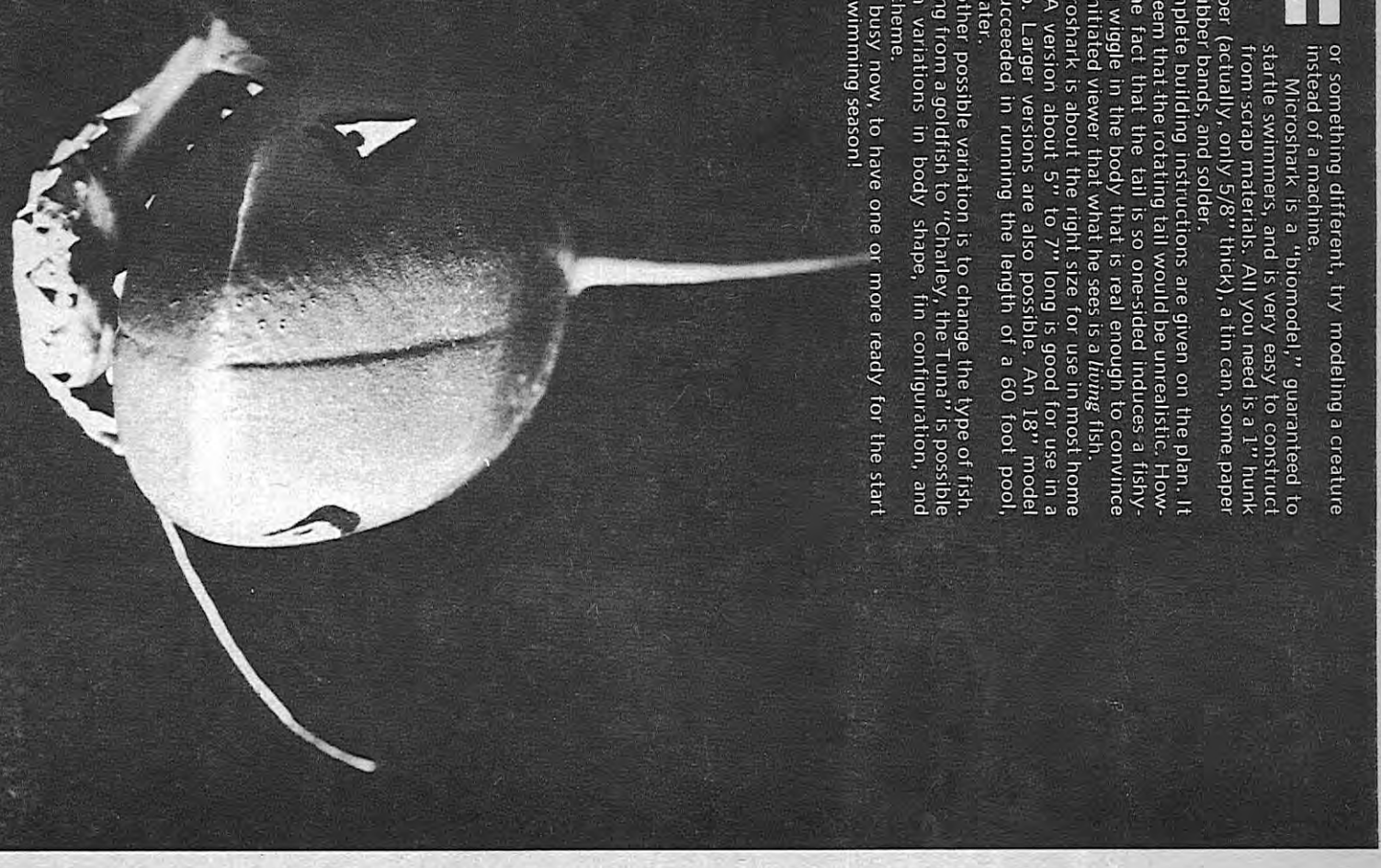
Microshark is a "biomodel," guaranteed to startle swimmers, and is very easy to construct from scrap materials. All you need is a 1" hunk of lumber (actually, only 5/8" thick), a tin can, some paper clips, rubber bands, and solder.

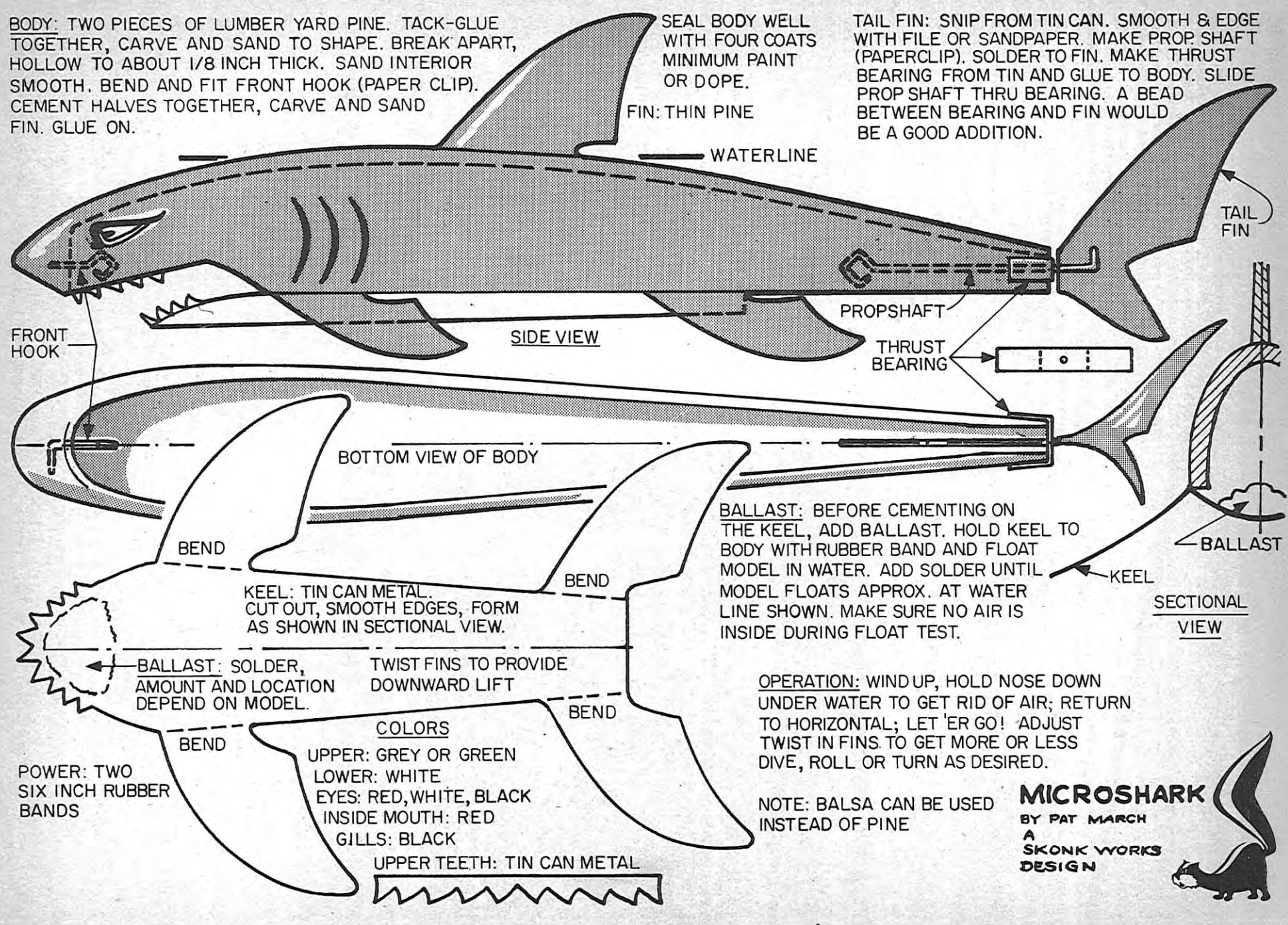
Complete building instructions are given on the plan. It might seem that the rotating tail would be unrealistic. However, the fact that the tail is so one-sided induces a fishy-looking wiggle in the body that is real enough to convince the uninitiated viewer that what he sees is a *living* fish.

Microshark is about the right size for use in most home pools. A version about 5" to 7" long is good for use in a bathtub. Larger versions are also possible. An 18" model once succeeded in running the length of a 60 foot pool, underwater.

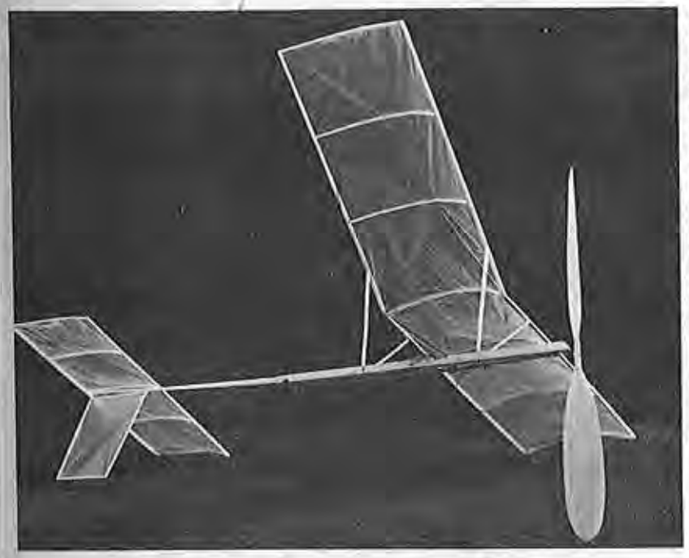
Another possible variation is to change the type of fish. Anything from a goldfish to "Charley, the Tuna" is possible through variations in body shape, fin configuration, and color scheme.

Get busy now, to have one or more ready for the start of the swimming season!





(See additional photos on page 50)



pennyplane

by TIM NOONAN

My favorite indoor model is my dad's design of the **Pennyplane**. This plane was our first design according to **Pennyplane** rules and turned out to be too light, so clay had to be added to the stick. We found that a light airplane carrying a small load of clay gave a longer and more controllable flight than a heavy model which requires no additional weight.

Ervin Rodemsky of the Chicago Aeronuts originated the **Pennyplane** event about 2 years ago. The rules require a model of 18" span and 18" length weighing the same as a copper penny without the motor. The model may not touch anything in flight. (Doing so ends the flight.)

My plane in the picture was built for the first contest held at Arlington Heights, Illinois. Besides placing in several of these contests, it won first in the 1970 event at the Nationals and third at the 1971 Nationals (when the rubber looped around the prop shaft and stopped the prop about 60 feet in the air, giving only 5:32). Its winning time of 6:32 in 1970 was its very best and longest flight.

CONSTRUCTION: Tools needed are: a new razor blade, a 12" steel rule or straight edge and a small, round nose pliers. You should have a sheet of soft but strong 1/16" balsa, a similar sheet of 1/32" balsa and a small piece of 1/8" balsa sheet, as well as a 10" piece of 1/8" x 1/4" stiff balsa and condenser paper or Jap tissue. Use regular Ambroid cement.

(Editor's Note: Indoor model supplies, including condenser paper, may be purchased from MICRO-DYNE, Box 2338, Leucadia, Ca. 92024. Condenser paper is rather difficult to apply. Superfine Japanese tissue, available at many hobby shops, is a suitable substitute. Its weight lies between that of condenser paper and regular Japanese tissue. Japanese tissue is available in colors. You will note in this article that the author found a lightly built model, with weight added to meet **Pennyplane** rules, had slightly better performance than a model built to required weight, but without adding extra weight as necessary ballast. Probably only an expert would note the difference. A satisfactory model will result when Japanese superfine tissue is used for covering.)

Begin by making a tracing from the plan of the entire wing, using any paper such as onion skin or tracing vellum. Note that the wing is 4-1/4" wide and that the right hand panel is 8-3/4" long and the left hand 9-1/4" long (making 18" total).

Now make a rib template by cementing a tracing of the template from the plan to a piece of thin aluminum or tin can metal. Make wing and stabilizer rib templates at the same time. When dry,cut out with a tin snips or an old pair of scissors. Use a file or sandpaper block to smooth the edges of the metal.

To cut wing ribs, prepare a piece of 1/16" sheet balsa exactly 4" long, the grain running along the 4" side. Lay the template on the balsa, and cut carefully along the curve; now move the template down 1/16" and make another cut along the curve. The result will be one wing rib as shown on the plan. Make up the necessary wing and stabilizer ribs and put them aside.

Now prepare a piece of 1/16" sheet about 10" long. Lay straight edge so that 1/8" of balsa projects on one side and 1/16" on the other. Make a clean, smooth cut and you have a spar. Set the scale to start with 1/16" wide and end with 1/8"—you have another spar. You will need four, so make six and select the best four; they should be 1/16" x 1/8" at one end and taper to 1/16" square on the other.

Now cut about four strips 1/16" x 1/16" from the same sheet for the tail section frames. To assemble wing, lay spars on the wing tracing so that the thick sections are in the center; lightly cement to join; cement all ribs but the center rib in place. When dry cut away spar projections from the tips and raise one wing panel to give the dehedral shown. Cement the spar joint securely at the center, applying several coats. When dry, cement the center rib in place. You may now add 1/16" square braces in corners. Cut wing clips from thin aluminum (from a beer can) about 1/16" wide. Bend to shape shown and cement to 1/16" x 1/8" strips cut from 1/16" sheet. Front and rear clips are shown exact size, the front being longest. Cover the wing using two pieces of tissue. Work from the center rib and cover half at a time. (Clear dope or Elmers glue thinned with water may be used as a tissue cement.) Trim tissue, cover the other half and trim. When dry, the wing clips may be attached, cementing several times.

Build stabilizer in the same manner. Note when building the rudder that it is flat and made entirely of 1/16" square.

To make the motor stick, sand 1/8" x 1/4" lightly and cut to size shown. Thrust bearing may be purchased or made from a small strip of hard aluminum or steel—but it *must* be light. Drill .020" dia. hole. Thrust bearings may also be bent from .020" piano wire. Another possibility—a small fishhook may be heated to remove some of its temper, bent to shape, and its eye will be an already-formed bearing. The rear hook is bent from .015" or .020" piano wire. Use many thin coats of cement to hold fittings on securely. Make the tail boom from 1/8" sheet. Slice it from the sheet with a straightedge and sand all corners round. It should be very light and stiff.

Lay tail boom on edge and cement stabilizer to it, using drawing and picture as guides. When dry, turn this assembly upside down and cement the rudder in place; note that the leading edge of rudder is attached to the boom but the trailing edge is attached to the trailing edge of the stabilizer. The offset is for a left-hand circle.

Carefully fit the tail boom assembly to the motor stick. Coat both surfaces with Ambroid and let dry—but do not join. Later coat them with Ambroid again and join. Note that the boom should be straight from the top, but tilted upward from the side. Add a film of cement around this joint. At this point attach the wing to the motor stick. A slight squeezing of the wing clips may be needed for a snug fit. Looking at the model from the front, bend the wing clips slightly to make the tail tilt as shown. Do not cement the clips to the motor stick. Your wing and tail surfaces should be free of any warping. Do not water spray or dope the tissue. In fact the tissue should be a bit floppy because it is affected by moisture and temperature.

The most critical part—the prop—requires the most care. Follow these steps closely. From a light but strong piece of 1/32" sheet, cut two blades as shown. (Note the slot for the hub pieces.) Cut these exactly 1/8" wide but make only a razor mark across the top—do not remove this balsa now. Lay each blade on a flat surface and using a fine sandpaper block, sand from the hub out (very gently) and on both sides. This will taper the blades from 1/32" at the hub to about 1/64" at the tips. Very lightly block-sand both blades for a smooth outline shape. They should be as exactly alike as you can make them. Cut two pieces of 1/8" square balsa and sand them round for the hub pieces. Find a round bottle about 4" in diameter and clean its outer surface of labels and glue. Soak the prop blades in water. Lay them on the surface of the bottle so the top of the blade is about 10 to 15 degrees off center. Slip several large wide rubber bands over the blades, forcing them to take the shape of the bottle. This gives a helix and camber to the blade. Set this near some warm place (like a heating duct) and let dry several days. The longer it dries, the better the balsa will hold its shape.

Now construct the prop hub—this is a tube made by rolling thin writing paper several turns with glue applied, or by rolling thin wet sheet balsa. It must be rolled around a 1/8" rod or dowel and must be 1/2" long. Bend a prop shaft exactly the size shown of .015" piano wire and insert it into the hub. Cement a teflon or brass washer, the smallest you can find, as shown. Bend shaft end as shown but do not push it into the hub.

When the blades are dry, carefully remove the rubber bands and let the blades lay on your table a bit. They should hold their shape exactly. Now remove the balsa to expose the slot and cement the 1/8" round balsa hubs in place, so that the balsa blade centers on the round sections. When dry, cut away excess balsa except where the round section will enter the tubular hub; this cut should taper gradually. Make a cardboard angle template. Insert one blade at a time into hub, using the template to assure equal angle on both blades in relation to the prop shaft. Your prop must be right hand—when pulling, it must turn clockwise in front of you. When you are satisfied that the prop is aligned, rotate it on the shaft to correct for any wobble. Now a touch of cement will lock the blades in place on the

(Continued on page 55)

Tim with the model in the story—and some of the trophies he won with it. He won a first and third place at the Nationals! Best time was 6½ minutes plus.

SPARS— 1/16"X1/8" TAPER TO 1/16"SQ. AT TIPS

OPTIONAL BRACES

3/8" LEFT OFFSET

RUDDER POSITION

1/16" SQ. SPARS

LEADING EDGE

STABILIZER

THIS IS RIGHT HAND WING PANEL, 8-3/4" LONG

RIGHT HAND WING PANEL

2-1/4 DIHEDRAL

NOTE TILT OF STAB.

ASSEMBLY

JOIN AT LINE

CLAY

RUDDER

STAB

RAISE TAIL 1/2"

LEADING EDGE

1/8 DIA.

FORMED PROP. BLADE

HUB WASHER

PAPER

SHAFT

JIG

1/16 SQ. RIB

SPAR

STAB RIB TEMPLATE

1/16"SQ. WING RIB

SPAR

WING RIB TEMPLATE

READ AND FOLLOW INSTRUCTIONS

JOIN TO WING PLAN AT LINE

FRONT OF BLADES

RUBBER BANDS

4"DIA. BOTTLE

RUDDER

END VIEW OF PROP. BLADE

PROP. JIG

BENT WIRE BEARING

JOIN WING CLIPS TO SPARS AS SHOWN

1/8"X1/4"X10" MOTOR STICK

1/16"X1/8"

TAIL BOOM

REAR HOOK

PROP. SHAFT

PROP. BLADE

FRONT WING CLIP

REAR WING CLIP

FRONT

1/64"X1/8" ALUMINUM

1/8" SQ. SANDED ROUND

TIM NOONAN'S

PENNYPLANE

Building model airplanes of the balsa wood variety requires relatively few tools; but the choice of tools can be important. We will divide our discussion into two parts: the first will deal briefly with those tools considered ESSENTIAL, while the second will be concerned with supplementary items, which, although not absolutely necessary, can assist in the construction of your models.

If I had to get by with only ONE tool, without a doubt it would be a single-edge razor blade. Single-edge razor blades are NOT all the same, incidentally. Some are too thin to be practical for cutting wood. Some of the "hollow ground" types fall into this group. They work well for trimming tissue, but their edges will nick and/or fold over if they are used for wood cutting. Probably you will have to try several brands before you find one that will best suit your needs. The price has very little bearing on the suitability of the blades. Locally, we are able to obtain "Industrial" razor blades at low cost through paint and discount stores.

Use only brand-new blades when cutting balsa. If they are used with a slicing motion, longer blade life and cleaner cuts will result.

The next most important tool, to my way of thinking, is the modeling knife. The advantage of this sort of knife is primarily in the choice of blade shapes which are available. For example, thin-pointed blades are useful when cutting curved parts from sheet balsa. By comparison, it is difficult to cut tight curves successfully with a razor blade. Also, a certain amount of whittling or carving is required in model building, and a modeling knife is well suited to the task. Several brands are on the market and it is well to examine them all. Look for one which holds the blade securely, yet permits easy removal when a replacement is needed.

While we are on the subject of cutting tools, we must remind you that anything capable of cutting wood is equally capable of cutting skin. When using ANY tools, exercise extreme caution at all times. Common sense safety precautions are a "must" if you are to enjoy your hobby without being hurt.

Since most models contain at least a few wire parts, a pair of needle-nose pliers and some sort of wire cutters (such as diagonals) are important additions to your tool supply. A little extra money spent on quality will be well rewarded here, as in the case of most tools.

Scissors are useful for cutting out patterns, tissue paper, etc. Any common household type is suitable, providing the scissors are sharp and in good condition. If you are buying a new pair especially for modeling purposes, the barber type is suggested.

Razor saws are useful for making clean cuts in the larger sizes of balsa, and also in harder woods. Coping saws are helpful in making curved cuts.

A few small drills are desirable, and a pin vise or hand drill can be employed to turn them. Inexpensive carbon drills will serve in most cases.

For marking on wood, we have found fine-tip marking pens ideal. Very soft lead pencils or ballpoint pens will also do the job.

A ruler with a metal edge, or a machinist's scale greatly eases the task of making straight cuts, in addition to serving its intended purpose of measuring.

Brushes come in all sizes and price ranges. The cheapest ones are annoying since they usually shed their hairs at the most inopportune times. The quality of the brushes can affect the quality of the finish on your model too. So be prepared to invest in good brushes, which if properly cleaned, will last for years.

Sandpaper is a vital aid to modeling. Often the chief difference between an exceptional model and a "so-so" one can be traced directly to the proper application of sandpaper. It is an inexpensive product and is available in a great many forms. Its usefulness can be extended by fastening it to various blocks of wood to form sanding blocks. My personal choice in grades are No. 120, 220, 400, and 600, but try the various varieties yourself to discover the type best suited to your needs. Fingernail emery boards are another inexpensive form of sanding tool, which can be obtained in any department or drug store.

Common straight pins are particularly handy in model building, and are available in different sizes and types. They have a way of disappearing with use, so buy a few extra!

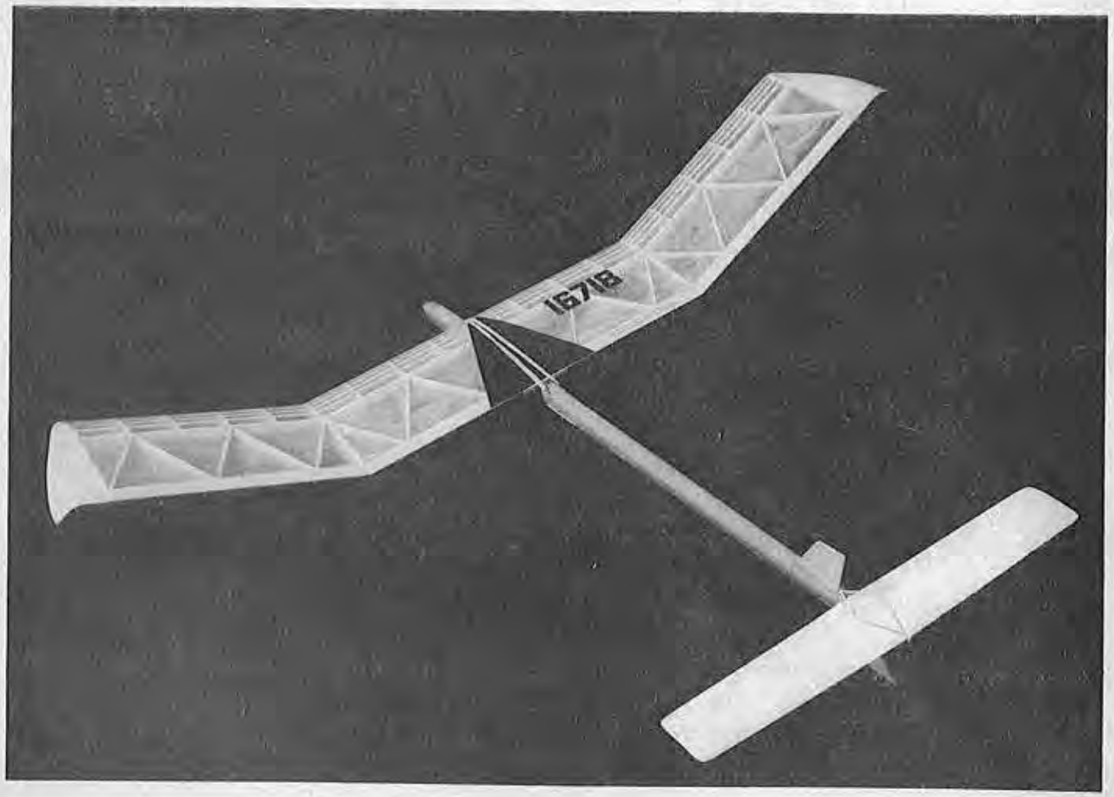
Probably 98% of most models COULD be constructed using only the basic tools mentioned above. There are, however, many other items which will make model construction easier and faster. Among the simpler ones are:

Files	Bench Vise
Razor Planes	Round-nose Pliers
Tweezers	Soldering Iron

Power tools are outside the scope of this discussion. Some "hobbiests" have facilities that closely resemble industrial machine shops. Yet, the fact remains that anyone willing to master the simple tools we have described, can produce satisfying models with a minimal investment.

by BILL HANNAN

feather



THIS TOW-LINE GLIDER HAS CONTEST-TYPE PERFORMANCE, IF YOU ARE GAME FOR A TOUGH PROJECT.

by BUD TENNY

Each modeler has favorite memories, and one of mine is of my first successful towline glider. The silent, drifting flight of a glider expresses the beauty of flight better than any other model.

Feather is a special towline glider with rugged, simple structure, and performance good enough for contest work. Even if you fly **Feather** just for fun, remember that she likes to fly. Put your name and address on the model *before* you fly it even once, and *always* use a fuse in the DT (dethermalizer) to be sure you get the model back. **Feather** has the special snuffer tube required for safety—the aluminum tube holds the excess fuse and automatically extinguishes to prevent grass fires where you fly.

Feather is constructed from full size plans, available as noted. Order the plans and order or buy the materials listed in the Bill of Materials. All parts are listed as available from Sig Manufacturing Co., since these items are available via mail order for those who have no local hobby shop. For those who have a good shop available, feel free to use other brands. However, it is not advisable to use a substitute for Sig Lite-Coat Dope—this is a low-shrink dope needed to prevent warps on the thin tail surfaces.

Read the text and study the plans thoroughly before beginning construction. The text gives building instructions, but it is left to the builder to realize that glue must dry before going to the next step. Use glue drying time to work on some other part, then return to the first part. All cutting operations can be done with a single edge razor blade, or any other *sharp* knife with a thin blade. Assemble the model with Sigbond Aliphatic Resin, applied with a small brush for good control. Epoxy is used for the external wire fittings. Always protect the work surface with thin plastic, such as cleaners use to protect clothes, since a model part which sticks to the work surface will be ruined in the process of removing it. It is important to pay close attention to the use of sandpaper on **Feather**. Much of the model's fine appearance will be due to proper use of sandpaper, and a sanding block is essential. (See "Handy Hints—Sandpaper" in March-April JAM.) Make a sanding block by fastening 1½" wide strips of both coarse and medium sandpaper to a flat paddle with contact cement. Fig. 1 shows how such a tool is used for slanting the butt end of a wing before joining the wing halves for dihedral.

The fuselage is built on one of the side pieces, as it appears on the plans. Cut all the pieces of the fuselage from the correct materials specified by the plans. Cut the "V" splice between the spruce and balsa bottom pieces, drill holes for the tow hook mount, and use epoxy glue to fasten the 4-40 nuts on the spruce strip. Glue all the fuselage pieces to one fuselage side except the balsa bottom piece; add this piece after the other glue has dried. Glue the second fuselage side in place and put the fuselage aside for at least 24 hours.

Cut out the tail group pieces after smoothing the sheet with fine sandpaper. Cut lightly along the high point of the stabilizer (shown on the plans). Bend the stab gently until it cracks along this line and assumes the bent airfoil shape shown. Cut and taper the spar, then glue it to the bottom of the stabilizer. Immediately pin the stab to the work surface, so it holds the bent shape. Note on the plan detail that a scrap of the fuselage side material has been tapered with the sanding block. Glue these tapered blocks next to the stab in the same detail. Sand the stab thoroughly with fine sandpaper.

Form all the hardware parts for the autorudder and DT (dethermalizer) systems. Form the tow hook from 1/32" steel wire which has been polished with steel wool, then

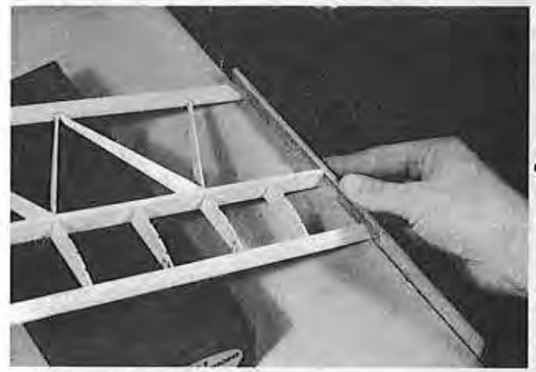


Figure 1

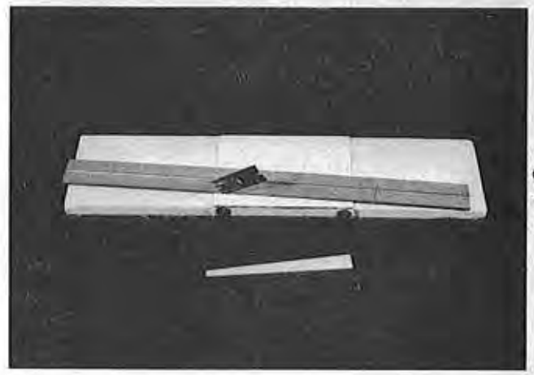


Figure 2

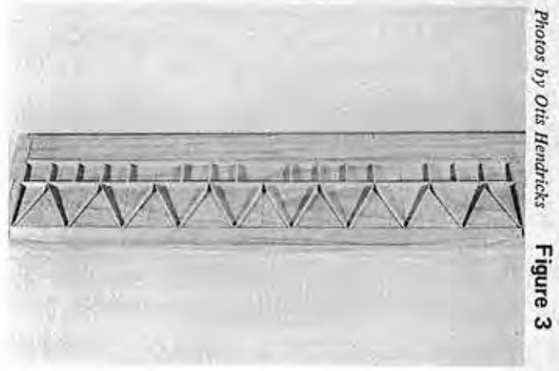


Figure 3

Photos by Otis Hendricks

Top: Careful use of sanding block makes spars fit neatly into dihedral joints. Wing tip is blocked up to correct angle. Center: Simple jig using metal straight edge makes quick work of rear wing ribs. Bottom: All wing ribs are glued in place during construction—refer to both text and plans for procedure. Shown is one wing panel.

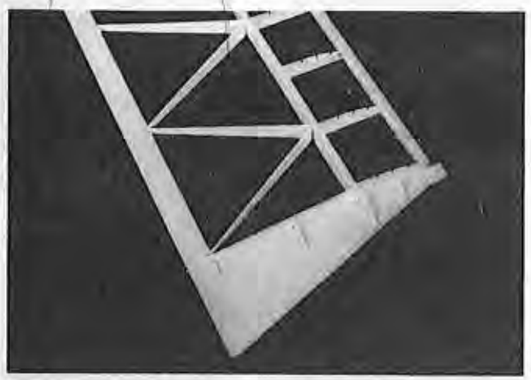


Figure 4

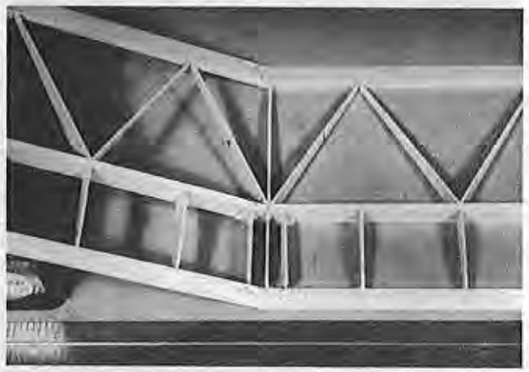


Figure 5

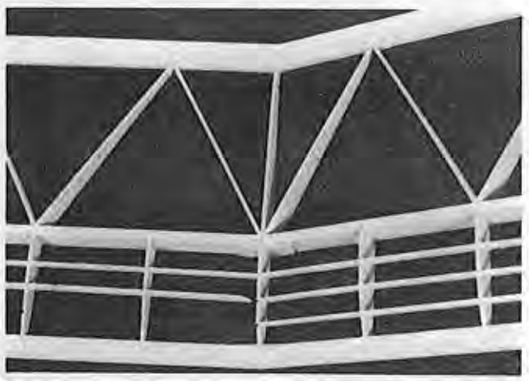


Figure 6

Top: Close-up of wing tip fairing pieces before sanding to shape. The diagonal rear ribs impart warp resistance for a true wing. Center: Closeup of dihedral joint. Balsa scraps wedge plywood dihedral braces against spar and leading edge. Bottom: Spars are spliced at dihedral joints. Note angle cut on center light spar at left which makes joint fit in rib slot.

solder it where shown. Be sure the wire gets hot enough to melt the solder and make it flow smoothly.

Make a full size template for the front wing ribs by transferring the outline to thin metal (aluminum or tin can stock). Cut close to the lines, then file it to exact size. Make the notches carefully to get the proper size and location. Cut several pieces of 1/16" sheet, 1¾" long, then cut top and bottom rib outlines only until all ribs are the same length. Cut the notches after the outlines are cut, working carefully for accuracy.

In similar fashion, cut pieces of 1/16" sheet exactly 4" long for the rear wing ribs. Mark the spar and trailing edge height on the edge of one sheet and arrange a jig like the one shown in Fig. 2, with a stop block along one edge. Push the rib sheet against the stop, place a straightedge over the marks, and set the pins to hold the straightedge steady. Cut along the straightedge to make the first rib, turn the sheet end-for-end and cut a second rib. Turn the sheet and cut again; continue until all ribs are made. This easily produces a set of identical ribs.

Use a marker pen and straightedge to make a line on the trailing edge stock, 3/8" back from the thick edge. Make numerous light cuts along this line until the strip separates into two pieces. The narrow piece is the wing leading edge, and the other is the trailing edge. Notch the trailing edge piece as shown on the plans.

Fig. 3 shows the wing under construction. The original wing plan was drawn on a board, but still protected with plastic. Pin the wing spar on the plans, then place the trailing edge and rear ribs in approximately the proper location. Begin at the left end, aligning the ribs and trailing edge and work across the wing. Pin the trailing edge in place and glue all the ribs in place except those marked "A." In similar fashion, assemble the front of the wing and glue all ribs except those marked "B." Cut two tip ribs and glue them in place. Add the tip pieces and reinforcement pieces as shown in Fig. 4.

Use the sanding block to shape the little blocks on the wing tips, and to smooth and level all the ribs, top, and bottom of the wing. Shape the leading edge as shown on the plan, then smooth the entire wing with fine sandpaper. Cut through the wing at the dihedral locations to make three pieces.

Block up the wing tip pieces to the proper dihedral angle as shown in Fig. 5, then sandpaper the ends of the spars so they fit flat against the center section spars with the tips elevated. Work slowly to avoid breaking the wing, but get these angles correct for best wing strength. Wet the outer portion of the wing tips and gently curl the tip downward. Keep working the tip into a curve until it is dry, and the curve will be permanent. Cut two of each size dihedral gusset from plywood.

Fig. 5 shows how the dihedral joints are made. Block up each tip and glue the joints at the spar, leading edge, and trailing edge. Cut a spare rear rib to fit between the spar and trailing edge ("C") and cut a new taper to match the slope of the other ribs. Trim the wide ends of the "A" ribs to fit into place and glue them. Glue the dihedral braces against the front of the spar and behind the leading edge; wedge them in place with balsa scraps. Trim both ends of the "B" ribs to fit snugly between the gussets and glue them in place.

Fig. 6 shows the top spar installation. Cut pieces of spar to proper length with bevels cut to fit in the notches of the dihedral ribs. Cut and fit the entire length of spar and check to see that it fits flush with the top of the ribs all along the spar, then glue it in place. Repeat this on each of the three spars.

Cut the wing and stab platforms from hard 1/16" sheet, noting that the grain runs *across* the fuselage and that the wing platform is spliced. Add the spruce strip across rear of the wing platform. Cut and assemble the pieces for the wing pylon and glue this to the wing platform. Carefully round and shape the entire fuselage with the sanding block, then finish with fine sandpaper. Sandpaper the wing and stab platforms smooth and glue them in place, taking care with proper location and alignment. Glue the top and bottom rudders in place, being careful to set them vertical to the fuselage and straight for zero turn. After the rudders are completely dry, fine-sand them thoroughly and touch up the entire fuselage, especially where glue has roughened the wood grain.

Brush clear dope over the entire model structure, using Litecote dope for the tail surfaces (don't forget the movable rudder) and Supercoat for the rest of the structure. Sand the structure smooth and dope it again. Sand lightly after the second coat with very fine sandpaper. Apply sanding sealer over the whole fuselage except for the rudders, and color dope the fuselage to just ahead of the wing pylon. Mount all the hardware parts on the fuselage with epoxy and screw on the tow hook.

The wing and tail surfaces are covered with Jap tissue, which gives a lighter color finish with clear dope. If the tissue is wrinkled before covering, iron it smooth with a warm, dry iron. Run the "grain" of the tissue lengthwise on all surfaces. To find the tissue grain, tear a corner of the sheet in two directions. It will tear easily with the grain, and will have a ragged edge when torn across the grain.

Cut pieces of tissue 1/4" bigger all around than the surface to be covered. Use very thin dope or thinner to attach the tissue to the tail surfaces. Wrap tissue around the edge of any surface, and trim it with fine sandpaper. The sandpaper makes the tissue tear loose easily and leave a fine ragged edge which fairs in smoothly with overlap from the other side to make an invisible joint. (A properly covered surface has uniform color and appears to be covered with a single piece of tissue.) Dope the tail surfaces with two or three coats of Lite-Cote, sanding lightly between coats. Be careful not to cut through the tissue! Add the hardware and stop blocks to the stab and rudders, and mount the movable rudder. The hinge for the rudder is heavy sewing or carpet thread, and should be pulled snug but not tight enough to cut into the wood.

Cover the wing in the same fashion, except that the center section is covered first. Use thin dope to stick tissue to the dihedral ribs. Stick the tissue only to the dihedral ribs and the leading and trailing edges, except stick it to the entire bottom of the curved tips. Use six pieces to cover the wing except for the top of the tips—one each, top and bottom of the center section, one each for the bottom of the outboard panels including the bottom of the tip, and one each for the top outboard panels to the tip ribs. Use several small pieces for the top of the tips, working slowly and carefully to avoid wrinkles. After the entire wing is dry, spray the tissue with water and stand the wing on the trailing edge to dry. Don't handle the wet wing—wet tissue is very weak and easy to tear!

After the tissue is dry, dope the wing with clear Supercoat in the following pattern: top then bottom of one tip section, top and bottom of the second tip, then let dry. Follow with top and bottom of the center section and set the wing on the trailing edge (on plastic) to dry between coats. This doping pattern prevents warps by having both sides of a panel wet at one time so dry dope won't pull things out of shape. (It also leaves a dry place for a

Figure 7

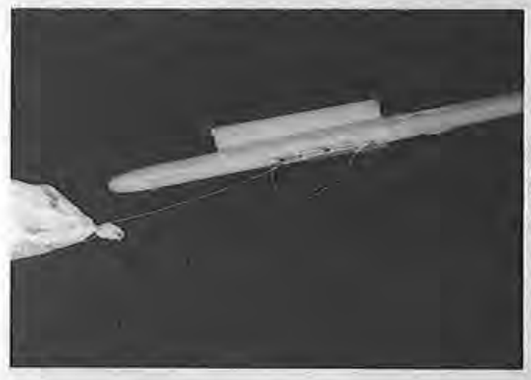


Figure 8

Figure 9

Top: Tail-end hardware: Note hooks for auto-rudder rubberband, auto-rudder stop block, thread hinges, dethermalizer line guide, DT stop line (left), stabilizer hold-down line (right), and pop-up angle. Center: Front-end hardware: Note flag and tow-ring attachment to tow line, stab hold-down line with rubberband crossing snuffer tube and stab hold-down line, line guide, and release pin. Also: Top view of stab hold-down hook, pop-up rubber band, and auto-rudder line. Bottom: When covered with Jap tissue, a lighter color finish results with clear dope.

"handle"!) After the first coat of dope is dry on the wing, type your name and address on another piece of tissue and dope it to the wing. After the wing is complete, your name is a permanent part of the model so if it flies away, the finder can return the model. After the last coat of dope has dried for 48 hours, check the wing for warps. Sight along the bottom of each panel—any twist must be removed by holding the warped area in steam from a teakettle and twisting it straight (away from the steam) until the wing is dry and cool. It is important that the wing be flat, so don't shirk on this step!

Cut a small opening into the ballast compartment. Rubber-band the wing and stab to the fuselage, then pour enough lead shot into the ballast compartment to make the entire model balance at the point shown on the plans. Pour glue into the ballast compartment and shake the model until all the shot is covered with glue. Hang the model nose down until the glue is dry and check the balance again. Add more shot and glue if necessary to get the model balance at least as far forward as shown—it must not balance *behind* this point! Repair the opening into the ballast compartment, smooth over with sanding and finish color doping the fuselage.

Make the DT and autorudder lines from 8-pound test monofilament (fishing line). The loop on the free end of each line is made with bowline knot (check the Boy Scout Handbook) and the other end is anchored with a square knot. Put a drop of household cement or fingernail polish on each knot for safety. Set the length of the rudder line so a minimum of pressure is used with a standard DT band. This reduces the strain on the rudder and prevents the autorudder pin from binding on release. The DT line must hold the stab firmly in place at the rear of the platform with a single DT band as shown. Review Figs. 5, 7, 8 and 9 for details of the hardware.

Make a towline from 160 feet of 8-pound test monofilament. Cut the autorudder pin from a heavy straight pin and secure it to the end of the line with a square knot. Make the tow ring and secure it with a bowline knot, 8" from the end of the line. Make a flag from thin silk and mount it on the line with two slipknots. The light line and silk flag combination is important to **Feather**—it is a light model. **Feather** will carry heavier line, but not as high and you have to run like crazy to get it up!

Test glide **Feather** over soft grass. Always check the alignment of the wing and be sure the model is properly assembled before flying—small changes in alignment make big changes in adjustments! It is important to get a smooth glide with about a 30-foot radius circle. Adjust the turn by cutting away rudder stop or packing thin strips of masking tape under the stop on the rudder. Trim the glide with nose weight or by putting layers of masking tape under the stab on the rear of the stab platform. If it noses up, then dives (this is called a stall), add nose weight to get a smooth glide. The hand launch into glide is important—slightly nose down into no more than a slight breeze. Don't push the model hard or it may zoom and possibly stall!

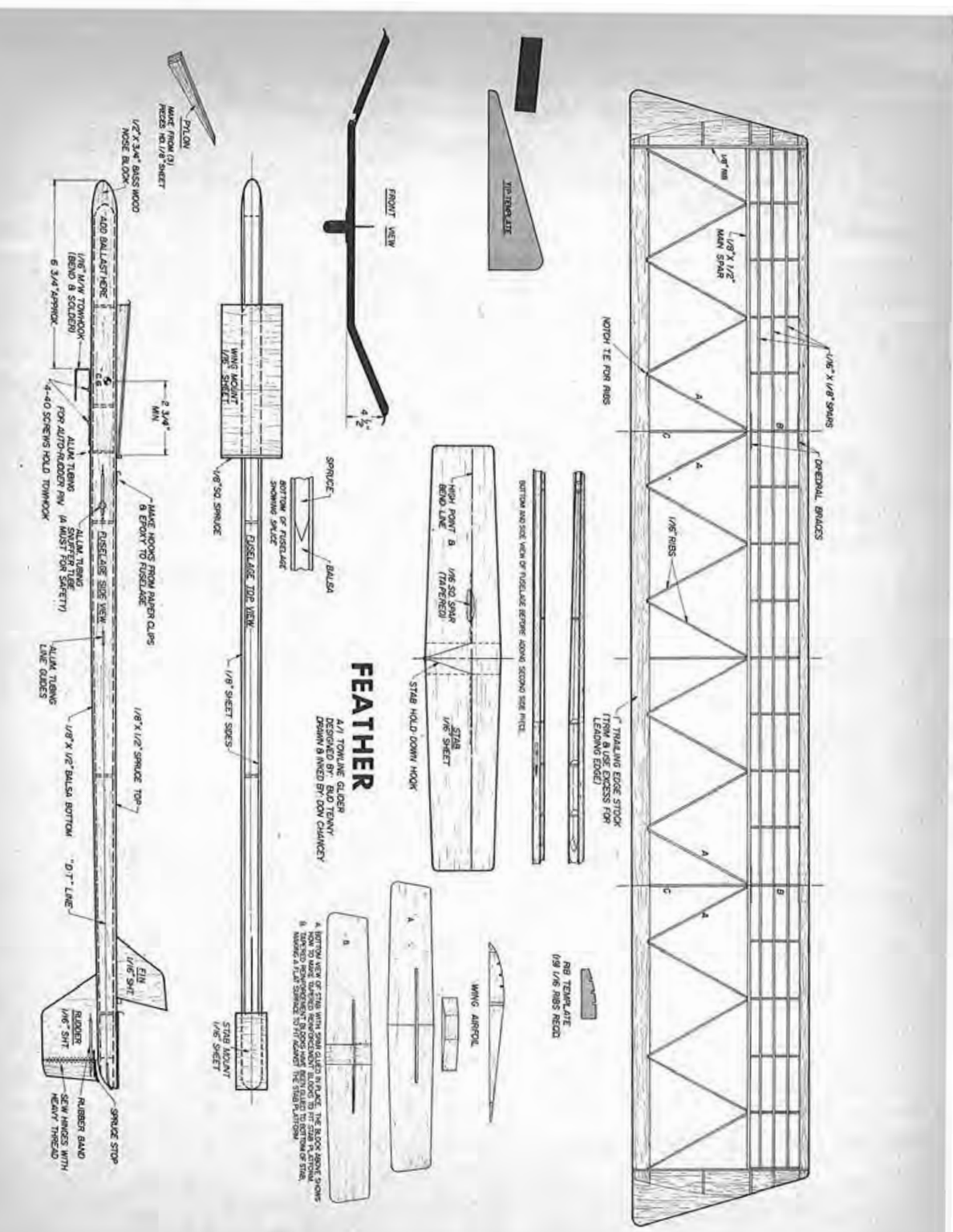
It takes a helper to fly **Feather** on a towline. Pick a day with light breeze, and *always* use a lit DT fuse! Hook up the towline as shown in Fig. 8 and have your helper hold the model slightly nose up into the breeze while you extend about 100 feet of line. Both you and your helper need to move slowly upwind while the helper lets the model fly smoothly out of his hand. At this point, the glider should nose up and climb. Govern the rate of climb with line tension—more tension means a faster climb. Try for a moderate climb which gets almost overhead. Slack the line for release.

Troubleshooting the towing: Glider dives to one side or refuses to tow up in straight line—tow hook too far back, autorudder not hooked up, model out of alignment. Model weaves on tow—hook too far forward. Model won't climb on tow—hook very much too far forward or stab not flat on platform; not properly glide tested. Model always veers slightly to one side during tow—adjust the "straight" autorudder position by small amounts or check for wing warp and/or misalignment.

After the launch is mastered, **Feather** can be trimmed more carefully. Fine changes in nose weight and circle diameter will make the glide "just right," but the only way to measure really fine trim is on the stopwatch. Fly for perfection or fly for fun, but good luck!

Medium	Grade	Number	Use
1/16 x 3 x 36" balsa	soft	2	Wing ribs, tail surfaces
1/16 x 3 x 36" balsa	hard	1	Wing, Stab platforms
1/16 x 1/8 x 36" balsa	medium	4	Top spars
1/8 x 1/2 x 36" balsa	medium	2	Fuselage top, bottom
1/8 x 1/2 x 36" balsa	hard	1	Tip ribs, wing pylon
1/8 x 1 x 36" balsa	soft	2	Fuselage sides, misc.
1/4 x 1 x 36" tapered balsa	medium	1	Leading edge, trailing edge
1/8 x 1/8 x 36" spruce		1	Wing platform
1/8 x 1/2 x 36" spruce		1	Fuselage bottom
1/32 x 6 x 12" birch plywood		1	Dihedral gussets
1/2 x 3/4 x 6" Basswood		1	Nose block

Jap Tissue — Need four sheets for wing, tail covering, choose color to suit. Also choose one sheet of contrasting color for trim if desired.
Sig Supercoat Dope — Need 4 oz. color, 8 oz. clear dope, 16 oz. thinner. Choose color to complement tissue color.
Sig Lite-Coat — 4 oz. for tail surfaces (clear only).
SigBond Aliphatic Resin — 2 oz. for model assembly.
Sig Epoxy — 1½ oz. pack.
Sanding Sealer — 4 oz.
1 piece 1/32" diameter music wire (tow hook).
1 piece 1/16" diameter aluminum tubing (DT and autorudder line guides).
1 piece 9/32" diameter aluminum tubing (DT Snuffer tube).
Package No. 6 rubber bands (DT bands and autorudder tension).
1 package 4-40 nuts and bolts (mount tow hook).
1 package Sig DT fuse.



FULL SIZE PLANS AVAILABLE—SEE PAGE 54

bring 'em back alive

by STEPHEN S. FENTRESS

Estes Industries, Inc. Photograph

After a model rocket has been boosted several hundred feet by its engine and has coasted to a stop in mid-air, gravity always takes over, pulling the rocket back toward the ground. There are no recorded cases of gravity failing to do this sooner or later. Since a plummeting rocket will certainly damage itself and might damage something else when it hits the ground, some kind of recovery device is always used to break the fall.

Most model rockets descend on parachutes which are ejected from the front of the body tube by the ejection charge in the engine, but parachutes are only one of several general kinds of gadgets designed to bring rockets back alive. Some models use long streamers to provide a gentle landing, while others are equipped with simple detachable nose cones, helicopter blades, spin tabs, dragbrakes, or wings for gliding.

The best place to start in a discussion of recovery systems is with one of the simplest and oldest: the "nose-blow" (Fig. 1). Rockets with nose-blow recovery simply use the pressurized gas from the ejection charge to pop the loose-fitting balsa nose cone off the front of the model. With a gaping hole instead of a smoothly curved nosepiece at the front end, the rocket's stability and streamlining is destroyed, and it tumbles back to the ground at a relatively slow speed. However, a nose-blow rocket often lands hard enough to break off a fin or beat up the paint job; therefore, this recovery method is used only on lightweight, sturdy models. (It should be pointed out that even a hard nose-blow landing is hazardous only to the model itself, not to people or property on the ground. This applies to almost all model rockets.)

Rockets using the nose-blow system, as well as most other types, have some kind of "shock cord" which connects the nose cone and body section so that they land together. Since there is quite a jolt when the ejected nose cone snaps up to the end of the line, shock cords are usually made of some kind of strong, elastic material. Strips of rubber 1/8" to 1/4" wide are often used, but these deteriorate and weaken after a few flights, due to age and exposure to hot ejection gases. A better material is the cloth elastic-band stuff that is used in stretch waistbands, mitten cuffs, etc. It is available at a very low price at sewing shops, department stores, and many big supermarkets, in widths ranging from about 1/8" up. A piece about 3/16" wide makes a good shock cord for most models. It is important to use shock cords of ample length—about 1 to 1½ times the length of the rocket is a good rule of thumb for most cases—because a cord which is too short will snap the nose cone and body back against each other after ejection, resulting in dings and scratches on one or both pieces. Actually, you can't make a shock cord too long, provided you can get it to eject from the rocket properly. In a wild mood one day, I flew a rocket with a 12-foot shock cord made of 1/4" elastic, and no other recovery device—a kind of "super nose-blow." I used a rocket with a long, 1" diameter body tube to make sure the folded-up cord would slide out easily when the time came, and I powered it with a B engine. To the sound of sarcastic cheers from my "trusty" companions, the long cord spread across the sky and the whole thing settled gracefully to the ground. One of my friends referred to the idea as "garter" recovery. What a frivolous name for such an engineering triumph!

Make sure that your shock cords are attached firmly to both ends. Usually, one end is tied to a screw eye set in the base of the nose cone, while the other is held to the inside of the body tube with gauze, cloth, or paper as shown in Fig. 1.

To provide a gentler landing for a basic nose-blow rocket, a parachute or streamer can be attached to the nose cone and packed into the body tube for the boost phase, then the ejection charge pushes the device out along with the nose cone and shock cord. Let's look at streamers first.

A recovery streamer (Fig. 2) is a strip of thin plastic or crepe paper, an inch or two wide and ranging in length from 18 inches up. When pulled through the air by a falling rocket, the streamer flaps back and forth and provides considerable resistance to the fall. This makes for a soft easy landing.

Streamers can be made of polyethylene plastic sheet (polyethylene is used in "Baggies" and in dry-cleaner bags, and is available in color from the model-rocket manufacturers), but a better and cheaper material is crepe paper. The thousands of little wrinkles in crepe paper make it easy to roll and add to the streamer's aerodynamic drag. Crepe paper is available already cut and rolled into party streamers in a variety of colors as well as in the "Happy Birthday" and "Happy New Year" styles. To aid in visibility in the air and on the ground select a bright color. Something in the red-orange-yellow range is usually best.

A piece of strong string is attached either at the middle or at one end of the streamer with a piece of cellophane or masking tape (as shown in Fig. 2, a knot in the string gives the tape a better grip) and is tied securely to the eye of the nose cone. The streamer is then rolled into a small, neat cylinder and is slipped into the mouth of the body tube. Then, at ejection, it is unrolled quickly by the air moving past the rocket.

As you can see, streamer recovery is simple, easy, and very reliable. It is often used instead of parachute recovery because streamers give a fairly soft landing without drifting in a wind as far as chutes do.

For a slower descent, you might want to try a long streamer. There is really no limit to the length of streamer you can use, as long as it ejects and unrolls properly. The longest one I ever saw was about 25 feet, and that was in a small, low-flying rocket. (A model powered by a D engine and carrying a 100-foot streamer would probably be quite spectacular on the way down!) Some extra care is required in packing very long streamers, because there *is* a limit to

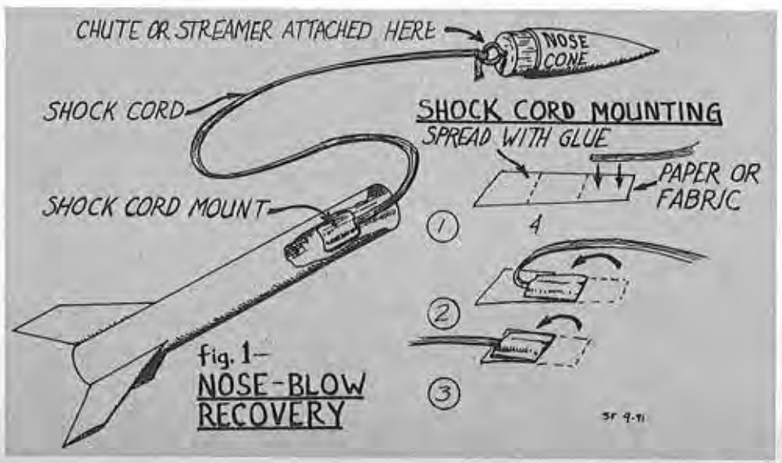


fig. 1– NOSE-BLOW RECOVERY

how tightly any material can be rolled; a long streamer rolled into a single cylinder may not fit into the body tube you plan to use. Fig. 2 shows one solution to this problem: the streamer is rolled into a series of small cylinders, with the streamer mateial leading from the inside of one roll to the outside of another. When rolling a streamer this way, it's helpful to slip each cylinder into the body tube as you finish it. The best way to learn this trick, though, is to try it yourself.

The most commonly used recovery device in model rocketry is the good old parachute. Although parachutes are more difficult to make and pack than streamers, they provide the softest landing of any recovery device.

A model rocket parachute (Fig. 3) is usually made from a single piece of polyethylene sheet material cut into a circle (or a hexagon, octagon, etc.) Some modroc chutes, but not many, are made from fabric sewn into a truly hemispherical canopy. Attached around the edge of the canopy piece are the shroud lines, which are usually 1 to 1½ times the chute diameter, made from heavy thread (sold in stores as "button & carpet" thread), and held on with small pieces of cellophane or masking tape. The chute may be any diameter from 7" to 8" up to 4 feet or more, and it may have anywhere from four to 24 shroud lines. Most ordinary modroc parachutes, however, are from 12" to 24" in diameter, with six or eight shroud lines.

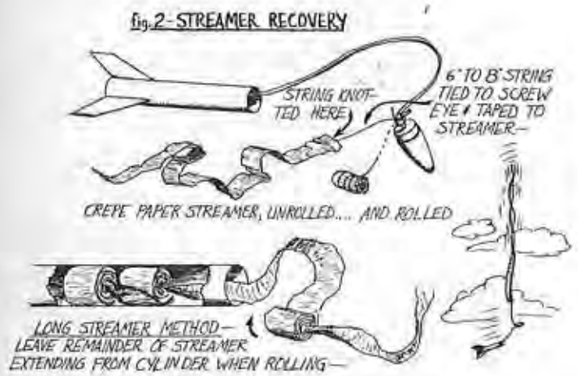


fig.2- STREAMER RECOVERY

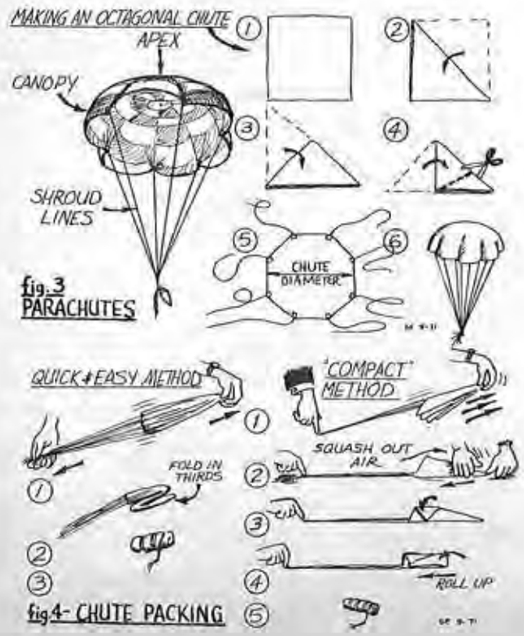


fig.3 PARACHUTES

fig.4- CHUTE PACKING

After the shroud lines have been attached, they are tied together at their free ends, and the chute is ready to attach to the rocket. For added convenience, the shroud lines can be tied to a snap swivel (a little brass fitting normally used on fishing lines) or a tiny safety pin so that the chute can easily be switched from one model to another—you just clip it to the screw eye and unclip as desired.

You can make your own parachute from carpet thread and dry-cleaner bags, or you can buy moderately expensive (25 to 50 cents each) parachute kits from the modroc manufacturers. The advantage in the factory-made kits is that the chutes are printed with bright colors in high-visibility patterns.

If you decide to make your own parachute from home materials, I suggest starting with an octagonal job, as shown in Fig. 3. Cut out a square of cleaner-bag material with a side between 12" and 24"; cut and fold as shown, attach shroud line at the corners, and you're ready to go.

Once assembled and attached to the nose cone, the chute must be packed into the rocket properly so that it will eject easily and open quickly. Fig. 4 shows two basic ways of packing a parachute. The quick and easy way will work on most rockets, most of the time. However, when you want to pack a large chute into a comparatively small rocket, you'll have to resort to the more difficult folding procedure. When using the second method you must constantly smooth out the chute from the apex end toward the shroud lines, to squeeze out air and flatten the folded canopy.

With either packing method, the final result should be a neat cylinder with the shroud lines wrapped around it evenly. To prepare for flight, just slip the packed chute into the body tube, stuff the shock cord in on top, and put the nose cone in place. Neither the rolled chute nor the nose cone should make a tight fit in the tube. If you think your recovery system might be stuffed in too tightly, try blowing *hard* into the rear of the body tube after removing the engine, of course. I'm not kidding; it really works, for most other recovery systems as well as parachutes. If you can't eject the chute, it's in too tight. Repack it into a longer, narrower cylinder by folding it in half instead of in thirds in the first method, or by skipping the fold in Step 3 of the second method. I should mention here that the rear end of the rocket also plays a part in ejection reliability. The engine has to make a tight press fit in its tube (unless a particular design requires that the engine eject itself) and the whole aft end must be as airtight as you can get it, so that all the ejection pressure works on the recovery system, and not the leaks. Glue everything properly when you build the rocket, and there should be no leakage problems.

Parachutes are sometimes troublesome because the polyethylene film of which most of them are made is somewhat temperamental. When polyethylene gets cold, it becomes stiff. As a result, parachutes used in cold weather may not open properly unless they are kept warm in a heated car or house or in a warm pocket. On the other hand, warm polyethylene tends to stick to itself. A chute which is left packed in a rocket in hot weather for more than about 10 or 15 minutes probably won't open completely. And, of course, if the plastic is heated too much it will just melt. What can be done about these problems?

To prevent sticking and make packing easier, rub both sides of the chute canopy with talcum powder. Any "off-brand" bath powder, no matter how cheap, will work on rocket parachutes (and give your models a delightful fragrance, too!) Just sprinkle it liberally on the plastic and spread it around. It's also helpful to sprinkle a little powder occasionally when packing it.

Always use recovery wadding to protect parachutes (and streamers, too) from the hot ejection gas. Shape the wadding material into a plug which will form a loose-fitting piston in the tube, about twice the tube diameter, and insert it into the body tube before the chute, so the wadding ends up between the engine and recovery system. The best material for this is the recovery wadding made by Estes Industries. It is chemically treated toilet paper which is flameproof—it will not retain even a spark after the heat source has been removed. Ordinary cotton is also sold as recovery wadding, but it is unsafe because it tends to smolder and could start a fire when it gets to the ground after being ejected with the chute.

In addition to being useful recovery devices, parachutes are interesting all by themselves. As you can see in Fig. 3, the six or eight shroud lines on an ordinary chute pull the flat plastic into a dome shape, which scoops in air to retard the falling rocket. The trapped air spills out around the edges (see Fig. 5), and inevitably more escapes from one side than the others, making the chute move sideways as well as down. Actually, it's a sort of glide—the canopy is an airfoil, which generates lift as air flows around it. But a chute with only four or six shroud lines may spill air in large amounts, making the descent jerky and the landing rough. To give a steadier ride down, you can add more shroud lines, or cut a hole in the chute to provide a place for air to pass out smoothly, or both. A chute with 16 or 24 shroud lines and a hole in the apex about 1/10 to 1/6 the chute diameter makes a beautifully slow and steady descent (a hole of the aforementioned size doesn't increase the descent speed and may decrease it). By cutting an off-center apex hole, you may be able to get a fast forward glide; theoretically, a gliding chute with a higher forward speed should have a slower vertical speed and give a softer landing.

Up to this point I have neglected wind completely. The chute always "thinks" it's in still air. A wind simply means that the body of air the parachute is in, is moving in relation to the ground (with the rocketeer running furiously beneath). In addition to wind there may be thermals—rising columns of warm air—which the descending model may drift into. Often the parachute will stand still in the thermal for a few seconds and may rise 10 or 20 feet before moving on. Sometimes a parachute may do more to help lose a rocket than to recover it—winds and thermals may cause it to drift for miles before it lands. To increase the descent speed of a chute (see Fig. 6) you can pinch it off at the apex with string or a rubber band, bind the shroud lines together just below the canopy, or butcher the chute by cutting a *big* hole or a few large slots.

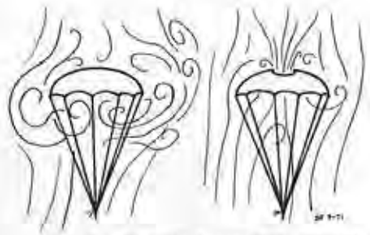
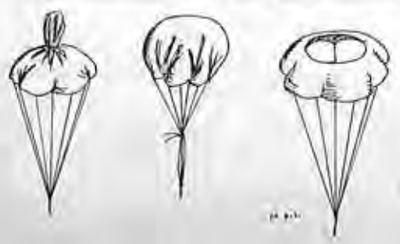


fig.5- AIRFLOW AROUND CHUTES WITH AND WITHOUT APEX HOLES

fig.6- THREE EASY WAYS OF REDUCING PARACHUTE EFFECTIVENESS



Glide-recovered rockets, called boost-gliders or BG's, also deserve mention here, although a whole book could be written about them alone. Originally, glide-recovered rockets used the engine's ejection charge to kick the spent casing out of the body (with streamer attached), and activate some mechanical device to transform the rocket into a glider. However, the BG's used in duration competitions today are actually very similar to hand-launch gliders with rocket power pods that detach at ejection, leaving the glider free in its home environment to do its thing. Examples of models of this type are the Estes Nighthawk kit and Centuri Engineering Company's Swift. BG gliders need to be very strong to take the high acceleration and aerodynamic forces imposed on them during the boost phase, and they must be a little more stable (better at recovering from dives, more resistant to spirals, etc.) than hand-launch jobs because the rocketeer cannot predict at what attitude the glider will be thrown into the air.

Beginners should fly a few conventional rockets before attempting a BG kit, since BG's present all the problems of ordinary birds, plus many of their own. If you're a hand-launch glider fan, you will probably want to design your own BG's after flying a kit model or two.

While most competition boost-gliders are basically hand-launch gliders with rocket launch instead, some rockets use the gliding principle as their main recovery system. The Estes Space Plane and Centuri Space Shuttle are examples of models of this type. The booster stage on Centuri's famous old Black Widow kit glides in after it separates from the top stage, as do many other modroc booster stages (usually by accident).

There are limitless possibilities for experimentation with glide-recovered rockets. Lots of work is presently being done with "variable geometry" BG's, most of which have wings that are folded during the boost and open up at ejection. How about a BG with a rubber-powered prop that is released when the model starts gliding?

Some rockets don't float down or glide down, but spin down, helicopter-fashion. The best-known example of a "helicopter-recovery" rocket is the Estes Gyroc. The Gyroc has big, wing-like fins with hinged tabs that spring out when the engine ejects, making the rocket roll rapidly. The model comes down in a stable configuration with the nose down, but the rapid spinning saps gravitational energy and slows the fall. Some work has also been done with rockets that carry rotor blades which ride up folded in the body tube, then eject and unfold for the descent.

That's not the end of recovery systems. People have tried all sorts of contrivances provide soft landings: drag-brake flaps that fold out of the fins or body of the rocket; retro-rockets, which break the model's fall with rocket thrust in a reverse direction (don't try retro experiments anywhere except in areas like barren deserts, where there is no vegetation or anything else on the ground which might be endangered by rocket exhaust flames); rockets that separate into two sections that flutter down like maple seeds; Rogallo wings (or "parawings") which eject like a chute and unfold into flexible, delta-wing shapes; and I suppose someone, somewhere, has tried at some time to use the ejection gases to inflate a balloon. (If not, somebody should.) Feel free to experiment with some of these "odd" recovery systems. Model rocketry is a very experimental, research-and-development-oriented hobby, and recovery systems can be fascinating subjects of research. But be careful. In the event of a recovery system failure, the rocket may land hard; although this won't be hazardous to people or property on the ground as long as the nose ejects, the expense of repeated crashes (also called "prangs") can add up, at $1 to $2 per rocket. That's especially rough if you, like most research people, are on a tight budget.

Literature is available from the modroc manufacturers which can give you all kinds of information on the design and use of recovery systems. You can also learn a lot from observing rocket flights. You may become so wrapped up with recovery devices that you think of a rocket merely as a device to boost your latest parachute or glider creation into the air!

REVELL'S MESSERSCHMITT "GUSTAV" IS EASILY MODIFIED INTO A RARE GEM FOR YOUR COLLECTION.

by MARVIN SOULE

'BUMP'

The "Gustav" ME 109G-6 is a supermodel to build for a Junior Modeler Collection. I used a Revell 1/32-scale "Gustav" kit (No. H-279) to make up the 12½"-wingspan model in the photographs.

Here are some of the goodies in the Revell kit: flash-free castings, precision-fit parts, scale flush rivets and skin lines. Still in the superbracket are the official Luftwaffe decals, finely detailed miniature Daimler-Benz engine (cowling comes off to show the really neat engine detail), super detailing in cockpit interior and instrument panels and a Luftwaffe pilot in flying suit. There are several movable parts: wheels, propeller, and control surfaces.

The decals in the kit are for the aircraft flown by Grupp Kommandeur, 2nd Grupp JR-54, based in Russia in 1943. (*Note:* the German Fighter Group was equivalent to the American Wing; "JG" stood for "Jagdgeschwader/54" whose insignia was "Grunnerz," meaning "Green Heart.")

The engine in the aircraft was a 12-cylinder, liquid-cooled Daimler-Benz 605AS which gave a maximum speed of 390 mph with booster. For long range flight, an external jettisonable tank of about 65 gallons could be attached under the fuselage. Seventy percent of all ME 109's were the "G" series. Several of the "G" series aircraft resulted from the use of different types of engines. Installation of the DB 605AS, AM, or D engines produced power ranging from 1435 to 1800 hp.

The armament was as follows: two 13-mm. (millimeter) MG 131 machine guns with 300 r.p.g.'s (rounds per gun) mounted above the engine cowling, synchronized to fire through the airscrew. The installation of these guns made it necessary to do some reshaping of the engine cowling on the aircraft and it was from the resulting humps on the aircraft—which became characteristic of the "G" series—that the pilots of the Luftwaffe nicknamed the aircraft Beule, meaning "Bump." The nickname thereafter was applied to all Bf 109G's.

In addition to the two MG 131 guns, there were two 20-mm. MG 151/20's with 120 r.p.g.'s per cannon in the underwing gondolas, and one engine-mounted 20-mm. MG 151/20 cannon with 150 r.p.g.'s firing through the spinner. The undercarriage was strengthened to cope with the heavier power plant and armament, as, by that time, the 109's had increased in weight from 4850 lbs. to 6500 lbs. which made the "beefing up" necessary. Wingspan was 32' 6½", length 29' 8", height 8' 6" and wing area 174.375 sq. ft.

Building the **"Bump"** requires some skill with jeweler's saw and also a little patience. Use the finest blade (000) you can buy and fit it into place. Remember, the teeth of the blade should face the handle, because you will be sawing with a downstroke and also keep in mind that you must complete all saw work before you assemble.

If you have never used a jeweler's saw, you should spend a little time practicing or you can easily ruin your model.

A good way to get some practice with the saw is to draw some lines on scrap plastic from discarded kits: saw on the lines you have drawn until you can saw accurately.

TOOLS AND MATERIALS A list of the minimum equipment required must include a tube of Revell's cement or bottle of cement and a set of jeweler's files (available at hobby shops or mail order discount houses). Of course you must have a "trusty-knife"—a single-edge blade, good craft knife, or pocket knife. (In fact, a good sharp paring knife will come in very handy. Better get one of your own, though, don't swipe it out of the kitchen drawer.) Also include a small screwdriver or spatula which is good for filling in cracks, a pin vise and assorted drills, a package of assorted rubber bands to hold cemented parts together while drying, a roll of 1/2"-wide masking tape, and a can of "Duratite" thinner. A can of Duratite will last a long time. I have had the same can for almost a year and have built many, many models using it. There is only one thing to beware of—you *must* follow the directions on the can to the letter, or you will not get good results on your models and you will not get your money's worth either, as the Duratite will dry out in the can.

In addition to your tools and supplies you will need the following: Assorted grades of wet or dry sandpaper (very good for sanding and blending dividing lines on camouflage or mottle pattern. One sheet of each of the wet or dry, starting with No. 200 through No. 500 will take care of normal needs and can be purchased at hardware or hobby shops); inexpensive metal tweezers and paint brushes from No. 0000 to 1/4" (good brushes are a wise investment as they will last a long time if you take care of them); a pressure can of primer coat (this is always required and light gray is the best color, as it is easy to cover over this shade). You will also need a spray can each of Testor's clear Glosscote and one of Dullcote No. 1260 which leaves a transparent, flat, satin finish without altering the color, and finally a set of flat enamels in assorted colors. You can make a temporary paint-mixing tray of pieces of aluminum foil pressed into discarded can lids. For cutting out decals, curved manicure scissors are best. Use these also for cutting out the intricate shapes for masking off for mottle, camouflage, etc. For applying tube cement to small parts, use round cocktail toothpicks. To wash off mold release which is common to all plastic kit parts, household detergent such as Trend will do the job.

The above is just a minimum list, nonetheless you will find that even this assortment of supplies must be carefully put away after use or you can easily lose some of the small items. For the beginner who may not have adequate storage space of his own, a shoe box makes a very good toolbox. Believe me, the other members of your family will greatly appreciate this little effort on your part. *Nobody* likes to see this sort of stuff littered around!

I. Starting the model:

1. Saw the coolant flaps from the upper and lower wings (parts 50,52, and 53).
2. If you want your landing flaps in a lowered position, remove the landing flaps from parts 50, 52, and 53 at this time.
3. Assemble and paint the engine (Assembly 1 on your kit drawing). When it is dry, attach parts. Paint parts in Assembly "B" and cement in place.
4. Assemble rudder and tail surfaces.
5. Fuselage halves. (Parts 21, 23). On both compartments on lower engine cowlings, measure 1/16" below the exhaust opening and mark or scratch a line. Saw the two parts free and cement together.
6. Remove oil cooler location marks for oil cooler radiator and, depending on the type of equipment you have, then grind, sand or file off the location marks.
7. Cement oil cooler screen (part 30) to a 3/8" thick balsa block. When dry, cut and sand the block flush to fit oil cooler screen on all four surfaces. Paint oil cooler radiator flat black and assemble. Cement it in place to the bottom of engine.
8. Cement coolant radiator screen (part 49) to a 3/8" thick balsa block, using Testor's wood cement or contact cement. When dry, cut and sand the block flush to fit wing coolant screen on all four surfaces. Paint the unit flat black and cement in place in wing. Remove location marks. Repeat process on second wing coolant radiator.
9. Cement and paint pilot, using flat colors, as follows: flying suit: medium blue; helmet: brown; face and hands: flesh-color; parachute straps: white; flying boots: black; flotation jacket: red or yellow.
10. Paint and assemble following parts: Propeller: flat black; spinner: white; instrument panel: flat black; tank and gun pods: undersurface color; armor plate: dark grey.

II. How to make the underwing gondolas:

1. By drawing or photostating, enlarge the drawing in the article so that the gondola is 1½" in length. Enlarge only the gondola side view.
2. Make side-view templates and use knife or single-edge razor to rough shape from balsa block to a streamline shape.
3. Gun barrel is 1-1/8" long and made from aluminum tubing or small wood dowel; both are 3/32" in diameter. After part is shaped and a minimum of two coats of sanding sealer have been applied (sand lightly between coats with fine sandpaper), you are then ready to install the gun gondolas on the wings.
   Install guns last, after the model is painted and the decals are applied. Drill gun location holes before installing.
4. For smooth joints, use Duratite on the wing and fuselage joints. Be sure to follow the directions on the can for best results.

Follow the instructions for assembly as given in the kit, with the exception of instructions for landing flaps and coolant flaps if you have cut these out. Also, the coolant radiators (part 50) should be cemented in place before the top wings are cemented.

Cement painted cockpit assembly and landing gear assembly into place on part No. 50. This has to be done before upper wings are cemented in place.

Color scheme for model in photo: Undersurfaces and entire fuselage are sprayed pale blue. Camouflage on fuselage (top and sides): olive mottle green pattern. Top surface of stabilizers and wings, irregular splinter pattern of olive green and dark green. Spray with very light gray (almost white) over the mottle on the fuselage sides.

The progress photos in the article do not follow the construction sequence in all cases. In actual practice, to avoid breakage the following parts are attached last: coolant flaps, underneath section of engine cowling and landing flaps. These parts are shown attached in the photos so you can see their exact location.

All above parts are to be fully painted before attaching; then scrape or sand both edges to be joined and apply a minimum of three coats of Testor's liquid cement to both joining edges. When the two edges seem to be "tacky," press them firmly together. Check to see that parts are in line.

Additional decals can be purchased from Almark Publishing Co., 104/106 Watling Avenue, Edgware, Middx., England.

The 12½ in. model has authentic markings from Russian theater in 1943. Suited pilot in kit.

Author elected to install landing flaps in the down position. Radiator coolant flaps are open.

Placement of two 13-mm machine guns on fuselage of real craft requires fuselage bumps shown.

The two 20-mm cannons are dowel. Gondolas shown here as attached to underwings. (See page 56.)

[See detail of Cannon for "Bump" on page 56]

new products

by PAUL KUGLER

Dremel Creative Power Tools

By now you have seen the JAM bi-monthly model contest. The prizes being awarded are the Dremel Moto-Tool Kit No. 261 or the Dremel Moto-Shop No. 572. We thought that you would like to know how well these items perform, and what uses they are best suited for.

For many years I have owned the older version of the Dremel Moto-Tool, Model No.2. The new tool has much greater torque. This is important because of the way that the Moto-Tool is used by the modeler. Speed does the work, not pressure. The new tool (with its greater power) continues operating at the highest speeds even as you apply pressure, thus it cuts better. Another improvement is the increased speed of the tool—from 27,000 RPM to 30,000 RPM. This insures easier cutting.

The uses of the Dremel Moto-Tool are not limited to modeling. We use ours to sharpen garden tools, to build projects for school, to remove rust before finishing metal parts, and for Boy Scout projects. In modeling we find that three uses are most important. First, the steel cutters are used to carve and shape balsa. The tool is most helpful when hollowing out blocks of balsa for fuselage parts. When plywood bulkheads need trimming, the Moto-Tool is a life-saver. Even when building hand-launched balsa gliders, I use the Moto-Tool to do all the shaping of the fuselage and the airfoil. Secondly, the tool is used as a drill. The tool fits in places that regular power drills do not. Because of the high speed of the bit, you will find that it is easy to drill the hole exactly where you need it. Oftentimes I find that an irregularly shaped hole is needed. This task is simple with the wide assortment of cutters that are available in the kit. Lastly, the tool is used as a grinder to trim and shape metal parts. Screws that are too long sometimes stick out the other side of parts of the tail assembly. I use the tool to grind off the ends of these parts for a neat finish.

The Dremel Moto-Shop is fantastic. The feature I liked best is the jig saw. This saw cuts through the hardest plywood quickly and easily. Making plywood bulkheads for fuselages has always been a job that I didn't like, but the Moto-Shop has made the job easy. Another use is in the making of wing ribs. First take a balsa sheet of the right size. Next, stack the rectangles and pin them together after making sure that a cutting guide is on the top. I use a rib

(Continued on page 50)

Tern Aero Company—Balsa And Tissue Model Aeroplanes.

Tern Aero Co. makes three model airplanes that the beginning modeler will want to try. I built the Gone Goose for this test, and also examined the Starduster Sportplane and the Traveler sailplane. All kits feature quality balsa that is printed with each part rather than die cut. Although the initial cutting out of the parts requires more work than does diecut kits, printed balsa has the advantage that none of the parts are crushed by the die cutting machine. Other kit features include complete, full size plans that are illustrated with a series of very clear photographs. The instructions are quite clear. All kits include the necessary parts, except for glue and dope.

The Gone Goose is a rubber powered cabin model with a high wing. I followed the instructions exactly and was rewarded with a fine model. The first step after reading the plans is to carefully cut out all the parts. One trick I use in doing this is to cut each part slightly larger than indicated. Once the part is cut out I then sand the parts to the exact size of the printed line using a sanding block. Several parts join along a common line. In cutting out these parts a steel ruler is most helpful in cutting exactly along the proper line. Otherwise you should have no problems in getting the parts ready to assemble.

To construct the fuselage, the sides are assembled over the plans, making two sides. Once dry, the sides are removed from the plans and then glued together using the former and strip balsa method of construction. Care should be taken to assure that the fuselage is square for best flight characteristics. Wing construction is simple. The process is the same as most models of this type. The rudder and stabilizer are cut out of sheet balsa.

To meet the deadline for this issue I was forced to fly indoors at the gym of the local school (March winds you know). This was a blessing in disguise—the still air of the gym let me trim the model without any damage. The Gone Goose flies really well too, with a minimum of adjustment. One nice feature that the beginner will like is that flight is adjusted simply by sliding the wing on the fuselage. Anyone can build this model and get good flights.

Try the Tern Gone Goose for summer flying. Be sure that you fly at a large field because this model performs. The Gone Goose sells for $1.50.

Tatone Products Clockwork Timers

Tatone timers are back in your hobby shop. Every free flight modeler can breathe a sigh of relief. Because Tatone timers were not on the market. I *quit* powered free flight for a while. I quit immediately after losing my second model out of sight in a one-week period. Tatone timers are of two types—engine run limiters and dethermalizers. Both are badly needed.

Engine run limiters are of two types. The flood off timer is used where the fuel system is of the pressurized type. This is common in the high performance free flight field. The timer works well, but will not be used by most novice modelers because the pressurized fuel system is somewhat more complex than the simple vacuum feed system. Most modelers will want the tick off timer. This timer mounts on the side of the fuselage, and the fuel line is run from the fuel tank through the timer to the engine. The timer works by pinching the fuel line and cutting off the flow of fuel to the engine. Regardless of the size of the engine, I can assure you that the system works.

A smaller ½A tick off timer is made for the smaller engines. This timer is made smaller to accept the smaller diameter fuel line used by the .049 engines. Where the fuel tank is part of the engine (as with the Cox Golden Bee) the timer can also be used. In this type installation, the vent tube is plugged using a plugged piece of tubing. The other vent tube receives the piece of tubing that passes through the timer. The timer works by creating a vacuum in the tank when it pinches the fuel line. This method works for the .049 engines. Instructions are included with each timer.

Tatone D-T tick off timers save model airplanes from going out of sight. At the time you set, the timer snaps a thin rod back against the fuselage. This releases a line that is holding the stabilizer assembly in place under tension. When released, the stabilizer pops up and the model comes gently to the ground. Be sure to read the directions before using, and limit the stab tilt to 45 degrees.

Paul K. Guillow Build-By-Number Free Flight Kits

Guillow's rubber powered free flights remove all the guesswork from model building for the beginning modeler. These kits are most impressive because of the detailed way that they are engineered for the novice. Nothing is left to chance. For this review, my 13-year-old friend Bill Boyne built the Arrow, while I built the Javelin. Although the Javelin is designated as stage 1 and the Arrow is designated as stage 2, we found no basic difference in the building skill required. Both models can be built be the young modeler.

Both of the planes are so designed that they are easy to adjust and fly. The wing is of the type that slides on the fuselage until the best flying position is discovered. Even models that have wrinkled tissue covering and small warps fly well.

The balsa parts in all the Build-By-Number-Kits are die cut for the easiest building. All necessary parts are included in the kits. But in my mind, the most valuable part of the entire series is the complete, detailed instructions that are a part of the plans. The instructions actually teach you how to do each step. Bill says that after you have built one or two of these Build-By-Number-Kits, you can build any model in the Guillow line. (I agree.) Once you have built several of these planes, you will have the necessary skill to move to engine-powered free flights.

Learning how to build and fly is cheap enough with the stage 1 models at $1.50 and the stage 2 for $2.50.

New Products

(continued from page 48)

that has been previously cut for the guide. Now all you do is carefully feed in the balsa for a set of perfect wing ribs. If you build from plans, the Moto-Shop will make it possible to build several models at the same time with no extra work. A blade guide makes the Moto-Shop completely safe too.

A disk sander is also a nice attachment. Large areas are sanded quickly. The Moto-Shop is well designed so it remains stable when you use the sander. This feature is very important because you have complete control while sanding.

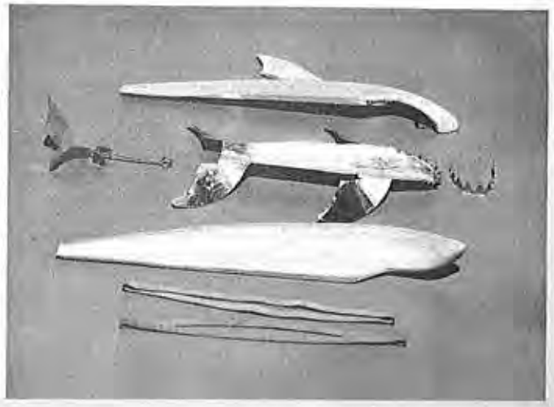
The flexible shaft is designed to take accessories for a wide range of grinding and drilling jobs. The shaft revolves at a slower speed than does the Moto-Tool described above. This feature is valuable when working with plastics, yet the shaft is still effective in working with wood.

My favorite is the Dremel Moto-Shop because of my own needs. You will have to decide which tool best meets your modeling needs. You may want to suggest either of the above tools as a Christmas or birthday present. The Moto-Shop No. 571 is the basic saw and includes the disk sander. This is a good starter at $37.95 and is recommended as the best value when cost is a factor. The Moto-Tool ranges in price from $24.95 to $49.95. The kit No. 261 includes the Moto-Tool and 34 accessories. This kit is the best value for the modeler starting to expand his workshop.

SOMETHING FISHY

by PAT MARCH

Below: Moby Dick was less ferocious than your finished shark. A bit of white, black and gray dope makes it life-like.
Right: When that fin cuts water in the swimming pool, it's really a case of "everybody out of the pool." The rotating action of the tail fin imparts an appropriate fishy wiggle.
Below, right: Shown before painting are, the two halves of the hollowed-out pine body, the tin-can metal keel, his upper "denture," the two loops of rubberbands for power, and the tail-fin with hook.

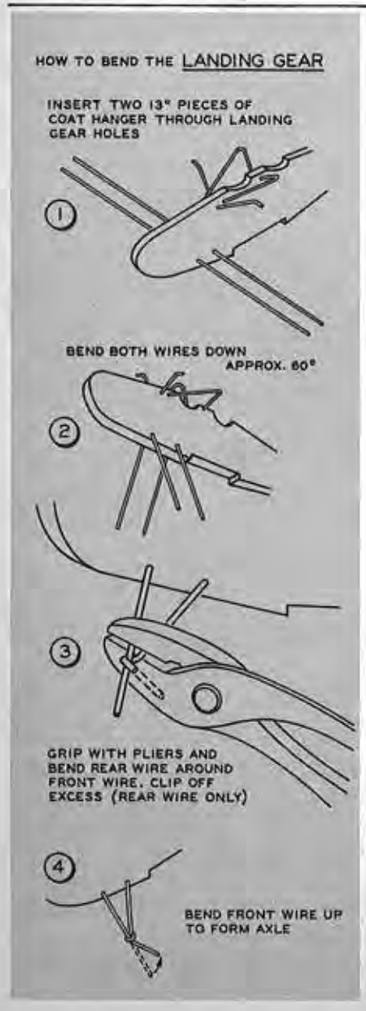


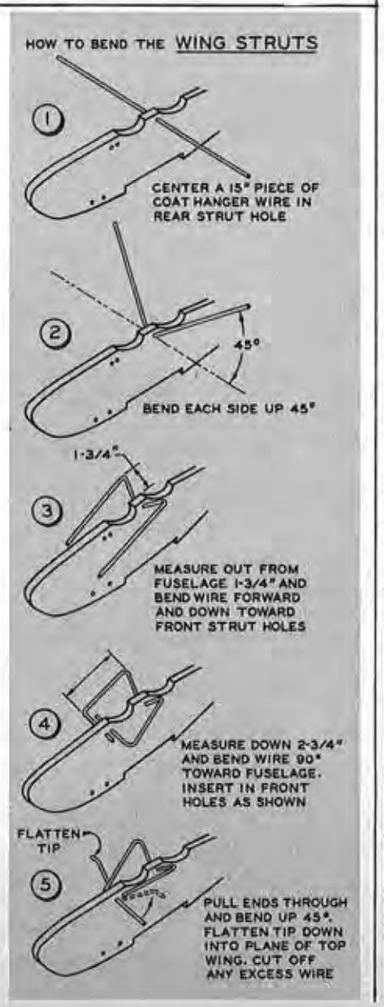
AHOY AGAIN!

So many readers inquired about the availability of a kit or plans for the cute sailboat published under the title "Ahoy" in the March-April issue, that we hasten to add the name of the kit is "Skippy" and it is manufactured by Sterling Models Inc., Philadelphia, Pennsylvania 19144. If you don't find the kit at your hobby shop, write the manufacturer and mention JAM.

APPLE BIPE

by DAVE THORNBURG





Q & A

(continued from page 8)

Next we come to your question about cutting spar notches. I have a couple of techniques for you to try, so get out some scraps to practice on. Save your good ribs for later. Notice in the center picture on page 33 of the "Sassy" article, the author has drawn lines indicating the spar notch on the top and bottom of the stack of rib blanks, and that the end ribs show the outline of the side view of the notch. This is the first step, regardless of the method used for cutting. With these lines as a guide, cut the sides of the notches to the proper depth using a razor saw, or a new single edge razor blade used with a sawing motion. This is easy to do if you clamp the whole stack in a vise. Tighten the vise just enough to hold the work firmly. (Use a couple of extra rib blanks if you clamp them in a vise, as the outside two will be crushed by the vice jaws.) Go easy when cutting, don't force the blade, and check your progress against the outlines on the end ribs as you go. When both sides of the notch have been cut, you can easily pop out the wood between the cuts, or you can cut the bottom of the notch on each individual rib with a pointed X-acto blade after final shaping and unpinning of the stack. The other method of cutting the spar notches is to tape sections of an old hacksaw blade together to get the required width. I save all my old hacksaw blades just for this purpose. Experiment on scrap wood to determine the number of blade sections necessary. Be careful when breaking up hacksaw blades, as the metal is quite brittle and shatters easily. You don't want to get a piece of the blade in your eye.

Finally we come to dethermalizers. A dethermalizer, or DT in modeler slang, is a device which causes a free-flight model to return to earth after a predetermined time, instead of being borne out of sight by an unfriendly thermal. In the early days of modeling, free flight was the only kind we had, and it was not uncommon for a fellow to spend months building his pride and joy, hours of tinkering and sweating to get a balky ignition engine started, and then loss the whole "shebang" on the first flight because the model caught a good thermal and rode it out of sight. This was quite unsettling, of course, and drove many to take up other hobbies. But die-hard free flighters are an inventive lot, and it wasn't long before dethermalizers were developed. Many wild and wonderful designs were tried, (some successful), and today most flyers have settled on the pop-up stabilizer idea as the most efficient and easiest to build. These are controlled either by clockwork timers or by a burning fuse. The fuse type, which is used on Sassy, gets my vote as it is simple, inexpensive, and not affected by vibration. You do have to remember to light the fuse, however.

To build a dethermalizer, you will need some wire for hooks, a supply of rubber bands, a piece of 1/4" I.D. aluminum tubing, and some fuse material. Commercially made dethermalizer fuse should be available at your local hobby shop, or can be ordered by mail from Sig Manufacturing Company, 401 S. Front Street, Montezuma, Iowa 50171, or from M & P Enterprises, 1222 Briarcove Drive, Richardson, Texas 75080. If your hobby dealer can't order for you, write directly to one of these outfits for prices. Now on to the building. First form and attach the DT hooks and the stop pin to the model. Make the snuffer tube out of a piece of the aluminum tubing, closed off at one end. *(Editor's Note:* The snuffer tube extinguishes the fuse which eliminates any fire hazard, such as a dry field.) You can close off the end by crushing it shut with pliers or a vise, or by plugging with a short length of hardwood dowel epoxied in place. Glue the snuffer tube into the rear of the fuselage, with the open end 1/8" or so in from where the DT rubber band will be. Attach the stabilizer/fin assembly to the model by looping a rubber band through the hole in the fin and around the dowels in the fuselage side. Adjust the stop pin so the stabilizer is held up at an angle of about 45 degrees. Now pull the stab down onto the fuselage and loop a rubber band over the DT hooks to hold it tightly in place. Insert the fuse *through* this retaining rubber band into the snuffer tube, and cut the fuse off at the proper length for the time you wish. The DT fuse manufactured by M & P is marked off in 1-minute increments for your convenience. The Sig fuse burns a little slower, I think, at about 1¼" per minute. Regardless of brand, you should test it to find out how fast it burns, as there will probably be some variance in different batches. If the fuse burns at 1" per minute and you want a 3-minute flight, cut the fuse off 3" beyoud the rubber band. In operation, the DT works by the fuse burning through the retaining rubber band, allowing the stab to pop up. The model then descends in a flat glide, somewhat like a parachute. As I said before, you have to remember to light the fuse, but otherwise it's quite simple, isn't it?

Q: I recently acquired a Mel Anderson Baby Spitfire engine, and I can't seem to find any information as to its history. Could you tell me the age and other vital statistics of this engine?

Gene R. Cade
Princeton, Ill.

A: Ouch, you tossed me a real curve ball! However, my friend Jim Arnold, who's a nut for old engines, bailed me out with the necessary details.

The Baby Spitfire was manufactured by Mel Anderson, designer of the famed Super Cyclone and Baby Cyclone engines of pre-WW II days. After the war, Anderson manufactured the Spitfire, with displacements of both .60 and .65. In 1949, the Baby Spitfire, which is probably the engine you have, was introduced. It was an .045 displacement engine with a removable aluminum tank. During the '50s, Anderson also produced the Spitzy, another .045, the Super Spitzy, which was the same engine with an integral gas tank, the Royal Baby Spitfire, an .065, and later another version of the Spitzy, which was an .049. There may have been some others, but I can't remember any. Mel Anderson is now out of the model engine business, and lives in Alhambra, California.

For those readers who are interested in collecting old model airplane engines, the following addresses may be of value: The Engine Collector's Journal, c/o The Model Museum, 1265 Yates, Denver, Colo. 80204; Model Engine Collectors Association, c/o James Dunkin, 10411 East 39th Terrace, Kansas City, Mo. 64133.

Both of these sources should be able to provide information on model

engines long since vanished from the scene.

Before leaving you for this issue, I want to mention one new discovery I have made. While attending a sporting goods show recently, I came across a product called Shape-A-Wate, a moldable putty used to make fishing sinkers. This stuff is about 90% lead and has the consistancy of modeling clay. I've found it to be ideal for use as ballast, since it is as heavy as lead, but doesn't have to be melted down into the right shape. It takes up a lot less space than the usual modeling clay, too, since it's so much heavier. You should be able to find the stuff at any large sporting goods store, and maybe if you bug the proprietor of your local hobby shop, he can stock some too.

Let me hear from all you inquisitive modelers. See you next issue.

RAP Session

(continued from page 6)

Eliminating the age gap

No, I'm not a beginner but I am subscribing to JAM. I find the other magazines are leaving me behind, as FF scale and sport are my main interests. Raising a family on teacher's pay has kept me from RC. Yet, the underlying reason for not progressing as a modeler is the fact that I have no one to share my hobby—it is like going on a picnic by yourself. Not much fun alone.

Perhaps I started reading JAM in the hope that it will progress to .020 and .049 FF scale—plus the fact that I will have material for the grandchildren, if and when.

John Sailors, Rock Falls, IL

Juniors involved

Your efforts in publishing JAM are certainly timely. I built and flew models as a kid in a rather isolated modeling environment—Kentucky—and I depended entirely on kit instructions and magazine articles for modeling techniques.

My club, the Cliff Cloud Climbers of Dallas, has just initiated a new junior program that we hope will spark some enthusiasm in junior FF competition. We are awarding a special certificate to second- through fifth-place juniors, in addition to our high time award.

When the first awards were made at our Sun and Fun contest last summer, the juniors were standing proudly next to the trophy table, rather that staring blankly at the ceremonies from about four rows back. I think maybe it's going to work. AMA president John Clemens came by the meet to review the awards; I think he will comment on them in AAM.

My point is that even hard core competition clubs are re-evaluating their obligation to the young modeler. Certainly, however, a publication which focuses on basic skills will be the most valuable contribution to the junior program.

Frank H. Perkins, Richardson, TX

Pennyplane

(continued from page 29)

hub. Push the bent end of the prop shaft into the hub and cement.

Besides the regular thrust bearing, we used an extra bit of bent wire which is just an open "U"-shape to support the prop shaft behind the thrust bearing. This may be bent to give down- or sidethrust and keeps the prop rotating true, even when using a great deal of slack in the rubber. Add a bit of modeling clay to make the model's weight equal to a penny.

We used .051" square high torque rubber. Since this size is no longer obtainable, we recommend the use of .060" or .070" wide Pirelli, made into a loop about 15" long. Our motor took 1500 turns on its longest flight.

Begin test flying in a good sized hall. First try to get a smooth left circle of about 20 feet in diameter with a slow climb. If the model climbs too steeply or stalls, move the wing back slightly and try again until a slow climb is attained. Adding more tail tilt will correct stall also.

Never hand wind—use a 16/1 winder, obtainable at dealers. Properly built, the model will last a long time. Ours are intact after 2 years and countless flights. To refine the model, build an entire new one, sanding spars to rounded sections, making boom and stick lighter and using a larger, slower prop. Ultralite condenser paper may be used. A very light model must then be loaded with clay to bring it up to penny weight, but this combination makes a winner.

This past summer we tried to fly **Pennyplanes** outdoors on calm days but after about 3 minutes, the downdrafts forced the model into the grass. Under proper conditions the model will fly out of sight and we plan to try again, since it is a good way to get rid of a boxful of experimental Easy B's and **Pennyplanes.**

Pennyplane will give you many hours of fun, up to 5-minute flights in small halls, and much experience in the all important art of adjusting a model for winning flights.

Paper Circus

(continued from page 24)

STEP NO. 3: Here is one of the reasons that this little glider flies so well. We are going to shape that flat wing into one with a rounded airfoil. The sketch shows how to use a pencil, pen or other dowel-shaped object to help curve the airfoil. The forward part or leading edge of the wing is gently bent to shape around the pencil. Nice and smooth, no ridges or creases please. The result should look like those in the plans. The picture shows that the whole wing has this shape. The 1/2" dihedral is added by folding the wing at the dashed center line. The airfoil may need to be reshaped after this folding. The tail does not use this curved airfoil but it has to be bent on the dashed lines so that it looks like the sketch on the plans. The horizontal stabilizer is flat and the two vertical stabilizers are bent down 90 degrees as shown. Remember these two names, as they are used in some of the future gliders and in fact by most full size aircraft.

STEP NO. 4: Grab the wood and make a body like the one shown on the plans. Notice the slight upward taper of the bottom on the tail end. A medium grade of sandpaper can be used to shape the body instead of a knife. A fine grade will smooth off the entire body. Always use a sandpaper block.

STEP NO. 5: Get the sticky stuff next and let's glue on the tail. The secret of good glue joints is pre-gluing. Spread a thin coat of glue on both surfaces to be joined. Let it dry for a few minutes then add another thin coat and stick on the tail. When the second coating of glue is dry, attach the wing using the same method. Make sure that everything is lined up and then leave it alone until it is dry. I know that this is hard to do, so why not start building the second one?

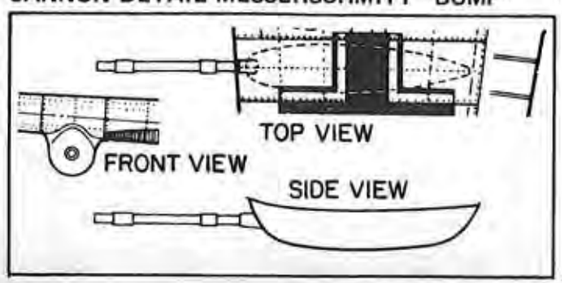
STEP NO. 6: When it has dried, wrap a piece of solder around the nose and trim it until the glider will balance just about on the spot that is marked C.G. (center of gravity) on the plans. Another type of weight can be used as mentioned

earlier. Use a coat of glue to hold the weight in place. You won't need the glue if you use clay; instead, mold the clay around the nose and it will stay by itself. Use the flat side of a pencil to get the proper balance. It won't stay put exactly but get it as close as you can. All done? Let's go fly it.

FLYING INSTRUCTIONS: Pick the biggest room in the house and move back the furniture. Holding the glider by the body under the wing, point it straight ahead with the wings level. Launch it with a quick smooth push. Don't point it upward. Well, does it fly? Try it several times until it does the same thing each time. It should fly straight ahead in a smooth gradual descent. If it doesn't, check it over for twists in the wing or tail which cause sharp turns in one direction or the other. Looking at the glider head on, it should look like the front view drawing in the plans. This glider can be made to fly one or two full turns of the room by tipping it to the left or to the right as you launch it. If it dives too much or doesn't turn tightly enough, remove some of the nose weight or bend the wings down a bit, thus reducing the amount of dihedral. If it stalls or turns too tightly, add weight or bend the wings upward a bit. There are other methods for trimming the flight of a glider but give these a try to start with. You can't change the dihedral easily on most other gliders, but you can on this one. Want to try it outdoors? Add just a little more weight to the nose and give it a try. Make this glider a little bigger, using file card material, when outdoor use is in order. A light spray coat of clear plastic lacquer will help to moisture-proof it. Christmas card stock or even stiff paper works best indoors. The lighter you make it the better it will go. Felt tip pens and colored pencils will make fancier, brighter planes for you. How about your brothers, sisters, friends, dad and even mom? Make them each one and you can soon have your own contest. Try to see who can do the most turns or loops. Who can keep his in the air the longest? You can change the size and shape quite a bit and I'll bet that some of them will fly pretty well. Remember to taper the bottom of the tail and use the curved airfoil.

Next issue, we'll build the "Paper Circus" Glider No. 2 and use some more advanced methods of flight trim. The same building methods will be used so save up some card stock and don't throw this magazine out. Till then—Keep Them Flying!

CANNON DETAIL MESSERSCHMITT "BUMP"



JAM Session
(Continued from page 5)

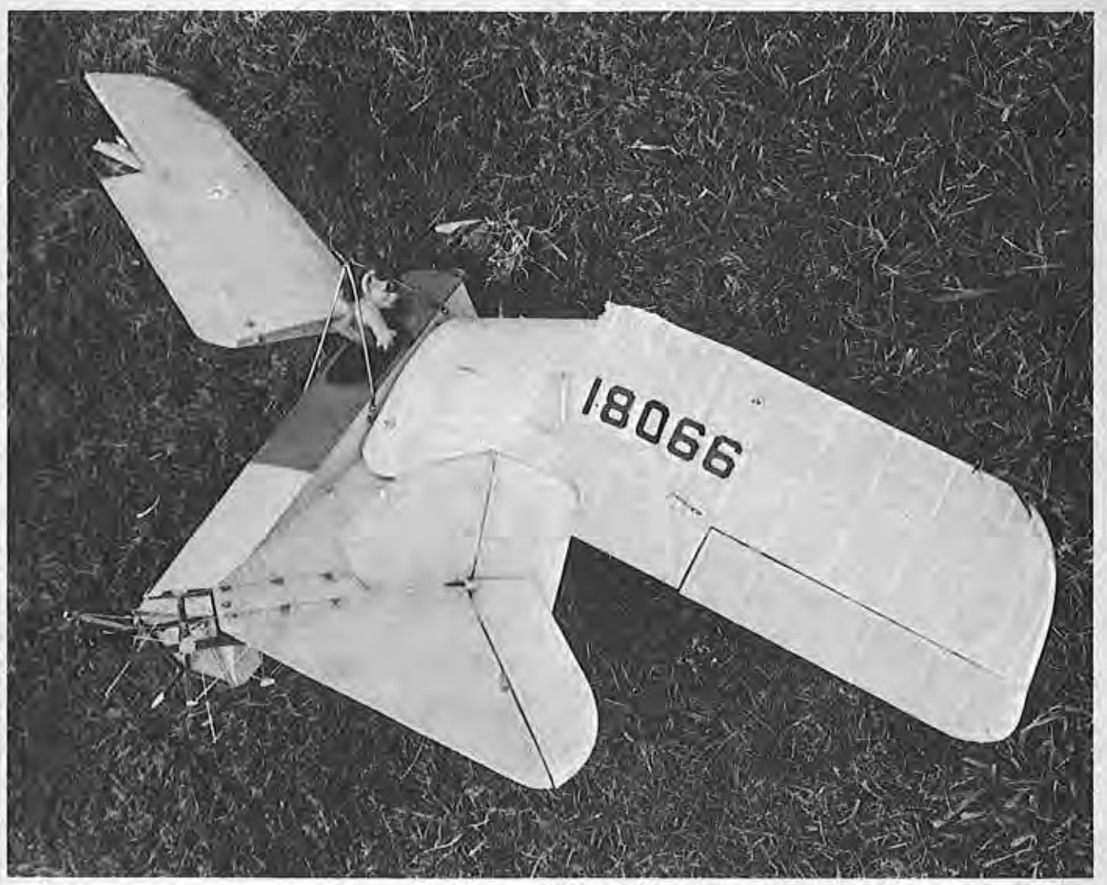
Cherokee Park. Each year a special award is given to the boy who shows the most improvement in his building and flying ability—and in his attitude toward other people. This award is given out at the yearly awards dinner held each spring during National Boys' Club Week.

Don't think that model planes play second fiddle with the Fly'n Tigers. They have plenty of fun and things to do in addition to models, but they've carved out quite a reputation as competitors. They are well known in regional and national competition—both for competitive capabilities and for the group's work with youthful modelers. The Club's flying interests include just about every event—Control-line, Free-Flight and even Radio Control. Control-line seems to capture their main interest, probably because of the variety of things to do. So far they have flown Class C Jr. Speed, ½A Proto Speed, ½A Profile Speed, Goodyear Scale Racing, Profile and Class 1 Carrier, Sport Race, Fast and Slow Combat, Stunt and Scale.

Don't forget—all this started with just six boys and one advisor. Now... how about your town?

William J. Winter

YOU WOULD NEVER DO THIS!



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Stomper	4.8 oz.	Tee Dee .049-.23

ACE MINI FOAM WINGS

These jobs are being used by more and more modelers to come up with their own designs. See recent issue of AAM for P38 and RCM for Mr. Mulligan. Ideal for 1/2A Racing and other planes of semi-scale or fun types.

Constant chord measures 35" span, 5½" wide, area 192.5. Weighs 3+ ounces.

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- † Also works beautifully as Rudder-Only Pulse ship with Commander.

13L106—2T Foam Wing Airplane Kit $14.75

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This is the KRD Motor Control which replaces the one by Ken's R/C, and is a considerable improved device. (Ken is still part of KRD!) Designed for high, medium and low throttle on rudder only pulse system, the control requires only a slight factory modification to the transmitter for a fast pulse button. Easy to hook up to the airborne rudder only packs of '72 models. Just three wires. Uses the same battery supply, and therefore amounts to a considerable saving in weight. Designed specifically for a Commander RO series of Standard or Stomper units.

Housed in an EK case, the unit is completely wired and tested.

Transmitter modification is simple, but we recommend that you allow us to do a factory conversion for the fast pulse button. This is a custom job, and generally shipment is made within 48 hours of receipt of your unit. See below.

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No. 14K69—KRD R-O Throttle Control Servo Ready for Installation $24.95

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We recommend that you allow us to convert your transmitter for fast pulse button to make sure it operates your motor control servo. There is some variation in components which makes it almost mandatory to tailor each transmitter to achieve the desired high pulse burst. Throttle control response is so fast that there is no interaction apparent, because you thumb the motor control button and get right off, and the KRD Throttle Control takes over.

No. 14E71—Factory Custom Installation of Fast Pulse Button in your transmitter. This can be done at time of purchase of KRD Pulse Throttle Control Servo. $6.00

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