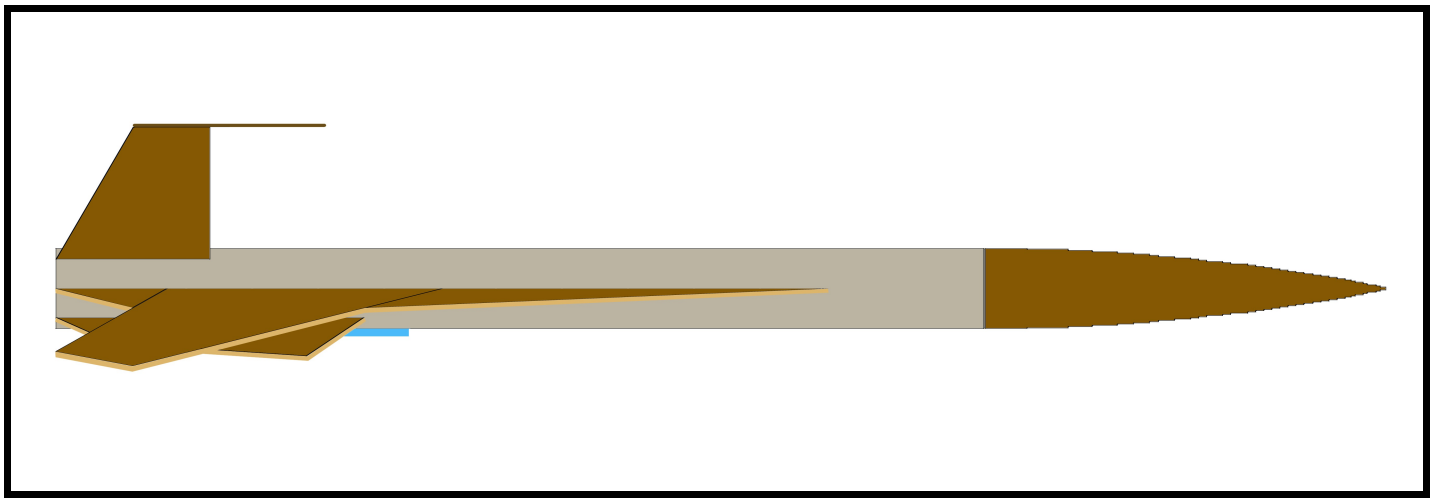
BARCLONE
Rocketry Products

Skill Level 1

Stryker

Created By C. P. McGraw



Length	17.2”
Diameter	1.040”
Fin Span	9.080”
Weight	1.2 oz

Parts List

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Nose Cone.................................BC-1052
Body Tube................................ST-10120
Engine Mount..............................EM-710
Fin Stock.........................3/32″ Sheet
Fin Tip Probes.............1/8″ x 6″ Dowel Stock
Launch Lug................................LL-18
Shock Chord...............................SC-24
Kevlar Thread............................SCK-24
Parachute................................CPK-12
Screw Eye.....................................1″
Snap Links..............................(2)  #10
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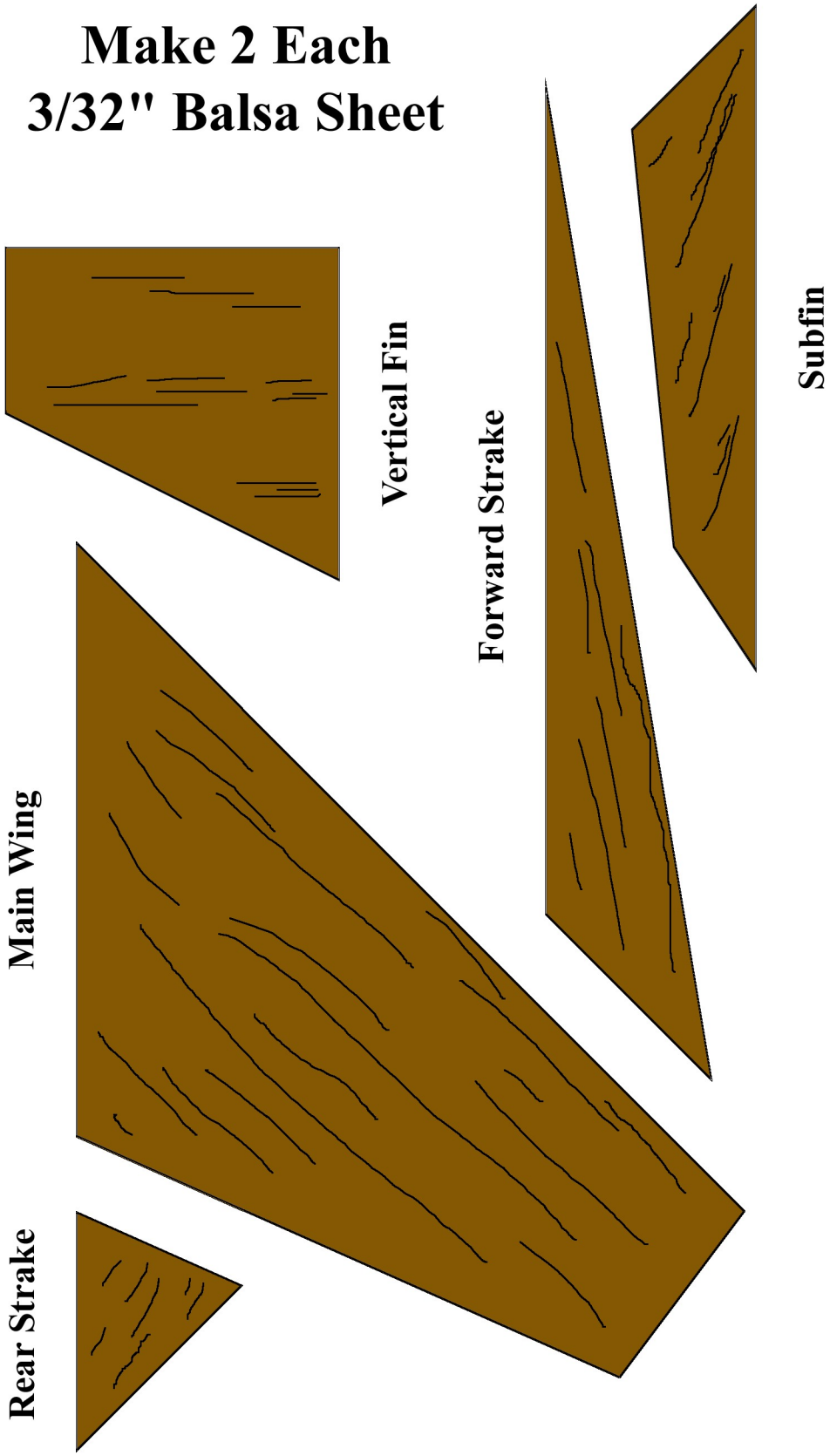
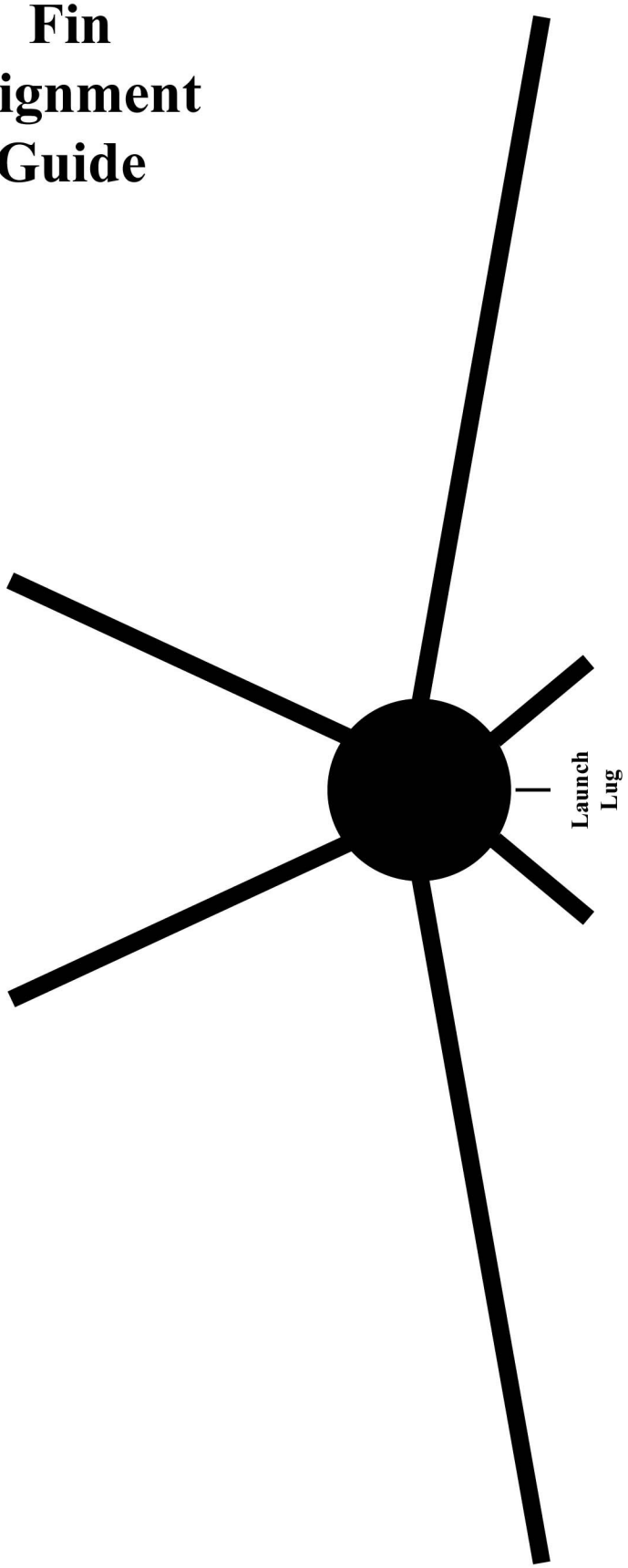
Additional Items Required:

Small bottle of yellow carpenter's glue with 'precision' applicator tip; sharp hobby knife; steel ruler; 0.05mm mechanical draftsman's style pencil; small soft-bristle hobby brushes; sheets of 220-, 400- and 600-grit sanding papers; several sheets of cardstock for templates and guides; sprayable primers, paints, and clearcoat; expended 18mm motor casing; empty CD-R spindle for use as a holding spike; a personal copy of **The Model Rocketry Handbook, Seventh Edition**, by G. Harry Stine and Bill Stine

Make 2 Each
3/32" Balsa Sheet



Fin Alignment Guide



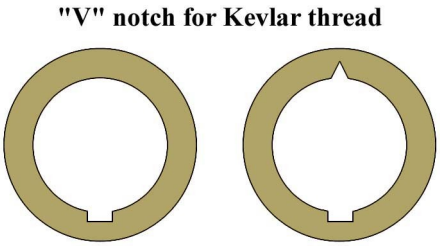


Figure 1

- ***Step 1*** Modify the two CR-710 centering rings from the EM-710 package as shown in the left-side image of Fig. 1. Modify one of these two rings with a "V" notch, as shown in the right-side image.

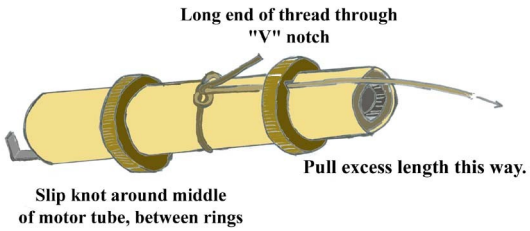


Figure 2

- ***Step 2*** Assemble the EM-710 following the Semroc assembly sheet but without glue, using the "V"-notched ring as the forward ring. The flat notches should align over the motor hook. Study Fig. 2. Form a slip-knot loop at one end of the Kevlar thread, then pull this loop tight around the mid-point of the mount. Slip the loose end of the thread through the "V" notch, and slide the loop up against the rear of the forward ring, pulling the excess thread through the notch. Now glue this motor mount assembly together and set aside to dry.

- ***Step 3*** Give the entire body tube a light sanding with 220-grit paper to remove the shine from the surface. Do not sand through the outer layer of paper.

- ***Step 4*** Using the Tube Marking Guide, mark the body tube for the six fins and the launch lug.

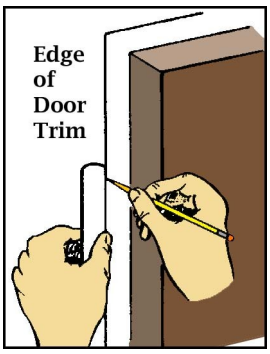


Figure 3

- ***Step 5*** Extend the fin lines using the trim around a door, as shown in Figure 3, or using a piece of brass angle stock. Measuring from the rear edge of the body tube, the two vertical fin lines are 2" long, the two main fin lines are 10" long, the two subfin lines are 4" long, and the launch lug line is 5" long. Place a mark on the lug line 2.75" from the rear edge of the body tube.

- ***Step 6*** Using an artist's brush, apply a layer of thinned glue to the full length of the fin alignment lines, and to the launch lug line between the position marks.

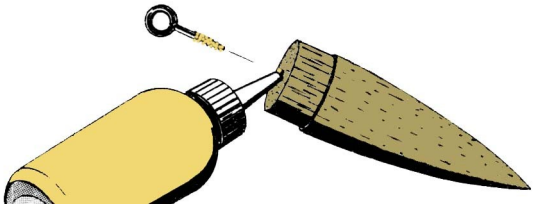


Figure 4

- ***Step 7*** As shown in Fig. 4, thread the screw eye into the base of the nose cone Remove the screw eye and force glue into the hole. Coat the threads of the screw eye with glue and reinsert. Do not wipe away the excess glue. Allow the glue to dry with the cone pointing downward.

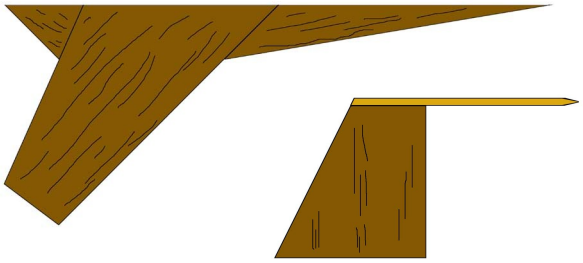


Figure 5A *Figure 5B*

- ***Step 8*** Cut all of the fins from 3/32" sheet stock, and give only the flat surfaces a gentle sanding with 220-grit paper. Cut two 3” lengths of 1/8” diameter dowel stock for the probes. Taper and shape the forward-most 1/4” to 3/8” of each dowel, and smooth this with 220-grit paper. On a flat surface, glue the large main fins to the strakes as shown in Fig. 5A. Attach one probe to the top of each of the vertical fins, as shown in Fig. 5B. Allow all of these to dry.

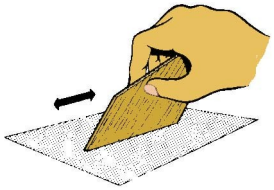


Figure 6

- ***Step 9*** Sand the excess glue from the fins. Do not over-sand. Gently round over the outer edges of all fins, except for the root edges. Square up the root edges so that they will be flat to the body tube when attached. See Fig. 6.

- ***Step 10*** Apply a layer of thinned glue to the root edges of the fins, and along the full length of the launch lug, using the artist’s brush. Allow these to dry.

- ***Step 11*** Apply a bead of full-strength glue to **one** of the fin alignment lines (on top of the layer you applied in Step 6), and to the root edge of the **matching fin** (on top of the layer you applied in Step 10). Push the fin against the body tube and hold in place for about 12 seconds. Use a moist soft-bristle brush to smooth out the excess glue that squeezes from the joint. Slide one or more alignment guides over the tube and down over the fin, gently aligning the tilt of the fin to match the corresponding slot in the guide(s). Allow this fin to dry about 20-30 minutes. Remove the guide(s), and repeat this sequence for **each** of the remaining fins.

- ***Step 12*** Attach the launch lug to the body tube on the lug alignment line, between the 2.75” mark and the 5” mark. Allow to dry.

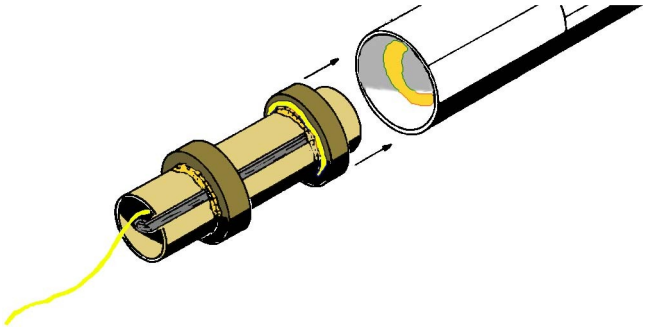


Figure 8

- ***Step 13*** Push the Kevlar thread down through the center of the EM-710 mount from the front and pull tight. Apply a bead of full-strength glue inside the body tube at the rear, about 1.5" up, as shown in Fig. 8. Insert the front end of the mount into the bottom of the body tube and push forward with a smooth, continuous motion until the bottom of the motor tube is even with the bottom of the body tube. Do not stop during this process, or the mount will ‘freeze’ in the wrong place. Allow to dry.

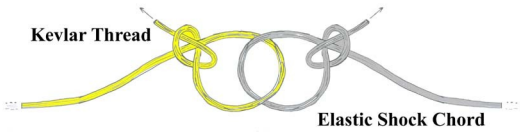


Figure 9

- ***Step 14*** Loosen the free end of the Kevlar thread and push the thread back through the motor mount, through the body tube, and out the top end. Tie a slip-knot loop in the free end, as close to the end of the thread as possible. Push one end of the elastic shock chord through this loop, as shown, and tie a slip-knot loop in it. See Fig. 9. Pull the two knots tightly together, and coat the knots with thinned glue. Allow to dry.

- ***Step 15*** Attach one of the snap-link swivels to the free end of the elastic shock chord. Assemble the parachute according to the Semroc instruction sheet, except attach the shroud lines to the other snap-swivel instead of to the screw eye in the base of the nose cone. Attach the shock chord snap-link on the shock chord to the nose cone screw eye, but do not attach the parachute at this time.

- ***Step 16*** Apply a bead of full-strength glue to the **base** of each fin on both sides, and smooth these out with a wet finger, forming the outer reinforcing fillet. Do the same to the launch lug. Allow these fillets to dry a full day before gently sanding with **used** 220-grit paper to reduce any sharp edges.

- ***Step 17*** Fill the grain of the balsa nose cone and fins with a surfacing treatment of your choice. We currently recommend **Elmer's Fill-N-Finish**, thinned to a pea-soup consistency and brushed into the grain of the wood. Remember to coat both sides of each fin when using this product, as the water content will tend to warp the wood if only applied to one side. Allow this to dry for 24 hours before sanding with 220-grit paper, and do not sand into the wood. If deep gouges are present in the wood, a second application may be needed. Finish this sanding with a dry 400-grit paper, then give the model a thorough wipe-down with a tack rag to remove sanding dust.

- ***Step 18*** The illustration in Fig. 10 shows the correct way to spray your model, regardless of the equipment used. Always spray the model from top- to-bottom, never from side-to-side, or bottom-to-top. Use the CD-R spindle as a cheap holding spike. Maintain a distance of about 12" between the tip of the spray and the model. This step applies to primers, paints, and final gloss coats.

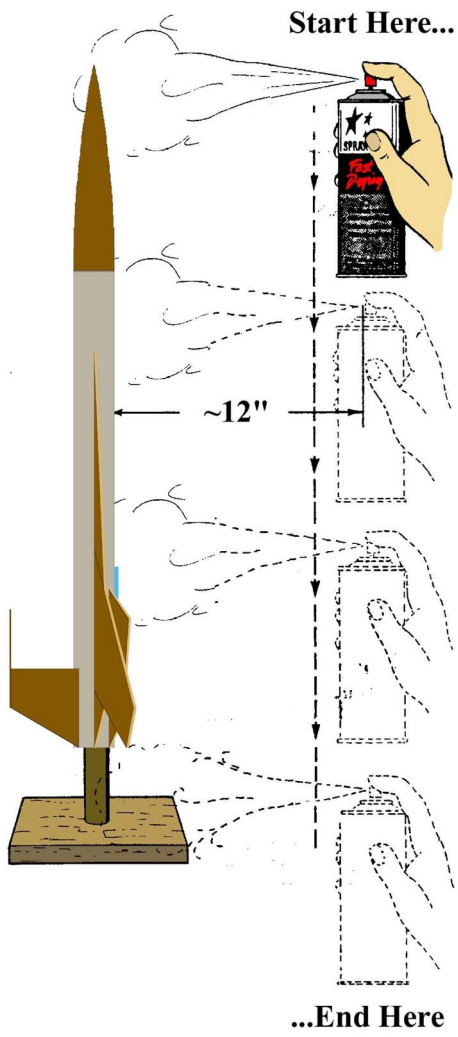


Figure 10

- ***Step 19*** Use a good sprayed primer over the entire model. We currently recommend **Rust-O-Leum Clean Metal Primer** in white, applied with an airbrush or spray gun. Once the model has been fully sealed with at

least two or three coats of primer, and the last coat has dried at least two days, you can begin sanding with 220-grit paper. Do not sand through the outer layer of paper! Repeat this sequence with as many coats of primer (sanding between coats) as needed to achieve a surface as free of imperfections as possible. The final coats of primer can be sanded with 400- and 600-grit paper, giving a very smooth surface for a glass-smooth color layer. Be sure to tack-rag the model before starting to apply color.

- ***Step 20*** The choice of paint scheme is left up to you, but we suggest a solid white body and fins, a black nose cone and black trim around the leading and tip edges of the vertical and main fins, and bright red subfins. An alternate paint scheme is to match the ghost gray camouflage of an F-15 Eagle

- ***Step 21*** After the final color coat has dried for several days, spray a clear gloss acrylic coat over the entire model in the same manner as shown in Fig. 8.. Give this a day to fully cure, then apply decals of your choice. When the decals have dried completely, give the model another coat of the acrylic clearcoat to seal the decals and protect them from flight hazards.

- ***Step 22*** For the first flight, we recommend the venerable A8-3. This is a workhorse of an engine, and you will probably use it more often for general flying than any other motor. While it will not give you the highest altitude with this model, you will likely get the model back every time when you fly with it. Wrap a layer of masking tape around the middle of the motor before inserting it into the motor mount. This will reduce the chances of recovery system failure.

Recommended engines:

A8-3 (First flights)
B4-4, B6-4
C6-5

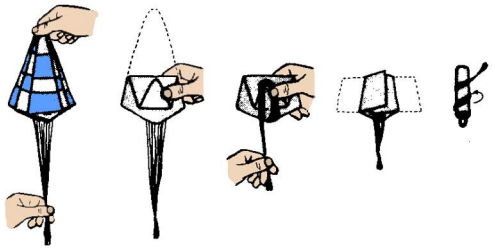


Figure 11

- ***Step 23*** Use the illustration in Fig. 11 to correctly fold the parachute prior to each flight. In cold climates, or during winter months, lightly dusting the parachute with fine talcum powder will help the chute open. Attach the snap link to the nose cone screw eye.

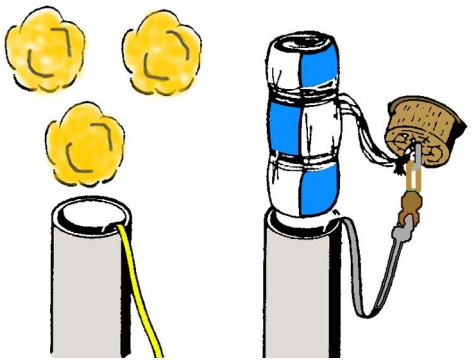


Figure 12

- ***Step 24*** As shown in Fig. 12, insert several loose wads (five or six at least) of flameproof recovery sheets, or about 2" of shredded cellulose insulation, into the top of the body tube, pushing with a pencil or a wood dowel until it is just above the motor mount. DO NOT PACK THIS MATERIAL TIGHTLY! This material has to blow out with the parachute and the shock chord to ensure complete deployment. If it is too tight in the tube, you will suffer recovery failure and likely a damaged model.

- ***Step 25*** Review the Model Rocketry Safety Code, and then go enjoy your new model!

Designed for BARCLONE Rocketry
by Craig McGraw.

Model Rocket Safety Code

Materials: **I will use only lightweight, non-metal parts for the nose cone, body, and fins of my rockets.**

Motors: **I will use only certified, commercially-made model rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer.**

Ignition System: **I will launch my rockets with an electrical launch system and electrical motor ignitors. My launch system will have a safety interlock in series with the launch switch, and will use a launch switch that returns to the "off" position when released.**

Misfires: **If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock, or disconnect it's battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.**

Launch Safety: **I will use a countdown before launch, and will ensure that everyone is paying attention and is a safe distance of at least 15 feet away when I launch rockets with "D" motors or smaller, and 30 feet when I launch larger rockets. If I am uncertain about the safety or stability of an untested rocket, I will check the stability before flight and will fly it only after warning spectators and clearing them to a safe distance.**

Launcher: **I will launch my rockets from a launch rod, tower, or rail that is pointed to within 30 degrees of the vertical to ensure that the rocket flies nearly straight up, and I will use a blast deflector to prevent the motor's exhaust from hitting the ground. To prevent accidental eye injury, I will place launchers so that the end of the launch rod is above eye level or I will cap the end of the rod when it is not in use.**

Size: **My model rocket will not weigh more than 1,500 grams (53 oz) at liftoff, and will not contain more than 125 grams (4.4 oz) of propellant or 320 N-sec (71.9 lb-sec) of total impulse. If my model weighs more than one pound (453 grams) at liftoff, or has more than four ounces (113 grams) of propellant, I will check and comply with Federal Aviation Administration (FAA) regulations before flying.**

Flight Safety: **I will not launch my rockets at targets, into clouds, or near airplanes, and will not put any flammable or explosive payload into my rockets.**

Launch Site: **I will launch my rockets outdoors, in an open area at least as large as shown below, and in safe weather conditions with winds speeds no greater than 20 MPH. I will ensure that there is no dry grass close to the launch pad, and that the launch site does not present risk of grass fires.**

LAUNCH SITE DIMENSIONS

Total Impulse (nSec)	Motor Size	Minimum Size
0.00 – 1.25	1/4A – 1/2A	50'
1.26 – 2.50	A	100'
2.51 – 5.00	B	200'
5.01 – 10.00	C	400'
10.01 – 20.00	D	500'
20.01 – 160.00	E, F, G	1000'
160.01 – 320.00	2G	1500'

Recovery System: **I will use a recovery system, such as a streamer or parachute, in my rockets so that they return safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rockets.**

Recovery Safety: **I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.**

Model Rocket Safety Code
developed by the
National Association of Rocketry
Revised Code November, 2004