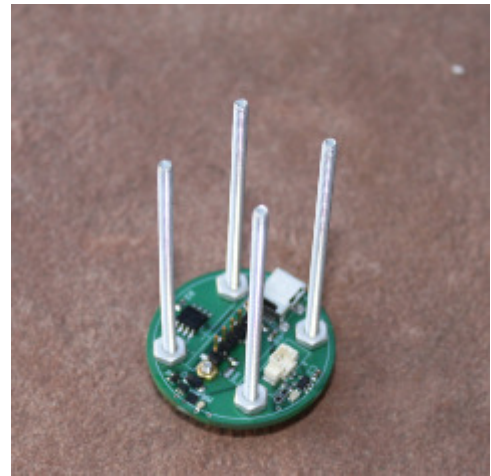
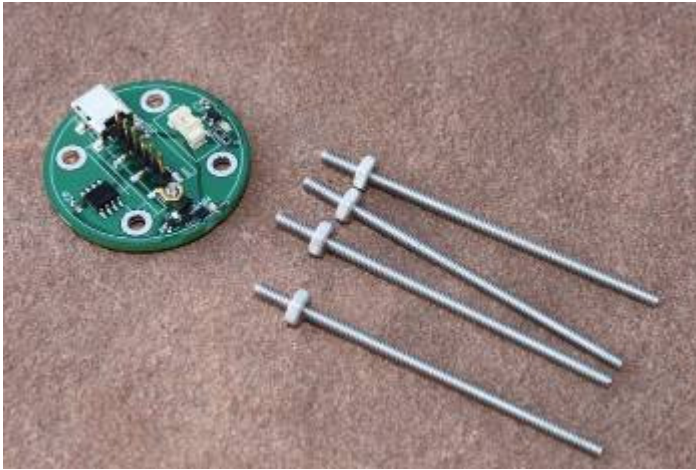


## Initial preparations

For the most secure connection of the av-bay to the rocket, glue in a 2" long coupler tube into the rocket using high-strength epoxy, using about ½" overlap, so that approximately 1.5" of coupler is sticking out. A typical configuration attaches the coupler to the bottom of the main chute (upper) tube. Many other configurations are possible, but this is the one assumed for the purpose of this manual.

## Preparing the active bulkhead plate

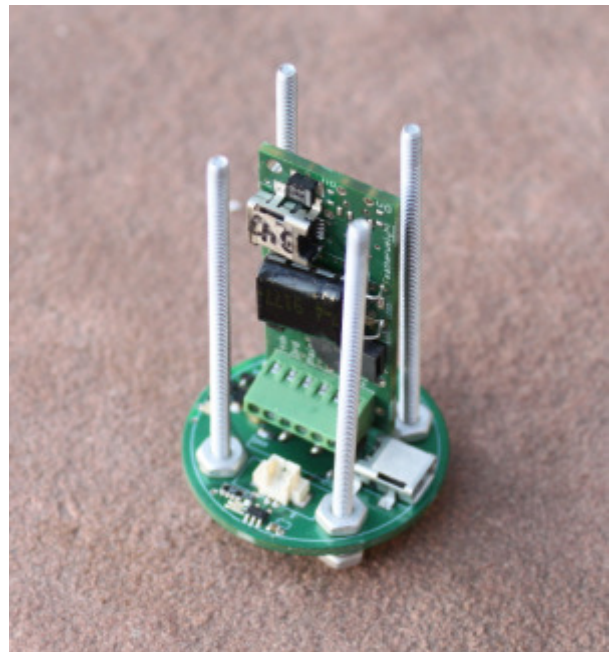
Assemble the threaded rods onto active bulkhead as shown below. A nut driver makes it easy to tighten the nuts. Be careful not to over-tighten the nuts, since the nuts and the threaded rods are made of aluminum.



Attach the Raven onto the connector header as shown at right, using a small screw driver. Orient the Raven according to the outline on the altimeter plate. **The green screw terminals on the Raven must face toward the white battery connector on the bulkhead.** Tighten each of the screw terminals.

Next, plug in the battery, as seen below. If the battery does not block access to the screw terminals, the Raven is installed backwards onto the bulkhead.

This is a good time to test the magnetic arm switch. Note the blue arming switch LED showing that it is sensing the proximity of the included magnet. The magnet should be oriented as shown for best activation range.



The large, rectangular part of the Raven covered in shiny black plastic is an aerogel ultracapacitor with a very large capacity, great for providing power to the Raven even through several consecutive deployment events. However, it can also provide the Raven with a small voltage long after the Raven's external power is removed. For the Raven version 1 (original Raven), this small



voltage can prevent the Raven from powering up properly when an external power source is re-applied. After turning using the magnet to turn the Raven off, use the magnet or another conductive item to discharge the capacitor, as shown at left. For a Raven 2, this step is not necessary.

## Preparing the passive bulkhead:

The passive bulkhead is the bare bulkhead without electronic components. When the av-bay installation is complete, the passive bulkhead and the active bulkhead should face the same direction. For the passive bulkhead, that means that the silkscreened output terminal labels will be facing into the av-bay where they are not visible. To avoid confusion about which threaded rod is connected to which output channel, be sure to use a marker to label the other side of the passive bulkhead. In the picture on the right, the passive bulkhead is oriented correctly, in the same direction as the active bulkhead. The threaded rods are labeled “+” for the arm out threaded rod, “M” for the Main altimeter channel, “A” for the apogee channel, and “3” for the 3<sup>rd</sup> altimeter channel.



## Attaching the shock cord

A braided Kevlar shock cord can be attached directly to the threaded rods by separating the strands to put the threaded rod through the middle of the cord, and clamping it using the included nuts. During a test flight of this attachment method in a minimum-diameter rocket, drag separation caused premature separation when coasting at Mach 1. The chute was ripped off but this attachment method was strong enough keep the rocket sections together. Attach the main chute shock cord to the active bulkhead.

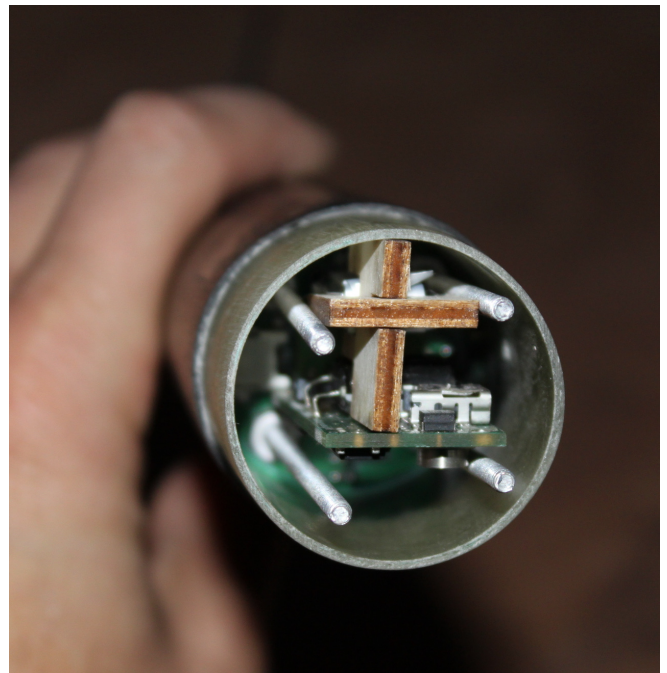
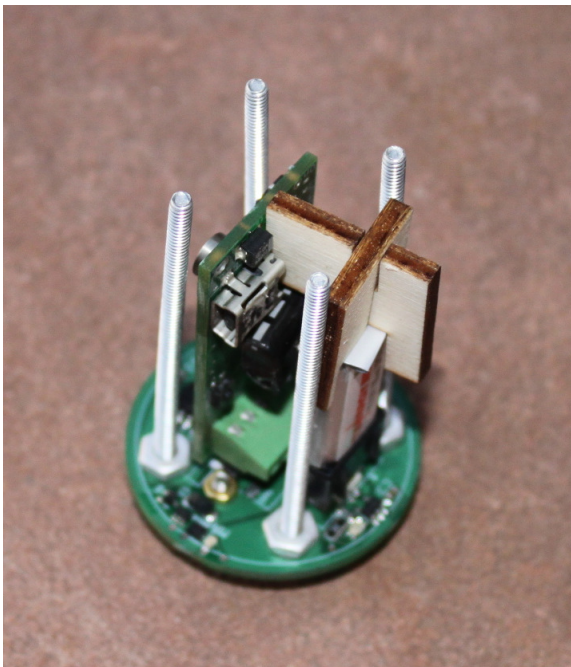
## Attaching the deployment charges:

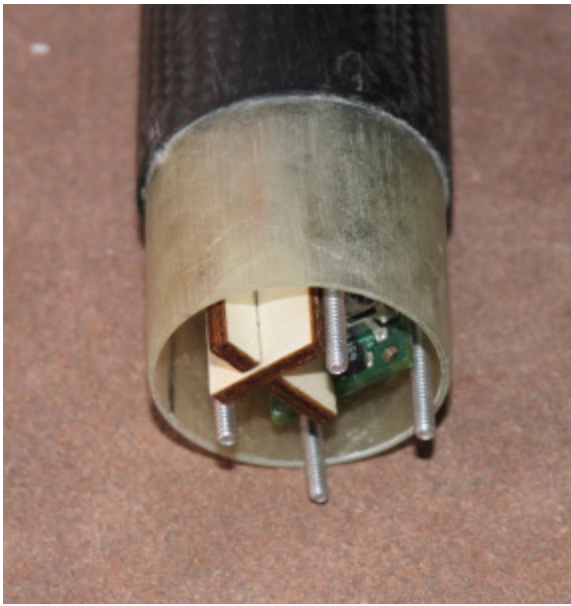
The threaded rods are also the deployment charge terminals, so be sure not to put insulating washers between the bulkhead and the nuts. The altimeter bulkhead, in particular, needs good electrical contact with the nuts of the threaded rod. Clamp the wires of the deployment charges between two nuts as shown at right. In this example the deployment charge is made with a Quest Q2G2 ignitor and Pyrodex inside a cardboard tube sealed at each end with 5-minute epoxy. Other deployment charge holders can be used. **Caution: Whenever handling deployment charges, use eye protection.** Be sure that the charges are attached to the correct terminals for your application. One end of the charge attaches to terminal labeled “Arm Out”, and the other attaches to the terminal according to your application. Note that the 4<sup>th</sup> output is only connected to the altimeter on the active bulkhead, but all 3 other outputs are available at either end.



## Assemble battery restraint

Assemble the two halves of the plywood battery restraint. Note that there are two orientations in which the battery restraint can fit together, but only one of which will allow the pieces to stay perpendicular when installed in the av-bay, as shown at right. Optionally, the battery restraint can be glued together and glued onto the passive bulkhead.





## Install the av-bay into the rocket

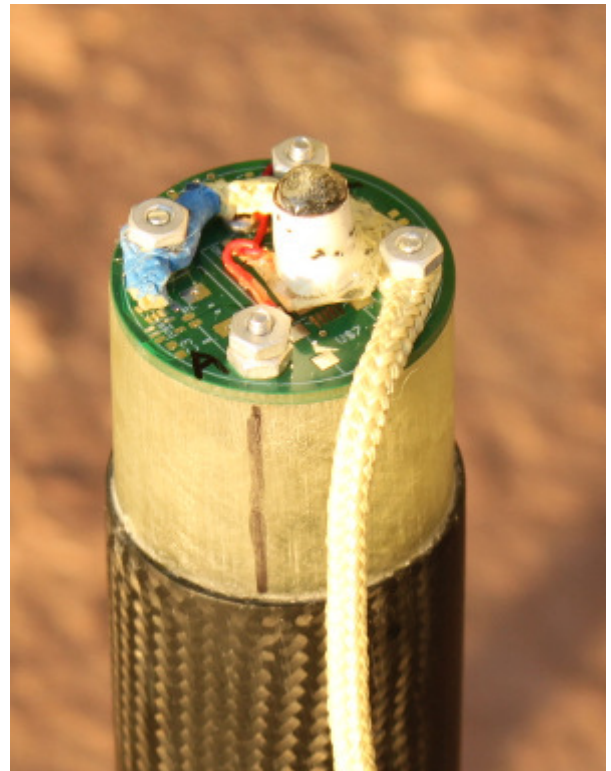
Drop the bulkhead with the rods through the tube with the coupler, so that the rods poke through the coupler. If the battery restraint has not been glued onto the passive bulkhead, install it now. Install the passive bulkhead over the threaded rods.

Important: Align the two bulkheads so that they are facing the same direction. If the labels are not facing the same direction, the charges will be connected to the wrong terminals. Attach the shock cord and deployment charges as you did for the other end of the av-bay. Completed av-bay shown below.



Be sure to keep the magnet clear of the av-bay until it's time to arm at the pad. If you put the magnet in a pocket, be sure to maintain an awareness of where the magnet is, and keep the rocket from close proximity.

At the pad, turn on and arm the av-bay by bringing a magnet next to the rocket, near the side with the magnet and the blue LED. Wait 2-3 seconds for the altimeter to boot up and start beeping out the battery voltage and the continuity status. **If you don't hear the Raven beep out the continuity status you're expecting, don't launch!** To dis-arm the av-bay, bring the magnet back near the magnet sensor, and the beeping from the altimeter will stop, indicating that the av-bay has been powered off. When you do hear the continuity status, walk away and get ready for a great flight!



## Battery Charging:

To charge the battery, plug the battery in to the board, then connect the USB cable to the board, and finally to either a USB port on your computer, or a USB wall wart. Any USB-mini cable, such as those included with digital cameras, cell phones, etc., will work. The Raven USB data connection and the av-bay USB battery charging are separate and independent functions. Plugging a USB cable into a connected Raven altimeter does not charge the battery. The LED on the board will be red while the battery is charging, and will turn orange when charging is complete.

The charger takes care of charging the battery, and won't overcharge the cell unless there is a failure in the system. **Because of the (remote) possibility of failure, you should take precautions when charging, such as not charging unattended or with flammable material nearby. Never charge a cell that is damaged or that has its cover puffed up.**

When the charger's LED turns from red to orange, the cell is fully charged. If the cell has been very discharged, it could take 1-2 hours to fully charge it. Usually the cell would start out with a higher state of charge and it would take less time than that.

Always recharge the battery and/or measure its voltage before flight. If it's less than 4 V, a recharge is recommended. When the charger cuts off the charge and turns the LED from red to orange, the cell's open-circuit voltage should be around 4.1-4.15 V.

While the LiPo battery included with the av-bay has a long life, there are limitations. The magnetic switch used to turn the av-bay on and off consumes power, even when the unit is powered down. Because of this, the av-bay should not be assembled with the battery installed for extended periods of time – a few days is fine, but more than a week will noticeably discharge the battery and is not recommended.