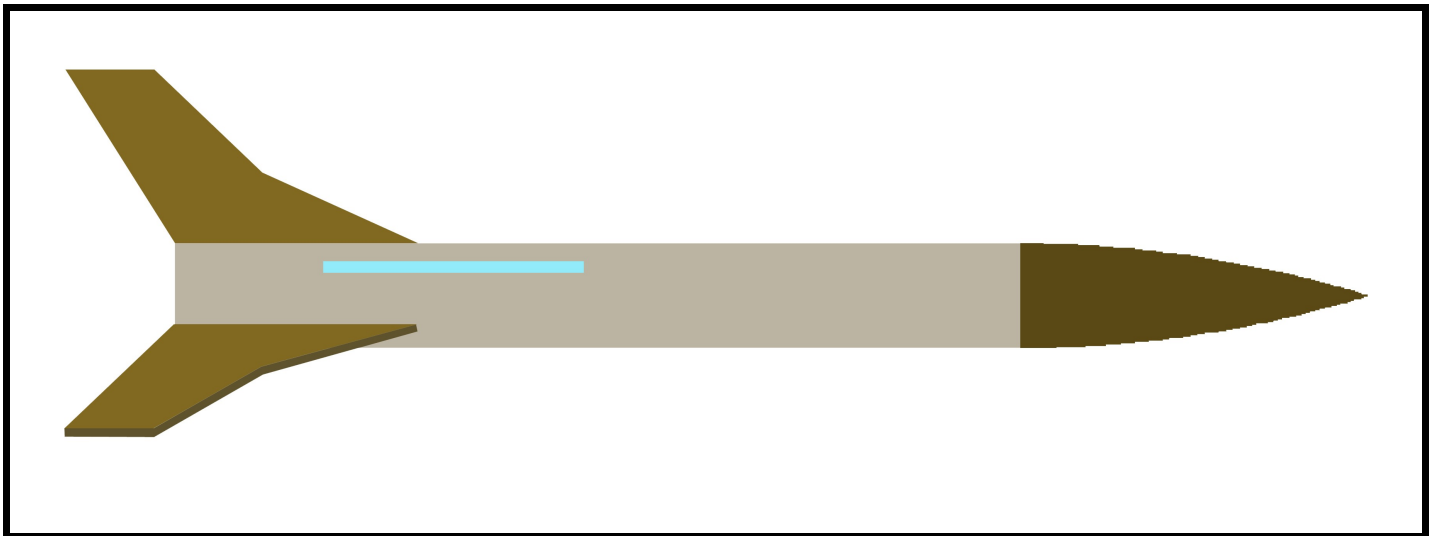




Skill Level 1

Eaglet

Created By C. P. McGraw



Length	11.25"
Diameter	0.908"
Fin Span	4.0"
Weight	0.75 oz

Parts List

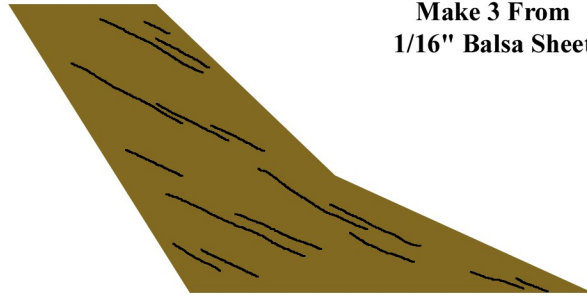
Nose Cone.....	BC-300
Body Tube.....	ST-873
Engine Mount.....	EM-58
Fin Stock.....	1/16" Sheet
Launch Lug.....	LL-18
Parachute.....	CPK-12
Screw Eye.....	1"
Snap Links.....	(2) #10

Additional Items Required

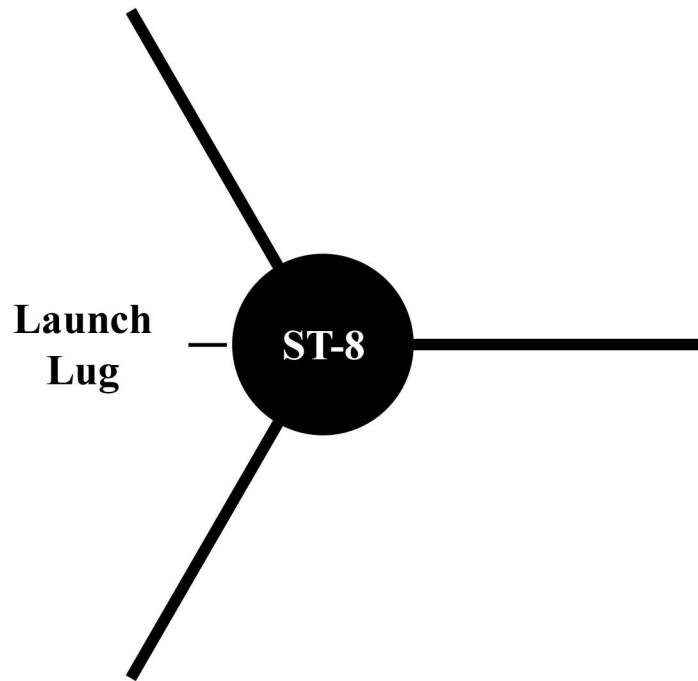
Small bottle of yellow carpenter's glue; sharp hobby knife; 0.05mm pencil; steel ruler; sheets of 220-, 400-, and 600-grit sanding papers; lightweight filler compound; tack rag; sprayable primers, paints, and Acrylic gloss clear coat; small, soft-bristle hobby brushes; various clamps and weights; one 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 3 From
1/16" Balsa Sheet

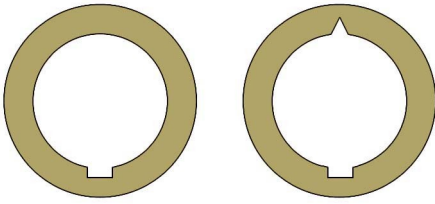


Fin Alignment Guide



Print the fin pattern and several copies of the guide onto cardstock, then remove all of the outline area in solid black using a sharp hobby knife. Trim the corners off of the fin-to-body joint locations to allow for glue fillets, and to reduce the chances of getting the guide glued in place.

"V" notch for Kevlar thread



Flat notches to fit motor hook

Figure 1

- **Step 1** Open the EM-58 package, and modify the two CR-58 centering rings with flat notches to fit the engine hook, as shown in the left-side image of Fig. 1. Modify **one** CR-58 ring with a "V" notch as shown in the right-side image of Fig. 1. Assemble the EM-58 according to the SEMROC instructions, using the "V"-notched ring as the **forward-most** ring. Clean out any glue that fills up the "V" opening with a moist, soft-bristle brush. Set aside to dry.
- **Step 2** Give the body tube a complete sanding with 220-grit paper to remove the shine from the surface.

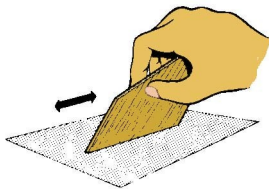


Figure 2

- **Step 3** Cut out the three fins from 1/16" balsa sheet, using the template provided. Give the surfaces a careful sanding with 220-grit to remove the fuzziness. Round over all of the **outer edges** except the root edge with 400-grit paper. Square up the root edge as shown in Fig. 2.
- **Step 4** Give the nose cone a careful sanding with 220-grit paper to remove the surface fuzziness. Do not alter the shape of the cone! All you want to do here is to correct for any swelling of the balsa that

typically occurs.

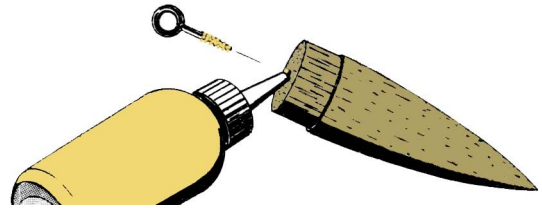


Figure 3

- **Step 5** Use the threads of the screw eye to cut matching threads into the base of the nose cone, then carefully reverse the screw eye out of the hole. As shown in Fig. 3, force glue deep into the hole, and coat the screw eye threads with glue, then reinsert the screw eye into the hole. Do not wipe away any glue. Set this aside to dry in a vertical attitude, pointing downward.

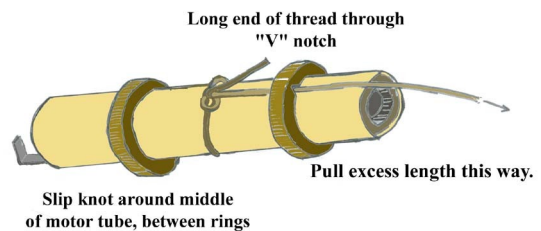


Figure 4

- **Step 6** Tie a slip knot around the middle of the engine mount using the Kevlar thread, as shown in Fig. 4. Push the free end of the Kevlar thread through the "V" notch in the forward ring, pulling the excess all the way forward as you slide the loop up against the back of the ring. Secure this loop to the mount with a layer of thinned glue, then set aside to dry.
- **Step 7** Slide an alignment guide over the body tube and mark the tube for three fins and the launch lug. As shown in Fig. 5, extend these upward along the tube using the trim around a door, or a piece of brass angle stock. The fin lines should be 2.25" long, and the launch lug line should be 3.5"

long. Measure rearward from this location 2.25" and mark the lug line.

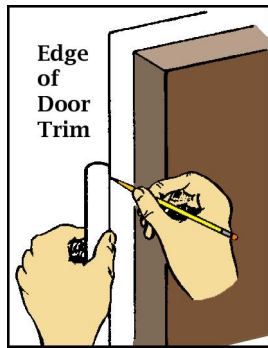


Figure 5

- **Step 8** Apply a layer of **thinned** glue to the **root edges** of all three fins, to the launch lug, and to the fin alignment lines on the body tube. Apply thinned glue to the lug alignment line **only** between the mark and the top end of the line. Set these aside to dry.
- **Step 9** Assemble the parachute according to the SEMROC instructions. Attach the barrel end of one snap link to the shroud lines.

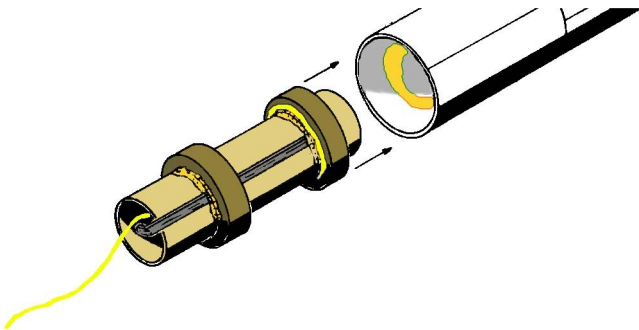


Figure 6

- **Step 10** Push the Kevlar thread down through the center of the mount and pull the excess out of the way. As shown in Fig.6, apply a generous bead of glue up inside the **bottom end** of the body tube, about 1.5" from the edge. With **one continuous motion**, push the engine mount into the body tube and through the glue, until the

bottom edge of the motor tube is even with the bottom edge of the body tube. Do not stop during this push, or the glue will "freeze" the mount in the wrong place. Set aside in a vertical attitude, top end up, until the glue has dried.

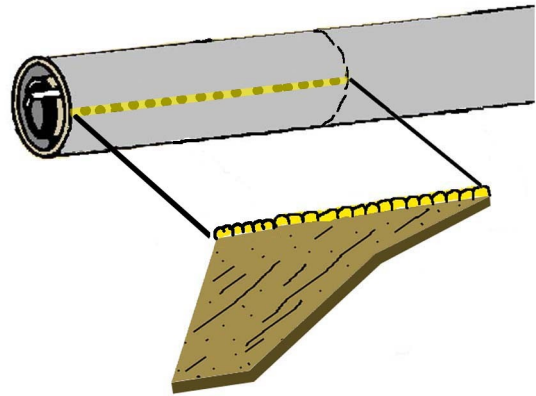


Figure 7

- **Step 11** As shown in Fig. 7, apply a bead of full-strength glue to one of the fin alignment lines, and to the root edge of one fin, directly on top of the existing layer of glue from Step 8. Press the root edge of the fin against the body tube, with the trailing edge of the fin even with the edge of the body tube. Hold the fin in place for about 12 seconds before releasing it. Use a moist, soft-bristle brush to smooth down the glue which squeezes out from the joint. Slide one or more alignment guides over the tube and down over the fin, carefully adjusting the angle to fit the slot. Allow this to dry about 20 minutes, then repeat this sequence for each remaining fin.
- **Step 12** Attach the launch lug to the body tube on the lug alignment line, with the top of the lug at the 3.5" end of the line, and the bottom of the lug at the mark 2.25" down from that. Set aside to dry.
- **Step 13** Apply a bead of glue along both sides of each fin at the base, and smooth this out with a moist finger or soft-bristle brush.

This forms a reinforcing fillet to strengthen the fins. Apply a similar fillet to both sides of the launch lug. Set aside to dry.

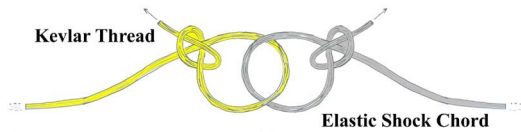


Figure 8

- **Step 14** Tie a slip knot in the free end of the Kevlar thread, as shown in Fig. 8. insert one end of the elastic shock chord through the loop and tie a slip knot in it, then pull the two knots tight against each other. Apply a layer of thinned glue to the knot to secure it. Let this dry, then attach the barrel end of the remaining snap link to the free end of the elastic chord.

- **Step 15** Push the shock chord and Kevlar thread back through the motor mount and out the top of the body tube. Attach the snap link to the screw eye in the base of the nose cone, then push all of these lines back into the tube. Insert the nose cone into the top of the tube.

- **Step 16** Apply a lightweight filler compound to all exposed balsa surfaces, and to the spiral gap in the body tube. Allow a full day for this to dry, and sand smooth with 220-grit paper. Examine the surface for gouges, scratches, and for the spiral wrap. If these are not fully filled, reapply filler, let dry, and sand again. Keep repeating this sequence until these flaws are eliminated. Give the model a thorough tack-ragging to remove the sanding dust.

- **Step 17** The illustration in Fig. 9 shows the correct method for spraying your model, regardless of the equipment used. Keep the tip about 12" away from the model, and use a top-to-bottom spray pattern – **never** spray from side-to-side, or from bottom-to-top –

to avoid runs in the spray. Use this technique for applying primer, paint, or the gloss coats.

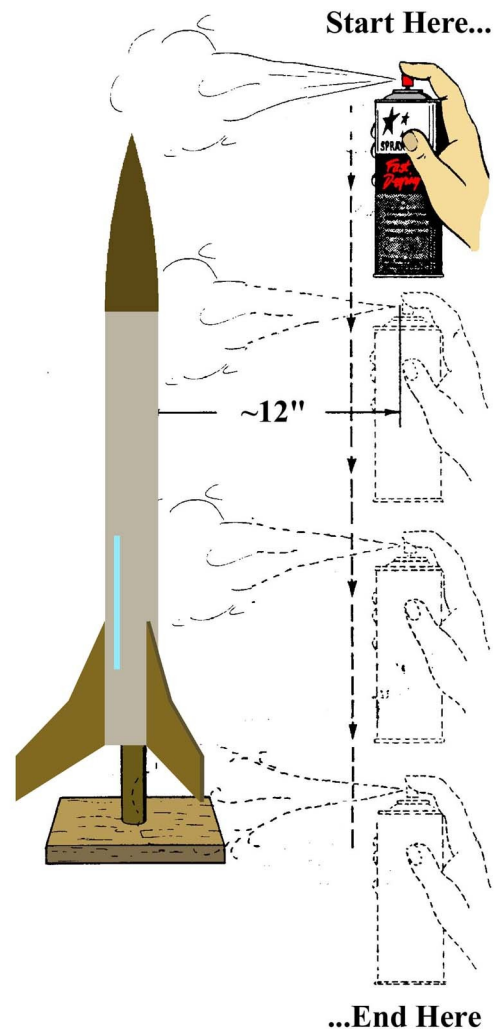


Figure 9

- **Step 18** Apply at least two complete coats of primer to the model, allowing time between coats to fully dry, before sanding with 220-grit paper. Do not sand through the outer layer of the tube. Continue applying primer, sanding between coats, until the surface is free of blemishes and scratch marks. Tack-rag the entire model after each sanding to remove any residue.

- **Step 19** The suggested color scheme is a simple white overall with a red nose cone, and one fin painted either red, blue, or

black. Paint the entire model white for a base color and allow at least two days drying time before applying the trim color. We recommend applying the color to the nose separately, using a scrap piece of ST-8 as a holder. This will make the color separation line crisper.

- **Step 20** When the color coats have dried at least two days, or until there is no longer a smell of solvent (in the case of spirit-based enamels), spray the entire model with a coat of gloss clear Acrylic. We have used numerous brands of this product, from several manufacturers such as Krylon and Valspar. This will provide a smooth base to apply decals (if desired). Allow to dry completely (at least one full day).
- **Step 21** Apply any decals you may desire (we prefer the waterslide variety), and use a soft cloth to wipe away any adhesive residue after the decals have dried. Give the entire model a second coat of the gloss clear Acrylic to seal the decals and provide a protective finish. Allow several days for this coat to fully cure.

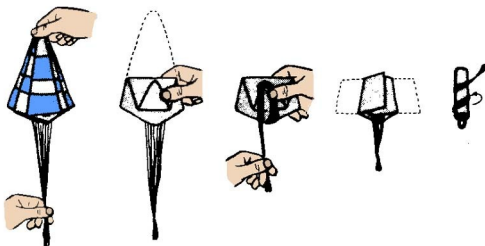


Figure 10

- **Step 22** Study the illustrations in Fig. 10 to see how to correctly fold the parachute. Attach the snap link to the screw eye only when you are ready to fly. Do not store the parachute in the body of the rocket between flights. In cold climates, or during winter months, you will find it helpful to give the parachute a light dusting of talcum powder. This will help the parachute open at deployment by keeping the plastic from

sticking together.

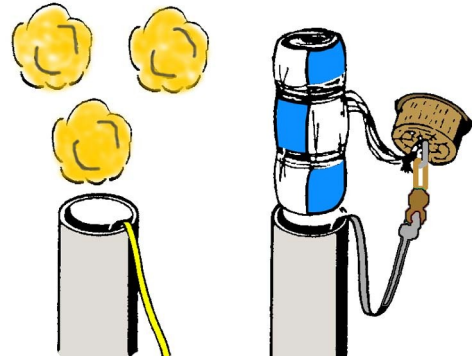


Figure 11

- **Step 23** When packing the parachute into the body tube, insert several balls of crumpled Recovery Wadding (the sheet kind), or at least 2" of shredded cellulose insulation, into the tube and lightly tamp it down until it is just above the motor tube. See Fig. 11. Do not pack this material tightly! The purpose is to provide a protective gas seal between the motor and the recovery device(s). Whichever material you choose, it must be able to come out at deployment, otherwise the recovery system will fail and the model will crash.
- **Step 24** We recommend the 1/2A3-4T for the first flights. This will provide a reasonably good flight profile of greater than 200' altitude. We **do not** recommend the use of the A10-3T for this rocket, as it puts the airframe and recovery system through unnecessary aerodynamic stresses during launch and at recovery. If you are flying in a **very** tight area, you can use the 1/4A3-2T, with an expected altitude of only 100'. For most flights, you should limit the power to the A3-4T, which still provides altitudes of a respectable 500'+.
- **Step 25** Review the safety code, then go fly!

**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 igniters. 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