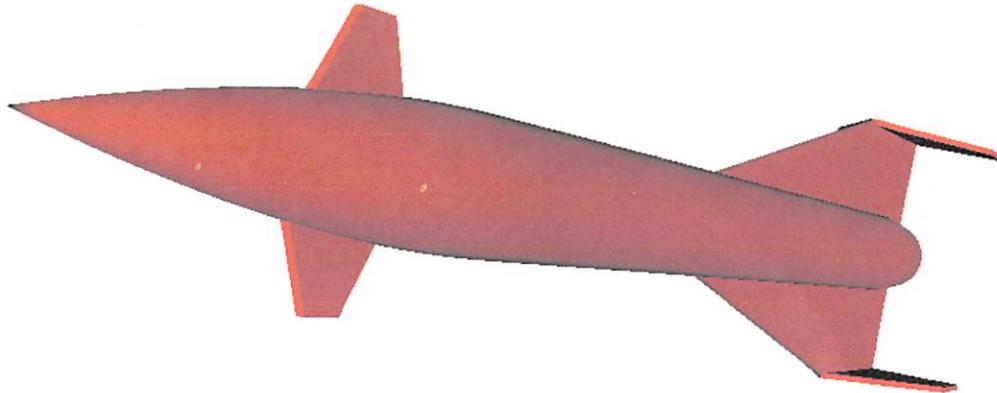


Wildman 2.6" Jayhawk kit – official instructions



1. Unbox the kit and check contents. You should have...

- 2.6" x 8.5" fiberglass infused polycarbonate nose cone, slotted for the canards
- 1-piece canard section (contains both canards), slides through nose cone slot
- 1 nose cone bulkhead
- 2.6" x 22" fiberglass body tube, slotted for the main wings
- 2.6" fiberglass infused polycarbonate conical tailcone
- 38mm x 14" fiberglass motor mount tube
- 2 fiberglass centering rings
- 1 plywood centering ring (must be sanded to fit into the taper of the tailcone)
- 2 main wings, 3/32" G10 fiberglass, CNC cut with tabs for winglet attachment
- 2 winglets, 3/32" G10 fiberglass, CNC cut with slots to match tabs on the wings
- 4500 high temperature 2 part epoxy

2. What you will need to finish this rocket

- motor retention
- recovery harness & parachute
- rail buttons & screws
- paint and decals
- shop supplies (sandpaper, epoxy, modeling tools, etc...)
- nose weight (do not attempt to fly this rocket without properly balancing it)

3. Initial preparation

(a) The first step, as in all fiberglass rockets, is to wash off the components. A tub full of hot sudsy water (such as Dawn dishwashing detergent), followed by a thorough rinse of hot plain water and a gentle towel dry will get all the mold release agent off the glass components.

(b) The next step is to rough up all the surfaces that will get epoxied, with

a good bit of coarse sandpaper. While you are at it, use your best technique (sanding, router, etc.) to give a nice taper to (or just break the square profile) of the leading edges of the main wings and the winglets. Also both the leading and trailing edges of the canards. No need to do the trailing edges of the main wings or the winglets, save your energy and attention to detail to do a really good job on the leading edges. Take care not to disturb the tabs on the tip chord (outside edge) of the main wing - it is important in winglet alignment.

(c) Carefully cut out the molding sprue (tree) from the inside of the tailcone. with an X-Acto knife or sharp, small wire cutters. Don't put too much pressure on the side of the tailcone as you do so. If you have a nub or two left over, no worries. Sand them off with coarse sandpaper, as roughing up the inside of the tailcone helps epoxy and won't affect your (optional) paint job at the end of the build.

WARNING - I know a lot of us have had good luck using acetone as a washing agent for fiberglass components. DO NOT USE Acetone with the polycarbonate nose cone or tailcone. Acetone will melt the plastic.

4. Prepare the aft (wood) ring.

The aft (plywood) centering ring is the same O.D. (outside diameter) as the O.D. of the aft end of the tailcone, so it must be sanded down (with a taper) to properly fit inside the tailcone. This may seem like a difficult process, but is actually relatively simple, with a couple of fall-back options should you inadvertently take too much wood off.

(a) mark the aft (wood) ring for sanding. Lined up the O.D. of the ring and the tailcone, and then mark the face of the ring from the inside of the tailcone with a sharp pencil. This will be the aft surface of the ring.

(b) Use the tailcone as a guide to determine the angle of the wood you will remove. Sanding will be easiest with a bench sander, using the motor tube as a mandrel, but it can also be done by hand with a sanding block and medium grit sandpaper. Check your progress frequently and stop when it fits perfectly up inside the tailcone. (The ring is now a transition, matching the I.D. of the tailcone.)

(c) In the event you take off a little too much, the ring will go too far into the cone, sticking out the back end. You can then sand the face (aft surface) of the ring to bring it back flush with the tailcone. If uneven, or nicked / gouged, no worries. The epoxy will fill in small voids during installation of the tailcone to the aft ring.

5. Assemble the motor mount.

(a.1) Install the aft (wood) ring onto the motor tube. When you do this, allow sufficient tube for installation of the motor retention you chose to use. Trial fit everything to ensure they fit BEFORE mixing epoxy.

(a.2) As an example, this is how an Aero Pack would be installed... slide the aft (wood) ring onto the motor tube, far enough up to be out of the way when applying a skim coat of JB Weld on the outside edge of the tube for the Aero Pack body. Put the same tiny amount on the inside of the Aero Pack itself, spreading it evenly with a popsicle stick. (JB Weld is good for this step as it is the consistency of toothpaste, so easy to work with, and has excellent high temperature characteristics when cured.) Pushing the Aero Pack onto the tube, a little JB Weld oozes out of the seam, both on the inside of the Aero Pack and the outside of the tube. Carefully wipe the inside of the tube with a paper towel, repeatedly, until it comes out clean. This is important, as it affects how your motor casings will slide into the motor tube. (Note - any residue that you miss can later be scraped off of the aluminum with an X-Acto knife, or sanded from the inside of the fiberglass tube. It is just easier to do it now while the epoxy is wet.) There will still be a little bit of JB Weld on the outside of the motor tube. Holding the Aero Pack in position against the tube, slide the wood ring aft until it rests against the Aero Pack. The epoxy will squish out, and you can make a nice little fillet on the aft side of the ring, keeping it small so as not to affect putting the Aero Pack cap on at a later point in time. Or, you can wipe it off completely if that suits you, this one is cosmetic. Using the remaining epoxy, make a good fillet on the forward side of the wood ring. Set aside to dry.

(b) Continuing to build the motor mount from the aft end forward, the next step is installation of the tailcone, using the body tube to line it up properly. Temporarily install the mid and forward rings to align the motor tube in the body tube. Be careful to only get epoxy on the tapered outside surface of the aft (wood) ring. Mask off your motor retention to protect it. As always, trial fit everything before mixing epoxy. Steps to permanently install the tailcone onto the motor mount...

(1) pull out the motor tube slightly, so it extends aft of where it will end up.

(2) mix a small amount of the included epoxy with a 5.5 : 1 ratio.

(3) holding the tubes horizontally, skim coat the outside edge surface of the aft (wood) ring. (Caution - DO NOT tip the assembly vertical (Aero Pack end up), to prevent dripping epoxy onto the mid centering ring. The motor mount assembly will be removed in a subsequent step, so do NOT get epoxy on the rings, inside the body tube, or on the shoulder of the tailcone.)

(4) carefully position the tailcone over the Aero Pack, and slide it forward into position, with the sleeve of the tailcone fitting up into the aft end of the body tube. Pulling on the Aero Pack while pushing the tailcone will make this easy. As it fits into position, the inside of the tailcone and the outside of the wood ring will squish out a little epoxy as they touch. Wipe off the excess on the exterior, live with the excess on the interior.

(5) set the assembly aside (motor retention end down) to dry. Note the orientation of how pieces may migrate while the epoxy is setting... i.e. depending on how loose / tight your tailcone shoulder is inside the body tube, you may need to put some tape around the body tube-tailcone joint to keep the tailcone from slowly slipping down while the epoxy is wet. Also, if you set it on the motor retention, the weight of the body tube and tailcone may cause it to slide off of the tapered edge of the aft ring.

(c) Installation of the mid ring. After a full night of epoxy curing, carefully pull the motor mount out of the body tube. The motor mount now includes the aft ring, motor retention, and the tailcone. The assembly in this configuration (tailcone attached only at the aft end) is somewhat fragile, so be careful not to bump or drop the motor mount assembly before installation in the body tube.

(1) Put a bead of epoxy around the motor tube, slightly forward of the edge of the tailcone shoulder. Slide the middle centering ring down the motor tube until it rests on the tailcone shoulder. This forms a fillet on the aft side of the mid ring. Set the assembly aside, aft end up, to cure. When dry, flip the assembly over and make a fillet of epoxy around the forward side of the mid ring. Set the assembly aside, aft end down, to cure.

(d) Installation of the recovery harness and the forward ring. The wing tang has to fit between the top and middle rings. The root chord of the wing ALSO has to follow the bend as the body tube joins the tailcone. So it is important to trial fit everything before committing to final epoxy fillets. You may have to trim the tang a little on one end to accommodate.

(1) since you can't fit your hands into the 2.6" body tube, there is no need for a U-bolt... I just recommend permanently attaching a length of kevlar to the motor mount. Obtain and cut approx 36" of Kevlar. File a notch in two sides of the inside edge of the top ring to clear the Kevlar shock cord, which will be epoxied to opposite sides of the motor tube (to deconflict with wing tang area) between the top and mid rings. Trial fit the assembly, and then tack (medium cyanoacrylate) the top ring (aft side) to the motor tube, ensuring the wing tang fits properly between the mid and top rings.

(2) After the CA has set, put a fillet of epoxy around the forward edge of the top ring. Try not to let the Kevlar "wick up" the epoxy, which would create a weak spot in the cord.

(3) epoxy shock cord down opposite sides of motor tube, individually.

(a) lift shock cord out of the way

(b) apply epoxy down the side of the motor tube

- (c) pull the shock cord taut and press into the epoxy
- (d) using a toothpick or popsicle stick, press the shock cord fully into the epoxy
- (e) spread the excess epoxy over the top of the shock cord.

NOTE - the strength of the shock cord retention is the shearing resistance of this epoxy bond. Ensure the shock cord is fully imbedded into the epoxy.

- (f) set aside to dry
- h) repeat for other side
- (i) apply epoxy fillet on aft side of top ring.

6. Install the motor mount.

(a) The motor mount is now complete and ready to be installed into the body tube. It is important to keep the shock cord areas of the motor tube away from the wing slot areas of the body tube, so that the wing tang has a smooth surface to contact. Mark the tail cone with a Sharpie to ensure the shock cords ends wind up 90° from the wing slots. Trial fit to make sure everything fits properly. Tuck the shock cord into the motor tube to keep it out of the way, then spread some runny epoxy around the forward surface and edges of both exposed rings (the forward and the mid), as well as the edge of the tailcone coupler sleeve. Finally, quickly slide the motor tube into the body tube, referencing your alignment marks to keep the tang areas clear. Wipe off any excess epoxy that squishes out the seam between the body and the tailcone. Spin the body tube a few times, in the air (oriented vertically), catching it between spins, so that the centrifugal force will help the epoxy on the forward edges of the rings flow towards the inside of the body tube, making fillets. Set aside, tailcone down, to dry.

7. Installation of launch guidance (rail buttons and/or lugs)

(a) Using the wing slots as a reference, mark the centerline of the body tube between them. It is easier to mark the centerline before wing installation, but should definitely be done prior to fillets, as the sharp edge of the slot is a better defined reference point than the radius of a fillet. Measure the circumference of the rocket between two wing slots, divide in half, and mark this as the centerline of the rocket.

(b) Launch lug(s) may be used in lieu of or in addition to rail buttons. Install on opposite sides if using both. 1/4" should be the minimum launch rod with this rocket. Use two short lugs separated by 6", or one lug 6: in length, to minimize rod whip.

(c) Buttons should also be separated as much as possible. The lower button can be placed near the bottom of the body tube, through the shoulder of

the tailcone and aft of the mid centering ring. (This also mechanically fastens the motor mount to the body tube.) The upper ring should be placed as far forward on the body but still aft of the forward centering ring, so as to not interfere with the recovery harness. This works out to be 1/2" and 10 1/4" from the aft edge of the body tube. Choose your drill bit carefully... it should be the same size as the shank of your screw, but smaller than the teeth, so the screw shaft won't bind going into the hole while the teeth will cut threads into the fiberglass. Sight down the fuselage and ensure they are lined up with each other to eliminate the possibility of having cock-eyed buttons. Once you are happy with the threads and alignment, cut them to length (or replace them with shorter ones). A 38mm motor tube in a 2.6" body leaves only about 1/2" of room on each side. Accounting for the 1/4" thickness of a 1010 button, screws of 3/4" total length will go in fully without bottoming out against the motor tube.

8. Installation of winglets and wings.

(a) Do not glue anything in this step. Now that the motor mount is permanently installed in the body tube, again trial fit the main wings. Pay particular attention to the fit of the shallow angle of the wing root where it passes over the bend between the body and the tailcone. Also, the mid and forward rings should be just outside the edges of the wing slot. If they protrude slightly into the slot, trim off a corresponding amount on the wing's tang. And if you put rounded fillets on the tang sides of both centering rings, you will need to round the square corners of the tangs to fit against the fillets. It is easier to work with the wings at this point if you have not yet installed the winglets. This is also your last chance to put a nice bevel on the leading edges of the wings and winglets.

(b) Once everything fits to your satisfaction, it is time to attach the winglets. The tabs (2) on each CNC-cut main wing have perfectly square corners, while the slots (2) in each winglet have rounded ends. The temptation therefore would be to round off the tabs or square off the slots. Don't do it - they are designed for a nice tight fit. Just (a) place the winglet flat on a firm surface (garage or basement floor works fine), (b) hold a wing over it and line up the tabs with the slots, and (c) give the wing a few gentle taps with a hammer to seat it firmly into the winglet. The advantage of the tight fit is that it also holds the winglet perfectly perpendicular to the wing. Any sanding you would do might make it a loose fit and correspondingly less likely to hold itself to a proper 90°. Once happy with the fit and alignment, put a small bead of CA along the seam to hold everything securely until fillets are done. Thick CA (gap-filling) will be less likely to run through any minute openings.

(c) Once the winglets are on the wings, mix a little of the included epoxy (5.5:1 ratio) and create fillets along the joint on the inside edges. You may also defer this step until the wings are attached to the body. There is an economy of effort when it is possible to do two fillets simultaneously (wing to body and opposite wing to winglet). Roll the body in 90° increments and you are done in 4 steps instead of 8.

(d) Mix some thick epoxy, spread along the edge of the tang with a popsicle stick, and insert into the slot with the rocket body laying flat and the slot pointed straight up. In a two-finned rocket, even more so than 3 or four finned ones, the straightness of the fins/wings is critically important. Take time to make sure it is lined up correctly and set aside to dry. Overnight.

(e) After the first wing is dry, roll the body tube over and install the second wing. Same general procedure as the first. Ensure the two wings are lined up. You may use a straight edge or fin alignment jig as necessary. Set aside to dry.

(f) After both wings are fully cured, set it upright on a flat surface. One measure of how accurately the slots were cut and the wings and winglets were installed is if she stands upright without rocking like a table with one short leg. Note – the winglets are in place now but may have full fillets yet. If so, be careful not to disturb them. If you should knock one out of alignment or off, it will be extremely difficult at this point to get it back on correctly.

(g) With the rocket rolled 45°, start putting on her fillets. You may do 2 at a time... wing to body and opposite wing to winglet. Roll the body in 90° increments and you are done in 4 steps.

9. Nose cone, canard, recovery attachment, and nose weight

(a) While the wing attachments are curing, you can get the canard (nose wing) attached. It is a one-piece item in the kit, including both canards and a common tang, CNC-cut perfectly to fit through the slot in the nose cone. The width of the tang corresponds exactly with the width of the nose cone, wider towards the aft. However, when you bevel the leading and trailing edges of the canards themselves, you will lose the nice, easily defined corners that identify where the canards end and the tang begins. So, before you glue anything, trial fit and mark where the canards line up with the nose cone, and measure to ensure it is even (equal exposure left and right). Tack in place with thick CA. Install the four external fillets PRIOR to any internal epoxy or foam work. One the externals are dry, reach inside with any suitable stick and apply fillets to the inside, between the canard tang and inside of the nose cone.

(b) As a rule of thumb, a Jayhawk with a correctly scaled body should have the Cg at least or forward of the 60% point (measured from the tip of the nose to the aft edge of the tailcone). On this kit, depending on your frugality or generosity with epoxy, it will take about 14 ounces of nose weight. There are many techniques to accomplish this, here is one as an example...

(1) Since the kit comes with a nose cone bulkhead, and weight needs to be added up there anyway, add some hardware and make the weight functional. Drill the bulkhead for a stainless U-bolt (1" wide) and two all-threads, (1.25" apart). Cut and bend the all-threads to fit up into the

tip of the nose, where the lead will be. Stagger them slightly to fit around the canard. Install the all-threads and U-bolt to the bulkhead, then weigh the assembly. (This will be part of your nose weight, and it also mechanically ties the nose weight to the recovery harness, to avoid it breaking free under load. The nose cone itself is therefore just along for the ride.)

(2) Trial fit the assembly to ensure it fits into the nose cone properly. The bulkhead should be slightly submerged into the nose cone's shoulder, to allow for a fillet of epoxy on the aft perimeter of the bulkhead.

(3) Use Rocsim or other suitable method to determine the remaining amount of weight required to balance your Jayhawk. (I recommend #4 lead shot). If using the U-bolt and all-threads as described, you will generally need about 7.6 ounces. Mix the ballast into a slurry of epoxy, and pour it into the nose cone. Use a dowel to make sure all the shot gets up into the tip - nothing worse than a loose BB rattling around inside a sealed nosecone. (One can drill a small hole in the bulkhead and injection foam the cavity at a later date if warranted, particularly if a BB does break free.) While the slurry is still liquid, press the bulkhead in place, imbedding the all-threads into the nose weight. Add a fillet of epoxy to the aft side of the bulkhead and set aside to cure, vertically with the tip down. When complete with bulkhead, all-threads, U-bolt, epoxy, and lead shot, it should weigh approximately 1 pound, 4 ounces.

10. Fit and finish

(a) With everything installed and balanced to your satisfaction, time to clean up any imperfections and paint. Alternating primer colors helps identify high and low spots during wet sanding. Super Fil or Squadron Putty work equally as well. Some areas that may need attention include:

(1) the rectangular indentations where the wing tabs fit thru the winglet slots.

(2) the nose cone / canard slot (the gap between them created by beveling the leading and trailing edges left small depressions to fill.)

(3) try to make the transition from body tube to tailcone seamless.

(b) Final primer should be white as it helps the low-hiding orange stay bright. Gloss orange with a little red in it would be prototypical, with Chevy Orange engine paint being a suitable approximation. The nose cone tip should be done in satin black.

(c) Final weight will come in at approximately 3 pounds, 3 ounces, which will fly nicely on G thru I motors in the 100-200N thrust range. (i.e. H135, I161, etc.)