

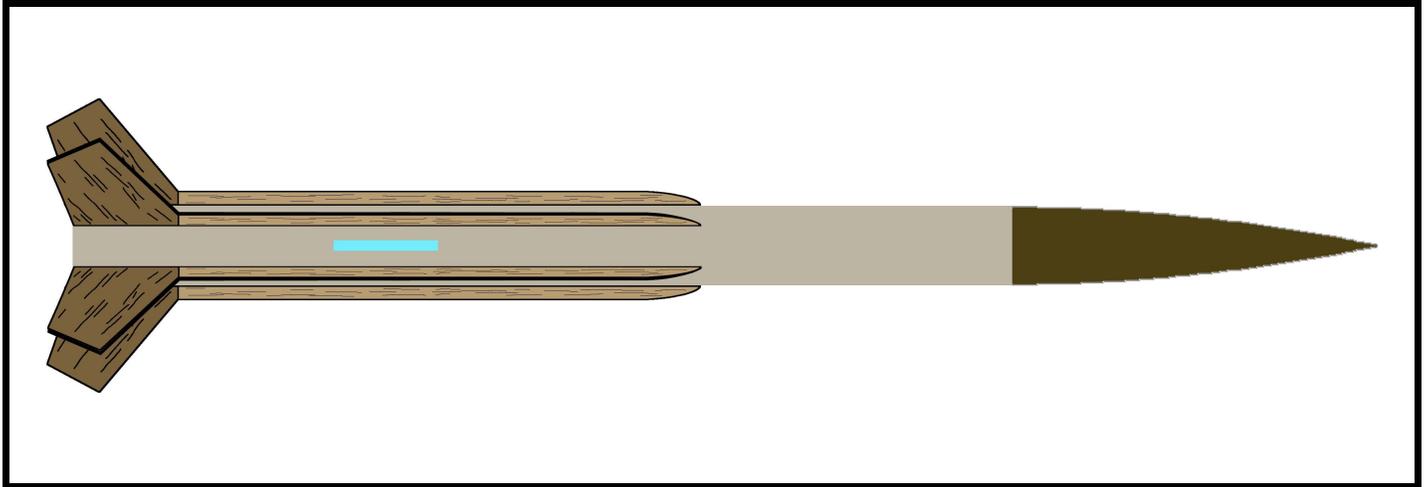


Skill Level 1

Ascender

Created By C. P. McGraw

Revision Date: Feb 24, 2005



Length	12.750"
Diameter	0.759"
Fin Span	2.813"
Weight	0.75 oz

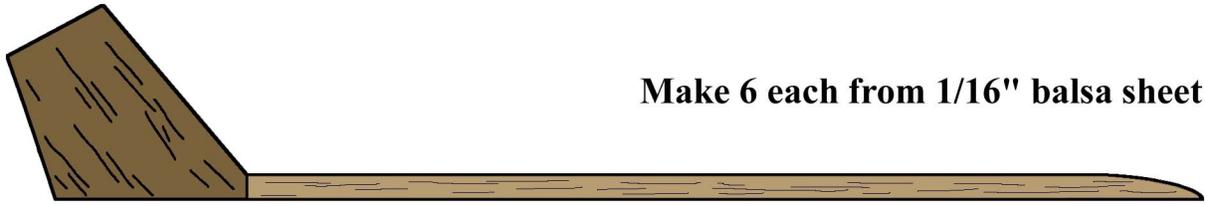
Parts List

Nose Cone.....	BC-735
Body Tube.....	ST-790
Thrust Block.....	TB-7
Fin Stock.....	1/16" Balsa Sheet
Launch Lug.....	1/8" x 1"
Shock Chord.....	SC-24
Shock Chord Mount.....	SCK-24
Screw Eye.....	SE-1
Snap Links.....	(2) #12
Parachute.....	CPK-12

Additional Items Required

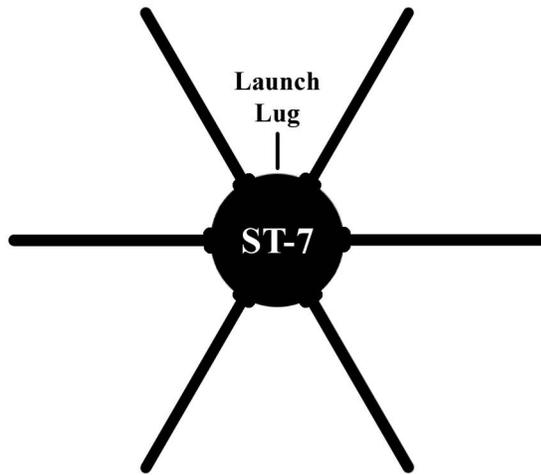
Small bottle of yellow carpenter's glue; sharp hobby knife; 0.05mm pencil; steel ruler; sheets of 220-, 400-, and 600-grit sanding papers; lightweight filler compound; tack rag; sprayable primers, paints, and Acrylic gloss clear coat; small, soft-bristle hobby brushes; various clamps and weights; one expended motor casing.

It is also recommended that you have a personal copy of **The Model Rocketry Handbook, Seventh Edition**, by G. Harry Stine and Bill Stine. Read and understand the sections on Construction, Recovery, and Safety.



Make 6 each from 1/16" balsa sheet

Master Fin Patterns



Large Alignment Guide



Small Alignment Guide

Print the fin templates, the Large Alignment Guide, and several copies of the Small Alignment Guide, onto 110-lb cardstock. Remove only the silhouetted areas from each guide, including the small corner tips at the base of the fins. This will help keep the guides from interfering with the glue. Leave as much area around the silhouette as possible for stiffness.

"V" Notch

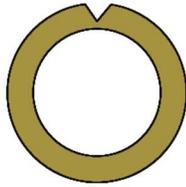


Figure 1

- **Step 1** Cut a "V" notch in the outer diameter of the TB-7 ring, as shown in Fig. 1.
- **Step 2** Tie a slip knot around the TB-7 ring with the Kevlar thread. Pull the knot tight against one face of the ring, and the thread trapped down in the "V" notch. Secure this knot with a layer of glue and let dry for about 20 minutes.

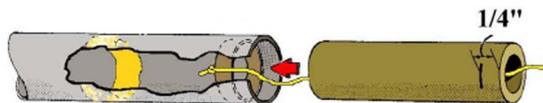


Figure 2

- **Step 3** Mark an expended engine casing 1/4" from one end. As shown in Fig. 2, apply a generous bead of glue up inside the bottom of the body tube, about 2" from the edge. Push the Kevlar thread down through the center of the ring and insert the ring into the body tube. Pull the thread down through the center of the casing, then use the casing to push the ring forward, through the glue, until the line on the casing is even with the edge of the body tube. Remove the casing immediately and allow the glue to dry.
- **Step 4** Cut out the six pairs of fins from 1/16" balsa sheet. Glue the pieces together over a piece of wax paper, as shown on the master pattern, making sure the root edges are aligned. Clamp or weight down the pieces to the building board to keep them

flat. Set these aside to dry about 20 minutes.

- **Step 5** Give the entire body a thorough sanding with 220-grit paper to remove the shine from the surface. Do not sand through the outer layer of the tube. Using a pencil and the Large Alignment Guide, mark the body tube for six fins and the launch lug.

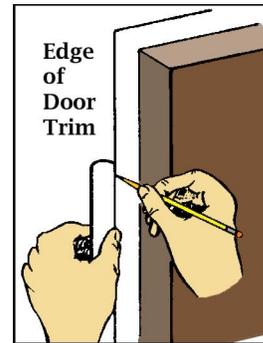


Figure 3

- **Step 6** Extend the fin and lug alignment lines using the trim around a door, as shown in Fig. 3, or using a piece of brass angle stock, as a straight edge. The fin alignment lines should be 6" long, measured from the bottom edge of the tube. Mark these lines at this location. The lug alignment lines are 1" long, with the top of the lug 3.5" from the bottom of the tube.
- **Step 7** Block-sand both sides of each fin to remove the excess glue. Do not sand hard enough to reduce the thickness of the fin! Round over the all of the outer edges of the fins with 400-grit paper, except for the root edge. Stack the six fins together and square up the root edge, as shown in Fig. 4.

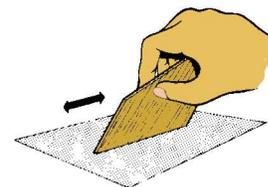


Figure 4

- **Step 8** Apply a layer of thinned glue to the body tube along the alignment lines, and to the root edges of the fins. Allow to dry.
- **Step 9** Sand the nose cone with 220-grit paper gently, to remove the fuzziness from the surface caused by humidity and temperature. Do not gouge the surface, or change the shape. Check the fit of the cone in the end of the body tube. If it is too tight, gently reshape the shoulder with sandpaper or a gentle compression under a heavy object (like a pine sanding block), rolling the shoulder completely around until the diameter is fractionally reduced. If the cone is already too loose, you may need to apply a strip of self-adhesive label material around the shoulder to build it up.

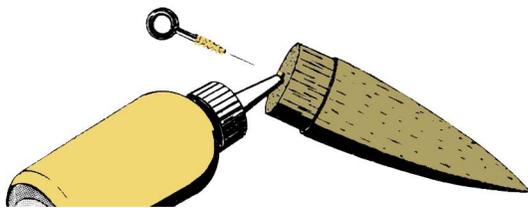


Figure 5

- **Step 10** Use the threads of the screw eye to cut a matching hole into the base of the nose cone, then carefully reverse the screw eye out. As shown in Fig. 5, force glue down into the hole, and coat the threads of the screw eye. Re-insert the screw eye into the hole. Do not wipe away the excess glue. Set aside to dry.
- **Step 11** Assemble the parachute according to the SEMROC instructions, then attach the shroud lines to the barrel end of one of the snap links.
- **Step 12** Apply a bead of full-strength glue along the root edge of a fin set, and along a fin alignment line. Press the fin onto the body with the trailing edge touching the rear edge of the body tube. Use a moist, soft-bristle hobby brush to smooth out the

glue around the base of the fins. This creates the first glue fillet. Carefully slide down from the top two or three of the small alignment guides, and slide up from the bottom at least one of the large alignment guides, gently nudging the fin into the slot. Allow this to dry about 20 minutes, then repeat this sequence for each of the remaining five fins. Finish this step by applying a bead of glue along both sides of the base of each fin, and smoothing this out with your finger to form a fillet. This will reinforce the joint and reduce the chances for damage during flight.

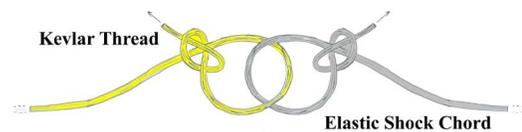


Figure 6

- **Step 13** Push the Kevlar thread back up through the body tube and out the top end. As shown in Fig. 6, tie a slip knot in the free end of the thread, then slip one end of the elastic shock chord through this loop, and tie a slip knot in this end of the elastic. Pull the knots tightly against each other, and secure the knots with a layer of thinned glue. Allow to dry. Attach the free end of the elastic to the barrel end of the remaining snap link.
- **Step 14** Attach the snap link on the shock chord to the screw eye in the nose cone. Push the lines down into the body tube, and insert the nose cone. Apply a lightweight filler compound to all exposed balsa surfaces. Our product of choice at this time is Elmer's Fill-N-Finish, thinned with water to a consistency of cream soup, and brushed into the wood. Be sure to coat both sides of the fins, to avoid warping. Allow this to dry at least one full day before sanding with 220-grit paper. Inspect the surfaces and repeat this sequence as needed until the surfaces are free of exposed areas. Tack-rag the entire model before proceeding.

- **Step 15** Figure 7 shows the correct method of spraying primer, paint, and the final gloss coats, regardless of the equipment used. Always spray from the top-down -- never from the bottom-up, or from side-to-side -- to avoid runs and other spraying imperfections.

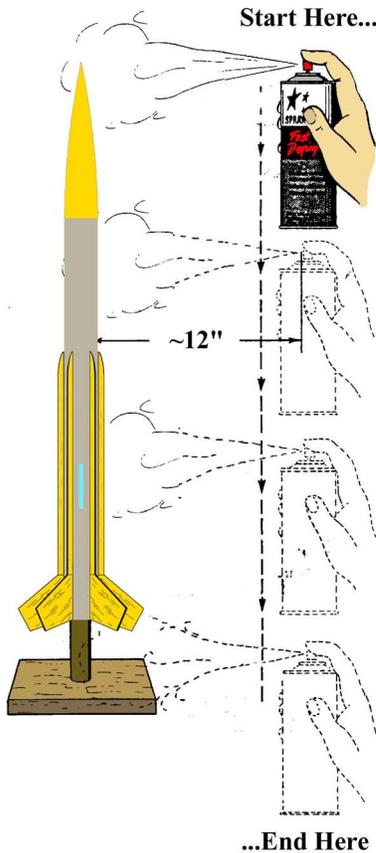


Figure 7

- **Step 16** Spray at least two coats of primer on the model and give each coat a day to dry before sanding with 220-grit paper. Tack-rag the model and inspect the surfaces for scratches and other blemishes, such as the body tube spiral. Repeat this sequence of priming-drying-sanding-inspecting until you are satisfied with the surface, and when you cannot see the spiral. Spray one final coat, let dry, then polish with 400-grit paper for a glass-smooth color coat. Tack-rag the model before continuing.
- **Step 17** Spray the entire model with a

base color of white and allow to dry for at least two full days before masking off for the trim color(s). The paint should fully cure to keep from peeling. Use a low-tack masking tape. The trim color can be anything you wish, but we recommend that you keep the same brand of color as you used for the base, to reduce the chances of having a chemical reaction. Paint the nose cone as a separate piece, using a scrap length of ST-7 tubing as a holder. Allow the same two days drying time for each color before masking again.

- **Step 18** Spray the entire model with a coat of gloss clear Acrylic to seal the paint and to provide a smooth surface for any decals you may wish to apply. After the decals have dried, gently wipe away any adhesive residue with a soft cloth. Spray a second coat of Acrylic over the decals to seal and protect them. Allow each of these coats to dry **until the solvent smell has dissipated**.

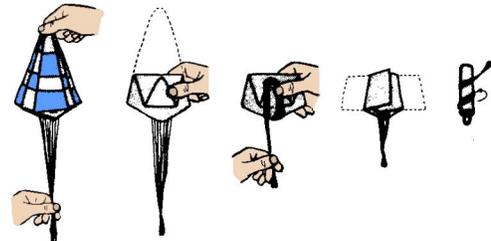


Figure 8

- **Step 19** The illustrations in Fig. 8 show the correct way to fold the parachute. Do this only when you are ready to fly -- never store the parachute in the rocket between flight sessions. In colder climates, and during winter, you will often find it helpful to dust the parachute with talcum powder to prevent the plastic from sticking to itself.

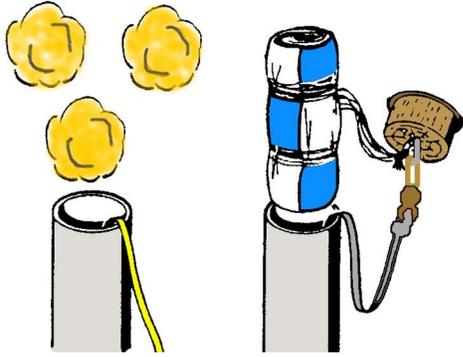


Figure 9

- **Step 20** Attach the parachute snap link to the screw eye in the base of the nose cone. As shown in Fig. 9, push three or four crumpled sheets of recovery wadding, or about 2" of shredded cellulose insulation, down into the body tube until it is just above the motor tube. Do not pack this material tightly. It is meant to act as a gas seal and to protect the parachute from the ejection charge. This material must come out of the tube to properly deploy the parachute. Insert the lines over the wadding, then the parachute over the lines. Finally, insert the nose cone.

- **Step 21** We recommend the use of the A8-3 or A8-5 engine for your first flights. The -3 will deploy just before apogee, and the -5 will deploy after apogee. Higher power engines can be used, but the effect will be to make the rocket disappear from sight and be that much harder to recover.

**Developed for BARCLONE Rocketry
by C. P. McGraw**

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by C. P. McGraw**

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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 its 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 Field Size
<i>0.00 – 1.25</i>	<i>1/4A – 1/2A</i>	<i>50'</i>
<i>1.26 – 2.50</i>	<i>A</i>	<i>100'</i>
<i>2.51 – 5.00</i>	<i>B</i>	<i>200'</i>
<i>5.01 – 10.00</i>	<i>C</i>	<i>400'</i>
<i>10.01 – 20.00</i>	<i>D</i>	<i>500'</i>
<i>20.01 – 160.00</i>	<i>E, F, G</i>	<i>1000'</i>
<i>160.01 – 320.00</i>	<i>2G</i>	<i>1500'</i>

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