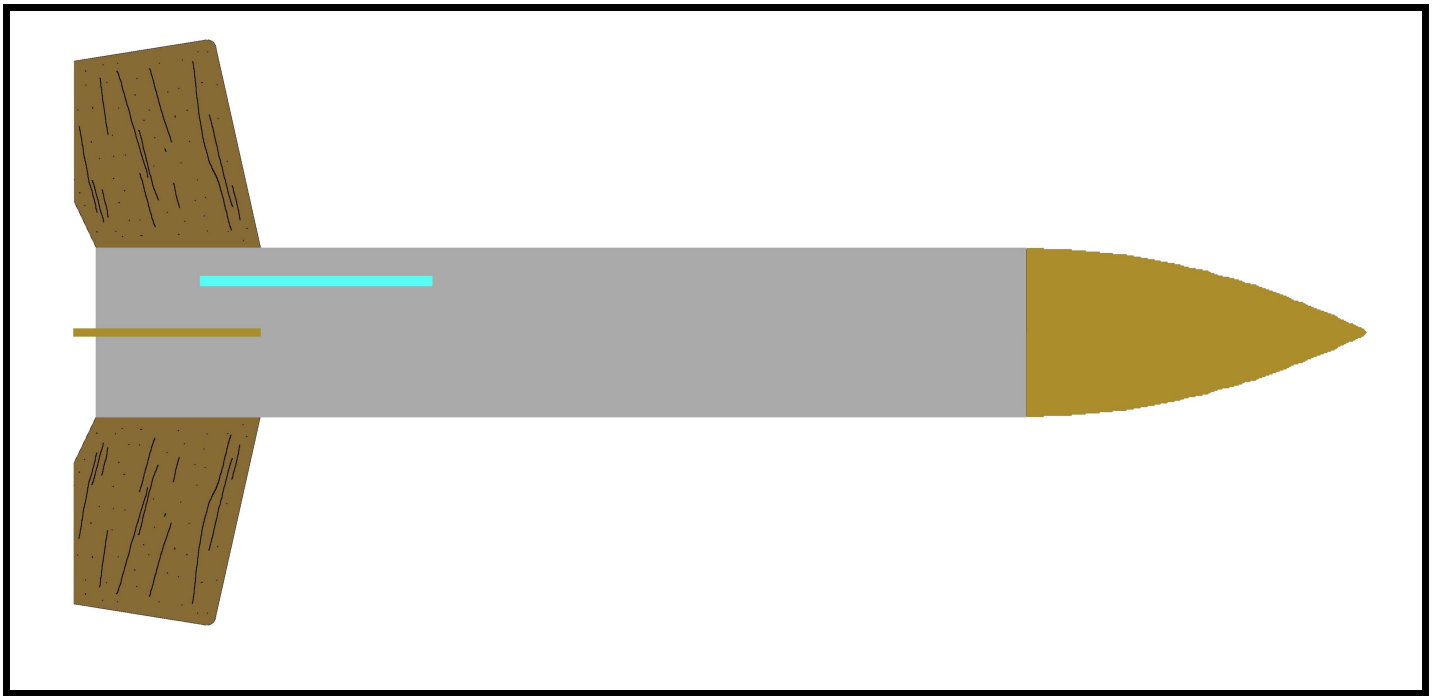




POOK 24

Created by C. P. McGraw



Length	12.513"
Diameter	1.640"
Fin Span	5.66"
Weight	1.2 oz

Parts List

- Nose Cone.....BC-1633
- Body Tube.....ST-1690
- Motor Tube.....ST-950
- Centering Rings.....(2) CR-916
- Thrust Block.....CR-79
- Engine Hook.....EHL (Long)
- Launch Lug.....LL-18
- Fins.....3/32" Balsa Sheet
- Parachute.....CPK-12
- Screw Eye.....1"
- Elastic Chord.....SC-24
- Kevlar Thread.....SCK-24
- Snap Link.....(2) #10
- Coupler.....HTC-16

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 24mm 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.

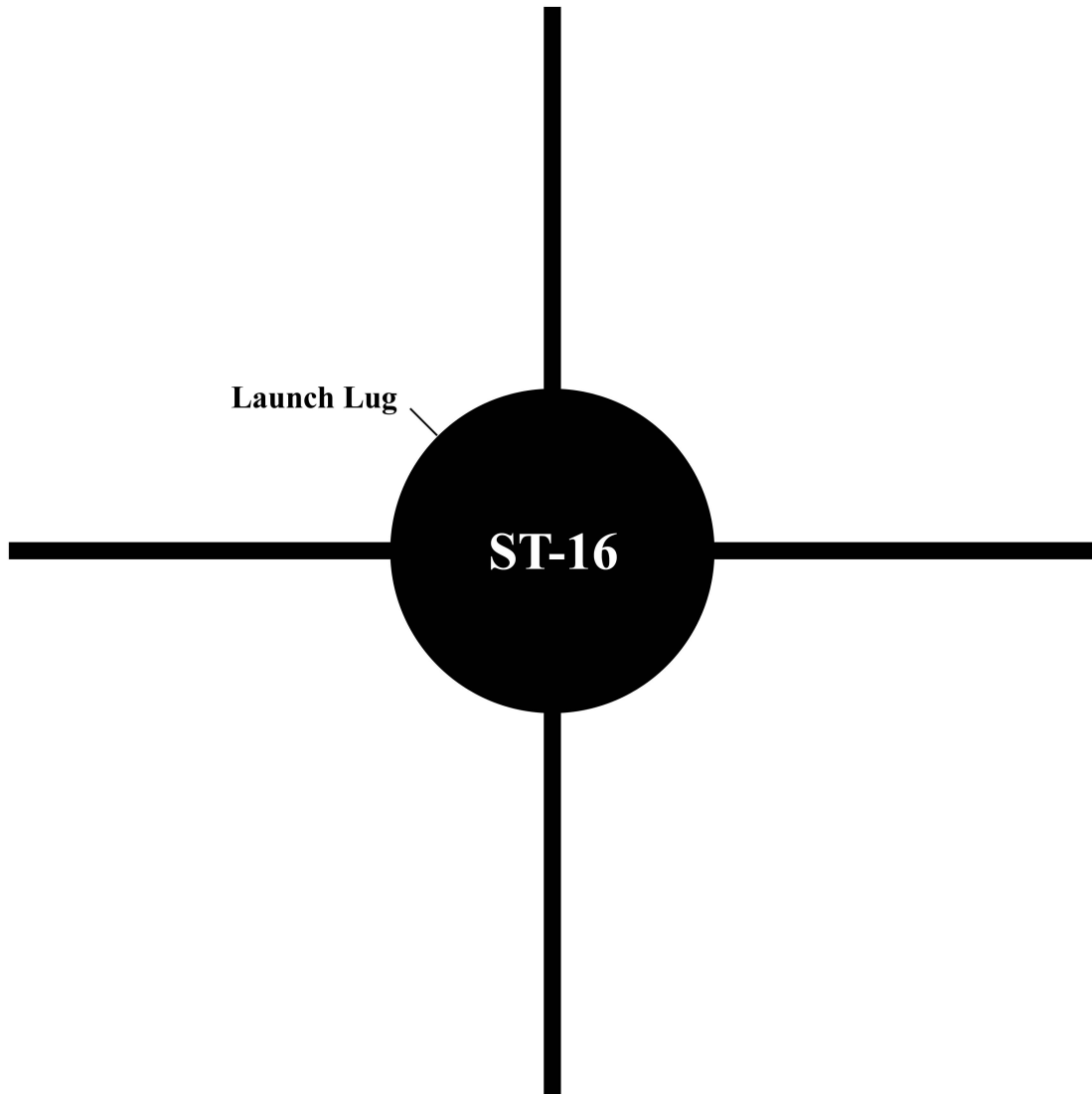
General Notes:

All fins are to be cut from 3/32" sheet balsa.

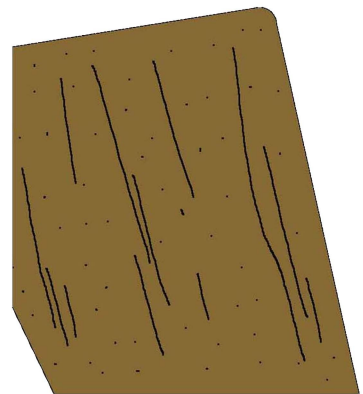
Make multiple copies of the Fin Alignment Guide on some stiff cardstock, and trim away the area inside the lines. You can use these patterns for holding the fins in perfect alignment while the glue dries by slipping the guides over the tube.

We recommend you should read the Construction chapter of The Model Rocketry Handbook for a thorough discussion of the Double-Glue technique for attaching fins and launch lugs to the body tube.

Fin Alignment Guide



Main Fin
Make 4



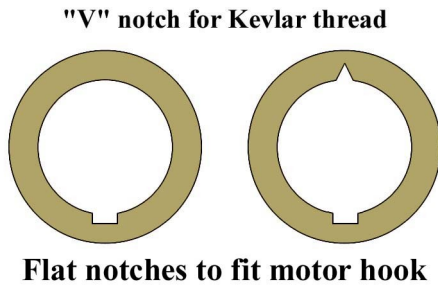


Figure 1

- **Step 1** Using a sharp hobby knife, modify the two CR-916 rings as shown in Figure 1. Cut the "V" notch in only one of the rings, and use this ring at the forward end of the mount.
- Draw a straight line down the full length of the ST-95 motor tube. Mark the tube at 1" and 3.5" from one end. Draw lines completely around the tube at these locations. Cut a slit in the motor tube at the 3.5" line, where it crosses the hook alignment line, wide enough to fit the tip of the motor hook. Insert the motor hook into the slit, and slide the "V" notched ring down from the top of the tube, until the ring is **just below** the line at 3.5". The hook should be aligned over the alignment line, and the flat notch should be aligned over the hook. Slide the other CR-916 ring up from the bottom of the tube, until the ring is **just ahead** of the line at 1", with the flat notch over the hook. Secure both rings with glue. Make sure the "V" notch remains free of any glue. Clean it out with a damp brush before the glue has time to harden.
- Use a soft-bristle hobby brush to apply a layer of glue around the inside of the tube from the top, about 1" down from the edge. Insert the CR-79 ring into the tube from the top, and push downward with an expended 24mm motor case, through the glue, until the ring **just touches** the tip of the hook. Remove the casing and set this subassembly aside to dry.

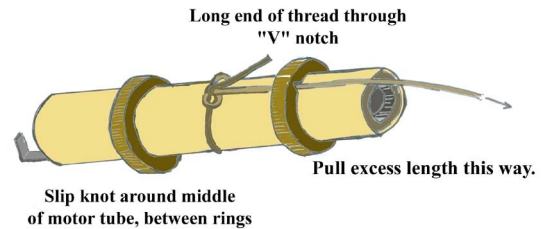


Figure 2

- **Step 2** Tie a slip knot around the center of the engine mount subassembly, as shown in Figure 2, using the Kevlar thread. Push the thread up through the "V" notch, and pull the excess length forward until the loop is firmly against the back of the forward ring. Secure the thread with a layer of thinned glue, and set aside until dry.
- **Step 3** Give the body tube a gentle sanding over the entire surface with 220-grit paper to remove the shine. Gently sand the nose cone with more 220-grit paper to remove the fuzziness and to restore the shape of the cone from any swelling that typically occurs with turned balsa.
- **Step 4** Using the Fin Alignment Guide, mark the body tube with a pencil for each of the fins and for the launch lug.

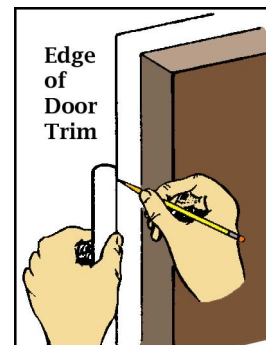


Figure 3

- **Step 5** As shown in Figure 3, using the straight edge of a steel ruler, the trim around a door, or the 12" length of brass angle, draw lines upward from the bottom of the tube for a distance of 1.75" for the fins, and 2.25" for the launch lug.

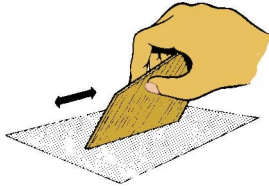


Figure 4

- **Step 6** Cut out all of the fins from 3/32" thick sheet stock. Use 400-grit paper to sand the flat surfaces of all the pieces, and to round over all of the **outer** edges. Do not round over the **root edges** of the fins. As shown in Figure 4, square up the root edges so that the glue surface is as flat as possible with respect to the body tube.

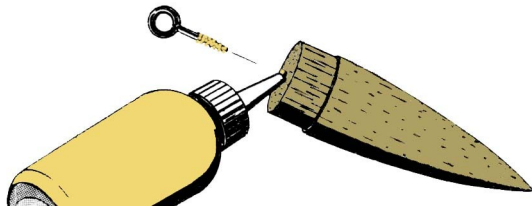


Figure 5

- **Step 7** Use the screw eye to cut threads into the base of the nose cone, then carefully reverse the screw eye out of the hole. As shown in Figure 5, apply glue to the threads of the screw eye, and force glue into the hole. Re-insert the screw eye until it bottoms out. Do not wipe away the glue that squeezes out. Let the glue dry with the nose cone pointed downward.

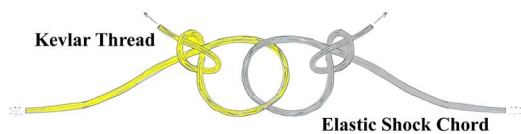


Figure 6

- **Step 8** Pull the Kevlar thread back through the tube and out the top end. As shown in Figure 6, tie a slip knot in the free end of the thread. Run one end of the elastic shock chord through the loop and tie a slip knot in the elastic. Pull these knots tight against each other, and coat the knot with a layer of thinned yellow glue to lock the knot. Allow to dry, then attach the other snap link to the free end of the elastic chord.

- **Step 9** Assemble the parachute according to the SEMROC instructions, and attach the shroud lines to the second snap link. Do not attach the parachute to the rocket at this time.

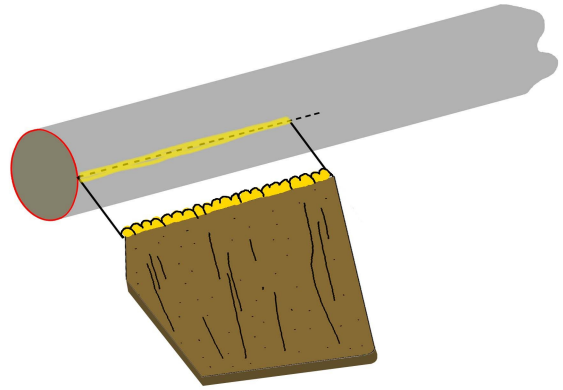


Figure 7

- **Step 10** Attach the fins to the body tube, with the bottom of the root edge touching the bottom of the tube, as shown in Figure 7. Use cardboard cutouts of the alignment guide to ensure the fins are properly aligned to the tube. Attach the launch lug in the same manner on the lug alignment line. Allow these glue joints to dry completely.
- **Step 11** After all of the glue on the fins and the launch lug has cured, apply a bead of full-strength glue along these joints and use a soft hobby brush, moistened, to smooth out the glue into a fillet. This will add strength to the joints. Allow these fillets time to dry before handling the model further.
- **Step 12** Fill the grain of all bare wood surfaces (fins and nose cone) using a lightweight compound. We currently recommend Elmer's **Fill-N-Finish**, thinned to a pea-soup consistency, and brushed into the grain of the balsa. Allow to dry at least a day before sanding with 220- and 400-grit paper. Repeat this step as often as needed to completely fill any surface imperfections.
- **Step 13** Attach the snap link of the shock chord to the screw eye in the nose cone, and then push all of the chord into the body tube. Insert the nose cone into the tube and check

for proper fit. The shoulder should fit with some resistance, but not too tightly, or you will suffer recovery failure in flight. The cone should not be loose, either. You should be able to turn the model pointing cone-down without the cone falling out on its own, but it should come out with a light puff of air through the tube from below.

- **Step 14** The illustration in Figure 8 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 empty CD-R spindle, or a length of 3/4" hardwood dowel, with an expanded 24mm casing pressed onto one end 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.
- **Step 15** Apply at least two coats of primer to the model before sanding it, allowing time for each coat to dry completely. Our current preference is **Rust-O-Leum** Clean Metal Primer, White. Sand carefully with 220-grit paper to remove the excess primer, then tack-rag to remove the dust. Re-prime and sand as many times as needed to eliminate all visible surface imperfections (such as the spiral wrap in the tube). When you reach a point where you are satisfied with the surface, give the model a final prime and sand with 400- and 600-grit paper to achieve a glass-smooth surface. Tack-rag the model before proceeding.
- **Step 16** We recommend spraying the nose cone as a separate item from the body, using a scrap piece of ST-16 as a holding tool. The body should be gloss white, while the nose cone should be bright gloss red, or black. Mask off and spray one of the fins black on both sides.

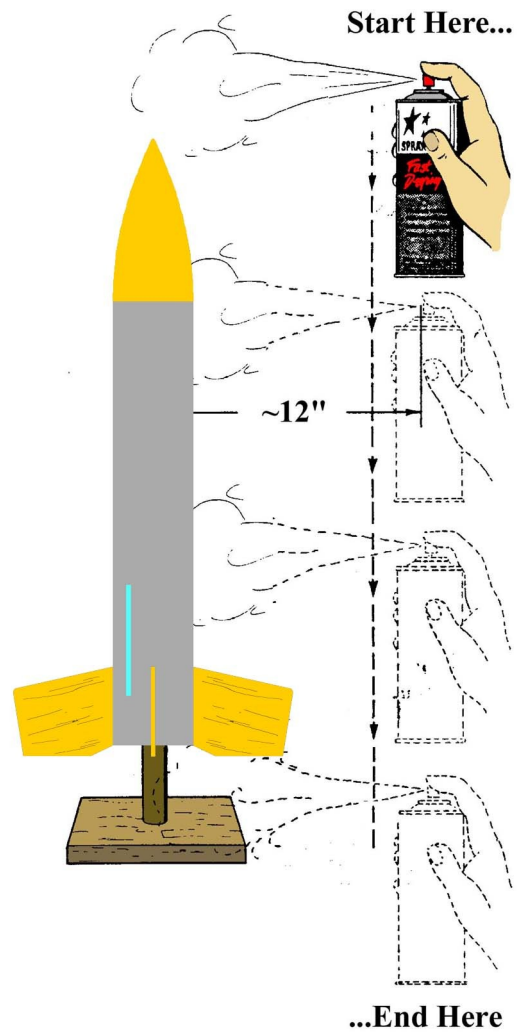


Figure 8

- **Step 17** After the final color trim has been allowed to dry at least a full day, preferably two days, you can apply the Acrylic Gloss Clear coat. We have used clear coat sprays from several manufacturers with good success, but you should always test on something other than your model before making the final commitment. Give the model a complete coverage of the Acrylic, and allow to dry until you cannot smell the solvent anymore.
- **Step 18** Apply any decals of your choice at this time, and allow these to dry completely before handling further. When dry, wipe down any remaining adhesive residue and give the model a final spraying of clear Acrylic gloss to seal and protect the decals. Allow this final coat to dry and fully

air out (no solvent smell).

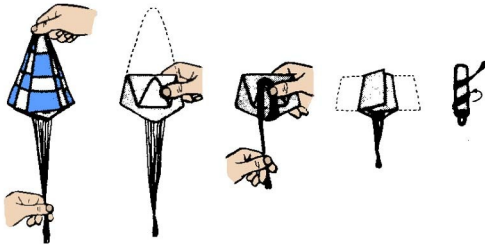


Figure 9

- **Step 19** Use the illustration in Figure 9 to correctly fold and prepare the parachute for flight. Do not wrap the lines too tightly around the parachute, as it may prevent the parachute from opening properly at deployment. Attach the snap links of both the shock chord and the parachute to the screw eye in the nose cone.

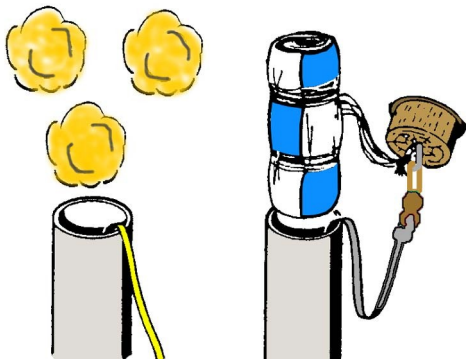


Figure 10

- **Step 20** Use prepackaged flameproof wadding, or shredded cellulose insulation, to protect the parachute from hot gasses and particles at deployment. As shown in Figure 10, use at least five sheets, loosely crumpled into balls, or about 2" of shredded fill, loosely packed into the tube. You are trying to provide a gas seal, not an immovable wall. Next, push the shock chord and anchor line into the tube, followed by the parachute. Insert the nose cone, and check for fit. If the nose is too tight, lightly sand the shoulder with 220-grit paper until it just fits snugly. If the fit is too loose, wrap pieces of masking tape around the shoulder until the fit is correct. If the nose cone does not pop out cleanly at deployment, the parachute will not open and the rocket will fall too fast, resulting in damage to the rocket.

- **Step 21** We recommend the C11-3 as your first-flight motor. Since the motor tube can accommodate 3.5" 24mm motors, you will need to take an HTC-16 coupler and trim it down to a length of 1" to act as a filler in the motor tube, just ahead of the C11-3. Wrap masking tape around the motor and test-fit into the tube. The fit should be just snug, to provide a gas seal. The motor hook will prevent the casing from popping out.

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

**Model design copyright © 2005
by C. P. McGraw**

Instruction text copyright © 2005

All Rights Reserved

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 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