

Gizmo XL Dual Deploy





- Nose Cone
- Booster Tube
- Payload Section Tube
- Coupler/AV-Bay
- Motor Mount Tube
- Motor Mount AV Bay Extension Tube
- 3- Fins
- Nosecone Bulk Plate
- Body tube Bulk Plate
- 2- Airframe Centering Rings
- 2- Coupler Centering Rings

These instructions will use the Wildman's "injected internal fillet" technique.

You will need other items to complete this build. Here is a list of those items.

- West Systems Epoxy (or equivalent) Fast Cure
- Chopped Carbon
- Colloidal Silica
- 5 Min Epoxy (West Systems Brand Recommended)
- Thin C.A. (superglue)
- Mixing Cups
- Mixing Sticks
- Masking Tape
- 80 Grit Sand Paper (or coarser)
- RA98 Aeropack Motor Retainer(optional)
- Recovery Hardware And Shock Cords
- Kevlar Strap (If "bridal" used for booster)
- Drill And Bits For Aeropack, Vents, Rivets, Shear Pins And Rail Buttons

PLEASE READ THROUGH DIRECTIONS BEFORE BUILD. IF YOU ARE UNSURE, IT'S BETTER TO FIGURE IT OUT BEFORE IT'S GLUES TOGETHER.

Remove all parts and do "inventory" make sure you are not missing anything.

Test fit all the parts, and sand all mating parts to get a nice smooth but snug fit

Notice the black marks (PIC 1) on the body tube and payload section **DO NOT SAND OFF THESE MARKINGS.** You will need them later.



PIC 1

Pre-Prep Sanding (< Or 80 Grit)

- **Sand ENTIRE motor mount Tubes (outside only)**
- **Sand about 1'' on each side of the fin slots (inside and out)**
- **Sand inside the coupler.**
- **Sand INSIDE booster tube AROUND the inside fore and aft of the fin slots**
- **Sand fin tabs 1' past the end of the tabs (for the contact point of the external fillet)**
- **Sand ALL centering rings and bulk plate**
- **Sand the outside of the booster for paint prep with 220 grit to remove any oils.**
- **Sand again**
- **SAND AGAIN**

Coupler/Nose Cone Reference Marking

Slide the coupler into the aft of the booster body tube.

Using a marker, draw 3 lines onto the coupler(PIC 2). Repeat with the nose cone shoulder using the fin slots as a guide.



PIC 2



PIC 3

Repeat this process with the nosecone shoulder. These lines will be used later for reference marks for vent holes, rivets and shear pins.

Motor Retention and Motor Mount Assembly

An Aeropack is recommended for motor retention. The directions shown are for the “bolt on” flange type.

Parts needed:

1. Motor mount tube (the longer 4” tube)
2. Motor mount centering rings (**LARGER ONES**)
3. Aeropack assembly Part # RA98
4. Quick set adhesive of choice (5 min. epoxy or c.a.)

With the Aeropack in place, test fit motor into motor mount tube and position one of the centering rings on the aft end of the tube (PIC 4). Mark holes for Aeropack retainer with a marker, pencil or drill bit (PIC 5). (carefully keeping all holes aligned)

Drill holes in aft centering ring for retainer. I suggest drilling one at a time , putting a screw into each hole as you go, to keep things aligned PIC 6).



PIC 4



PIC 5



PIC 6

When you are happy with the fit of the retainer, remove and set off to the side.

The next steps will show the motor mount assembly using “U-Bolts as a recovery harness attachment point.



PIC 7

You will now need the motor mount tube, fins and the 2 motor mount centering rings (Aeropack can be left on for this step if you want)



PIC 8

After all parts have been test fitted, put a small bead of epoxy on the aft end of the motor mount tube(PIC 8). Set the centering ring (PIC 9) and wipe off all excess glue to prevent dripping. **(MAKE SURE YOU GLUE THE ONE WITH THE HOLES FOR THE AEROPACK)** Keep the centering ring flush with the motor mount tube. Make sure the ring stays level while the epoxy cures.



PIC 9

This is what it should look like when done

After the aft centering ring has cured, test fit the forward ring on the motor mount tube (PIC 10) Using the fins as a guide, glue the forward ring in place (PIC 11) . I used thin C.A. (super glue) and then went back with a nice epoxy bead. Make sure the ring stays in place while the glue cures and make sure not to let the glue build up in between where the fins will go. If you can keep it clean as you go, it will make the fin attachment process much easier.

It is VERY important to keep the centering rings perfectly straight and the fins need to fit nice and snug. This will help prevent glue leakage during internal fillet injections and also a good bond of all parts when gluing.



PIC 10



PIC 11



PIC 12

After all the glues have dried, double check ALL fins and make sure they slide free into place (PIC 12) . Now would be a good time to install the recovery harness attachment point. I used $\frac{1}{4}$ " U-Bolts spaced 180° apart (PIC 13).

As you see in the picture, I have the 2 U-Bolts installed and I have marked where the fins will go. This is important to make sure the fins will fit in between the U-Bolts and the bolts from the Aeropack on the opposite side.



PIC 13

Prepare the booster tube for motor mount installation by sanding all contact points for glue. Also drill four 1/4" holes evenly spaced along fin slot (PIC 14). These will be for the injected fillets later on. It is easier to drill these holes before the fins are in place.



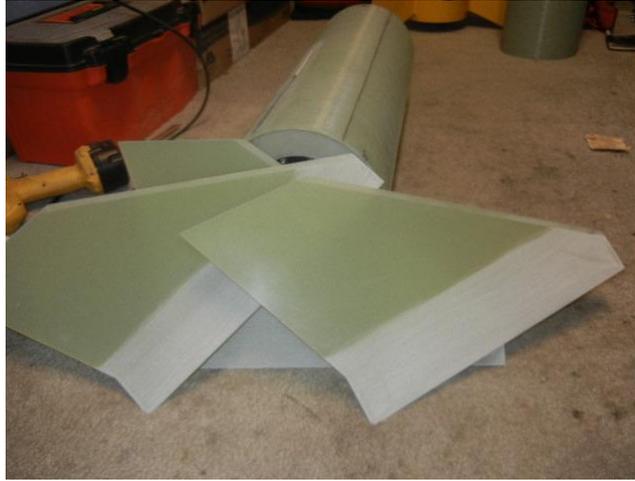
PIC 14

Next, test fit the motor mount tube into the booster. The booster tube is going to be a bit “out of round” near the fin slots. Sliding the motor mount into the booster from the top might be easier. When you are happy with the position of the motor mount assembly and you have test fitted all the fins (PIC 15), the next step will be gluing the fins in place.



PIC 15

Sanding reminder!!!!



PIC 16

When all fins are sanded and test fitted. Install them one at a time allowing the glue to cure on each. A good 5 min epoxy can be used for this.

Mix up a small amount of glue and put a liberal amount on the root cord, leading and trailing edge of the fin tab. Making a nice heavy bead of glue on these contact points will help to prevent “running” of glue when the internal fillets are installed.

Using your favorite alignment technique for keeping the fins straight and equally spaced (PI18).

When gluing the fins in place, you will be able to see through the motor mount tube (PIC 17). Look into the tube as you set the fins in place. You will be able to see the contact point of the fin. Make sure the fin is making FULL contact and the root cord of the fin is flat on the motor mount tube. The picture shown (PIC 17) is a different rocket, same result.



PIC 17



PIC 18

After all the fins are installed and the glue has been given enough time to cure. Prepare the fins and body tube for external fillets. Make sure all contact areas have been sanded with heavy grit sand paper to assure a good fillet bond. Now we will inject the internal fillets. Using west systems or Proline, inject 4 pumps of epoxy mixed with chopped carbon. Each side of each fin gets 4 full pumps. This might seem like a lot, but these are large fins that sweep past the booster. The fins will be the first thing to touch the ground.

Internal Fillets



PIC 19

Epoxy, Gloves, Chopped Carbon, Syringe, Mixing Cup



PIC 20

Mixed epoxy, ready for carbon



PIC 21



PIC 22

Mixed in and ready to inject. If you put too much carbon, the mix will not flow. You want to have a nice flowing consistency.

Before injecting any epoxy, it is recommended to seal off the fin pointing towards the ground. If you have not made a nice tight dam of glue on your fins, the injected fillet glue will run down and it will find its way out of the booster. Take 2 strips of masking tape and run it over the 4 holes in the body and tight up against the fin and body (PIC 23). This will reduce the risk of running glue. If the glue DOES run and it fills up the holes you drilled.....Re drill them when you are ready to move on to that fin.



PIC 23

Using the syringe, inject 4 full pumps of carbon mixed epoxy into the holes drilled at the fin slots. As you inject the mix, keep the booster leaning over as not to drip and run the epoxy to the other fin. After the 4 pumps are injected, prop up the booster and keep it level (horizontal) until the epoxy cures. This will allow the fillet to level itself out to a nice even bead. Repeat this for all 6 sides (each side of each fin)

External Fillets



Epoxy, Gloves, Mixing Cup, Filler of choice.

Before we can install the fillets, we need to prepare the booster.
As I have said before, make sure all contact points are sanded well.



PIC 24

Find a round “tool” to use to shape your fillet. I used a 29mm Aerotech single use motor case. Using the tool, “scribe” a line in the booster and fin. Pressing down on the tool and dragging it across the fin cord, you will be able to see the line that is made from the edge of the tool. If you have troubles seeing the lines, you can use a marker and put some marker ink around the edge of the tool, then when you drag it, the ink will leave a mark on the fiberglass.



PIC 25

Once you are happy with your lines, mask off the fins and body tube with some thick painters tape, using the lines you just made as a guide. I would recommend masking off all 6 fin sides at once. I have found it easier to do that way. And if you feel confident, you can do all 3 fins at once.



PIC 26

Now we can mix up some epoxy. The external fillets will use less epoxy than the internals did. 2 full pumps will be enough material for 2 fin halves.



PIC 27

Using the mixing stick, place some material in between the masked off areas. Try to keep it nice and even.



PIC 28

When you are satisfied with the amount of material, use the tool and pull the epoxy back and forth to make a nice smooth fillet. Pressing down nice and firm will make a nice even fillet that will match the others. The time you have to work the material will change with the epoxy brands and the room temps that you are working in.

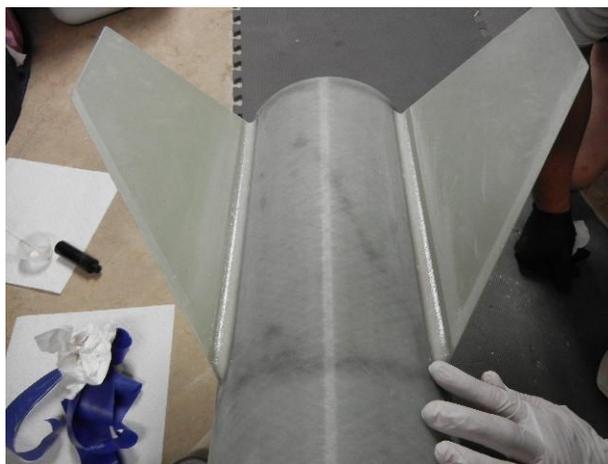
When you are satisfied with the fillet, with a gloved finger, round off the front and rear edge of the fillet. It is easier to do this now. Sanding the fillet to shape later will be a lot more work.



PIC 29

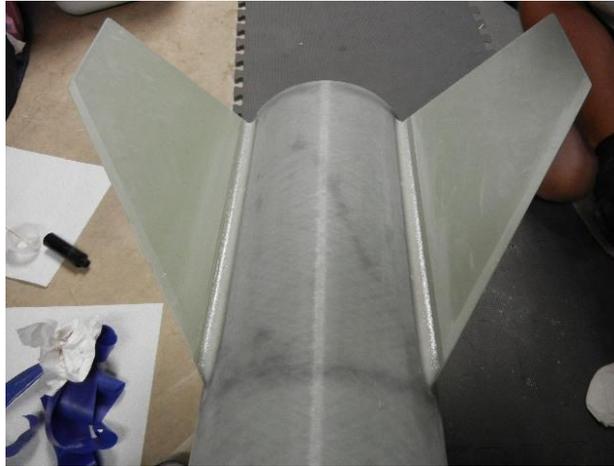
PIC 30

Before the epoxy has cured, remove the masking tape and make any final “touch ups” needed to help reduce sanding when cured.



PIC 31

After the epoxy has cured, only minimal sanding will be required. Some builders will also add a second filler to help smooth out any imperfections in the fillet.



PIC 32

Here is the completed booster with standard rail buttons.



PIC 33

Here is the 4 grain 98mm motor installed in the booster.



PIC 34

Decide what size rail guide you are going to use and install them centered in between two fins.

Drill a 1/8" vent hole half way between the forward centering ring and the top of the booster body tube.

The booster is now complete and we are ready to move on to the av-bay.

Av-Bay Construction.

Start by using a straight edge and extend the lines that we made earlier with the fin slots (PIC 35). These lines will help to evenly space out the vent holes and rivets.



PIC 35

Measure the coupler and make a mark at the center point (PIC 36). Length of coupler may vary. This centerline will be used as a reference mark for the installation of the payload body tube and also a line to install your vent holes.



PIC 36

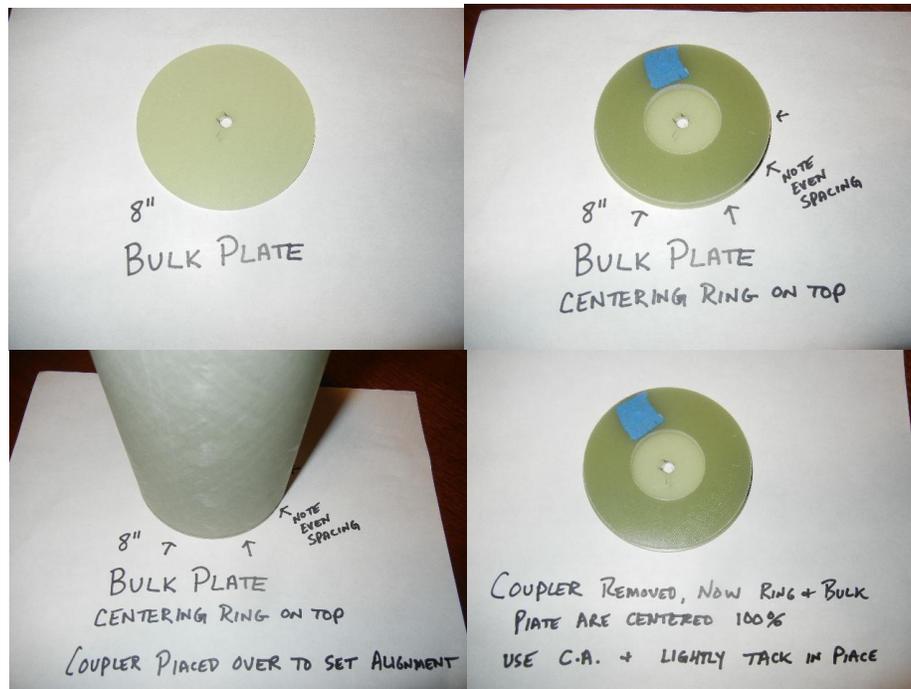
Now comes the part of the build that is a bit different from most builds. You will be building the av bay with a motor mount extension running through it allowing a longer motor to fit the rocket.

Grab the 2 coupler centering rings and a bulk plate, sand and test fit all parts making sure you have any rough edges sanded smooth. For future reference, mark the 2 rings with “ID” marks. I used “IN & OUT”

You will need to drill 2 holes through all 3 of these pieces, the trick will be to get all the holes to align for the threaded rods.

Here is one way to do that.

Stack the 2 centering rings on top of the bulk plate. Place the ring marked “IN” in the middle of the stack(the marking faces up). The ring marked “OUT” should be on the top of the stack with the marking facing up.



(This set of photos was taken after the build with different parts. It is just to help to understand the idea of this step. Disregard the blue tape and lack of markings listed above)

Slide the coupler on top of the rings and center it on top of the bulk plate. Carefully remove the coupler and you will have a perfectly centered stack of rings and a plate. Do not move the stack until the next step is completed.

Using thin CA, dap a drip (**not more than a drop or two, you will need to break this glue joint when you are done**) on the edges of the 3 parts. The thin CA will “wick” into the parts and will make a good temporary bond of the parts.

When the CA has fully cured, drill 2 holes evenly spaced and centered in the web of the centering rings. These holes will be for the threaded rod that will hold the av bay together. The

size of the drill bit should match the threaded rod you decide to use. 1/4" is smallest recommended.

When you drill through all 3 parts at the same time, you will guarantee proper alignment of the threaded rods.

After the holes have been drilled. Break free the CA'd parts. This should be very easy to do with little effort.



PIC 38

Once all the parts have been separated, you will need to permanently glue one of the rings to the bulk plate. This will become your removable cap for your av bay.

The best way to make sure the 2 pieces being glued stay aligned, use the holes that were just drilled and place a bolt or dowel in the holes to hold everything straight. Clamp the parts together and let glue set up.



PIC 39

Picture is showing wooden dowels as a guide
Drill out the dowels if they get "stuck" in place during glue set up.

Use your favorite glue of choice for this step (5 min, West System...)

The last Centering ring will be glued onto the motor mount extension tube. Tack the ring in place about ½ " below the motor mount, leaving enough room for a nice healthy fillet (PIC 40&41).



PIC 40



PIC 41

Place the bulk plate (**with centering ring facing up**) on a smooth flat surface with the centering ring facing up (PIC 42).



PIC 42

Place the coupler on top of the assembly (PIC 43). The coupler should fit right onto the bulk plate and the centering ring should be recessed into the coupler. If this is not a nice fit, Make adjustments now. Sand off any glue that may have high spots, or imperfections in the coupler edge. I used a dremel for this to remove any excess glue that had “oozed out”



PIC 43

Place the motor mount extension into the coupler (PIC 44) and make sure the motor mount slides INTO the opening in the centering ring **DO NOT GLUE THIS !!!** Again, if this does not fit smooth, fix it now. Sand any glue or high spots before moving on to the next step.



PIC 44

This (PIC 45) is what you should have. This is the av bay with forward and aft bulkplates (the aft bulk plate happens to be a centering ring in this case)



PIC 45

Before you glue anything, understand how this all works together. The Bulk plate with the centering ring glued to it will be a removable cap to the av bay. The centering ring glued to the motor mount extension will be permanently glued to the coupler. Now you should see how the holes drilled in the rings will all line up together. That brings us to the next step.

Reminder....SAND ALL PARTS GETTING GLUE!!!!!!

Glue the centering ring to the inside of the coupler. Keep the parts as you see them in the picture (PIC 45) as you are gluing them in place. Keeping the motor mount extension straight and centered with the bulk head/ centering ring plate is very important. **If these parts are not kept in line, the motor will not fit or be tight in the extension.**

Now finish off the bulk plate with some nice heavy fillets.....OK, mine are pretty healthy. I mixed in some chopped carbon.



PIC 46



PIC 47

Don't forget the inside of this ring. It should also get a fillet.

Install the recovery attachment points to the ring. 1/4" U-Bolts are shown in the picture. Installing the recovery hardware after is not a problem because there is plenty of room to work inside the coupler, even with the 4" tube running through it.



PIC 48

This shows the inside of the coupler and the U-Bolt installation. There is room inside to get the washers and nuts and a long extension with a socket.



PIC 49

Install the recovery hardware attachment points to the **forward bulk plate**. It is advised to use 2 points spaced apart as in the picture, again ¼” U-Bolts used. Leave the center hole open in the top of the bulk plate. This will help to relieve the “vacuum” when the drogue charge is fired and the motor extension is pulled off the top of the motor. (PIC 50)



PIC 50

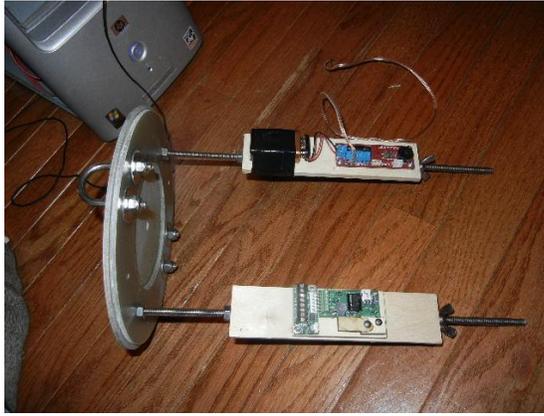
Install threaded rod and secure it to the forward bulk plate (PIC 51). These rods make a great location for a few altimeter sleds.



PIC 51

Here is one way to install 2 altimeters (PIC 52). It has flown in this configuration with no problem.

This is a Raven2 and a SL100 Stratologger. The raven was armed with a magnetic switch and the SL100 was armed via twist and tuck. There is plenty of room in this av bay for you to be creative and design what works best for you.



PIC 52

The av bay is pretty much done at this point. Final detail will be up to you, as far as what type of charge canisters you decide to use, and all the wiring. All hardware shown in the build is $\frac{1}{4}$ " SS.

For reference, I successfully used 3 (1/4") vent holes spaced evenly on the centerline of the coupler (This is called the "half hole" method.) Each body tube will have a "half hole" to match up with the vent hole in the coupler.

It is recommended to use proper vent hole sizing for the altimeter/s being used.

Payload Section.

Start with the booster tube and make sure you pay attention to the reference mark made on the tube (PIC 53). This mark will need to be the aft/rear of the payload. The nose cone will fit to snug if the tube is on upside down. This picture is pointing to the reference mark. If your tubes are not marked, just make sure you find the end that best fits the nose and coupler.



PIC 53

Slide the coupler/av bay into the payload. Make sure the coupler is not in backwards. The motor extension tube will be exposed. Slide the coupler until the centerline mark is at the edge of the body tube.

Hold the 2 parts in place with some strong tape and install your rivets or hardware of choice. I recommend installing 3 evenly spaced rivets. Extend lines on coupler onto body tube for perfect spacing.

It is also recommended to install the rivets one at a time to assure proper alignment. The rivets should not be installed “in line” with the vent holes. The turbulent air could cause problems with “baro” type altimeters. Space the rivets so they are not in line with the vent holes.

Install the 3 rivets (equally spaced/120 degrees apart) to hold the payload section to the coupler.



PIC 54

PIC 55

Drill a 1/8” hole in the payload tube for a vent. Center the hole in between the aft end of the nose cone shoulder and the forward end of the av bay/coupler. This will center the vent in the payload section.



PIC 56

Nose Cone

Install the nose cone and install 3 shear pins. 2-56 standard pins used. Same line used for the rivets can be extended and used as a even spacing reference mark. If you ar planning on using the nose for any sort of weighted payload, you might want to use 4-40 shear pins. Ground test charges before flight.



PIC 57

Again, drill holes one at a time and install a shear pin in each hole as you go. This will keep every hole aligned.

Make a “Keyway” mark on the nose/body tube seam. This will help to line up the nose for proper orientation. This can be done with a ¼” Drill bit and just make a small indentation in the two sections.



PIC 58

Finish off the nose construction by installing a recovery harness attachment point to the nose cone bulk plate (Welded Eyebolt shown). Then epoxy the bulk plate into the nose cone at the shoulder. Again, there is TONS of room inside this nose, so decide now if you want to use it as a tracker payload. Be creative and build it for your needs.



PIC 59

NOW GO FLY IT!!!

