

# HIGH FLYING CARDS

## ELBRUS-SCUD MISSILE KIT INSTRUCTIONS

### For models- “B”- “C”- Al-Hussein



Real SCUD



model SCUD ☺

## Forward-

*It is recommended that you should thoroughly read and understand the GENERAL INSTRUCTIONS for all our rocket kits, and that you have at least built a few of the free models as well, and or have experience in other card modelling projects before attempting this series of kits. Above all the other listed instructions should be two words: “TEST FIT!” Test fit EVERYTHING prior to gluing! This kit was designed with 67lb-145gm2 cardstock. Switching types of cardstock will result in changes of fit. Remember, once you touch pieces together with glue, they’re done! If you make a mistake, you will need to print and make new parts. A few of the things affected if you use 110 are: the inner and outer diameter will be smaller/ larger. You will need to cut a little more outside the inner lines of the centering- rings, and inside the outer lines. Also the nose cone parts will seem a bit larger, as they are being fitted to an inner diameter. As such here are 3 more words to remember; “trim to fit!” Paper is not like working with standard rocket materials. While you can do a little sanding, it is formed primarily by folding. How you prepare and make each fold will adversely affect the way all the pieces will fit together. Work accurately.*

*Smaller parts can use up a lot of your energy and patience. It’s hard to keep up the kind of coordination and muscle control needed to make very fine movements. Take lots of breaks. Try a brisk walk or other low impact aerobic activity to replenish oxygen to the muscles. You’ll probably find you can work steadier, longer, and maybe even get more accomplished with better results than trying to work straight through. The kit will be there when you return; at least it should be. **DO NOT- lift any weights or do any extreme muscle demanding exercises**, it can cause temporary lack of muscle control for fine precise movements. . Take the time to earn bragging rights for it’s appearance! ☺ You may want to build 1 kit completely with your printer having been set on ‘DRAFT’, to save ink, and experiment with, and test fly. Build your ‘show’ kit, once you feel confident! This kit uses a lot of ink! Depending on what type of printer you have, it may actually be more cost effective to have it professionally printed up for you.*

*My personal experience and opinion on the difficulty of the models represented in these instructions rates as follows from easiest to most difficult:*

2- R-300 makeover "SCUD-C"

3- Al-Hussein

4- SCUD "B"

**Materials:** General, white, or clear drying glue (a must), scissors, sharp hobby knife, straight edge/ruler, Colored pencils, markers, paint of appropriate colors. **For flying model:** 5cm wide streamer material, or parachute material (trash bag) masking taps, string, modeling clay, or other nose weight material.

### READ ALL INSTRUCTIONS BEFORE BEGINNING WORK

**PRE-ASSEMBLY STEPS:** Print out the first sheet - or one of the 'motor tubes' on regular paper. Paper is cheaper than ink and cardstock! Use this first sheet, to check and see if you are printing at the proper scale. Each tube should measure:

**"B" model low-res pdf - motor tubes should measure 160.5-161mm's X 119.5-120mm's**

**"C" model motor tubes- 119mm x 168mm**

**"AL-Hussein" Tif's each page has a black rectangle around the perimeter for consistent sizing with every page. This outer black rectangle should measure 253.5- 254mm x 190-190+a hair mm's. As long as the pages are consistent; the parts will fit.**

Measure from the outsides of the black lines. Once you have gotten the proper scale for the kit, then print out the parts, using a high quality setting. The TIFF pages are best printed up using a photo editing program, and selecting EXACT, ACTUAL, (or similar word) SIZE. They can also be rited in PAINT, or other similar graphics program, in the same fashion.

The pages are categorized by part reference rather than number. Though not necessary, as the rocket will work fine, the conduits and inner fin forms can be printed on 110lb cardstock for extra strength. The fin layovers MUST be printed on regular paper for proper finished and scaled appearance.

*\* For a better appearance: **DRESS UP** all the paper edges with a colored pencil, marker, or paint of the appropriate color. This will hide 'white' edges. Do the same for the underside parts where overlay parts meet together at seams. **Try to cut just inside of the lines noting the TOP AND bottom of each section, in order for the exact overall height to come out correct.***

**FLYING MODEL:** Before anything else- take one of the sheets- any sheet - just pick one! ☺ Measure in 3mm from one of the 2 long sides of the paper, and draw a line all the way across, making a 3mm wide strip. Cut this out- It will be the engine block ring strip.



cutting the engine block strip

### ASSEMBLY

**STEP 1- BODY TUBES:** Unlike the other kits where you have started with fins, this one starts with the OUTER body tubes, which can be difficult, and are the main-frame for all the other parts fitting. When cutting out the tubes, cut inside ON the lines for of the sections that have lines, and directly as close to "green" as you can without cutting into the green. There are several ways to roll the tubes. The simplest method, because this rocket has a near full length engine tube to hold the pressure from the engine: is to glue the very end of the outside part down, and then peel up and glue the inner flap as you would a nose cone shoulder, or coupler. For the best results and strength, I personally recommend the 'mandrel -heat' method by obtaining a pipe, such as PVC, or a dowel that is under 40mm in diameter, as that is the outer diameter of the SCUD model, and building it up, using cardstock, and regular paper to get the exact fit. Test wrap one of the sections around the FORM/MANDREL. Do not worry about where the inner part of the wrap is, just worry about matching up the outside marks. You will see that the end is left green, whereas the inside has a darker line. The green end should cover this, except where there is also a dark line on the end, and the inside, then they should match up on top of each other. Pay close attention to where the hatches and other marks are, as you want as close a fit as possible for a good appearance, and especially so that they can be properly joined together. Remember, the more solid, tighter and smoother your mandrel is, the better the completed tube section will look.

*\* The "B" model has an extra section, the nose base, that rolls up the same as the rest of the body tubes sections!*

*It would be a good idea to mark on the inside of the completed sections, with a pencil, which body section is which, and the direction they go( up is as the words are), so there won't be any confusion later.*



completed tubes after glue/ironing

**STEP 2- ENGINE TUBES:** \* It is possible to skip this step if you are building this model strictly as a static showpiece. Using engine casings with a layer of tape on them, or preferably making a form, and using the method for the body tube sections as in the General Instructions: paying attention that the marks are on the outside to place the centering rings, roll/glue the engine tube sections making sure that the lengthwise marks are lined up and as close as possible to just overlapping. The tube sections must be as close to identical diameters as possible. Once the engine tubes are dry, couple them together using the ENGINE TUBE COPLER STRIP. Again, make sure the marks are on the OUTSIDE. Roll up and insert the engine coupler strip most of the way into one of the completed engine tube halves. Butt the outer portion of the strip against the inside seam of the engine tube, and unwrap the coupler strip till it is tight inside the tube. Peel up the inside section of coupler strip and put a dab of glue in. Press back down, unrolling again to make sure it's tight. When the glue has set, remove the coupler, unwind, glue the whole strip together, clean the glue from the outside of the completed coupler, and reinsert back into the engine tube swirling it around to double check the fit. Remove, and let dry. Run a bead of glue around the inside of the engine tube lip, and re-insert the coupler, twisting as you go, up to the middle mark. Let dry. Glue the other tube onto the coupler in the same fashion, and roll the completed engine tube assembly on a flat surface to make sure it is straight as possible.



the 2 engine tube halves 1 with coupler inserted



engine tubes glued together

**STEP 3-Making Centering rings:** You will need to make 8. There are 6 perforated rings, and 2 solid rings; one for the top, and one for the backside of the rear detail ring, to help stiffen it. The top ring is solid for positive ejection without blowback. There are a few ways you can make these. Take the patterns and rough cut them, you do not need to be perfect at this time, just make sure all the lines are visible. Take your rough patterns and glue them to Cereal box (.5mm) thick cardboard. Stack laminate them again to 65-67lb cardstock. Make them 3-4 layers deep. Cut them out after drying. You can do the same by laminating them to 110lb cardstock 2-3 times also. Once everything has dried, cut them out. The outer line should be cut so that the line is either showing, or cut in the middle of the line itself, so half of it will be showing. The inside line should be cut to the OUTSIDE of the line. The little holes can be cut with a standard paper-punch. NOTE- although cutting these holes will lighten each ring, you do not have to cut all of them, but it will make a slight increase in the weight you will need to add much later to the nose. You should cut out at least 1 hole so no section of the rocket will pressurize differently, and air can be distributed throughout.



partially cut top ring



perforated ring cut

**STEP 4- ASSEMBLY OF THE BODY/ENGINE TUBES:** *This step must be done with great care and in the following sequence! Pay attention to the order of the body tube sections, and the orientation.* There are spaces marked where the tubes, and couplers go for reference. Place 2 rings on the lower bands of the engine tube where marked. All rings go to the side of the line where it is marked "ring here". Run a bead of glue around each side of each ring to glue them in place on the engine tube.

A: Cut out, and install a main body coupler, in the LOWER BODY SECTION 4 piece, in the same fashion as you did for the engine

tubes. Let dry. Once this has dried, run a bead of glue around the inside of the lower body piece, just under (inside) the coupler. Take the engine tube with the rings and insert it through the back of the lower body section tube, until the upper ring rests against the bottom of the coupler. Using a long stick, or cotton swab, run a bead of glue around the Lower ring lower body tube section joint. Let dry. Run another bead around the inside of the tube coupler/upper ring joint. Let dry.



B: Place a ring of glue at the next line marked “ring here”. Slide another perforated ring down to this mark, so the it rests against the top of the tube coupler in the lower body section. Run another bead of glue around the Next “ring here” mark up, and slide down and situate another perforated ring. Run a bead of glue around the top of each ring/engine tube joint. Run a bead of glue around the lower inside of the MID BODY SECTION 3 body tube. Run another bead of glue around the top of the body coupler in the lower section. Using a slight twisting motion install the MID BODY SECTION 3 tube over the top ring, and onto the coupler, and down to against the lower section, **PAYING CLOSE ATTENTION TO LINING UP THE SEAM LINES AND OTHER MARKS!** Quickly wipe off any glue that has seeped out of the assembled seam between the two sections. Using a cotton swab again, run a bead of glue around the top of the ring/inner boy section joint. Roll the assembly on a flat surface to be sure all the sections are straight. Let dry.

C: Roll up and install another coupler in the MID BODY SECTION 2 tube, as previously. Once dry, glue it inside the MID BODY SECTION 3 tube, so that it rests against the top of the centering ring, and is up to the line. Let dry. Slide the next 2 perforated rings onto the engine tube, as in B step. Let dry. Install the MID BODY SECTION 2 tube as you did with the number 3 tube. Roll the assembly across a flat surface to be sure all the sections are straight. Let dry.



Showing assemble order proceeding toward top

D: Roll up, and install the last body tube section coupler in the TOP SECTION 1 tube as previously. When dry, glue it into the MID BODY SECTION 2 tube, up to the halfway mark, and against the top of the centering ring. Glue the last SOLID centering ring, as done above, so that it is situated against the top of the coupler, and should be , or just about be flush with the top of the engine tube. Let dry. Run a bead of glue around the bottom inside of the TOP SECTION 1 piece, and another bead of glue around the tube coupler. Install the TOP SECTION 1 as the previous sections paying close attention to lining up seams and marks. Quickly wipe off any glue that has oozed out from the completed assembly. Run a bead of glue around the ring/ TOP SECTION 1 joint. Roll on a flat surface to be sure all the sections are straight.

**Set the entire completed body assembly aside, and on its side to completely dry.**

**\*If you elected not to make the body tubes, simply use the couplers to set the depth fr each centering/stiffeing ring.**

**STEP 5- FIN ASSEMBLY:** *If you are building this rocket for launching purposes: It is recommended as an option that the inner fin form assembly be made with 110lb cardstock. If you're printer will not handle 110, there are several methods to accomplish the needed strength for assembly: Print the inner forms out on regular paper, and laminate them too 110lb, or to an index style card, or file folder. Make the forms from 67lb, and trace them onto 110lb, or an index card or file folder, and cut INSIDE the lines. Use 67lb-145gm2 cardstock, and insert a little expanding foam through the opening at the inside top edge of each fin.*

Cut out and score all the dotted lines on the inner fin form, All the glue flaps go on the INSIDE. Be careful when gluing the fin together, not to collapse the walls. Cut out the backside root edge piece, and glue the lower small flap INSIDE the fin form.





When the glue has set, apply glue to the flaps, and glue them inside the fin form. Press the assembly up against the body tube to make sure that the backside piece is far enough in, so that the fin will not be raised up when gluing onto the curved surface of the body tube.



#### Set aside to dry.

Cut out the outer form, and fold it in the middle where the line is. **DO NOT SCORE THE LINE!** The fin should have a slightly rounded appearance on the outside edge, just fold it. Test fit the inner fin form into 1 side of the outer wrap, and see how it fits. When you have everything aligned, place glue on the inside portion of 1 side of the outer wrap. **DO NOT PUT GLUE ON THE INNER FIN FORM!** This will warp them. With the colored side of the outer wrap against a hard smooth surface, place the inner fin form into one side of the wrap. Rub the assembly lightly across your surface, to make sure both pieces are adhered together, again- making sure you do not press on the fin walls, causing them to collapse. Place glue on the other inner side of the outer wrap and repeat the procedure. Make all 4 fins in this fashion, and let thoroughly dry.



\* You can get the rear exhaust/detail ring trimmed up better by fitting it **BEFORE** you glue the fins on by centering up the little circle on the back with the body tube seam line. For the “C” model, since the fins have 0 numbering, it is especially wise to fit it now!

Glue the fins to the fin lines on the body. Yellow=fin I(1)The rest go in numerical sequence in a clockwise fashion, when viewed from the rocket rear; II(2) III(3) IV(4). Let dry, and apply a glue fillet to each side of all the fins. Let dry, and repeat.

Cut out the fin **leading edge overlay/Layover** pieces. Fold them in half lengthwise using the center-line for reference. **DO NOT SCORE THE LINE!** They need to be slightly rounded without a crisp edge. Test fit the wrap onto a leading edge of a fin. Place glue on the inside of the fin overlay wrap, and glue to the leading edge. Repeat for the other 3 fins.

#### STEP 6- NOSE CONE ASSEMBLY: *Per General instructions*

\* The “B”/ AL/HUSSEIN models use a multi sectioned cone, that when you are finished, will have some parts inside of others. **THIS IS PROPER!** The actual nose cone is not a perfect cone, but a conglomeration of parts. The parts that are on the outside, should stick out, and the parts on the inside should be recessed. ☺

\*\* The B model, because of the details on the nose that **MUST** line up properly with the rest of the model has to have the first lower conical part assembled exactly as follows: Assemble the round base exactly as you did the sections of the missile body. After gluing together Inside section 1, glue it to the base so that the seam is centered exactly on the red dot between numbers II, and III. Glue the outer matching wrap with the edge butted up against the seam of the inner wrap. This will insure that when completed, the



Seam shown above dot between numbers II and III

lines on the nose will match up correspondingly with those on the body.

**A** Cut out, roll and glue the shoulder as per the couplers EXCEPT!- Do not let the fit be excessively tight. IT will have to separate if you intend to fly the rocket. You can always add tape later to a loose shoulder.

**B:** After the shoulder has set and dried a bit, reinsert in the body tube ½ way, wrap and place glue on the **flap only** of the inside nose part 1 strip. Glue the strip fitting it tightly around the shoulder. Remove once the glue has set. Cut out the matching outer wrap. Test fit the outer wrap to the inner wrap. Fit the outer wrap on by butting the longer end with the white strip, against the outer seam of the inner wrap. By going in this direction, the panels will be equidistant apart all the way around. You may trim some off the white stripped end if you find it too long. Carefully glue the outer wrap to the inner wrap piece. You may want to smear glue on the inner wrap and let it dry, and apply the outer wrap by gluing the little bit against seam, and then again to itself at the end. Use an iron and dowel rod to melt the rest of the glue to join the 2 pieces together. This gives less chance for warp/wrinkle marks.

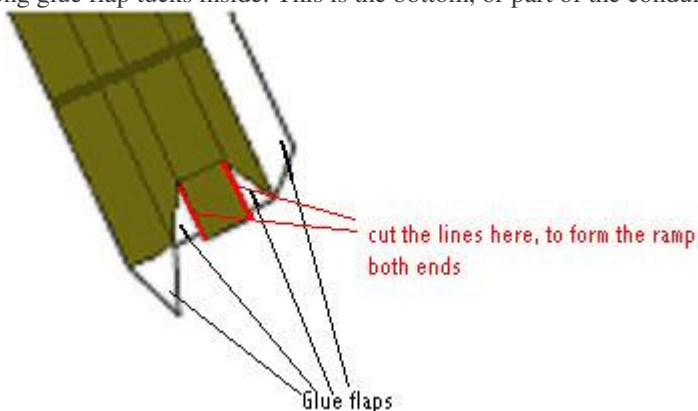
**C:** Roll and glue the large inner conical nose pieces. When dry, glue each piece to the next inner corresponding nose part, making sure the lateral dotter lines are just inside piece one. Check to be sure the assembly looks straight, and let it dry. The dark lines where the nose pieces fit are also seams on the real warhead, so they're supposed to be on your model as well Test fit each piece first. It is recommended to smear glue on the inner nose piece, and let it dry, so you can use the heat method to attach the inner and outer pieces together. Use just a little glue at the beginning of the lower outer wrap against the seam to hold it in place, while you roll it tightly around the inner piece. Use just a touch more glue to hold the outer wrap to itself. Use the same procedure for the upper outer wraps. After they are in place, Hold the partially completed nose by the lower section, and apply heat to fuse the outer pieces to the inner pieces. You can apply a **LITTLE** pressure to help smooth seams.

**D:** Roll up and glue the inner nose tip. It will be easier to do, if you cut out the little solid dot at the top, and form it around a pencil or similar object that is conical in shape. When it is dry, Fit inside the partially completed assembly, as you did Piece 2. Check to be sure everything looks straight, and let dry. *\*You may want to use a pencil, pen, or similar to reach inside the nose cone, and make sure the inner flaps are pressed against the sides.* When it has dried, cut out and test fit the white outer piece to the inner piece. **For the "C" model only! Fit the outer piece the ink-side IN. This way only white will show on the outside.** Place glue on the inside portion of the outer tip, and glue it around the inside tip piece as you did previously with the other pieces.

**\*"B" model ONLY!- Use the green strip you printed on the regular piece of paper with the fin leading edge overlays- to wrap around the white line on the nose cone base**

*For a better look and fit, while the outer wrap is still wet, snip off the tip down to the level of the inner piece. After the glue has set, put a small blob of glue on the top of the tip, and going from bottom to top and around, massage the pieces into a rounded point with your finger. If the glue starts to dry before you are finished, just add a touch more to complete the task.*

**STEP 7- THE LONG CONDUITS:** They're not as hard as they look!© Use 110lb cardstock or regular paper laminated to either 67 or 110lb if extra strength is desired. Cut out each conduit. The top ramp sits on the glue flaps, so cut on either side of the center rectangle, so the little white flaps can fold inward. Carefully score the long lines first, and firmly fold and sharply crease the edges. The long glue flap tucks inside. This is the bottom, or part of the conduit that glues against the body tube.



scored pre-folded conduit

Place glue on the flap, and fold the adjoining section over it, starting in the center, and working out to the ends. You will have less chance of creases or wards this way. Once you have it glued into a square tube, fold in the glue tabs, to the inside on either end, and glue the rectangular flaps to them. Repeat for the other conduit, and let them dry. Match up the conduits to the long gray lines on the body tube, with the shorter marked section of the conduit on the bottom. Place a thin bead of glue along one of the lines, and center up, and press a conduit to it. Work it a bit so that it is flat against the tube, and straight. Repeat the procedure for the other conduit.

*\* The Al-Hussein model conduit has been made into 2 sections for ease of printing purposes. They are marked top/bottom. Glue the coupler about 1/2 way into one section, let dry, then glue the sections together, and attach as above.*

### THE SMALL CONTROL & OTHER DETAIL PIECES



*\*photo of actual SCUD -missing exhaust vanes*



*\* model SCUD "B", Al-Hussein*



*\* "C" model*

### SUB ASSEMBLIES

*\* note: Some of the small parts you see in the instructions have a fuchsia color to them, to help them show on camera better. Also part "c" in the assembled pictures of the rear, has been changed to be slightly shorter, the detail pictures accompanying the assembly of this part are correct.*

*Score all the lines on the small parts BEFORE you cut them out*

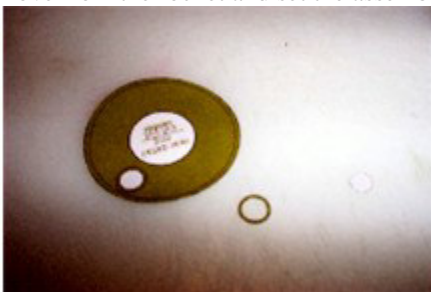
*. You will probably need as much time or more to complete the rear exhaust ring detail pieces as you did the main rocket. If you plan to fly your rocket; this is why it is designed to be detachable! You only have to make it once. If you lose the rocket- you will only have to build the rocket portion. ☺*

*\* If you only want the rocket for a static display, you can get better results by gluing everything down permanently*

*The following parts are optional, and are designed to be removed when flying the rocket, except part g.*

**Rear detail ring PARTS I, I1:** If you haven't already done so, cut out the rear detail ring, make the appropriate centering ring the same way as the others. Center and glue it to the backside of the rear detail ring. While setting, test fit it into the back of the rocket body, with the little circle on the back directly centered between fins I(1), and IV(4). Do not allow glue to get on the rocket body. Trim as necessary. The rear ring already has a small circle on the back. The "B/Hussein model is round, and the "C" has a flat spot. For a better effect on the B/Hussein", cut out the inside of, and then the small circle I1, and glue the now small ring over the center of the one printed on the ring, to give a better 3-d effect. You may also paint the light gray part bright silver if you wish. You may glue the optional cut ring to the printed part on the ring of the "C" model.

Remove from the rocket and set the assembly aside to dry completely, while you work on the other parts as follows.

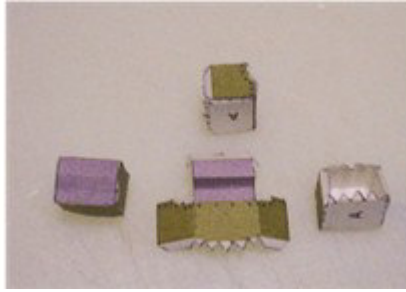


Cut rear detail ring with optional small circle



position between fins I(1) and IV(4) "B/Al Hussein" shown

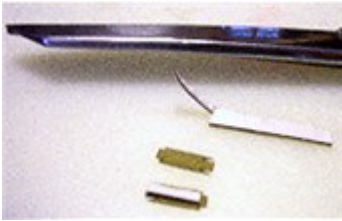
**Exhaust vane servo control boxes. PARTS-A** Make 4: Score cut out, and fold and glue the servo boxes as shown in the illustration.



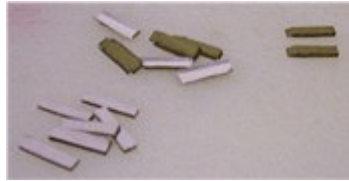
Folding/assembly diagram for A- servo boxes

The heavier gray line is for a VALLEY fold, (printed side will fold towards itself on that line), making a small shelf. Follow the outline of the sides. Once done, set them aside to dry completely, while you do the remaining parts.

**Small fin wedges : PARTS A-5** :Make 8. Make an inside former to wrap parts A-5 around. Your form will need to be just under 1mm hick, and fit just inside the long dashed lines. The length goes from inside the rear flap- to the end where the ramp folds. You can use a thin balsa strip, or Styrofoam-about egg carton thickness. Cardboard, about the thickness of your average USPS parcel box; or 1mm works very well. After you have measured out and cut your first inner form, you can use it to cut the others, Cut a bevel in one end for fwd edge of the form (ramp) to rest on. Repeat for the other 7.



Fitting the inserts to A5

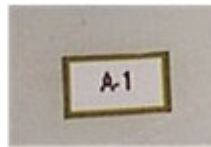
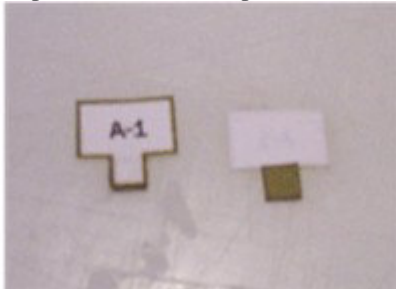


All the A5parts&inserts cut out and pre folded/w/2completed in back



cutting the bevel into the insert

**Servo box faces PARTS A-1,A-2** , **“C” model just has modified A-1 as shown.** **“B” model-**By now the servo boxes should have dried enough to attach the outer faces. Glue A-2 to A-1 on the non printed side as shown. **“C” model-** cut out and fold part A-r to form a wedge. Repeat for the other 3 parts, and let dry.

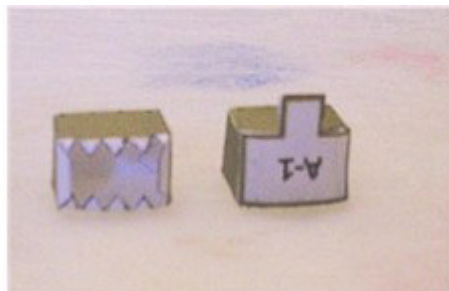


“C” model A-1



“C” model A-2

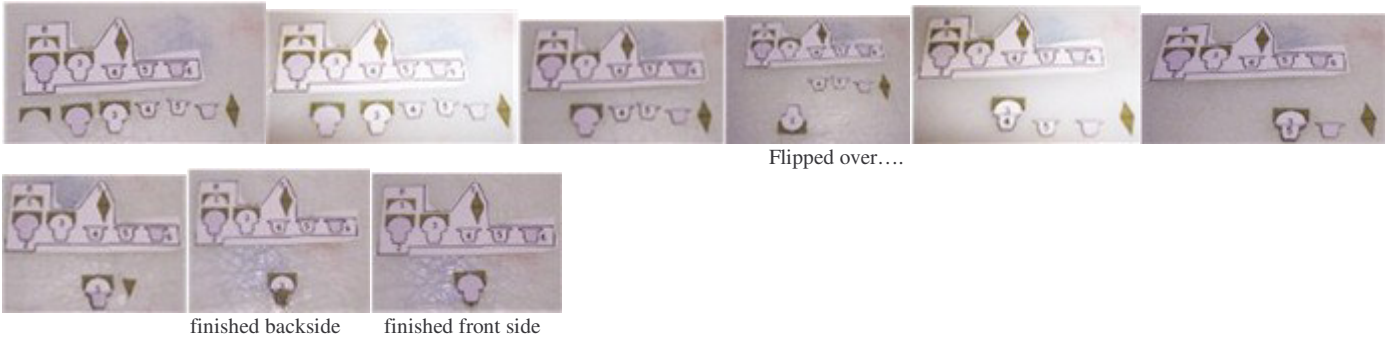
Center up and glue A-1 over the open face of the servo box as shown, with the center tab sticking past the printed side. Center the **“C” model part A-1** over the opening in the box. The bottom part of the A-1 should be flush with the white under face of the box. Repeat for the other 3 and let dry completely.



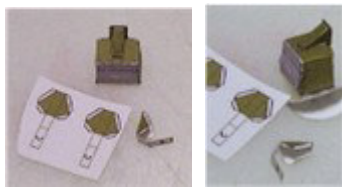
“B” models and AL-Hussein missiles shown



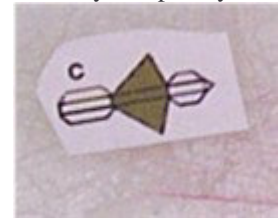
**Exhaust van roots: Parts B 1-7** Note in the following sequence of pictures the assembly order. Simply laminate the parts together in the order shown.



**Small reinforcing wedges that fit on the top center of the servo control boxes A: PARTS-c-** (showing the kit supplied parts) There's a mouthful!© Cut out and fold parts c as shown in the following picture. Make 4, and set aside to dry completely



\*NOTE\* Pictures show reinforcement triangle in kit uncut, pre-folded & placed on servo-box of "B" model for reference.



"C" model wedge

**Exhaust vanes- D (3-D style);** Score on the lines, and fold each part in a convex fashion, or printed sides away from you. Tuck in the glue flaps, and try to get the back side flush. Note the exhaust vanes in the picture of the real scud. They should be a little fat in the center.

If you do not wish to try making this style vane, simply cut out and fold in half with glue the **D-alt** style vanes. After the glue has set up, glue a vane on the front side, centered up, of a vane root as shown. Repeat for the other 3. Once dry you may paint the light gray, and edges of the vane, and root a bright silver, as shown in reference picture. This is the proper color. The green triangle stays, of course, green. ☺

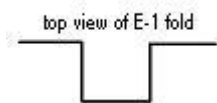


pre-folded vanes

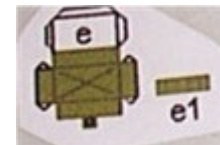


glued finished vanes attached to roots

**Cable hook-up boxes PART-e, e1-** make 2: Cut out fold and glue the 2 boxes as shown in the following pictures. Part e1 is folded as shown in the diagram, and glued on under the protruding part of part e, against the side as shown. The "C" is longer with a slightly different assembly, E-1 is the same



E1, E pre-folded, completed



"C" model E/E1

**Cable hook up triangle piece- part f:** All models- cut out, fold, and glue part f, in similar fashion as part e.

**Lower body tube side box PART g: all models** On the body tube of the rocket between fins III(3) and IV(4), just above panel 16, you will see a small rectangle printed. Part g is the optional **3-D** part that fits over this. Score on the heavy lines and the flaps, so that the flaps are in back. You may also eliminate the flaps, if you choose to use a small piece of cardboard as in forming the **small fin wedges**. Once the part is formed, glue it over the printed rectangle on the body tube.



backside of folded "g" next to printed area on tube



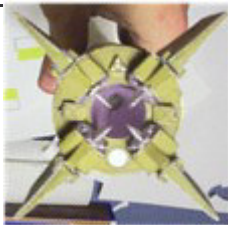
The 3D "g" installed

**Rocket engine nozzle- PARTS h, h1:** all models Cut out the part h. Roll it so that the printed portion is on the **inside**, and the **glue flap is on the outside**. Glue into a cone, and attach **h1** over the top covering the hole, black part to the inside. Let dry.

\*For more realism, paint the gray area of the inside of the nozzle a dark steel.



### Putting all your subassembly's together



"B/Hussein" model

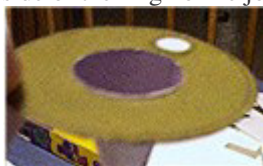


"C" model



parts for "B/Hussein" model

After everything has had a chance to dry, cut out the center portion of the rear detail ring, all the way through the layers. Test fit the engine nozzle by placing from the printed side, through to the back. There should be a tiny portion of the nozzle sticking out, just enough to create a lip. Place glue around the backside of the ring nozzle joint and let dry.



"B/Hussein" ring shown

Place the ring back onto the rear of the body tube, once again centering the little circle as you had before directly between fins I, and IV. Take a completed servo box and glue the white face **ONLY** against the ring, with the box pushed up against, and centered over



the rear of a fin. Repeat for the other 3 in the same fashion.

***Be certain of your placement before the glue dries!***

Once these have dried sufficiently, glue a completed vane root/vane assembly to the gray face of the servo box, so that the bottom green portion is pushed up against the outside lip of the exhaust nozzle, and the other end of the vane is laying against the servo box. It should be sitting on an angle facing outward, and the vanes should be straight across the bottom, parallel with the bottom of the rocket.

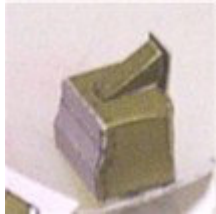
Repeat for the other 3, and let dry.



“B” model- Place the completed small reinforcing wedges, part *c*, on the green face, and green tab of the servo boxes, so that the white parts of the wedge are not showing. Note the fit. Place glue on the white portions of the wedge, and glue them in place.

“C” model- place part C with the long side (white part) against the servo box. Place part A-2 against the fin, so that the wedge is pointed down. Glue part A-2 to the servo box, and to part C. **DO NOT GLUE part C TO THE FIN!**

Let the assembly thoroughly dry completely.



“B/Hussein” model



“C” model

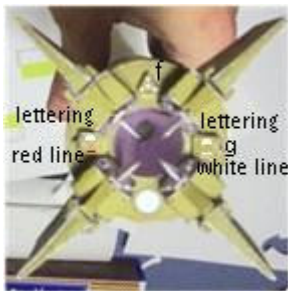
“B/Al Hussein” Once dry, glue a completed cable hook up box “*g*”-between fins I(1) and II(2), so that it rests directly between the servo boxes.

**“B” model only-** Orient the white lettering oriented as in the picture below

**“B”/Hussein models-** the little tab goes to the outside, with the other end of the box protruding slightly past the inside portion of the ring, or just touching the green bottom of the Vane roots on either side.

**“C” model-** Glue parts G in the positions shown in the reference pictures, with the little tabs even with the outer edge of the ring/rocket body.

**All models:** Glue the 2<sup>nd</sup> part G directly across from the first in the same position as done for your respective model.



“B” model



b/Hussein model



“C” model

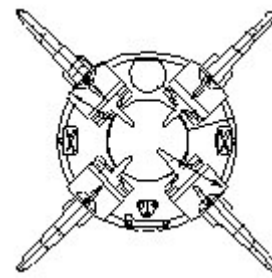


diagram of rear of “C” model

Place the triangular cable hook up piece, “*f*”, on the remaining section of the ring, between fins II (2) and III (3), so that is centered between the servo boxes, and the inside, and outside edges of the rear ring. \* note placement in picture above..

**Let the entire assembly dry completely.**

**All models:** After the assembly has dried , place the detail ring back in position on the rocket, and cut out parts A-3, A-4, and notice by the diagram how they line up. The longer portion will sit flush with both the trailing (bottom) and root edge (inside edge) of the fin, The shorter portion sits with the flat part flush against the bottom surface of the servo box, and the top of both parts ride over and onto the body tube. Score the heavy line in the middle of each part several times and roll it slightly to get a rounded valley instead of a sharp crease, the fold the printed halves toward each other and do the same. Since it will contact the fin on an angle, this will help it to sit just right.



showing position of A3/A4



Outward folded A-3/A-4 showing multiple score marks

*\*alternately, you can cut each part in half and glue the longer portions to the fins, in the manner mentioned above, for better appearance.*

Place a bit of glue on one of the halves of the outside part of the servo box protruding past the fin. Only glue the short piece of either A-3, or A-4, to the servo box. Repeat for the other part, for the other half. Do not get glue anywhere else except on the servo box, so that you can later remove the whole assembly for flight. Repeat this procedure for the remaining servo boxes and parts A-3, A-4. Let dry.

After they have dried, run a small fillet of glue along the inside creases of both A-3, A-4, and using a toothpick or something similar, press the crease into the body tube/fin joint, as close as you can. Be careful not to get glue anywhere but A-3, A-4. This will help those parts to hold their position and retention strength, after you remove, and replace the ring. After the fillet has dried, run a 2<sup>nd</sup> fillet again, and let dry completely.

Taking a completed part A-5, notice in the picture how it sits on the fin, flush with both the root, and trailing edges. Glue one A-5 to each of the completed A-3, A-4 pieces, and let dry. On the “C” model, also glue the inside portions of A-5 where they rest up against part A-2. **Again- be careful about your glue placement,!!** you won’t need much, just enough to tack them on. Repeat for the other 6 parts of the remaining fins and let the entire assembly completely dry. *Only after everything has dried completely, should you remove the rear ring assembly- give it time to mold, and hold it’s shape!*



**“B/Hussein” model only fin cable hookups PART -X** Notice the trapezoidal protrusions on fins II,(2) and III (3) in the picture. These are parts X. Parts X, were essentially made just to make an accurate kit, and are very optional! They will add to the authenticity of the model. ***HOWEVER- they are tough to form!*** These are for the ***“PURIST CARD MODELERS!”*** They can easier be made by shaping small pieces of balsa wood, cork, foam, or something similar, and painting them to match. They are placed equidistant from the root, and outside edges on the bottom of fins II(2), and III(3). If you choose to make the paper parts- **GOOD SHOW! VERY SPORTING OF YOU! ☺**



**This now completes the “modeling” portion of the scud- the next part is for making the model fly- for all you rocketeers that just gotta toss up in the air- and we hope that’s all of you! ☺**

**UPPER SECTION REINFORCEMENT RING:** Cut out, roll up and glues the upper reinforcement ring strip as you did the couplers/nosecone shoulder. When dry, push it to the bottom of the upper section against the centering ring- ***DO NOT GLUE YET!*** Test fit the nose cone into the body to see that it will seat all the way down on the “B/Hussein” models, and the green ring should be showing on the “C” model. Should the nose cone rest too high; withdraw the ring, trim a little off, and re-test the fits. When the fit is correct, Smear a band of glue around the inside lower part of the upper section. Push the reinforcement ring all the way down back in to position. Let dry completely.

**LAUNCH LUGS:** Cut out, and roll up each launch lug as per general instructions. Attach one lug along the body tube seam, with



the back of the lug 40mm from the rear of the body tube, just above panel 13. Glue the other launch lug, so the back of the lug is 160mm, from the rear of the body tube.

**ENGINE BLOCK:** \* Use an engine casing pushed up into the engine tube just past the lip, providing a temporary shoulder to help with the fitting of the engine block strip. Using the strip you cut out way back at the beginning of your assembly; roll it up to make the engine block as per general instructions. Mark a spent engine casing 6mm from the rear. Using a stick or similar object, smear glue around the inside of the engine mount tube, about 40 mm inside the rear end. Insert the block into the engine mount tube. Using the marked engine casing, push it up into the glue, and into position, so the mark on the casing is flush with the end of the engine tube.

**SHOCK CORD:** Cut out the attached shock cord mounts at the bottom of the instructions. Cut out about a 60cm length of shock cord and assemble it to the mounts at either end as shown. Glue one end inside the body tube top down toward the base of the centering ring, and partially onto the centering ring if too long. Attach the other to the inside nose cone shoulder. Let dry.

**Recovery devices:** If you want to use a parachute, the easiest is to get one of the pre-manufactured 12” chutes available from many retailers. OK- What fun would that be? CHEATER! ☺ Want to make your own the HFC way? It’s easy- Get a relatively quality trash bag of the color of your choice. Draw out a 30cmX30cm square, using a marker, onto the trash bag. If you do it right, you can two parachutes with 1 cut! Cut 2 26” or 66cm lengths of regular kite type string, or dental floss (it’s a bit lighter). Using masking tape, or notebook reinforcers with the hole in the middle- place them on the corners of your square. Punch a hole through the tape, and tie the string to opposite corner so it crosses the square diagonally. Pull both strings so the square spikes evenly, and mark the exact bottom with a marker. Tie it around the shock cord roughly halfway between the nose and the body tube, by passing the lines past the cord, and then pushing the chute between them, and pull it tight, making sure your marks are still at the very end. Wrap the shock cord around itself and pass it through securing it over the parachute knot so it won’t slide.

**OR**

You can also use a 4ft 120cm length of 2” 5cm Mylar streamer tape, available at most card/party type stores. Just tape it directly to the shock cord using wrapping tape, or a large self adhesive label, about halfway between the body nose cone.

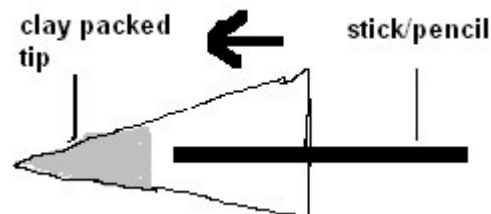
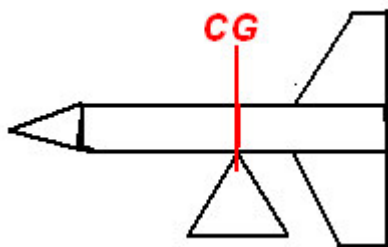
**BALANCE ROCKET-CG** (center of gravity)- Also known as the balance point. The rocket should be able to balance itself horizontally at the CG, or **VERY** close to it. **This is very critical to stable flight. Do not omit this step!** The nominal center of gravity CG balance point is:

**SCUD model “B”** 150mm from the *front of the body tube* with a C6-5 inserted.

**SCUD model “C”** 238-240mm from the *rear of the body tube* with a C6-5 inserted.

**AL-HUSSEIN-** 270 mm from the rear, or just even with the top of the numbers on the panels of section 2 with a C6-5 inserted

Pack the nose cone with modeling clay until the balance point is reached Double check the stability by tying a long string around the rocket at the balance point and swinging the rocket around you in a circle. The nose should point forward in the direction of the swing. If the rocket will not travel in the direction of the swing, add weight to the nose and re-tie the string at the new balance point and re-swing. Repeat until the correct swing path is obtained.



**FLIGHT PREP:** Place 1-2 sheets of recovery wadding inside the engine tube, and 2-3 sheets above in the top section of the body tube. Roll up the shock cord and streamer (or parachute) and place inside the nose cone, and any shock cord that will fit **LOOSELY**.

The following data listed is **CALCULATED** for engine/altitude:

**B4-107.69M, B6-106.42M, C6-194.68M**

Taking an engine of your choice, place either masking or plastic tape around the engine so that it holds firmly place inside the engine mount. Or body tube. **THE ENGINE SHOULD NOT HAVE TO BE FORCE FITTED!** If you can’t push into place with just firm easy pressure- remove some tape. Insert an igniter as per manufacturers instructions, Place on the launch pad, hook up the wires, and

press the *GO/LAUNCH/START* button!☺

