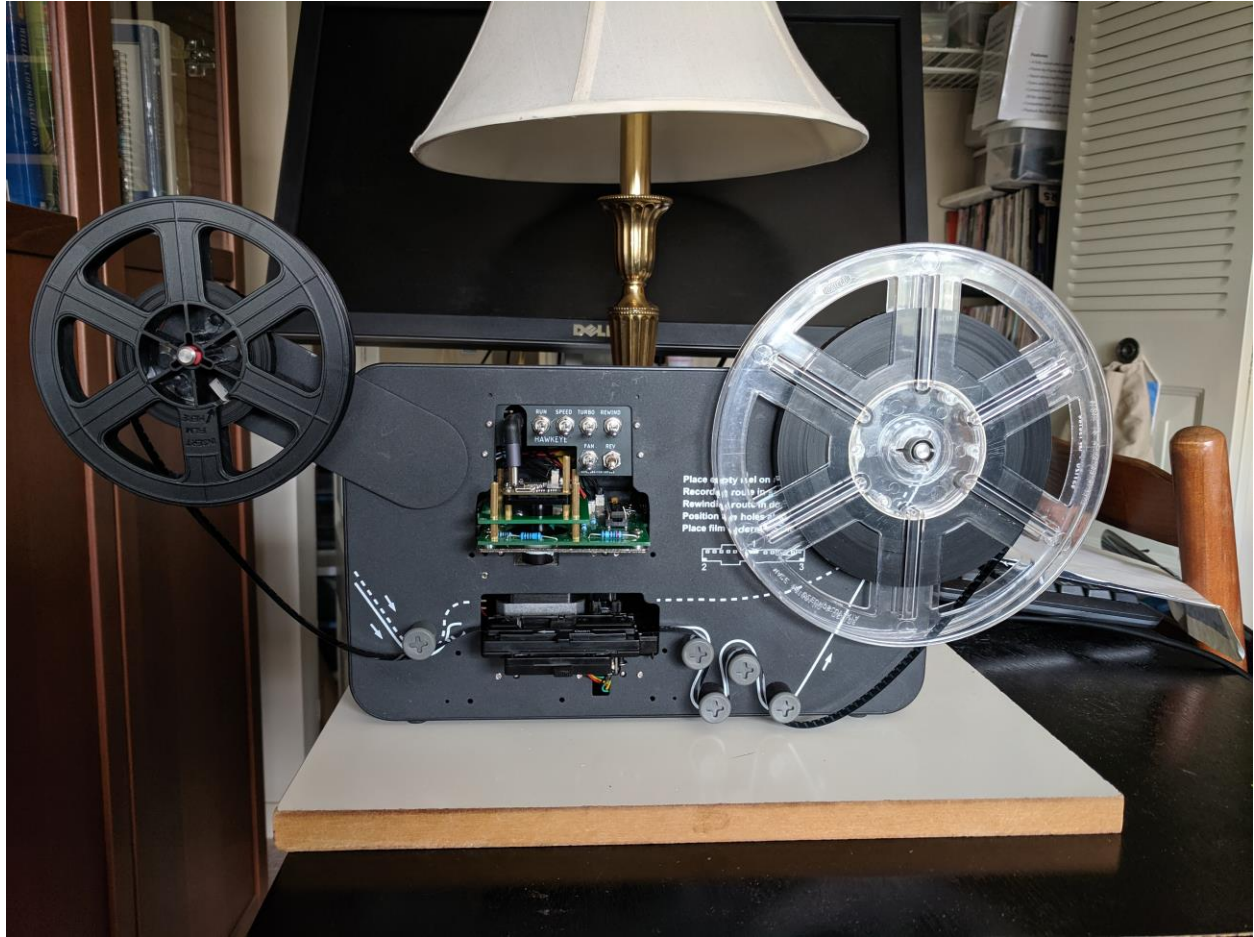


Hawkeye Operating Guide for UX178 Camera



This guide provides instructions how to use the Hawkeye scanner. This version includes the specifics for the UX178 Imaging Source camera. Although the general installation procedure and settings are very similar to the BUC02 and the UX226, there are some exceptions that are covered here.

It assumes that the unit has been fully assembled and that it is ready to be used. If you have an unassembled unit i.e. if you have a Wolverine and the Hawkeye kit that are not put together, then refer to the Hawkeye user manual for assembly instructions:

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

Test

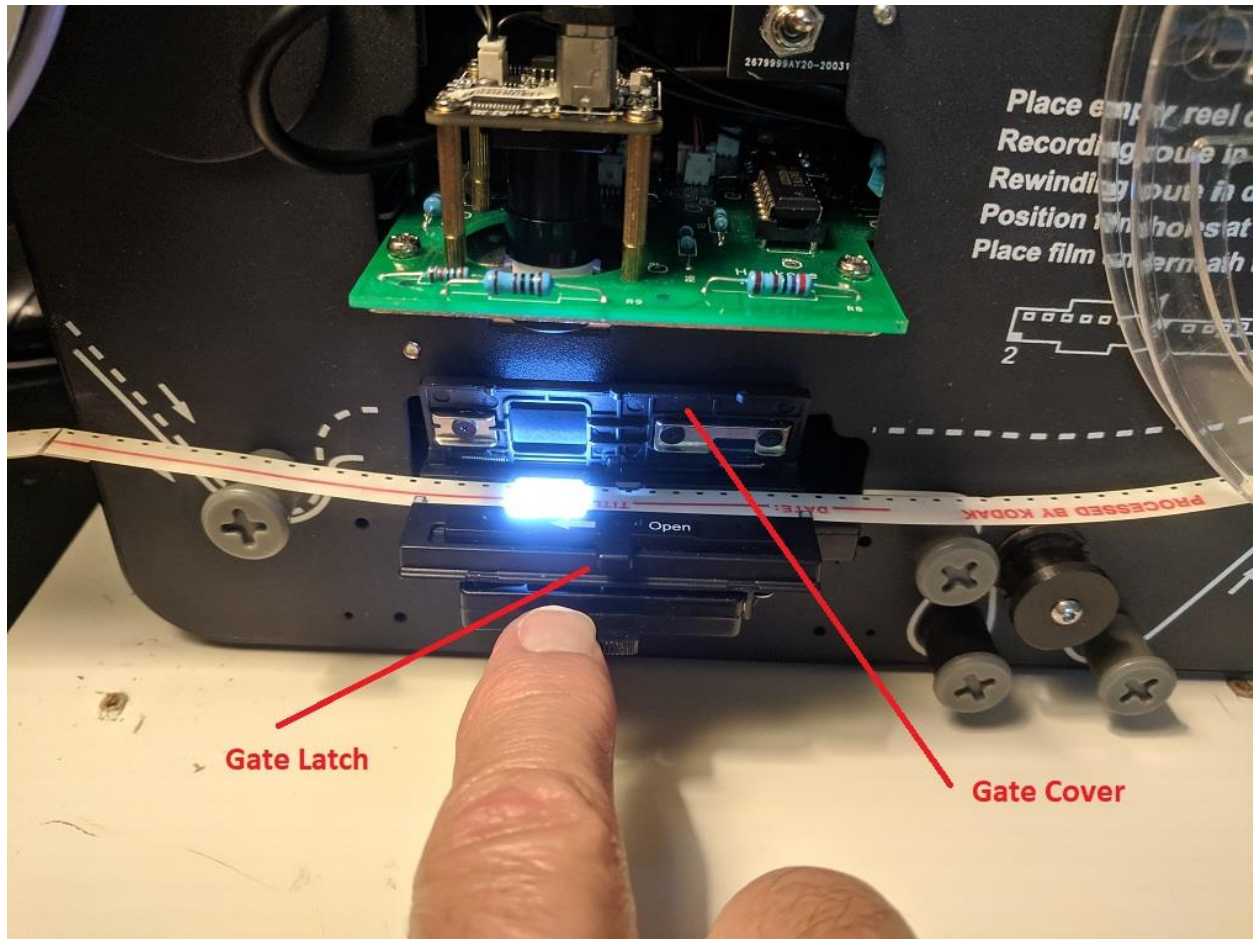
Set a unit on a solid flat surface. Be careful when handling the unit. It is top heavy and can easily tip forward if handled carelessly.

Plug the AC adapter DC output plug into the power supply. The film gate LED should turn on.



Make sure the fan is off. It could sometimes cause 5V startup issue. Once the unit powers up and the LED is on, the fan can be turned on.

Turn the RUN switch on. The stepper motor should start running. Carefully open up the film gate by holding the gate cover with one hand and sliding the gate switch to the left. Gently lift the gate cover up.



Make sure that the claw is moving and running at roughly 0.5 cycles per second.

Turn the SPEED switch on.

The claw should start running at 1 cycle per second.

Turn TURBO switch on.

The claw should start running at 2 cycles per second.

Turn REWIND on. The stepper should stop after 10 seconds and the alarm should sound.

Turn all switches off.

Note:

With the RUN switch on and REWIND on the capstan starts the capstan timeout count. If the capstan motor does not move within 10 seconds (no film), the stepper motor will stop and the alarm will sound.

With the RUN switch off, turn the REWIND switch on. The takeup motor should start running. Test the REV (reverse) switch and make sure that the takeup motor reverses.

Note: Make sure that the reverse switch is in proper position during normal operation to ensure proper film takeup.

Here is the function table for the switches

| Run | Speed | Turbo | Rewind | Mode |
|-----|-------|-------|--------|------------------------|
| Off | | | Off | Off |
| Off | | | On | Rewind |
| On | Low | Off | Off | 0.5 FPS HDR |
| On | Low | On | Off | 1 FPS HDR |
| On | Hi | Off | Off | 1 FPS |
| On | Hi | On | Off | 2 FPS |
| On | Low | Off | On | 0.5 FPS HDR + Capstan |
| On | Low | On | On | 1 FPS HDR + Capstan |
| On | Hi | Off | On | 1 FPS will add capstan |
| On | Hi | On | On | 2 FPS will add capstan |

Camera Installation

If you obtained the camera from Imaging Source it will be shipped in a protective aluminum bag. Remove the camera from the bag. Remove the protection film from the sensor and carefully clean the sensor with alcohol and soft lint free cloth. Wipe the sensor dry.

Install the lens holder as shown.

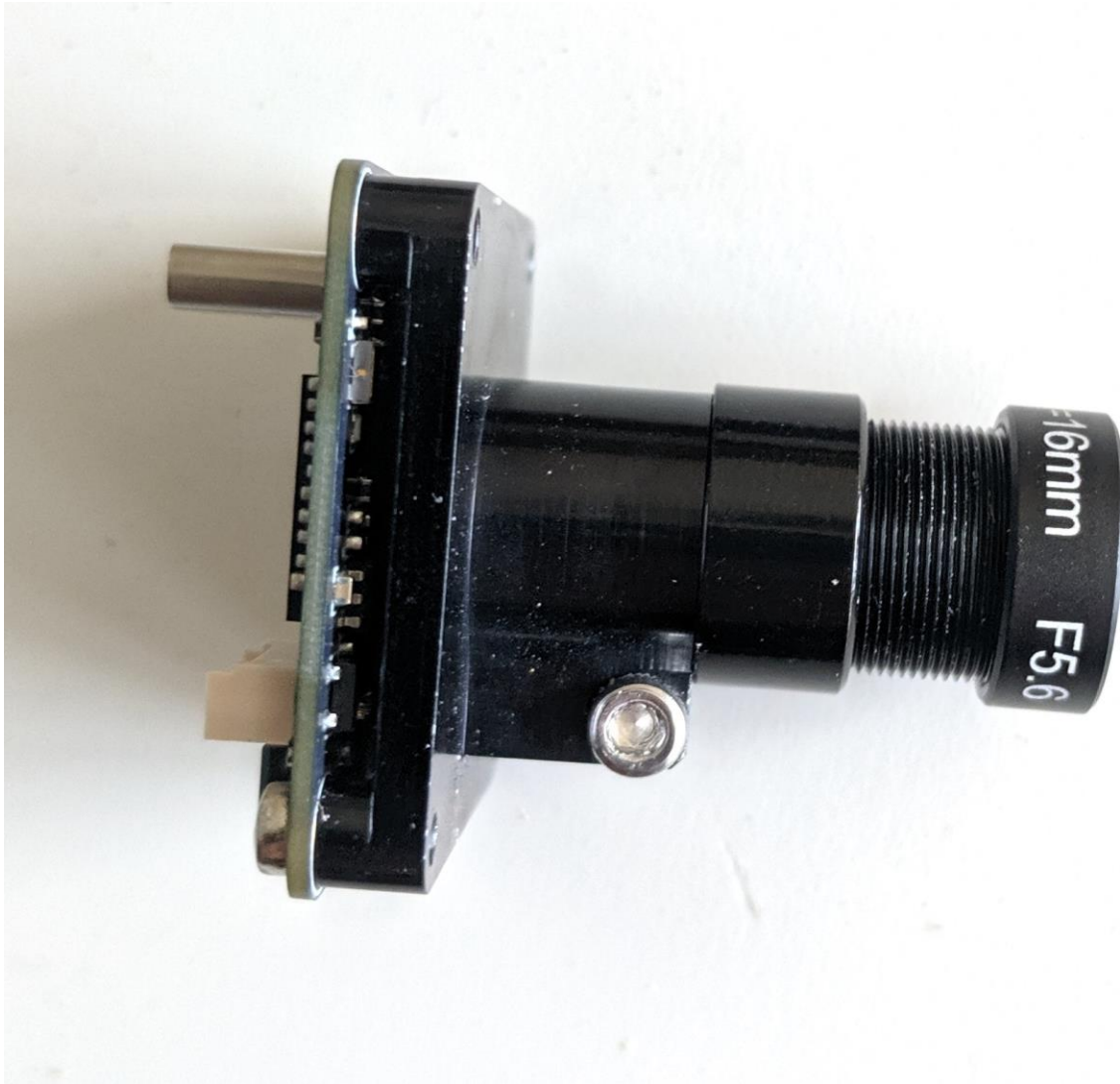


Attach the lens holder extension.



Make sure the extension is screwed all the way in as far as it will go.

Install the Aico 16mm lens next. Wrap a Teflon tape over the lens a few times to minimize any play. Screw the lens into the holder 4.75 turns. The lens may still need minor adjustment for best focus.

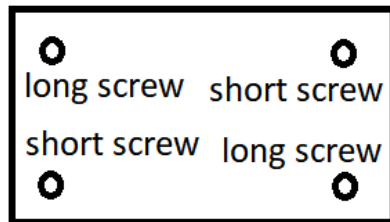


The camera does not mount directly onto the Hawkeye board. It mounts on a small camera adapter board and the adapter board then mounts on the main board. Two adapter boards are available, one for the S8 (V1 version) and one for the R8 film type (V2 version).

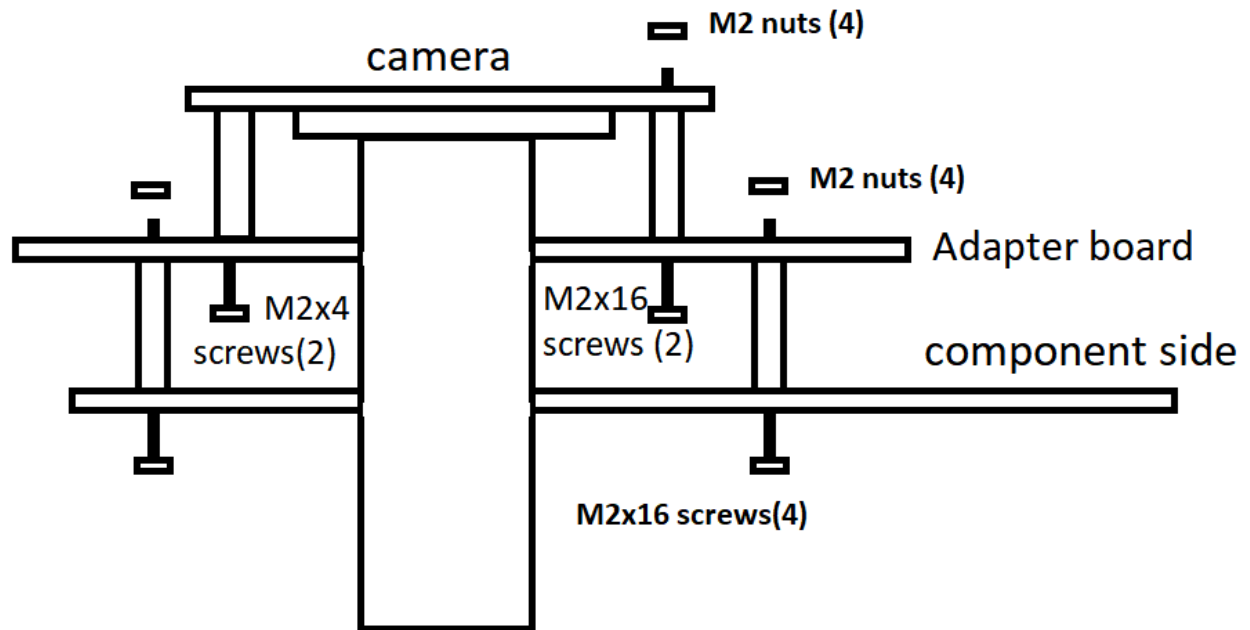
The images below illustrate the installation details.

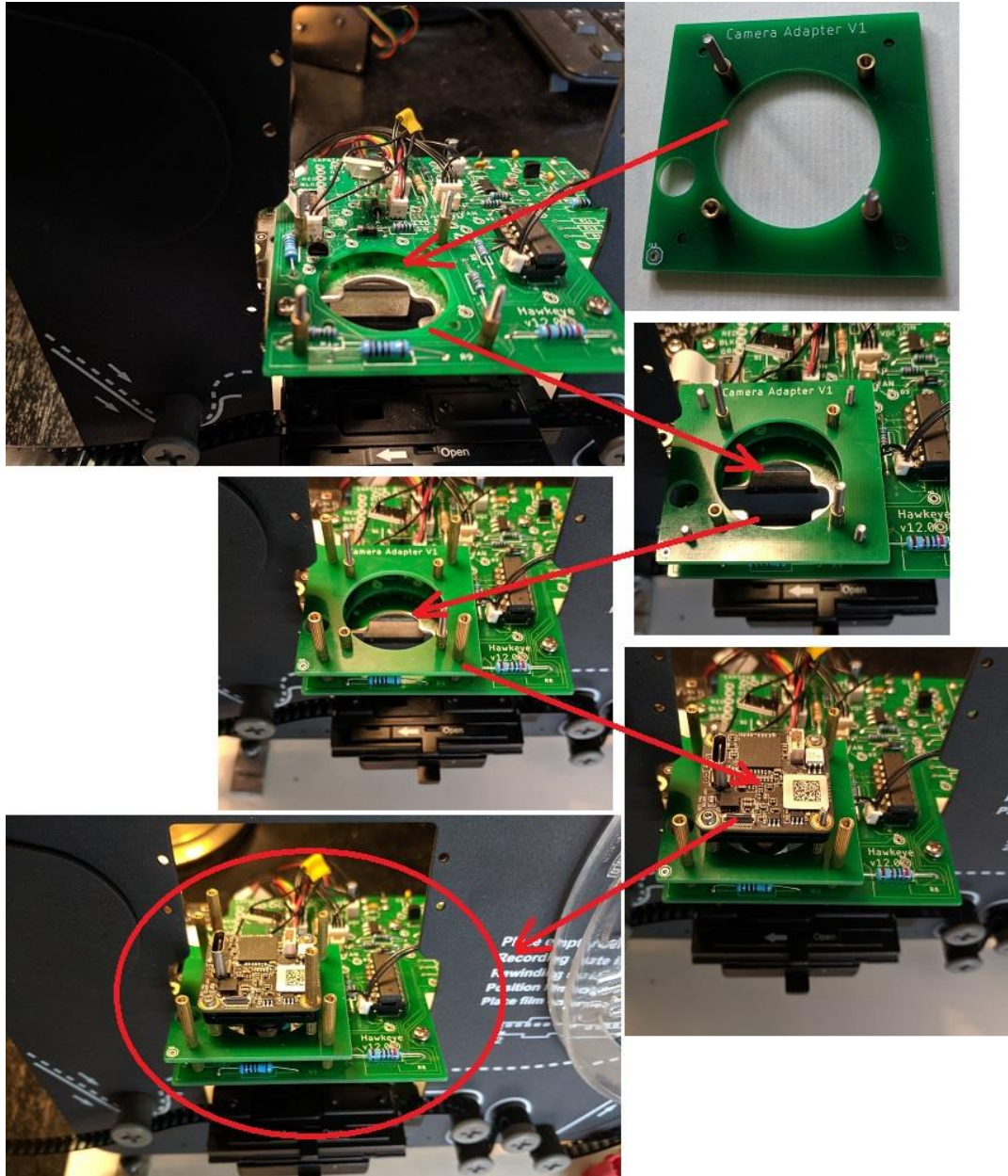
adapter board top view

back



front





Here are a few additional notes.

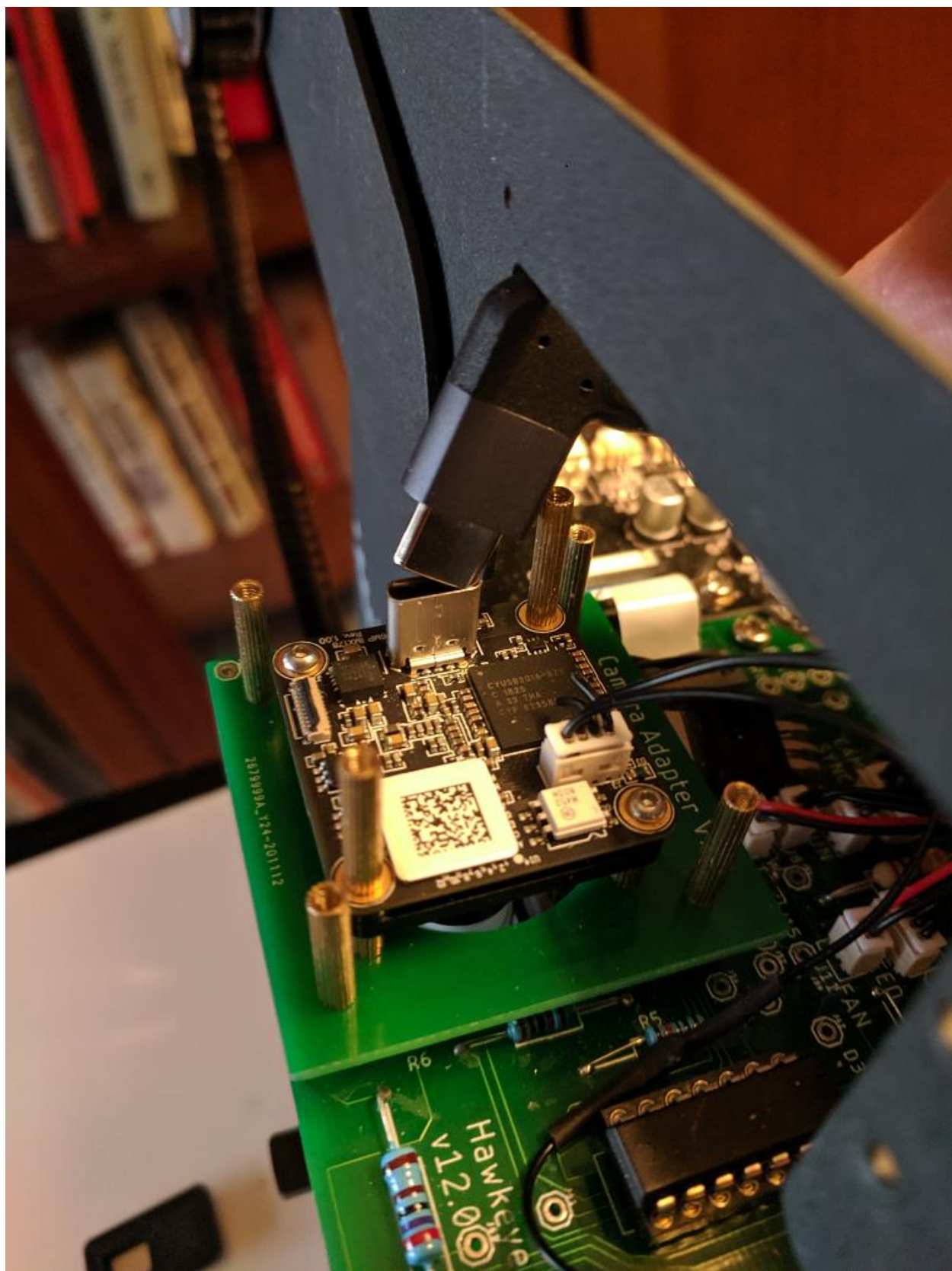
For ease of camera installation, remove the front switch panel. It is possible to install the camera without removing the panel but it is a big awkward.

Make sure the 8mm standoffs are already secured on the main board as per the illustrations above. Then install the camera to the adapter board as per the illustration. Then, install the camera-adapter assembly onto the 8mm standoffs on the main board. Observe the position of the usb connector and the orientation of the adapter board.

Connect the USB3 patch cable to the camera. Plug the external trigger cable into the camera aux connector.

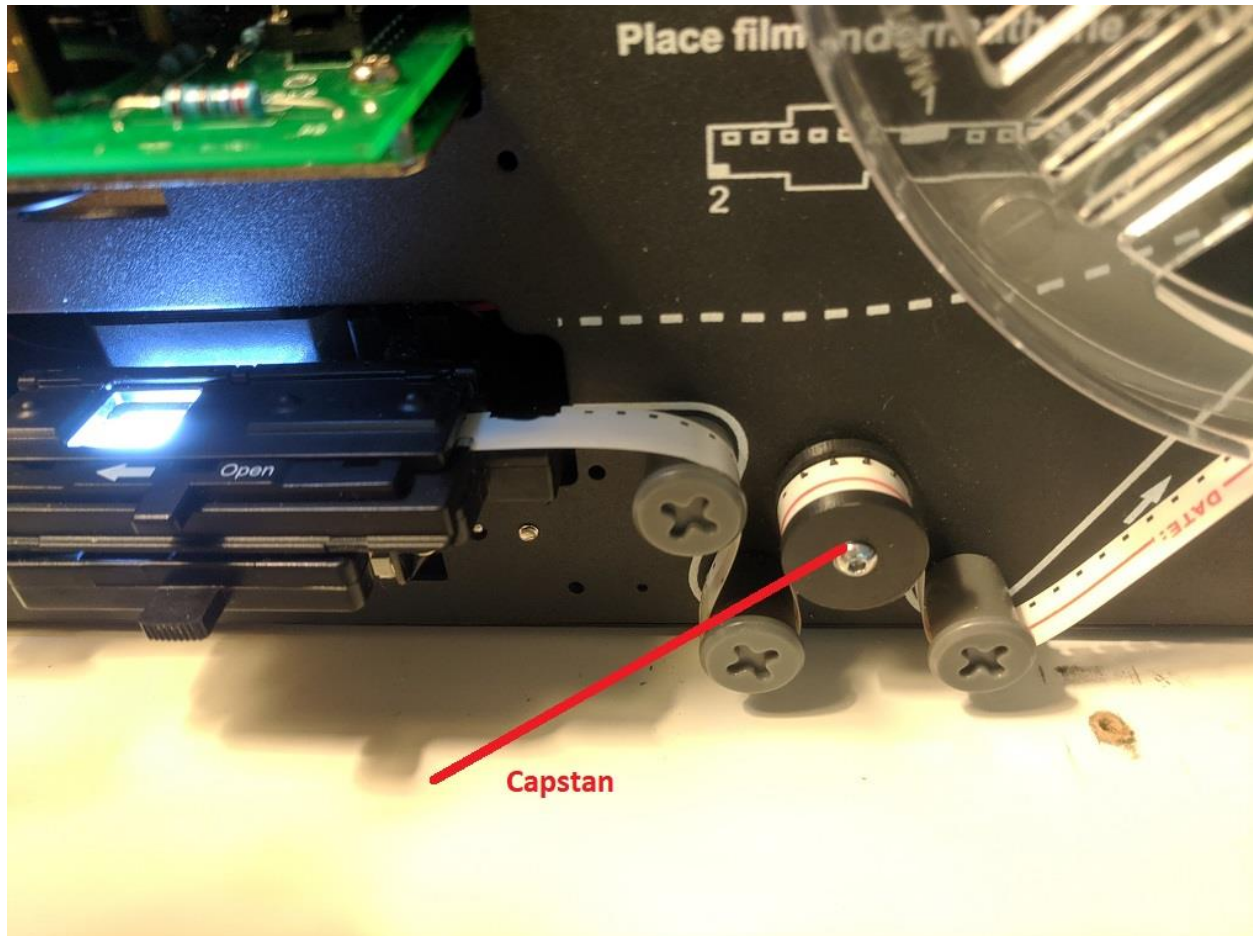
Reinstall the switch panel.

If the installation is done without removing of the switch panel it may be difficult to connect the patch cable to the camera. It still can be done by sliding the patch cable under the switch panel to the front of the unit. Then align the patch cable connector with the camera usb connector by tilting the patch cable connector towards the back of the unit. Once one side of the connector is inside the usb3 receptacle switch the patch cable connector upright and plug it in.

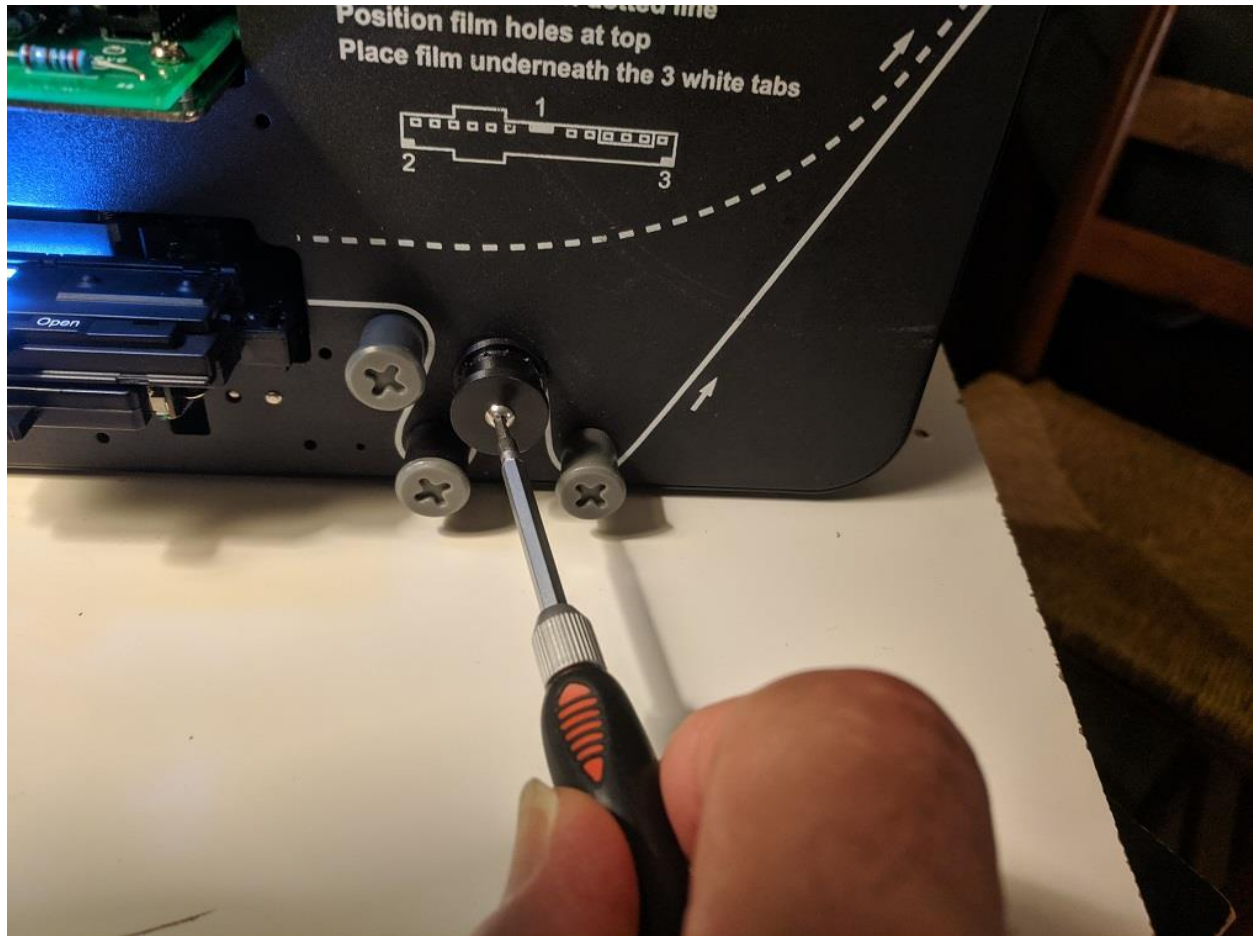


Capstan

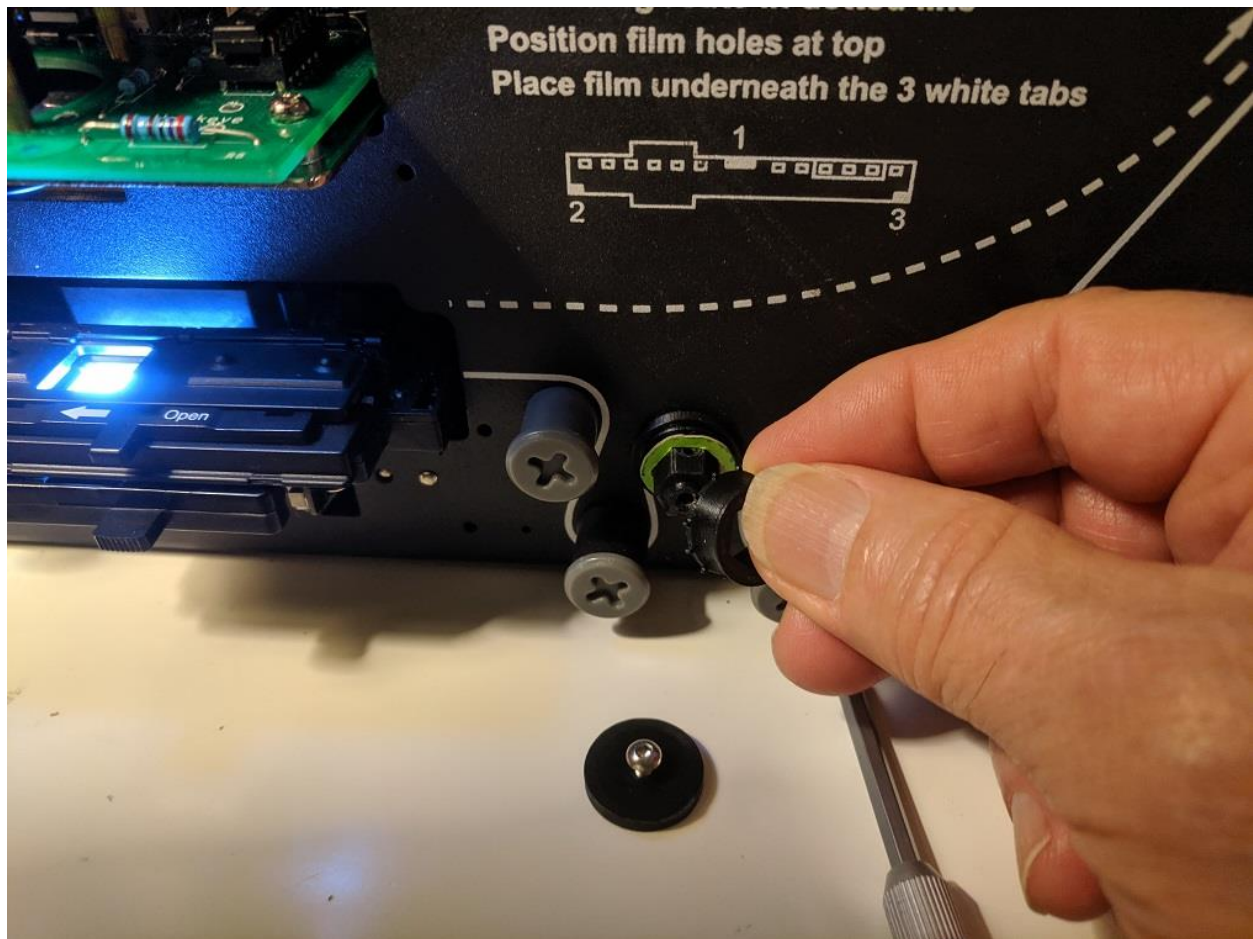
The capstan cogged pulley that is shipped with the unit works with the S8 film and does not work with the R8.



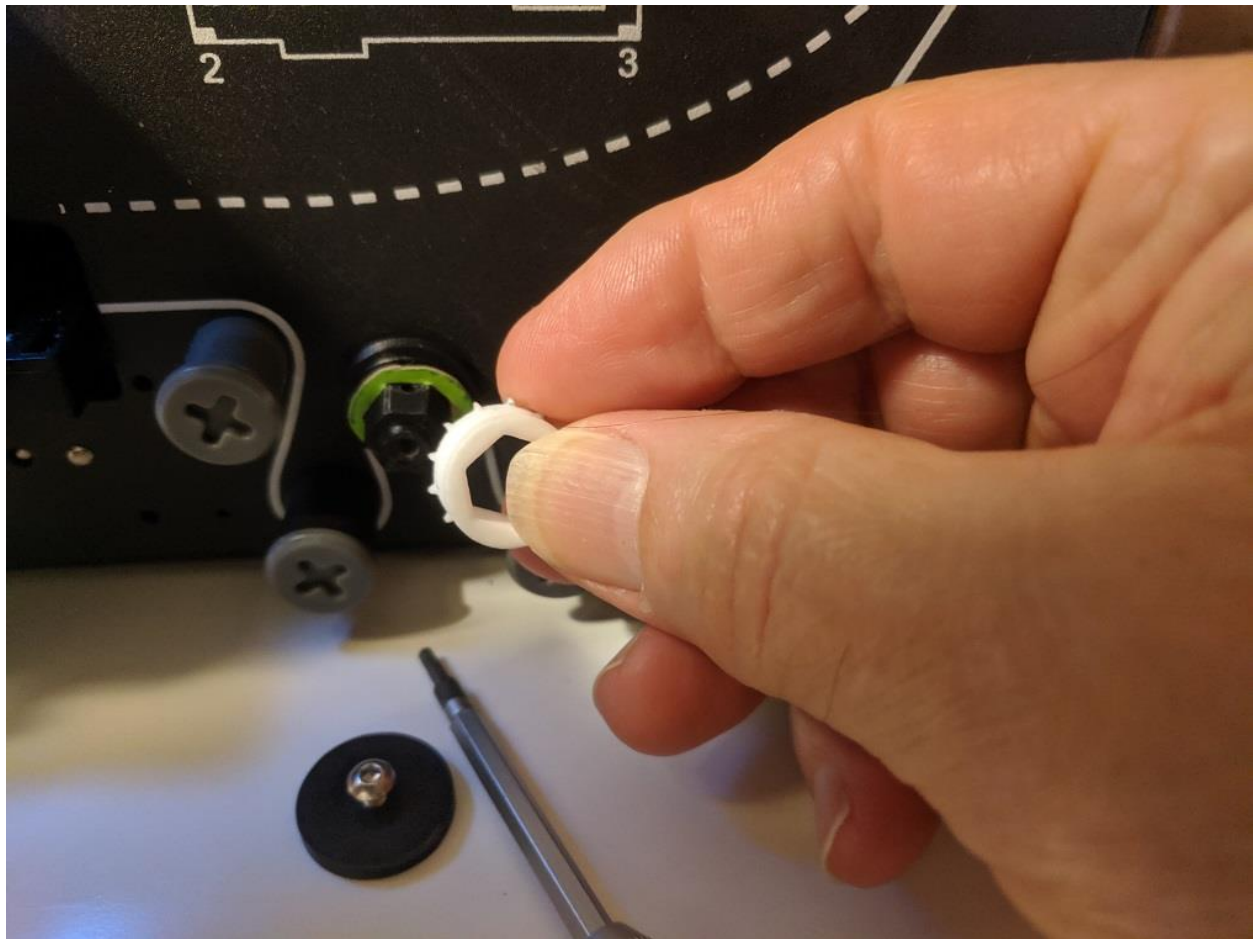
The shipping package contains a bag with accessories which includes the R8 capstan. In order to exchange the capstan for the R8 film, unscrew the retaining screw from the front of the capstan.



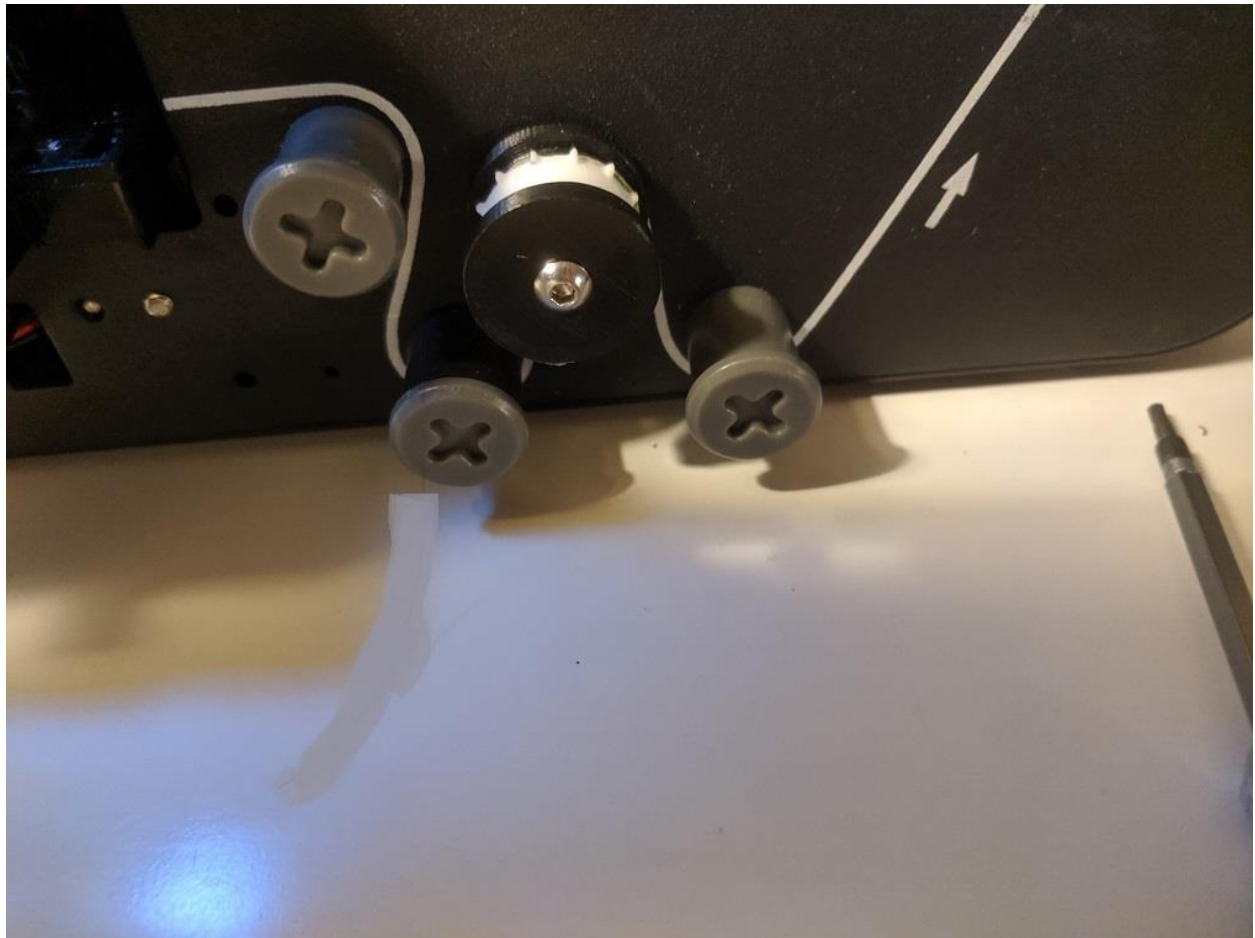
Remove the pulley.



Slide the R8 white pulley over the hexagonal hub. The teeth should be on the panel side (away from you).



Install the front disk and secure it by tightening the screw. Do not over tighten.



Hawkeye Film Scan Procedure

Overview

Here is a list of apps that you will need.

The IC Capture program can be obtained from the following link:

<https://www.theimagingsource.com/support/downloads-for-windows/end-user-software/iccapture/>

VideoFred's script plus VirtualDub2 – Stan's version:

<https://drive.google.com/open?id=1ICS4yfdq11s3UVfLaKwdj7SDPLWskHyt>

Fred's Script link:

<https://forum.doom9.org/showthread.php?t=144271>

VirtualDub2

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

First Step First

It is assumed that the Hawkeye board is installed and working.

Mount the reels and thread the film

Connect the camera usb to the camera and the PC.

Run IC Capture in the PC and proceed with the settings.

IC Capture Settings

Two camera models are used with Hawkeye:

The UX226 has higher resolution and a bit nicer color tones. The shadows have a bit more details and do not have the red tinge like with BUC02. Other than that the two cameras are similar.

Set resolution to 2048x1536.

Here is the summary of IC Capture settings. Try the settings first and if not happy with the result follow the detailed procedure below to tweak the settings.

Color

Device Properties - DFM 37UX178-ML

Auto ROI Color Color Matrix Exposure Image Partial scan Special WDR

Hue

Saturation

WhiteBalance ☐ Auto

WhiteBalance Mode

Auto Preset

Temperature Preset

Temperature

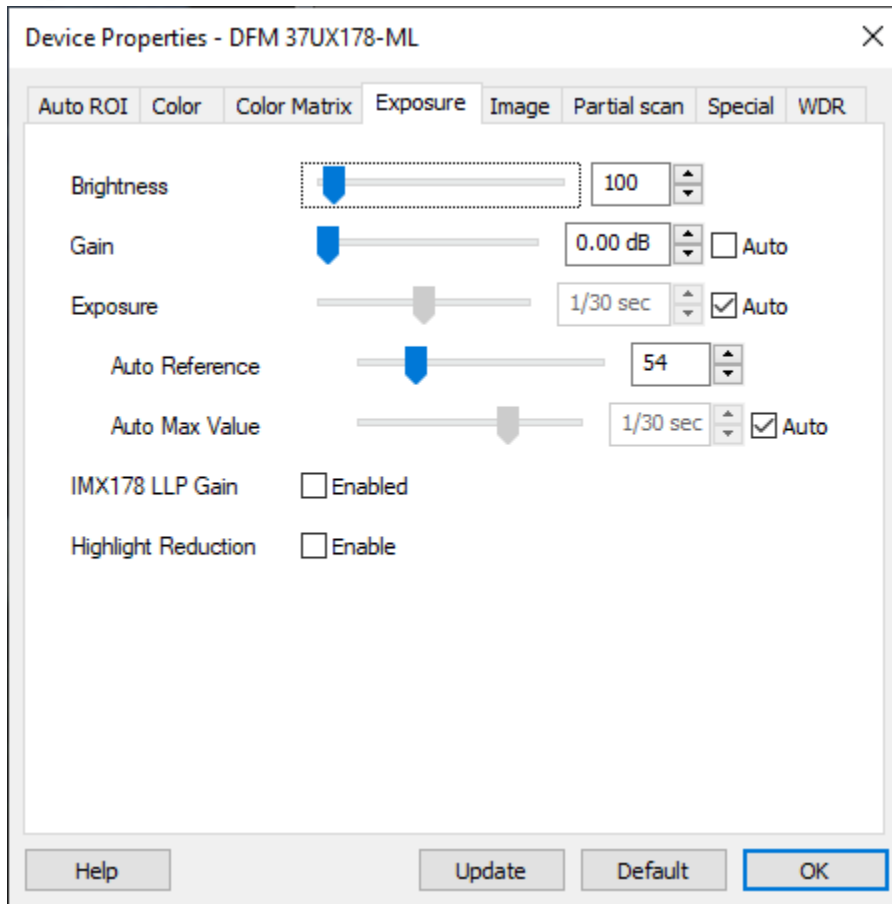
White Balance Red

White Balance Green

White Balance Blue

Help Update Default OK

Exposure



Note that the exposure is set to auto. Auto Reference sets the average brightness. Auto max value limits the brightness so that the set FPS can be maintained. This will prevent a very bright image from overlapping with the next image causing smear in some areas of the image.

Setting the FPS to 8 is a pretty good compromise i.e. a good bright picture and still fast enough to prevent image overlap.

Image

Device Properties - DFM 37UX178-ML

Auto ROI Color Color Matrix Exposure Image Partial scan Special WDR

Sharpness 0

Gamma 1.00

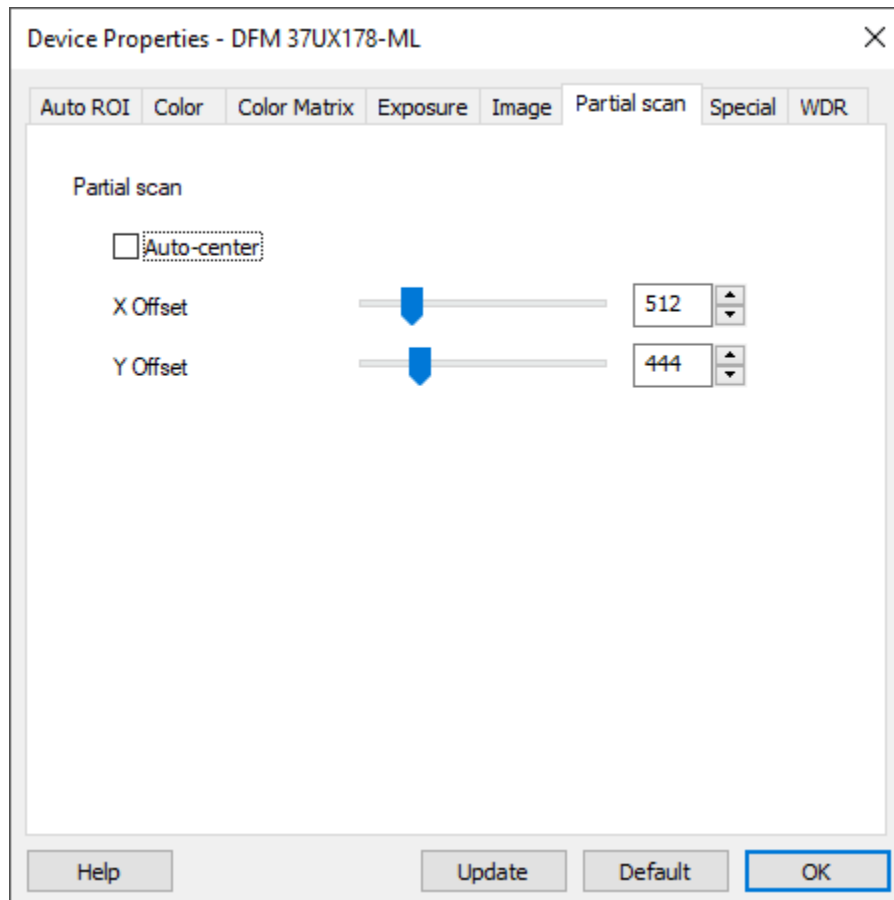
Denoise 0

Flip Horizontal ☐ Enable

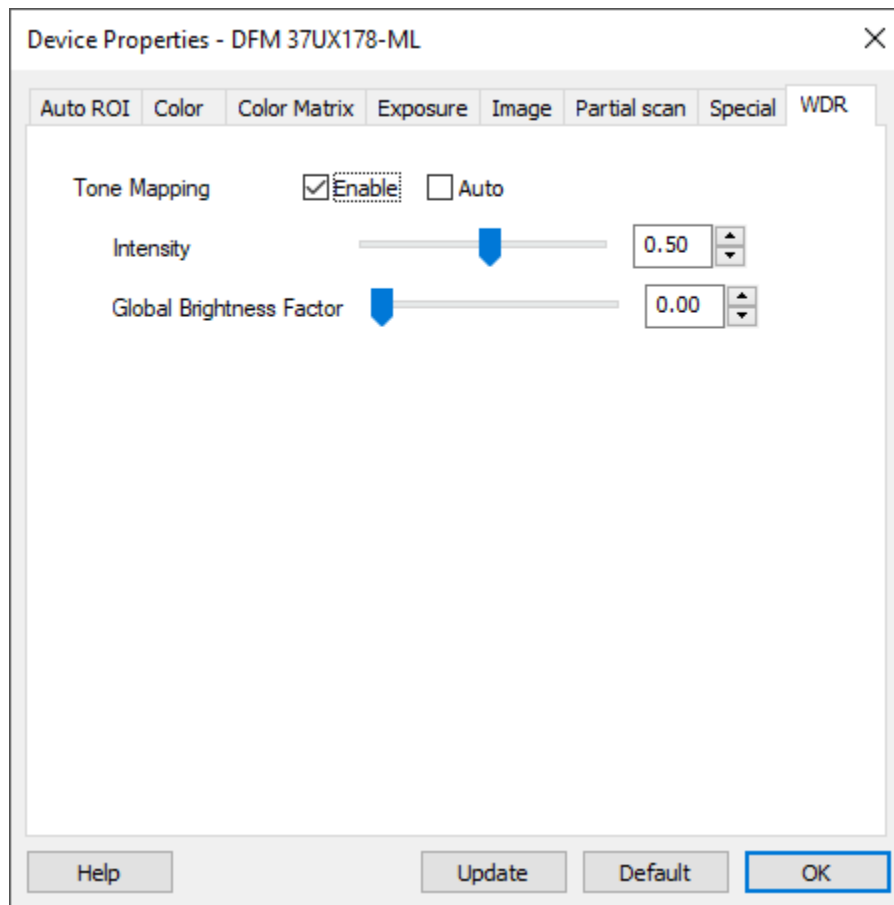
Flip Vertical ☐ Enable

Help Update Default OK

Partial Scan - set as required to center the frame



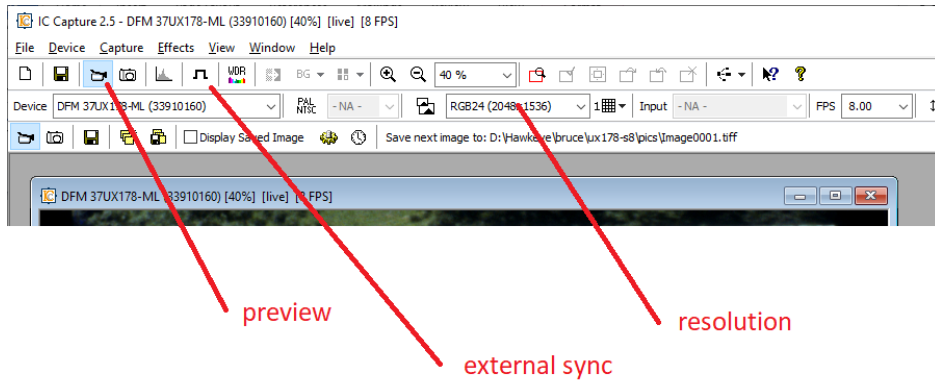
WDR



Save configuration.

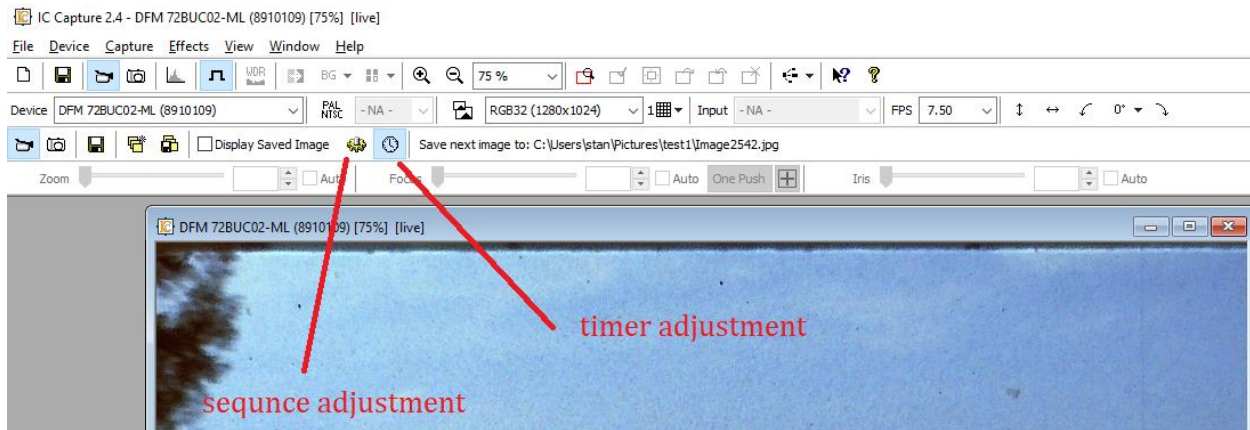
Resolution, external sync and preview

As mentioned earlier resolution should be set to 2048x1538 is to set the resolution to .



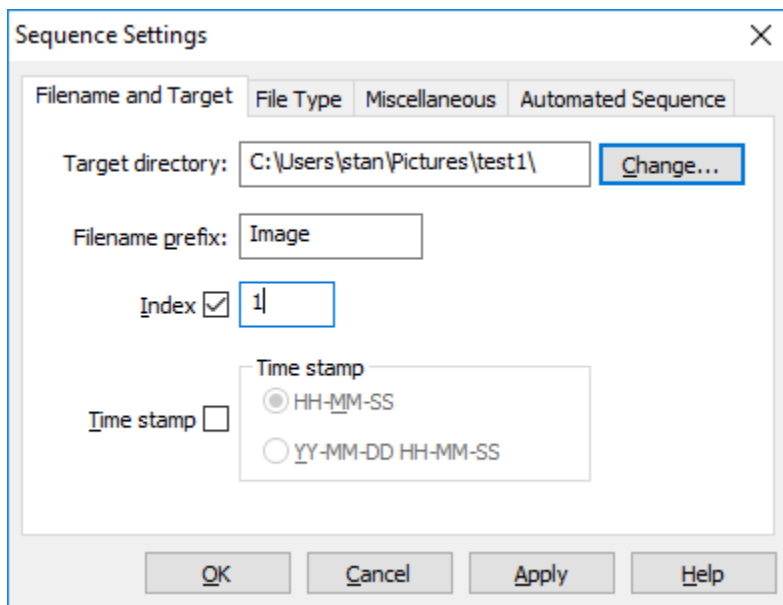
Turn external sync off and turn on preview.

Sequence and timer adjustment



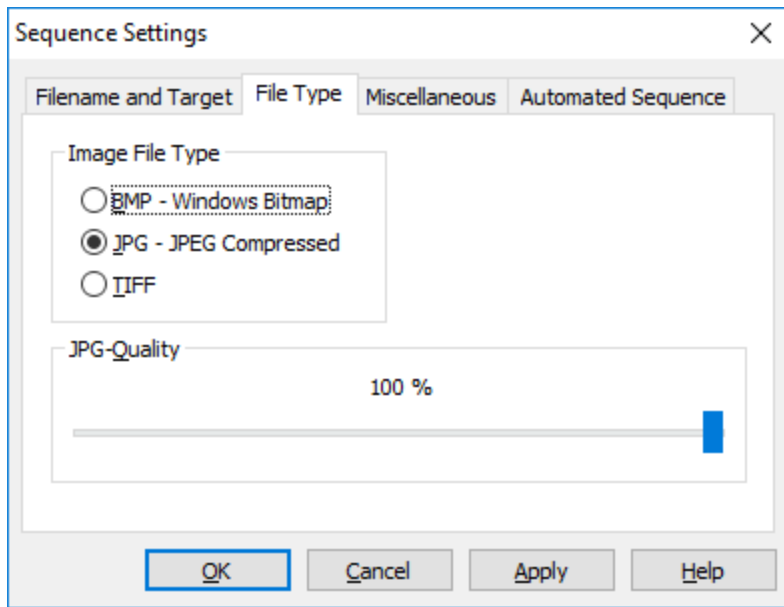
Click the sequence button:

Filename tab



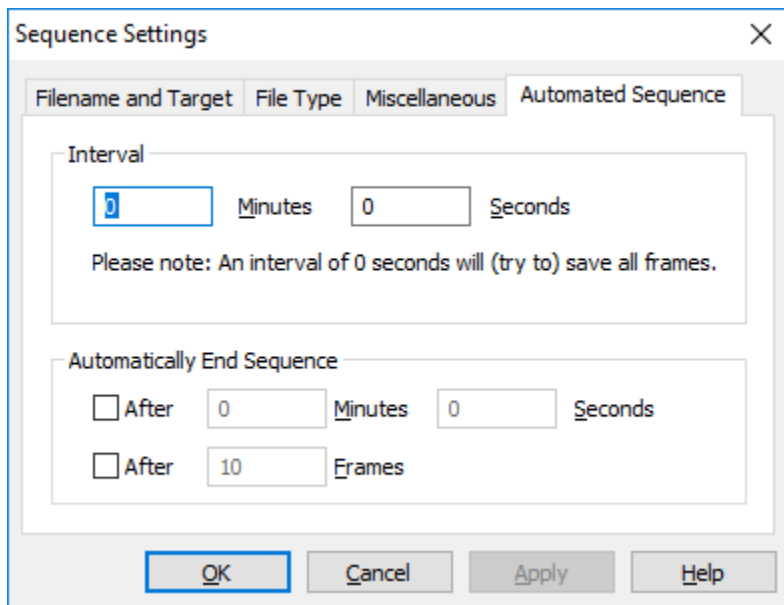
Set the destination folder path for the capture and sequence number and file name prefix as required.

Select File Type tab:



Select the type that you prefer. Jpg lower quality but less storage space required etc... If VideoFred is used, make sure to use tiff files. It will make a big difference in the end. BTW – you can spool the tiff files onto external drive if your machine is fast enough.

Select automated sequence:

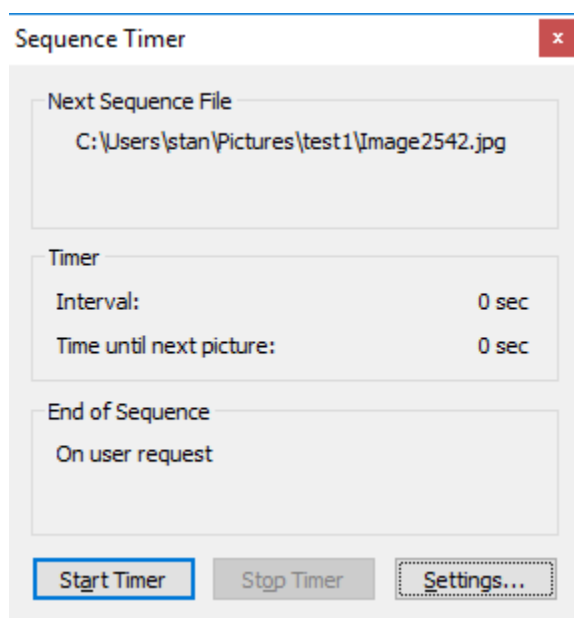


Make sure the interval is 0 minutes and 0 seconds.

Press OK button when done. The window will close.

Turn on external sync. If you do not proceed with the timer and start it the capture folder will be flooded with images. So, always make sure that the external sync is on before you start the timer.

Press the timer button:



Press start timer.

Start the capture by turning the Hawkeye run switch on. The machine will start capturing the images in the destination folder one every two seconds.

The destination folder will contain all of the images. These can be post-processed by Film9:

Create avi file with VideoFred (Virtual Dub2)

Install VirtualDub2 from:

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

Install VideoFred from:

<https://forum.doom9.org/showthread.php?t=144271>

Download the zip file from there and go into the scripts subdirectory.

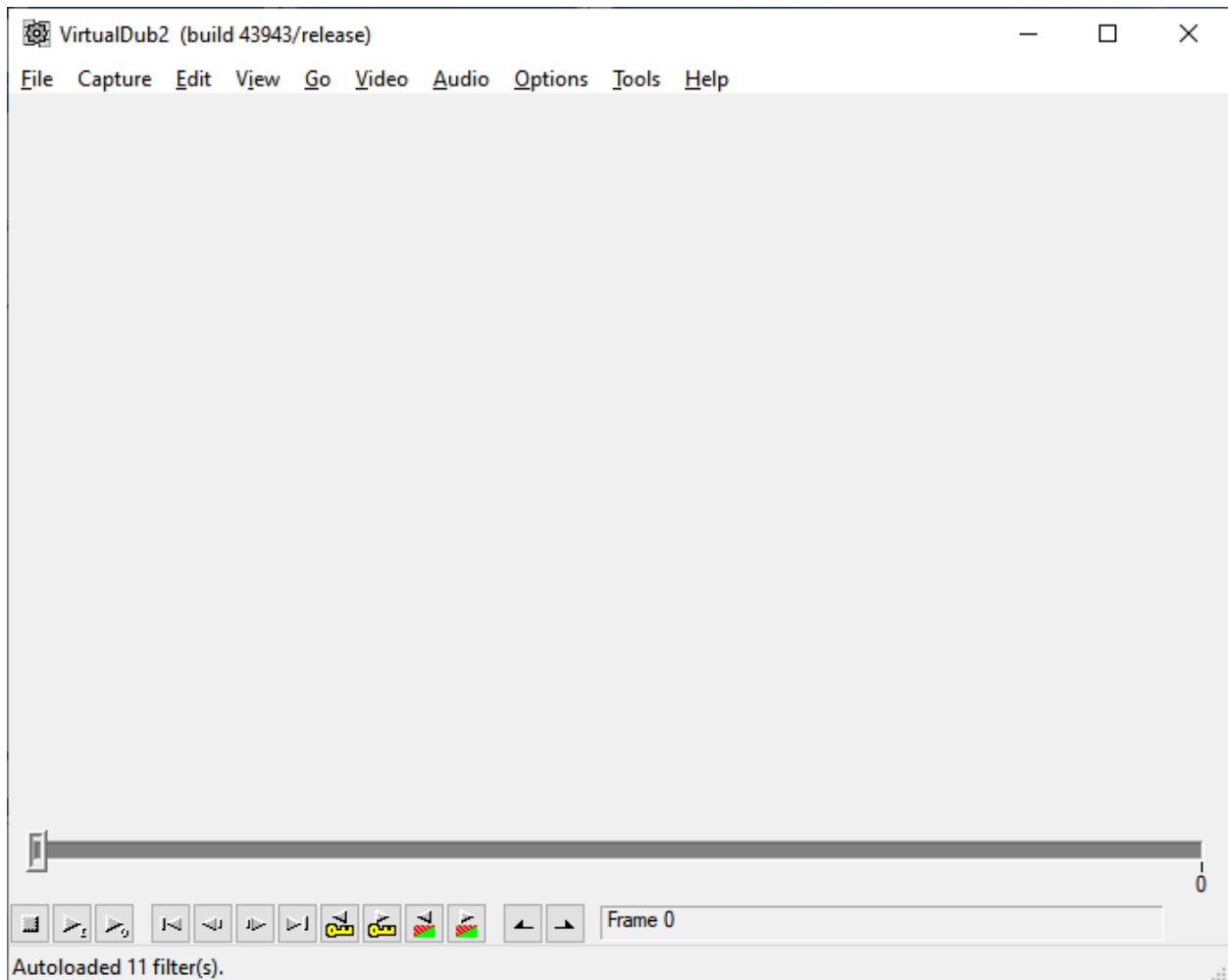
Add the option4.avs script from here:

<https://drive.google.com/file/d/1ICS4yfdq11s3UVfLaKwdj7SDPLWskHyt/view>

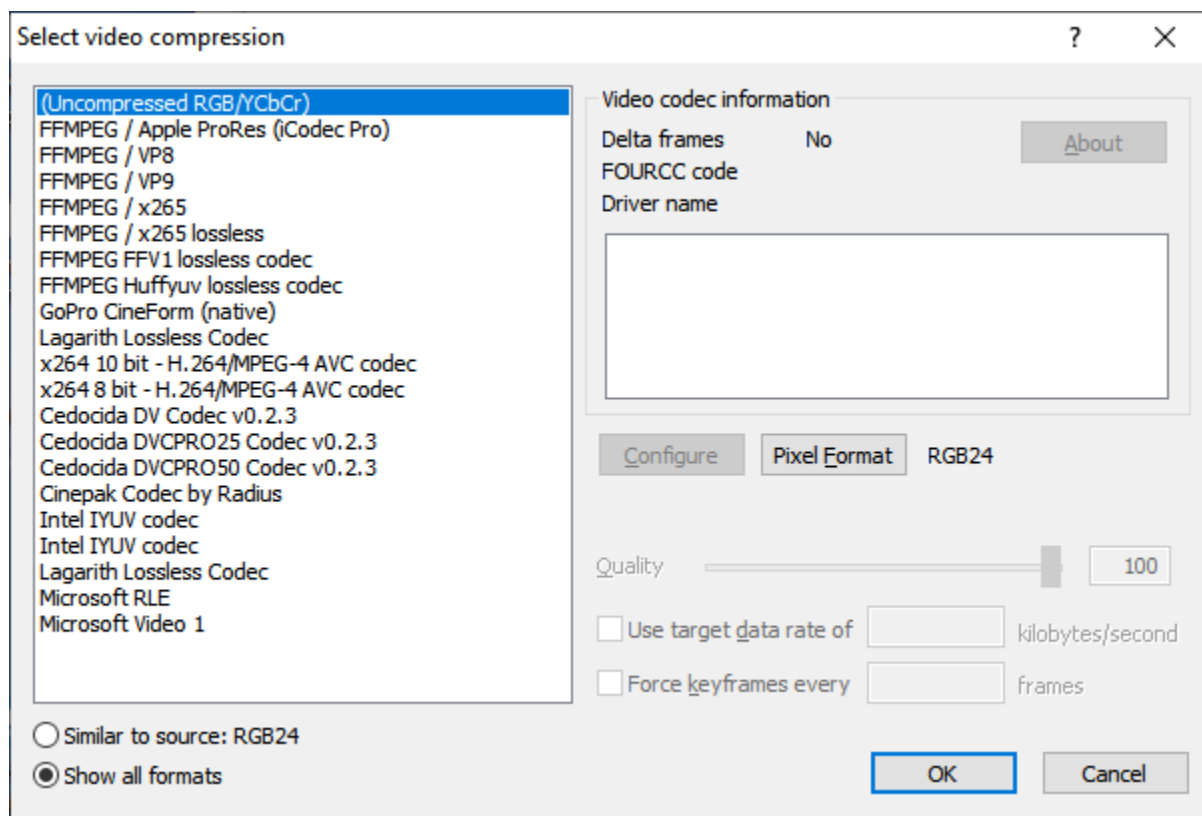
Go to the VirtualDub2 directory.

Double click on VirtualDub.exe.

VirtualDub2 will open.

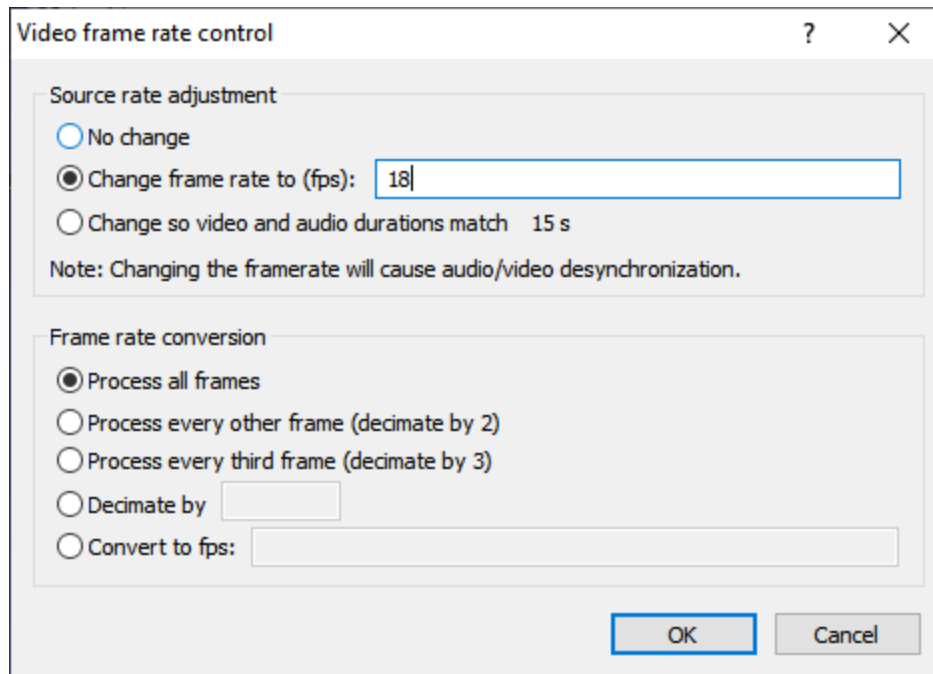


Click on the video tab and compression.



Make sure that Uncompressed is selected. Click OK.

Click on Video tab and then frame rate.



Set frame rate as required. I use 18 fls.

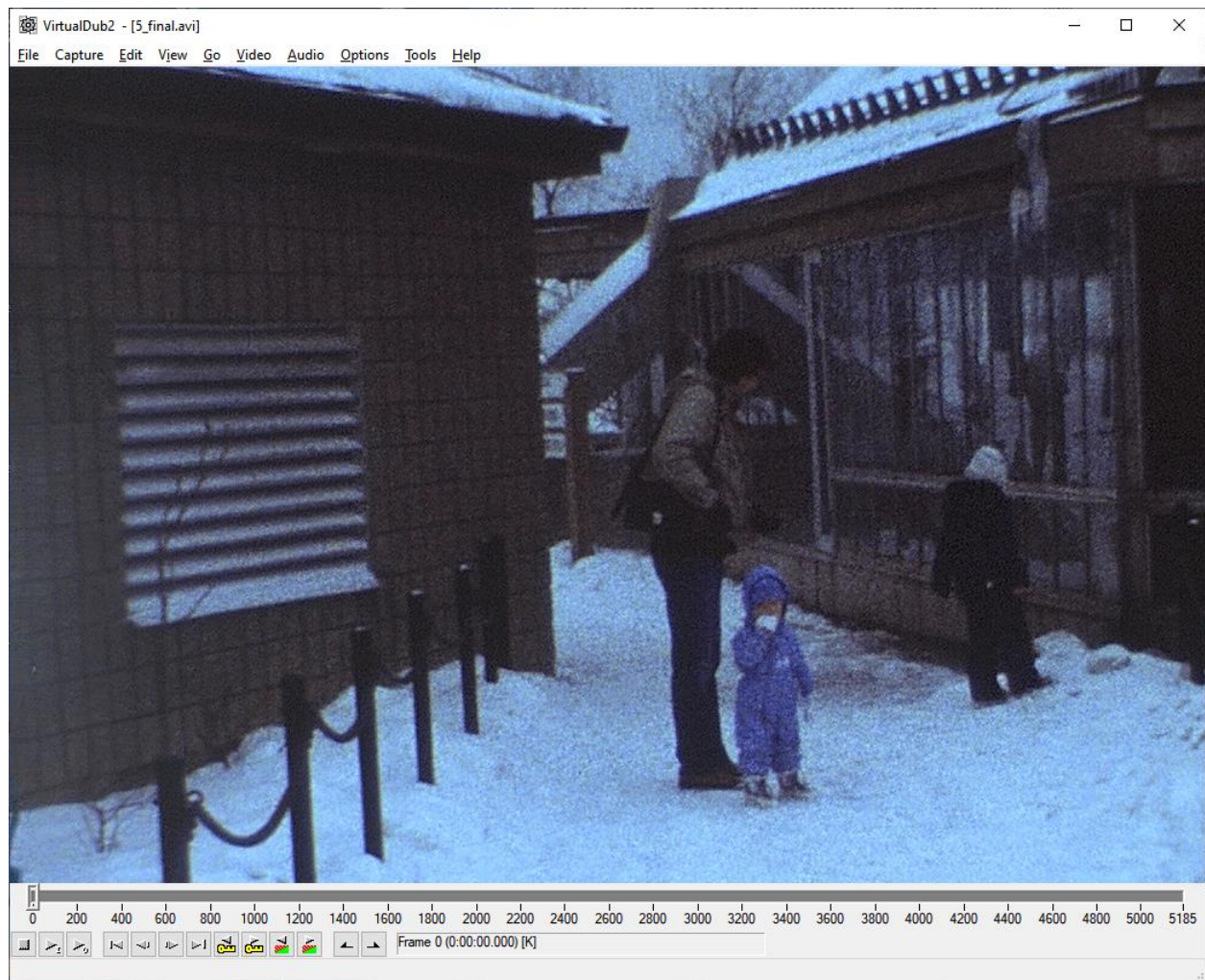
Click OK.

In VirtualDub click on File then

Open Video File

Open the first picture in the tiff series of pictures.

VirtualDub will create a video automatically from the series. Make sure that you have consecutive numbers in the series.



Then just save the file into you work directory and call it something like my_clip1_uncompressed.avi.

This is a raw unprocessed file. It is large and you can play it in VirtualDub or some other player but it will be choppy.

Next, close the file in VirtualDub by clicking File and then Close video file.

Do not exit VirtualDub. Leave it running.

Now, go into the following directory:

Film_Restoring_vs_06_2012\scripts

Open up option4.avs file with a text editor (notepad is fine).

You have to change only one thing there:

```

# 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, degrading, 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"

```

Change the path to the raw file that you just saved whether it is on your local drive or external drive.

Save the avs file.

Now, go back to the WirtualDub program and click on File and then Open Video File and point to the avi file that you just saved.

In a few seconds VirtualDub will display the video.



If you get the removegrain.dll error then you probably do not have Microsoft tools runtime library installed on your machine.

Try downloading the runtime from here (will need an account to download). If you are concern that the library may cause other issues with the computer than skip this step.

<https://www.wincert.net/forum/topic/9790-aio-microsoft-visual-bcfj-redistributable-x86x64/>

Try this instead

Use the script debugger (AVSMeter). Download it from here (7z version):

<https://www.videohelp.com/software/AVSMeter>

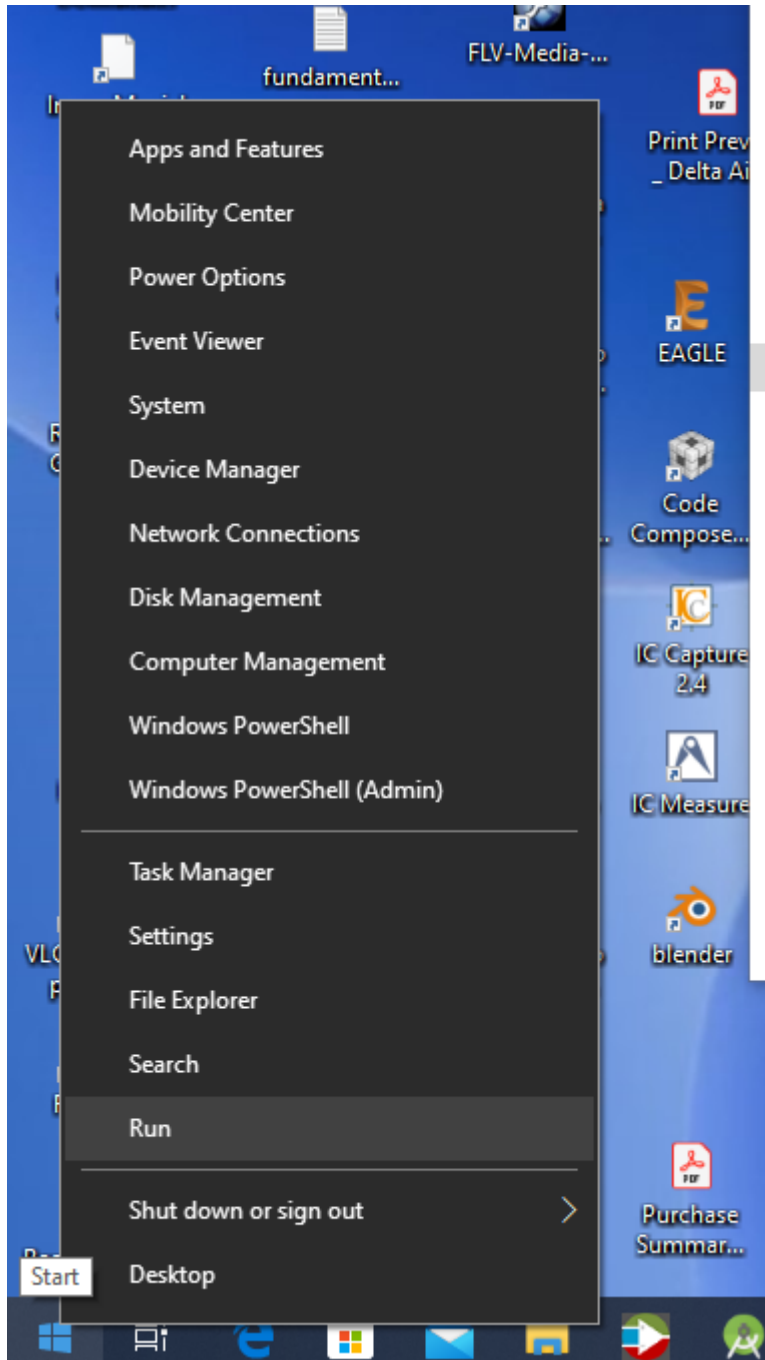
Or from here (zip version)

https://drive.google.com/open?id=1nTX_CwFATOGckPw0Upf7jWg6jWbTissD

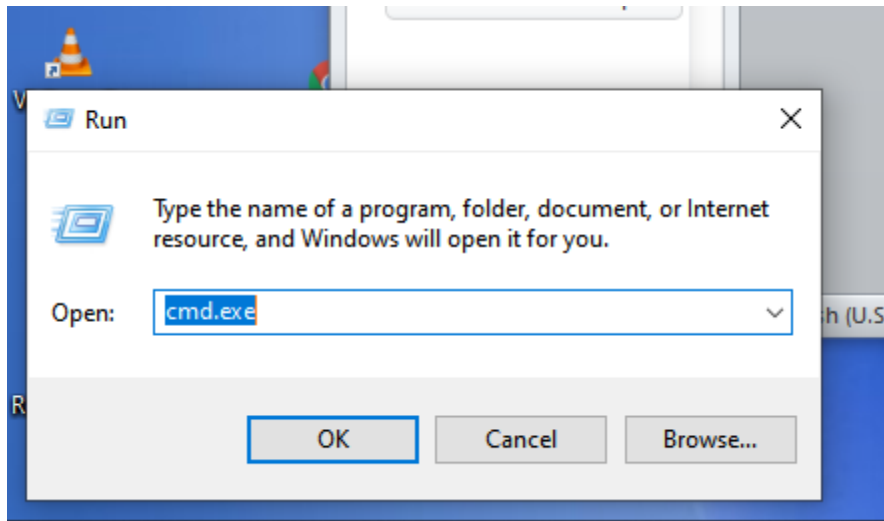
Save it somewhere. Unzip and go into it with the explorer. Copy

AVSMeter.exe into your VideoFred scripts directory.

Open up dos shell by right clicking on the start button and hitting the run.

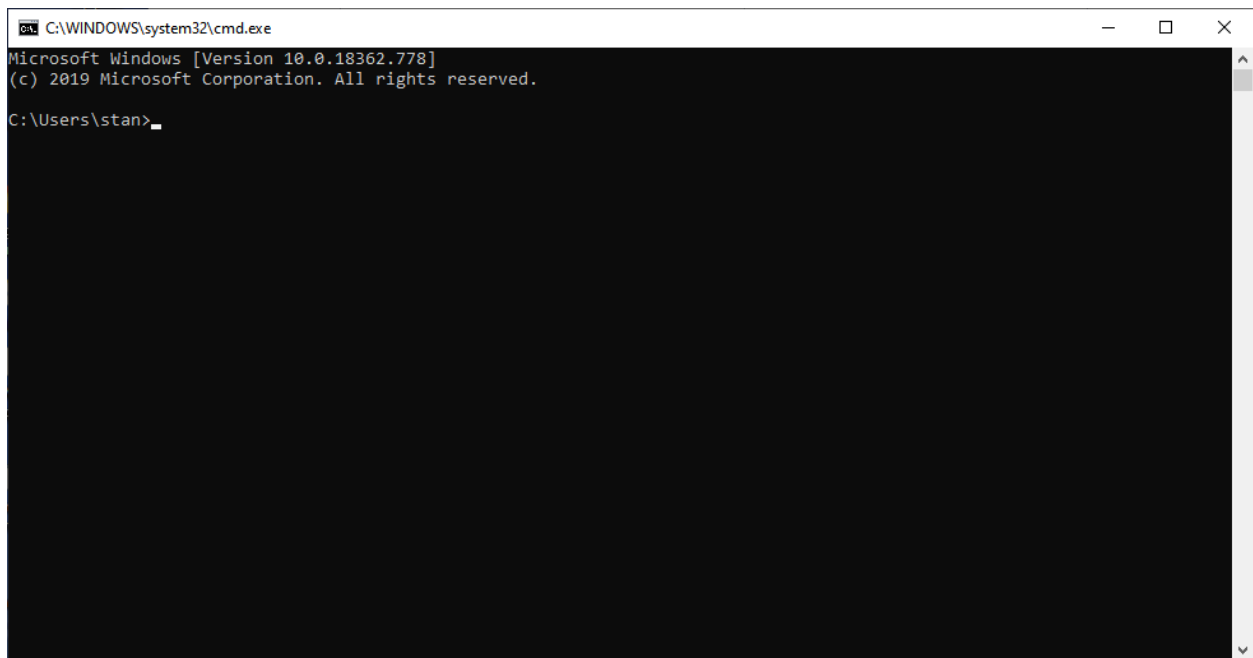


You will get the following:



Type in cmd.exe and then hit the OK button.

The command shell opens up.



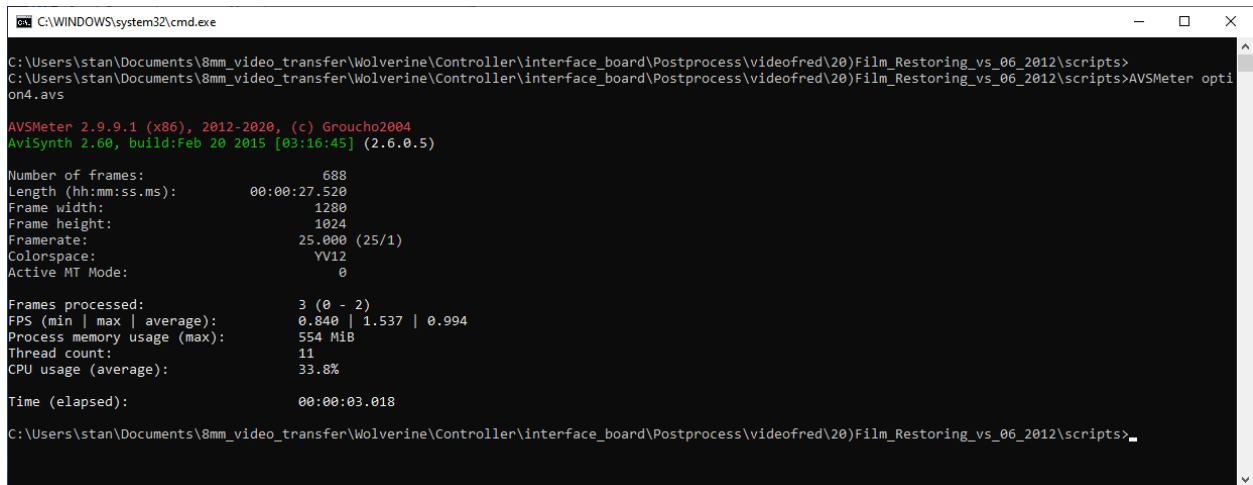
In the shell change the directory to your VideoFred scripts dir. For example, on my machine, I type in the following.



Then type in the following command in the shell:

AVSMeter.exe option4.avs

Should see the debug report.



```
C:\WINDOWS\system32\cmd.exe
C:\Users\stan\Documents\8mm_video_transfer\Wolverine\Controller\interface_board\Postprocess\videofred\20\Film_Restoring_vs_06_2012\scripts>
C:\Users\stan\Documents\8mm_video_transfer\Wolverine\Controller\interface_board\Postprocess\videofred\20\Film_Restoring_vs_06_2012\scripts>AVSMeter option4.avs

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:          688
Length (hh:mm:ss.ms):      00:00:27.520
Frame width:               1280
Frame height:              1024
Framerate:                 25.000 (25/1)
Colorspace:                YV12
Active MT Mode:            0

Frames processed:          3 (0 - 2)
FPS (min | max | average): 0.840 | 1.537 | 0.994
Process memory usage (max): 554 MiB
Thread count:              11
CPU usage (average):       33.8%

Time (elapsed):            00:00:03.018

C:\Users\stan\Documents\8mm_video_transfer\Wolverine\Controller\interface_board\Postprocess\videofred\20\Film_Restoring_vs_06_2012\scripts>
```

If there are DLLs missing the report will show that.

After finding what is missing, get the components from the internet or contact me at:

sjelavic123@gmail.com and I will send you zipped DLLs.

Install the DLLs in your scripts directory and that should fix the issue.

Now you can save the file and it will be cropped, denoised and interpolated.

One more important note:

It is not a good idea to save it in uncompressed format. So, in VirtualDub click on Video then Compression and select the compression type. I like Logarithm but you may want a different one, whatever suits your needs.

One more note:

Option4.avs sets the final frame rate to 25 FPS. You can change that to whatever you want.

```
#PARAMETERS
#-----
#-----
result="result4" # specify the wanted output here

trim_begin=2 trim_end=10 play_speed=18 #trim frames and play speed (PAL: 16.6666 or 18.75)

numerator= 25 #numerator for the interpolator (final frame rate)
denominator= 1 #denominator example: 60000/1001= 59.94fps
```


And that is it. Save the file and call it something like my_clip1_final.avs.

VirtualDub can also be used to concatenate the clips.

For that, save the processed clips in raw format.

Open the first clip in VirtualDub and move the end of the clip by clicking the end button.



Then click on File then Append Video segment. Hit again end button (do not forget that) then append next clip and so on until the last clip is in. Then set the compression and save the final video.

Hawkeye 2-exposure HDR

Required Support Software

Download:

<https://www.theimagingsource.com/support/downloads-for-windows/software-development-kits-sdks/icimagingcontrolcsharp/>

Once downloaded, run the .exe file for install the TIS components.

Download Hawkeye HDR app:

<https://github.com/vintagefilmography/HDR-UX178>

HDR Windows software for Hawkeye

Note: Hawkeye board V12 or higher and MSP FW mod are required for proper HDR operation to provide two camera triggers for a single external trigger.

This is the windows software that runs hdr on the Wolverine scanner that has the Hawkeye mod. The software is written in Visual Basic and it connects to the camera and waits for the image ready event. After the event is received the sw stores the first image and lowers the camera exposure for the second image. When the second event is received it stores the second image. The process then repeats. The hawkeye MSP430 firmware has a mod to trigger the camera twice for each external trigger.

To run the sw go to the .../bin/Release dir and run the hdr1.exe file.

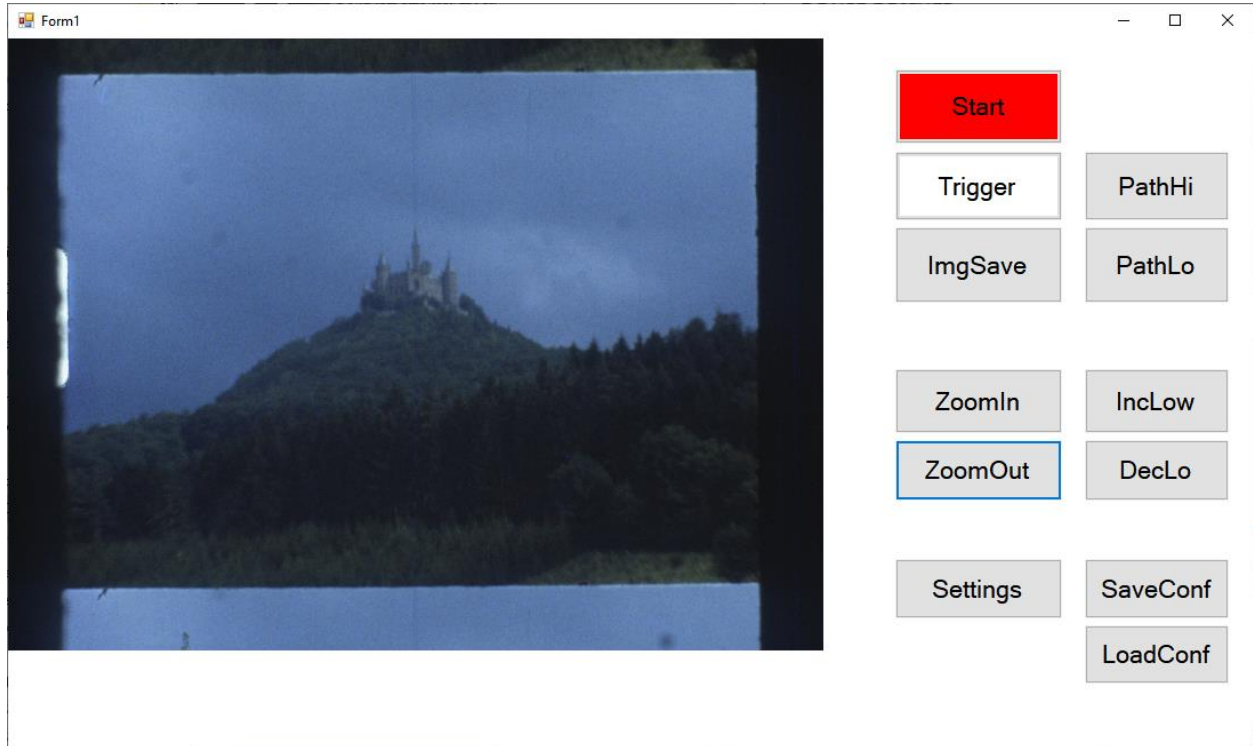
If you run into DLL issues, make sure that the TIS setup has been run as instructed above.

You also may want to install the Visual Studio 2019 community free version just to make sure that there are no DLL incompatibilities.

The Device Settings window will pop up.

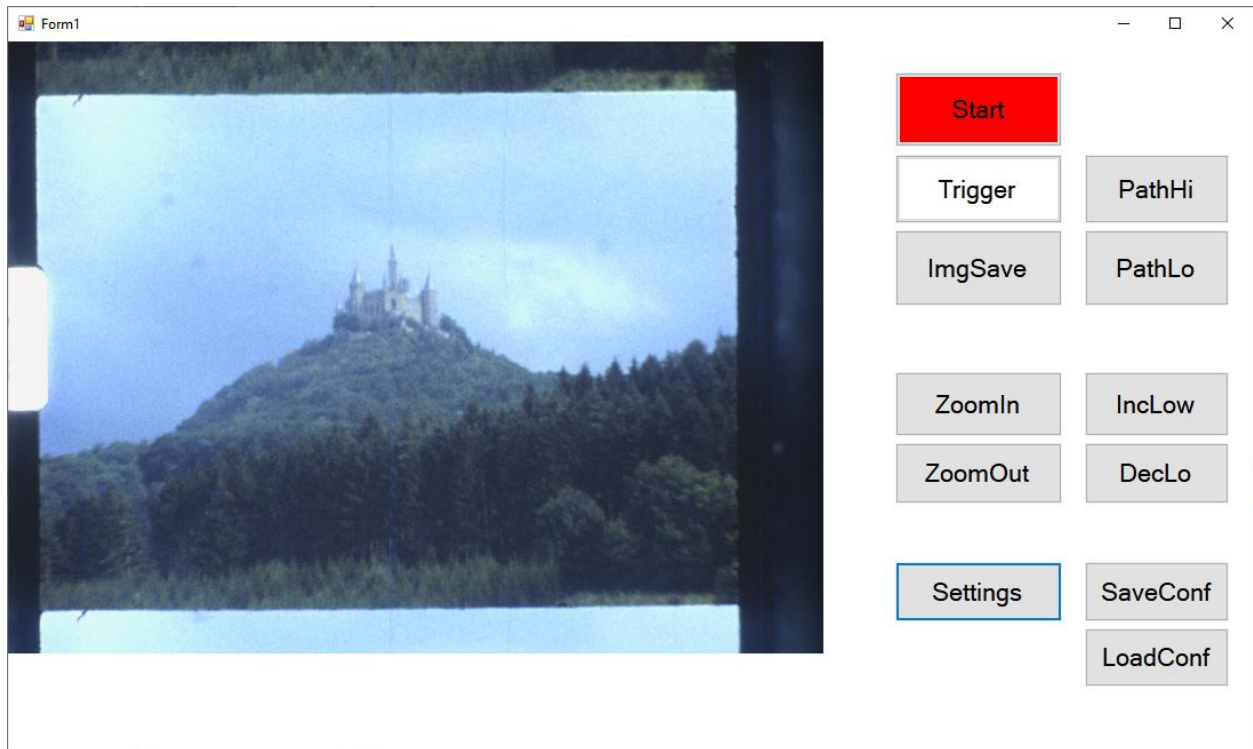
Follow the instructions from the github readme file.

Click OK. A new window will open.



Toggle the Trigger button to make sure the trigger is not on and then click the Start button. The camera preview preview should get displayed. Click on ZoomOut to be able to see the whole frame.

:



Now, click on PathHi and PathLo to set the paths for your hi and low exposure images.

Click on IncLo a few times so that it is set to 2 or 3. That means that the low exposure will be 2 or 3 stops below the high. You can always go the other way by hitting the DecLo button.

Turn the Start Button Off.

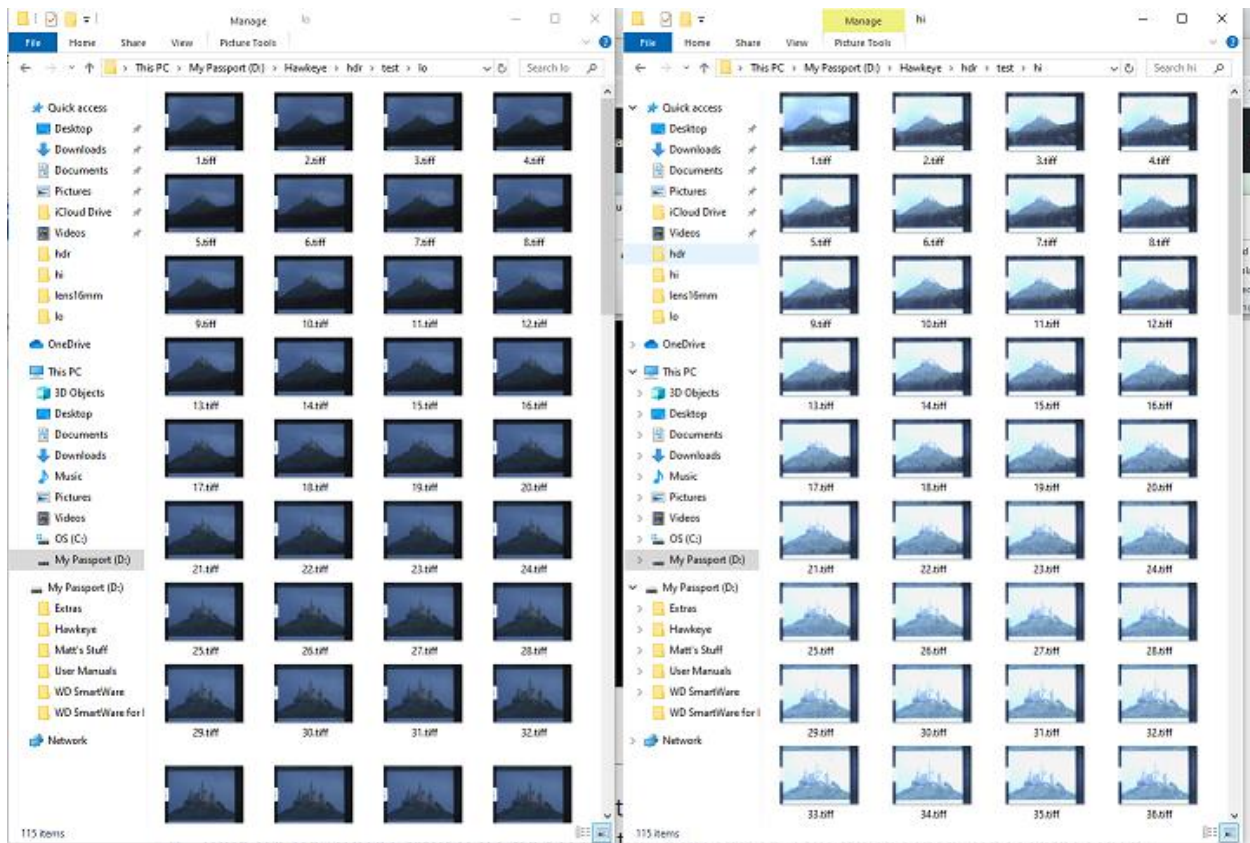
Turn on the Trigger button, Save button and Start button in that order.

The Image should go black.



Now you are ready to do the scan. Set the Hawkeye to slow speed to turn on HDR. You may try the turbo switch to speed up the scan but be careful because this could cause missed frames and the HDR exposures to go out of sequence.

Once done, you should have two directories with a bunch of images



Download enblend/enfuse from:

http://enblend.sourceforge.net/enfuse.doc/enfuse_4.2.xhtml/enfuse.html

Copy it from your download dir to your hdr work dir.

Create the following dos script and name it hdr.bat or enfuse.bat or something similar.


```
SET Input_PATCH1=D:\Hawkeye\hdr\hi

SET Input_PATCH2=D:\hawkeye\hdr\lo

SET OUTPUT_PATCH=D:\hawkeye\hdr\out

SET start=1

SET end=1000

FOR /L %%i IN (%start%,1,%end%) DO (CALL :loopbody %%i)

GOTO :eof

:loopbody

enfuse.exe --soft-mask --exposure-weight=1.0 --saturation-weight=0.2 --contrast-weight=0.0 --entropy-weight=0.0 --exposure-
optimum=0.4 --exposure-width=0.2 -v -o "%OUTPUT_PATCH%\%1.tiff" "%Input_PATCH1%\%1.tiff" "%Input_PATCH2%\%1.tiff"
GOTO :eof
```

Edit the script path names as required. The combined files will be in the out dir.

Before you run the bat file make sure that enfuse.exe and vcomp140.dll are copied over from the enfuse bin directory to the directory where the batch file is located. And that should be it. Run the bat file.

The images on the out dir will be an HDR blend of high and low exposure providing details for the bright and dark areas.

