



Gryphon
Created by C. P. McGraw



Length	12.5"
Diameter	0.759"
Weight	~1.0 oz
Fin Span	5.125"

Parts List:

Nose Cone.....	BC-735	SEMROC
Body Tube.....	ST-79	SEMROC
Thrust Block.....	TB-7	SEMROC
Launch Lug.....	LL-18	SEMROC
Fin Stock.....	1/16" x 3" x 6"	SEMROC
Shock Chord.....	SC-18	SEMROC
Shock Chord Mount.....	SCK-18	SEMROC
Screw Eye.....	1" [Large]	SEMROC
Parachute.....	CPK-12	SEMROC
Snap Links.....	(2) #8 Fishing Tackle	

Additional Items Required:

Small bottle of yellow carpenter's glue with 'precision' applicator tip; sharp hobby knife; steel ruler; 0.05mm mechanical draftsman's style pencil; small soft-bristle hobby brushes; sheets of 220-, 400- and 600-grit sanding papers; sprayable primers, paints, and clearcoat; expended 18mm motor casing; empty CD-R spindle for use as a holding spike; a personal copy of **The Model Rocketry Handbook, Seventh Edition**, by G. Harry Stine and Bill Stine



Gryphon Pattern Sheet

"V" Fin
Make 1

Wing Fins
Make 2

Strake Fins
Make 3

Subfins
Make 2

General Notes:

All fins are to be cut from 1/16" 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.

"V" Notch

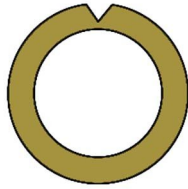


Figure 1

- **Step 1** As shown in Figure 1, use a sharp hobby knife to cut a "V" notch in the outer diameter of the TB-7 ring.
- **Step 2** Tie a slip knot around the TB-7 ring using the SCK-18 Kevlar Thread. Pull the knot tight with the thread aligned in the notch, and the knot against one of the faces of the ring.

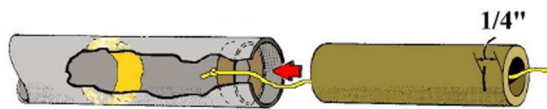


Figure 2

- **Step 3** Mark an expended 18mm motor casing at 1/4" from one end. Apply a generous bead of glue, about 1/4" wide, to the inside of the body tube about 2 1/4" from the bottom end of the tube. As shown in Figure 2, pull the Kevlar thread down through the center of the casing. Use the casing as a depth gage and push the TB-7 ring inside the body tube, up through the glue, until the mark on the casing is even with the edge of the tube. Remove the casing from the tube, but do not push the Kevlar thread back into the tube at this time. Allow this to completely dry.
- **Step 4** 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 5** Using the Fin Alignment Guide, mark the body tube with a pencil for each of the fins and for the launch lug.

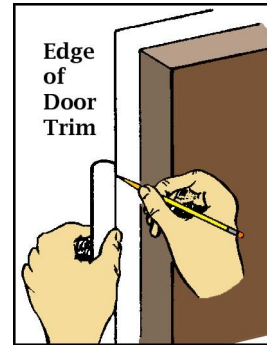


Figure 3

- **Step 6** 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 3" for all five fins. Draw a line upward for 5" for the launch lug.

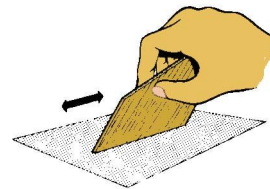
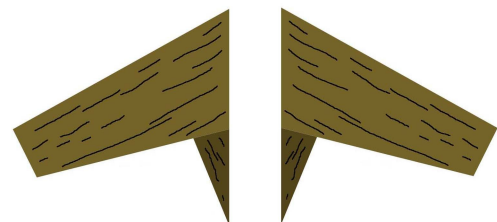


Figure 4

- **Step 7** Cut out all of the fin pieces from 1/16" 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, or the areas where the strake fins contact the main 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.



Align root edges of Wing Fins

Figure 5

- **Step 8** Using Figure 5 as a guide, assemble the wing fins. Build these on top of a flat surface with a piece of wax paper as a slip sheet.



Align root edges of vertical fins

Figure 6

- **Step 9** Using Figure 6 as a guide, assemble the vertical fin pieces in the same manner as the wing fins. Set all of these fins aside to dry at least an hour before handling.

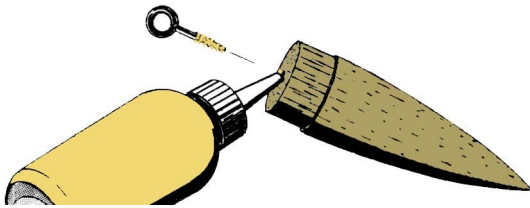


Figure 7

- **Step 10** 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 7, 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.
- **Step 11** Assemble the parachute according to the Semroc instructions, attaching one of the snap links to the shroud lines.

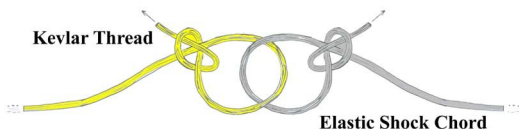


Figure 8

- **Step 12** Pull the Kevlar thread back through the tube and out the top end. As shown in Figure 8, 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.

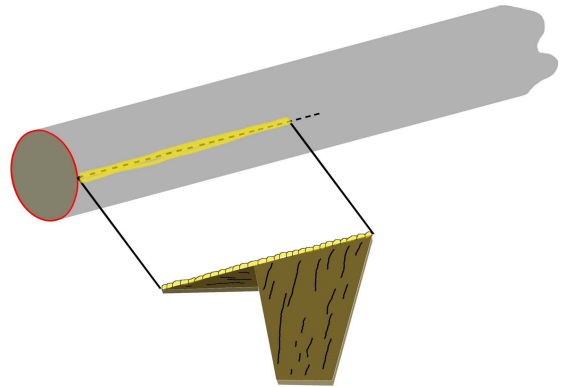


Figure 9

- **Step 13** Attach all fins to the body tube with their trailing edges touching the bottom edge of the body tube. As shown in Figure 9, attach the two (large) wing fins with their strakes to the rear (swept-rearward). Using two fin alignment tools cut from still cardstock (or cardboard), make sure the angle and location of these fins is correct. Allow each fin to dry thoroughly before proceeding to the next fin. Attach the (smaller) vertical fin to the body tube in like manner, but with the strake fin toward the front (swept-forward). Use the guides to maintain alignment while the glue dries. Attach the two lower-body sub-fins with the taper toward the front of the tube (large end rearward). Again, use the guides to ensure the alignment of all fins is correct.

- **Step 14** Mark the launch lug alignment line at locations 1.75" and 4" from the bottom of the tube. Attach the launch lug to the tube between these marks and allow to dry.

- **Step 15** After all of the glue on the fins and the launch lug have cured, apply a bead of full-strength glue along these joints and use a soft hobby brush, moist, 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 16** 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 17** 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 18** The illustration in Figure 10 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 CD-R spindle 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 19** 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.

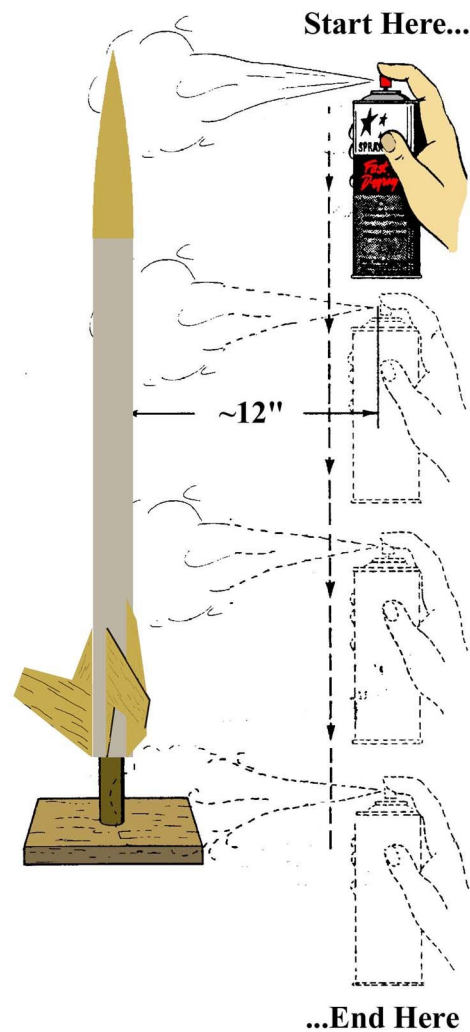


Figure 10

- **Step 20** We recommend spraying the nose cone as a separate item from the body, using a scrap piece of ST-7 as a holding tool. The body should be gloss white, while the nose cone should be gloss metallic copper. The upper 3/8" of the vertical fin, relative to a line drawn parallel to the body

tube, should also be painted gloss metallic copper, or medium red. The outer 1/16" of the wing fins, parallel to the tips, should be painted either black or medium red. Allow each color to dry completely before attempting to mask off for the trim colors.

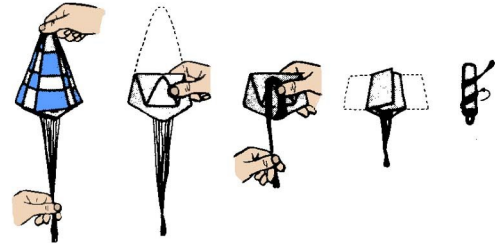


Figure 11

- **Step 21** After the final color trim has been allowed to dry at least a full day, preferably two days, you can apply the first 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. This may take several days, so be patient. Following this step carefully will prevent decalling headaches later.

- **Step 22** We highly recommend the use of waterslide decals, if you decide to apply markings to your model. These can be any commercially-available sheet **or** sheets which you make yourself with a personal computer and an inkjet or laser printer. Follow the instructions provided from the respective suppliers of your decal products for creation or use. Allow all decals to dry completely before moving on to the next step.

- **Step 23** As you did in Step 21, give the model a good spray coverage of Acrylic Gloss to completely seal and protect the decals. Allow the Acrylic to dry until the smell of the solvent has completely disappeared. The time this takes will depend on your local climate, temperature, and humidity, but it is usually two to three days.

- **Step 24** Using Figure 11 as a guide, fold the parachute just before you are ready to launch. Never store the parachute inside the rocket. This is why you are instructed to attach a snap link to the parachute lines. When preparing to launch, attach the snap link to the screw eye in the base of the nose cone.

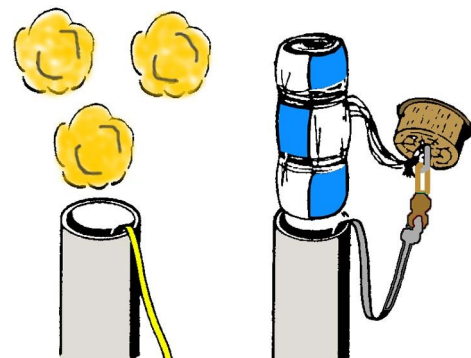


Figure 12

- **Step 25** Using Figure 12 as a guide, select either a pre-packaged flameproof recovery wadding, or flameproof cellulose insulation (shredded newspaper treated with a flameproof chemical, such as boric acid), to form a gas seal between the top of the motor and the parachute. Usually, three sheets of the wadding, crumpled into loose balls, or about 2" of the shredded material, is enough to do the job. Push the material down through the body tube but do not pack the material tightly. The material only needs to provide a barrier to the hot gases and burning particles released by the motor at deployment, and must be able to come out easily. Insert the shroud lines first, followed by the folded parachute, and finally the nose cone. Adjust the fit of the cone with bits of

masking tape attached to the shoulder, or gently sanding down the shoulder with 400-grit paper, depending on if the fit is loose or tight.

- **Step 26** We recommend the A8-3 or A8-5 as a good first-flight motor. The -3 will deploy while still climbing, and the -5 will deploy after the model passes through apogee and is coming down. Wrap masking tape around the motor and test-fit into the tube. The fit should be quite snug, more so than the nose cone, and the motor should not easily pop out. If that happens, the parachute will not get deployed and the model will come down ballistically, suffering damage.

**Developed for BARCLONE Rocketry
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 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