

# Wolverine ELP User Manual

## Introduction

These are modification instructions for the Wolverine telecine machine with the custom ELP camera that offers much better image quality than the original camera. The modification involves a new camera and some mounting hardware to allow the new camera to replace the original controller. The original controller is mounted just above the new camera and is used to control the transport and the LED light.



The camera used is the usb ELP model ELP-USBFHD04H-L28.

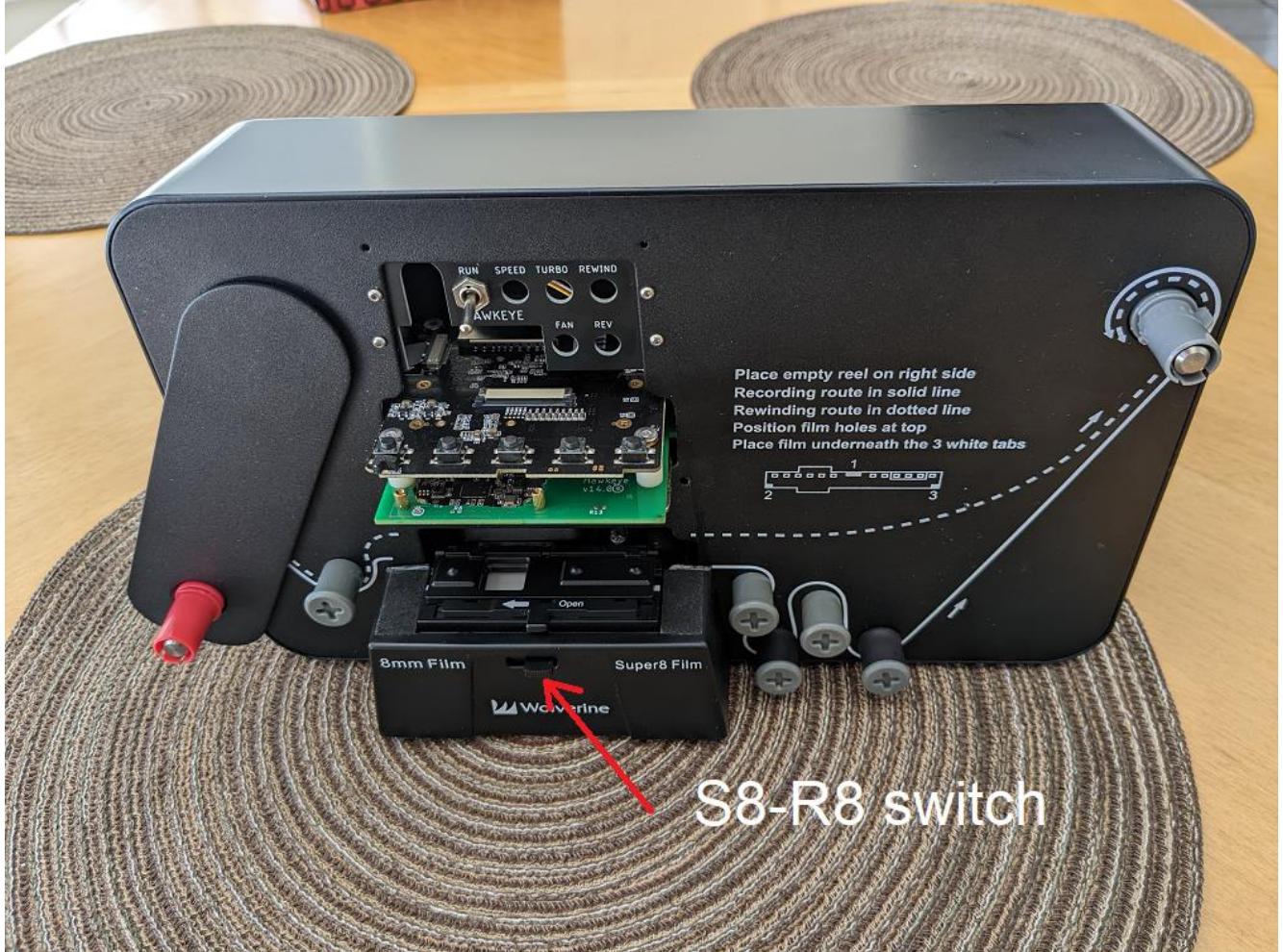
It uses an AR0330 sensor with 1080P resolution. Essentially, that is the same sensor that the Wolverine model uses but unlike Wolverine this one allows the user full access to the camera settings. The camera connects to a Windows PC that runs capture software included here:

<https://github.com/vintagefilmography/WolverineFix/>

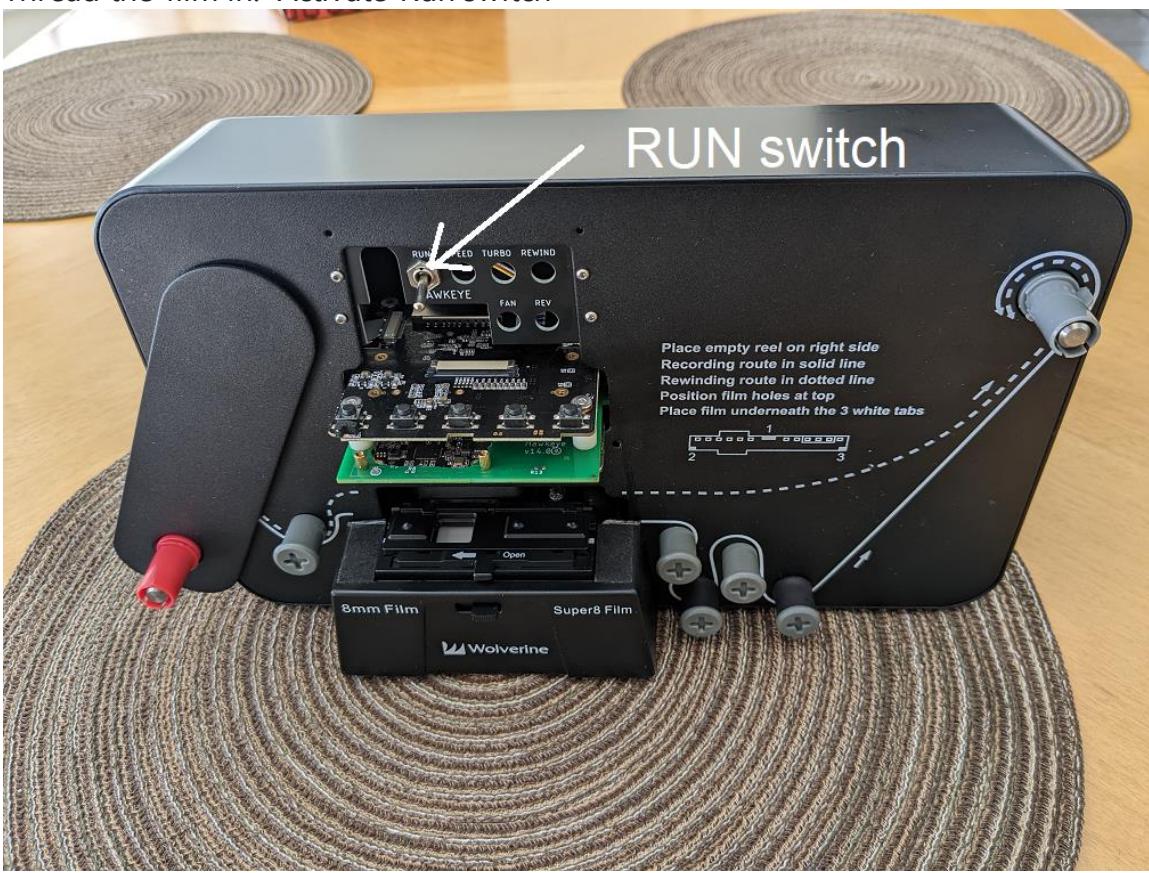
The capture software runs at 15 FPS and creates a video that includes the film transitions. The transitions can then be removed with postprocessing software that is also included in the above github site.

## Operating Instructions

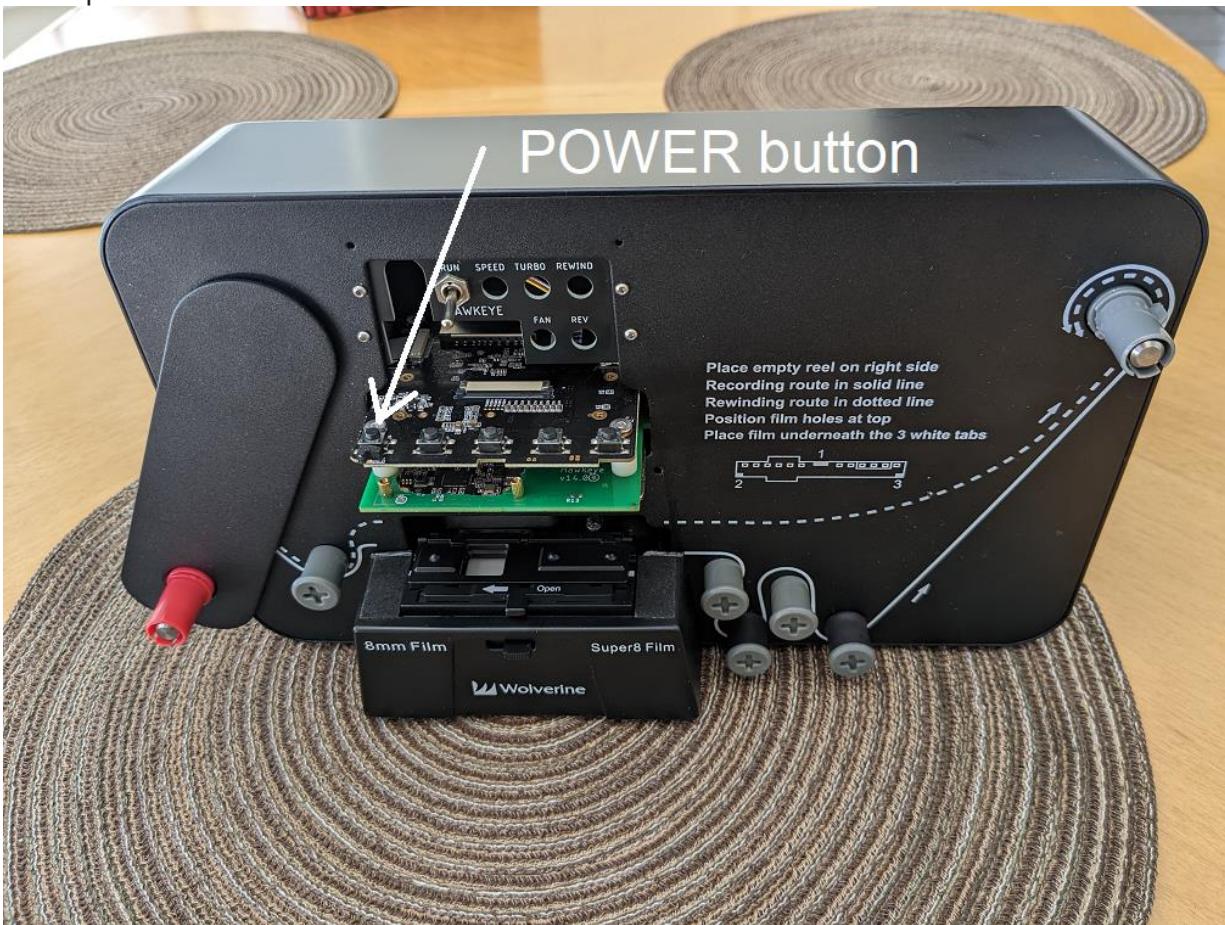
Plug the dc adapter into the unit DC input jack. Set the R8/S8 (regular 8 or super 8 film) switch as needed.



Thread the film in. Activate Run switch



Press power button on the Wolverine controller.



The unit should start advancing the film.

Once the film lead is done and the good film section start running through the gate, turn the RUN switch off.

The motor will stop but the light will be still on.

Plug the camera usb cable from the back of the unit into a PC usb connector.

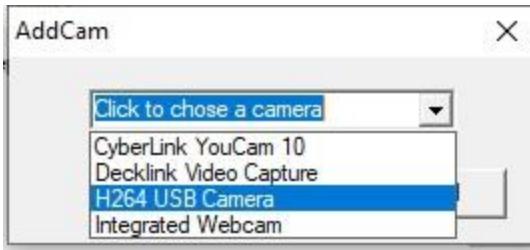
Download CapSample1.exe to your local drive.

Extract it.

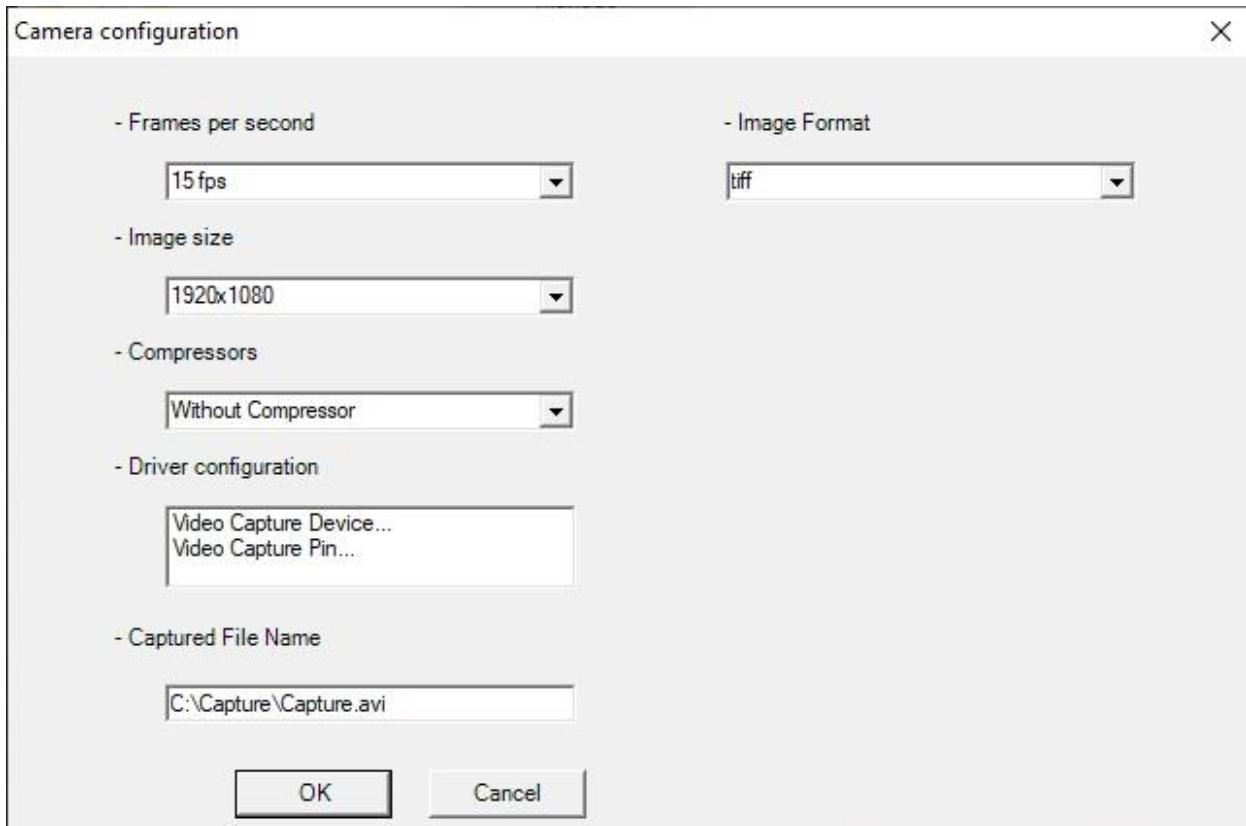
Go to:

..\CapSample1\CapSample\bin directory and run CapSample.exe

Select camera



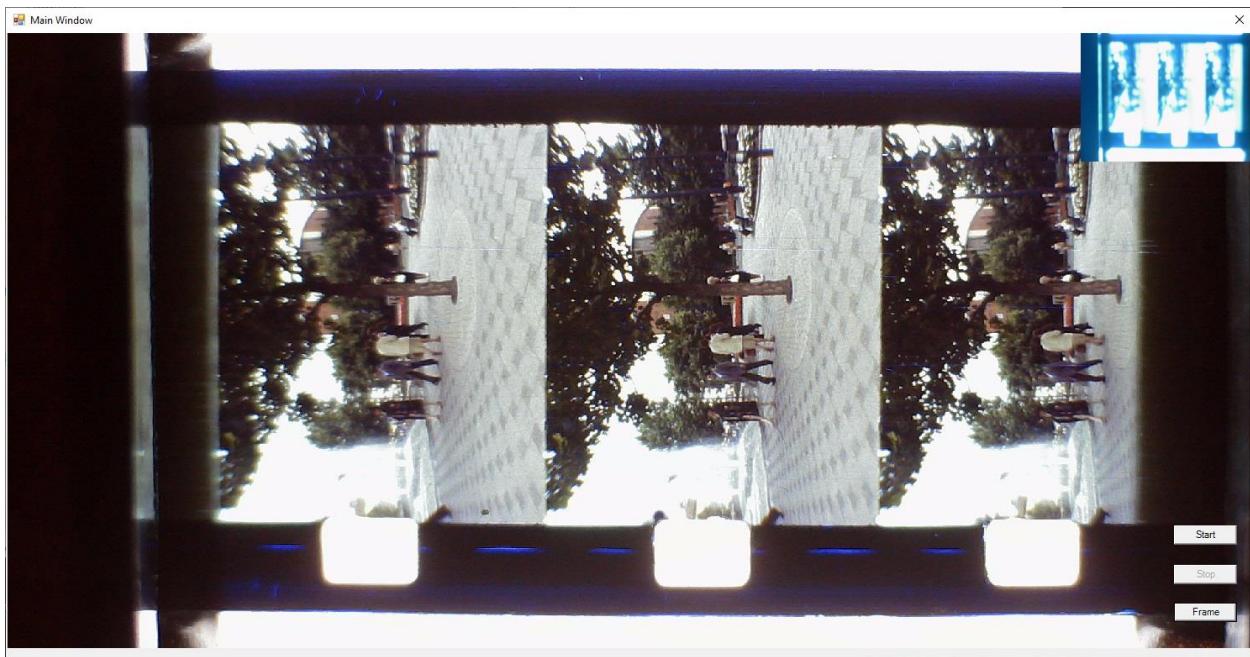
The config window should pop up



Select 15 FPS

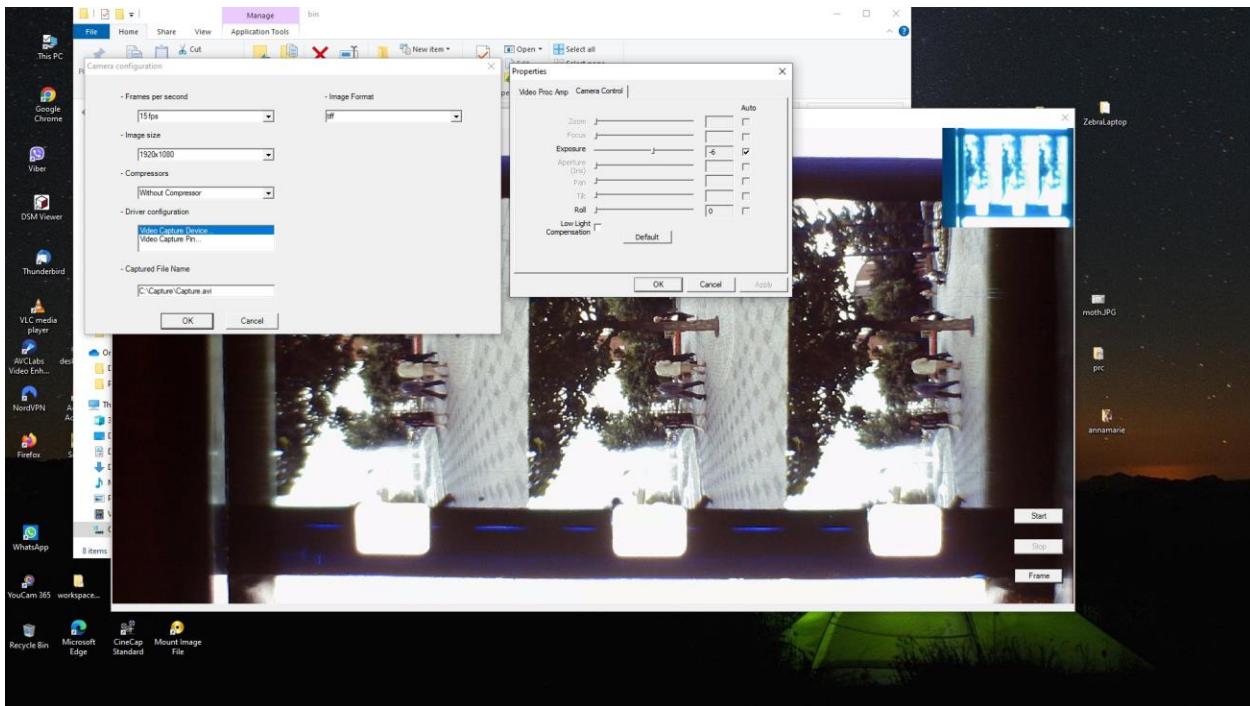
Click OK.

The preview window should display the camera preview.



Click on video capture device in the config window.

The camera info window should pop up.

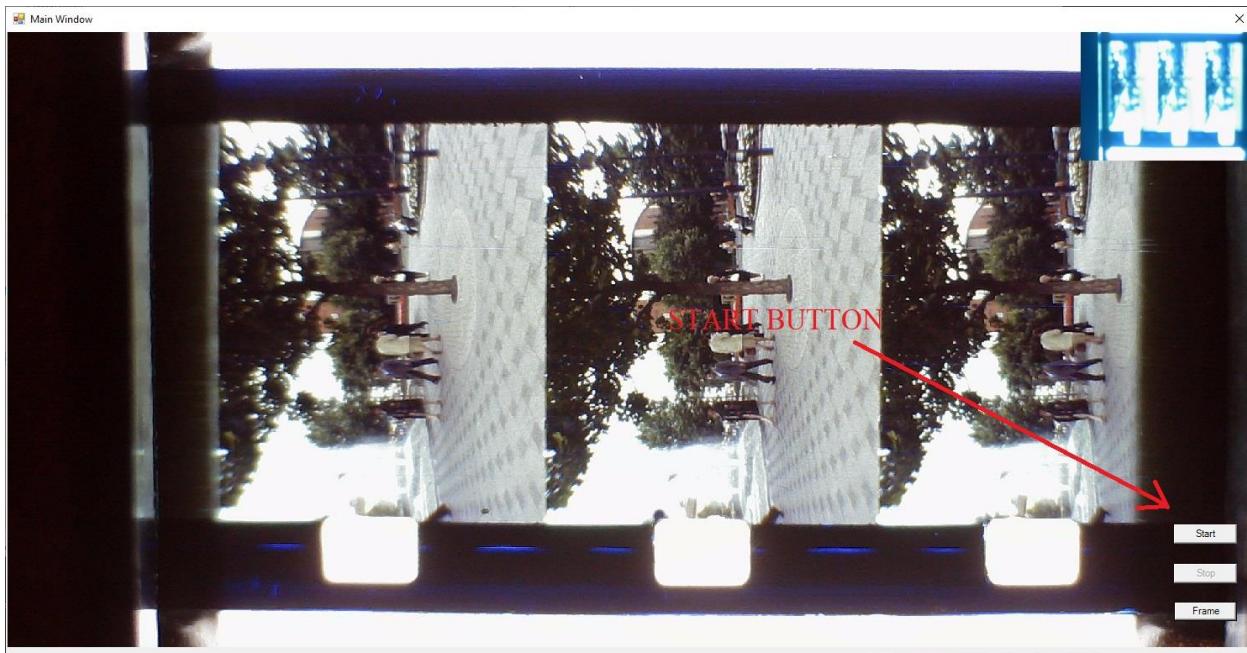


Click on Camera Control tab and set the exposure to manual and set the exposure control as needed. The auto exposure works ok sometimes but it can be fooled by the image white areas such as sprocket holes.

Now, you are basically ready to start the capture. The default output directory in the config window is set to C:/Capture. You can leave it like that or change it to some other destination.

It may be better to save the video to your local C: drive to ensure that there are no dropped frames. Once the capture is done it is easy just to copy the video from c: drive to an external drive and postprocess it right there.

Press the start button:



Turn the unit on by pressing the power button in the original controller. Then, turn the run switch on and press the power button again.

The unit should start running and the output will be sent to the C:\Capture directory or whatever directory you selected.

Note that you can adjust the exposure dynamically while the capture is running. It is also possible to adjust other camera parameters if required.

Once done, hit the Stop button in the preview window.

## Postprocessing

The video will contain many duplicate frames and transitions.

It is easy to remove the duplicates and the transition frames by using the Avisynth remove\_dups\_elp.avs script.

The first step in getting the script working is to get Avisynth from:

<https://sourceforge.net/projects/avisynth2/>

Download avisynth and install it.

There is tons of info on avisynth and its usage but you really will not need that for what we are doing here. Here is the avisynth main page just as an FYI.

[http://avisynth.nl/index.php/Main\\_Page](http://avisynth.nl/index.php/Main_Page)

Avisynth does not run as a standalone application. It is a tool that allows video editors and viewers to run the script.

The script is essentially a text file that contains avisynth commands for video processing. One video tool that is very handy for video processing is called VirtualDub.

In addition to basic video processing, VirtualDub can read avisynth script as well.

Download VirtualDub from here:

<https://sourceforge.net/projects/vdfiltermod/files/>

Run VirtualDub. Should get a window that looks like the following picture:



Download the scripts zip from the github site and extract it into your work directory.

Go to the scripts directory and open up remove\_dups.avs into any text editor like Notepad or any other text editor.

Change the source path in the script to point to your video. Example:  
film = "C:\Capture\capture1.avi"

Once done with the script, save it and then just drag it into the VirtualDub window.

After a minute or so the video first frame will be displayed.

At that point, set the video compression in the video pulldown and save the video.

In unlikely case that there are black frames in the resulting video, run the remove\_black\_frames.avs script included here Once this is completed the resulting video can be brought back into VirtualDub or DaVinci Resolve to do the final cut.

If the script reports issues with loading certain plugins the most likely reason is that your window installation is missing some DLLs. Run avsmeter.exe. in command window. It is in the scripts directory.

```
avsmeter remove_dups.avs
```

avsmeter provides the report and may give you additional info why the script is not loading properly.

Here is an example of the report: AVSMeter 2.9.9.1 (x86), 2012-2020, (c) Groucho2004 AviSynth 2.60, build:Feb 20 2015 [03:16:45] (2.6.0.5)

Number of frames: 2170

Length (hh:mm:ss.ms): 00:02:00.556

Frame width: 1920

Frame height: 1080

Framerate: 18.000 (18/1)

Colorspace: YV12

Active MT Mode: 0

Frame (current | last): 292 | 2169

FPS (cur | min | max | avg): 10.48 | 0.206 | 16.92 | 7.286

Process memory usage: 617 MiB

Thread count: 4

CPU usage (current | average): 24.7% | 24.5%

Time (elapsed | estimated): 00:00:40.076 | 00:04:57.825

In some cases avsmeter may not be able to help you and it may not give additional info on why a particular DLL is not loading.

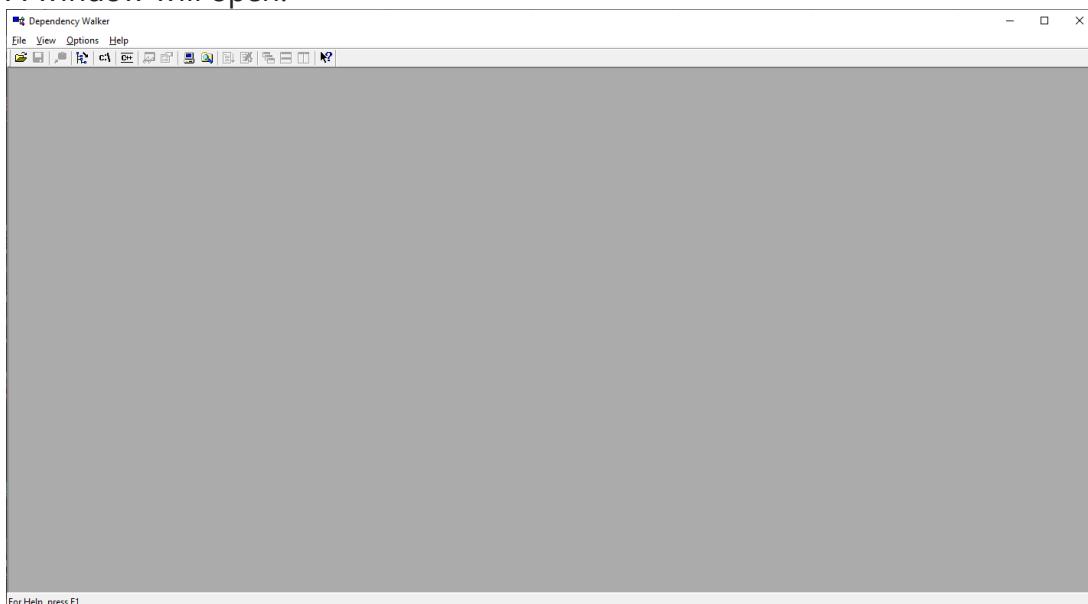
You can then try dependency walker

<https://www.dependencywalker.com/#:~:text=Dependency%20Walker%20is%20a%20free,diagram%20of%20all%20dependent%20modules.>

Download the zip into a local folder and unzip it there.

Run dependds.exe by double clicking on it.

A window will open.



Do File->Open and open the DLL that has issues loading. You will get a bunch of errors.

Most of these are no problem because the tool is old and does not recognize the new calls. Go down to the bottom of the error list and you will notice different types of errors. For example:

HVSFILETRUST.DLL

IESHIMS.DLL

PDMUTILITIES.DLL

You can search for DLL description and where used but most likely these are used by Microsoft redistributable package that is not loaded on your system.

<https://learn.microsoft.com/en-us/cpp/windows/latest-supported-vc-redist?view=msvc-170>

Install the 2015-2022 version and see if this fixes your issue. Most likely it will.

Some more details are available here:

<https://forum.doom9.org/showthread.php?t=172793>

Once the video is saved it should not have any transitions in it but it will still need to be rotated to the right and cropped.

That can be easily done in VirtualDub by clicking on the Video Tab and opening up Filters. The Filters window should open up and there you can add the rotate and crop filters.

Once done with rotation and crop, save the final video.

You can also select the frame rate and compression from Video Pulldown.

Lagarith is a pretty good compressor. It reduces the video size by 4 to 5x and it is lossless.

## DIY Mod Instructions

Before the new camera installation the original controller and camera have to be removed from the unit. Carefully read the following instructions.

Word of advice:

Follow the instructions carefully and do not apply force to any parts during disassembly. Pay attention to fragile small connectors and ribbon cables. Use the right size screwdriver to avoid stripping the screw heads. Make sure the power is disconnected and the SD card is out. Avoid touching the lubricated parts.

### Disconnect power, Remove SD card and film reels.



Set the unit on a table with enough work space around it.

Make sure SD card is out and power disconnected.



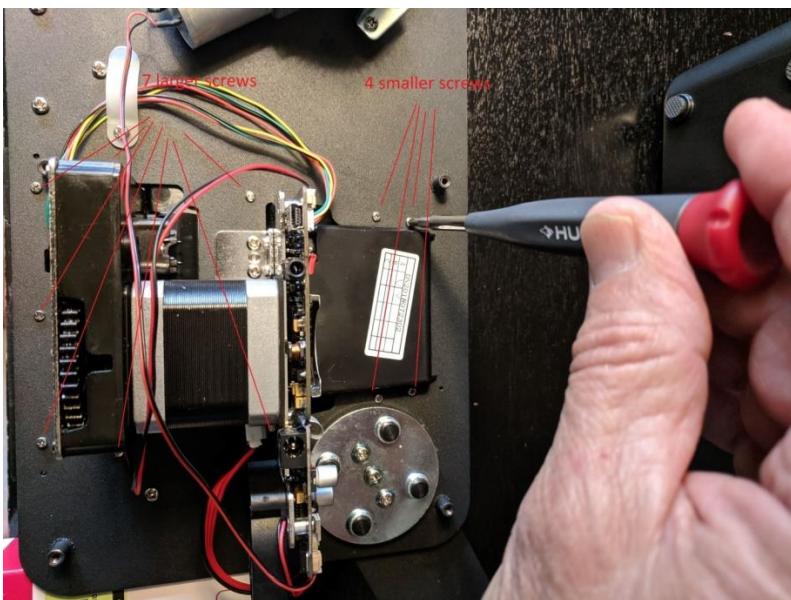
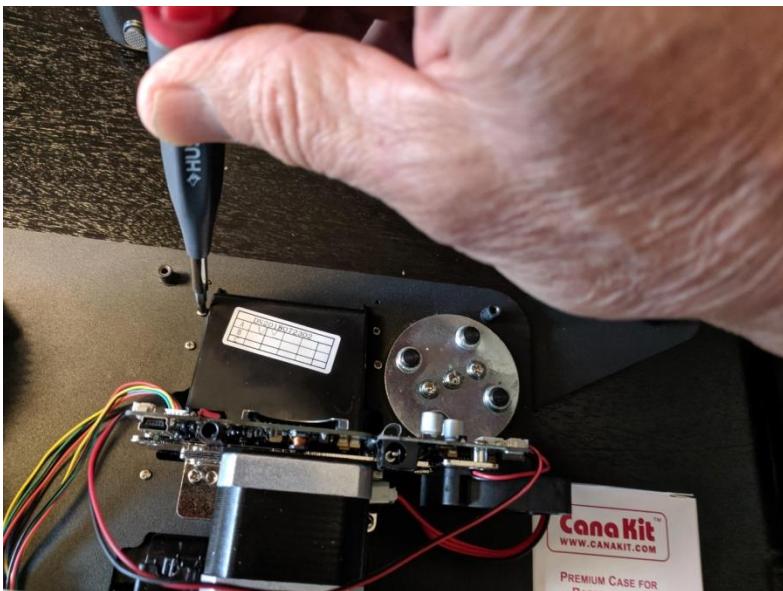
Lay the unit face down on the table. Add support to the sides by using empty boxes of right size or similar support. Remove 6 cover screws (the number of screws varies depending on the model). Set the screws on the side in a small container and mark them up. It is important not to mix up the screws because other unit components use the same thread screws but different sizes.



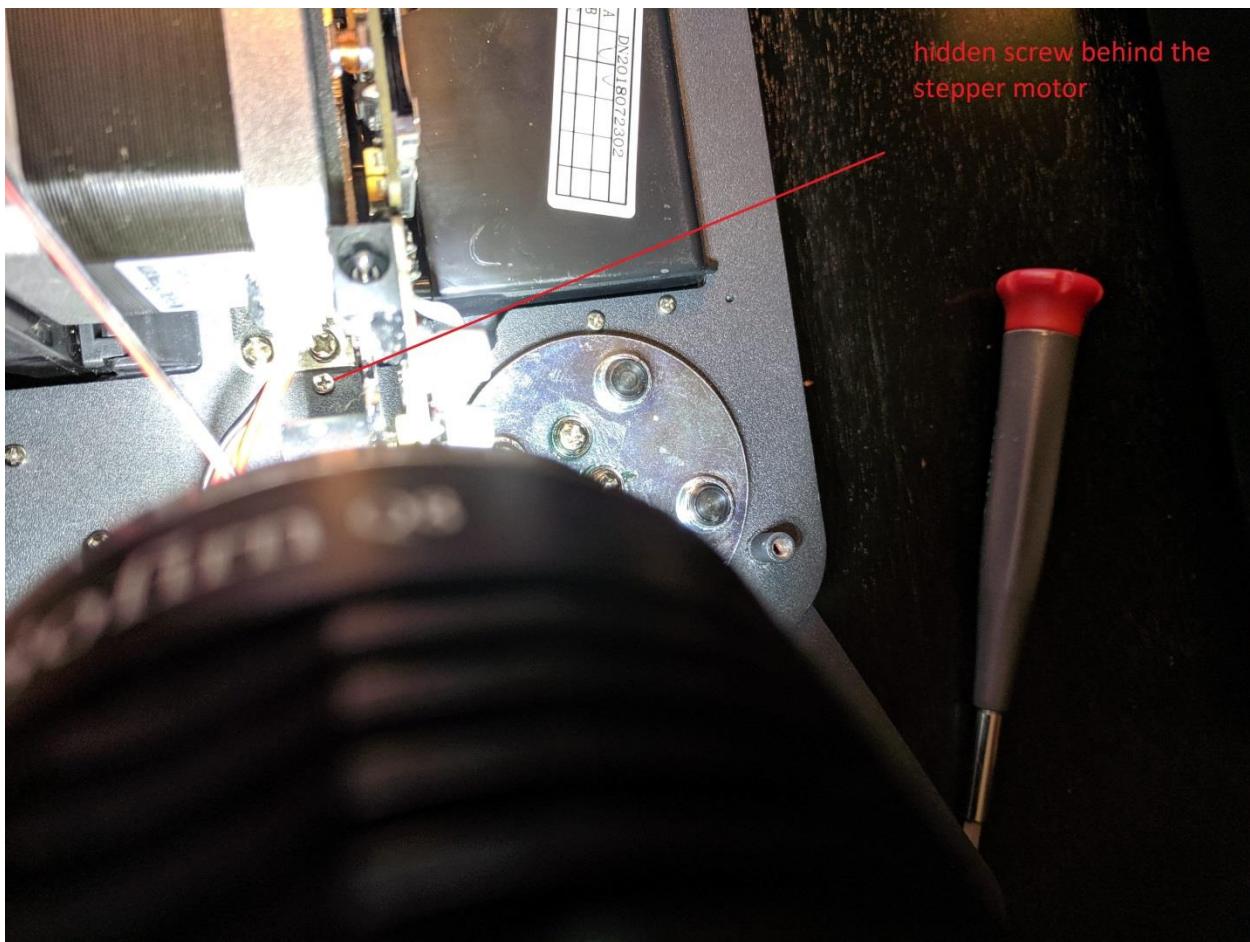
Remove the cover. Observe the greasy areas and avoid touching them.



Remove the front cover screws. There are 11 of them, 4 for the top part. These are smaller screws and 7 for the bottom part. Make sure not to mix them.



One of the larger screws is hidden beside the stepper. Don't forget that one.



Store the screws a container, or a jar or whatever. It is easy to lose them.



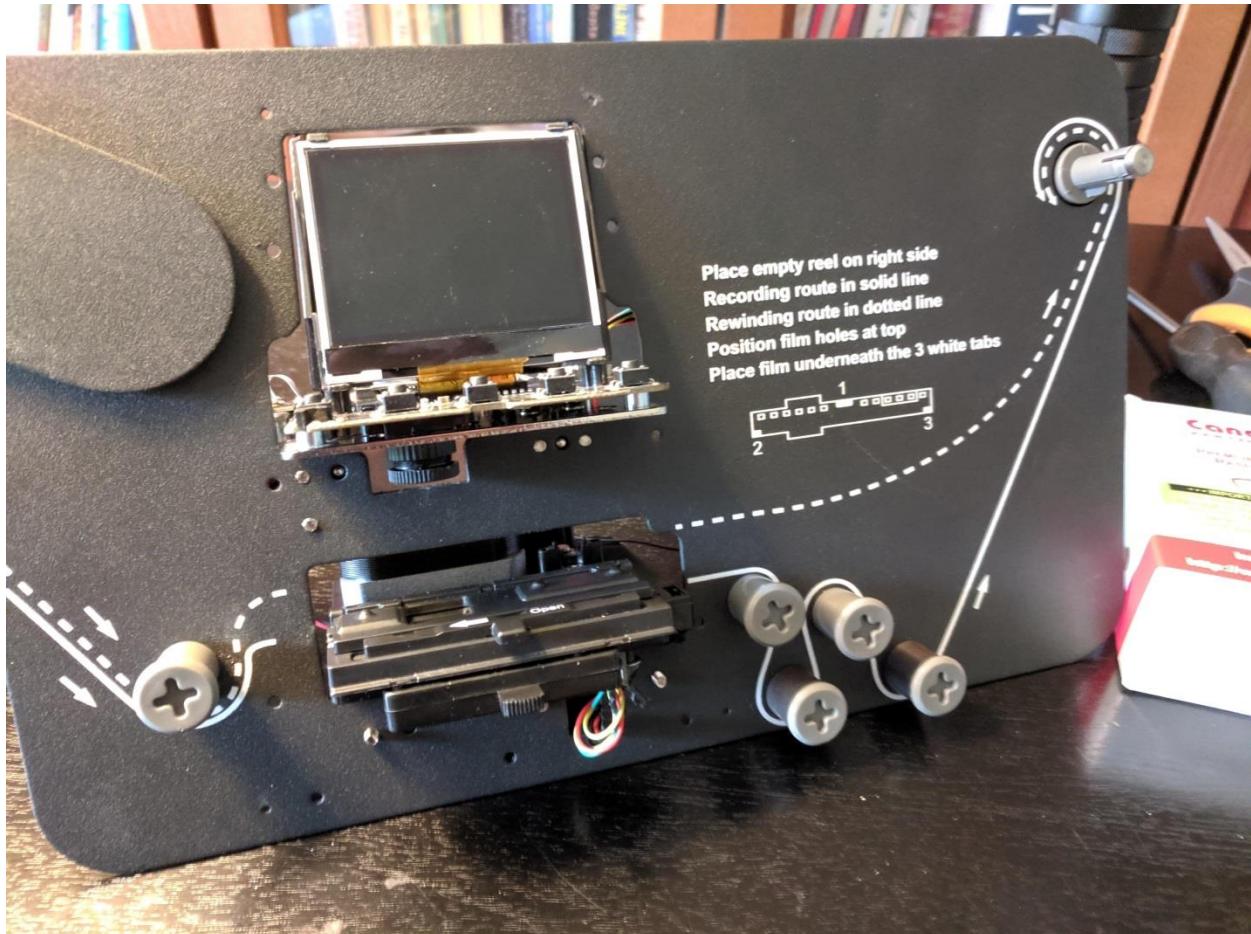
Set the unit upright and leave it supported by the stepper motor bottom. Make sure not to touch the stepper gear. It has grease on it.

Grab the plastic front cover as shown and slightly push upwards and wiggle it out. DO NOT USE FORCE. It may take some time but it will come out. If it does not, make sure that all 11 screws have been removed.

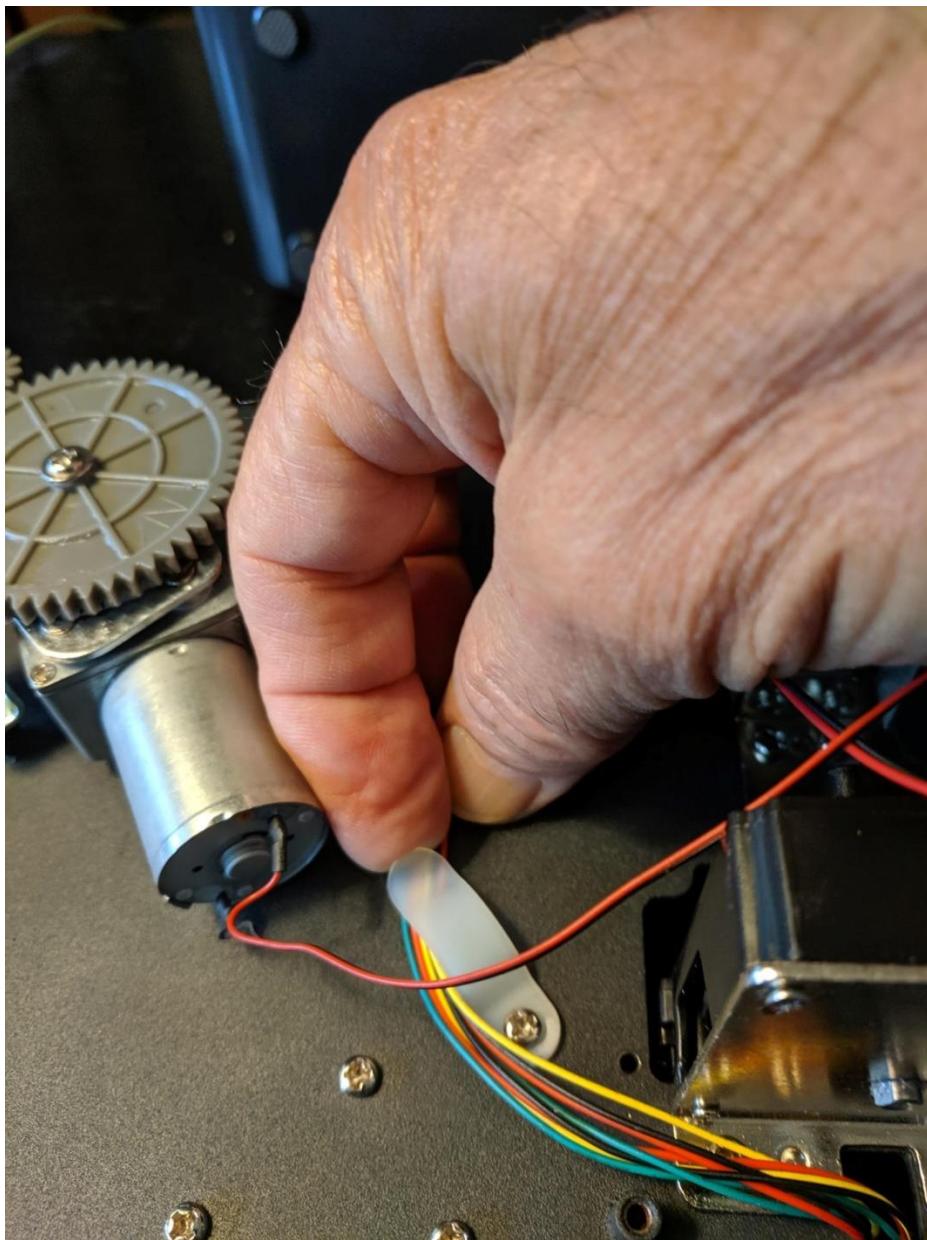
In some units it may be necessary to pry the button cover and to remove it. It can be done by catching on its edge with a nail and prying up.

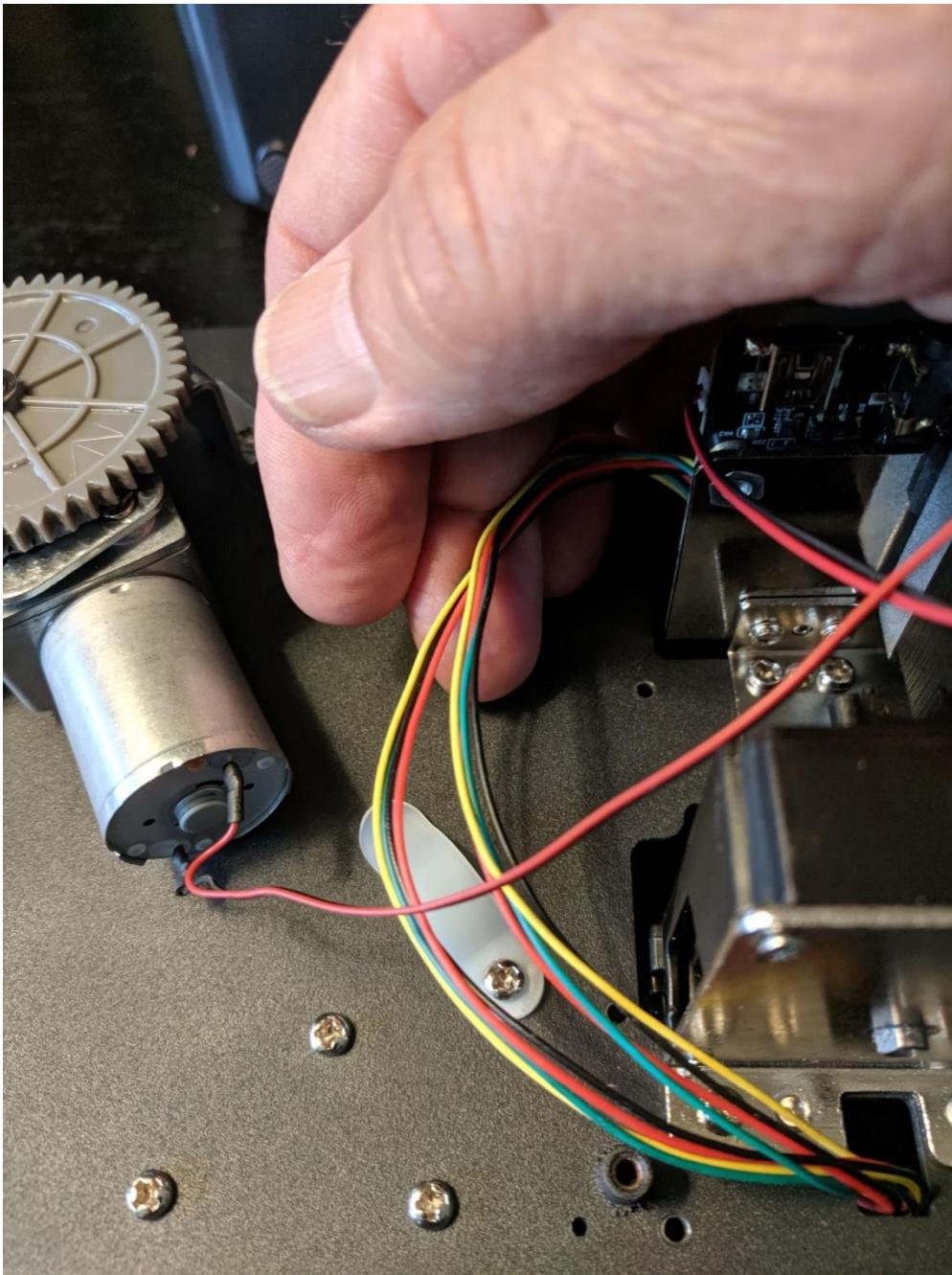


The picture shows the front of the unit with the cover removed.

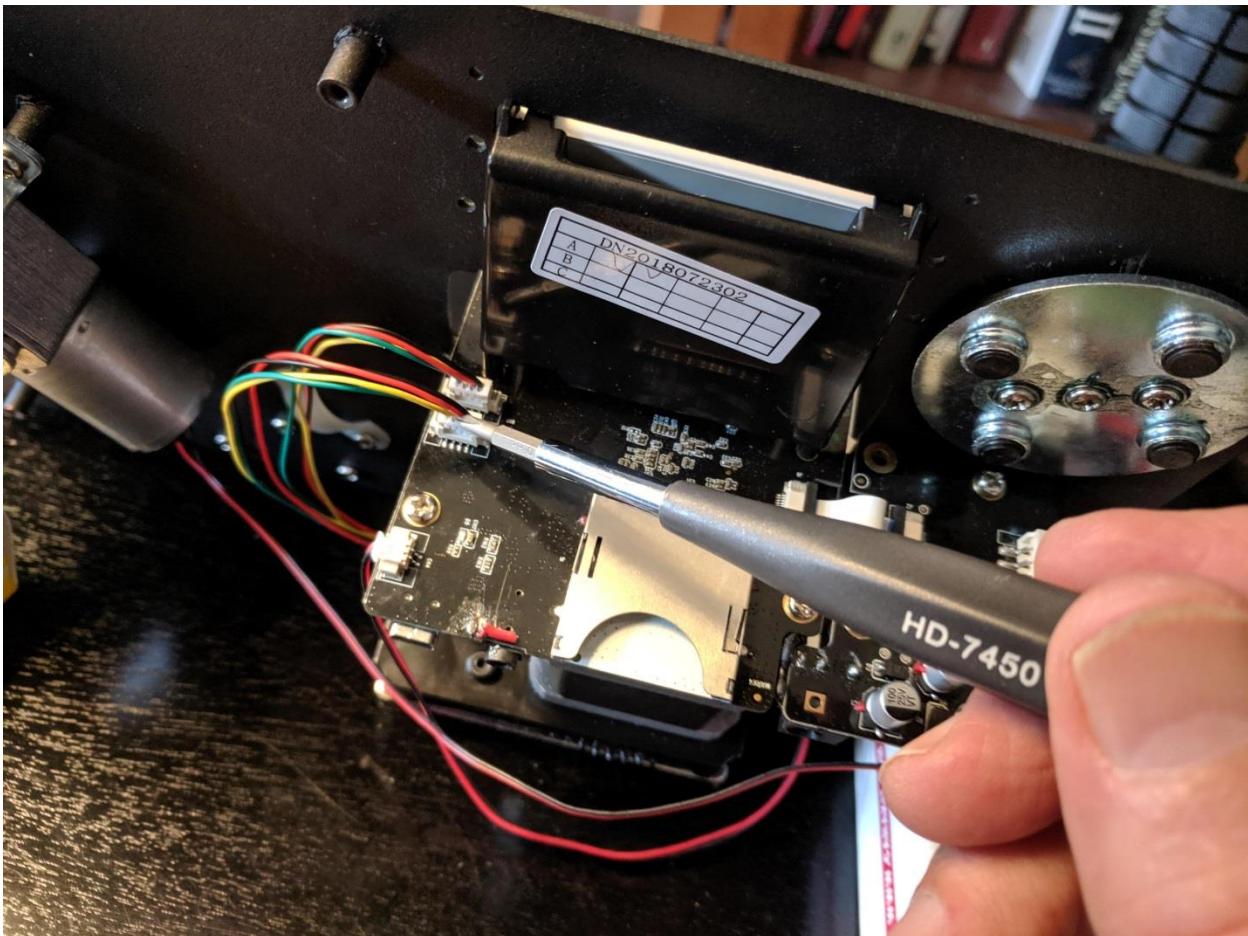


Slide the sync and S8/R8 switch cables from underneath the retainer clip.



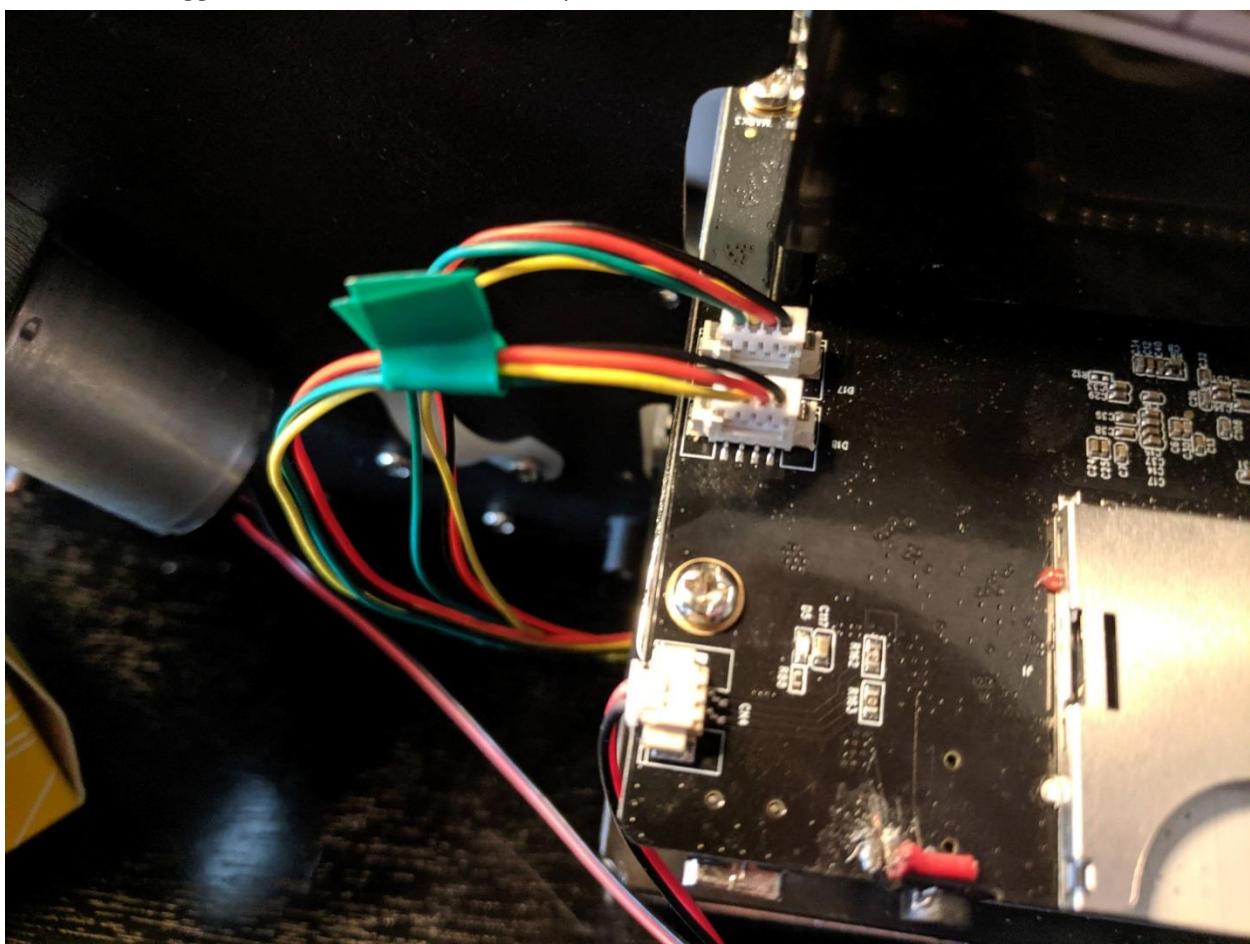


Disconnect sync and super 8 switch cables from the main board.



The connectors are interchangeable so make sure to mark one of the cables. The one towards the front of the unit (that does not have the green tape on it) is the sync cable that you will need later. The cable tagged with the green tape (I added the green tape) is from the R8/S8 switch and is not required for the

new board. Wiggle the connectors out. Do not pull hard.





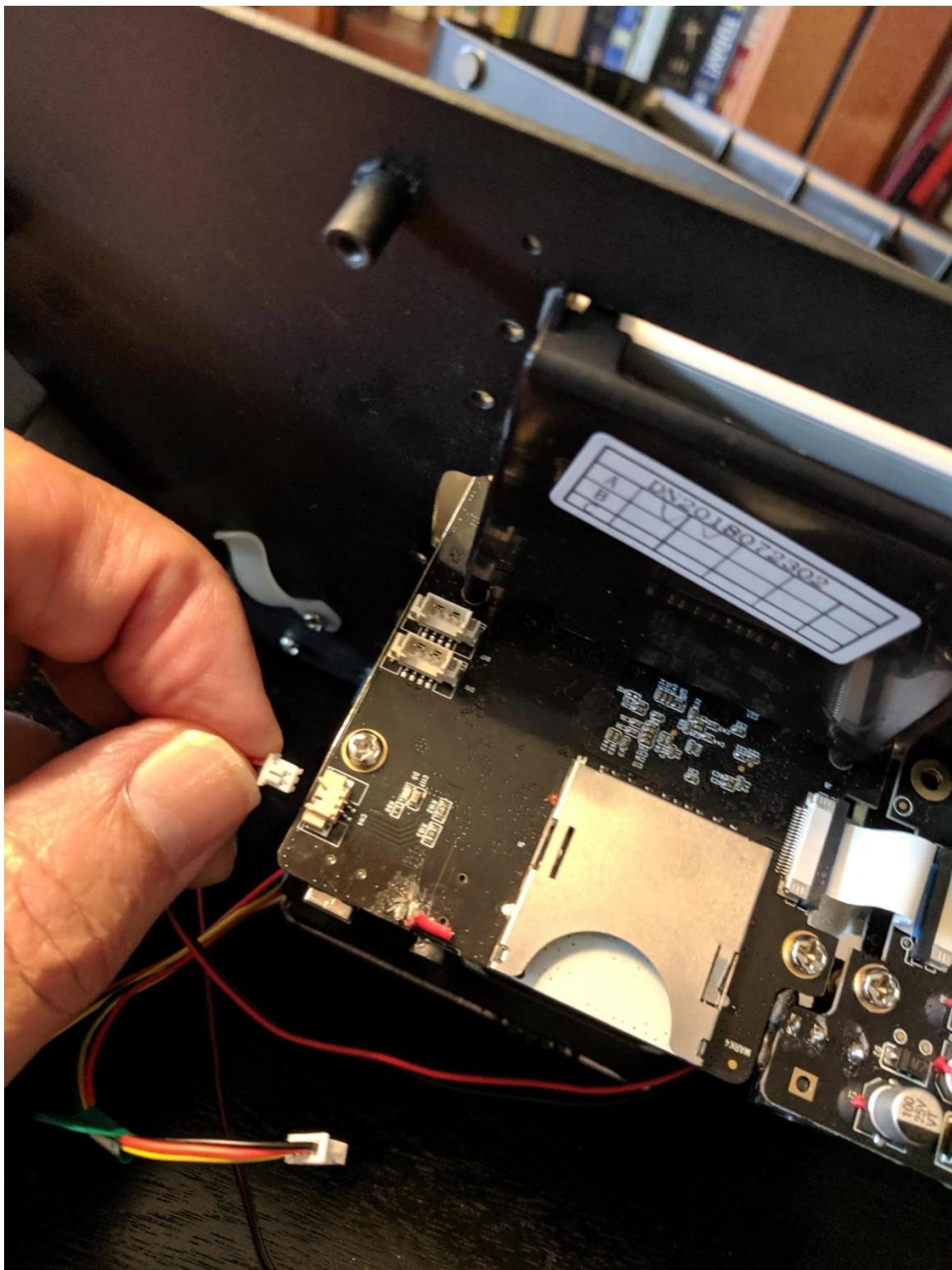




Remove the fan connector from the power supply. Tag this cable because you will be connecting it to the adapter cable provided and then to the new controller. Leave the takeup motor connector connected for now..

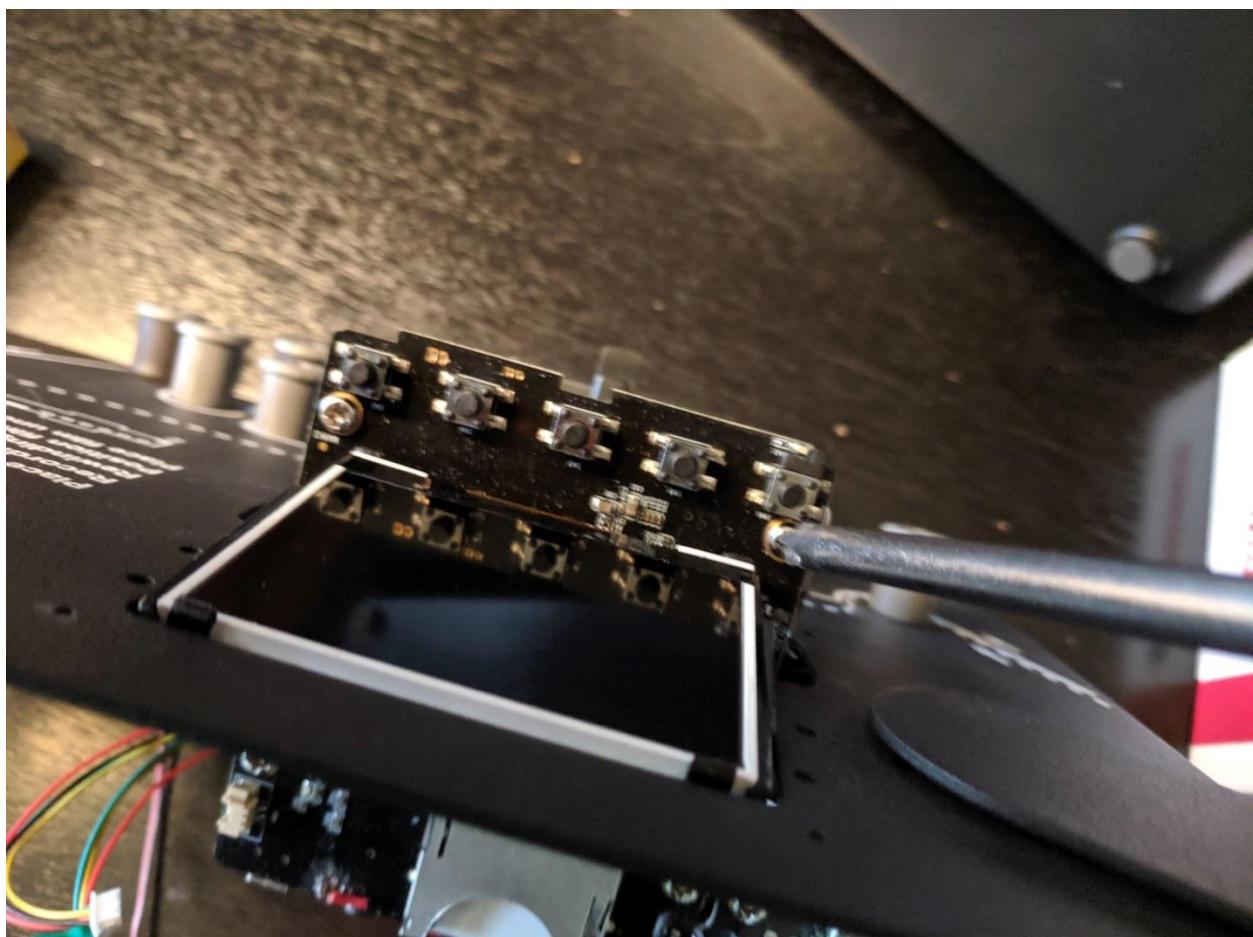


Disconnect the LED connector as shown. You will be connecting this connector to the new board. Put a tag on it.



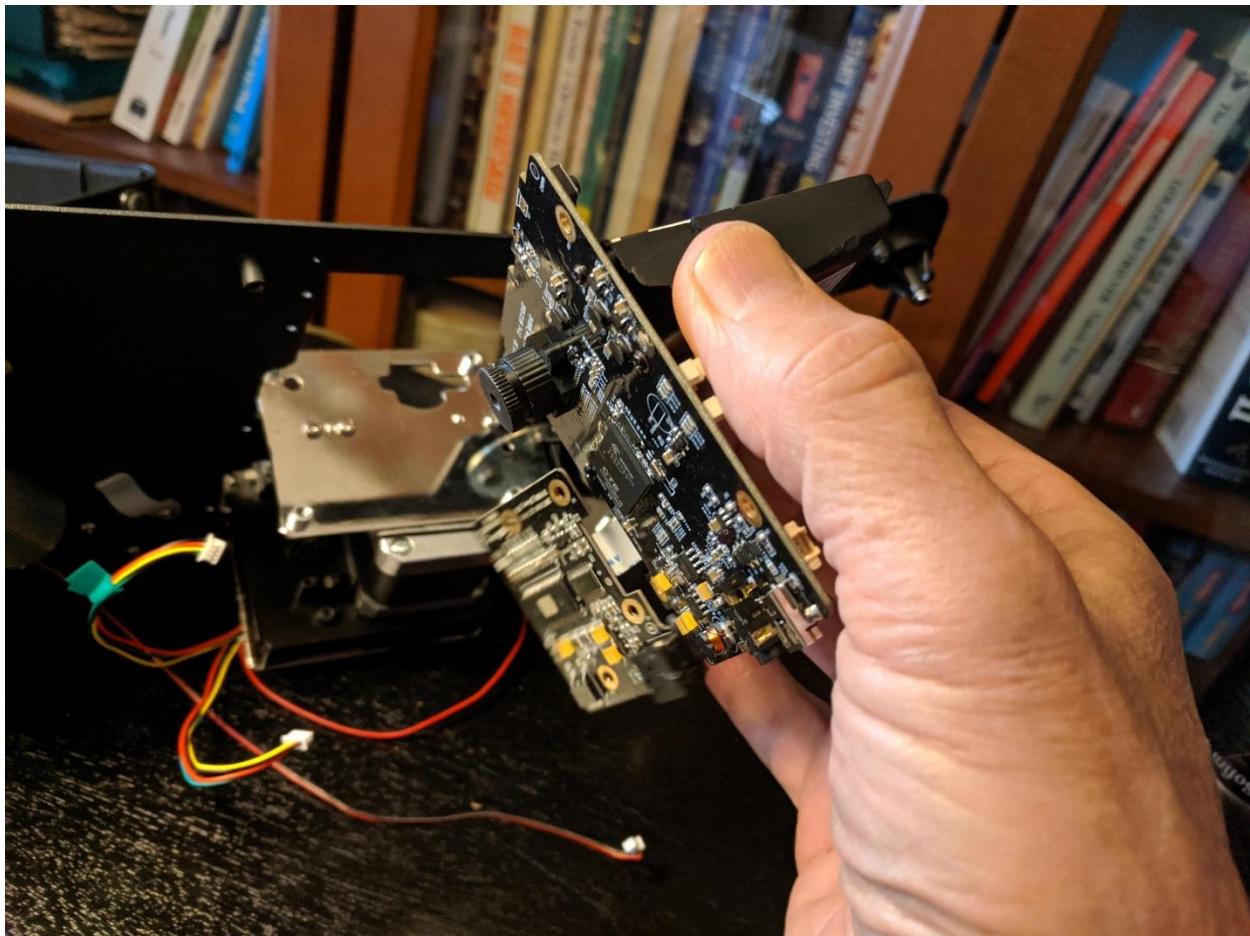
Remove the controller board and power supply screws (qty 7 total) . Note: One screw on the power supply is hard to reach. Slide the feed reel arm about half way up to facilitate the screw access.

Two of the board screws are at the front.

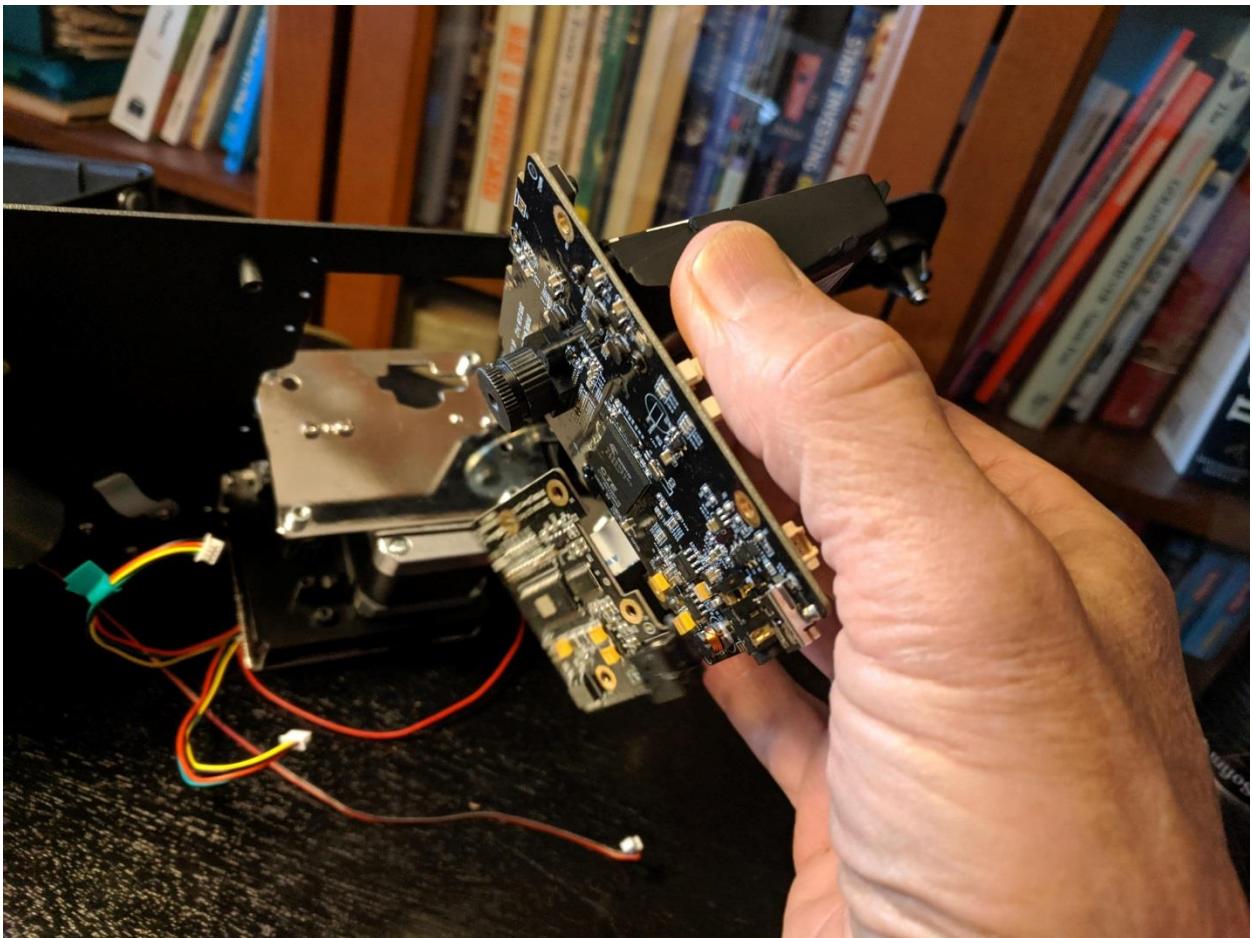


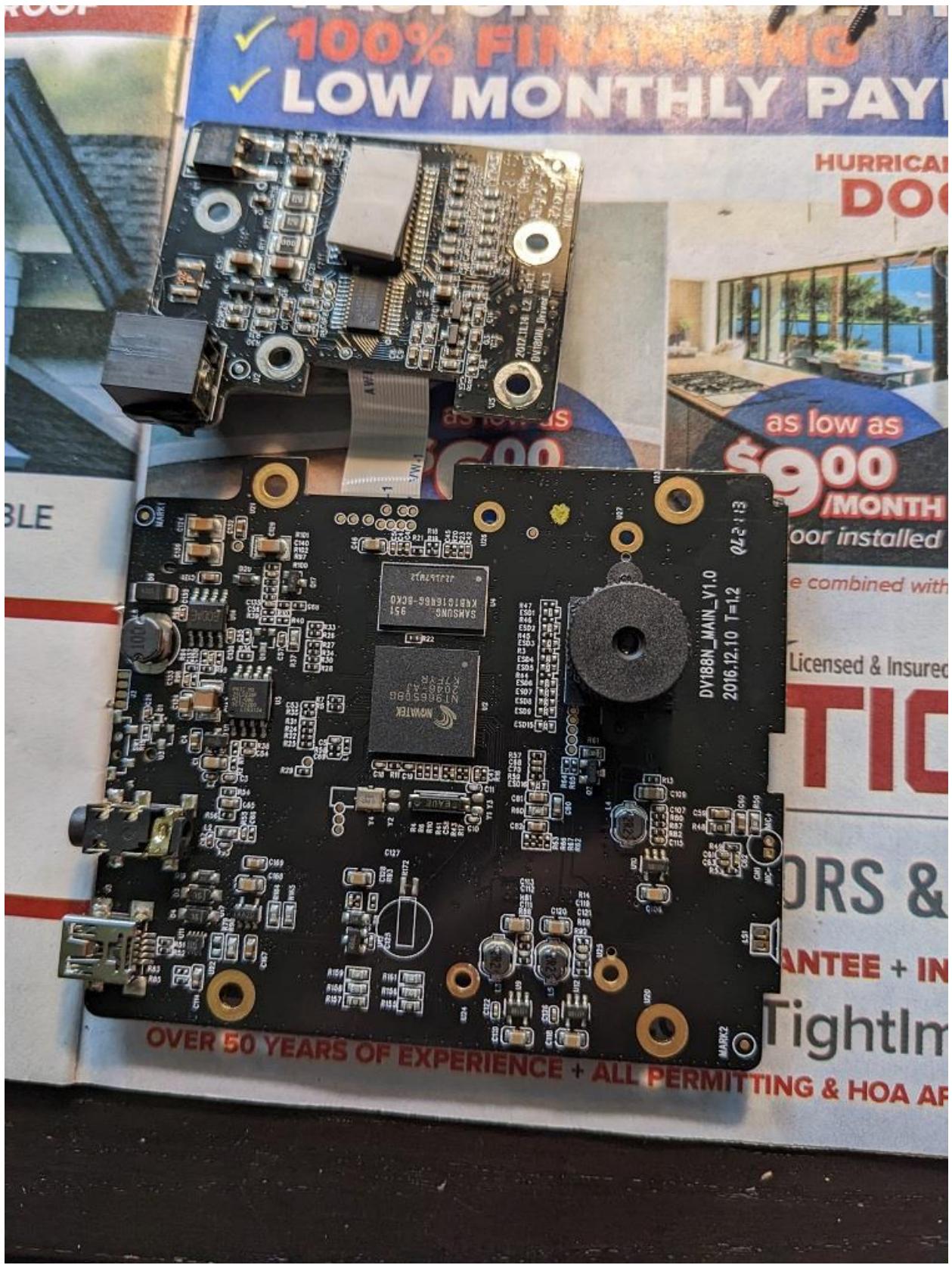


Wiggle the controller board up. Make sure there are no cables in the way. Be careful not to damage the power board ribbon cable.





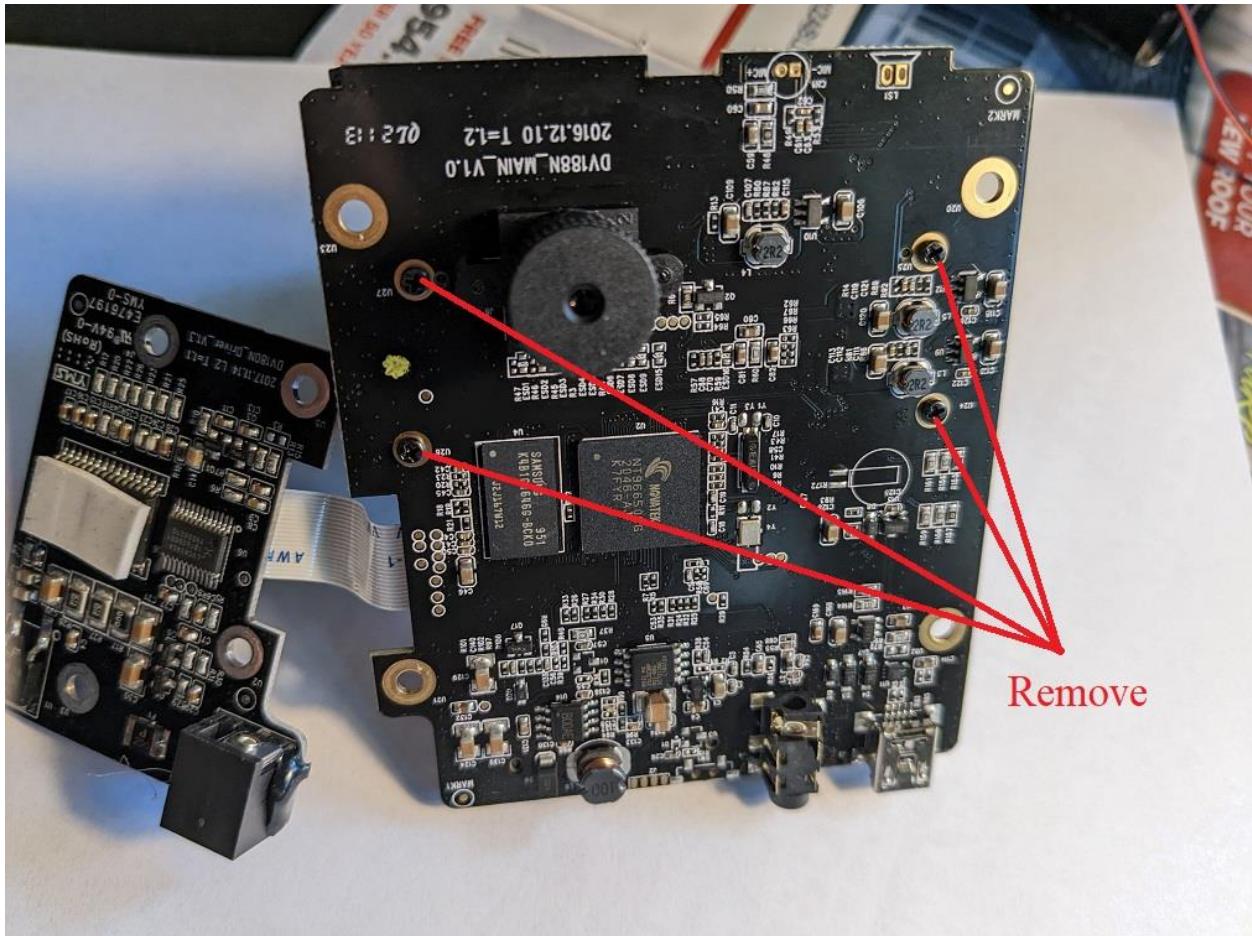




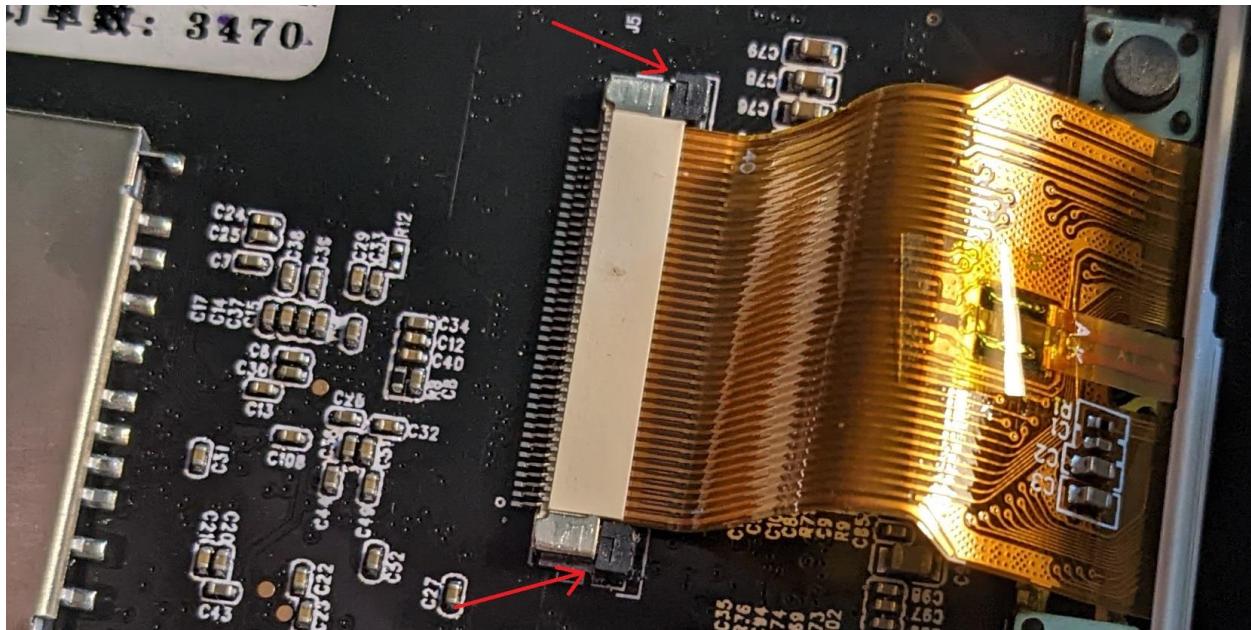
Now you are ready to mount the new camera.

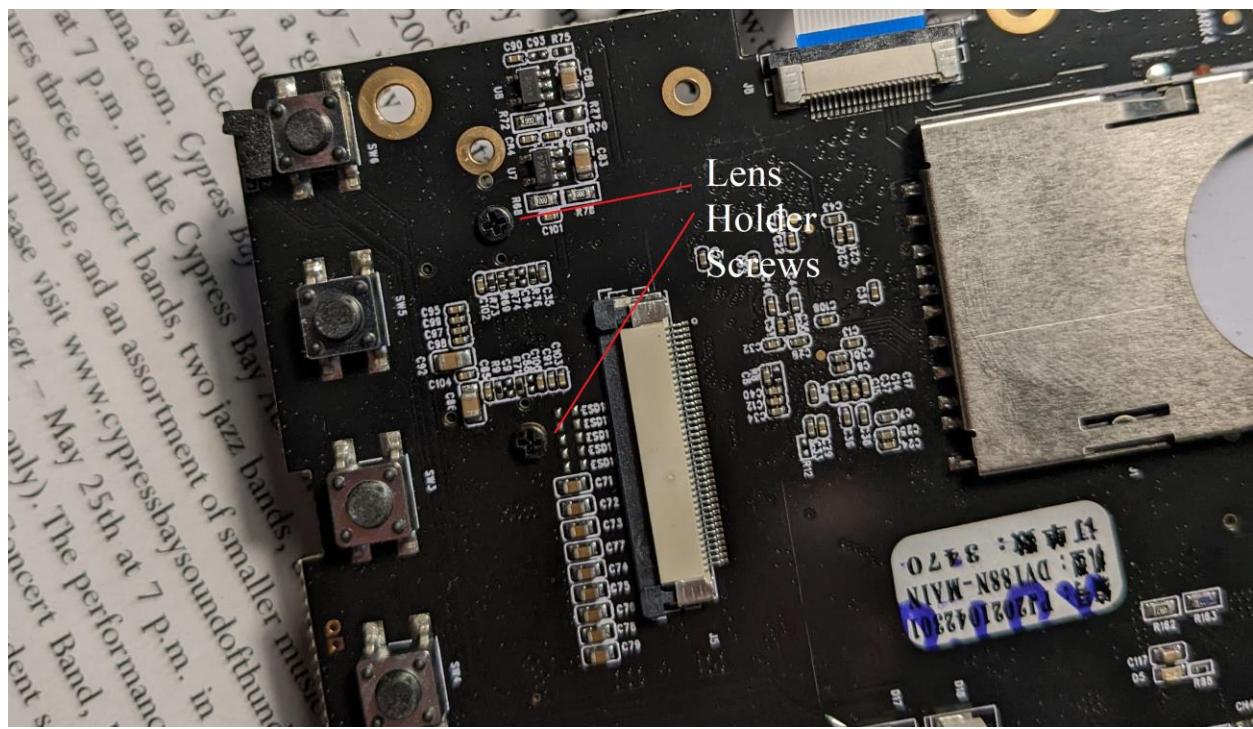
The original controller fits above the new camera but the display and camera holder have to be removed first in order for the board to fit.

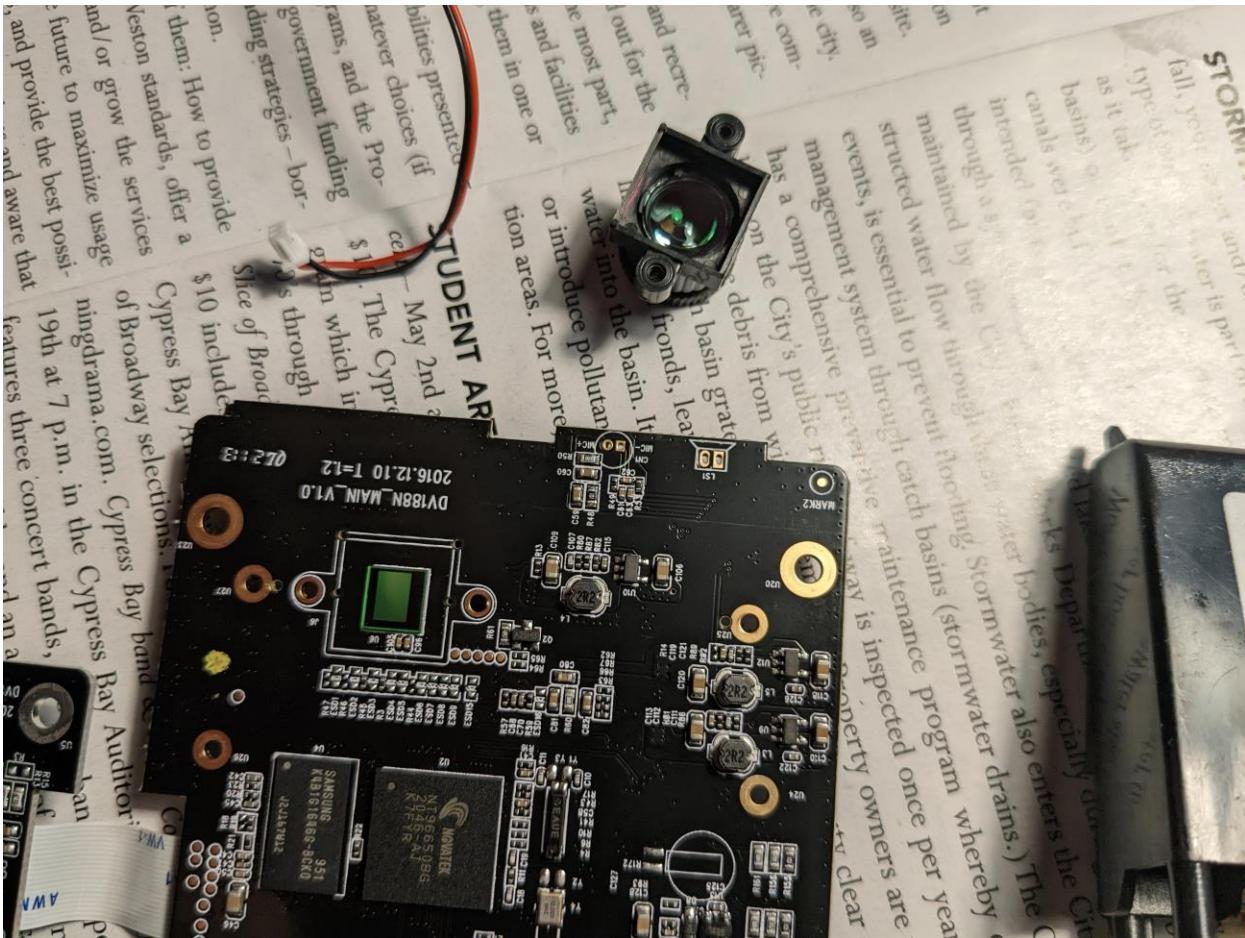
Remove display screws.



Unlock the display flex by gently pushing onto connector lock tabs as shown:







Put some tape over the camera sensor to protect it in case you wanted to convert the unit back to its original form.

Remove the lens.

Install the mounting screws back onto the lens holder and save the holder for possible future use.

Buy a new holder from:

<https://www.uctronics.com/m12x-p05-small-camera-lens-metal-mount-for-raspberry-pi-with-gasket-p-mp10-20.html>

If in a hurry you can get the holder kit from Amazon:

<https://www.amazon.com/dp/B07QMRDZYS>

The part that you need is M12, 20mm mount holes and 10mm high.

The camera can be purchased from:

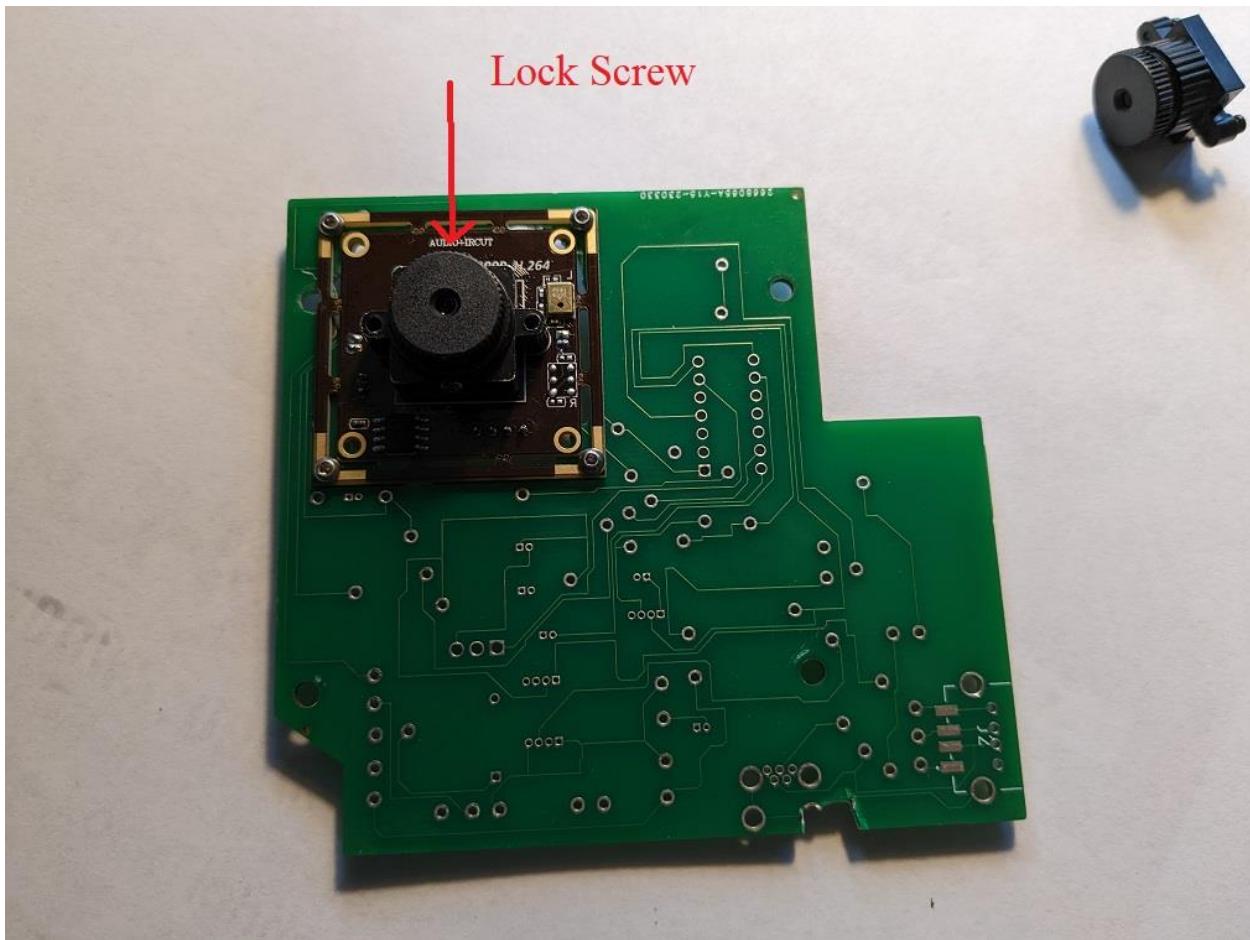
<https://www.aliexpress.us/item/2251832236711118.html?gatewayAdapt=glo2usa4itemAdapt>

or from Amazon:

<https://www.amazon.com/dp/B01E8OX212>

Amazon is more expensive but much faster delivery.

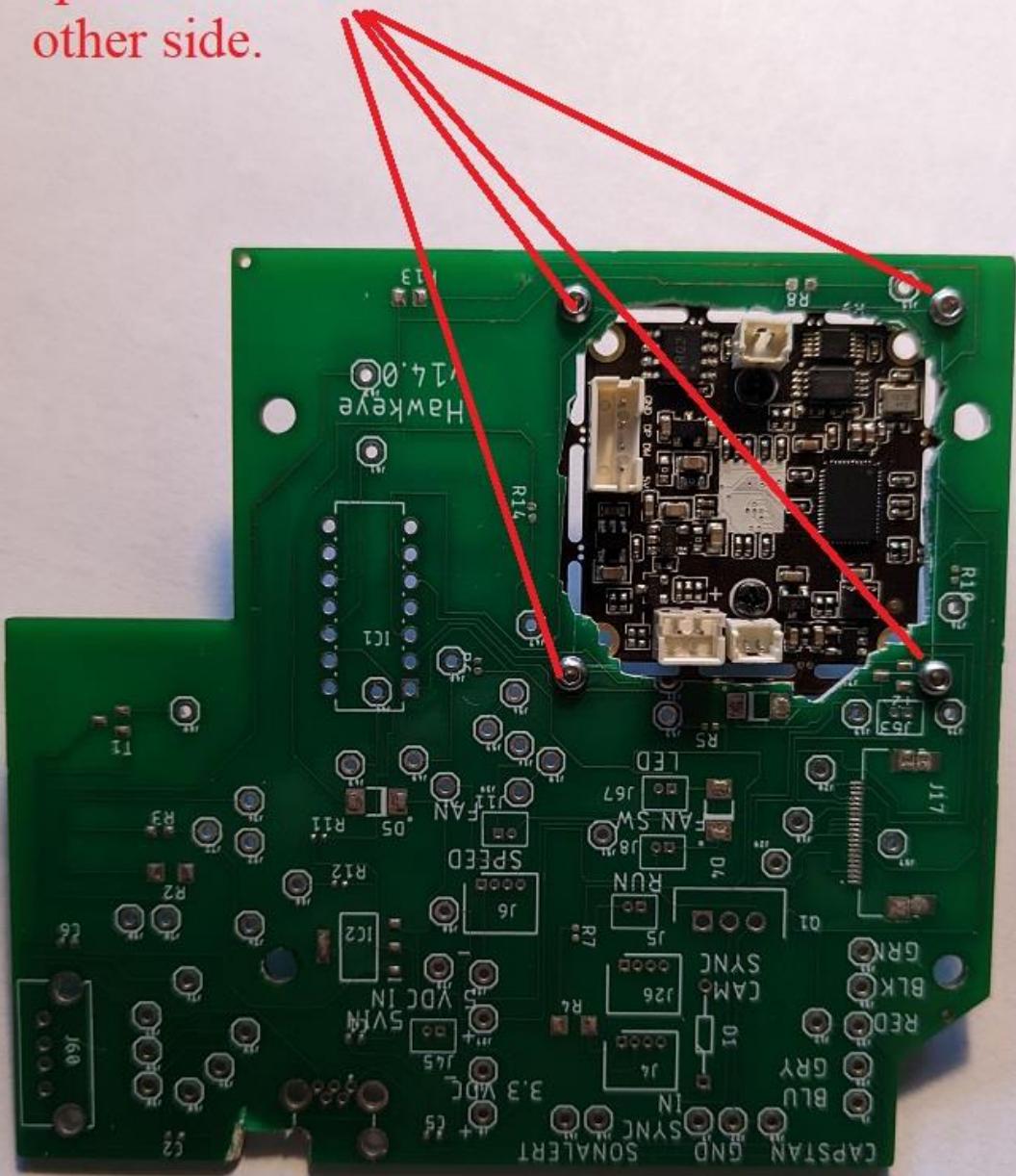
Remove the lens and lens holder from the new ELP camera and installed the new 10mm holder. Note that the holder can be installed ways. The proper way is to ensure that the lens lock screw is facing the side that is opposite the USB cable connector (front of the adapter board)



Remove the 6mm lens from the Wolverine holder and install it into the new camera.

Mount the camera to the adapter board using small 2mm screws and spacers instead of nuts (easier to handle).

2mm screws and  
spacers on the  
other side.



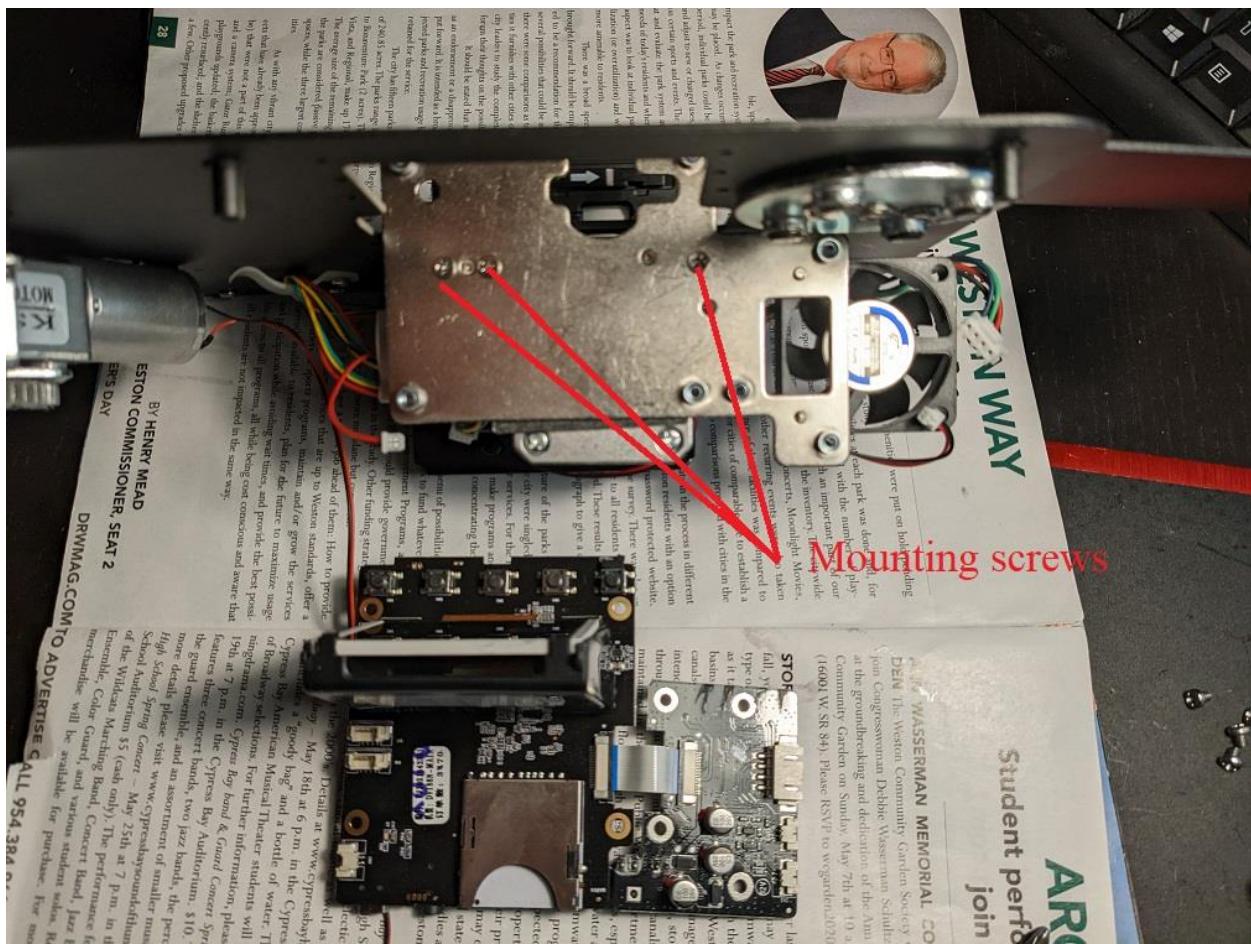
The adapter board in the picture is a prototype but the proper board can be purchased for a very reasonable price from:

[sjelavic123@gmail.com](mailto:sjelavic123@gmail.com)

Alternatively the board can be printed out on a 3D printer. The design will be available soon in github.

The next step is to remove the Wolverine mounting bracket and open up the lens cutout to make it wide enough for the new lens mount.

Remove the bracket mounting screws:



Remove the bracket. Mount it in a vise and open up the lens opening wide enough for the new lens holder proper clearance.



Once done, mount the bracket back onto the unit.

Place the camera and adapter board inside the unit on top of the bracket and temporarily secure in place with scotch tape. Then place the original controller on top of it. You may need to prop the unit so that it sits straight to prevent the controller from sliding out.

Once loosely in place, start inserting the 10mm spacers between the boards. The spacer kit can be purchased from Amazon.

<https://www.amazon.com/gp/product/B014KISXAG/>

Start with one corner first. Insert the spacer with one hand and use the other hand to insert the 3mm screw from the top. The screw has to go all the way through the controller board, the spacer and through the camera adapter board and has to engage the mounting bracket post below. Turn in the screw a few turns but do not tighten it at this point.

The screws can be purchased from Amazon:

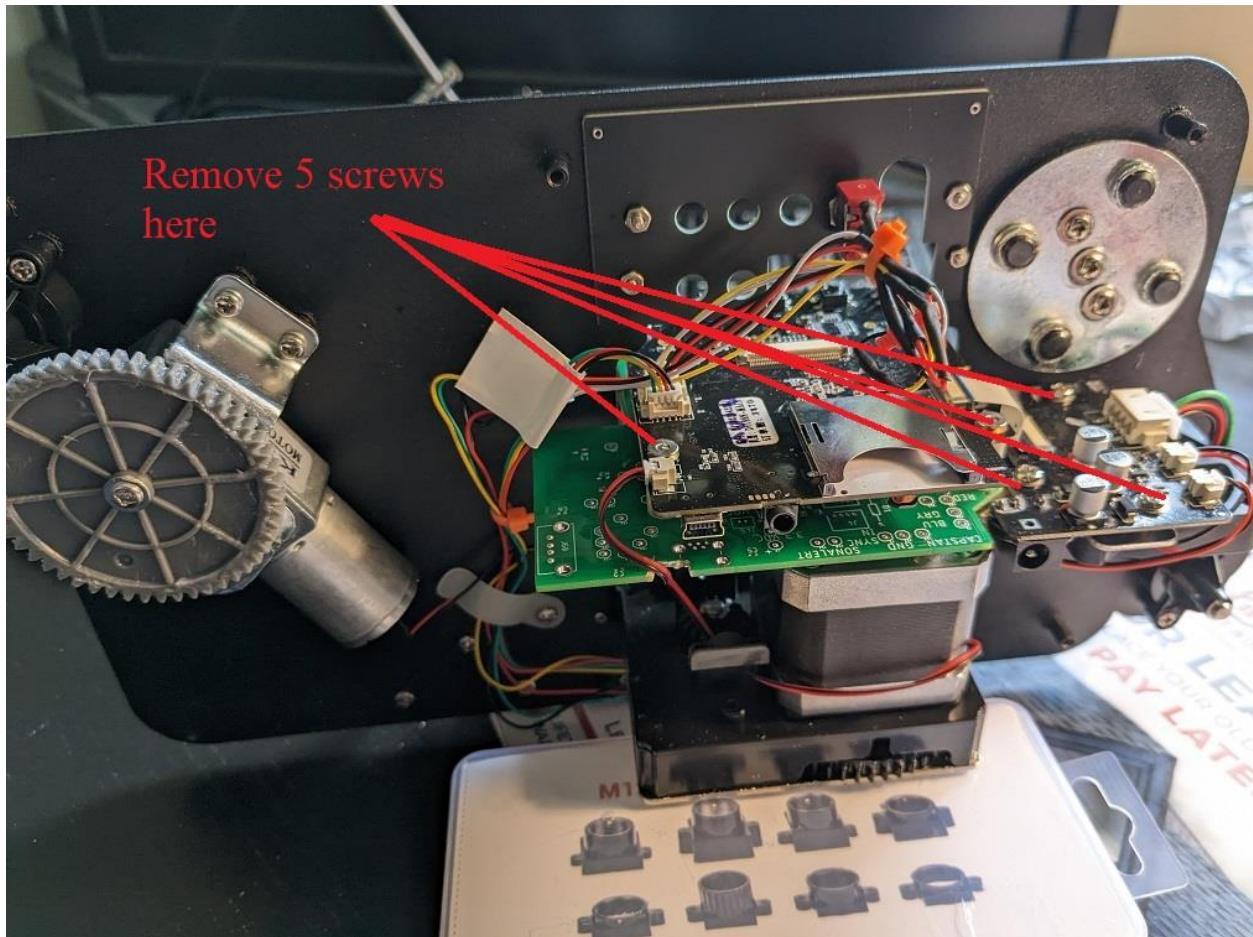
<https://www.amazon.com/gp/product/B076J3W7R4/>

## Disassembly – Go Back to Original Wolverine

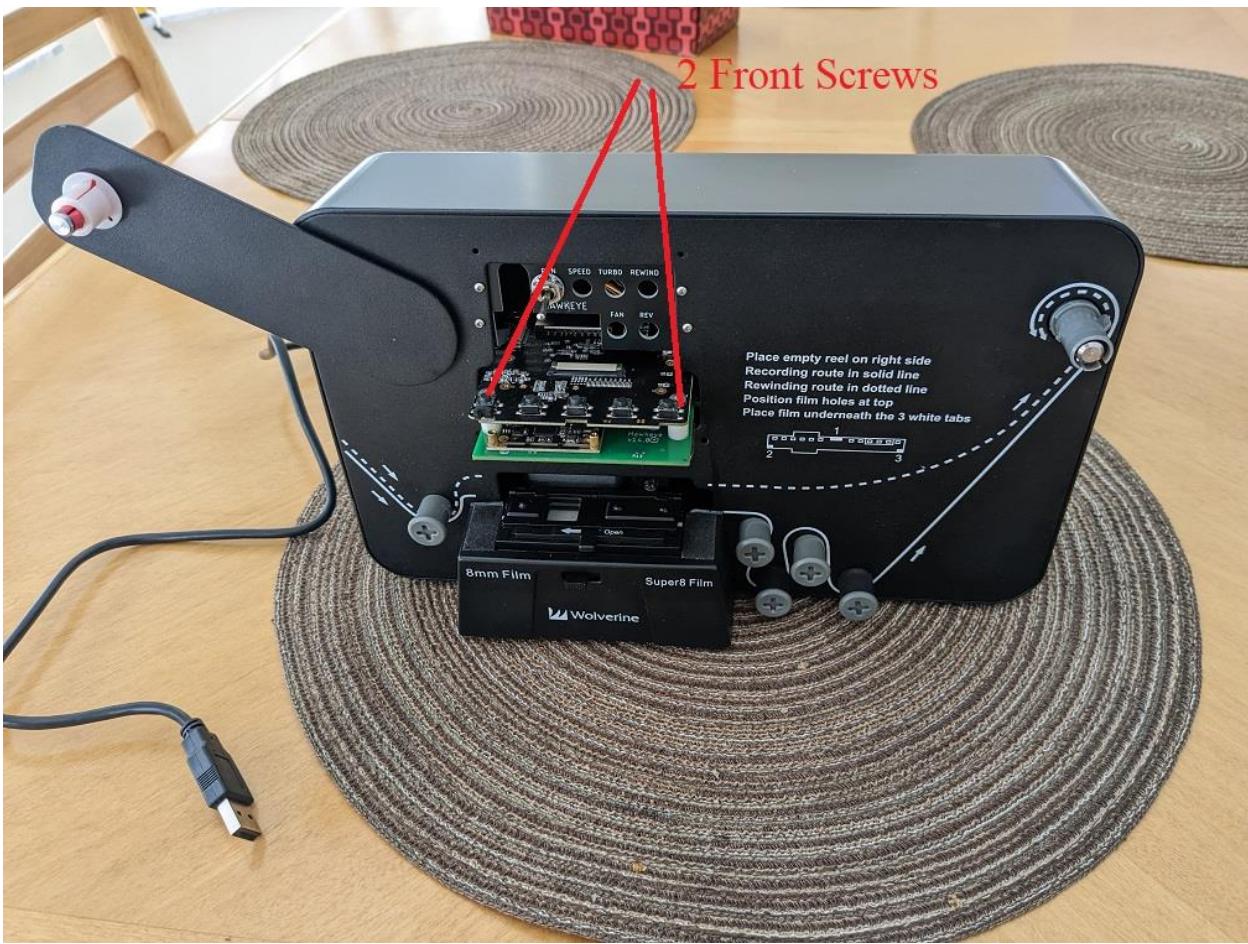
In order to restore the original Wolverine you will need the display and the lens holder that you saved during previous assembly.

Remove the back cover screws and pull the back cover open taking care not to damage the camera cable.

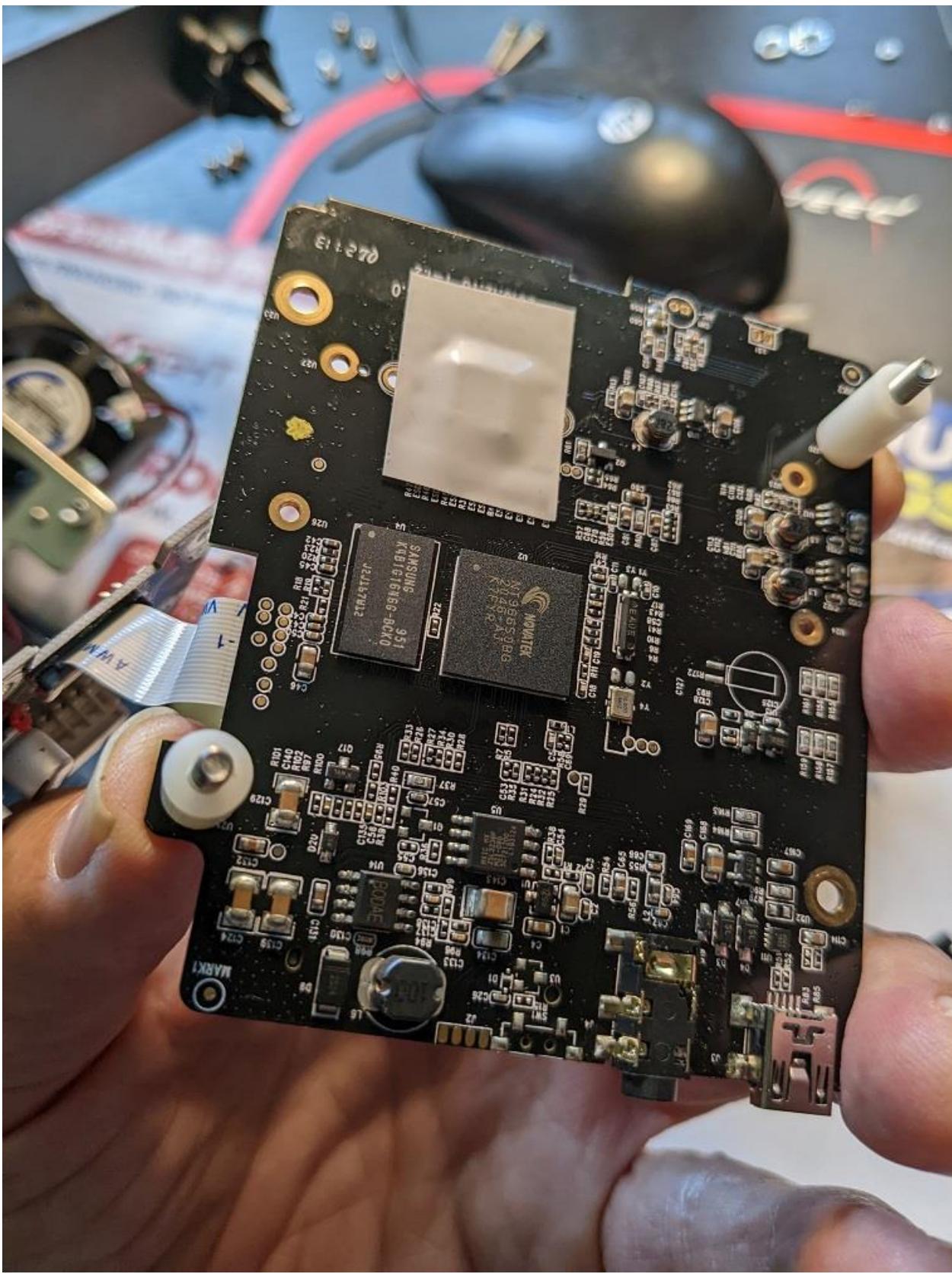
Remove the power supply 3 screws and 2 controller board mounting screws at the back.



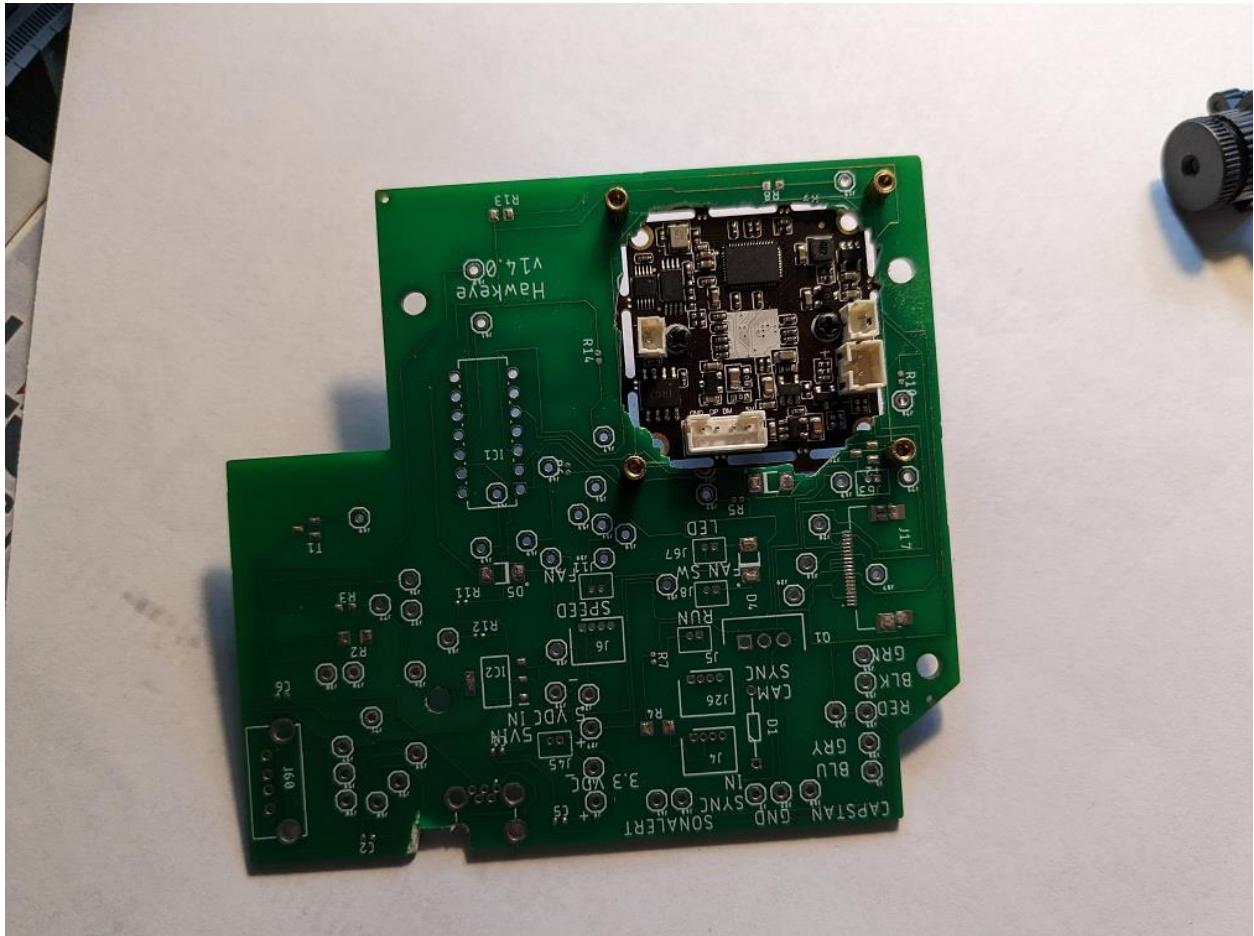
Remove the 2 front screws



Carefully slide the controller and power supply assembly towards the back.



Slide the camera adapter board out carefully making sure that the camera lens is not caught in the steel bracket.

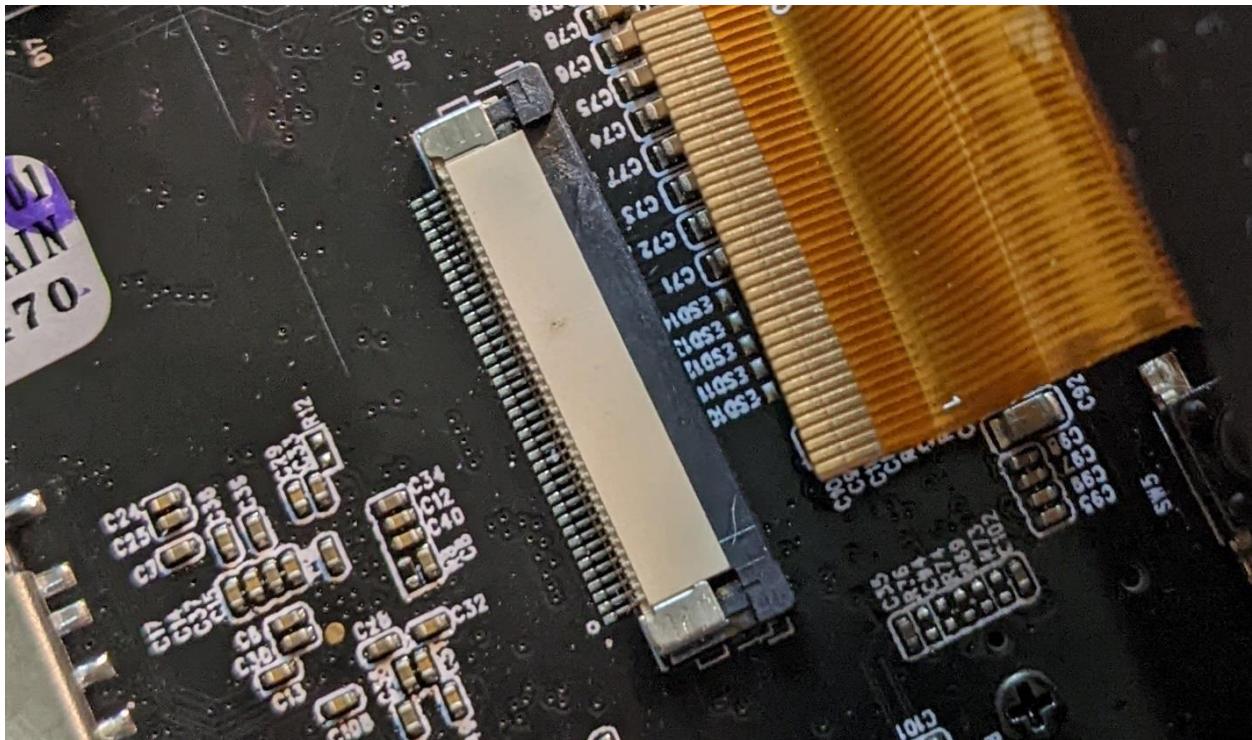


Remove the tape from the Wolverine camera sensor and clean the sensor with alcohol and lint free cloth.

Be careful not to damage the power supply flex cable during the following installation steps.

Install the original lens holder onto the Wolverine controller board and the lens.

Check the display connector and make sure it is unlocked.



Slide the display flex into the connector with the as shown in the above photo. Slowly lock the connector starting on one side first. Make sure not to disturb the flex cable during this process.

Once the connector is locked install the display. The display has the guiding pins that have to be aligned with the holes on the board.

Install the display mounting screws. Do not overtighten them.

Slide the controller into the unit from the back and secure in place with 4 mounting M3 screws that you saved during initial assembly.

Finish the power supply assembly by installing 3 mounting screws.

Connect the cables and shown in the following picture.



Remove the short front bezel and install the long one provided saved during assembly.

Attach the back cover.

## Additional Video Processing

Open up option4.avs file in the scripts directory in notepad.

Change the video path in the script and save it after that.

```
# 8mm film restoration script by videoFred.
# www.super-8.be
# info@super-8.be

# version 01.A with frame interpolation
# release date: june 20, 2012
#=====

# august 2010: added removerdirtMC() as suggested by John Meyer
# october 2010: auto sharpening parameters

# march 2011: new autolevels.dll by Jim Battle
# www.thebattles.net/video/autolevels.html

# june 2012: improved stabilisation

#=====

# cleaning, degraining, resizing, stabilizing, sharpening, auto-levels and auto-white balance.
#=====

#film= "C:\Users\stan\Documents\8mm_video_transfer\Wolverine\Videos\Hawkeye\test11.avi"
# source clip, you must specify the full path here
#film= "D:\Hawkeye\video\canada_raw.avi" # source clip, you must specify the full path here
#film= "C:\Users\stan\Documents\8mm_video_transfer\stan_8mm\4a.avi"

film= "E:\Hawkeye\canada\12_raw.avi"
```