

Welcome to the world of Wildman DarkStar Xtreme 4!



Leave it to Wildman to push the Darkstar to the Max with this radical upgrade. No Mildmen allowed!

Kit Includes:

- 4" Fiberglass Booster 52" Long
- 4" Fiberglass Payload 24" Long
- 4" 5-1 Von Karman Nose Cone
- 75mm Fiberglass Motor Mount
- 3/16" Thick G10 Beveled Fiberglass Fins
- 1/2" Baltic Birch Plywood Centering Rings
- 4" Fiberglass Coupler 11" Long
- 2" Long Fiberglass Switch/Vent Band
- Fiberglass Coupler and Bulk Plates
- All Hardware to Complete this Bird



Airframe made of spiral wound G-12, extra long booster so you can fly motors 48 inches long! This beast is ready to rock on any motor you can stuff in it! Finally the upscale of the original is here, the skies the limit, so let the build begin.

Needed to complete this build:

which are all available from Wildman Rocketry if you need them.

Pro Line or West systems epoxy

Chopped carbon fiber or kevlar

Hobby epoxy [5-15 minute] and CA [superglue] for tacking purposes.

Syringe for injecting epoxy. Preferably a 10ml [cc] one.

Rail buttons or launch lugs

Thickening agent such as West 406 for external fillets

Parachute [Skyangle classic 2 60 inch recommended]

2 Nomex chute protectors [12 inch] for dual deploy.

Altimeter if doing dual deploy

60-80 grit sandpaper for roughing up all fiberglass parts that are glued.

Motor retention: Aero-pac, slimline, T-nuts and mirror clips, etc. can be used.

Denatured alcohol for clean up of epoxy. Mixing cups and stir sticks.

Drill and bits: 5/32 for rivets, 5/64 for shearpins, 1/8 for airframe vents and rail buttons, 1/4 for altimeter vents and injection holes.

120-400 sandpaper for prep before painting.

Primer and paint.

If during this build, you come across anything that isn't clear or you have any questions, please feel free to call Wildman for assistance. We want your build to be a fun, trouble free experience!

READ these instructions first....then come back and Build!

For the sake of expedience the following abbreviations will be used during the build:

Centering ring= CR
Nose cone =NC
Superglue=CA

Motor mount tube=MM
Bulk plate =BP
Tubular nylon/shockcord= TN

Use the fin slots for a marking jig: slide coupler into rear of airframe & mark 3 lines through slots. These are for Av bay rivet positions.



Repeat with the NC and mark 3 lines. These are for shear pins. Insert NC partially into payload . Transfer 3 marks to payload tube, then measure back from edge 1 ½ inches, mark, this is shearpin locations.



Push NC tight into tube. Drill 1st hole with 5/64 bit, moving bit in & out several times to insure a clean hole. Insert a 2-256 nylon screw [shearpin]. Move to 2nd location and repeat, finally on to the 3rd and finish. Holes will be tight at first, but will loosen with use.

Do NOT drill all holes first, then insert pins. They rarely, if ever, will fit this way!

Do them one at a time! Before removing pins, scribe a keymark for future reference and alignment.

See tip in [Av-Bay](#) section on [Keymarks](#).



Extend lines on coupler with drawer or your preferred straight

edge.



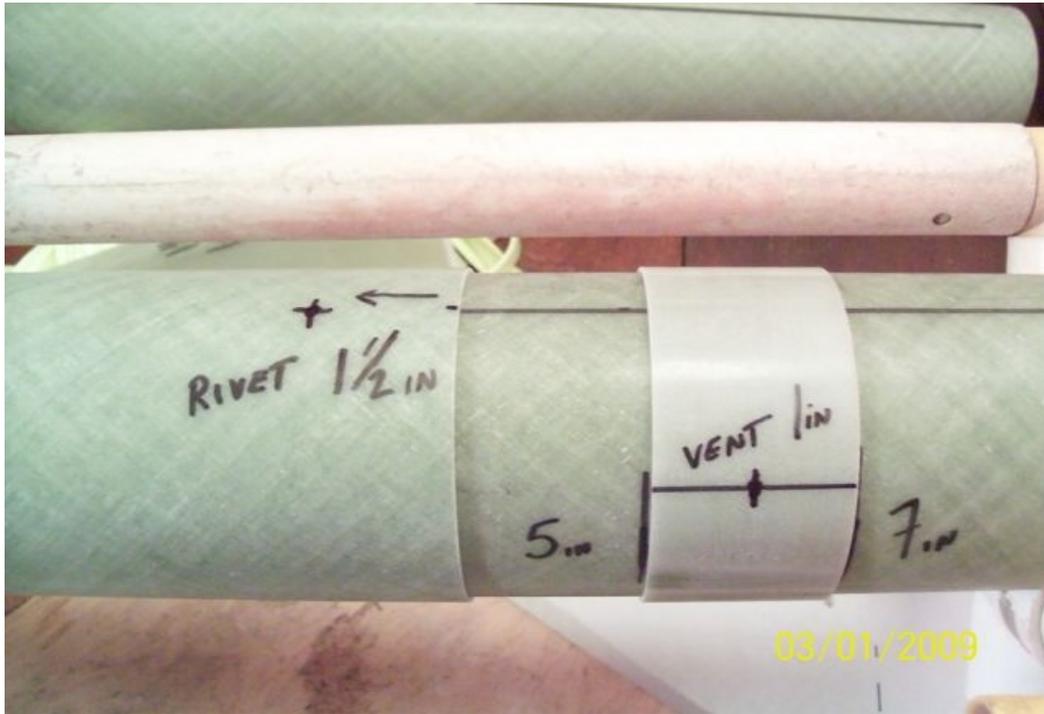
Slide vent band on & mark the 3 lines. Center vent band on coupler/av-bay. Mark on each side. Remove band, insert coupler into airframe and draw circle around coupler at marks, showing where the vent band will go. Masking tape on outside of one line will prevent epoxy from getting all over when sliding band on. Sand between marks on coupler and inside of band with 60/80grit.



Mix some epoxy and place a thin coat between the lines where vent band goes. With a twisting motion [to distribute epoxy evenly] slide vent band into position.

You want the lines on vent band **BETWEEN** the lines on coupler. These will be for altimeter vents and on coupler for rivet positions. As in 2nd pic. You do not want vents in line with rivets. Can cause air turbulence, giving incorrect altimeter readings!

Take care and remove any excess epoxy with a rag and denatured alcohol. Much easier to remove now, than sand it off later. Set aside & allow to cure.



Mark center of vent band on 3 lines , 1 inch from edge [center], use 1/4 inch bit to drill the 3 Av-bay vents.

Insert Av-bay into payload partially and transfer 3 lines onto tube for rivet location. Push bay all the way into tube, a piece of tape will hold position if needed. Measure 1 1/2 inches from edge of tube at 3 line marks, this is rivet location.

Drill 1st hole with 5/32 bit, insert rivet, move to 2nd hole repeat, move to 3rd location and finish. DO NOT TRY DRILLING ALL 3 HOLES AT ONCE! Do them 1 at a time, hole rivet, hole rivet, hole rivet! This insures proper fit.

Before removing rivets, make a keymark or scribe line from payload onto vent band to aid in future alignment!

Tip Keymarks: use a 1/8 inch bit and drill partially into both sections on center of joint. Leaving 1/2 hole on each section. Only needs to be deep enough to be seen through several coats of paint. Do this on your NC also. Makes locating shearpin and rivet locations easy! These were outlined with sharpie just to aid in seeing them for pics.



While the 1/8 inch bit is out.



Drill hole 12 inches from either end [center] of payload. This is to relieve internal pressure.



With 1/8 bit, drill vent hole 16 inches down from top of fincan airframe.
This is to relieve internal airframe pressure.

Tip: these vents will prevent premature separation of NC from payload and payload from fincan due internal pressure becoming higher than external.
This being caused by rapid acceleration during flight and pressure variance at different altitudes.
Higher internal pressure will want to force the separation of airframe sections in order to equalize with the outside. [Think ears popping when traveling up and down in the mountains]

Time to drill holes, sand and prep the Fincan for fin installation.



But first it helps to wrap some sandpaper [60/80grit] around a section of 1/2 inch to 1 in dowel or PVC pipe. Makes sanding the

inside of airframe a snap, unless you have very small arms!

Sand all fin slots to remove fuzzies and debris left over from slotting machine.

Dry fit fins into slots on tube.

Number fins and slots as you go.

Seems like some fins will fit better in some slots and bind in others.

Numbering them makes glueing later, easier.

Sand fins and slots where needed to make all fit.



Drill two $\frac{1}{4}$ inch holes on each side of all slots, spaced equally. Hole should be approximately $\frac{1}{4}$ in. from edge of slot.

If holes are too far from slots, they will not be covered by the external fillets.

Sand [with 60/80 grit] on both sides of all slots out to 1 inch for fillet adhesion.



Reach inside and sand all areas where CR's will come in contact with airframe to promote glue adhesion. [in front and back of all slots]



Make sure to sand holes , to remove fuzzies left from drilling. Otherwise they may catch and clog holes when injecting the carbon fiber mix or prevent the CR's from sliding in smoothly.



Sand entire outside of MM tube with 60/80 grit.
Dry fit all CR's to MM tube and airframe. Sand where needed to fit.



Lay kevlar recovery strap across 1 CR.
Mark on both sides of kevlar onto CR.

Transfer lines to inside. File notch
on both sides to allow strap to fit.



Stuff strap into MM tube, leaving
2 tails on outside. [make sure it's
not twisted] Slide top, notched
CR, over kevlar and onto tube,
into approximate position in front
of top fin.

Slide remaining 3 CR's on MM
and into positions.

They should be at the top and bottom of fin slots. Lay MM next
to fincan so you can position CR's above & below slots. Mark
positions with a pencil or marker.

Do NOT glue anything yet! This is a dry fit!

If using the recommended Aero-Pac for motor retention, you may add it now or later. **Depending on what YOU use for motor retention...you may need to add it NOW....if so, remove bottom CR and do it before next step. NOW!**



Use CA [superglue] to tack bottom CR into position. For flanged Aero-Pac this is flush with back of MM tube.

Position fins where the slots should be [120 degree apart] and slide next CR down tight to hold them. [You may need an extra pair of hands for this step.] Tack CR into position with CA.

Distance between the outside of middle CR's should be approximately 1 5/8 in. [where lower fins touch, to upper fins touch them]. Or the distance of gap between the upper/lower fin slots.

Tack bottom CR for upper fin set into position with CA.

Hold upper fins in position. Slid top CR down tight and tack CR on with CA.

Make sure the Kevlar strap is BETWEEN the fin sets or you will be in big trouble later. It will interfere with fin placement!

Make sure you use the numbered fin sets and number the positions on MM so they will go into their corresponding numbered slots! You are doing all this so the fins fit tight to CR's and MM tube. This way when you inject epoxy, it won't leak under or around fins and CR's.



Remove fins and slide MM assembly into the airframe. The Cr's should be barely visible at each end of slots.



Put all numbered fins into the correct numbered slots to check for proper fit.

If all is well remove assembly and epoxy rings into place, **but NO GLUE where fins will touch! Or the fins will not fit between rings!**

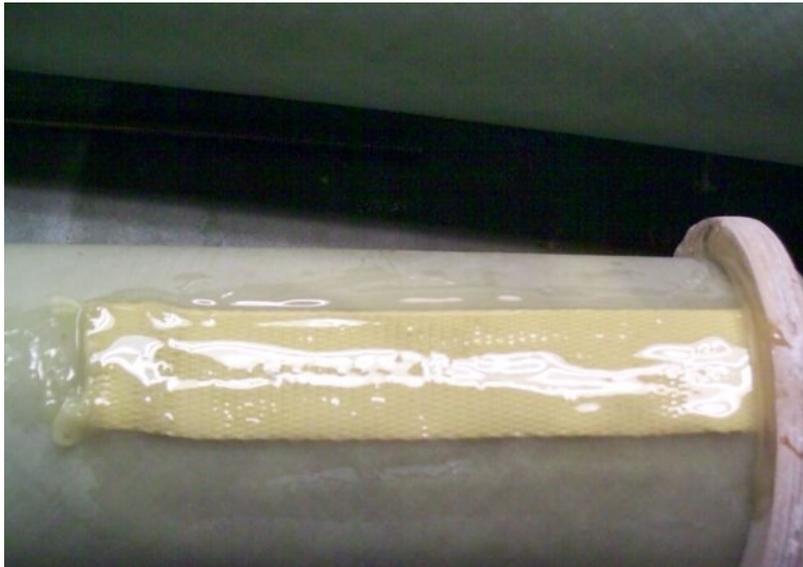
If there is a problem, reposition rings to fit.



Lift recovery strap and epoxy under it on MM tube. Epoxy back side of strap also.



Push strap into epoxy.



Epoxy top of strap. [Encapsulate it]

Do same to other strap. Set aside to cure. MM assembly is now finished & ready for fin assembly!

New Tip: When dry fitting fins, draw line down fin where it meets the body tube. [make sure fins are tight to MM first!]

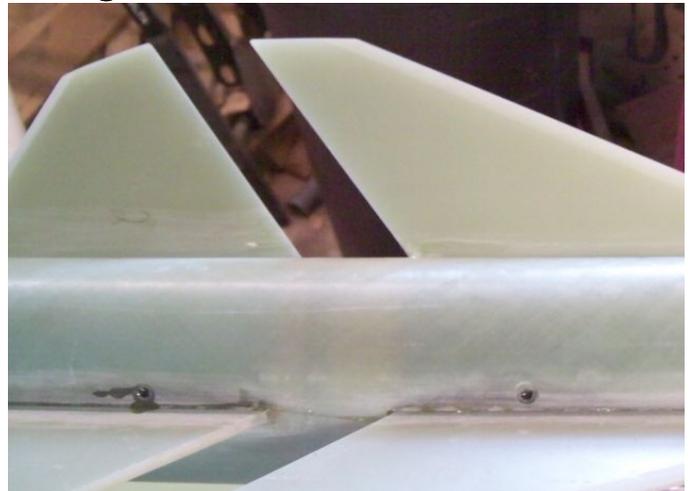
When tacking the fins with 5 minute, the line will show if the fins are pushed all the way tight to the motor mount, preventing any leaks under them when injecting internal fillets. Sand [60/80] both sides of all fins 1.5 inch from root [bottom] up to promote glue adhesion of internal/external fillets! See Sand marks 2nd pic.



After talking to several builders in the field, I became aware some were having trouble with leakage and most of it was related to fins not contacting MM tightly. This simple line will visually show you if they are in position or they need to be tapped down further. Usually due to tight fit of fins and CR's



NOT tight. Bad.... will leak
See line at angle.
Tap fin down tight!



Tight.....Good!

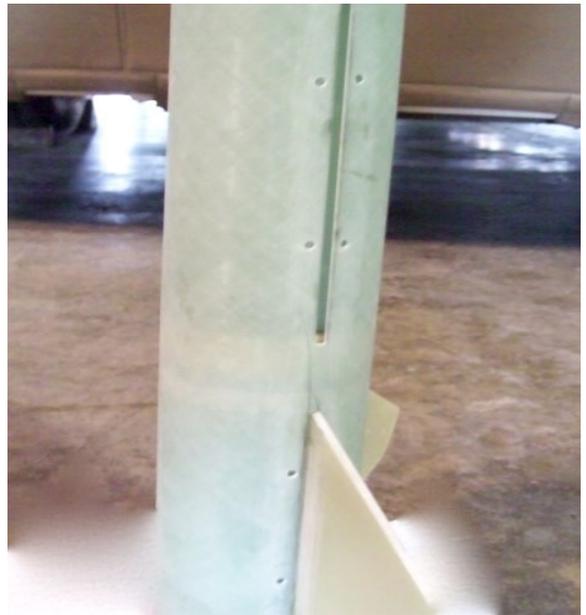
Since there are 2 sets of fins to tack & align, it is easier to tack the smaller rear set first.



Mix some 5 minute epoxy and butter [bead of epoxy on root edge] fin. Keep as much off sides as possible.

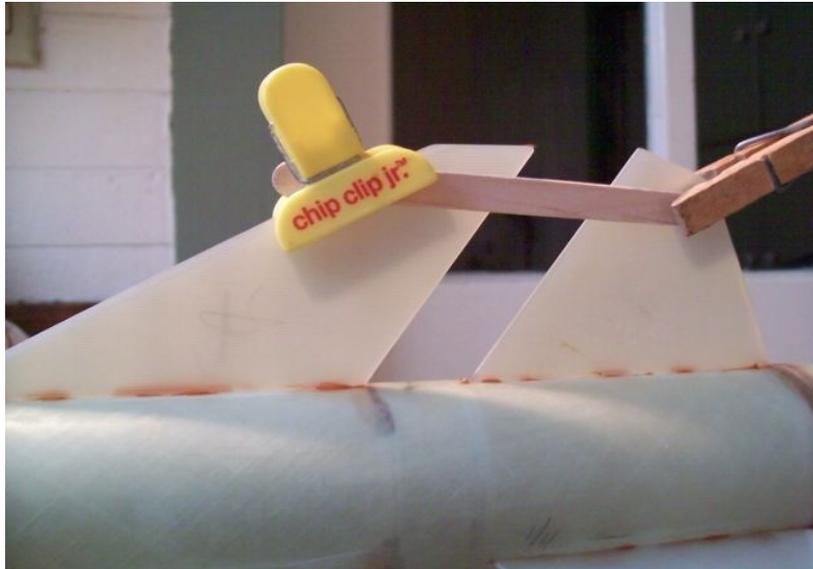
Place fin into correct numbered slot and push tight onto MM tube. Use your favorite alignment technique or just “eyeball” it, if you are skilled .

**Don't put them in UPSIDE down!
Beveled edge on bottom.**

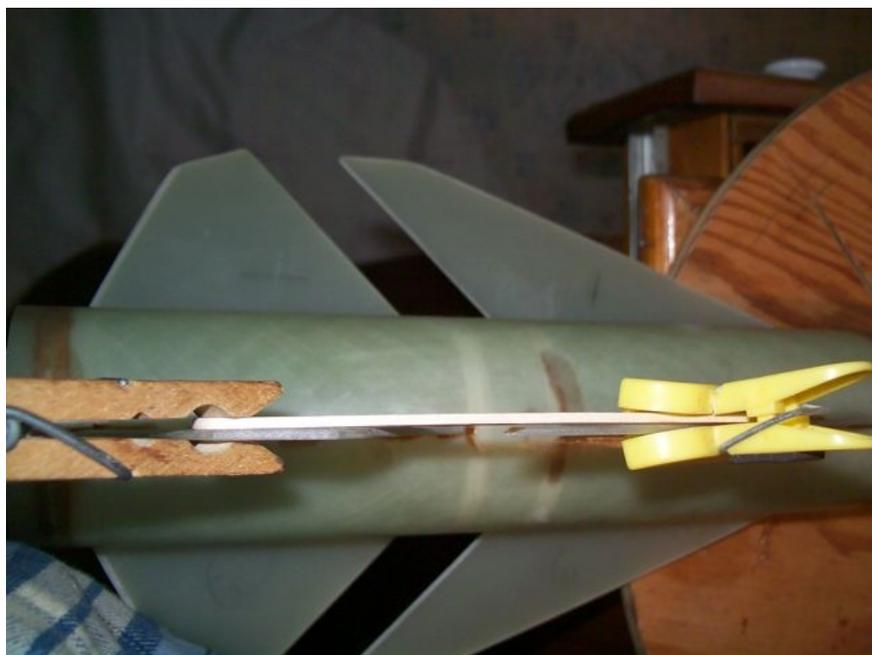


The fiberglass is transparent, so you can see the nice bead on each side of fin which is tight to tube, ensuring a good seal!

After the rear set is cured you can tack in the upper set and align them with the lower by the “eyeball” method OR for those lacking this skill:



Use clamps, cloths pins, chip clips or anything else you can come up with to hold a straight edge of some sort. Like a popsicle stick, paint stirrer, pencil, etc. to hold the fins in alignment!



Tip: to keep from making a mess in case of leaks when injecting.



Tape both sides of 1 fin set, covering holes and seam between fin & body tube.



Turn this side down. When injecting the top 2 fillets, if anything leaks, it can't drip out anywhere & make a mess.



Instead, you actually get another set of internal fillets, fin to body tube!

Remove tape and repeat when rotating to do rest of fillets.

Tip: looking for top notch, little sanding, no mess fillets? USE TAPE!

Lay the tool [dowel, pipe, spoon, tongue depressor] you will use to pull fillets smooth with, into the V-groove between body tube and fin.



Mark where the edge of tool meets the airframe, then the fin. Move tool to front of fin and repeat marking. Do this on each TOP set when you are ready to inject.

Then tape on the line between marks.

The fillet will be in correct place & all excess glue will be on the tape after smoothing! 1.5 inch PVC pipe used on this build to get correct radius for fillet.

With a little practice there will not even be an edge when you pull the tape, or one very small, requiring little sanding.

Do this before you inject and you can do both internal & external at the same time.

Time to inject:

Place rocket in rack or let fins hang over end of table, make sure it is level so fillets are also.

For this build 2 pumps of Pro-Line/West, or similar system will be enough to inject all 4 fins. [1 set] Total of 42-45 ml. epoxy.



Mix chopped carbon [pile about the size of dime] into epoxy **AFTER** thoroughly mixing resin and hardener. You should mix the carbon a good minute or 2 so it breaks up evenly into the epoxy.

Mixture should look like color of hypo above. **Do NOT add too much chopped carbon or you will have a mess!**



Fill syringe with 10ml [or cc, they are the same] of epoxy, inject 5ml or half of syringe into each hole. Cut tip to a 45 angle will make injecting easier. Inject slowly, there is very little room between hole and MM. **If you inject too fast, or stick tip of hypo in too far, mixture will backslash off tube all over the airframe!**



You can see mixture has dispersed evenly on the right, clotted slightly on the left.

But the epoxy has leveled out between the piles with no leaks or drips.

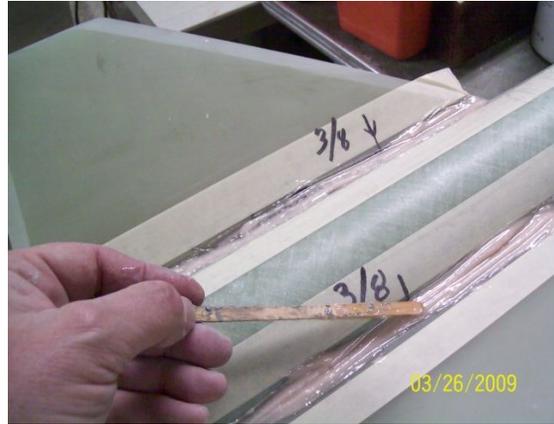
This is typical and all is A-OK!

Wait for 10 minutes or so to make sure you have no leaks, then if you wish, continue right on and do the external fillets. Obviously if there is leaking, you can not continue with externals and must wait for full cure to re-inject and correct the problem.

[Ready to do externals](#), epoxy must be thickened with filler. Recommend West 406, for the DarkStar Xtreme, 2 pumps of epoxy, same amount as in internals. This will be enough for the 4 fillets when filler added.



Actual amount used, added in 3 steps to get consistency. Mix to THICK peanut butter, more is better than not enough. Break up lumps, mix for several minutes to get it correct. Smoother the mix, less sanding to do!



Peanut butter consistency! Smooth it out with your stick as you fill, best as you can. Better to have to add more, than overfill & make a mess.



Now pull it smooth with one smooth stroke. Keeping the same angle, and even pressure with your tool.

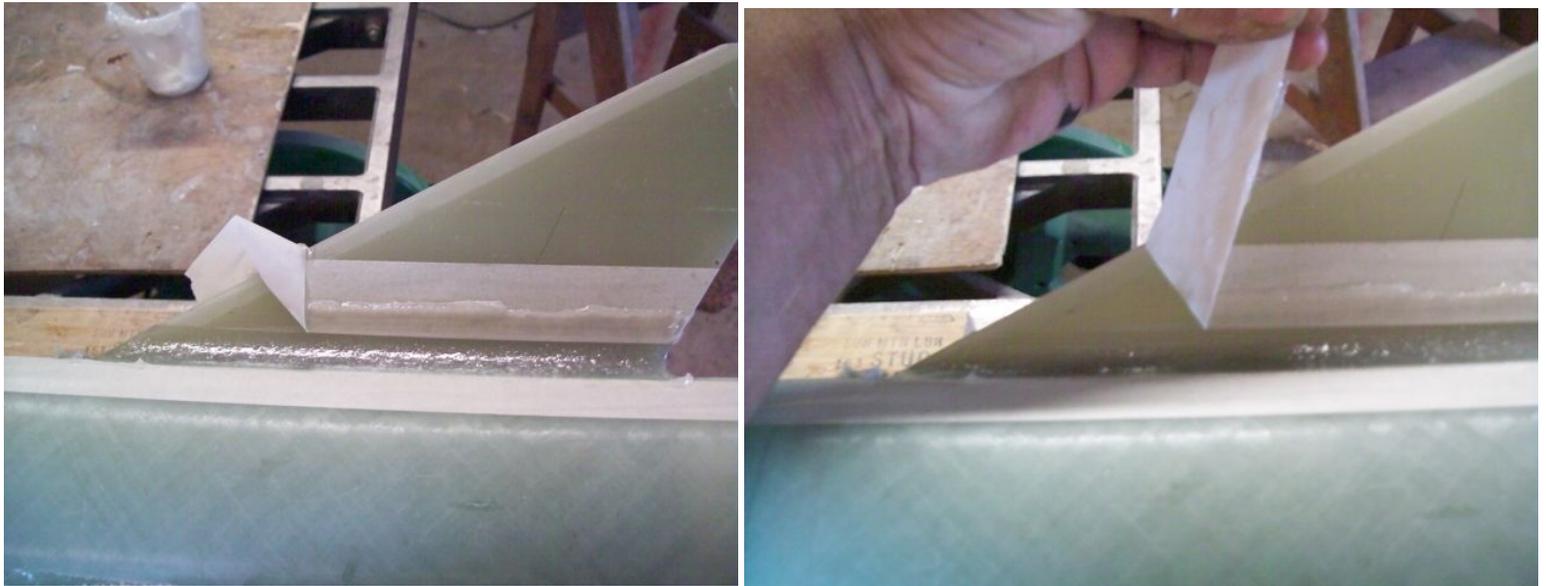
If there are low or missed spots, just add more & pull it out again.

The trick is to do it in 1 even pull. Not play in it or try to fix 1 spot.

If there is way to much excess on the tape, scrap it off with the stick so you are not short on material to finish.

If there is a major goof, add more, scrap out, or just start over, then pull the whole fillet out again.

When satisfied with your fillets, wait 30-45 minutes and remove tape. Waiting till cure, makes removing very difficult.



If material is mixed to correct consistency, tape will come off cleanly.

Pull tape back on itself at a 45 angle, keeps tape from getting in the fresh fillet.

You can see I got excess on the tape, but no worries.

The tape is spaced right where the tool touches the fin/tube, so there is a nice clean edge, with no or very tiny lip to sand!

“That's the trick to it!”

Once the tape is off, you can see how nice a clean, smooth, joint there is.

Wait for this set to cure, then rotate and set up for next set of fillets.

Do the remaining 2 fillets set, internal & external. If you are uncomfortable doing both sets at once.....then don't.....do all internals, then the externals separately.

Avionics bay:

Sand 1 side of all 4 BP's [2 large-2small] stack one large on eyebolt, sanded side up. Add few drops of glue. Place smaller BP on top, sanded side down. Repeat on other eyebolt OR stack the other 2 on same eyebolt. **Don't glue all 4 together!** Let cure.



Stack all BP's for this step on one eyebolt. Will keep all the holes aligned. Mark 1/2in. from edge of larger BP in 2 places, 180 degrees from each other. Drill holes for tie rods with 1/4 inch bit.

Then mark 1/2 inch from edge again for ejection charge holes. Drill 1 or 2 holes with 1/8 bit, depending on whether you are using 1 or 2 altimeters.

1/8 in. size holes are perfect for E-match leads. If using terminal blocks, or other means, size holes according to wire gauge.

Place 1 nut and 1 washer on eyebolt, insert through BP's, add 1 washer & 1 nut. Tighten, adding a drop of CA or epoxy on threads and nut, will insure they will never loosen. You can also add a lock washer to the assembly if you desire. [On inside]



Tip:

When mounting the tie rods, offset one slightly on the BP. This will make "finding the holes" when prepping the rocket much easier. The longer one will slip right in one hole, making finding the second hole a snap, rather than trying to get both through the BP at the same time.



Take threaded rod, place 1 nut and one washer on end, leaving approx. $\frac{1}{2}$ in of threads. Insert through BP's add 1 washer & 1 nut. Tighten and add drop of CA or epoxy to nut & threads. Repeat for other tie rod.

Altimeter Sled:

There are many ways to install sled & altimeters, here is one we used and another common technique.



Grind or file notch in center, so eyebolt nut clears. Do same on edge so washer clears. [On both ends]



You may have to grind or file the excess threads off the eyebolt, to make it flush with the nut. [On both ends]

If installed correctly, there should be no play between sled & coupler. Sled is locked in & cannot move.
If sled is too long, sand one end to fit.

This arrangement gives the most usable space on sled. Both sides can mount electronics with out any interference.

Another common option:

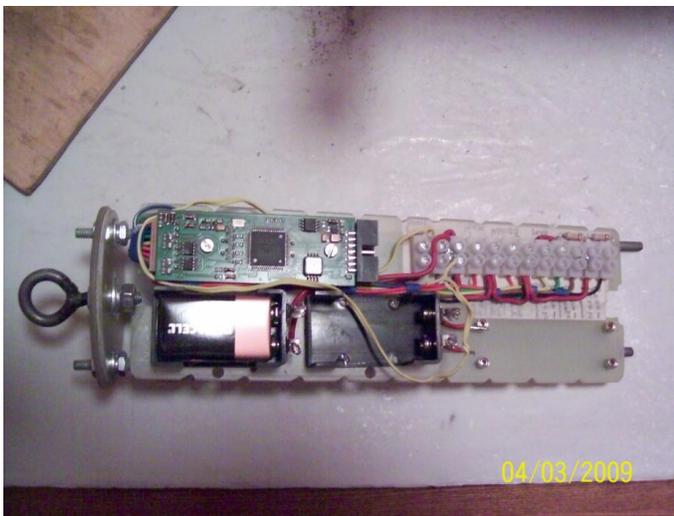


Using tubes that will fit over $\frac{1}{4}$ rods.
[tubes that contain igniters in Aerotech reloads work great]

Or brass/aluminum tubes from hardware or big box stores.
Place on rods.

Place over sled and put other BP's on to insure rod alignment. Tack tubes onto sled with CA.

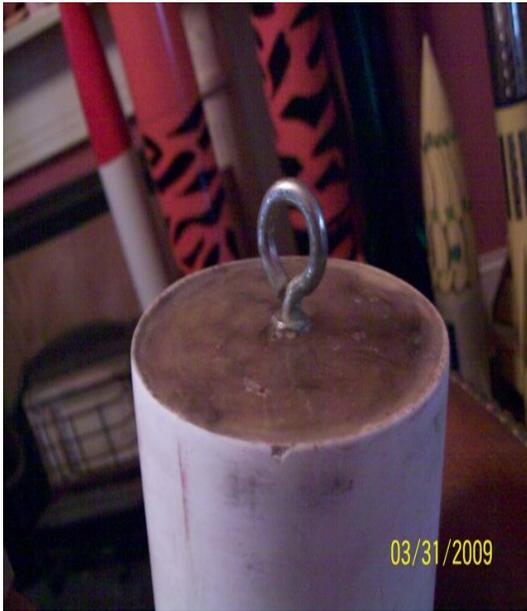
Then epoxy fillets on each side of tubes.



Finished sled mounts R-das
2- battery boxes, room for a
Missleworks Mini or altimeter
of your choice.

Nose cone:

Place NC into payload tube to hold while glueing.



Place nut and washer on eyebolt, insert through NC bulkplate, add another washer & nut. Tighten. Add a drop of CA or epoxy on nut & threads to keep from loosening.

Sand BP to fit the nose cone. Sand eyebolt side to help with fillet adhesion. Do not force it in or NC may no longer fit payload due to distortion of NC shoulder. You want it to slip fit into shoulder, with a 1/8 - 1/4 inch lip showing to hold fillet.

Mix some epoxy and thicken, or use left over mix from external fillets and apply a fillet to BP and nose cone to hold it in.

Rail button mounting: mount buttons on rear CR of bottom fin and front CR on top fin. Use your favorite method of finding center between fins OR this : [example shown not Darkstar]



Line up edge of paper with center of fin and tape.



Mark paper on center of 2nd fin.



Fold in half and mark on fold. This is your center for button.
Mark tube $\frac{1}{2}$ in. from bottom or center of wood CR.



Move guide to top of front fins and mark center there for top rail button. Try to hit center of wood CR.



Use a 1/8 bit to drill holes. Install rail buttons and screws. [these are 1010 standard size]
Screws will self tap through the glass and will be tight enough no adhesive is needed.
But add some if you must by removing screw, adding a drop of CA or epoxy in the hole and remount the buttons.

Mounting Aero-pac:



Place Aero-Pac on rear and slip a motor case into it. This will insure proper alignment when tightening screws so motor won't bind, as so often happens when just installing the retention.
Inserts are not used as there is so little web with CR thickness $\frac{1}{4}$ in. Drill holes and install screws opposite each other [180 degrees] Do not tighten fully till all are installed & keep checking fit by moving motor up and down as you go. This assures a non-binding fit. Pour some epoxy around it to seal rear CR to tube.

Epoxy fillet on top CR on the motor mount tube:

Tape a mixing cup on dowel at angle shown. This will allow you to hold rocket at same angle, slide a cupful of epoxy into the airframe, simply twist the dowel 180 degrees to dump the epoxy without slopping it all over the interior.



Alternative methods: drill small hole above CR and inject epoxy, then you must fill hole.

Tape a syringe full of epoxy to side of dowel. Insert into airframe and use another dowel to push plunger.

Congratulations ! Your finished! Take the "Oath". Now go Fly!

.....THE WILDMAN OATH.....

UPON COMPLETION OF THIS ROCKET AT THE FIRST FULL MOON YOU MUST:
PLACE YOUR WILDMAN OUTSIDE IN THE MOON LIGHT AND CRISN IT WITH A
BEER OR A SHOT.[OR SODA POP IF YOUR UNDER AGE] REPEAT THE FOLLOWING
WORDS WITH PRIDE AND DIGNITY, WHILE WATCHING THE MOONBEAMS
DANCE ON YOUR FINS.

THIS IS MY WILDMAN ROCKET. THERE IS NO OTHER LIKE IT. I HAVE BUILT
THIS ROCKET, AND PART OF ME LEAVES THE EARTH EVERY TIME IT FLIES.
OTHERS MAY POSSES ONE, BUT NONE ARE LIKE THIS ONE; IT WILL FLY
HIGHER AND FASTER THAN ANY OTHER.

I HAVE MET THIS CHALLENGE, BUILT THIS ROCKET, I AM NOW ONE OF THE
ELITE FEW. I WILL WALK TO THE PADS WITH MY HEAD HELD HIGH, A NEW
SPIRIT IN MY STEP, CONVICTION IN MY HEART.

IF I SEE ANOTHER WILDMAN BROTHER, I WILL TREAT HIM WITH RESPECT.
I WILL BE COMPELLED TO GREET HIM WITH THOSE HOLY WORDS,
PASSED DOWN THROUGH TIME, TEMPERED FROM THE SPARKS
AND FIRE OF COUNTLESS SKIDMARK MOTORS .
UTTERED AT THE HOLIEST OF EVENTS BY OUR FEARLESS LEADER
THE WILDMAN HIMSELF.
..... “WANNA DRAG RACE IT?”.....

I WILL ALWAYS STRIVE TO STUFF THE LARGEST MOTOR THAT I CAN IN THE
PIPE. I WILL FLY WITH OUT FEAR. NEVER REFUSE THE CHALLENGE.
I WILL DANCE WITH DELIGHT AT THE OPPORTUNITY TO DRAG RACE MULTIPLE
WILDMAN BROTHERS AT ALL EVENTS.

I SHALL NOT FRET OVER WHAT OTHERS MAY THINK, I AM A WILDMAN
I AM FREE FROM THE FEARS OF SCRATCHED PAINT, DIRTY FINS, ROAD RASH ON
AIRFRAMES, CATCHY PHRASES AND FUNNY NAMED ROCKETS .

NOW I AM A WILDMAN

I HAVE MY WILDMAN ROCKET, I WILL“ JUST FLY IT”
ALTIMETER OR CAVEMAN STYLEIT MATTERS NOT, “JUST FLY IT”
NAKED OR PAINTED.....“JUST FLY IT.”
MY FLYING SPIRIT HAS NOW BEEN FREED .
..... “SEMPER FLY”

WARNING

Failure to comply with the above will result in immediate revocation of Wildman status and
return to Mildman status.



A few recommendations:

This rocket was professionally designed to fly on any commercial motor that will fit **WITHOUT** any added nose weight!

No extra re-enforcement to the airframe or fins such as adding fiberglass to fins or tip to tip glassing is needed.

We fly with a 60 inch Skyangle Classic 2 parachute
Aero-pac motor retention
Standard or 1010 size rail buttons

Approximately 9 yards of 9/16 TN attached to fincan & payload.
Approximately 6 yards of 9/16 TN attached to payload and NC.
Attach main about 4-5ft from NC end of shockcord & use nomex chute protector.

DS can be flown with or without drogue. [where allowed]
Recommend FFFF black powder for ejection charges.
Start with 2-3 grams for apogee.
2-2.5 for main.

These are starting points, everyone builds slightly different,
GROUND testing is a must. Do so with rocket in flight configuration!

You can fly the DarkStar 4 Xtreme in single deploy mode [motor eject] on smaller motors by removing the payload section and attaching the NC and parachute to the fincan.

After several flights wiping the BP residue out of the airframe will keep coupler & NC from binding and residue from corroding metal.

Wipe all fiberglass parts with alcohol to remove residue, before painting to maximize adhesion.

A small flat file may be utilized for removal of mold flashing on NC and shoulder in lieu of sandpaper. Much faster.

This kit is made of the finest fiberglass materials available, even so there may be sanding required by the builder to “fine tune” the fit of parts.

Before assembly begins, you should sand all parts ie: NC, coupler, fins, slots, CR's, BP's, Fins and slots, to remove any remaining machining marks, made during production, such as: flashing on NC and shoulder. Fuzzies and debris in slots. Sharp edges of CR's and Bulkplates, tubes and fins.

Wipe out the airframe tubes and coupler with damp cloth to remove dust from slotting and cutting, this will ensure smooth non binding fit of parts during construction!

Need Altimeters, motor lighters, ejection charge lighters, motors etc? Join the Wildman Club and get the Club discounts. Sign up for the electronic newsletters and get special pricing & first crack at new products and the famous “WILDMAN SALES” . Sign up on the bottom of home page at www.wildmanrocketry.com