



Skill Level 1

Centuri Payloader

A 1963 Design Updated By C. P. McGraw

Revision Date: Dec 10, 2005

Length	14.8"
Diameter	0.759"
Fin Span	5.26"
Weight	0.59 oz

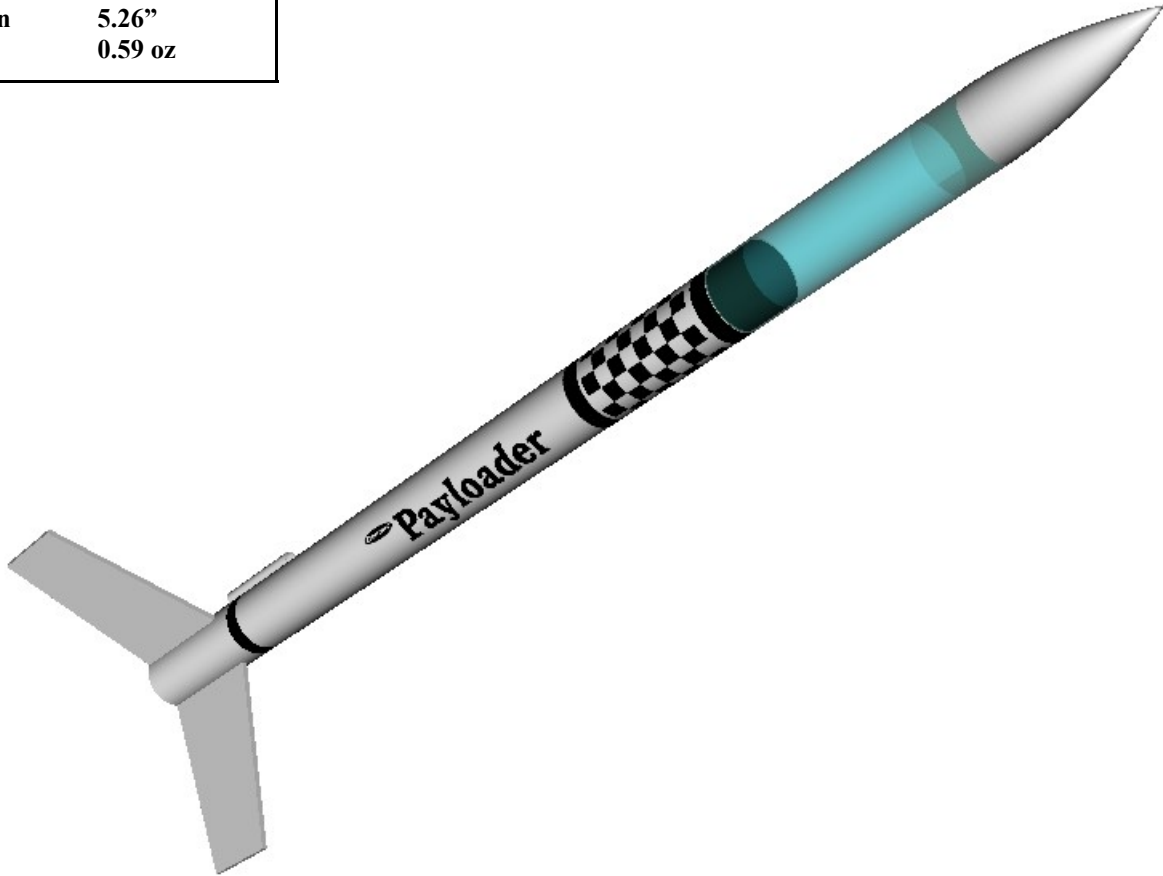


Image created with RockSim v8

Main Parts List

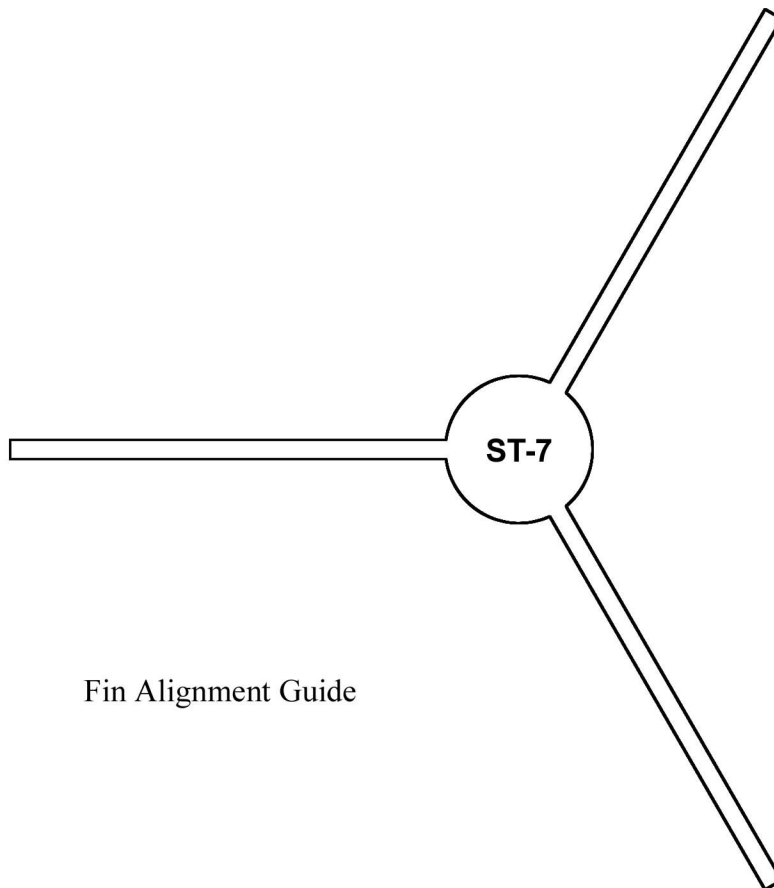
Nose Cone.....	BC-718
Clear Payload Body.....	CPT-730
Body Tube.....	ST-712
Bulkhead.....	BTC-7
Thrust Block.....	TB-7
Fin Stock.....	1/16" x 3"
Launch Lug.....	LL-122 1.25"
Parachute.....	CPK-12
Shock Chord.....	SC-24
Shock Chord Mount.....	SCK-24
Screw Eye.....	SE-1
Snap Links.....	(2) #12

General Instructions

All major components of this model, such as the nose cone and the body tube, and the Kevlar thread, can be purchased directly from SEMROC Astronautics Corporation. The sheet balsa is readily available through your local hobby shop or craft store.

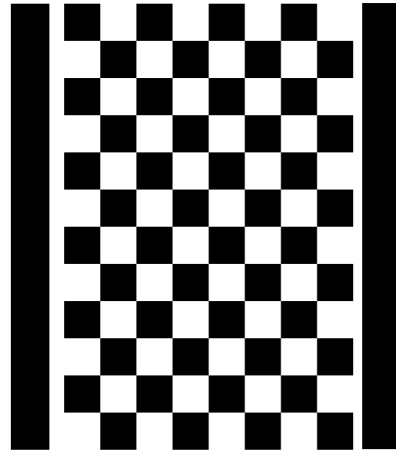
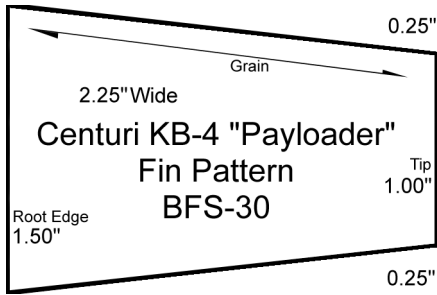
To assemble this model, you will also need a small bottle of yellow carpenter's glue for general assembly, soft artist's paint brushes, a pencil, a steel (or steel-edged) ruler, a lightweight wood-grain filler, sprayable primer, paint, and acrylic gloss clear coat, 220-, 400-, and 600-grit sandpaper and some sanding twigs, a tack rag, small clamps or other holding fixtures to keep the fins in place while the glue dries, and a sharp hobby knife.

You should also have a copy of **The Model Rocketry Handbook** by G. Harry Stine and Bill Stine [Seventh Edition] nearby. Read and understand the **Construction Tips** chapter thoroughly before starting this model, especially the text on the double-glue method of attaching fins to body tubes. There is also a section on making some special assembly tools that will prove very helpful in the construction of any model rocket.



Fin Alignment Guide

Fin Pattern
(Make 3 from 1/16" Balsa Sheet)



Optional 13mm Adapter Components

- Motor Tube.....ST-530
- Thrust Block.....TB-5
- Centering Rings..... (3) TB-7



Decal Image
(Print on clear decal paper)

Main Construction Steps

"V" Notch

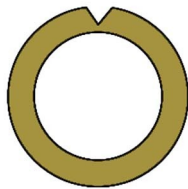


Figure 1

- **Step 1** Modify the TB-7 thrust block with a single "V" notch as shown in Fig. 1.
- **Step 2** Tie one end of the Kevlar thread around the TB-7 ring, making sure the thread sits in the "V" notch. Position the knot to one of the "face" sides of the ring. Do not position the knot to the outer diameter, or the inside diameter. Use this "face" of the ring as the front side in the next step.

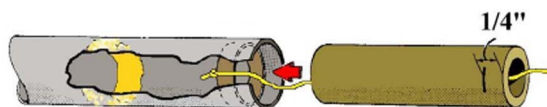


Figure 2

- **Step 3** As shown in Fig. 2, apply a layer of glue up inside the bottom end of the body tube about 2" from the edge. Mark an expended motor casing 1/4" from one end, and use this as a depth gauge tool. With the front face (knot-side face) of the ring inserted into the bottom of the tube, run the thread back through the center of the ring and through the center of the casing. Push the ring upward through the body tube, and through the glue, until the 1/4" mark is just touching the edge of the tube. Immediately remove the casing and allow the glue to dry.
- **Step 4** Sand the body tube and the nose cone carefully with 220-grit paper to remove any swelling or fuzziness from the balsa, and to remove the shine from the surface of the tube. Do not over-sand.

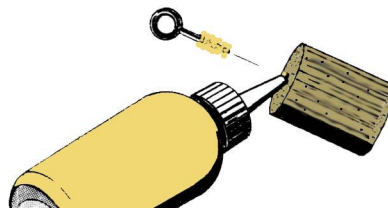


Figure 3

- **Step 5** Use the screw eye to create a threaded hole in one end of the balsa bulkhead, as shown in Fig. 3 above. Reverse the screw eye from the hole. Apply glue to the threads, and down into the hole. Reinsert the screw eye until it bottoms out. Do not wipe away the excess glue. Set the bulkhead aside in an upright position until the glue has dried.
- **Step 6** Print the fin template onto a sheet of cardstock, and the alignment guide on a piece of 0.05" fiberboard. Remove the area inside the lines of the alignment guide, as well as the points at the base of each fin.
- **Step 7** Cut three fins from 1/16" balsa sheet, using the fin template. Use a sanding block to true up the shape, and to square up the root edge. Round over the leading, trailing, and tip edges. Sand the large surfaces of the fins with 220-grit paper to remove fuzziness. Clamp the fins together and apply a layer of thinned glue to the root edges. Allow this to dry about 20 minutes. Also, apply a layer of thinned glue to the launch lug and set this aside until dry.
- **Step 8** Use the fin alignment guide to mark the main (10") body tube for three fins and the launch lug. Extend the fin lines upward from the bottom edge of the tube 2". Extend the lug line upward 3".
- **Step 9** Mark the main body tube 1.5" and 2.75" from the bottom edge. Draw lines completely around the tube at these locations. Apply a layer of thinned glue to the three fin lines between the edge of the tube and the 1.5" line. Apply a layer of thinned glue to the lug line between the 1.5" line and the 2.75" line. Allow these to dry.

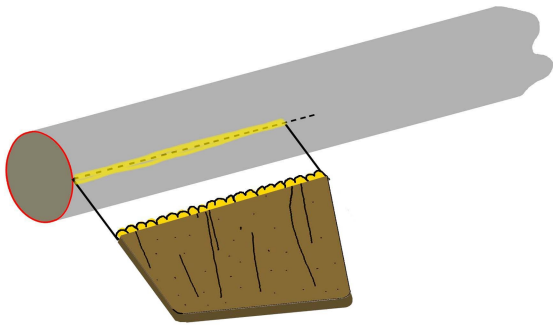


Figure 4
(Not this model shown)

- Step 10** As shown in Fig. 4 above, apply a bead of full-strength glue to the root edge of a fin, and to a fin alignment line on the body tube, directly over the previous layer of glue. This creates what is known as a “double-glue joint”, and is very strong. Press the fin in place with the leading edge touching the line at 1.5”, and the trailing edge touching the rear edge of the tube. Hold this in place for about 15 seconds before releasing. Use a moistened, soft-bristle brush to gently wipe away the excess glue that squeezes out from the joint, and form a smooth fillet. Slide the fin alignment guide down from the top of the tube, over the fin to about half way down its chord, gently aligning the angle of the fin with the one of the slots. Let this dry for about 20 minutes, remove the guide, then repeat this sequence for the remaining two fins.
- Step 11** In a similar manner, apply a bead of full-strength glue to the body tube along the lug line between the 1.5” and 2.75” lines, and to the launch lug. Press the lug onto the tube, hold for about 15 seconds, then wipe away the excess glue with the brush. Allow to dry.

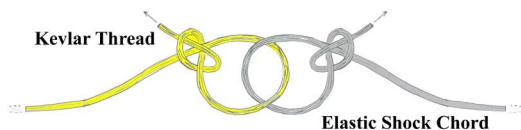


Figure 5

- Step 12** Pull the Kevlar thread back

through the body tube and out the top. As shown in Fig. 5 above, tie a slip knot in the free end of the Kevlar thread. Tie a similar slip knot in one end of the elastic shock chord, running the loop through the Kevlar loop. Pull these knots tightly together. Attach the swivel end of a snap link to the free end of the elastic shock chord, then apply a drop of thinned glue to all the knots to secure them. Allow to dry.

- Step 13** Draw a line around the balsa bulkhead at its midpoint. Insert the bulkhead into one end of the clear plastic tube up to this line. The screw eye should be outside of the tube.
- Step 14** Push all of the shock chord into the main body tube, then insert the nose cone in preparation for finishing. Do not put the payload tube in place yet.

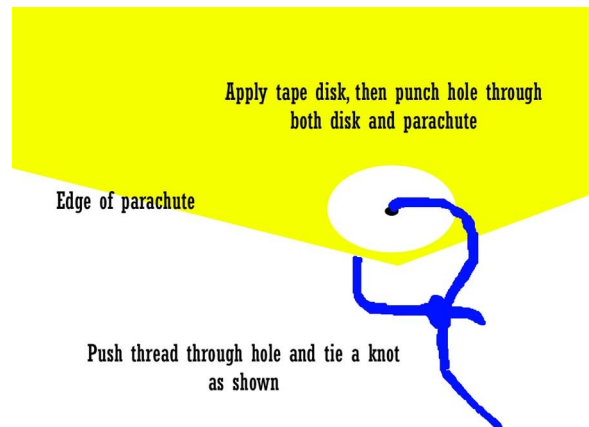


Figure 6

- Step 15** Assemble the SEMROC parachute according to the instructions included in the package, with the modification in this step. As shown in Fig. 6 above, apply the tape disks to the parachute first, then punch a small hole through the center of the disk. Push the shroud line through this hole, then tie the line. Pull the shroud lines together, then attach the swivel end of the second snap link to the combined lines. Do not attach the parachute to the rocket at this time.

Finishing Sequence

- **Step 16** Apply a wood grain filler compound, such as Elmer's Fill-N-Finish thinned with water, to the exposed wood surfaces of the nose cone and the fins. Use this same compound to fill the visible spiral wrap seam of the body tube. Set this aside for a full day to dry. Sand with 220-grit paper to smooth down the surface and remove the excess compound. Tack-rag the model and re-inspect for blemishes and gouges. Repeat this sequence as needed to reduce the visibility of voids before proceeding to the next step.

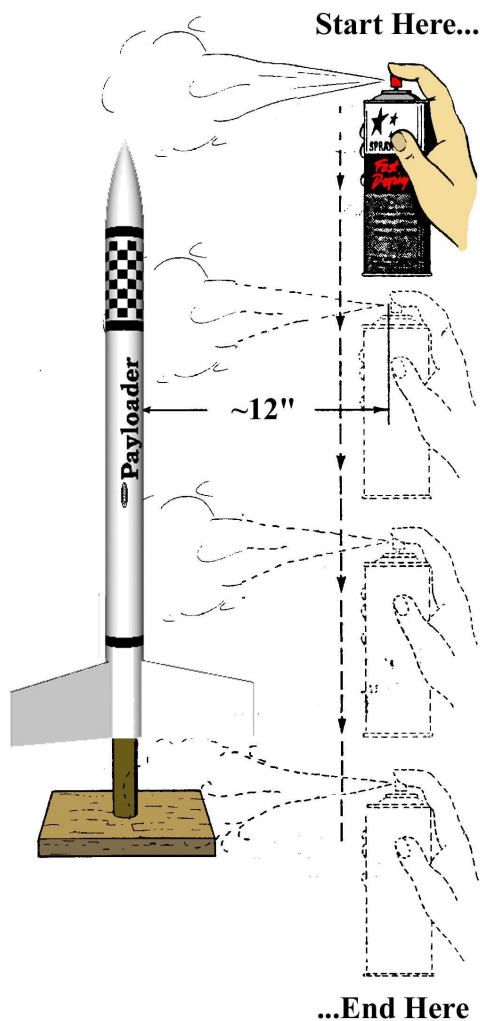


Figure 7

- **Step 17** Use the general illustration in Fig. 7 above to show how to spray the model with the primer, the color, and the final gloss coats. Always spray from top to bottom, and begin the spray ahead of the model. Follow through until the spray is

behind the model at the end before shutting off the spray. This will reduce the chances for splatter. Use a holding spike with a heavy base to keep the model at the correct position while spraying.

- **Step 18** The original model by Centuri was finished in an all-white scheme, with only the black & clear decals as a color trim. The BARCLONE version retains this simple scheme. If you use a bright white, sandable, flat primer, all you will need is a final coat of the primer -- left un-sanded, of course -- with the gloss coat sprayed over that to make the surface ready for the decal.

Begin by spraying at least two coats of white primer on the model, allowing a full day after each coat for drying, before sanding with 320-grit paper. Tack-rag the model and inspect for surface blemishes and scratches. Continue to spray, dry, and sand with progressively finer grits of paper until the blemishes have disappeared, then spray the final coat which is not sanded, and allow to dry.

Spray a coat of Future Floor Finish with an airbrush over the model (do not spray the clear payload tube or the bulkhead) and allow at least two full days for drying. Next, apply waterslide decals made from the images on page 3. When these have fully dried, wipe away any excess decal adhesive residue with a soft cloth. Spray a second coat of Future over the model to seal the decals.

Optional 13mm Adapter

- **Step 19** This group of steps allows you to build a small 13mm to 18mm adapter for use with the A3-4T motor.

Shorten the ST-530 tube from 3" to 2.75". This will allow the adapter to fit correctly in the space available for an 18mm casing. Mark the tube 0.25" from one end, and draw a line around the tube at this location. Slide one of the three TB-7 rings over the tube and position it over this line. Slide the other

two TB-7 rings over each end of the tube, and adjust them to be even with the edges of the tube. Apply a bead of glue around the base of all three rings to bond them to the tube. Set this aside until the glue has dried.

- **Step 20** Apply a bead of glue 1.5" up inside the tube from the end with the two rings. Next, using an expended 13mm casing as a push tool, insert the TB-5 ring into this end of the tube and push with the casing until 1/4" of the casing remains outside the end of the tube. Remove the casing and set this aside to dry.

Pre-Flight Assembly Steps

- **Step 21** Attach the parachute snap link to the nose cone screw eye only when you are ready to fly. Never store a parachute inside the body tube.

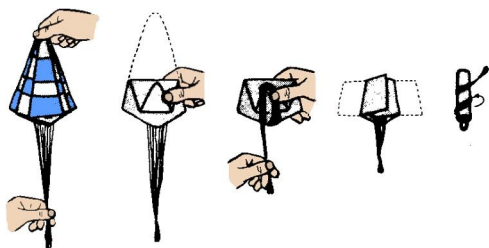


Figure 8

- **Step 22** Use the illustration in Fig. 8 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.

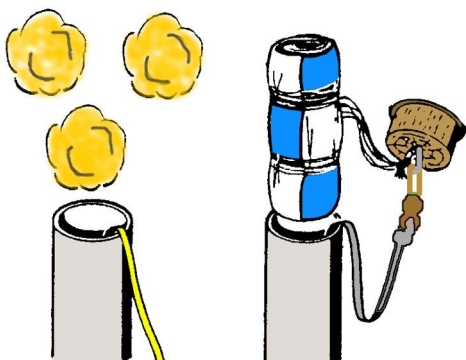


Figure 9

- **Step 23** As shown in Fig. 9, insert about 2" of your preferred flameproof recovery

material into the top of the body tube, pushing with a pencil or a wood dowel until it is just above the motor mount. We prefer shredded cellulose insulation over the more traditional wadding sheets. **DO NOT PACK THIS MATERIAL TIGHTLY!** This material has to blow out with the parachute and the shock chord to ensure complete deployment. It is meant to provide a protective gas seal between the motor and the parachute. If it is too tight in the tube, you will suffer recovery failure and likely a damaged model.

- **Step 24** For the first flight, we recommend the venerable A8-5. This is a workhorse of an engine, and you will probably use it more often for general flying than any other 18mm 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. (Note: You will find the smaller 13mm A3-4T will actually provide better performance than the A8-5. Consider using this motor when you are comfortable with the rocket.) Wrap a layer of masking tape around the middle of the motor (or around the lower rings of the 13mm adapter, and around the 13mm motor) before inserting it into the motor mount. This will reduce the chances of recovery system failure.

Recommended engines:

A8-5 (First flights)

A3-4T (Using the optional adapter)

B6-6

C6-7

When using the adapter, the end with two rings is the bottom. Insert the motor into this end, then wrap pieces of masking tape around the rings before inserting the adapter into the model. The adapter must fit snugly so as to remain in the model when the ejection charge fires.

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

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

Original design by Centuri Engineering

**Model redesign copyright © 2003, 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 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