

ENVEEGEE

Digital-Only, Binocular Night Vision Device

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INTRODUCTION

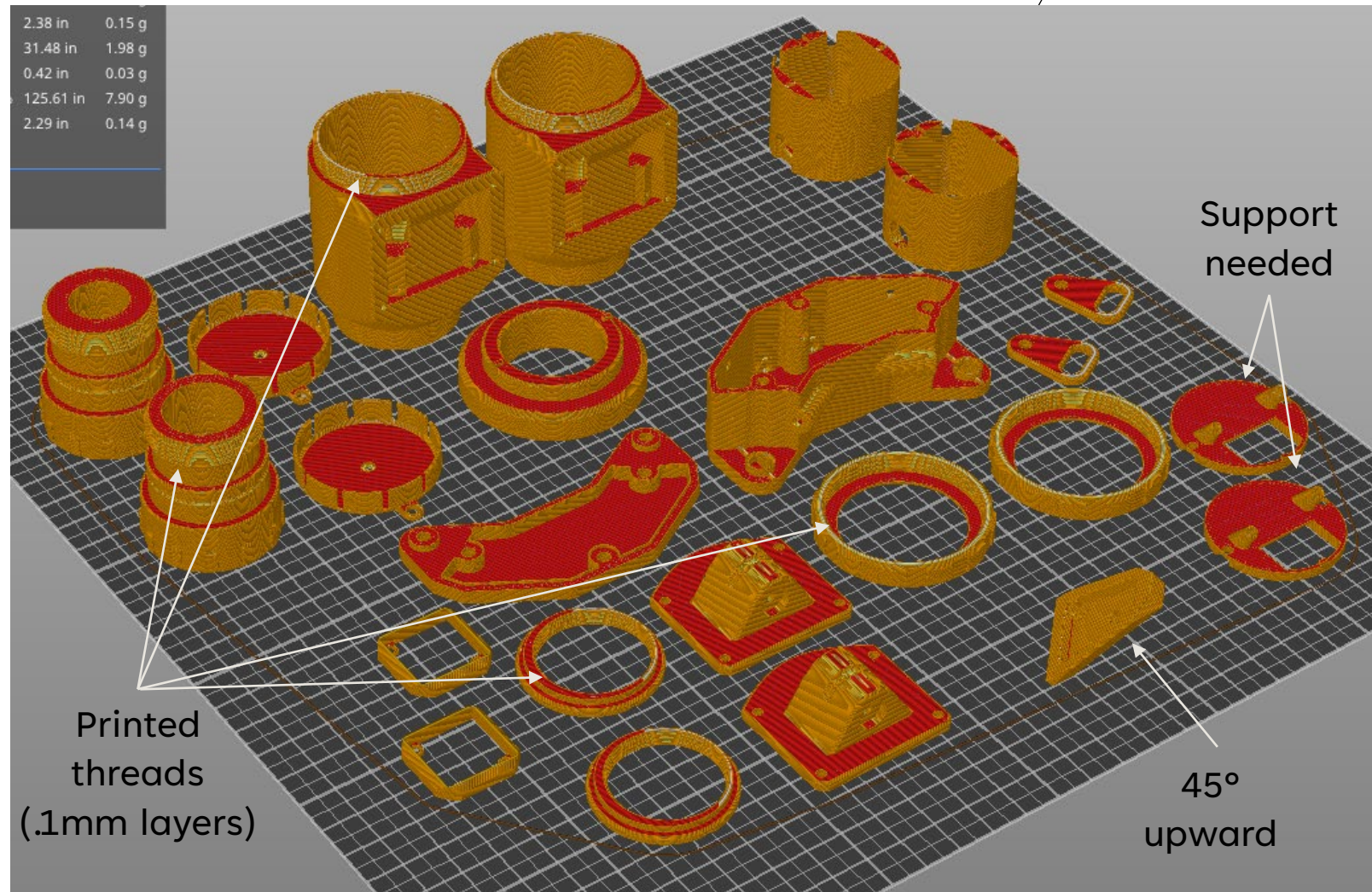
The EnVeeGee is a digital-only refinement of the PVS-69 created by VonScherfArms. Using the technology available, a more purpose-built version of Vaughn's "Alpha" was designed and built to use only Amazon, Ebay, and Aliexpress hardware. No custom electronics were used to keep this build as accessible as possible.

BILL OF MATERIALS

- 2x [V760A-5](#) or V780 Head Mounted Displays
- 2x Runcam NightEagle3 FPV [Cameras](#)
- 1x DC Power Jack, [5.5x2.1mm](#)
- 9x BHCS M3x0.5x5mm
- 5x BHCS M3x0.5x10mm
- 1x Latching Switch, 12mm [A9B0540-L003619953FBA](#)
- 2x Lens, 8mm F1.0 [CS MOUNT](#) OR LENS, [STARLIGHT](#) 6MM F0.95
- 8X UXCELL AA, A, CR2 Battery Spring Contact ([a17032200ux0178](#))
- 20x BHCS M2x0.4x5mm
- Printed components
- 2x Laser cut aluminum component (optional “TOOB, V2.0” part)
- 4x FHCS M2x0.4x5mm (optional “TOOB, V2.0” part)
- 1x Power Bank ([5VDC Output](#))

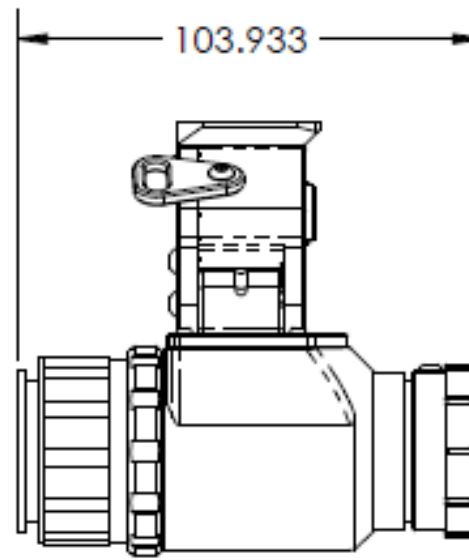
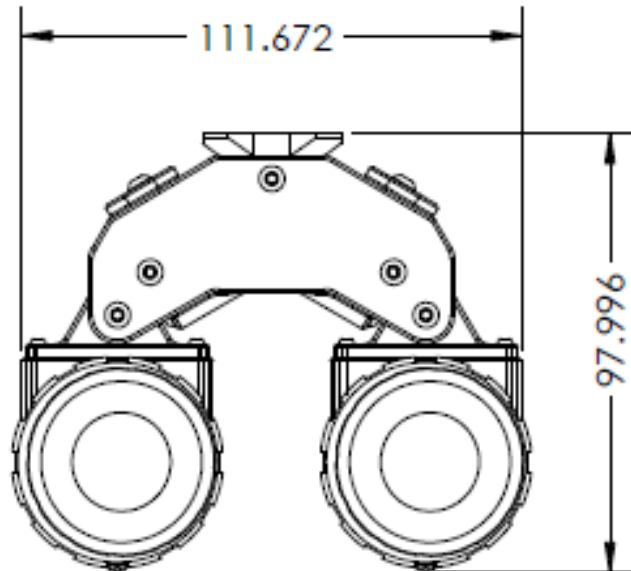
PRINTING

1. Print all components oriented as shown with the following settings.
 - a) 3 walls min
 - b) 35% honeycomb infill (can vary)
 - c) .2mm layer height ok, .1mm preferred on threaded components
2. The TOOB HOUSING, DISPLAY SIDE needs support touching the build plate only. Grid supports work best.
3. The DOVETAIL, MALE, WILCOX is printed at a 45 deg angle for strength. Use the flat provided to orient.
4. Due to cameras getting hot, the TOOB HOUSING and SPACER, NE3 HEAT SINK components must be printed in ABS, PETG, PA-CF, or better. PLA+ is insufficient for these parts.

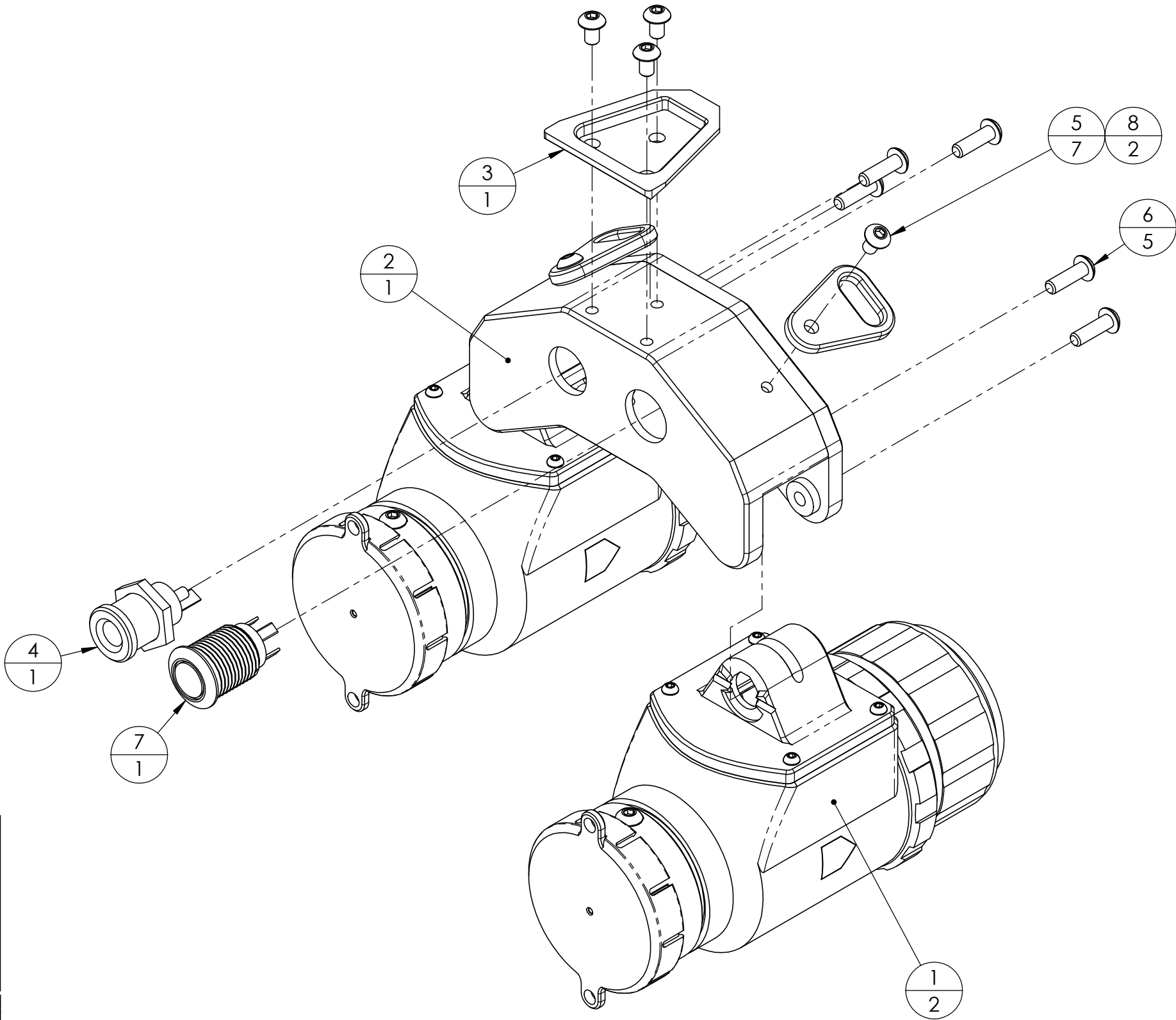
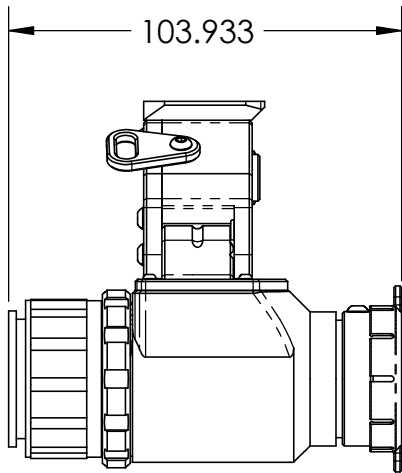
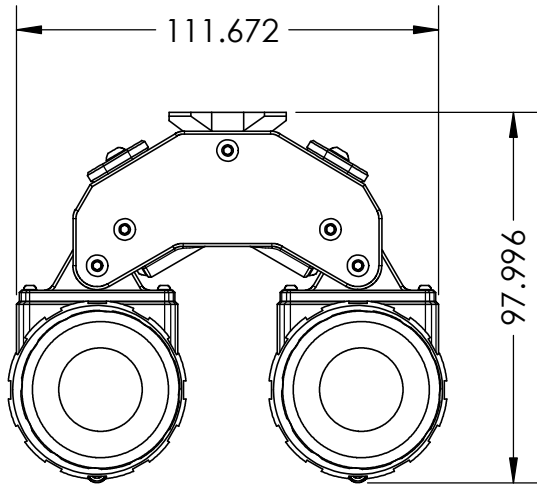
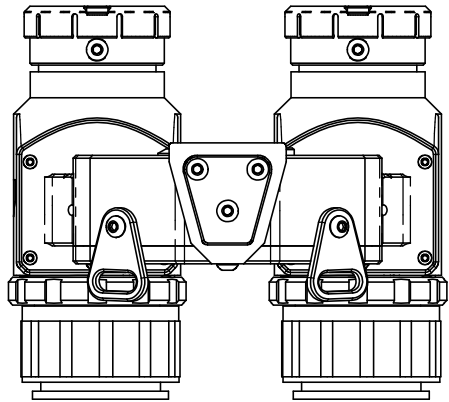


MECHANICAL ASSEMBLY

- Refer to the drawings for subassy BOMs and installation order.
- All fasteners are intended to thread directly into printed holes, though tapping may aid in assy.
- TOOB V2.0 is an optional assy utilizing a laser cut aluminum heatsink (dxf provided). This heatsink greatly improves runtime of the NE3 camera before heat soak begins to degrade image quality (around 100°C).
 - This does not cool the camera, it merely adds thermal mass.

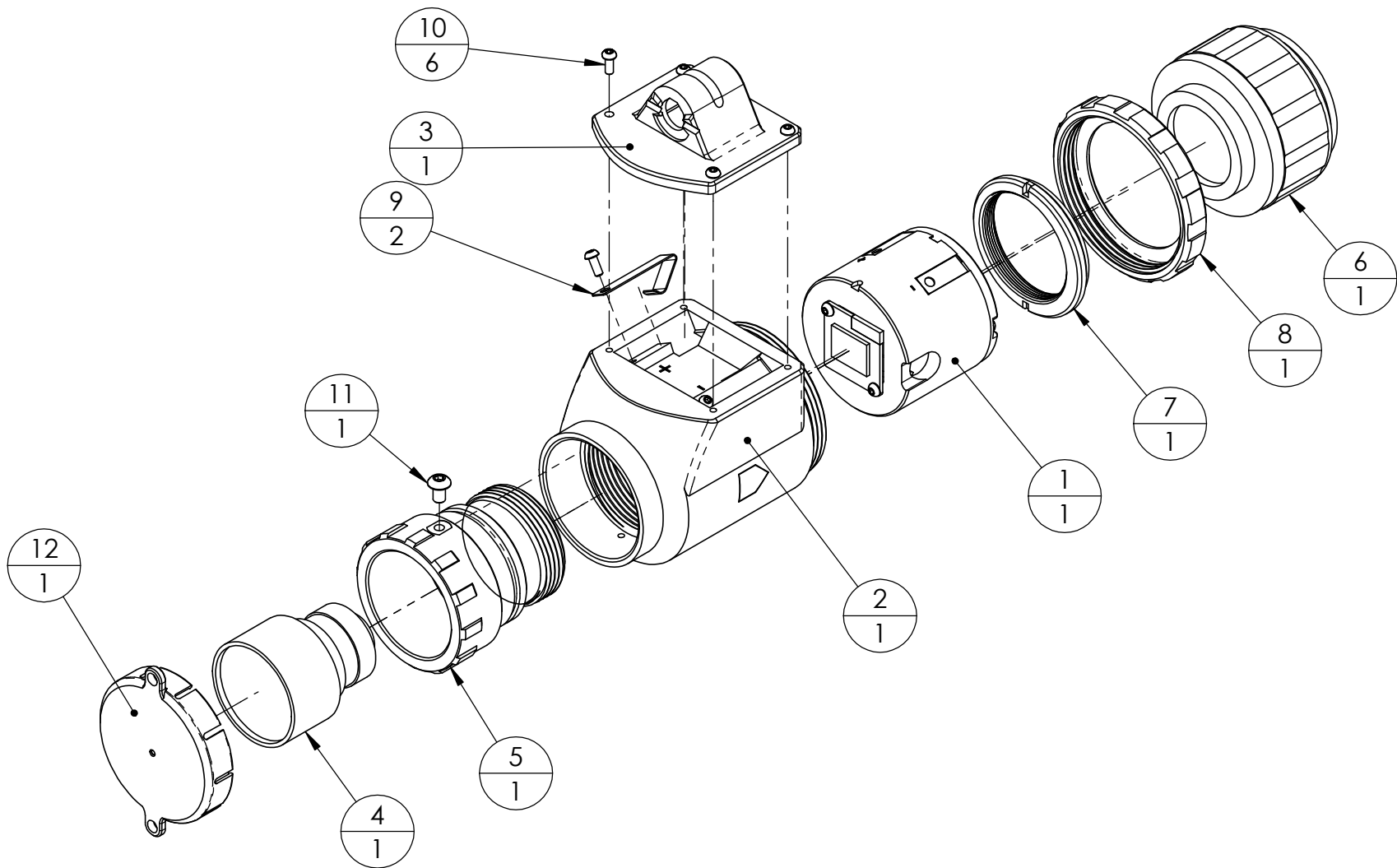
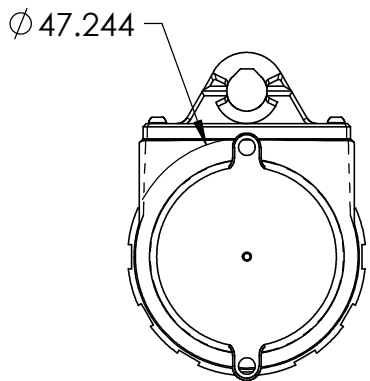
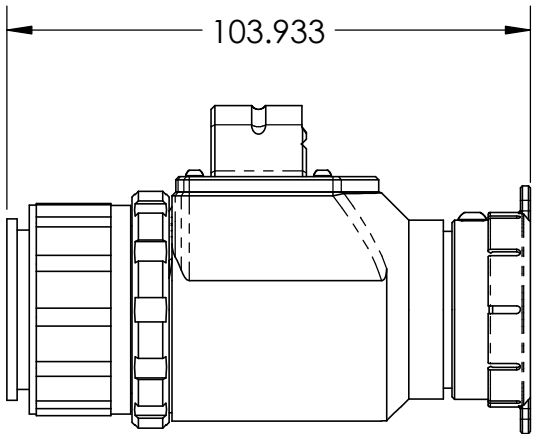
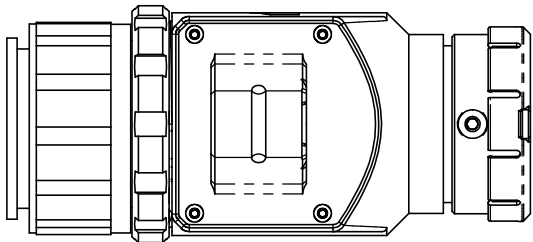


4		
ITEM #	SW-File Name(File Name)	QTY.
1	MONO ASSY, EnVeeGee V2.0	2
2	FACEPLATE, BRIDGE, V1.1	1
3	DOVETAIL, MALE, WILCOX	1
4	DC POWER JACK, 5.5X2.1MM	1
5	92095A177_BHCS M3x0.5x5mm	7
6	92095A182_BHCS M3x0.5x10mm	5
7	LATCHING SWITCH, 12MM, A9B0540-L003619953FBA	1
8	LANYARD CLIP	2

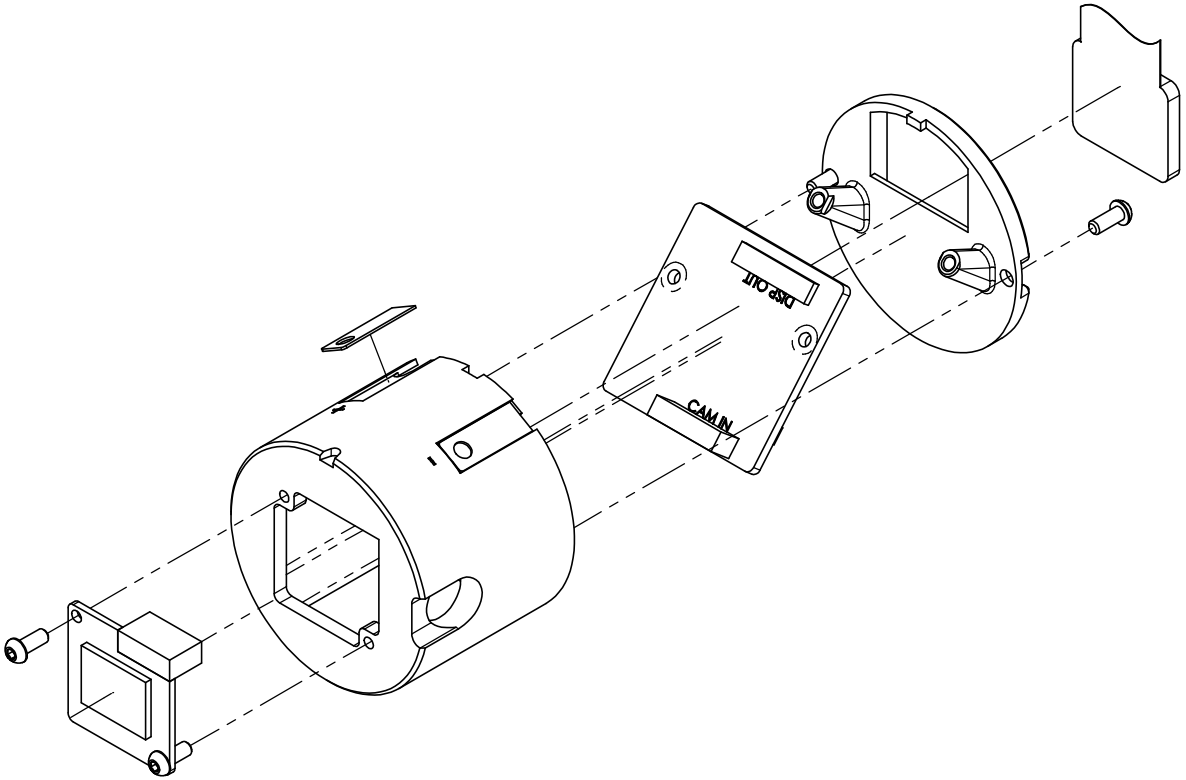
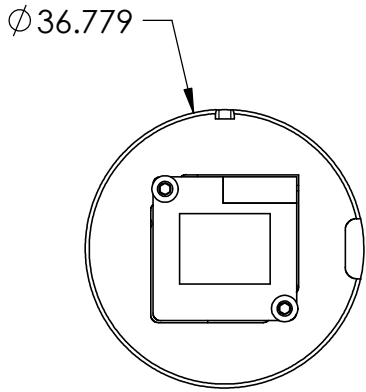
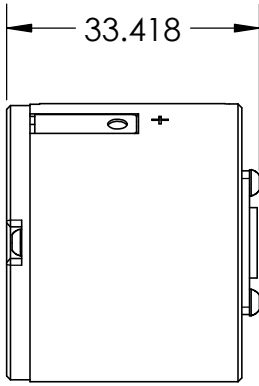
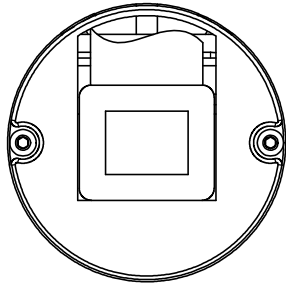
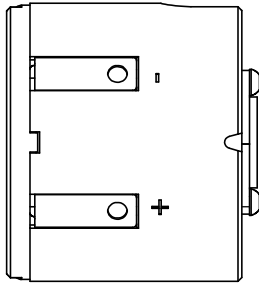


ENVEEGEE V2.0

4		
ITEM #	SW-File Name(File Name)	QTY.
1	TOOB, EnVeeGee	1
2	HOUSING, OUTER V2.0	1
3	PIVOT V2	1
4	LENS, 8MM F1.0 CS MOUNT	1
5	LENS ADAPTER, DIGITAL ONLY, 8MM CS MOUNT	1
6	V780 Ocular Lens	1
7	ADAPTER RING, OCULAR LENS	1
8	RETAINING NUT, OCULAR LENS	1
9	Uxcell AA, A, CR2 Battery Spring Contact (a17032200ux0178)	2
10	92095A452_BHCS M2x0.4x5mm	6
11	92095A177_BHCS M3x0.5x5mm	1
12	Lens Cap, Infinity	1
13	TOOB, EnVeeGee, V2.0	1



I TEM #	SW-File Name(File Name)	QTY.
1	RUNCAM NE3 V1	1
2	V780 DISPLAY	1
3	V780 Driver CCA	1
4	TOOB HOUSING, DISPLAY SIDE	1
5	TOOB HOUSING, CAMERA SIDE	1
6	Uxcell AA, A, CR2 Battery Spring Contact (a17032200ux0178)	2
7	92095A452_BHCS M2x0.4x5mm	4



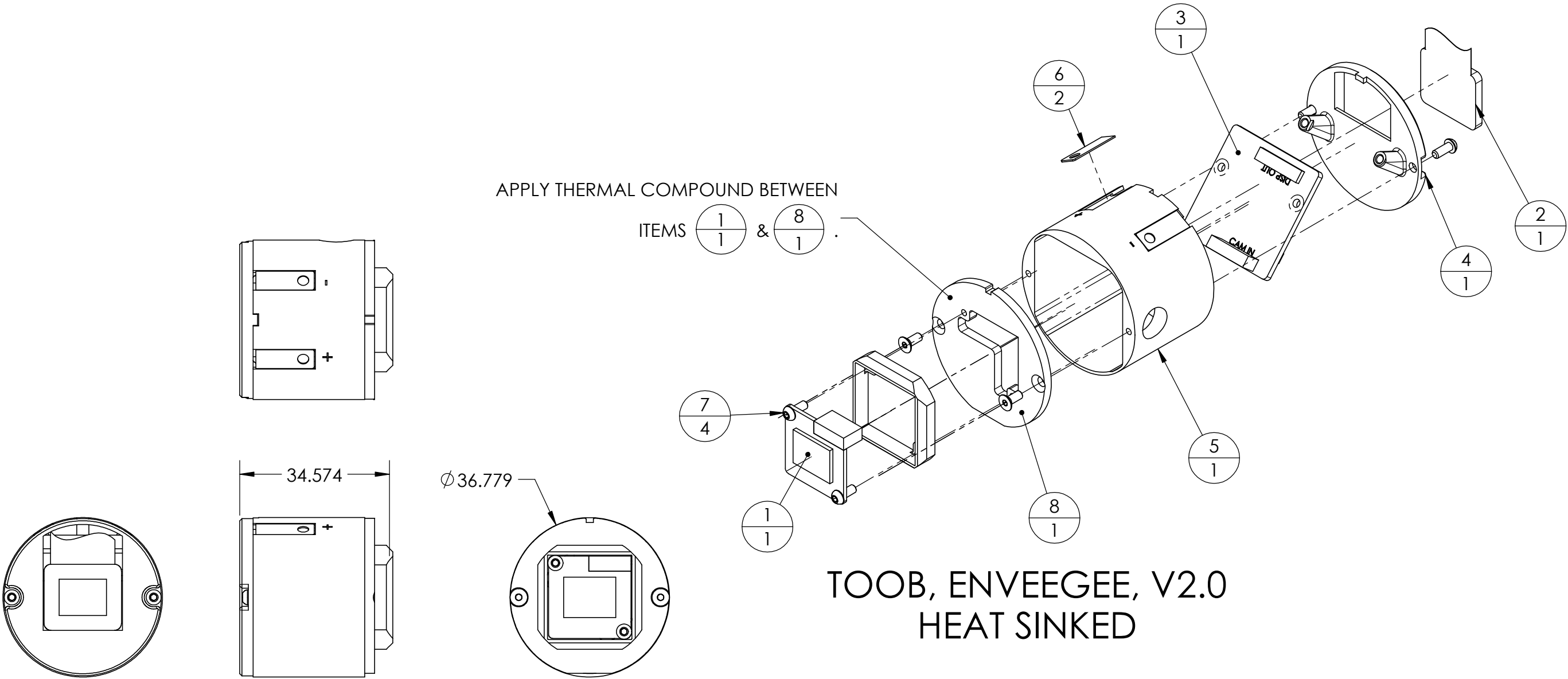
TOOB, ENVEEGEE
(UNCOOLED)

4		
ITEM #	SW-File Name(File Name)	QTY.
1	RUNCAM NE3 V1	1
2	Display, V780	1
3	Driver CCA, V780	1
4	TOOB HOUSING, DISPLAY SIDE, V2.0	1
5	TOOB HOUSING, CAMERA SIDE, V2.0	1
6	Uxcell AA, A, CR2 Battery Spring Contact (a17032200ux0178)	2
7	92095A452_BHCS M2x0.4x5mm	4
8	TOOB HEAT SINK, NE3 V1	1
9	91294A003_FHCS M2x0.4x5mm	2
10	SPACER, NE3 HEAT SINK	1

C

B

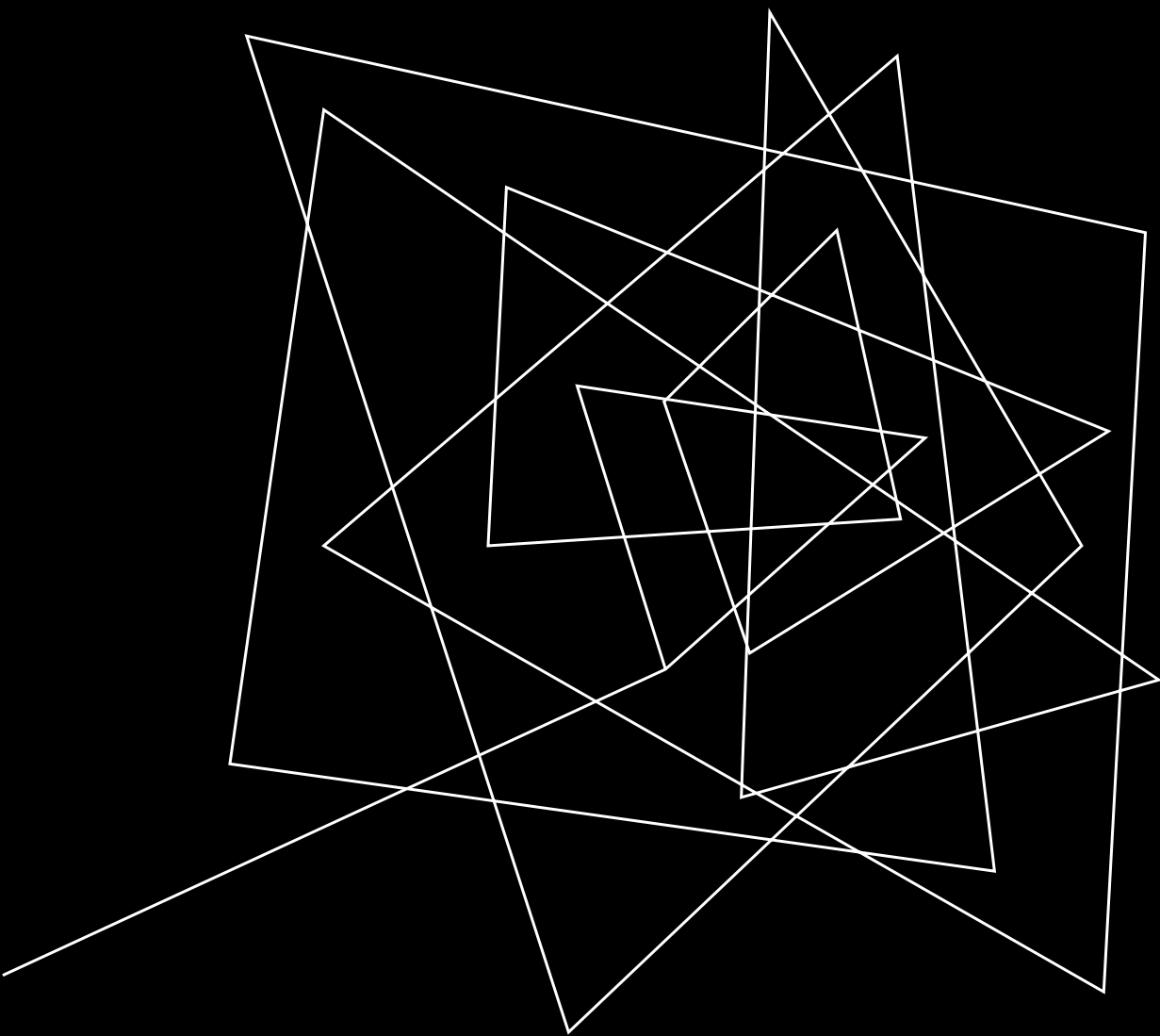
A



C

B

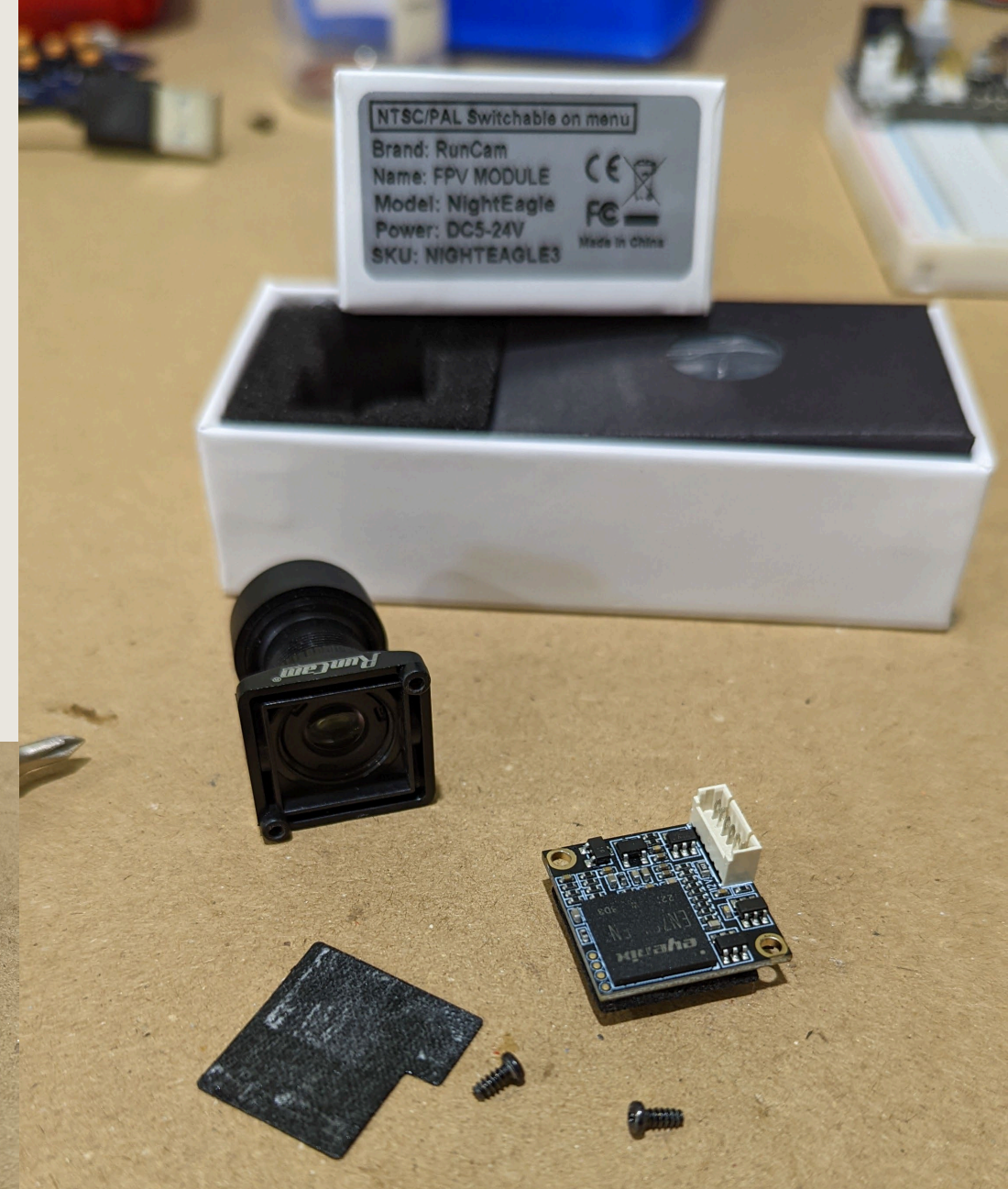
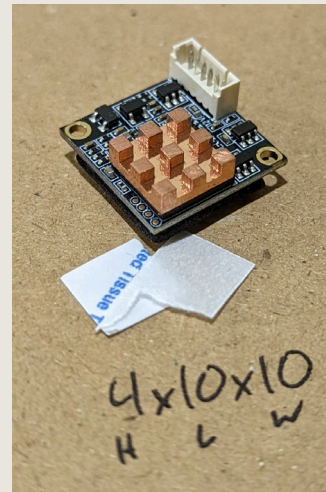
A

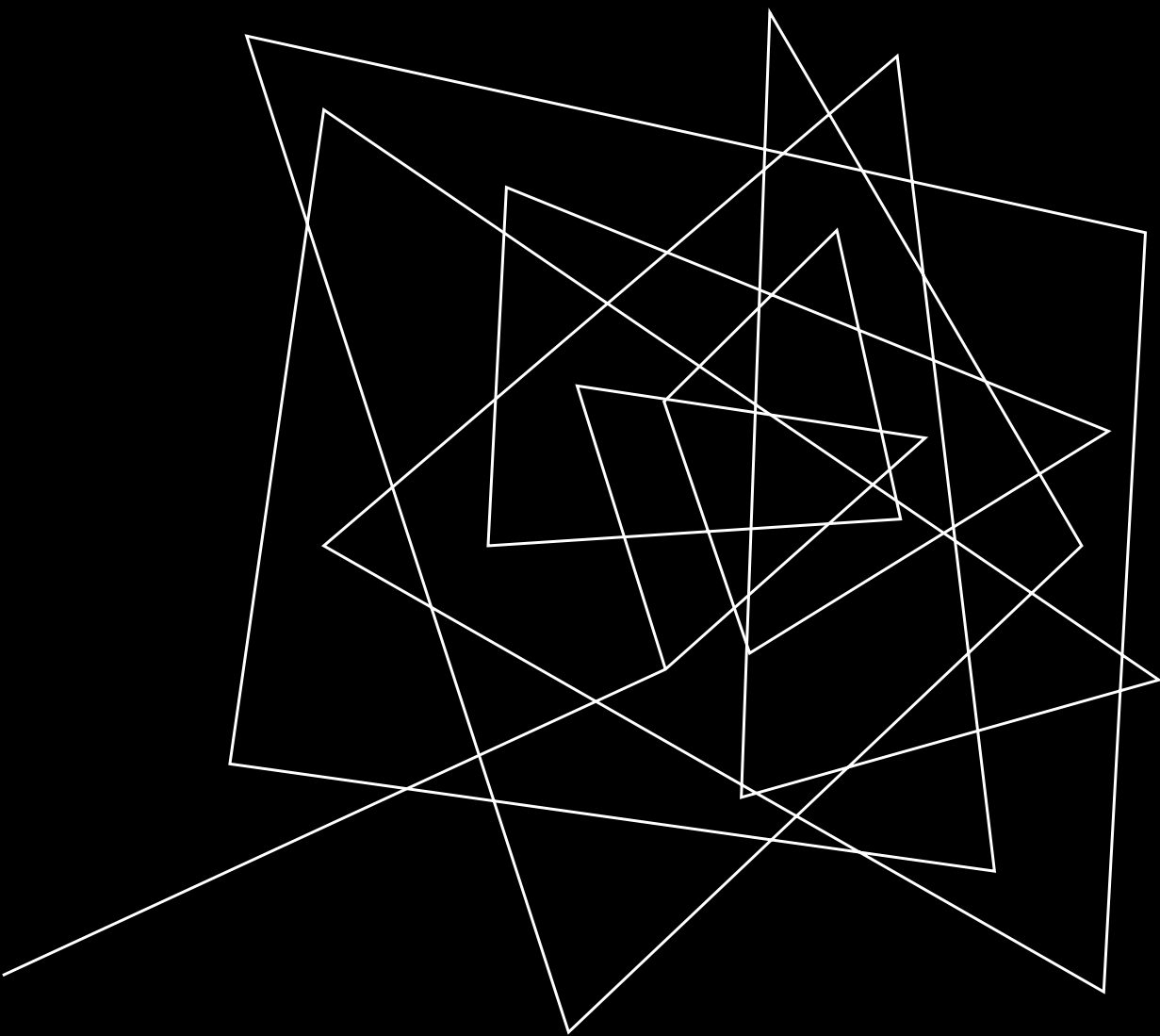


RUNCAM NE3 DISASSEMBLY

1. Peel off the protective sticker
2. Remove 2x Screws
3. Optional:
 - a) Add 4x10x10mm heatsink for additional cooling
 - b) Or build a "V2.0" Toob to use a much larger heat sink.

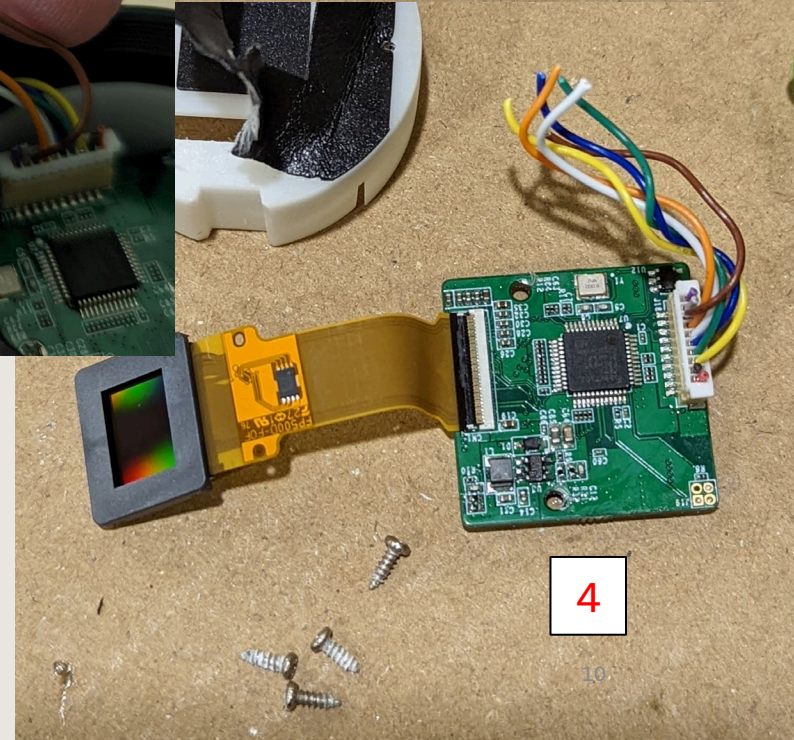
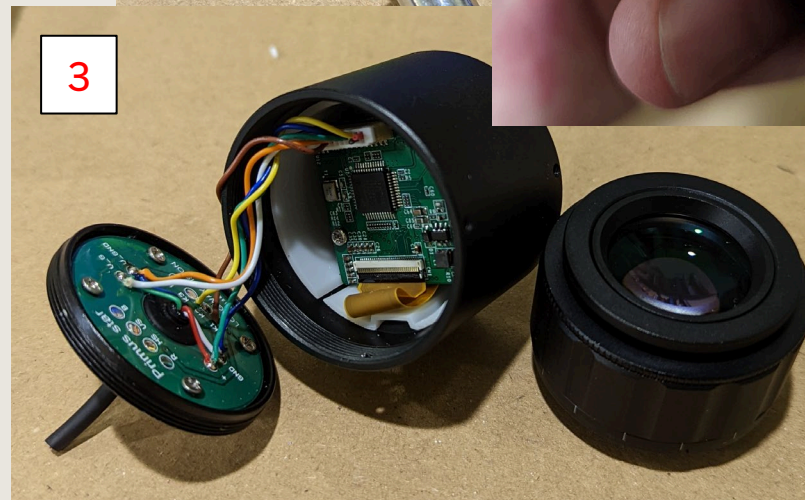
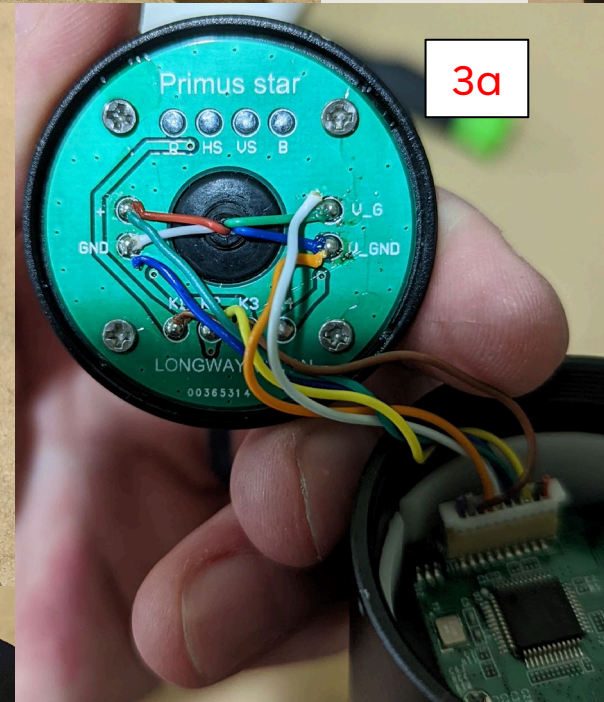
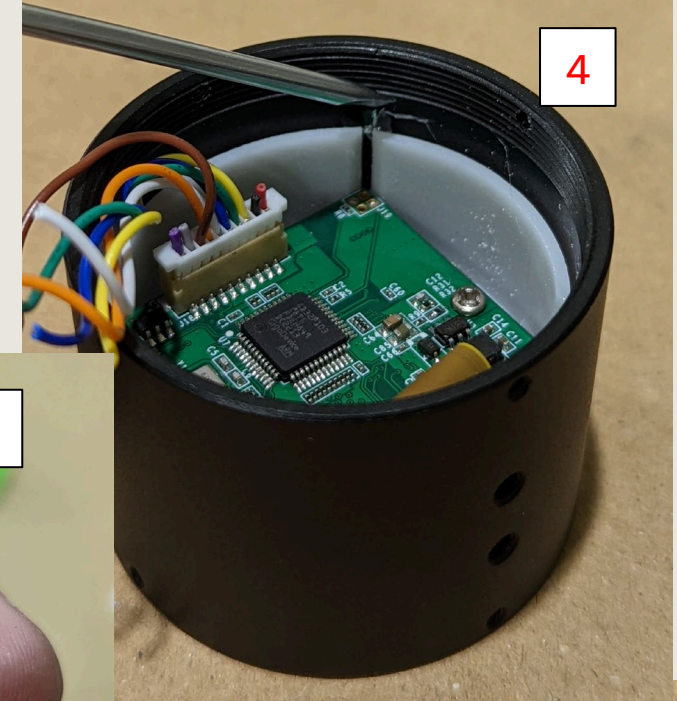
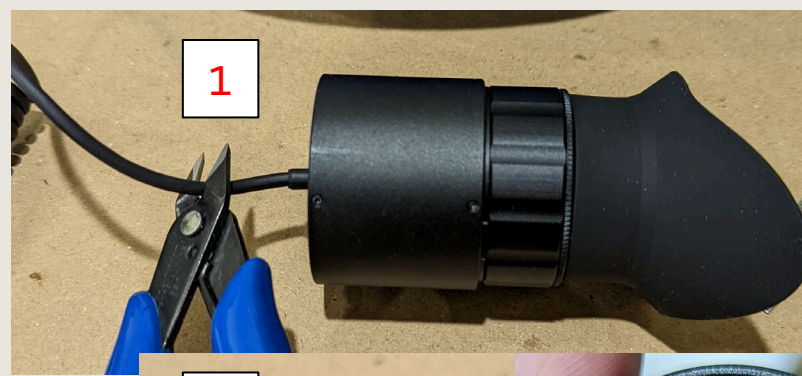
Care should be taken during this process not to scratch, drop, static shock, or dink the board or its components

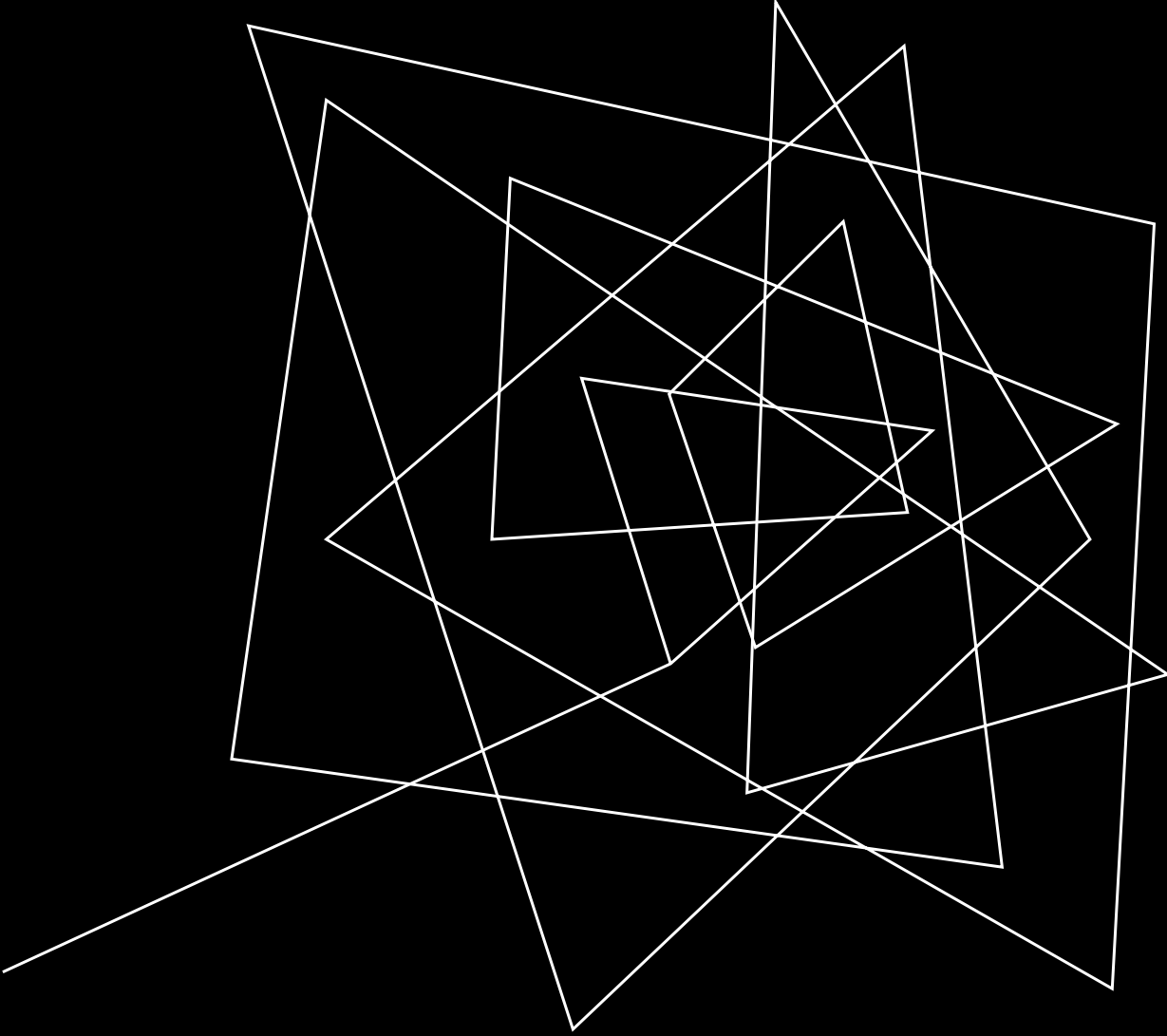




V780 DISPLAY DISASSEMBLY

1. Cut the cord
2. Remove the tiny socket setscrews using .035" drive
3. Separate the housing from the ocular lens.
 - a) Take a photo to document V_G, V_GND, +, and GND wire color/positions leading to display board
4. Crack the glue loose on the white plastic and remove display and display board

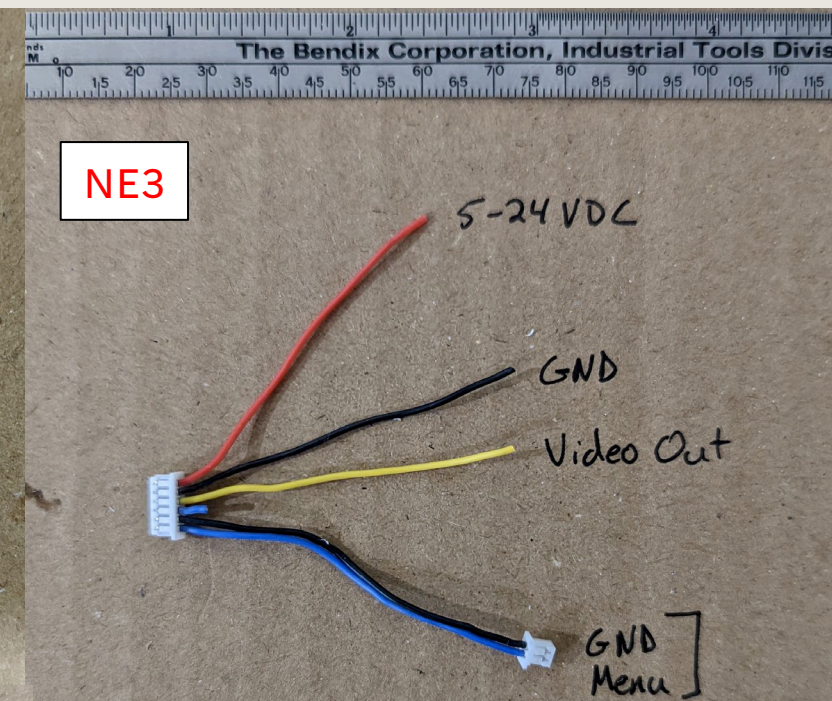
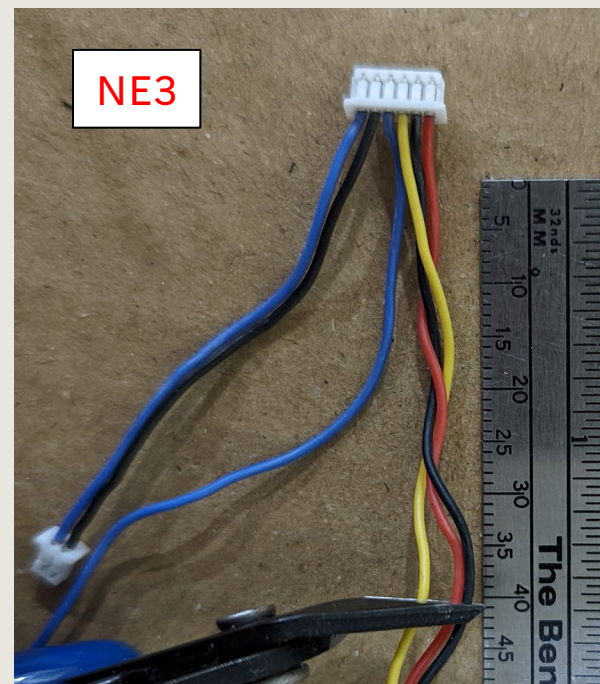




DIIT (DIGITAL IMAGE
"INTENSIFIER" TUBE)
WIRING

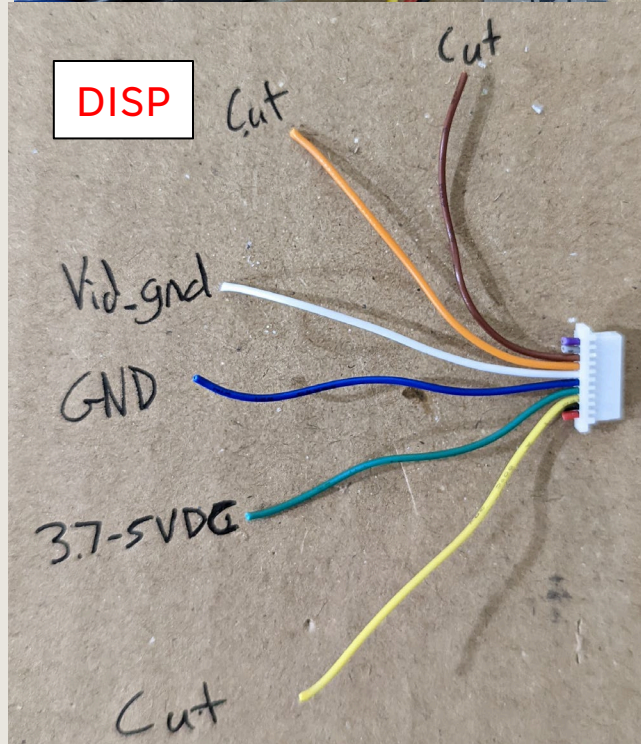
NE3 Cables

1. Cut the RED, BLK, and YLW wires at 40mm
2. Cut the loose BLU wire short (<5mm). Not needed



V780 Display Cable

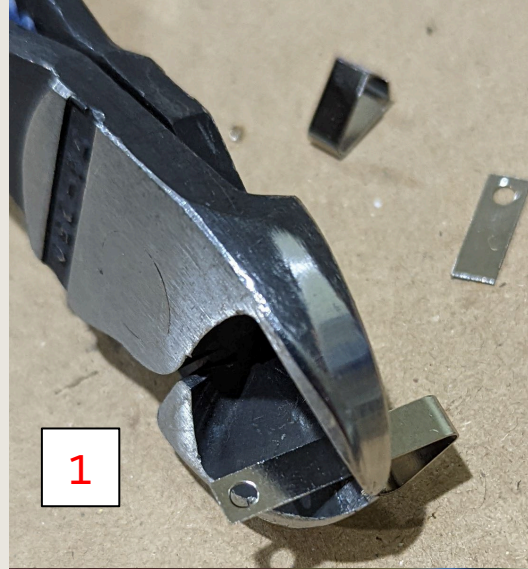
1. Cut WHT, BLU, GRN at 40mm
2. Cut BRO, ORG, YLW short (<5mm)(not needed)



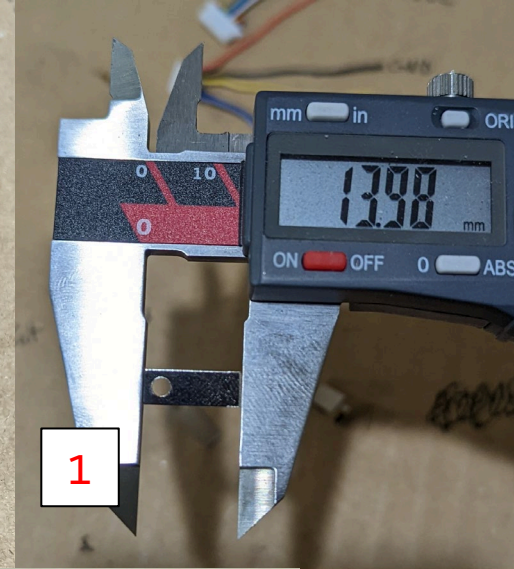
Note: Use wire positions on connector, not just colors from these photos.

1. Cut 2x “Uxcell AA Battery Spring Contacts” (A17032200UX0178) to <14mm
2. Solder 1x 25mm length of wire to each contact pad.
 - a) Note the solder blob is offset to one side on each contact. File away excess solder for flush-fit w/ housing.
3. Gather up your pairs and solder these connections.
 - a) GND contact pad (BLK), NE3 GND (BLK), Disp GND (BLU)
 - b) V_in contact pad (RED), NE3 V_in (5-24VDC)(RED), Disp V_in (3.7-5VDC)(GRN)
 - c) NE3 Video Out (YLW), Disp V_G (WHT)
4. Heat shrink over each pair to prevent shorts

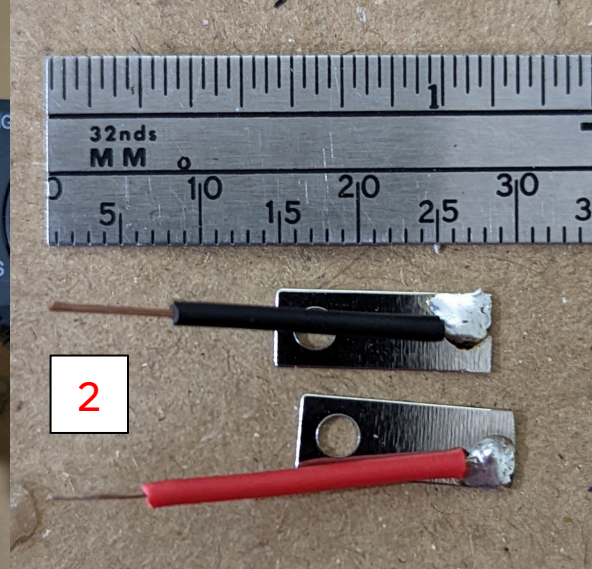
Note: Use wire positions on connector, not just colors from these photos.



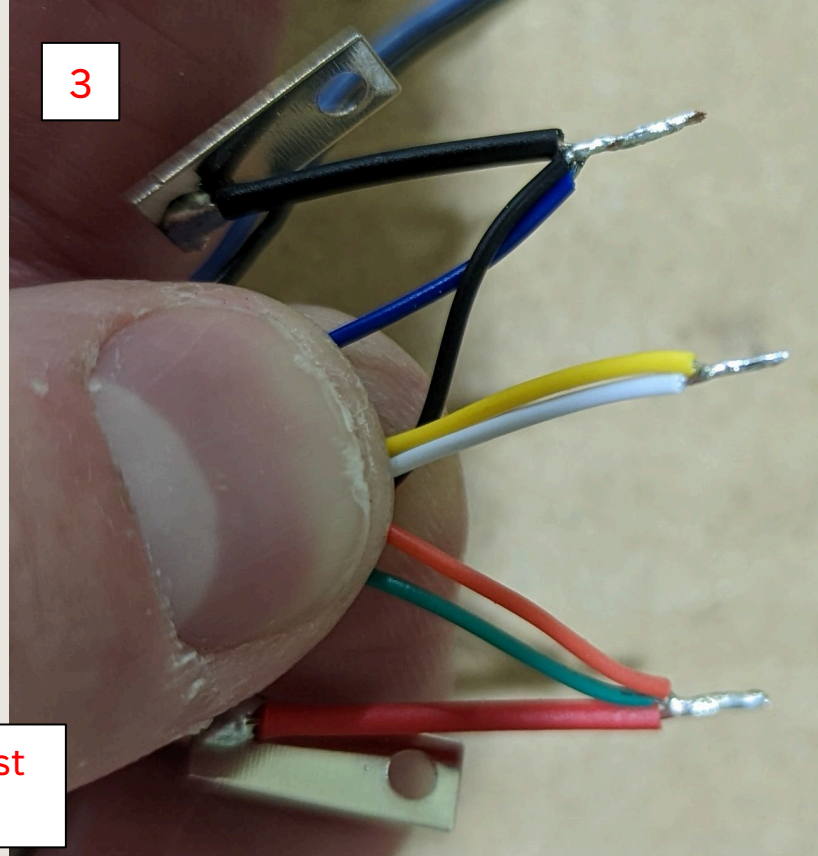
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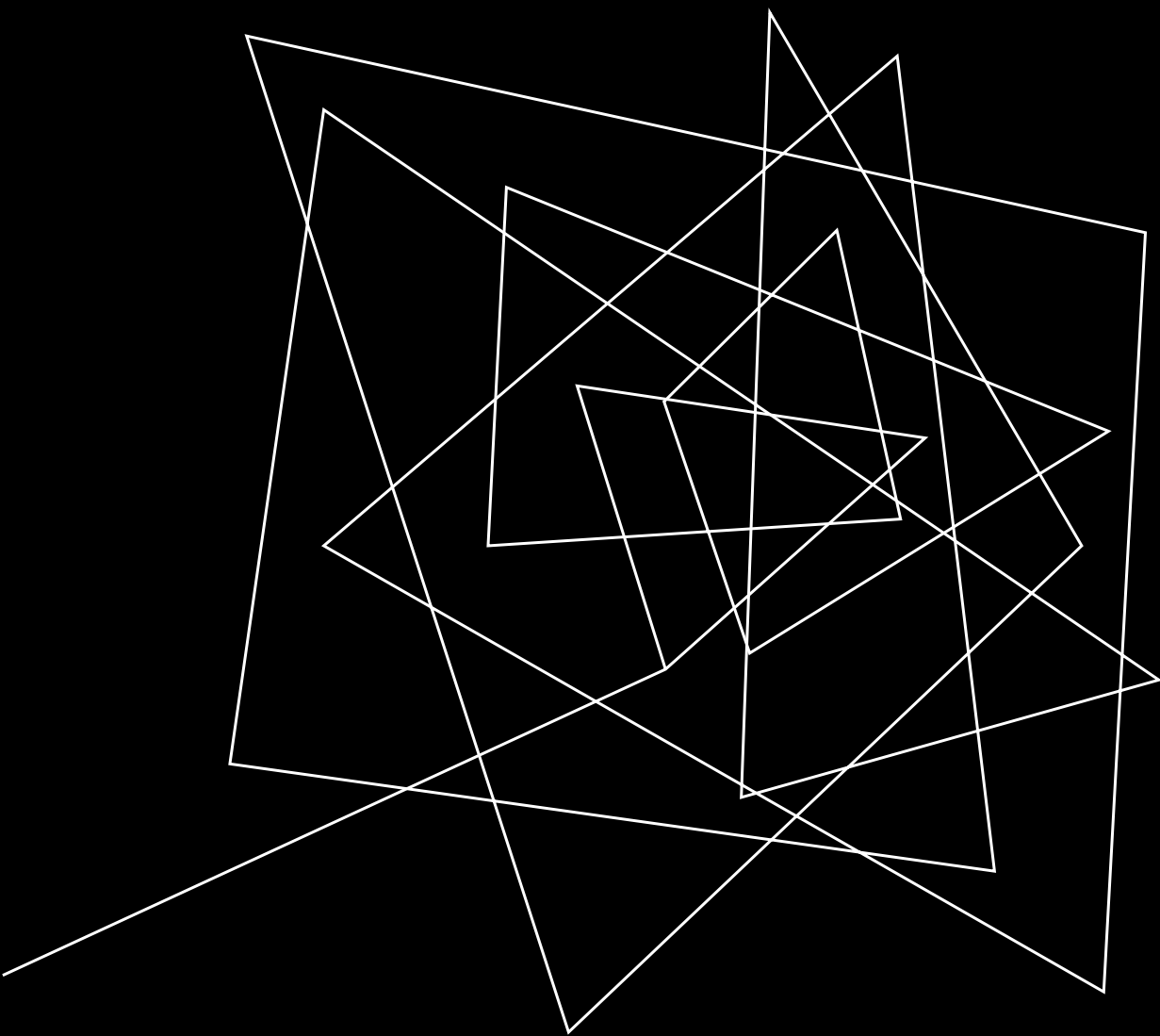
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2

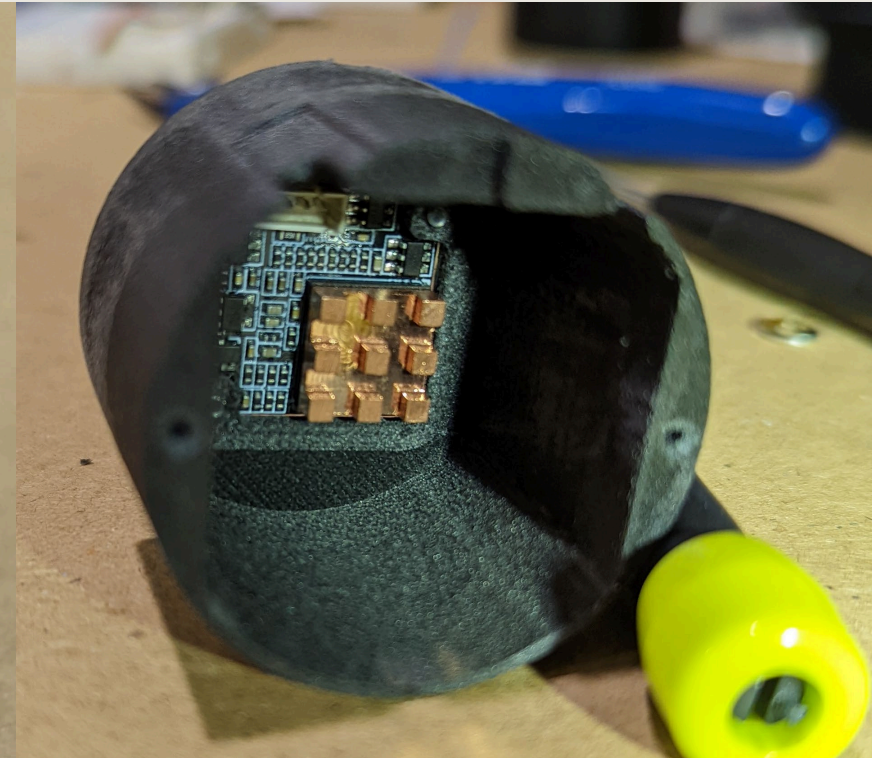


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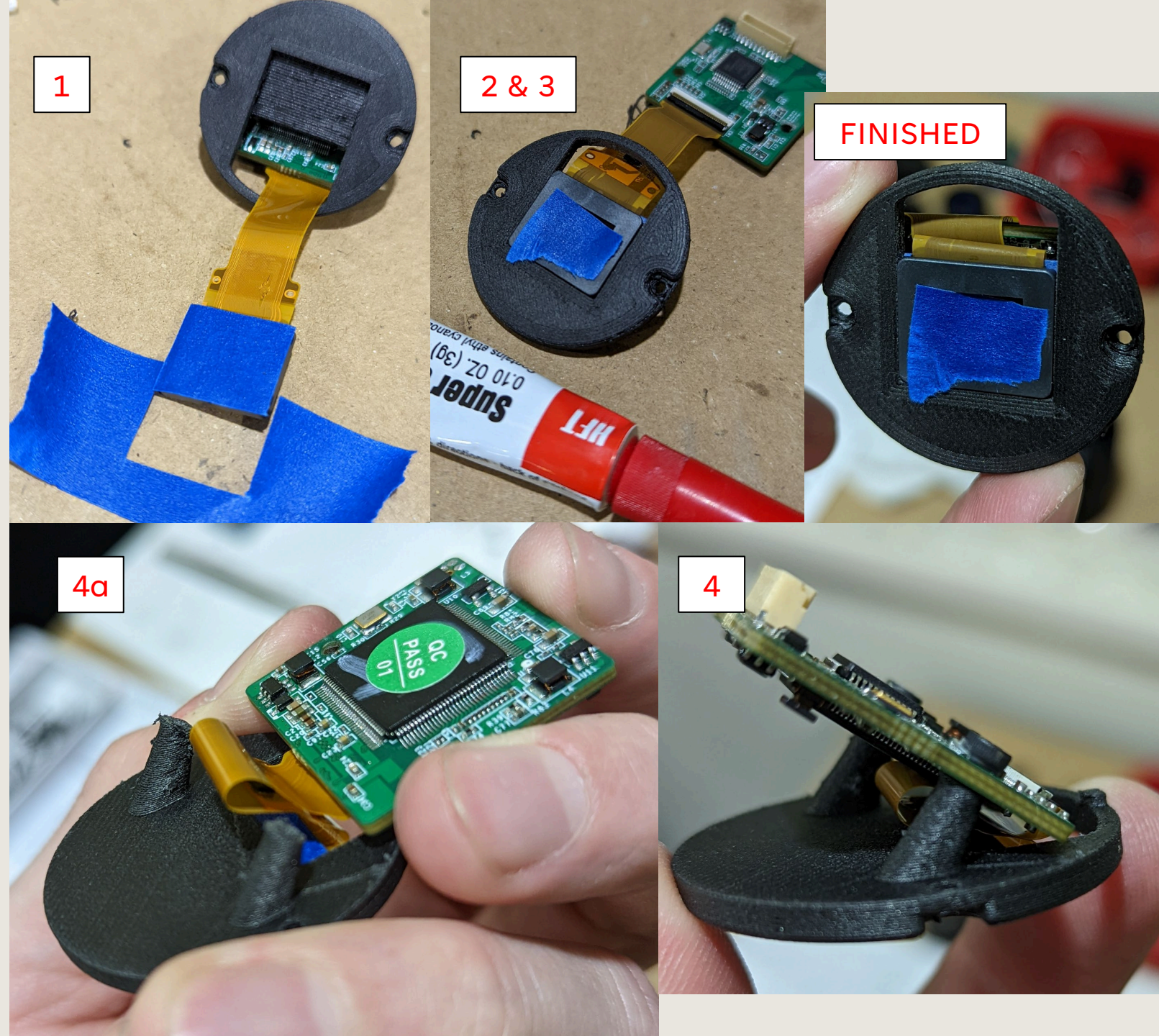


DIIT ASSEMBLY

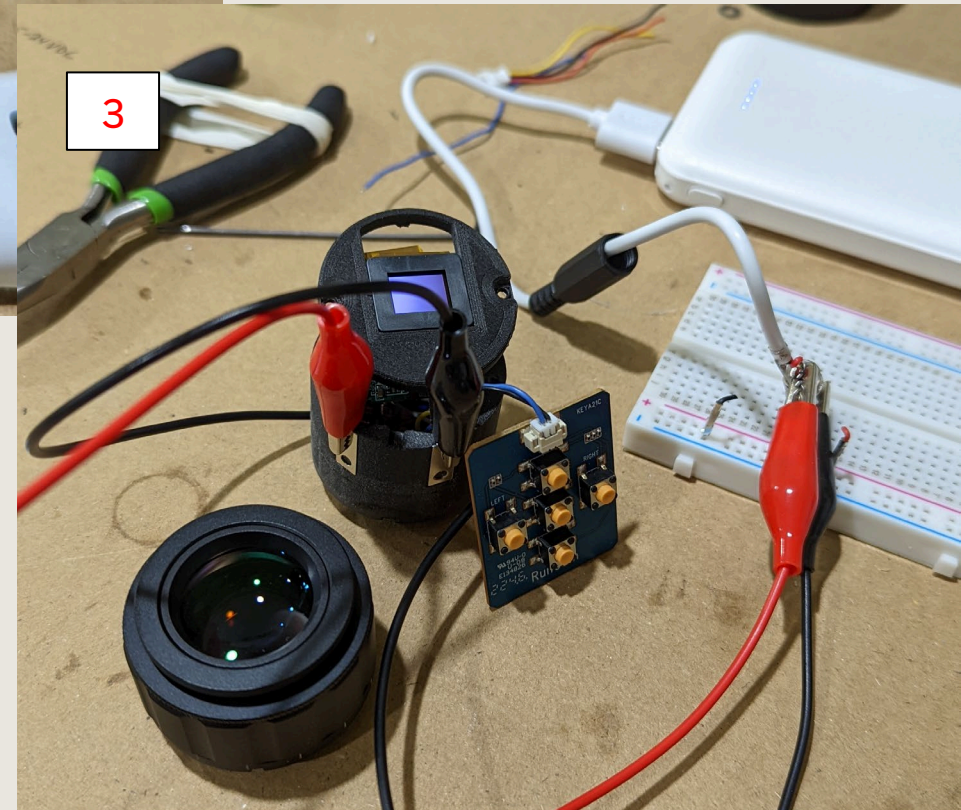
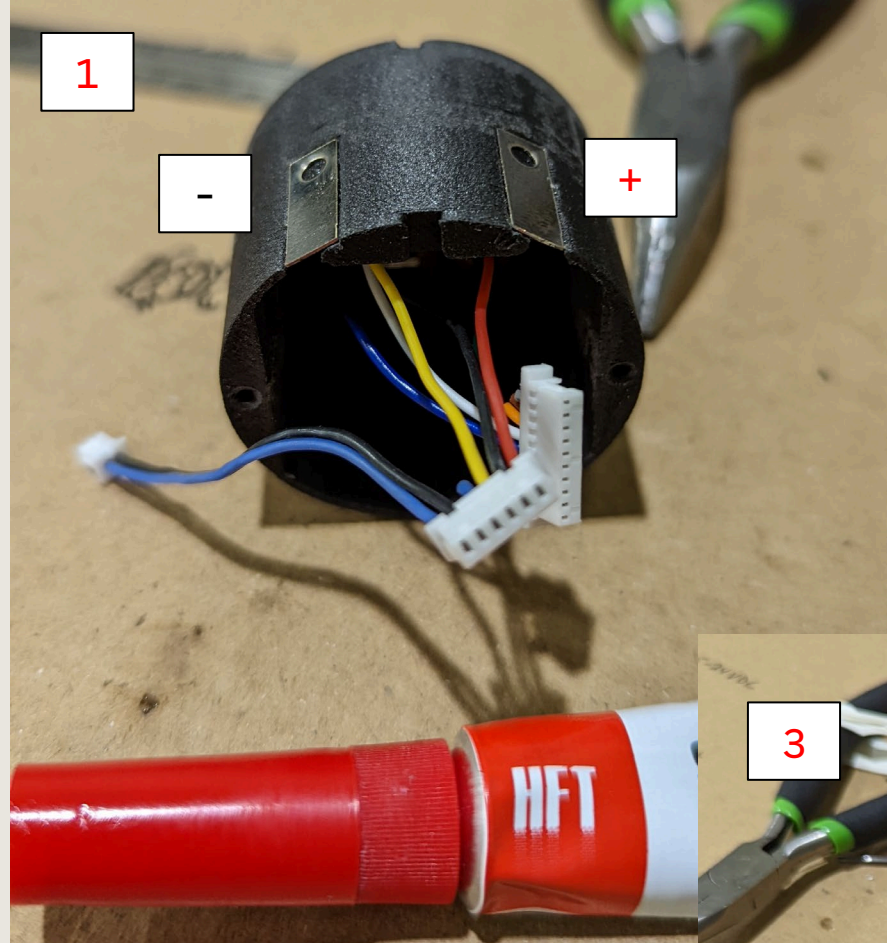
1. Fasten the NE3 cam board to the DIIT Housing using 2x M2 SHCS threaded directly into plastic
 - a) Screws included with camera are sufficient
 - b) Orientation is important. Mount the connector nearest to alignment notch on housing.



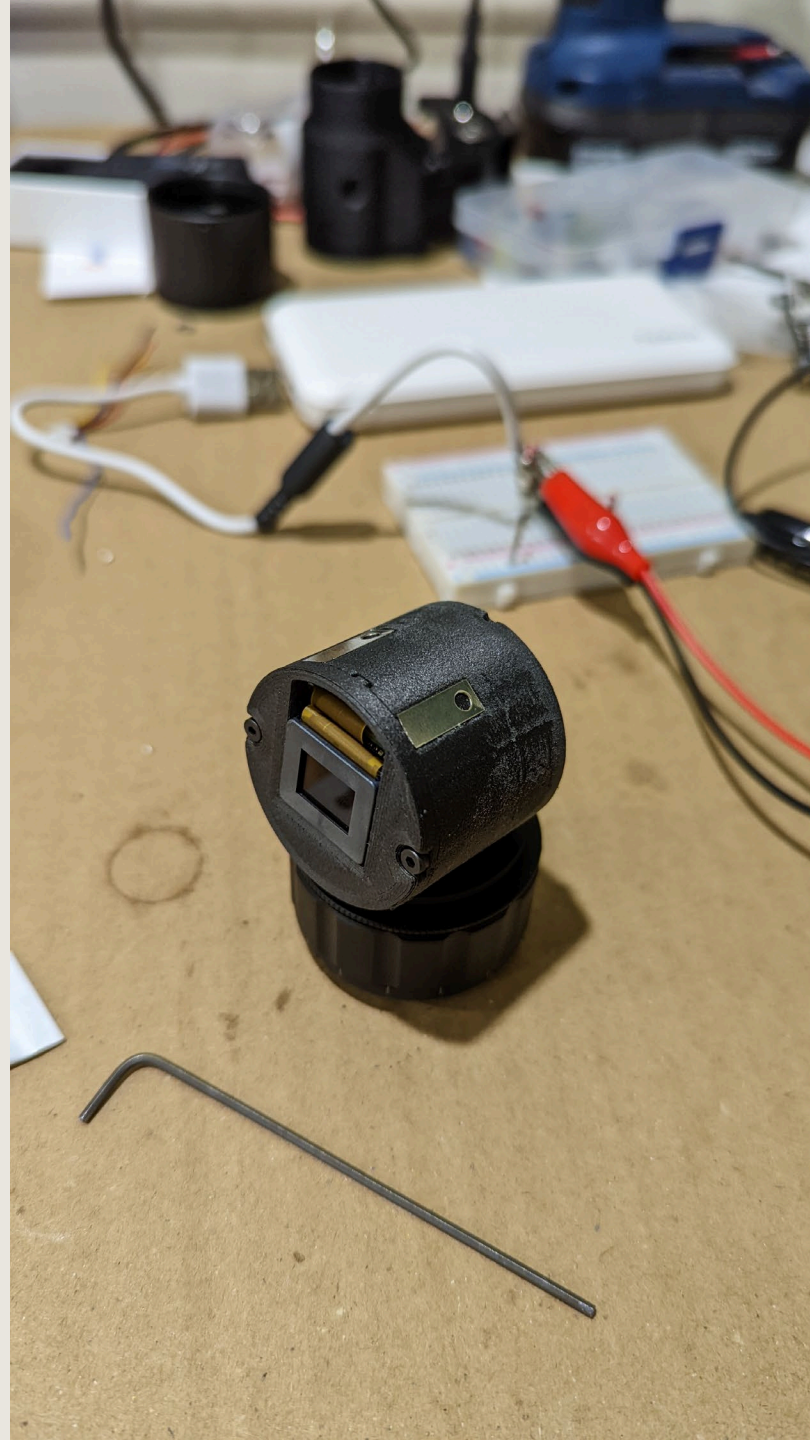
1. Apply masking tape to back of display
 - a) This makes removal easier should something go wrong
2. Apply masking tape to the front of the display to protect it from glue spills
3. Super Glue the display into the DIIT Housing as shown
4. Once dry, route ribbon cable as shown and fasten board to DIIT Housing using 2x M2 SHCS.
 - a) Caution not to crease or fold the ribbon cable. Bends should be smooth and radiused.

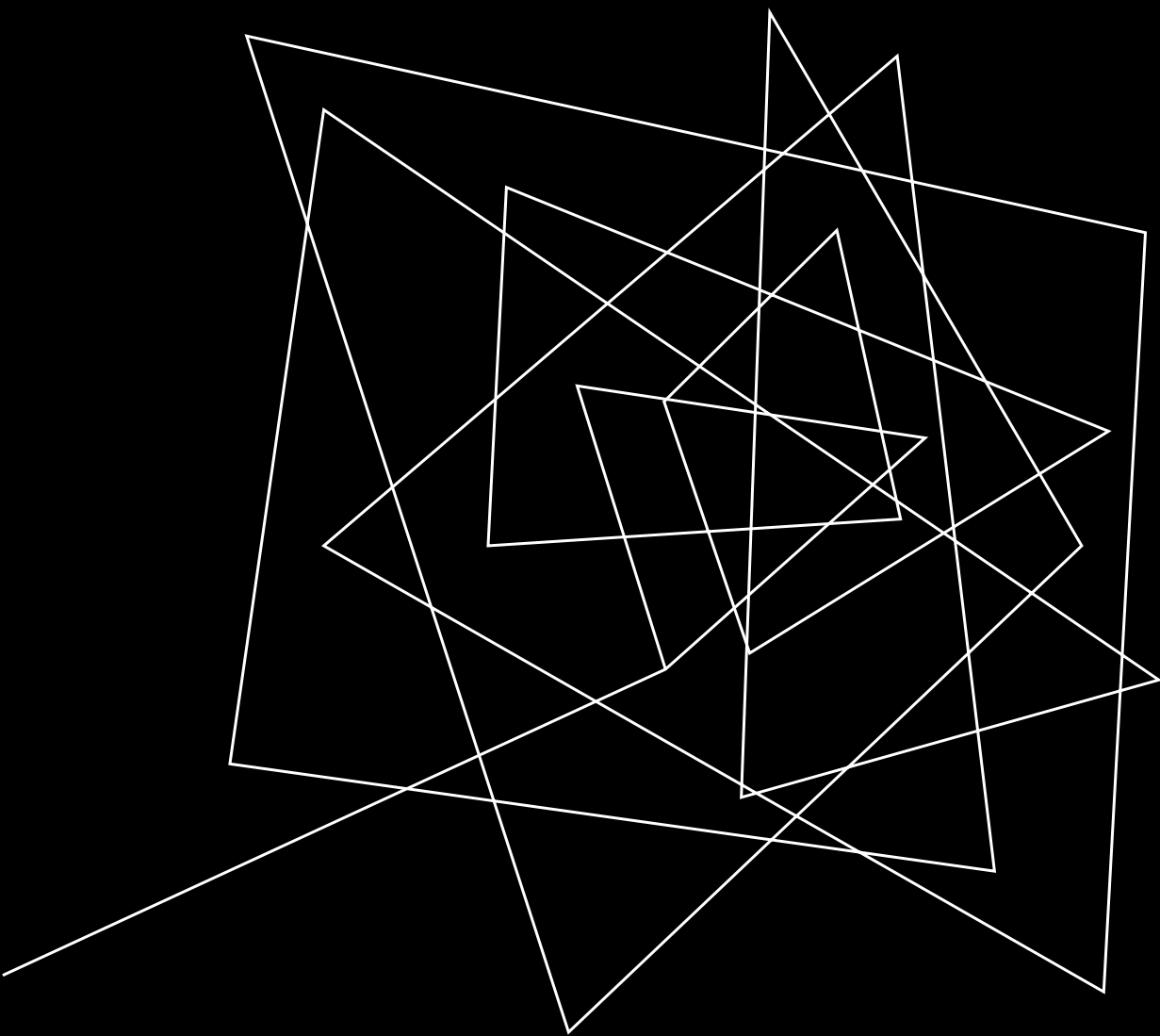


1. Super Glue the contacts of the wiring harness made previously to the DIIT Housing
 - a) With the camera end facing away, glue the positive (RED) contact on the right
 - b) **Red is on the Right**
 - c) Glue the negative (BLK) contact on the left
2. Ensure these contacts sit flush, or slightly below the radius of the housing.
 - a) You may need to file the housing and test fit these before gluing.
 - b) You may need to file your solder blob and test fit before gluing.
3. Function Test:
 - a) Install connectors into camera and display boards
 - b) Apply 5VDC to the contacts
 - a) **Red is on the Right**
 - c) You should see an image on the display that changes depending on light hitting the camera sensor (cover/uncover)
 - d) If blackscreen, you botched a display connection
 - e) If bluescreen, you botched a camera connection
 - f) The camera will get warm during use.



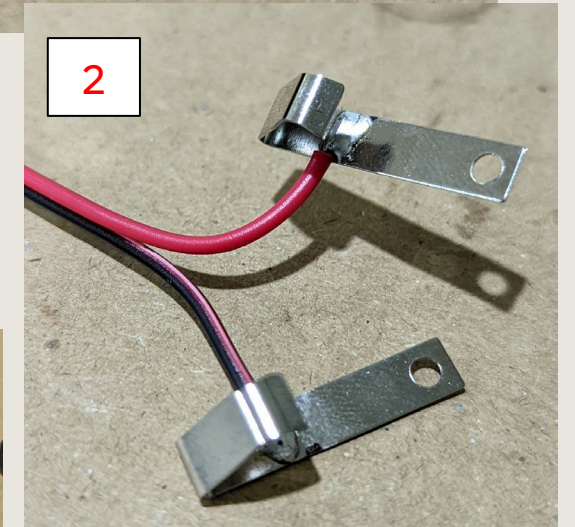
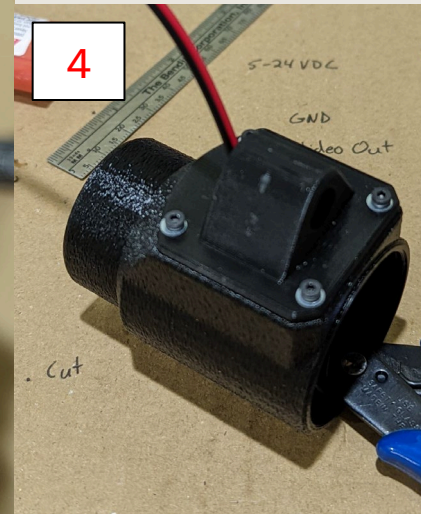
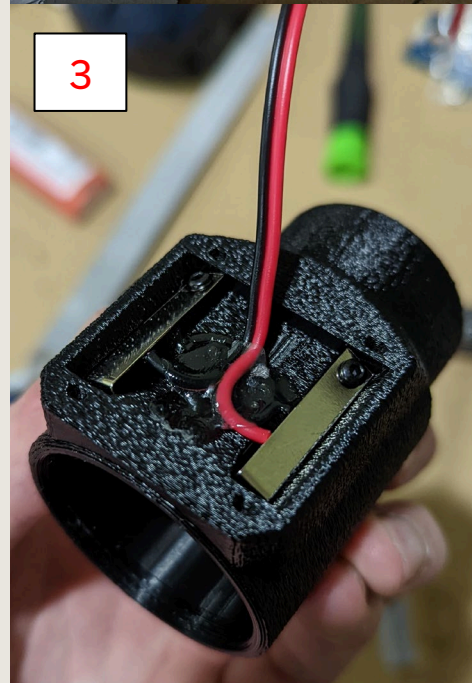
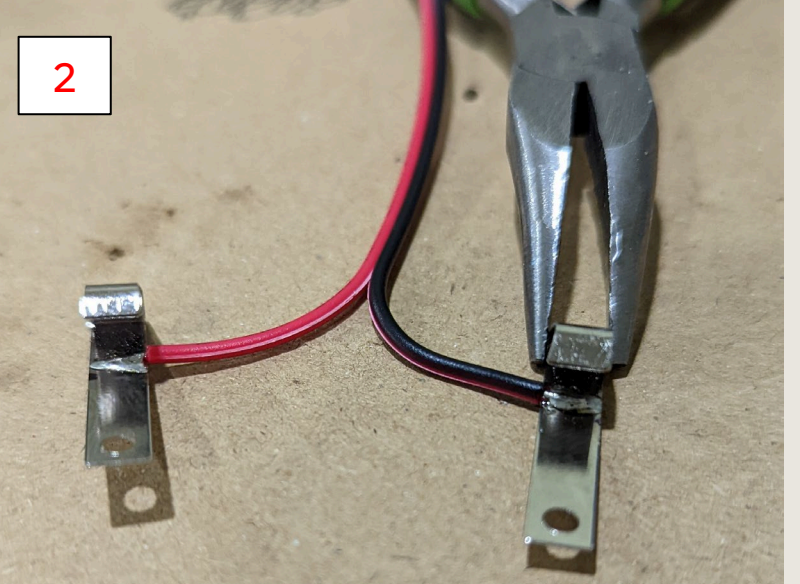
1. Attach the two halves of the DIIT Housing using 2x M2 SHCS

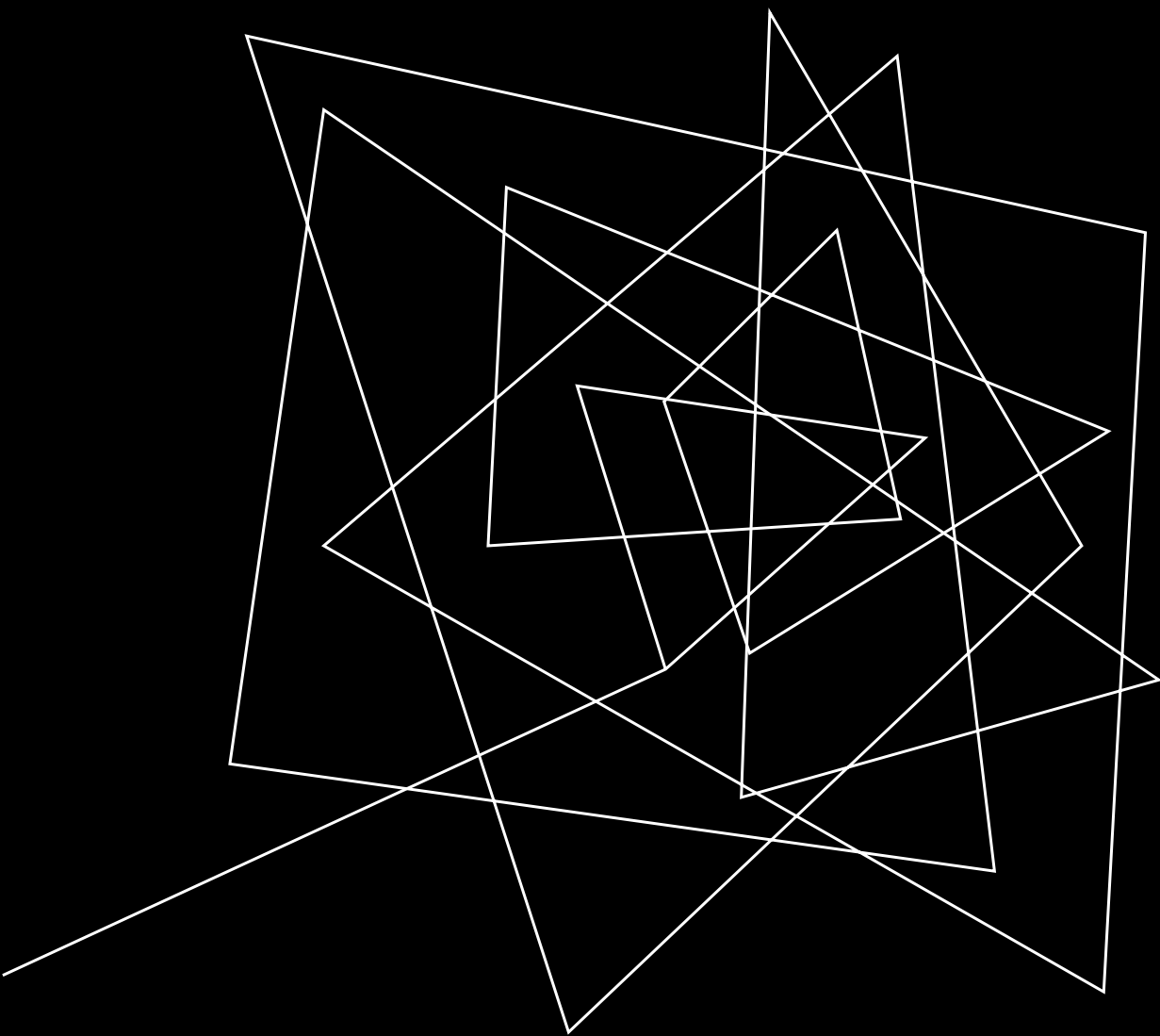




MONO WIRING

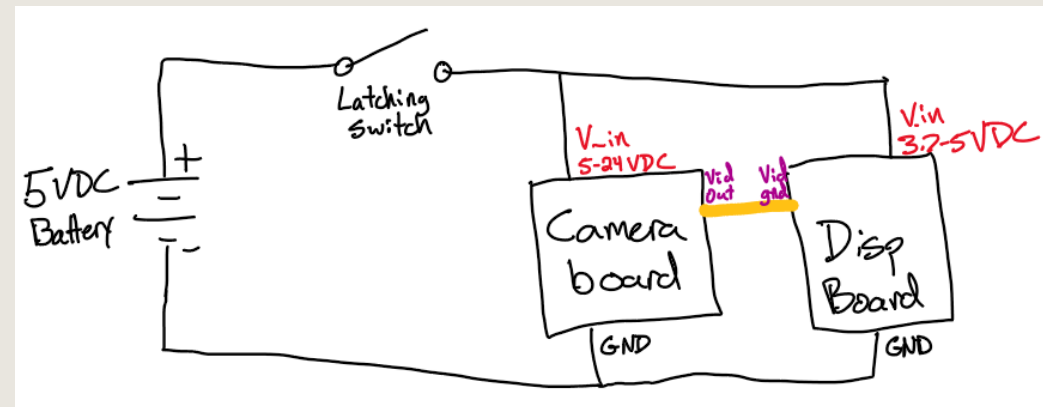
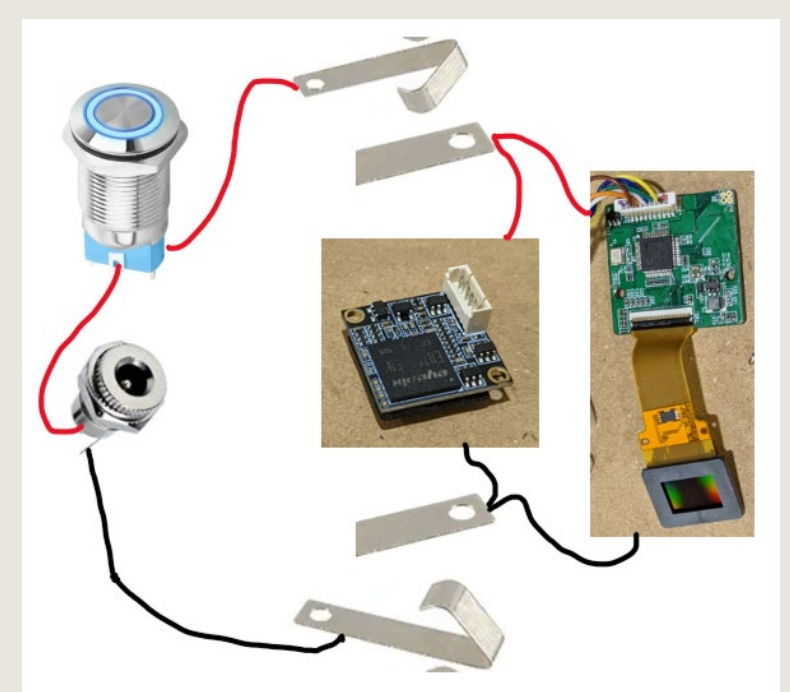
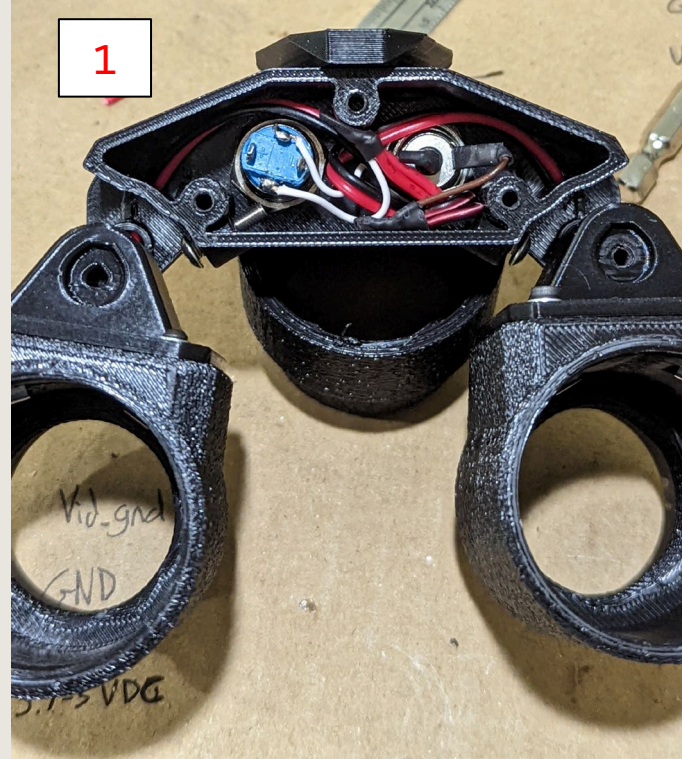
1. File down 2x battery contacts to 4.5mm wide. You need only file portion that will make contact with the Toob.
2. Solder RED & BLK wires (18-24AWG,>6") to these battery contacts.
 - a) Orientation is important here. The solder blob should be under the spring tab portion and wires routed exactly as shown.
3. Install these battery contacts into the Toob housing using 2x M2 BHCS, or spare NE3 screws.
 - a) Red is on the Right
 - b) Adding strain relief with hot glue is a good idea.
4. Route the wires through the pivot and secure to housing using 4x BHCS.
 - a) Note orientation of pivot relative to housing.

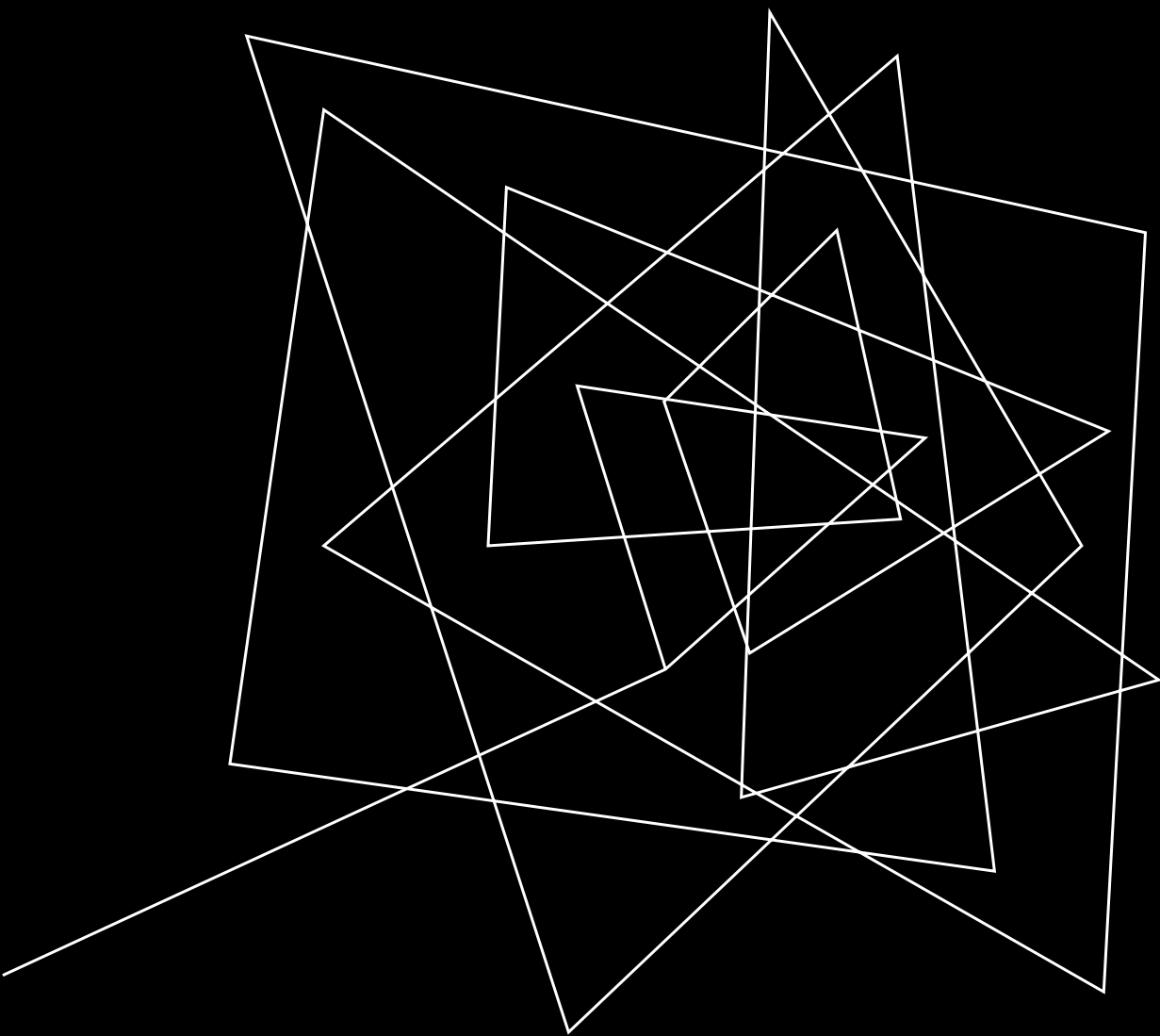




BRIDGE WIRING

1. Fish the wires from the Mono Housings into the bridge. Tweezers are your friend here.
2. Install the push button switch in the left hole, and the power jack on the right.
 - a) The center pin of the power jack should be the + terminal.
 - b) Reminder: Switches only break the positive wire. No black wires should get attached to the switch at all.
3. Follow the wiring diagrams shown to complete the wiring.
 - a) If you plan to use this housing for REAL IIT tubes, you'll need to add a stepdown converter here. MP1584EN should suffice.
 - b) Heat shrink any exposed joints to prevent shorts

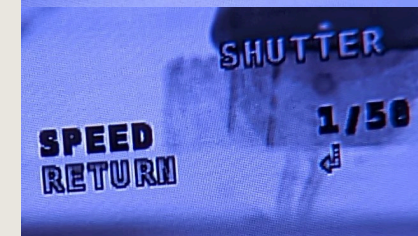
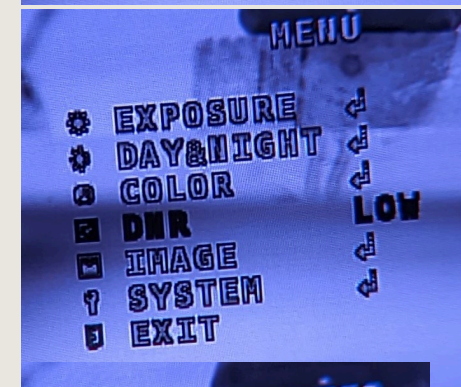
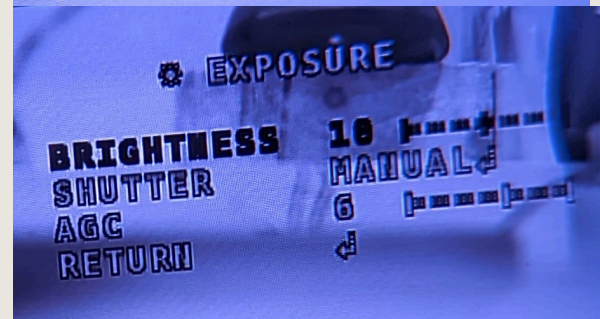
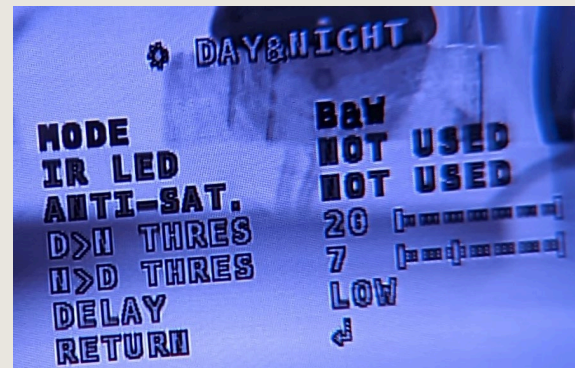
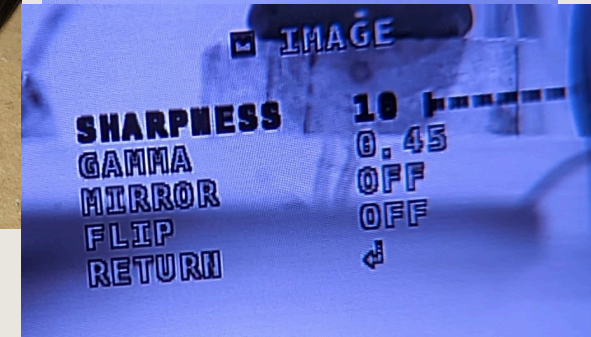
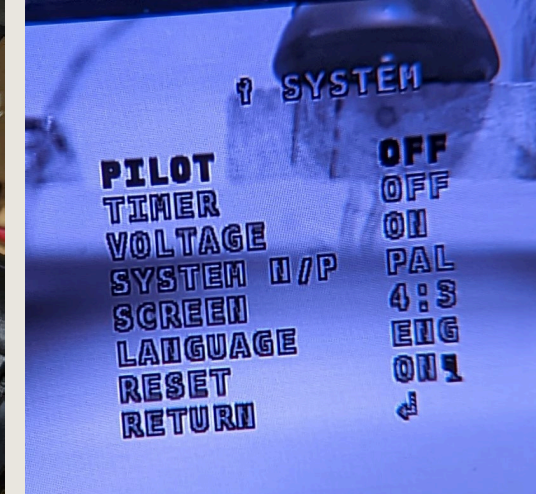
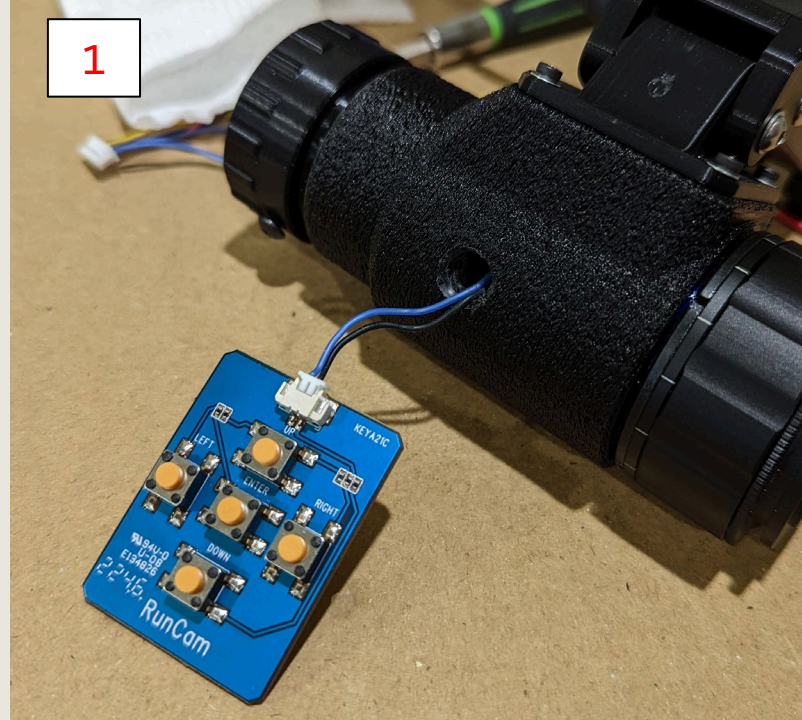




SETUP/CONFIG

Camera Settings

1. By knocking out the porthole on the Mono Housing, you can fish the NE3 controller wires out of the Toob assembly.
 - a) You may need to take the Toob out of the housing to get these wires.
 - b) Take care not to pinch or shear these wires off during reassembly.
2. Adjust your settings so they look like mine. These provided a decent image in low light, but I encourage you to experiment.
 - a) AGC provided the greatest change in image quality.
3. Once complete, tuck away the wires and reinstall the porthole plug.

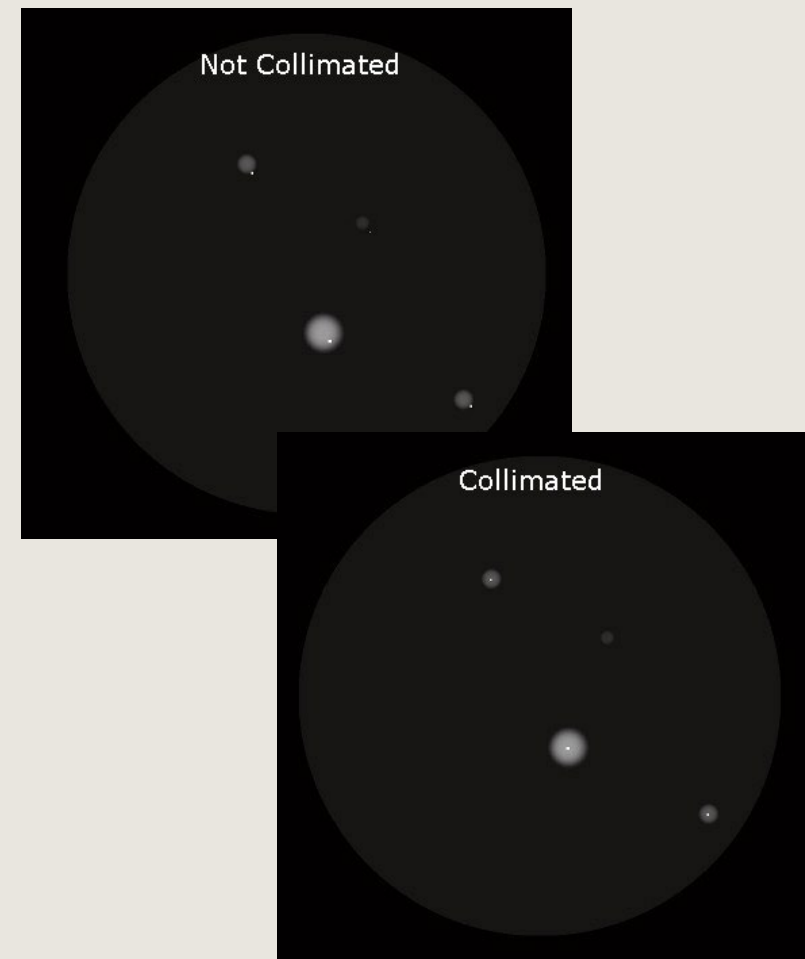
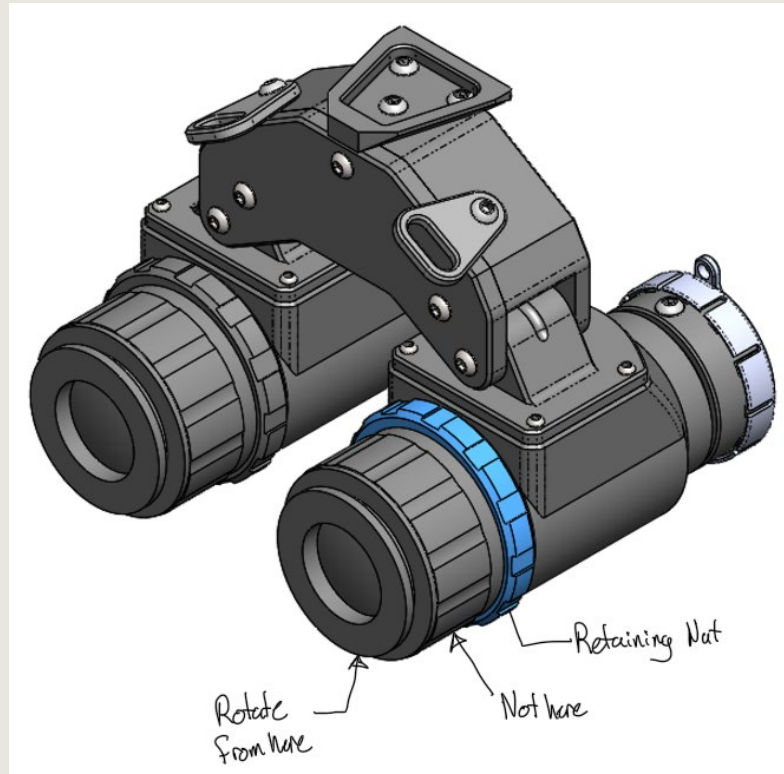


Collimation – The reason you're here

1. Focus the ocular and objective lens of each Mono Assy separately.
 - a) The ocular lens is focused by getting the text on the screen to appear sharp.
 - b) The objective lens is focused by looking at an object off in the distance (stars work great).
2. Flip one Mono Assy down and look off into the distance. A star or an LED across the street works great.
 1. Loosen the RETAINING NUT, OCULAR LENS on the Mono Assy and rotate the ocular lens assy (without adjusting focus). The lens will precess and the image will hit your eye in different locations.
 2. Continue rotating the lens assy until the image through the Toob roughly aligns with your naked eye.
 3. Tighten the RETAINING NUT, taking care not to rotate the lens assy further while doing so.
3. Flip both Mono Assys down and look at the same reference point.
 1. Loosen the other Mono's RETAINING NUT and rotate its lens assy (without adjusting focus) until the image through both Toobs aligns.
 2. Tighten the RETAINING NUT, taking care not to rotate the lens assy further while doing so.
4. Rinse and repeat as many times as you feel necessary to attain a collimated, headache-free image!



Use object in distance if collimating during daytime. These images are not-collimated.



Collimating using stars works best. When not collimated, two bright spots are seen near each other.

When collimated, these bright spots appear concentric.

Rotating the misaligned lens assy will bring the spots closer together.

ENVEEGEE – DIGITAL NIGHT VISION



