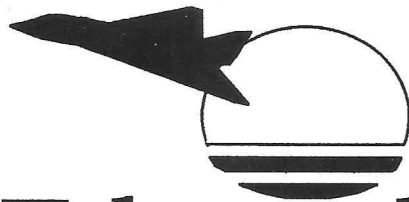




EDMONDS



Deltic **AIRSHOW**



Edmonds
AEROSPACE

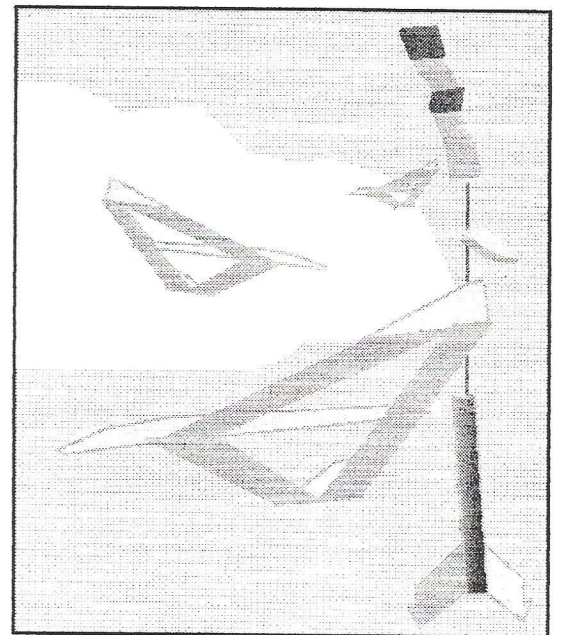
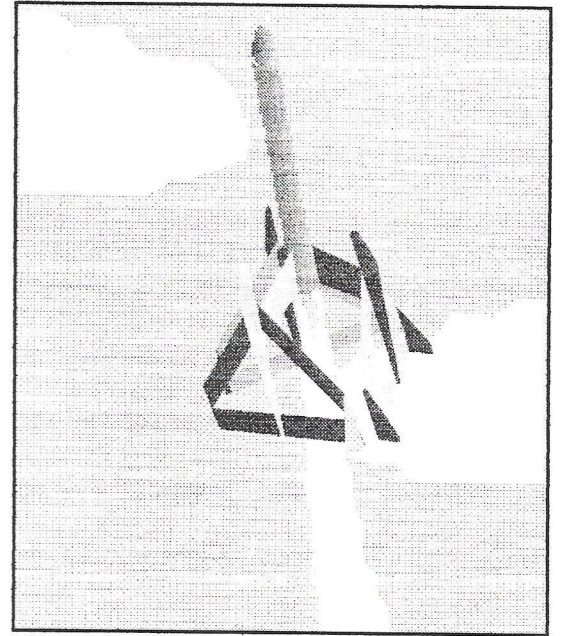
13326 Preuit Place * Herndon, VA 22070 * 703-471-9313

You're about to have some fun. Your Deltie will delight you with many exciting flights, but even before that, you're going to have the joy of knowing that you built your own aircraft. If you're a young person, why not get your parents to watch while you build your model? You'll impress them when they see how well you do, and if there is something you don't understand, they'll be able to help you.

Your Deltie Airshow is a special type of aircraft called a **boost glider**. A rocket motor **boosts** it straight up to a high altitude, and then it glides back, just like the NASA Space Shuttle that you see on TV. For a rocket-powered model to go up in a straight line, it needs to have lots of weight in the front, and fins at the back. For this reason, the rocket motor is mounted in a **booster pod** that attaches to the front of the gliders, and adds weight to the front. The gliders' wings and tails act like fins at the back. After the model has climbed to altitude and slowed down, the **ejection charge** in the rocket motor fires. The ejection charge creates a puff of gas that pushes a paper streamer out of the front of the pod and also pushes the pod backward off of the gliders. The streamer is tied to the pod by a long string called a **shock line**, and it helps the pod drift slowly back to the ground while the gliders circle around the field.

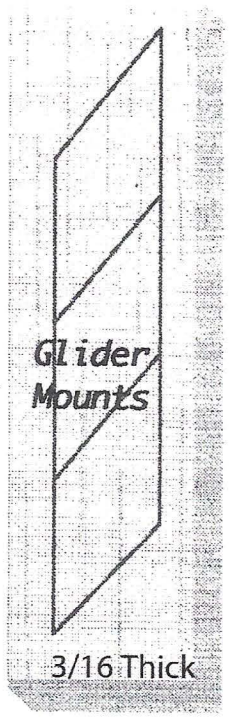
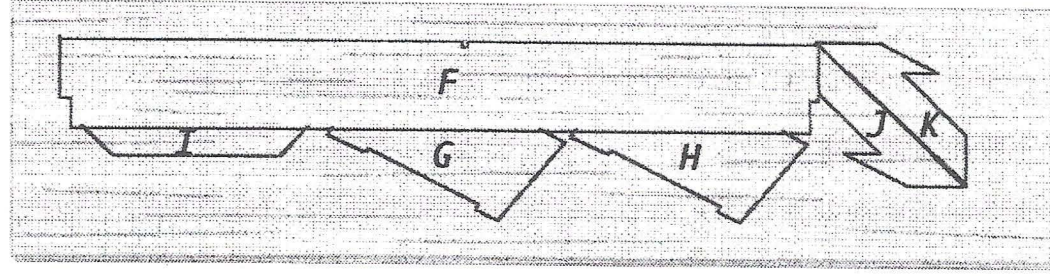
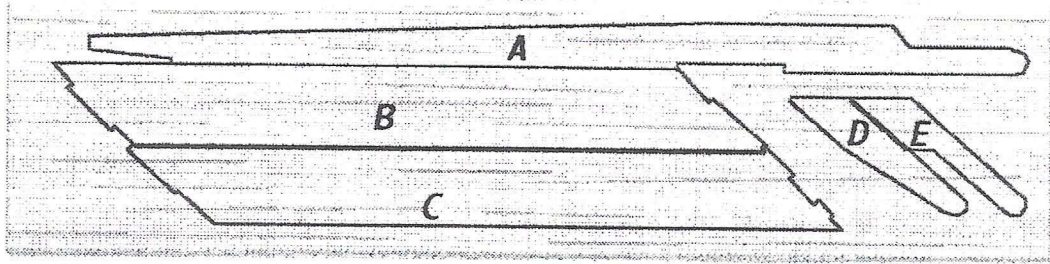
I've given you almost everything you need to build your Delties right here in the kit. The only other things you will need are a bottle of glue, a pencil, a small piece of sandpaper, and a board or table to work on (don't use a good table that you want to keep clean). There are just a few steps involved in building this model. First you're going to put the balsa parts together to make the gliders. The positions and angles of the parts are very important to the aerodynamics of an airplane or rocket, so I've put lots of notches and tabs on the parts to make them go together just right. Then you're going to make the engine pod. You'll make the balsa clips that hold the gliders on during the boost, and mount them on the pod. Next, you'll put on the shock line, which must hold very strongly to keep the nose cone and streamer from tearing off, so I'll have you attach it in two places. After that, you'll balance your gliders to make them fly right, and then you can take it out in the yard for some test glides. Finally, you'll learn how to set your model up for a rocket-powered flight, then take it to the field and let fly!

I, by the way, am Robert Edmonds, Jr. I wanted to design you a model kit that is not only easy and fun to build, but also one that is almost certain to give you good flying results if you follow the directions. Many models of this type require very careful adjustment in order to work properly. I've rounded up a group of manufacturers from all over the United States to produce the parts for this design. Their job is to make sure that the parts are so consistent that every model will fly well on the first attempt, with no need for special adjustment. Balsa Machining Service and Euclid Spiral Paper Tubes are just two of the companies that have made parts for your Delties. Together, I think we've put out one of the best kits for its price that you can get today. It's here waiting for you to build, so turn the page!

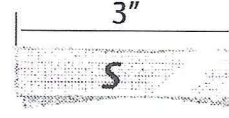
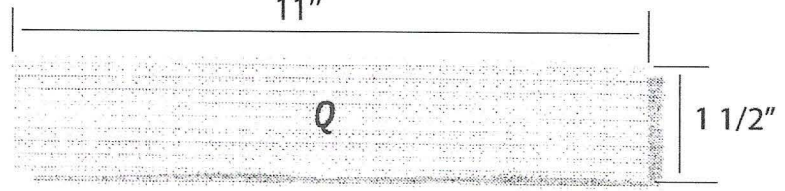
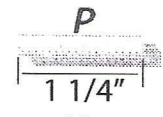
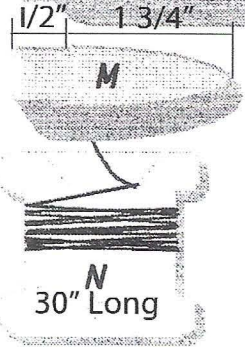


1/16 Thick

1/16 Thick

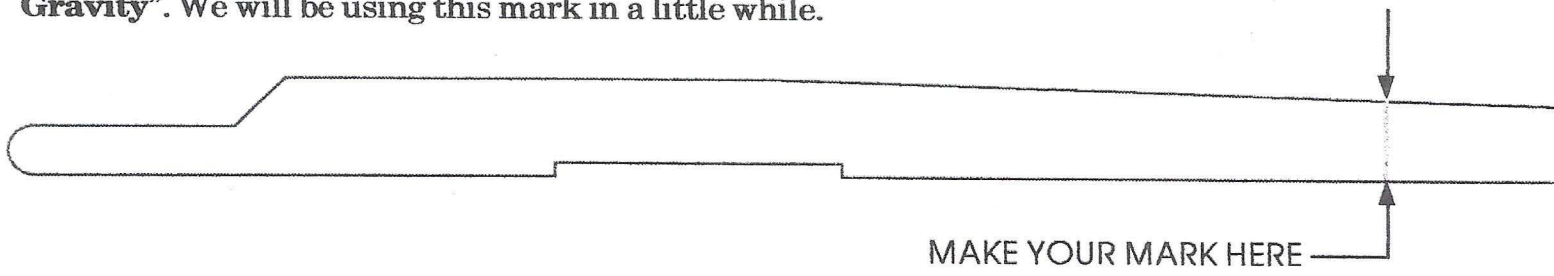


BT-20 12" Long



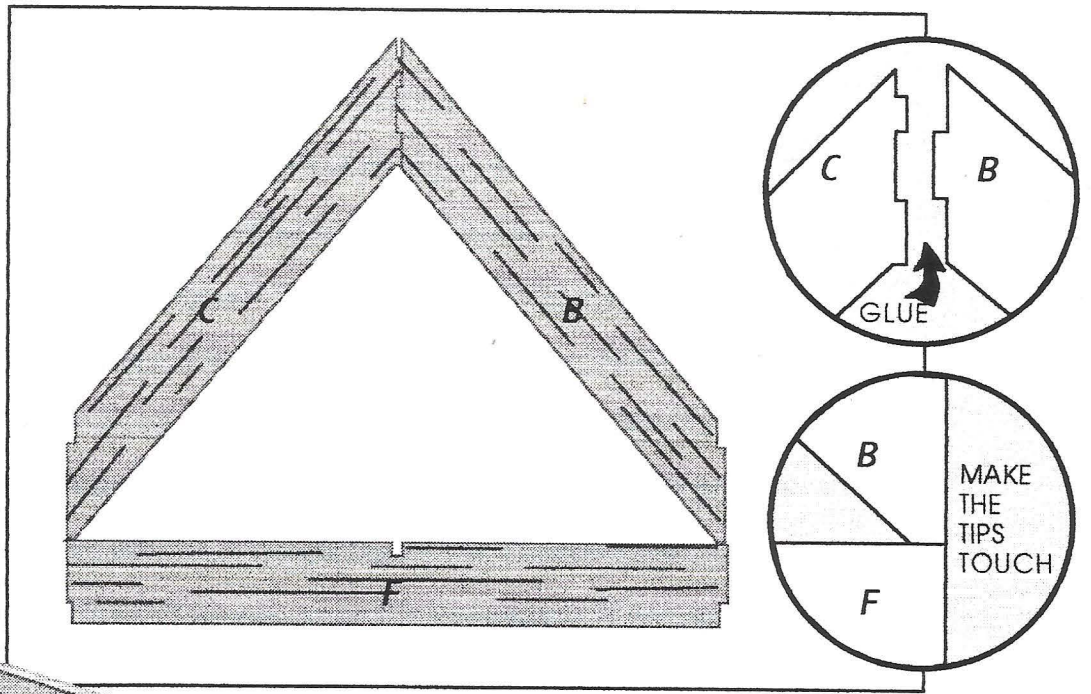
These are the parts for your model. Three sets of two balsa wood sheets have been laser cut for you, so all the parts are already the right shape to make your three gliders. Balsa parts A through H make up the glider. Balsa pieces I, J and K become parts of the pod. L is the tube that holds the motor and streamer in the pod, and M is called the nose cone (even though it isn't really shaped like a cone). It was turned for you from a block of balsa by Bill Saindon of Balsa Machining service. P is a "launch lug", used to guide the model along a rod to make it lift off straight. Q, the streamer, together with R, S and the string wrapped around N make up the **recovery system**. You will be using some of the clay from O to balance your gliders. T and U aren't even parts of the glider, they are tools to help you build, as you will see. The *Glider Mounts* are special pieces made from thick wood, they hold the three gliders in the right position while the booster carries them up.

Right now, I want you to perform the most important step in building a Deltie. Take A, the **fuselages**, from the balsa sheets put it inside the outline below, and make a mark on each one where I've shown. You have marked the balance point of your aircraft, often called the "**Center of Gravity**". We will be using this mark in a little while.

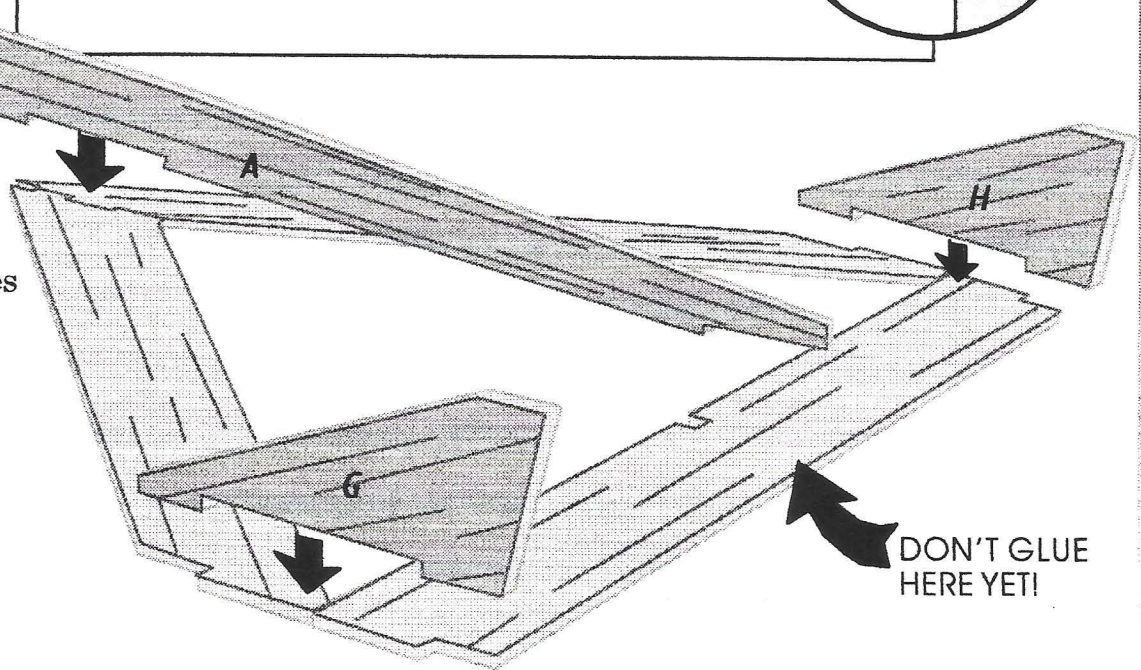


Make all three gliders the same way!

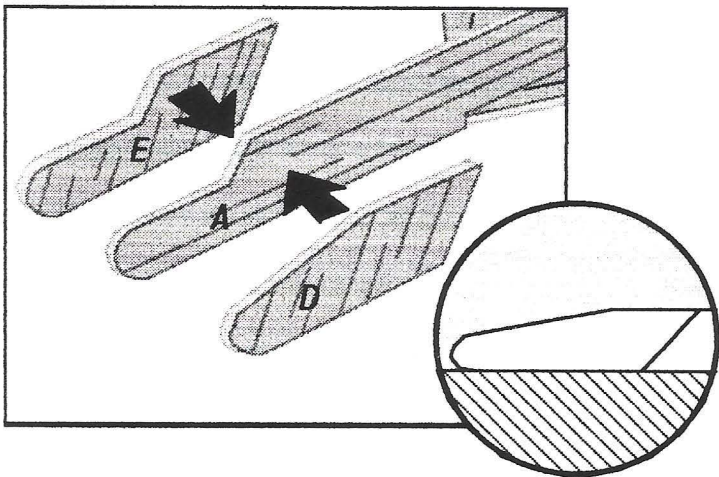
1 Begin your Deltie by removing pieces *B*, *C* and *F* from the balsa sheet. Put some glue on parts *B* and *C* where they will be touching, then arrange all three on your table so that the tips of *B* and *C* meet the tips of *F*. If you want, you may also put some glue where the tips touch. Make sure the glue doesn't end up sticking to the table, or it will ruin the table and the model!



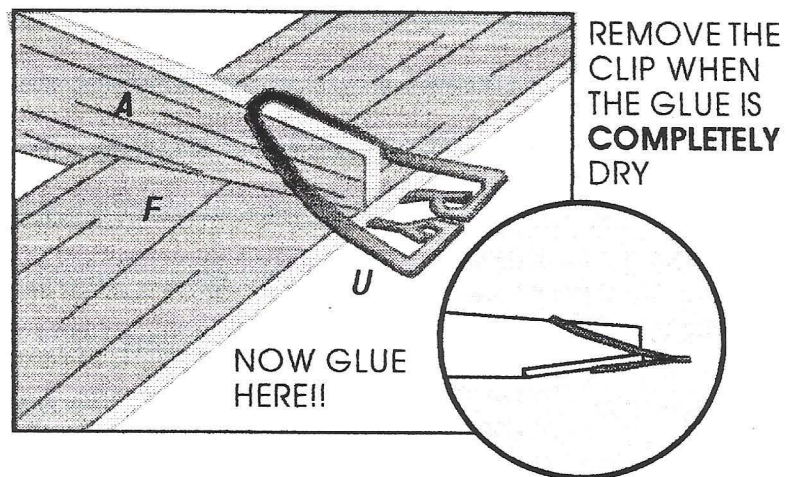
2 Now remove the fuselage (*A*) and the vertical fins (*G* and *H*) from the balsa sheet. Glue the fins into the notches at the wingtips, with glue at every place where the fins touch the wings. Put glue where the fuselage touches wings *B* and *C*, but **DON'T** put any glue between the back of the fuselage and *F*. (We're coming back to that later). Slide the fuselage down into the notches.

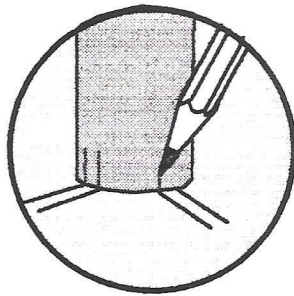
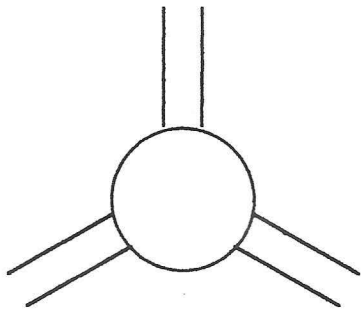


3 Glue pieces *D* and *E* to the sides of the nose of the fuselage. The pieces should rest on the table along with the fuselage, so you'll know that they're parallel. The pieces make a little pocket for clay on the right side of the nose.

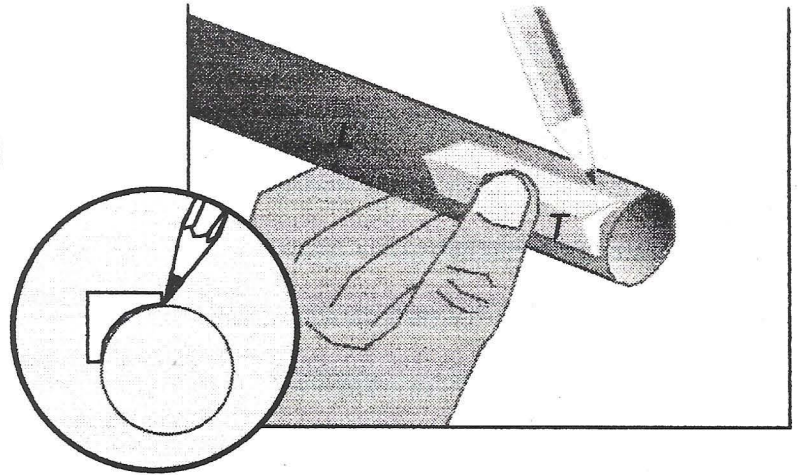


4 After giving the other joints a half hour or so to dry, put some glue under the back end of the fuselage and use *U* to clip *F* to the fuselage until it dries. This will twist *F* a little bit. This step is **EXTREMELY** important; we'll explain why soon.

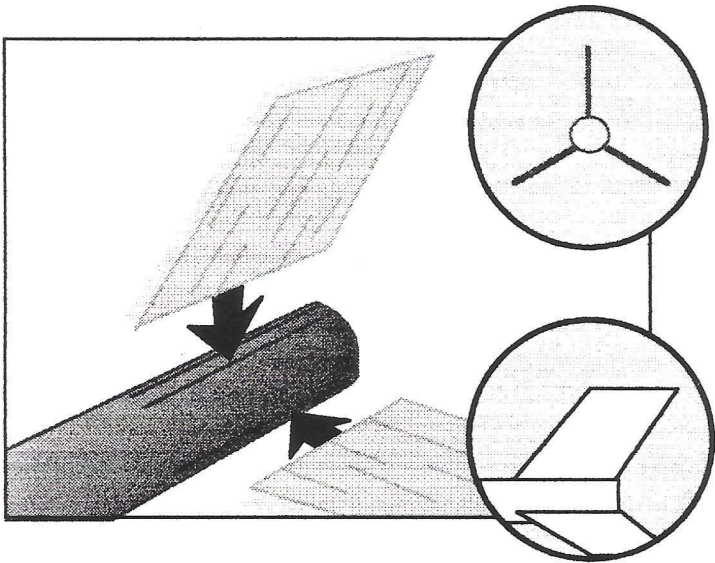




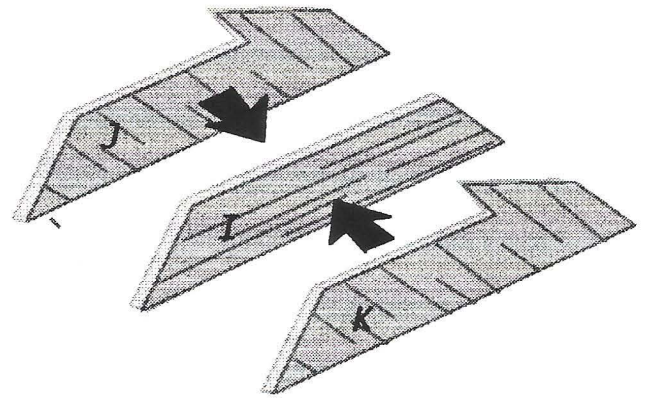
5 Now it's time to start on the booster. Place the bottom of the tube L right on this circle and mark in the position of the three glider supports with your pencil.



6 Take the tube marking guide T and use it to make a straight line down the tube from each of your marks. This will show you where to mount the glider supports.

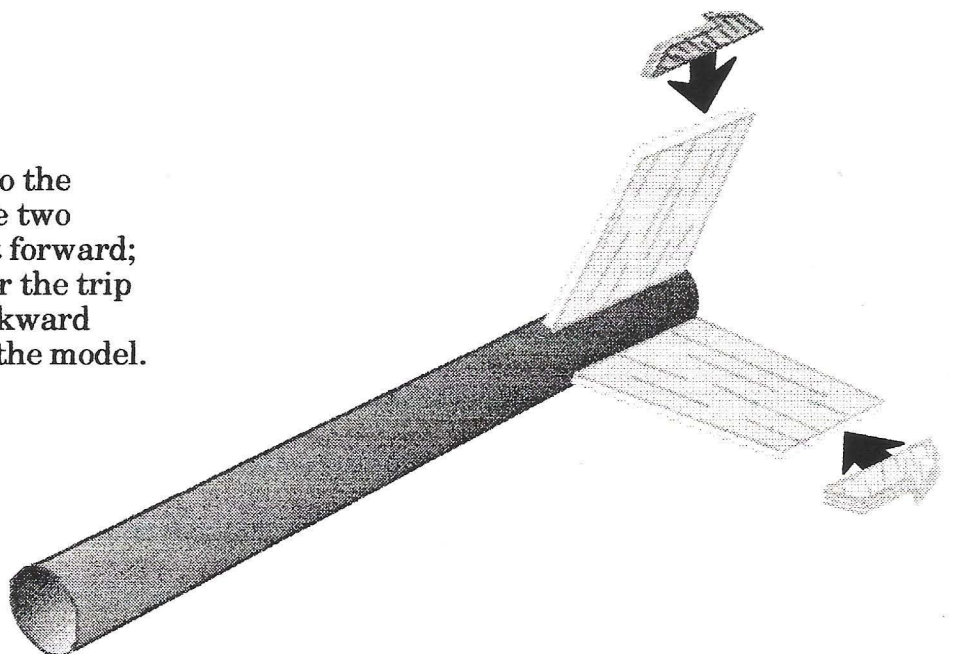


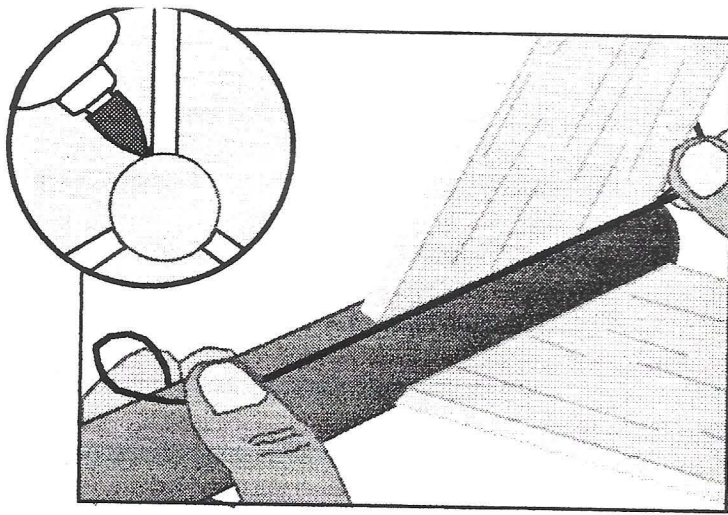
7 Take the three glider supports and glue them at the very back of the tube where you made your marks.



8 Remove the three sets of I, J and K from the balsa sheets and glue each set side by side, like this. These make the clips that hold the gliders to the supports.

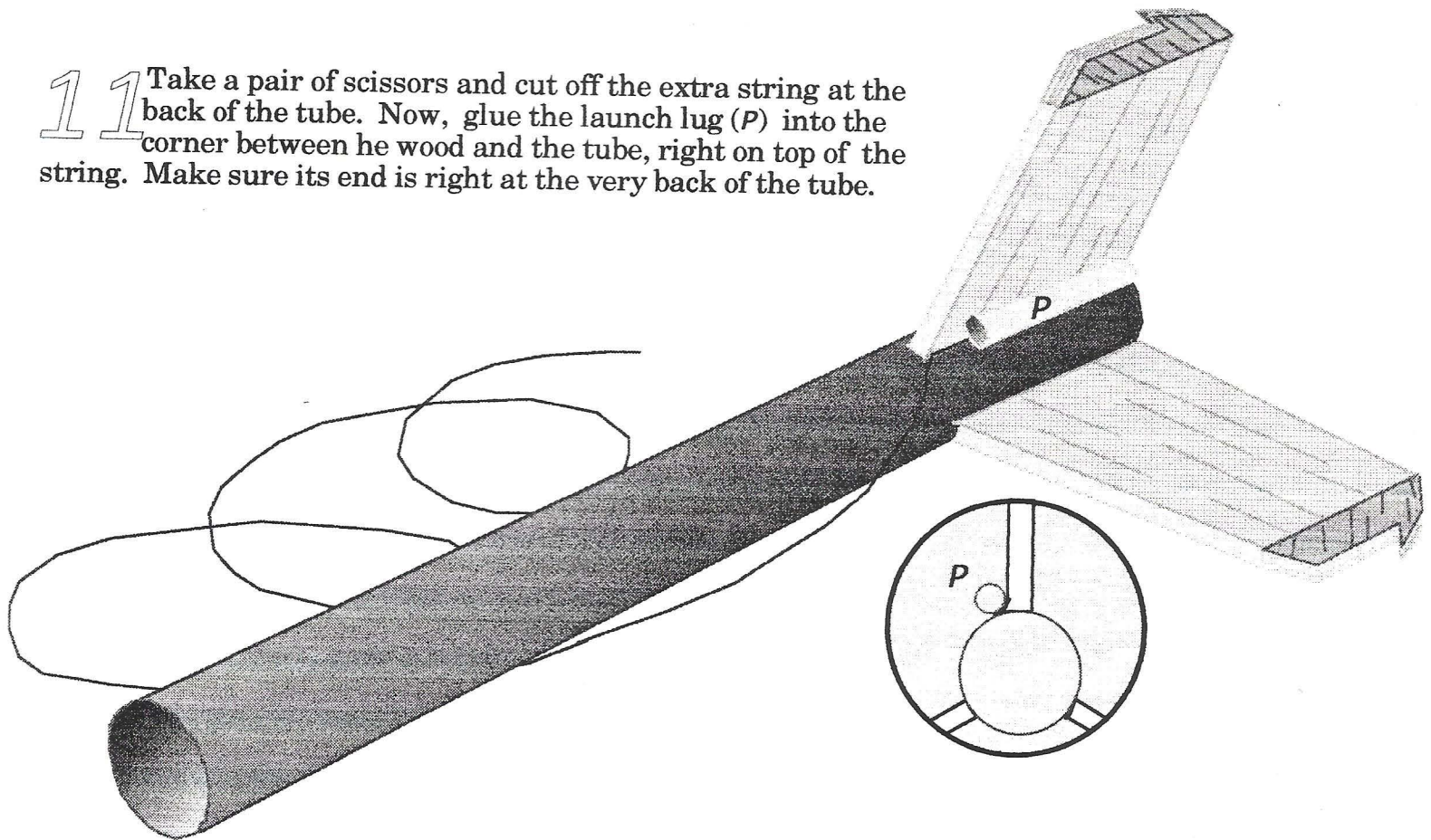
9 Now glue the three glider clips to the tips of the glider supports. The two "prongs" on each clip must point forward; the gliders hook on to these prongs for the trip upward. You will slide the gliders backward under these prongs before launching the model.



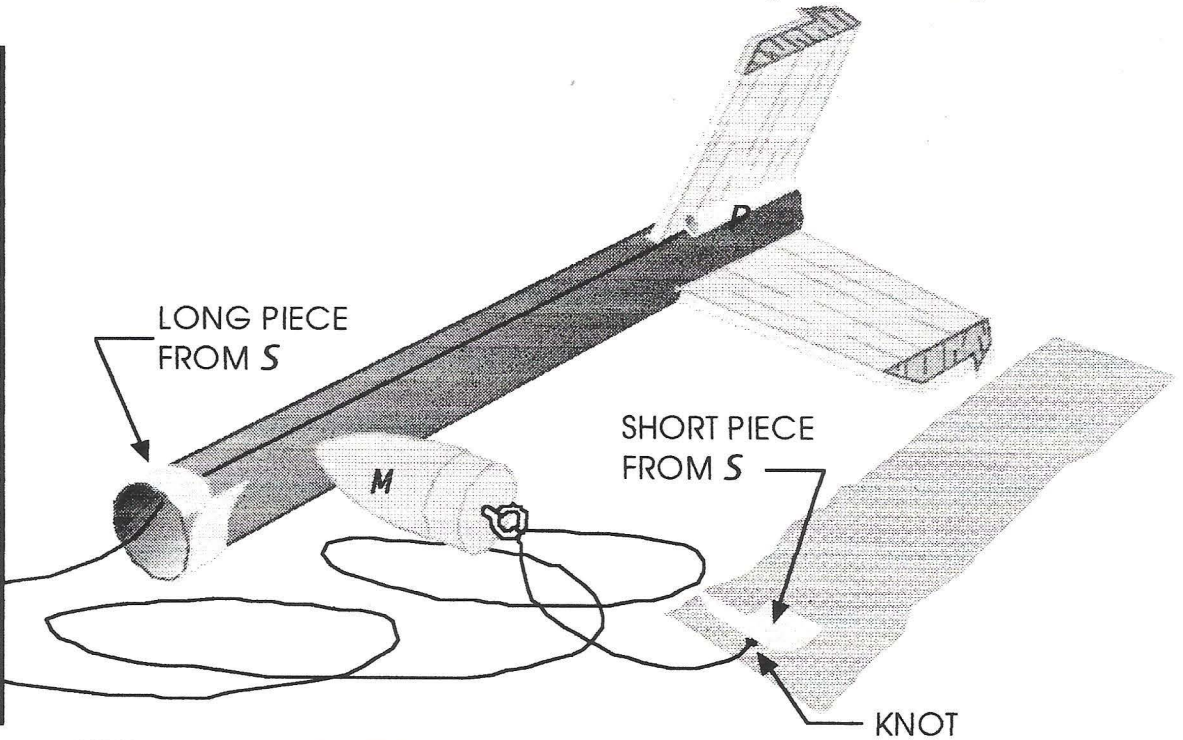
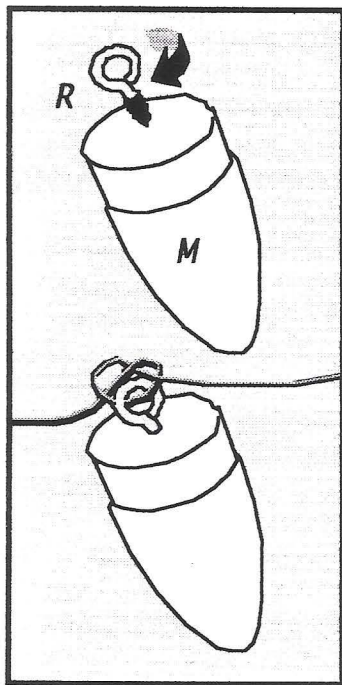


10 Let the joint between the wood parts and the tube dry for about a half hour. Then unroll the string from *N*. Hold the string near its end and glue it down into the corner between the wood and the tube, leaving no more than an inch of string beyond back of the tube.

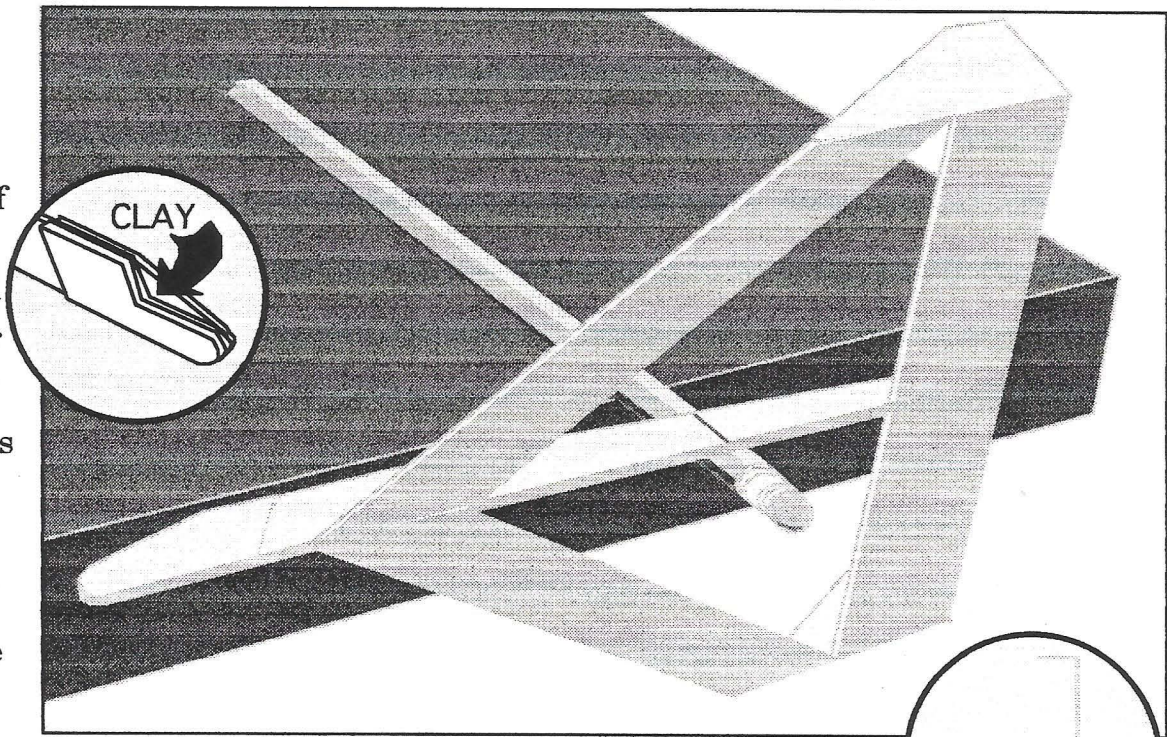
11 Take a pair of scissors and cut off the extra string at the back of the tube. Now, glue the launch lug (*P*) into the corner between the wood and the tube, right on top of the string. Make sure its end is right at the very back of the tube.



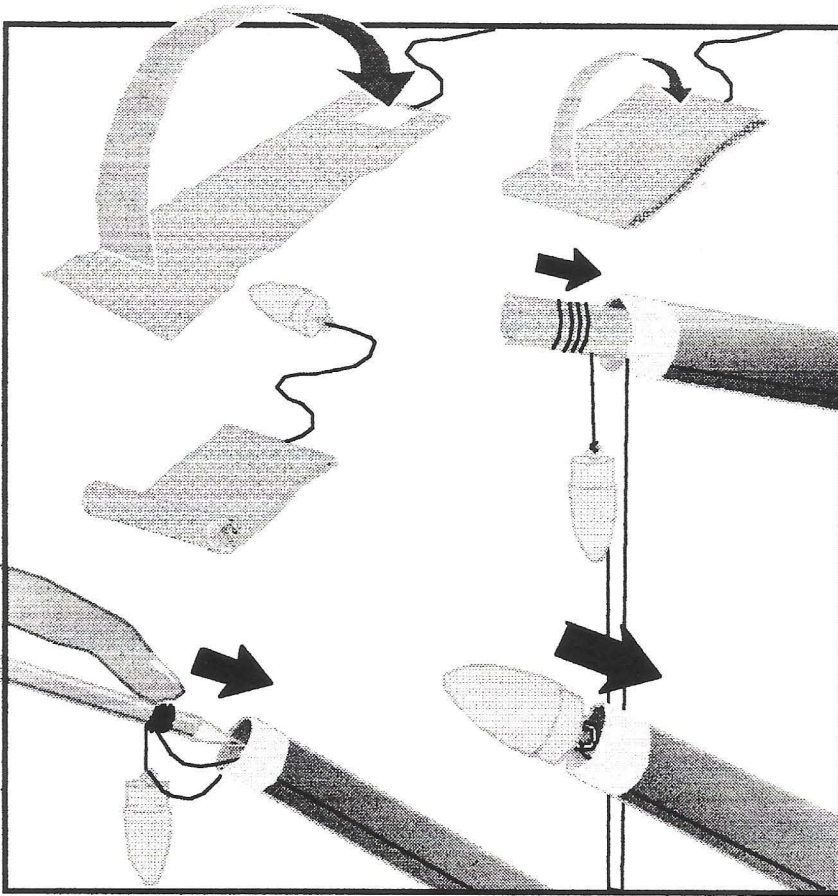
12 Now you will assemble the **recovery system** that lowers the booster to the ground. Part **S** is a strip of **adhesive-backed plastic** that you will use as really strong tape. Use scissors to cut a piece about 1/2" long from **S** and save it. Pull the backing off of the leftover piece of **S** so that you can see the sticky side, then wrap it around the front of the tube and the string so that it holds the string to the tube. Pull the string so that it is tight between the launch lug and the front of the tube. Now screw **R**, the **screw eye**, into the back of **M**, the nose cone. Then tie the string through the screw eye, making sure to leave about 2 inches of extra string beyond the knot. Finally, put another small knot in the string near the end, and stick it to one end of the streamer using the 1/2 inch piece from **S**.



13 Now, here is the reason you made that very important mark on the side of the fuselage. To fly, a glider (or any type of airplane) must be sort of heavy in front, just like a rocket. If it is just heavy in front, though, the glider will just go straight down. We have to do something special with aerodynamics to hold the nose up. For this glider, the little twist you put into **F** keeps the nose up while the glider is flying. When the nose is up, the wings can produce **lift** and let the glider fly. This can only work right

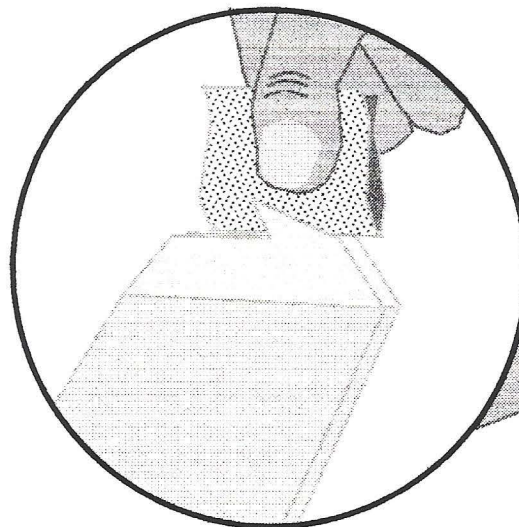
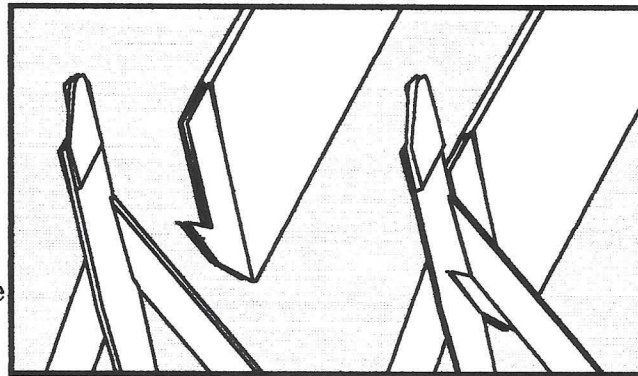


if the front of the aircraft has exactly the right amount of weight. Place a pencil so that it hangs over the edge of the table. Try to balance the glider with the side of the fuselage on the pencil. Now start adding clay inside the little pocket in the nose, a little at a time, until the glider balances with the fuselage mark directly over the pencil (it is OK to overflow the pocket). Once you've gotten it to balance here, it should fly pretty well when you take it outside and toss it by hand. If you fly the glider outside, and it seems to come down a little bit too steep, you might want to take a little clay off.



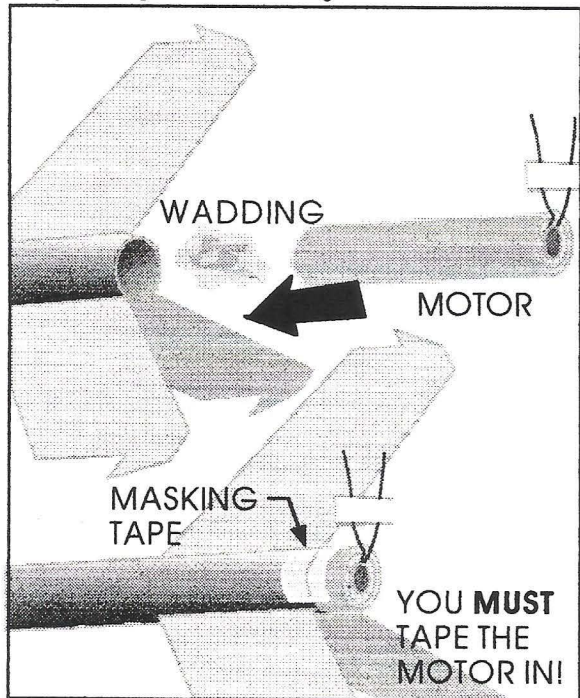
14 Now, you're pretty close to being ready to fly. The things you're going to do in this step need to be done for every flight. Basically, you have to get the entire recovery system inside that tube. Start by folding the streamer over a couple of times. Then roll it up like a snowball, and keep rolling until you have wound most of the string leading to the nose cone around it. Slide the streamer in through the front of the tube, and let the nose cone dangle from the short string. Now take the long string between the nose and the tube, and start winding it loosely around a pencil until you just about use it up. Then slide the string off of the pencil and into the tube with your finger. Finally, push any remaining string inside the tube, and then push the nose cone in. Only the piece of string from under the tape between the cone and the tube should stay outside.

15 Now test the fit one of the gliders into each of the three clips on the booster. Notice that the two balsa prongs on each clip should fit snugly around the joint between the wings and the fuselage, so that they will hold the glider on while the rocket motor is running. Now, hold on to the pod with one hand and see if the glider slides out easily when you turn the whole model upside down. The glider should either slide right out by itself, or come out with just a little bit of shaking. If it doesn't come out easily when you test it, it will not separate when it is flying, and may get broken when the glider and pod hit the ground together. If it takes more than a light shake to make the glider slide out, find a piece of small sandpaper and gently sand between the two prongs on the pod. Sand a little, then test again, and repeat this until the fit is loose enough to work.



THE GLIDER SHOULD SLIDE OUT WITH A VERY GENTLE SHAKE

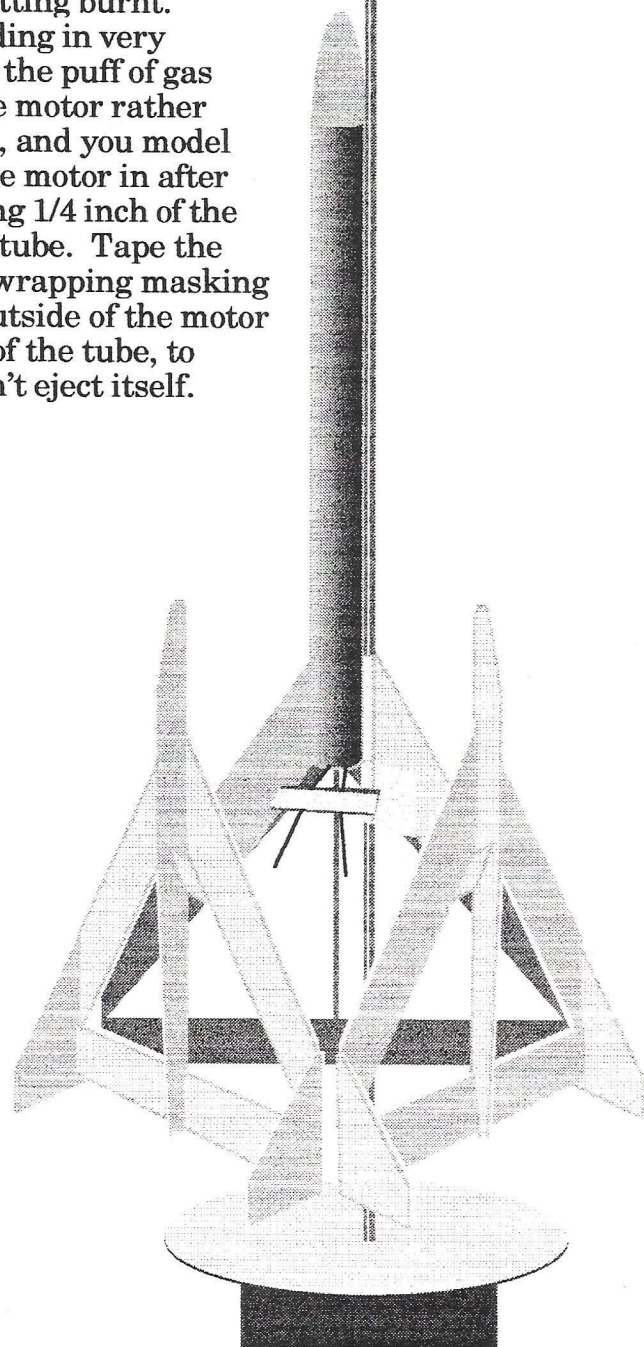
16 You're almost ready for the show! You should do these last few steps at the field where you're going to fly. Delties fly pretty well, which means that if the wind is blowing, they might go a long way before they come down. You should use a big place, like a park with several baseball diamonds or soccer fields, or a farmers field out in the country. That will help make sure you get your model back. Get a set of **B4-4** motors to make your flights, along with a package of **recovery wadding**. If you can't find the wadding, you can fly without it a couple of times, but the streamer becomes very sooty. Carefully follow the instructions that come with the motor for

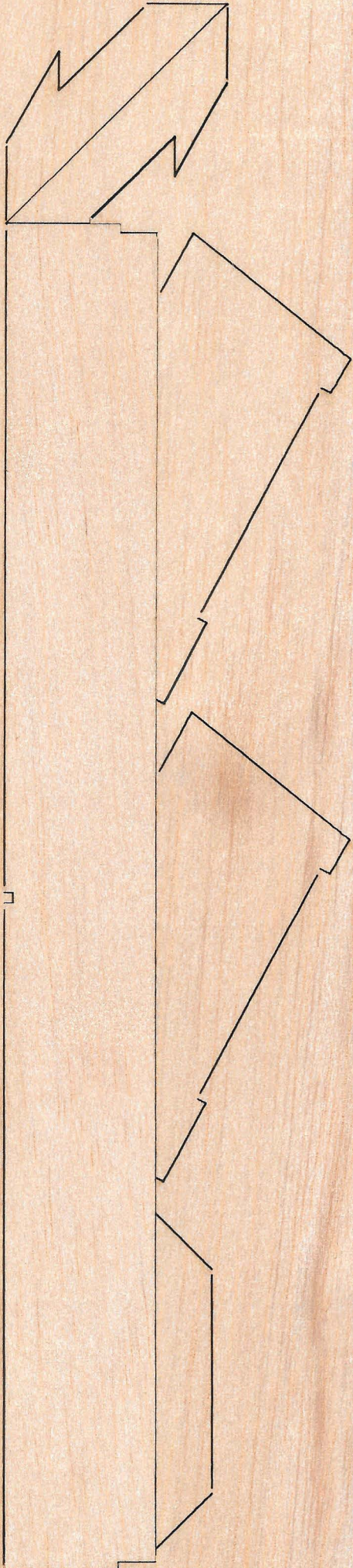


putting in the igniter. Now, take about a half of a sheet of wadding, loosely crumble it into a ball, and gently stuff it into the tube from the back. When the motor shoots that small puff of gas forward to eject the streamer and separate the gliders, the wadding will keep the streamer and string from getting burnt. Don't put the wadding in very tightly, though, or the puff of gas might blow out the motor rather than the streamer, and your model will crash! Put the motor in after the wadding leaving 1/4 inch of the motor outside the tube. Tape the motor in place by wrapping masking tape around the outside of the motor and the back end of the tube, to make sure it doesn't eject itself.

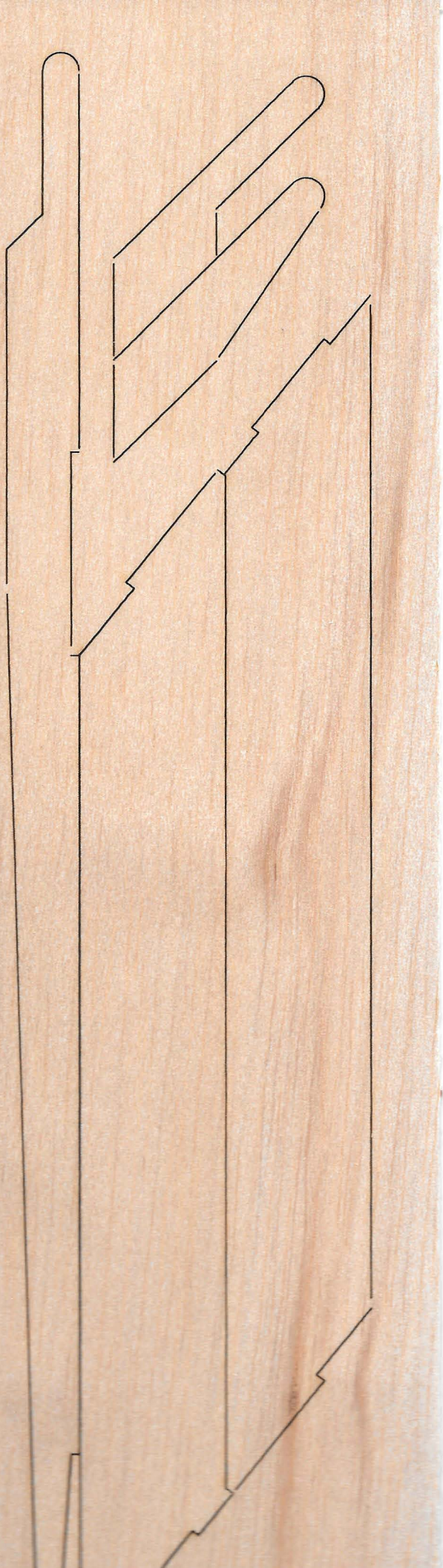
17 Now, you're ready to take the model out to the launch pad. If you plan to use your own launch pad, make sure you use a 1/8 inch launch rod 36 inches long. Since the gliders have to hang down from the pod for liftoff, you need to wrap a piece of tape around the launch rod to hold the pod just high enough for the glider to clear the pad. Put the launch lug around the end of the rod, then slide the pod down until it rests on the tape. If the weather is very windy and the gliders keep blowing off of the pod, put the model away for another day. Even if you did manage to launch on a windy day the gliders would probably all fly away. When everything is ready, hook the clips to the igniter, then mount the three gliders on their hooks. Make sure that, when the wires fall down after ignition, they won't catch the gliders on their way up! Tell everyone to stand back, and proudly make your countdown. When you get to zero, start the motor and delight your airshow crowd!

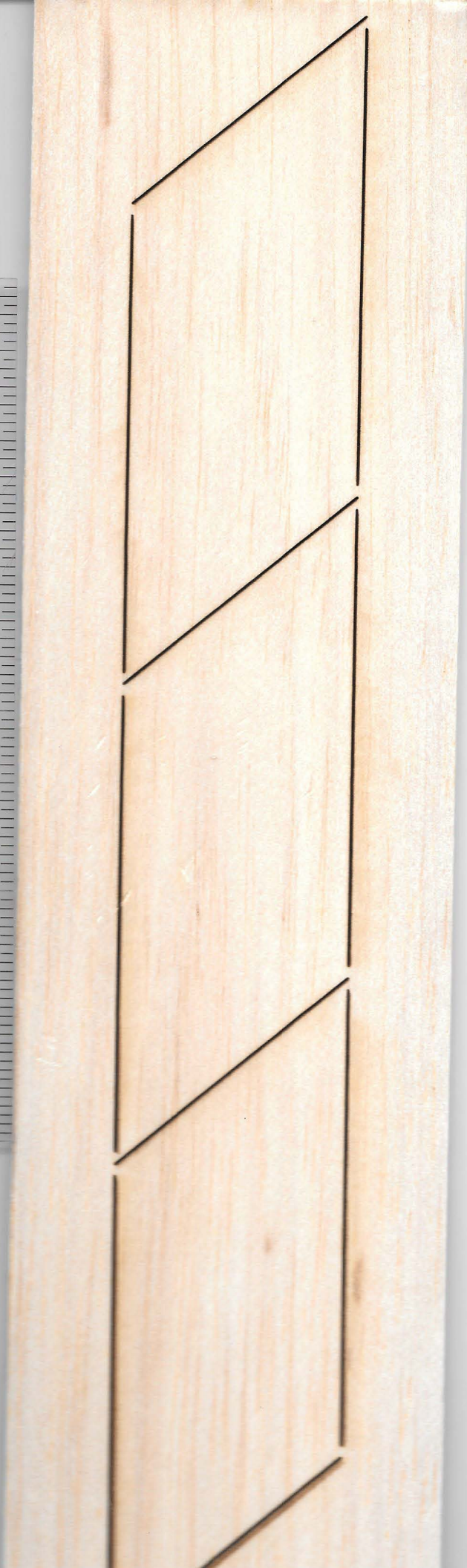
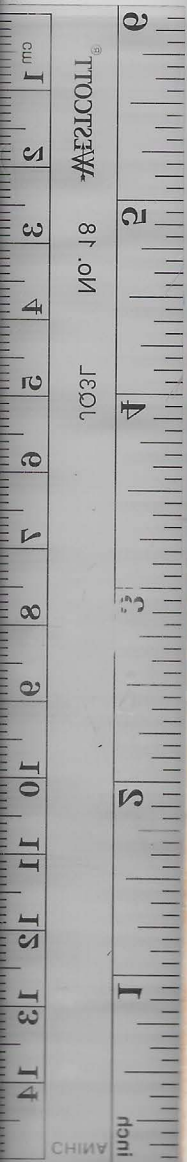
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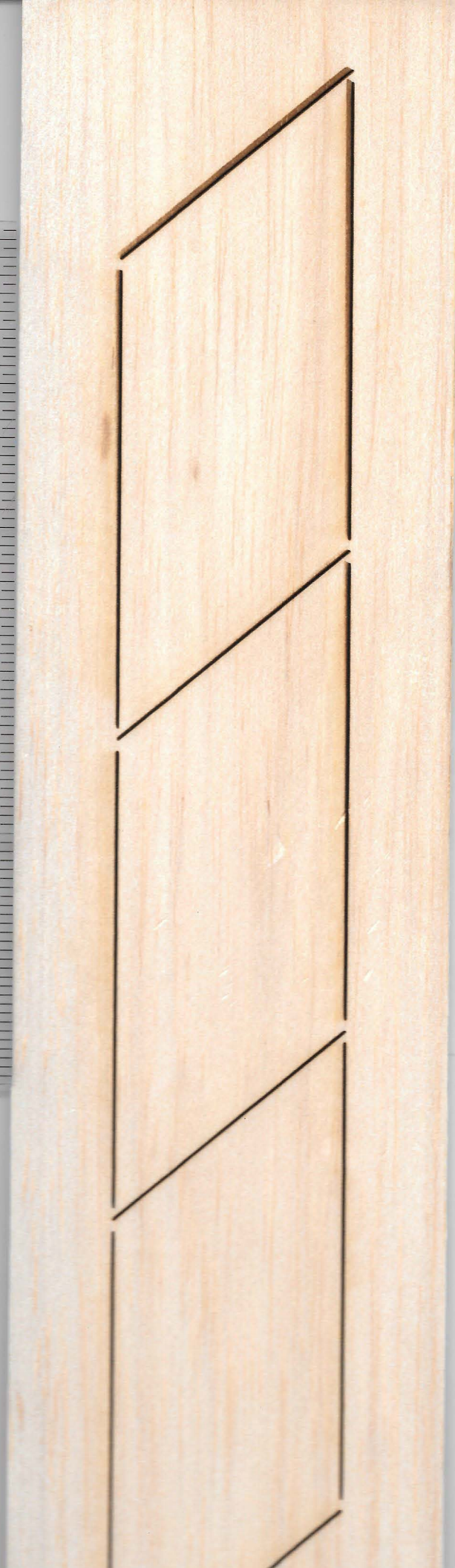














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Deltie Airshow

Spectacular
three-ship
airshow event!



The big booster carries three Deltie aircraft high overhead, where they are released in a spectacular "vertical break" maneuver just like the one performed by the Blue Angels. Use the A-3, B-4 and C-5 meters.



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