How I keep room light from getting into my RunCam Astro

Bob Anderson 8 April 2017

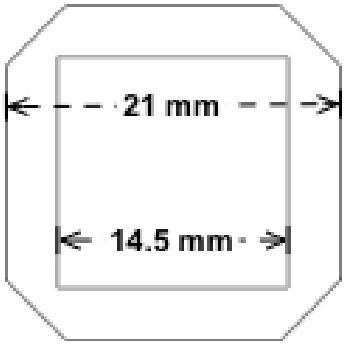
The RunCam Astro camera housing is made of metal and is well engineered mechanically. However, the housing does not block external light from leaking into the camera. RunCam has said that they will provide a light-proof housing, so the steps that I took to seal my camera will hopefully not need to be repeated by future purchasers.

I have been testing this camera in a room light environment; those tests are easier to make if I don't have to cover and uncover the camera to make adjustments, so I chose to light-proof the camera myself. What follows documents the steps that I took.

The camera can be wrapped with a light-proof tape (like heating duct tape) and this approach has been proven to work by Tony George. My experiments with tape were unpleasing --- I found it clumsy to do and difficult to keep tidy. So I looked for a way to do the light-proofing internally.

The approach taken was to add a black foam gasket in front of and around the sensor. This works because the housing is cone shaped, so a slightly oversized gasket, when compressed during sensor board installation, blocks light from the rear of the sensor board. (There are two boards in the camera.)

The gasket design is shown below. The sensor has an outline dimension of 14.3 mm x 14.3 mm and stands up about 2.4 mm above the board, so the gasket fits snuggly around the sensor. The thickness of the gasket I tested is 3.6 mm. I did not have foam of that thickness, so I used two layers of foam that was 1.8 mm thick (the nominal dimension of the purchased foam was 2.0 mm, but actual thickness was slightly thinner).



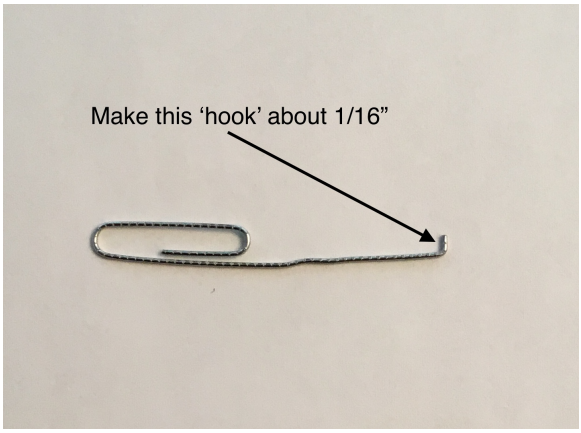
For ease of construction, I simply clipped the corners of the gasket so that it would fit around existing housing protrusions. If a production cutting die were to be designed, a more complex and better fitting treatment of the corners would likely be implemented (and would be a low cost production solution). But this approximation to the ideal gasket corner shape was still effective in light-proofing the camera.

The foam that I used was purchased in a local sewing/crafts store. Below is a picture of the labelling:

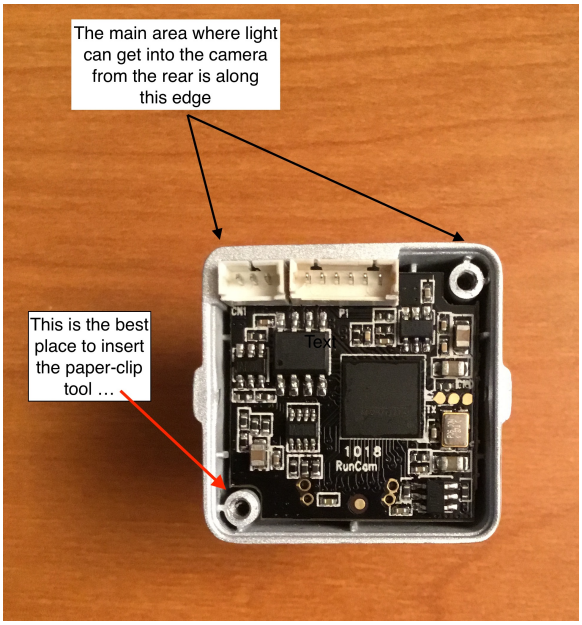
The Astro is easy to take apart. Only four screws are used: two hold the back panel in place; two hold the sensor board in place; all screws are the same size and need a small Philips screwdriver.

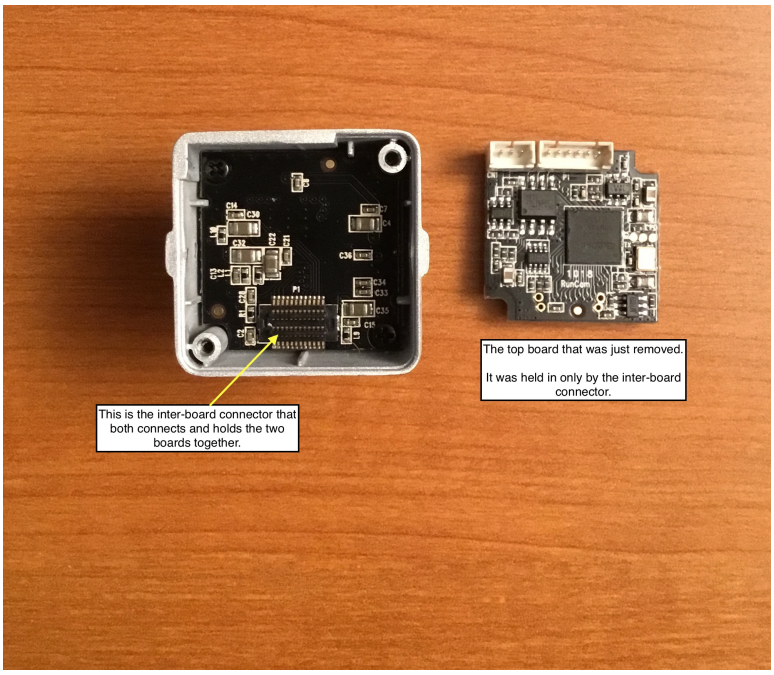
The second board (the one that is visible once the back panel is removed), simply snaps into the sensor board using an inter-board connector.

To make that second board easy and safe to remove, I made the following tool using a thin gauge paper clip and needle nose pliers to create a 'hook' as shown below:

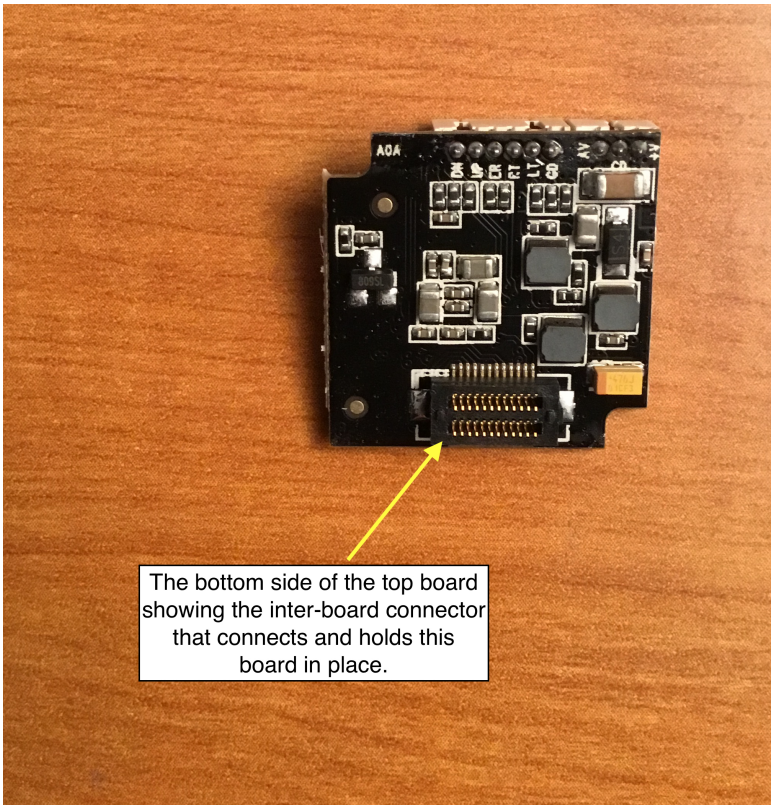


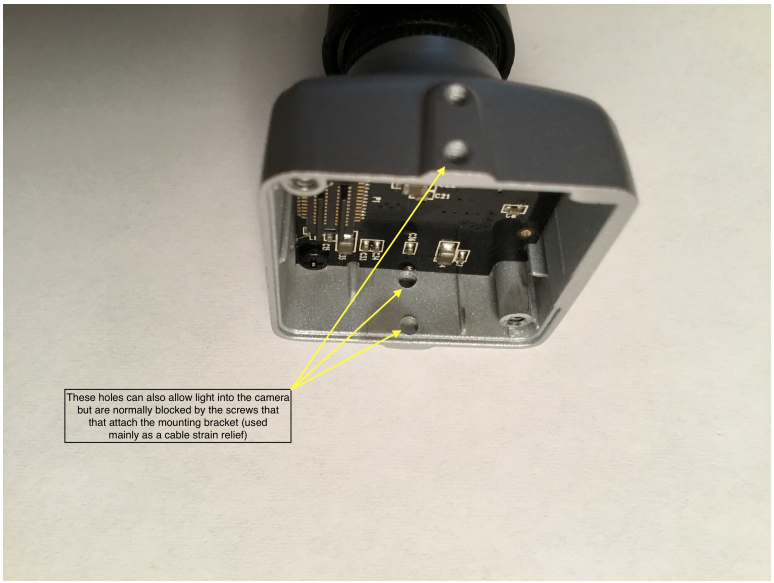
To remove the top board, insert the hook in the location shown in the picture below. Then, begin to pull with increasing force (it won't take a lot) until the board snaps out of the inter-board connector. It will give a satisfying click when that happens.





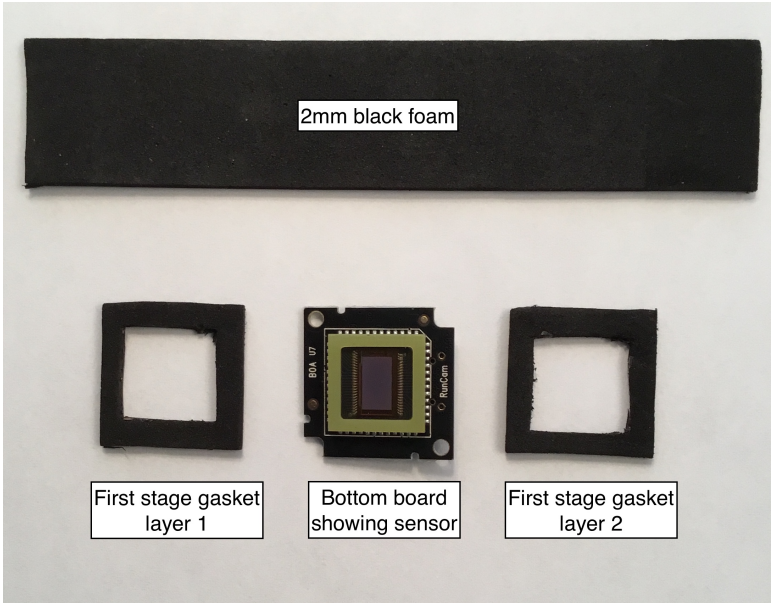
The top board is held in place by the inter-board connector and the pressure of a white foam pad attached to the back panel. This results in a shock-resistant assembly without the need for additional screws to secure this board.



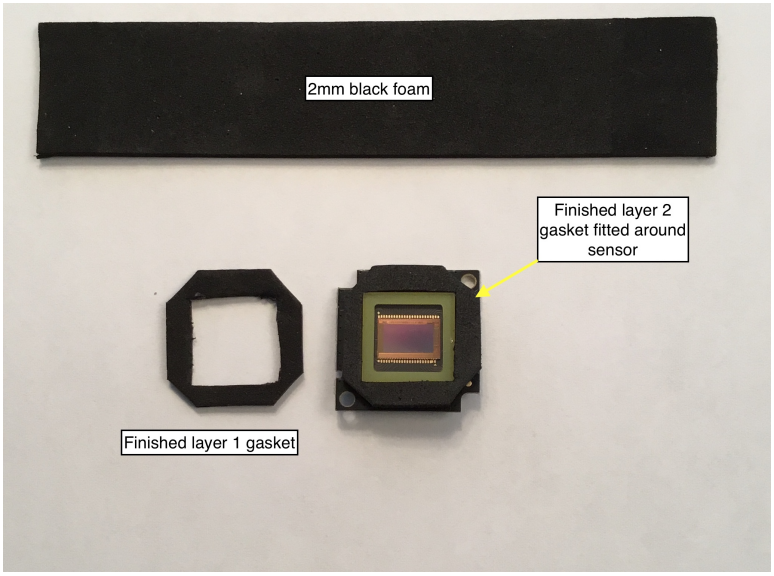


The mounting holes must be closed as well. This will happen normally if the the recommended practice of attaching the supplied mounting bracket and using it as a cable strain relief is followed. Do not be concerned that these screws, which can protrude into the case, might damage the electronics if fully tightened --- RunCam has taken steps in the board layouts to insure that that won't happen.

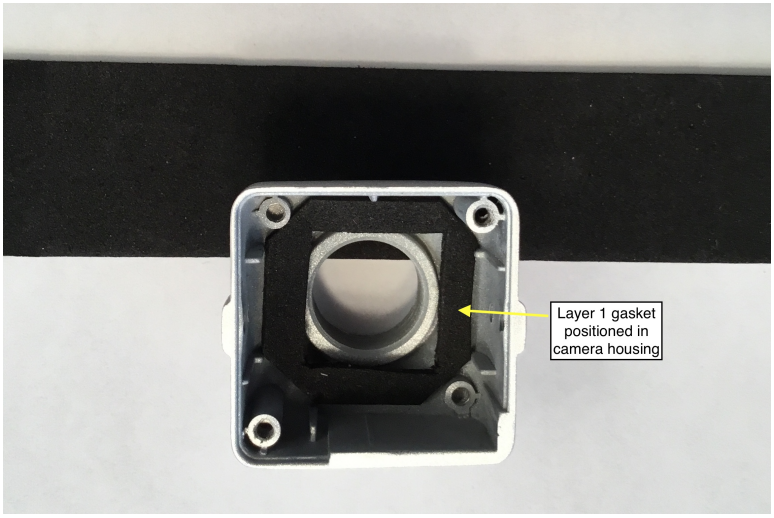
Here is what the foam gaskets looked like before I cleaned up the edges (an Xacto knife was used to do the cutting and scotch tape was used to hold parts down while cutting was done and also served as a markable surface for drawing cut lines) and cut the corners off:



Here, I have trimmed the corners and placed one of the gasket layers around the sensor to demonstrate the fit.



This shows how I placed the other gasket layer into the housing, ready for the sensor board to be mounted to the case. The two layers of foam are thick enough that a small amount of compression occurs as the sensor board is screwed down. This compression helps the light-seal by pressing the gasket assembly down and out against the cone shape of the housing in this area.



And here are the test results. A fairly large aperture was placed in the background of the image produced by the Astro while running in PAL format, max gain (9), and Night Shutter=1. A histogram of the pixel values found in this aperture were plotted with the camera exposed to room light and then with the camera covered by a dark towel. The overlap indicates that the case is now light-proof. (I made another test that is probably more sensitive by calculating the mean, median, and noise values of a 30 second light curve with and without the camera cover --- the conclusion was the same, but the results not as intuitively clear as the histogram.)