



Skill Level 1

ALFA

2005 upgrade of a 1966 Czech design

By C. P. McGraw

Revision Date: Dec 9, 2005

Length	12.875"
Diameter	0.976"
Fin Span	2.976"
Weight	0.93 oz

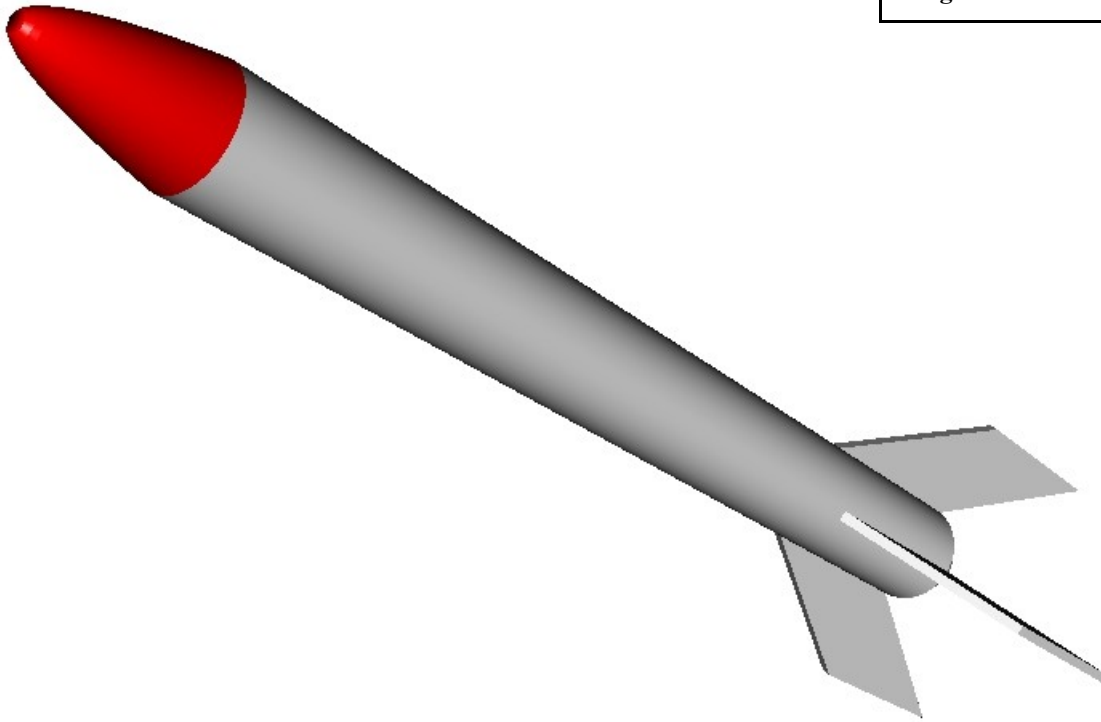


Image drawn with RockSim v8

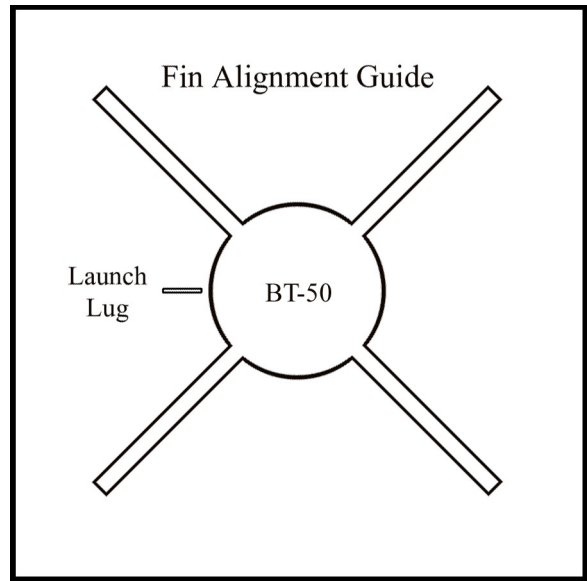
Main Parts List

Nose Cone.....	BNC-50J
Body Tube.....	BT-50W
Motor Tube.....	BT-20J
Centering Rings.....	(2) CR-2050
Engine Block.....	CR-520
Engine Hook.....	EH-275
Fin Stock.....	3/32" balsa sheet
Launch Lug.....	LL-18
Parachute.....	12" Dia
Shock Chord.....	SC-24
Shock Chord Mount.....	SCK-24
Screw Eye.....	SE-1
Snap Links.....	(2) #12

Full-Size Fin Pattern



Make 4 from 3/32" Balsa Sheet



Make from 0.05" fiberboard

General Assembly Sequence

- **Step 1** Mark the BT-20J motor tube at 0.75", 2.25", and 2.5" from one end. Draw lines completely around the tube at these locations.
- **Step 2** Draw one line the full length of the tube.

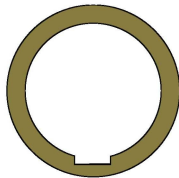


Figure 1

- **Step 3** Modify both CR-2050 rings as shown in Fig. 1. A sanding twig is the best tool for this job.

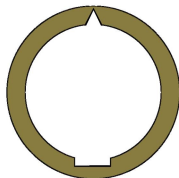


Figure 2

- **Step 4** Modify one of the two CR-2050 rings as shown in Fig. 2. A sharp #11 knife works best. Do not cut completely through the ring!
- **Step 5** Cut a slot with the #11 knife just wide enough for the tip of the engine hook to fit in at the intersection of the lengthwise line with the line drawn at 2.5" from the bottom. Insert one end of the hook into the slot, and let the remaining length of the hook trail over the bottom end of the tube.
- **Step 6** From the bottom of the tube, slide the CR-2050 ring with only the flat notch up until it is touching the line 1" from the bottom. The flat notch should be directly over the hook. Keep the hook aligned straight with the tube.
- **Step 7** From the top of the tube, slide the CR-2050 ring with the flat notch and the "V" notch down until it is touching the line

drawn at 2.25" from the bottom. As with the first ring, the flat notch should be directly over the hook.

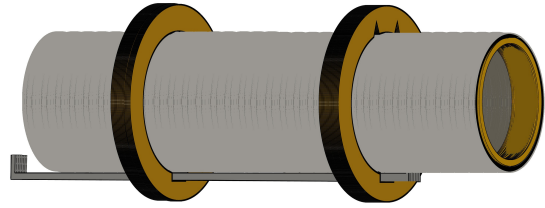


Figure 3

- **Step 8** Apply a thin layer of glue around the inside of the motor tube to a depth of about 1/8". Insert the CR-520 ring into the top end of the tube and push with an expended engine casing until it bottoms out against the tip of the engine hook. Apply a thin layer of glue around the base of each CR-2050 ring where it contacts the motor tube, front and rear faces. Clean out the "V" notch of any glue that happens to get into it so that it remains open after the glue dries. The motor mount should look similar to the illustration in Fig. 3 above. Allow this to dry completely, about 20 minutes.

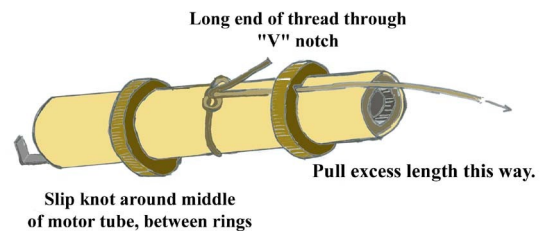


Figure 4

- **Step 9** Tie a slip knot in one end of the Kevlar thread. Loop this around the center of the mount, between the two rings. Push the free end of the Kevlar thread through the "V" notch in the forward ring and pull the excess until the loop is tightened against the tube and the back of the ring. Apply a thin layer of glue to the Kevlar loop to secure it to the back of the ring, and allow to dry.
- **Step 10** Using the fin alignment guide from page 2, mark the BT-50W main body tube for four fins and the launch lug. Extend the fin lines 2.25" from the rear edge of the tube. Extend the launch lug line 5.5" from

the rear edge of the tube.

- **Step 11** Cut out the four fins using the fin template on page 2. Clamp the four fins together and use a sanding block to finish shaping them. Use the sanding block, or a piece of angle aluminum with some sandpaper attached to an inside face, to square up the root edges. Apply a layer of thinned glue to the root edges of all four fins, then set aside to dry. Apply a thinned layer of glue to the launch lug at this time, and allow to dry.
- **Step 12** Draw lines around the main body tube at 2", 3", and 5.25" up from the bottom edge. Apply a thinned layer of glue to the fin alignment lines on the body tube between the 2" lines and the edge of the tube, and to the launch lug alignment line between the lines at 3" and 5.25". Set this aside to dry.

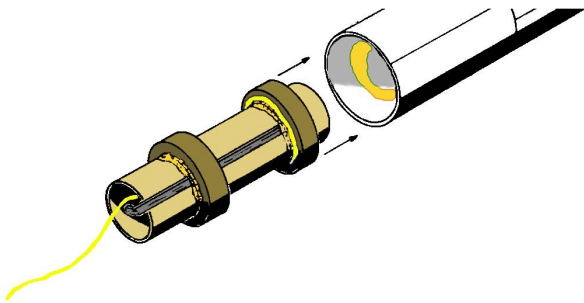


Figure 5

- **Step 13** As shown in Fig. 5 above, push the Kevlar thread down through the center of the mount from the top, and pull all of the excess out the rear of the tube. Apply a generous bead of glue up inside the bottom end of the main body tube, about 2" up from the edge. Spread this around evenly with a soft-bristle brush. With one continuous motion, insert the forward end of the engine mount up into the bottom end of the body tube and push completely in until the bottom edge of the motor mount tube is even with the bottom edge of the main body tube. Do not allow the mount to stop before reaching this position, as the glue will "freeze" the mount in place too soon. Allow the glue to dry with the body tube in an upright position.

- **Step 14** Unclamp the fins and separate them using the #11 knife. Carefully sand the large surfaces with 220-grit paper just to remove the raised fuzz from humidity and temperature changes. Gently round over the leading, trailing, and tip edges of each fin with 320-grit paper. Do not sand the root edges, and do not alter the shape of the fins.

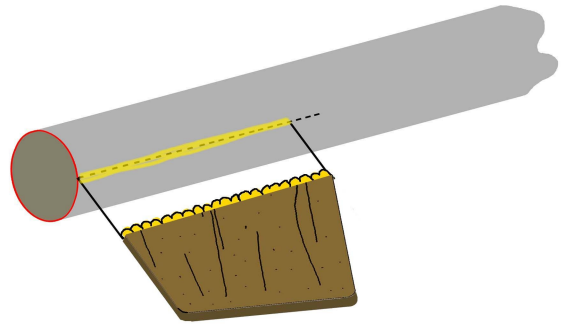


Figure 6
(Not this model shown)

- **Step 15** Slide the fin alignment guide down from the top of the body tube until it is about 1/2" above the 2" line. Apply a bead of full-strength glue to one of the fin alignment lines, directly over the glue applied in step 12. Apply a similar bead of full-strength glue to the root edge of one fin. As shown in Fig. 6 above, press the root edge of this fin onto the wet glue on the fin line, with the tip of the leading edge at the 2" line and the trailing edge at the body tube edge. Hold the fin in place for about 15 seconds, keeping the fin straight out from the tube. Using the soft brush, slightly moist, gently wipe away any excess glue that squeezed out from the joint, and form a fillet with what remains. Slide the fin alignment guide down over the fin to make sure the glue sets with the fin in the correct position. Let this dry at least 30 minutes before sliding the guide back up. Repeat this sequence for the remaining three fins.
- **Step 16** Using the same "double-glue" method, apply glue to the launch lug alignment line between the 3" and 5.25" marks, and to the lug itself, directly on top

of the glue layers applied earlier. Attach the lug to the body tube, and hold in place for about 15 seconds, aligning the lug parallel to the tube. Wipe away the excess glue with the moist brush, then set the model aside in a horizontal position, with the lug at the top, while the glue dries.

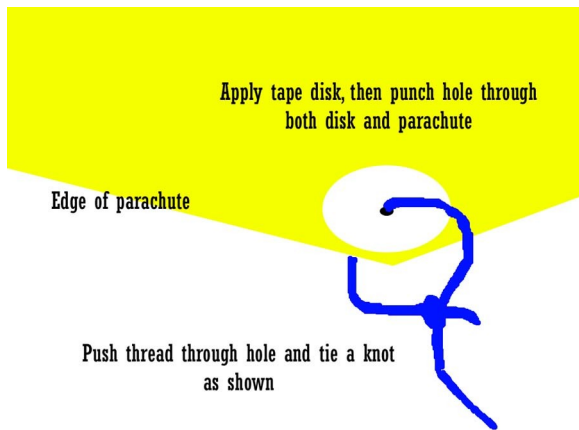


Figure 7

- **Step 17** If you are using a pre-assembled parachute, skip to step 18. Assemble the parachute according to the instructions provided in the parachute package, but with the change in the shroud line attachments shown above in Fig. 7.
- **Step 18** Attach the swivel end of one of the snap links to the parachute shroud lines. Attach the swivel end of another snap link to one end of the elastic shock chord. Apply a drop of thinned glue to the knots to secure them, and allow to dry.

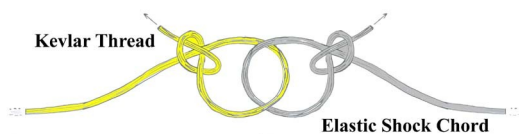


Figure 8

- **Step 19** Pull the Kevlar thread back through the mount into the body tube, and then out the front end of the body tube. Tie a slip knot in the free end of the Kevlar thread. As shown in Fig. 8 above, tie a similar slip knot in the free end of the elastic shock chord through the Kevlar knot, then pull the knots together tightly. Apply a drop

of thinned glue to this knot to secure, and allow to dry.

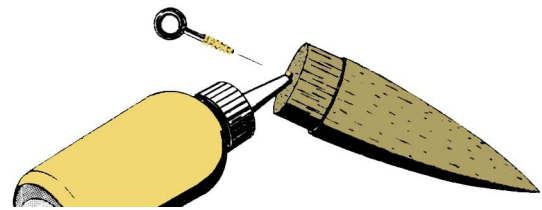


Figure 9
(Not this model shown)

- **Step 20** Use the screw eye to cut a hole in the center of the shoulder of the nose cone, as illustrated in Fig. 9, above. Carefully remove the screw eye and force glue into the hole. Coat the threads of the screw eye and reinsert it into the hole. Do not wipe away the excess glue. Place the nose cone in an inverted position while the glue dries.
- **Step 21** Sand the surface of the nose cone with 220-grit paper to remove fuzz. Do not re-shape the cone!
- **Step 22** Attach the shock chord snap link to the screw eye at the base of the nose cone, then push all of the shock chord length into the top of the body tube. Insert the shoulder of the nose cone into the tube. You have now completed the *construction* of the ALFA.

Finishing Sequence

- **Step 23** Apply a filler compound, such as Elmer's Fill-N-Finish, to all of the exposed balsa surfaces, and to the spiral seam of the body tube. Allow at least a full day to dry before sanding. Sand with 220-grit paper to remove the excess compound, inspect the surfaces for imperfections, and re-apply more compound to those areas as needed. Sand again, re-inspect, and repeat this cycle until all visible gouges and voids are filled.
- **Step 24** Spray the entire model with at least two coats of white primer, allowing each coat to dry a full day. After the second coat has dried, sand the model with 320-grit

paper to smooth the surface. Tack-rag the model, and inspect for surface flaws that might show through the color coats. Repeat this sequence as needed until all of the surface flaws have been reasonably hidden.

- **Step 25** The color scheme for the original 1966 model appears to have been a simple white body with a darker color for the nose cone, and our version uses this combination. We have chosen a traditional bright red for our prototype. Remove the nose cone from the model and use a scrap piece of BT-50 as a holder. Spray the nose cone with your choice of color, then set aside to dry at least *two* days, or until all of the solvent odors have disappeared. Using a length of 3/4" dowel stock as a holder, spray the main body with bright white and set this aside to dry, again for at least two days while the solvents disappear.

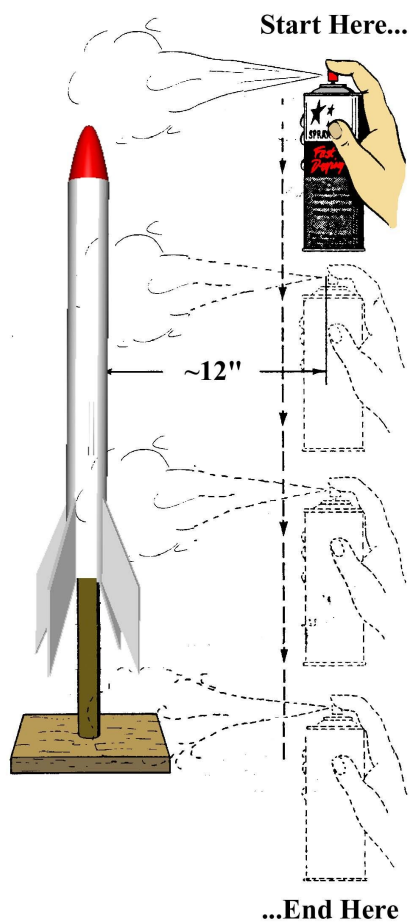


Figure 10

- **Step 26** After the paint has fully cured,

re-attach the nose cone to the main body. Spray the entire model with a gloss clear acrylic. We have had mixed results with spray-can acrylics, mostly because of the aggressive solvents used. BARCLONE now recommends the use of Future Floor Finish, sprayed with an airbrush, as the clear coat of choice. Use the illustration in Fig. 10 as a pattern for how to spray the model. Always start the spray at the top and work down. Begin and end the spray off the model to avoid splattering. Give the model several days drying time before handling.

- **Step 27** Apply any waterslide decals you wish to use, and allow to dry completely. Gently wipe away any adhesive residue from the model with a soft cloth. Spray the model again with Future Floor Finish and allow to dry completely. This will seal the decals to the model.

Flight Preparations

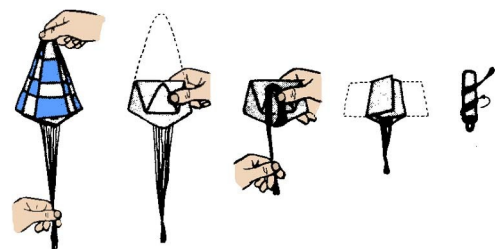


Figure 11

- **Step 28** Do not store parachutes in the model when displaying between flights. In cold weather, or cold climates, give the parachute a light dusting of talcum powder to prevent the material from sticking. Fold the parachute in the manner shown in Fig. 11 above. Do not wrap the lines tightly, but just tight enough to hold the final shape. Attach the snap links on the shroud lines and the shock chord to the screw eye on the nose cone.

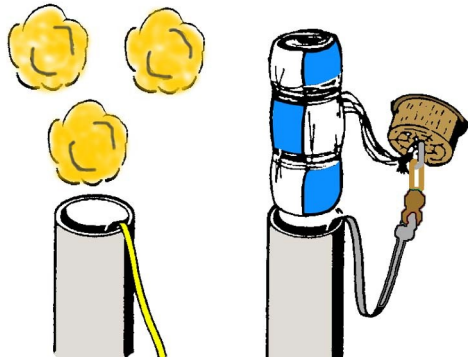


Figure 12

Developed for BARCLONE Rocketry
by C. P. McGraw

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by C. P. McGraw

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- **Step 29** Select the type of flame-resistant recovery wadding you prefer, either sheets or loose fill. Insert three to five sheets, crumpled, into the body tube (or, about 2" to 3" of loose fill) and push this down gently with a dowel. **DO NOT PACK THIS MATERIAL TIGHTLY!** The material must be allowed to blow out of the tube freely for the recovery system to work correctly. The wadding is only meant to provide a gas seal between the ejection charge at the top of the motor and the recovery device. Insert the shock chord and the Kevlar thread on top of the wadding, then insert the parachute on top of this. The parachute needs to be far enough down in the tube to allow the nose cone shoulder to fit without any gaps.

- **Step 30** Select the motor you wish to fly with. BARCLONE recommends these three motors:

Quest A6-4.....300'
Estes B6-6.....775'
Estes C6-7.....1550'

- **Step 31** Review the safety code on the last page of these instructions, and enjoy your ALFA!

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