

# Live Recording Prep

Some tips on things that may make things go easier





# Recording Drives

- Hard drives - internal, external, mechanical, or SSD. They have varying speeds that they can read/write data. The more tracks you will be recording simultaneously, as well as the **Sample Rate** and **Bit Depth**, can greatly affect your needs.
- Blackmagic Disk Speed Test - this is a free Mac program that can help with a comparison for drives you might have to work with.





There are several examples of different drives, both internal and external, on the next few slides to give an idea of relative speeds.

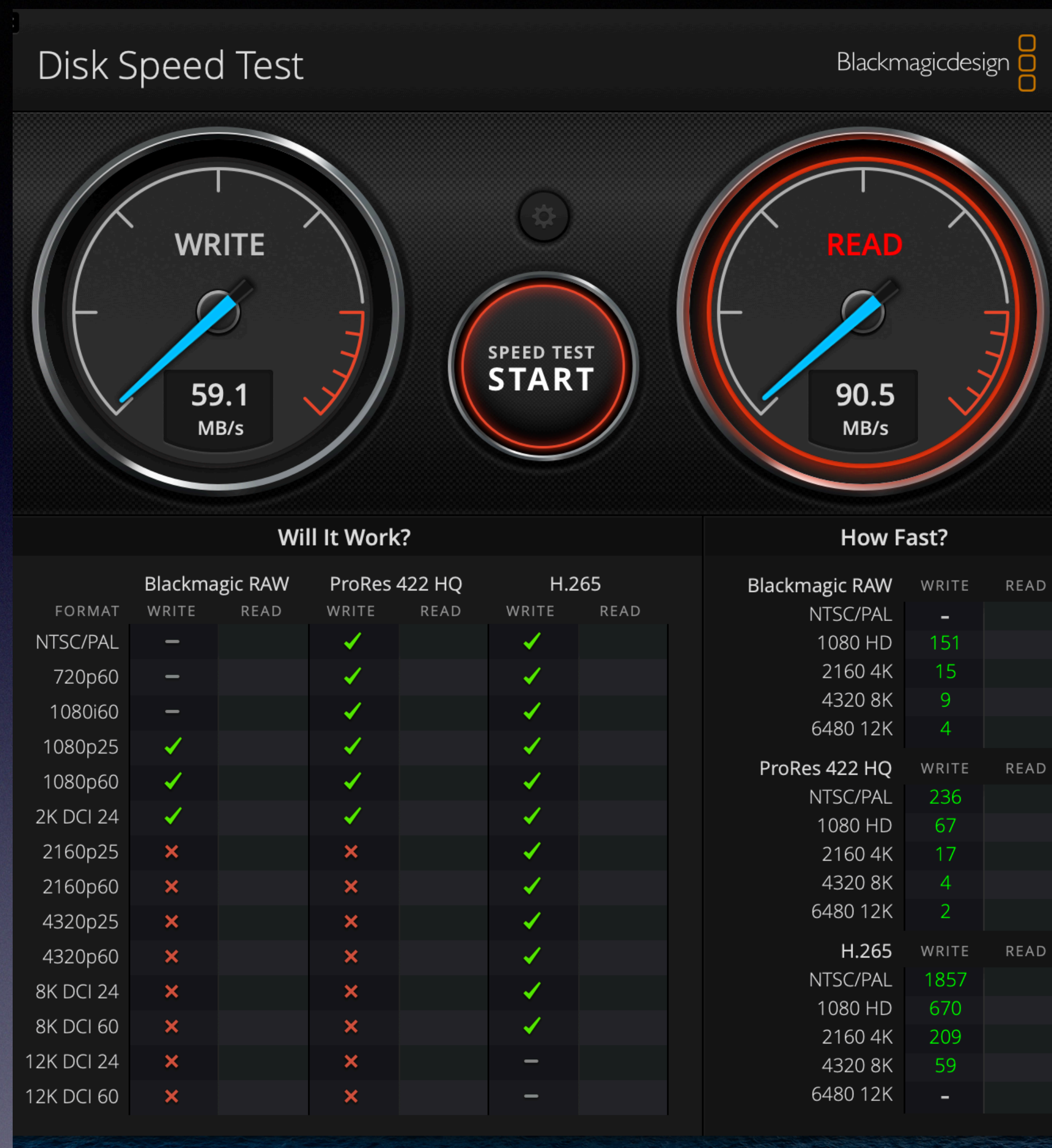
I used several computers as well since the factory installed Apple SSDs vary greatly with year and model

The large meters at the top are the numbers we're interested in. The bigger the numbers the faster the drive can read and write data.

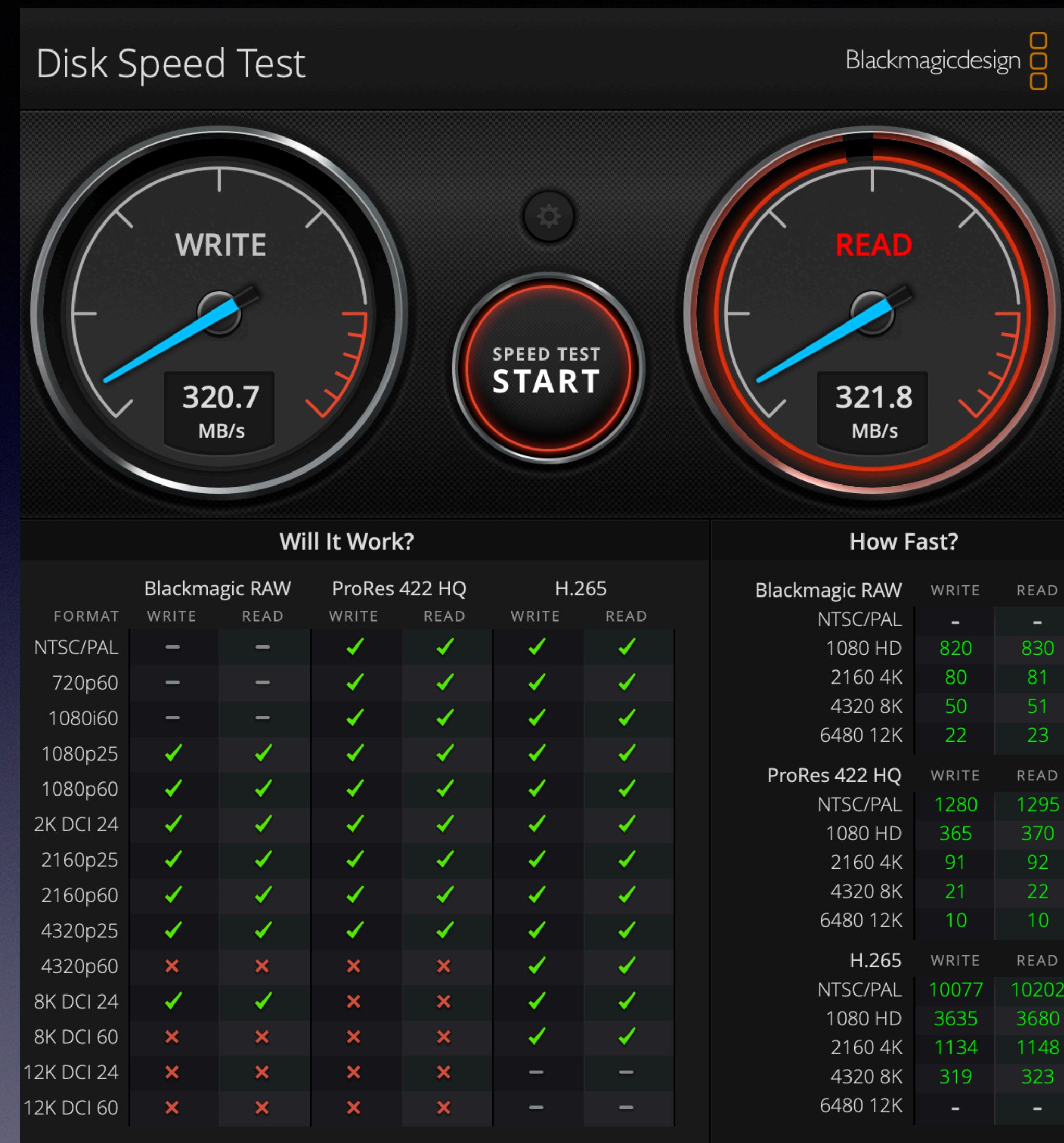


Seagate External USB HDD drive



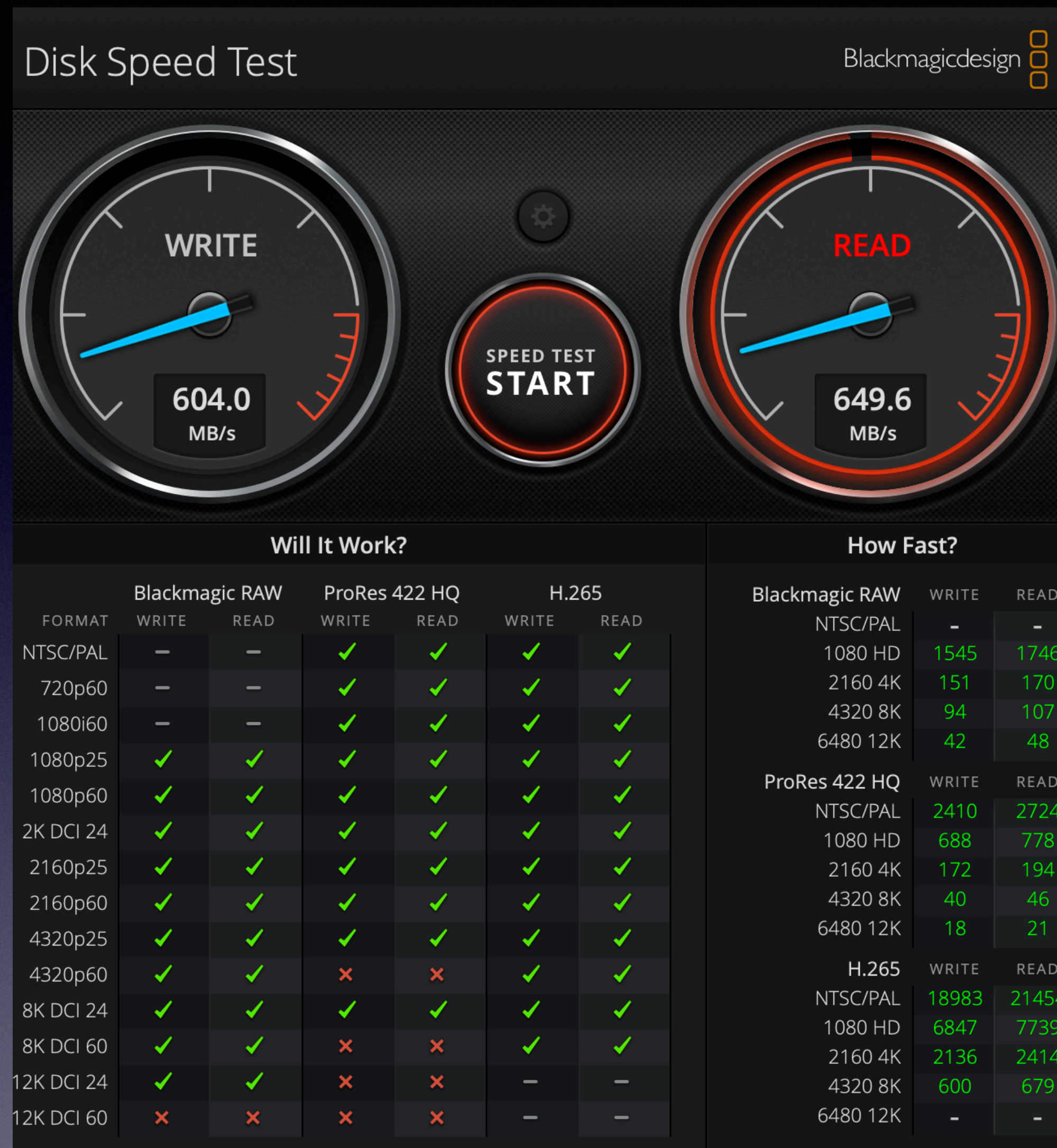


Western Digital External USB HDD drive

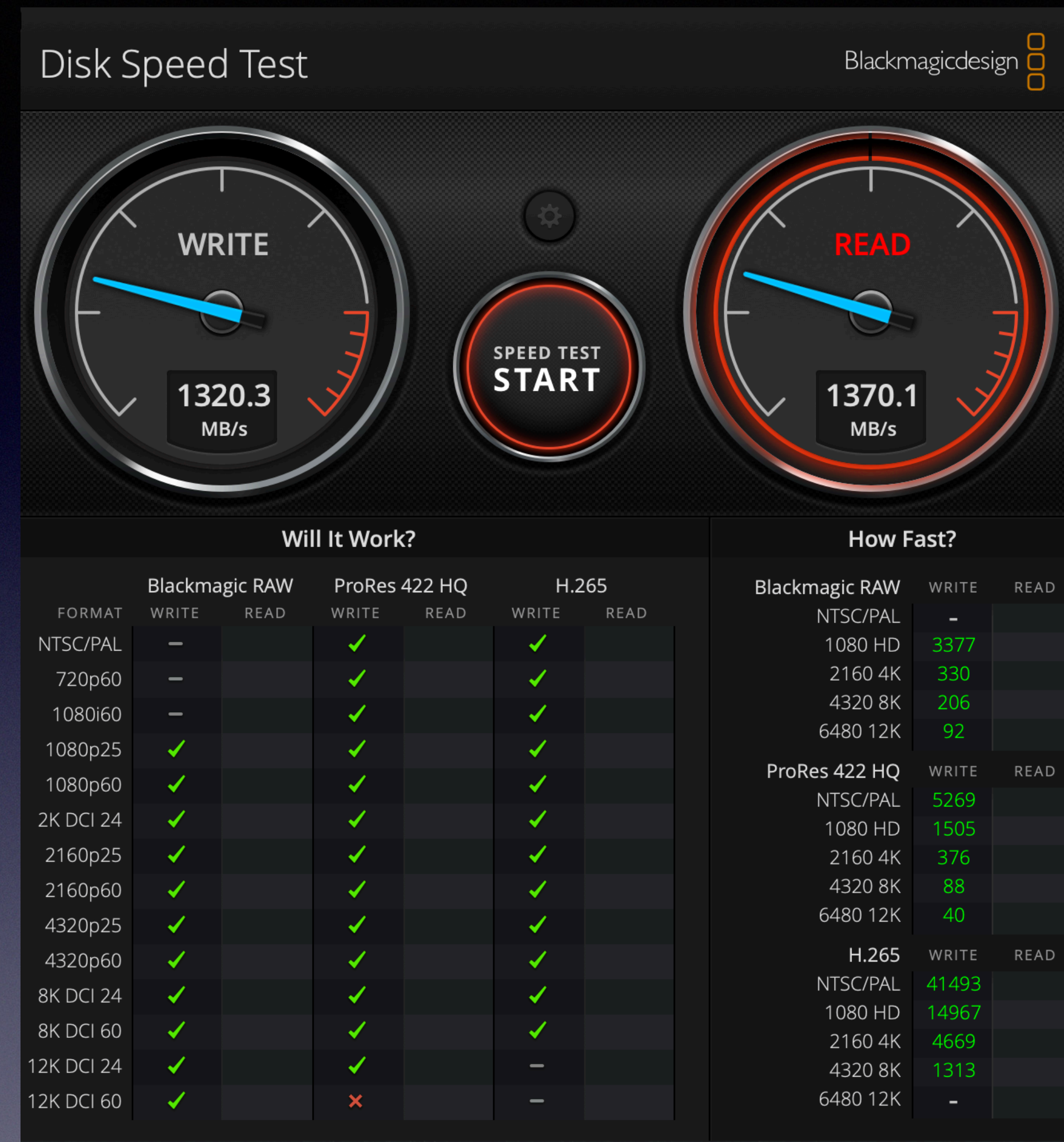


OWC External USB SSD



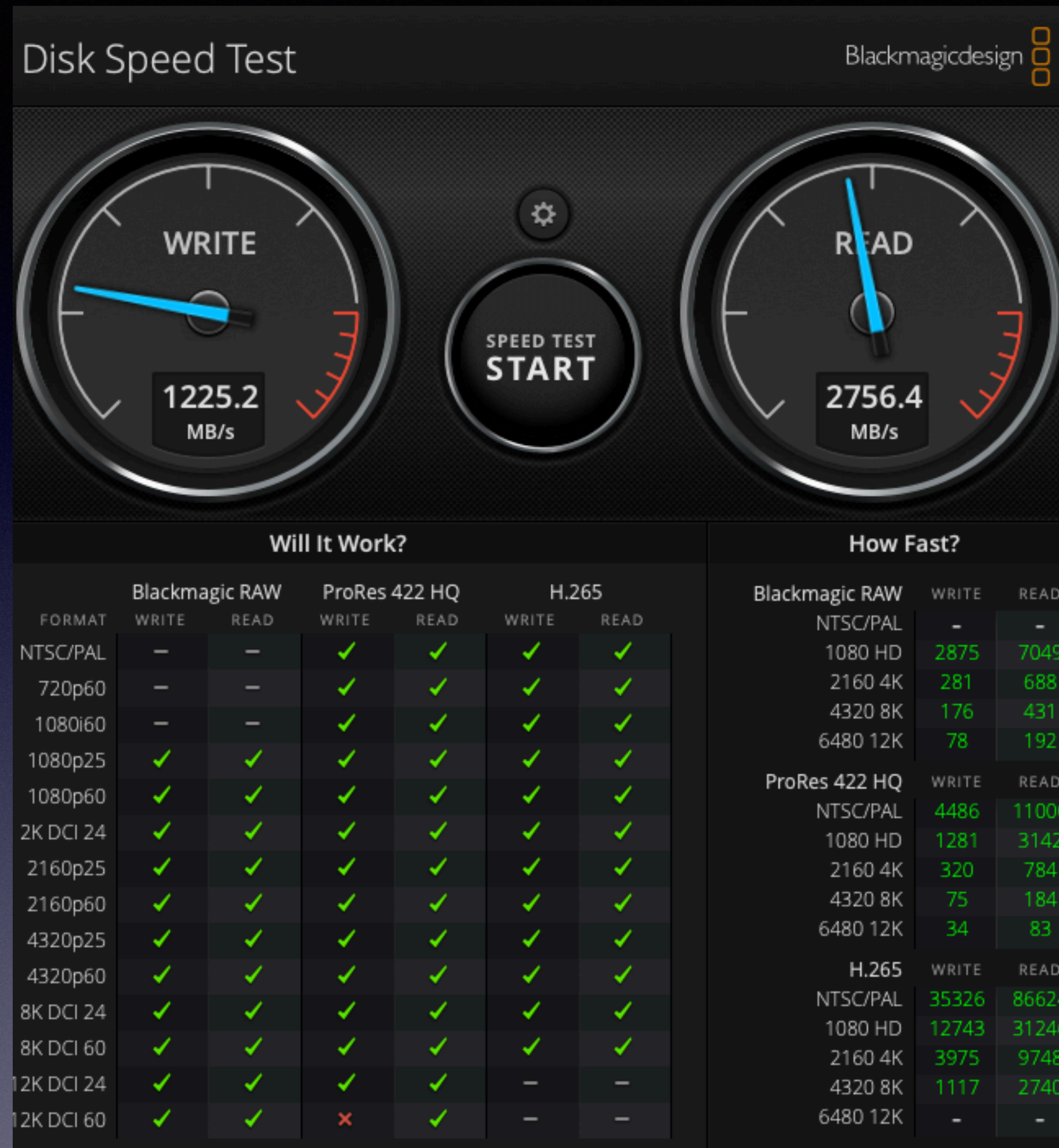


2013 MacBook Pro internal SSD

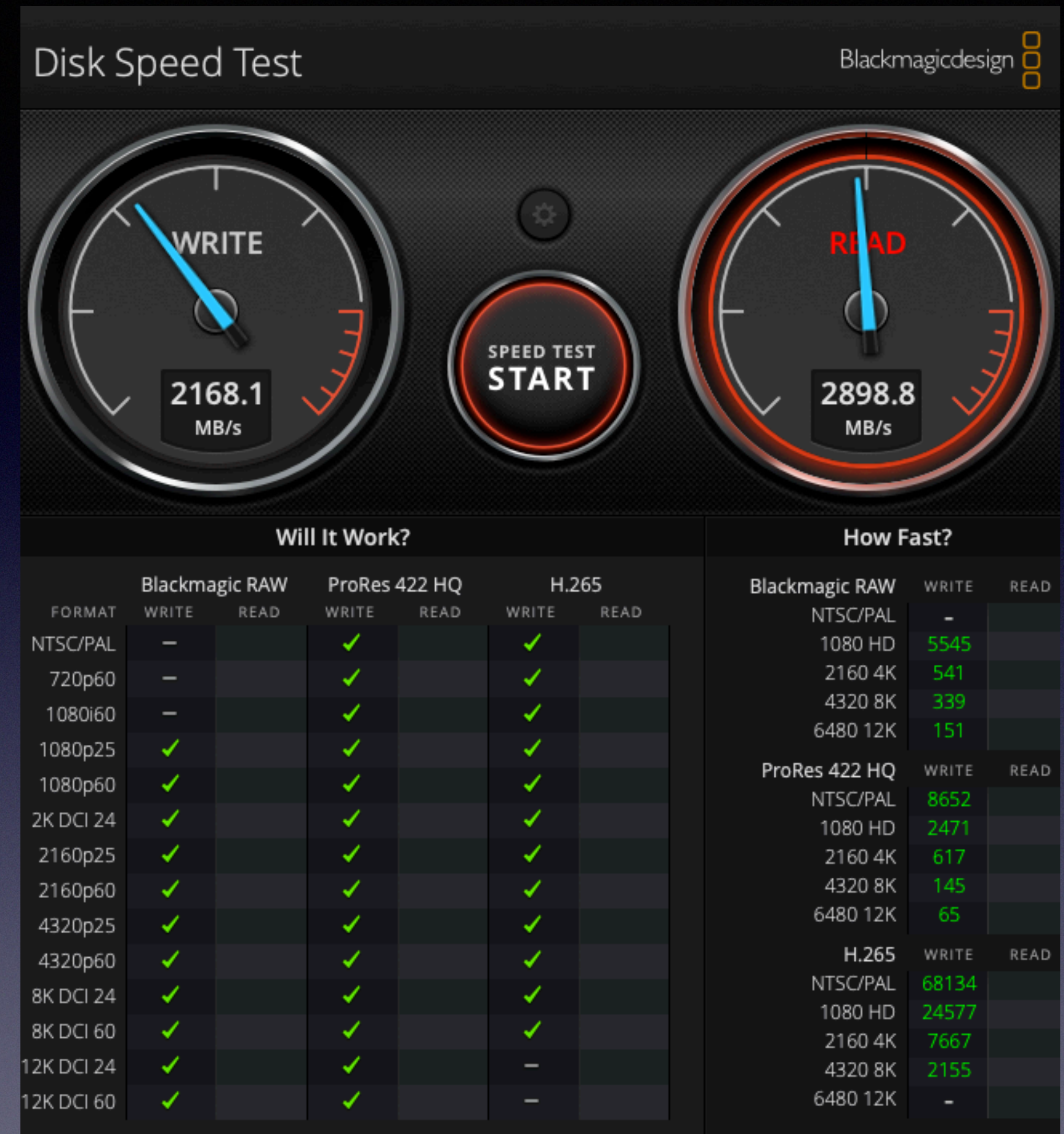


2015 MacBook Pro internal SSD





2019 Mac Pro internal SSD



2020 M1 Mac mini internal SSD



# Recording Space Available

- You'll need to know several things to make sure you have the minimum space required to record a live show or studio session
  - Bit Depth- 16 bit is 2 bytes per sample, 24 is 3, and 32 is 4
  - Sample Rate - 44.1k, 48k, 88.2k, 96k, 192k samples per second
  - Number of tracks being recording - up to 128 at once over AVB
  - Length of performance in minutes (and better to plan for more)



# Calculate for 1 minute on 1 track

- **bytes per sample \* sample rate per second \* 60 (for one minute)**
- 16 bit/44.1khz requires 5,292,000 bytes per minute - about 5.3 MB
- 24 bit/48k requires 8,640,000 bytes per minute - about 8.6 MB
- 24 bit/96khz requires 17,280,000 bytes per minute - about 17.3 MB
- 32 bit/96khz requires 23,040,000 bytes per minute - about 23 MB
- 32 bit/192khz requires 46,080,000 bytes per minute - about 46 MB



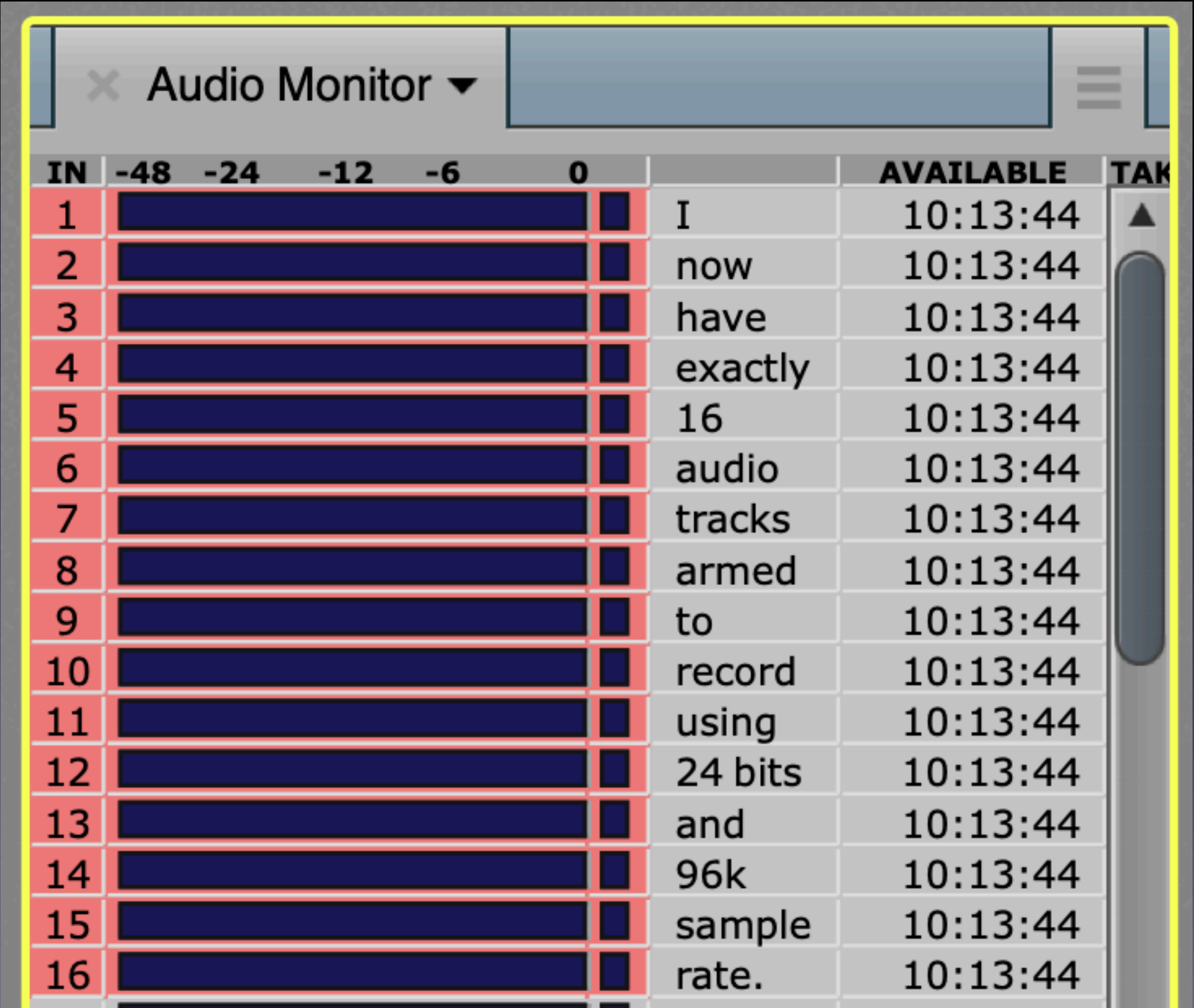
# Total space needed for Performance

- **number of tracks \* number of minutes \* MB per minute**
- 24 tracks \* 60 minutes \* (16/44.1k) 5.3MB = 7,632 MB or 7.6 GB
- 32 tracks \* 90 minutes \* (24/48k) 8.6 MB = 24,768 MB or 24.8 GB
- 32 tracks \* 120 minutes \* (24/96k) 17.3 MB = 66,432 MB or 66.5 GB
- 96 tracks \* 150 minutes \* (24/96k) 17.3 MB = 249,120 MB or 250 GB
- 96 tracks \* 150 minutes \* (32/192k) 23 MB = 331,200 MB or 331 GB



Digital Performer's Audio Monitor will do these calculations for you. If you arm the tracks you're going to be recording onto, it will tell you the total time available on the current project drive.

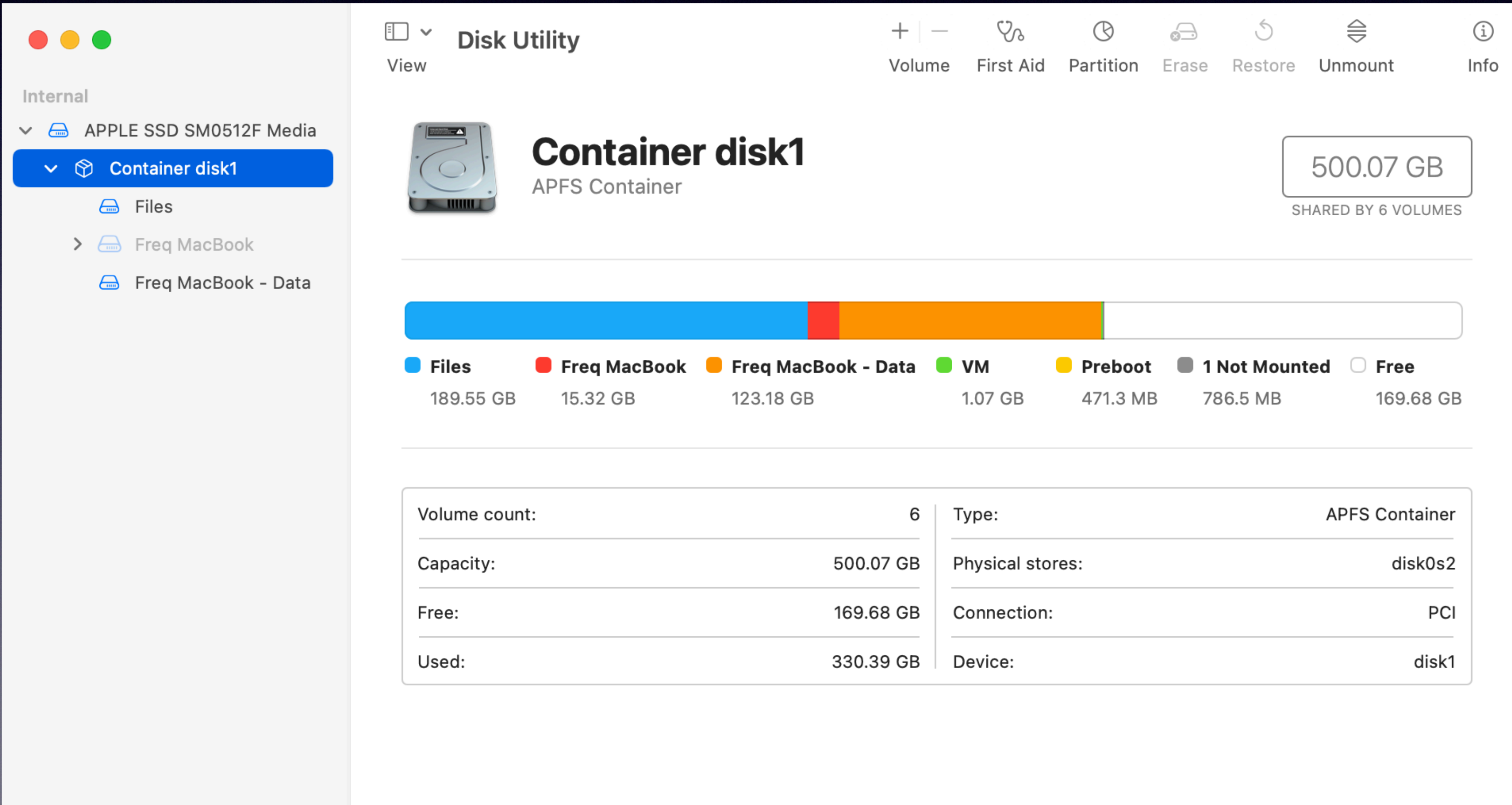
In the example on the right the record format is set to 24 bit/96k. 16 tracks are armed. The column on the right says there are just over 10 hours of record time available before the drive is full.





# Streamline the computer for recording

Making sure unneeded things are off and drives are healthy

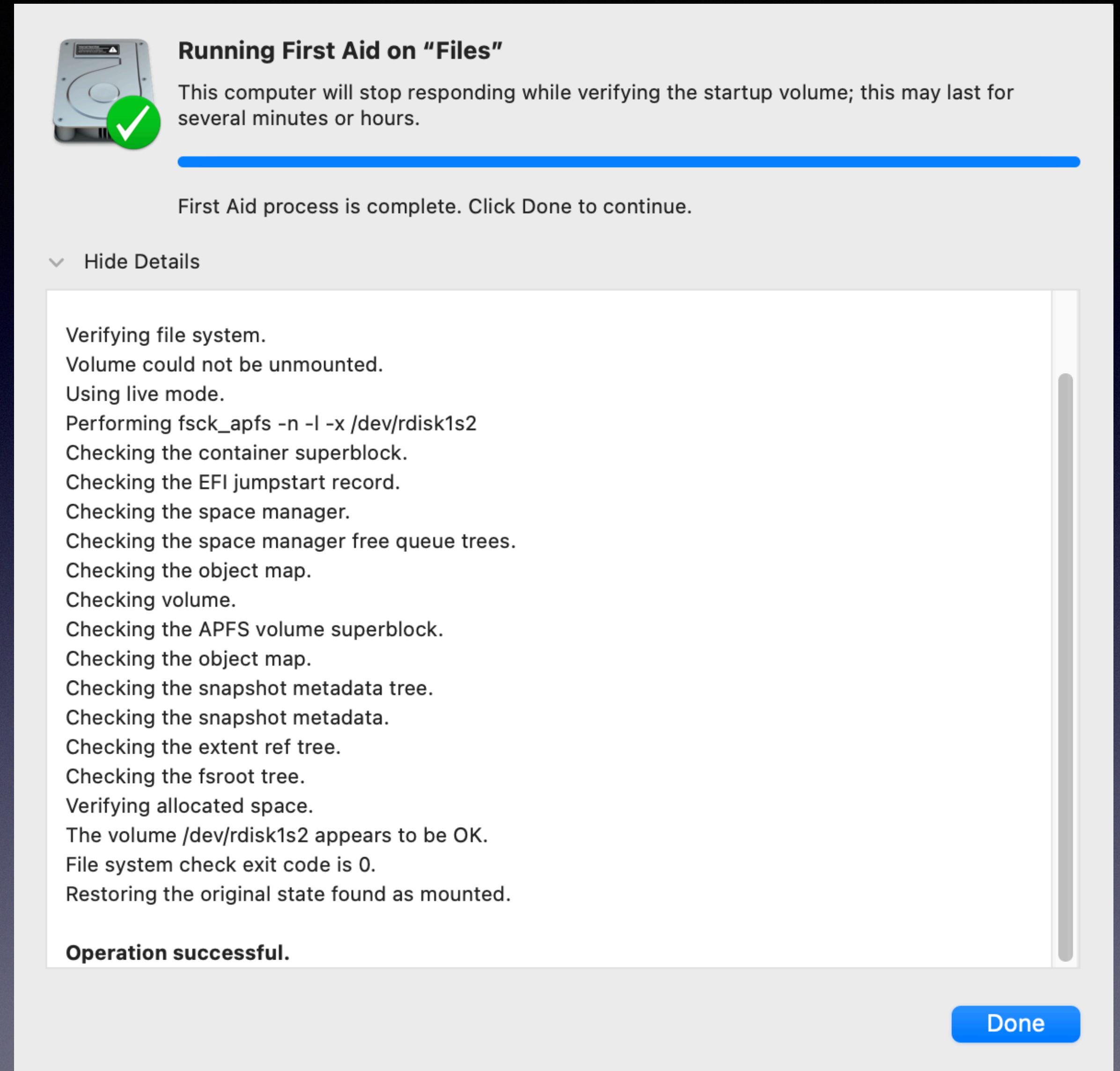




# Inside Disk Utility

It's a good idea to run First Aid on all the drives that will be connected when recording. This helps make sure there are no known drive problems.

Completely remove unneeded files (making a backup of any data) or erase your record drive if possible. It is great to have a clean empty space to record to.



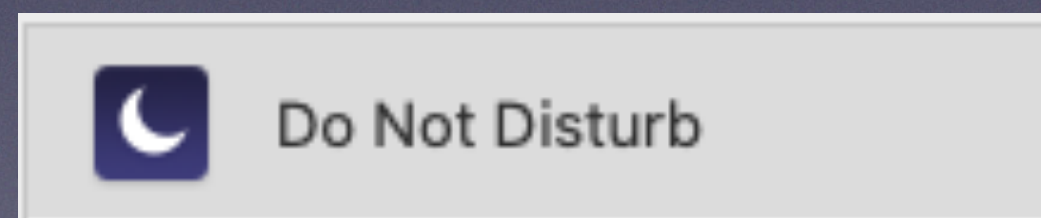


# System Preferences

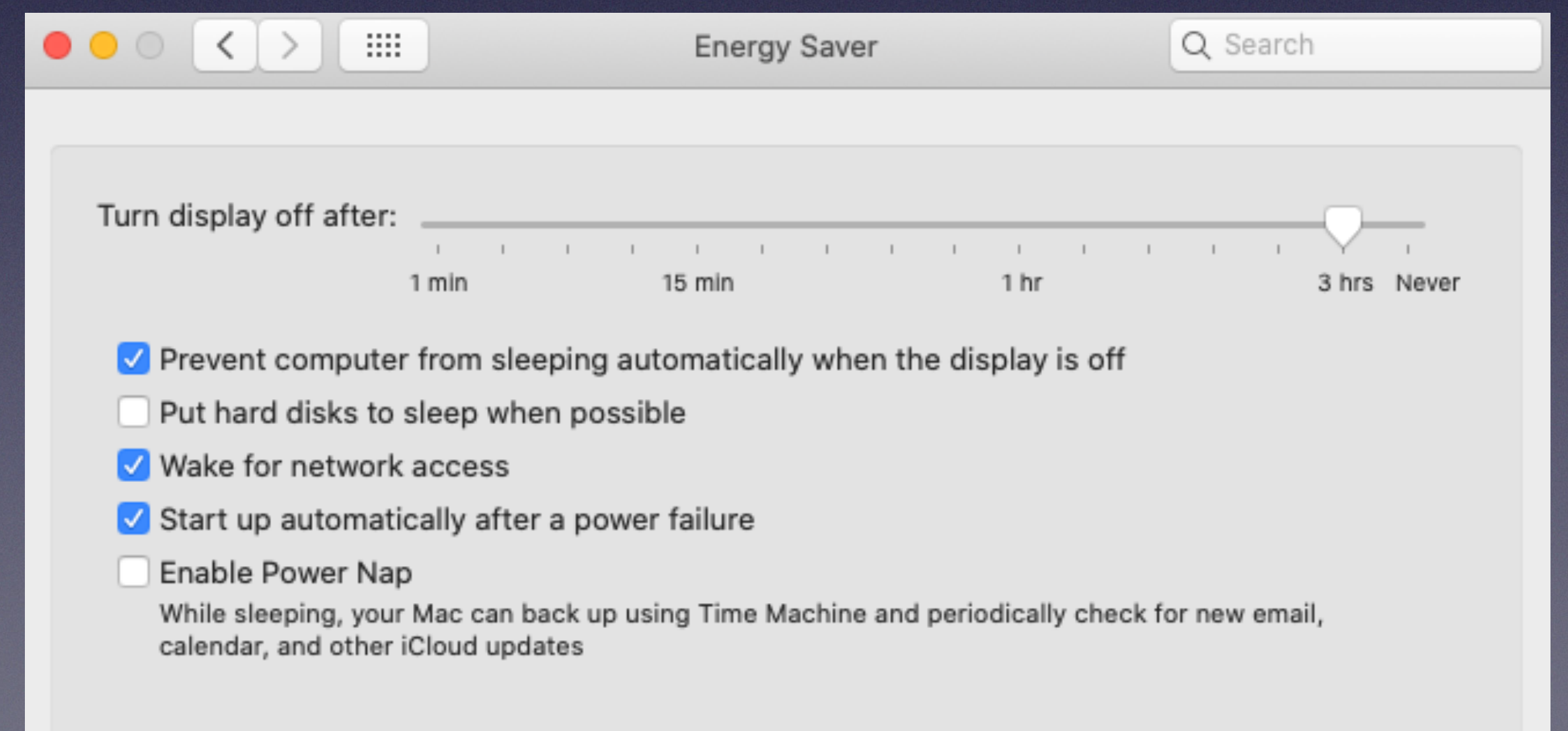
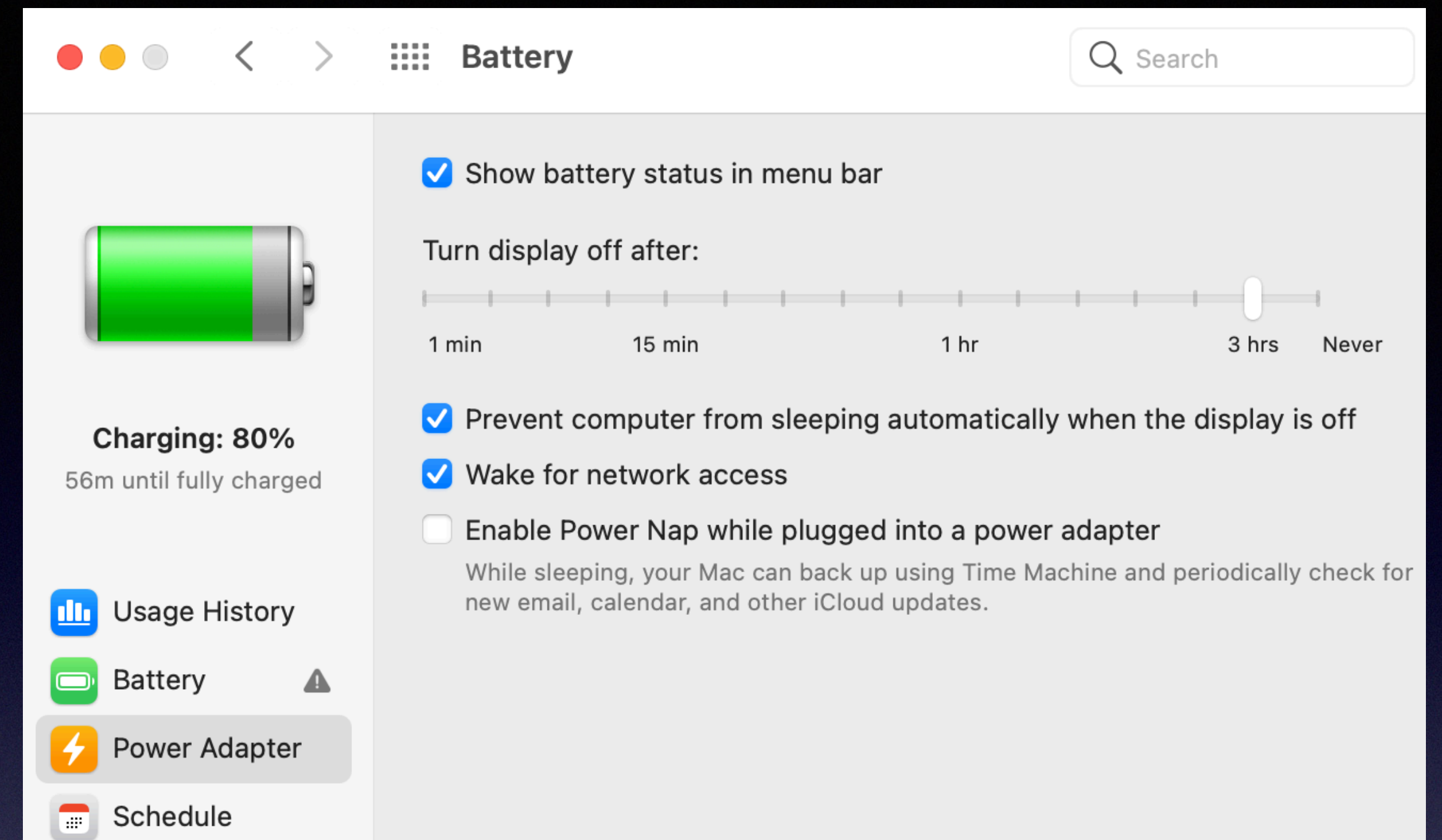
There are options for computer Sleep in the Battery or Energy Saver panel. Set “Turn display off after” to 3 hours or Never to prevent the display going dark during the recording.

Turn off “Put hard disks to sleep when possible” and turn off “Enable Power Nap” if those options are available.

Turn on Do Not Disturb in the Notifications panel.



In the Desktop & Screen Saver panel disable the Screen Saver.



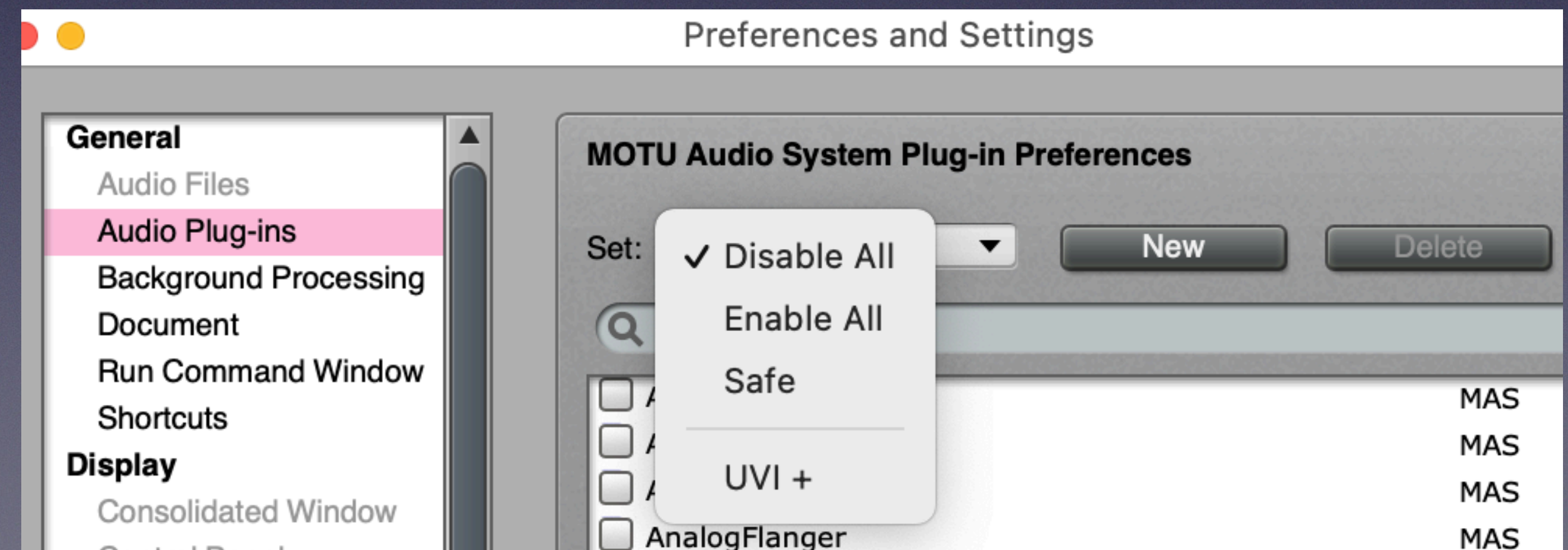


# Streamline DP for recording

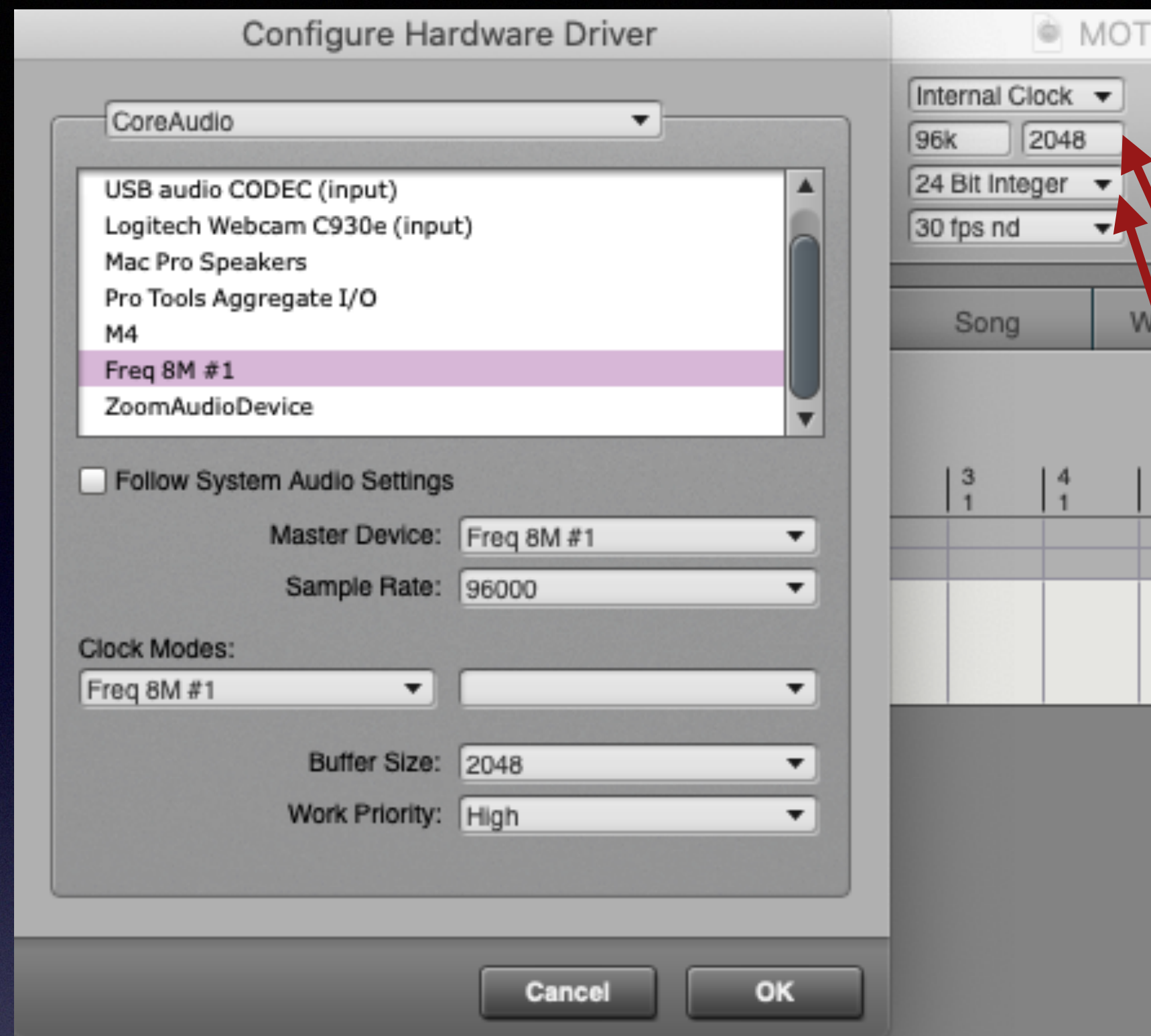
Quit all open applications. If you don't need them during the show, turn off WiFi, Bluetooth, and any menubar utilities.

If you launch DP with the option-key down, you can select a Plug-in Set. You can choose Disable All to help optimize performance.

You can also access this menu from Preferences/General/Plug-ins. If you do need some plug-ins during recording, you can create your own custom set here with just the ones you need.

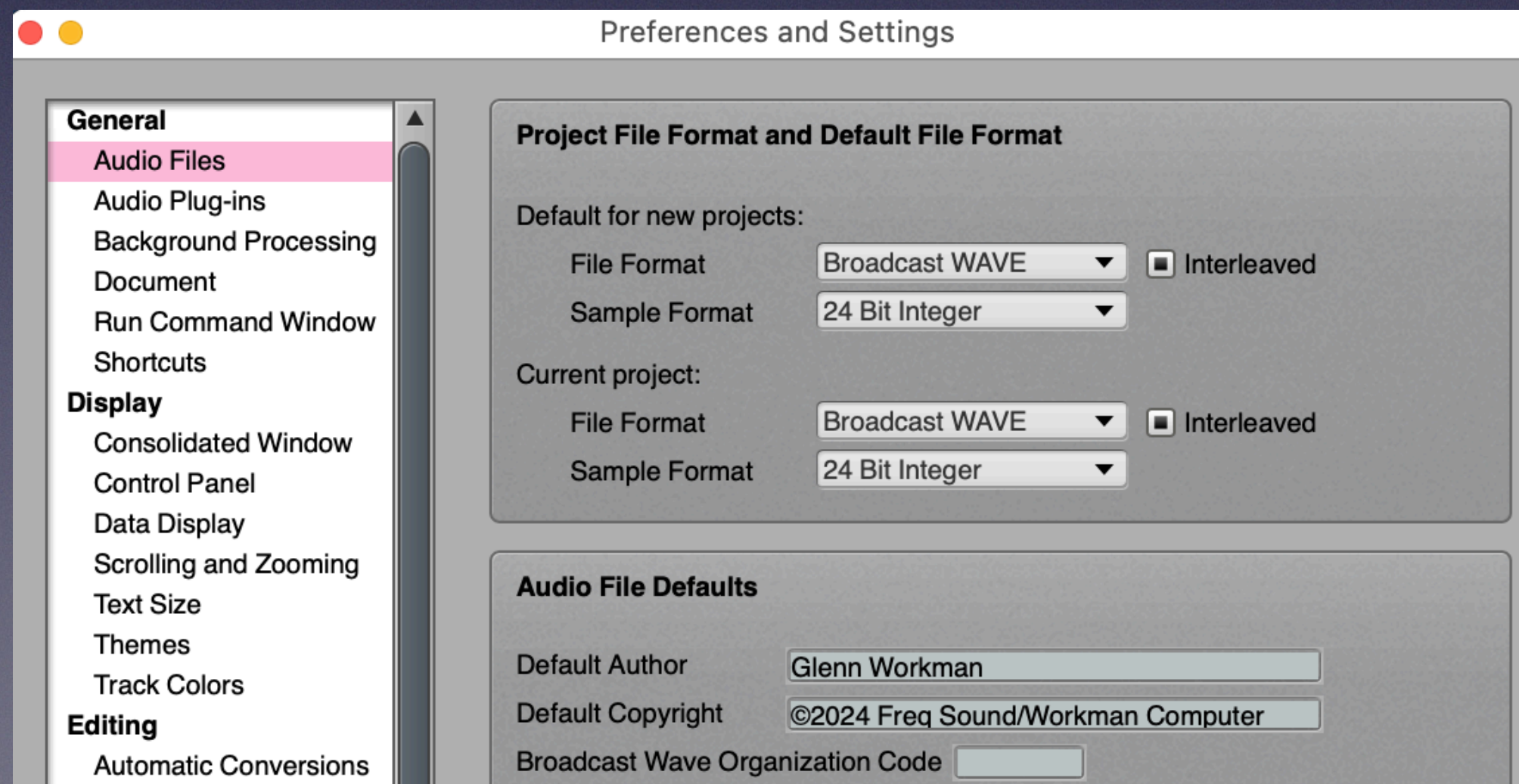






## Streamline DP for recording

In the Configure Hardware Driver window make sure the correct interface is selected. Set the Buffer Size as high as your interface allows. You can also set the Buffer Size in the Control Panel window.



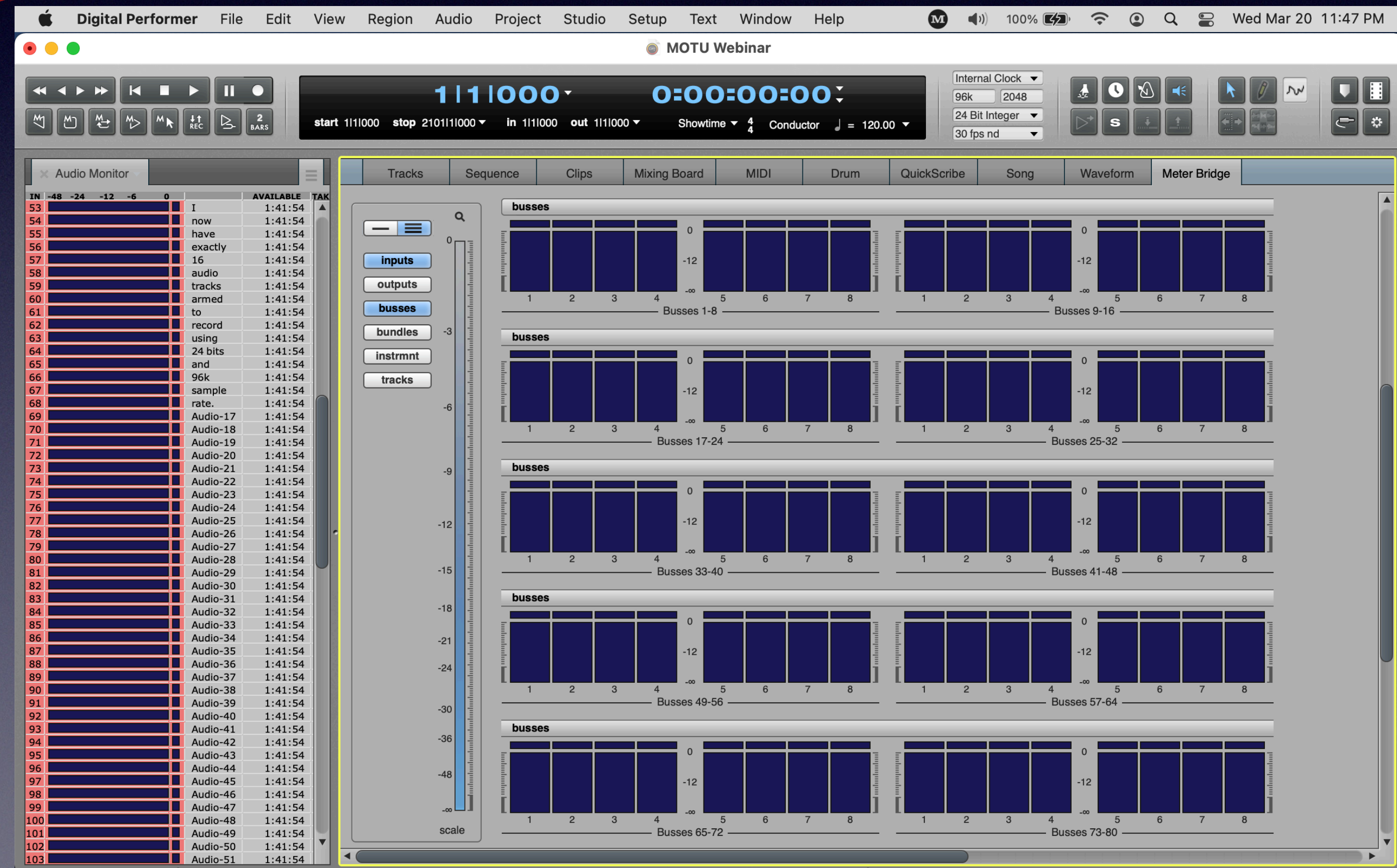
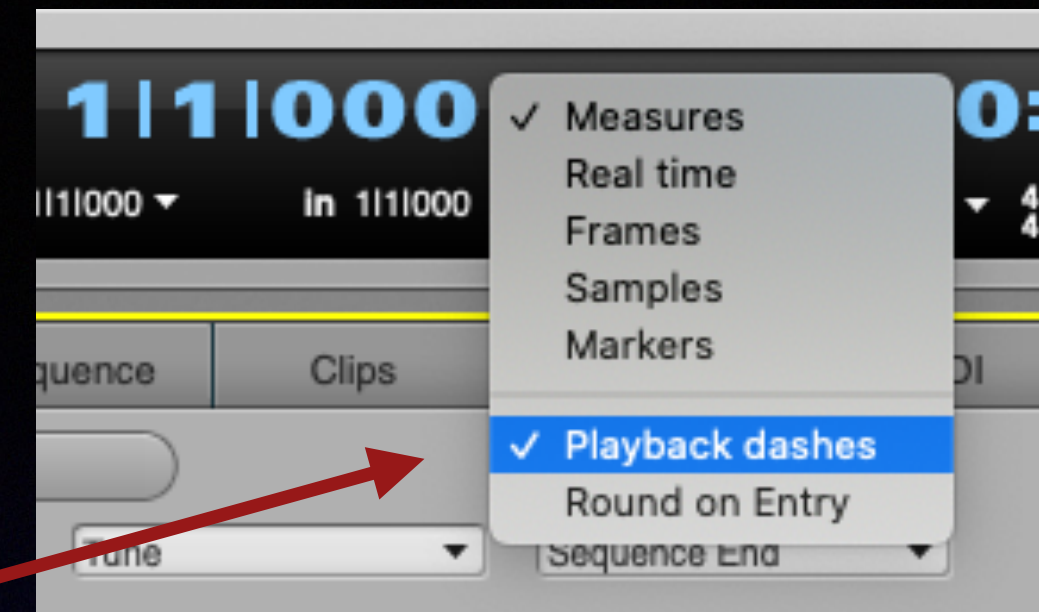
Bit Depth can be set for projects in Preferences/General/Audio Files. It too can be set in the Control Panel window.



# Streamline DP for recording

Rapidly changing numbers like ticks, hundredths of seconds, frames, and samples, can be turned into dashes during playback and recording for both of the Control Panel counters. This can help with a jerky or sluggish counter display.

Close all un-needed panels and windows. I prefer to see the Audio Monitor on one side and the Meter Bridge or Mixing Board in the body.





# AVB Setup & Suggestions

Using more than 2 AVB capable interfaces with an AVB switch

A MOTU AVB stream is a connection for up to 8 channels of audio per stream

The examples will be using two MOTU 8M interfaces and one Stage B-16 interface



Connected by USB

- 16 AVB Streams in and out except above 96k
- 44.1khz/48khz - 64 channels to/from computer
- 88.2khz/96khz - 32 channels to/from computer
- 176.4khz/192khz - 24 channels to/from computer but does reduce the AVB out streams to 8

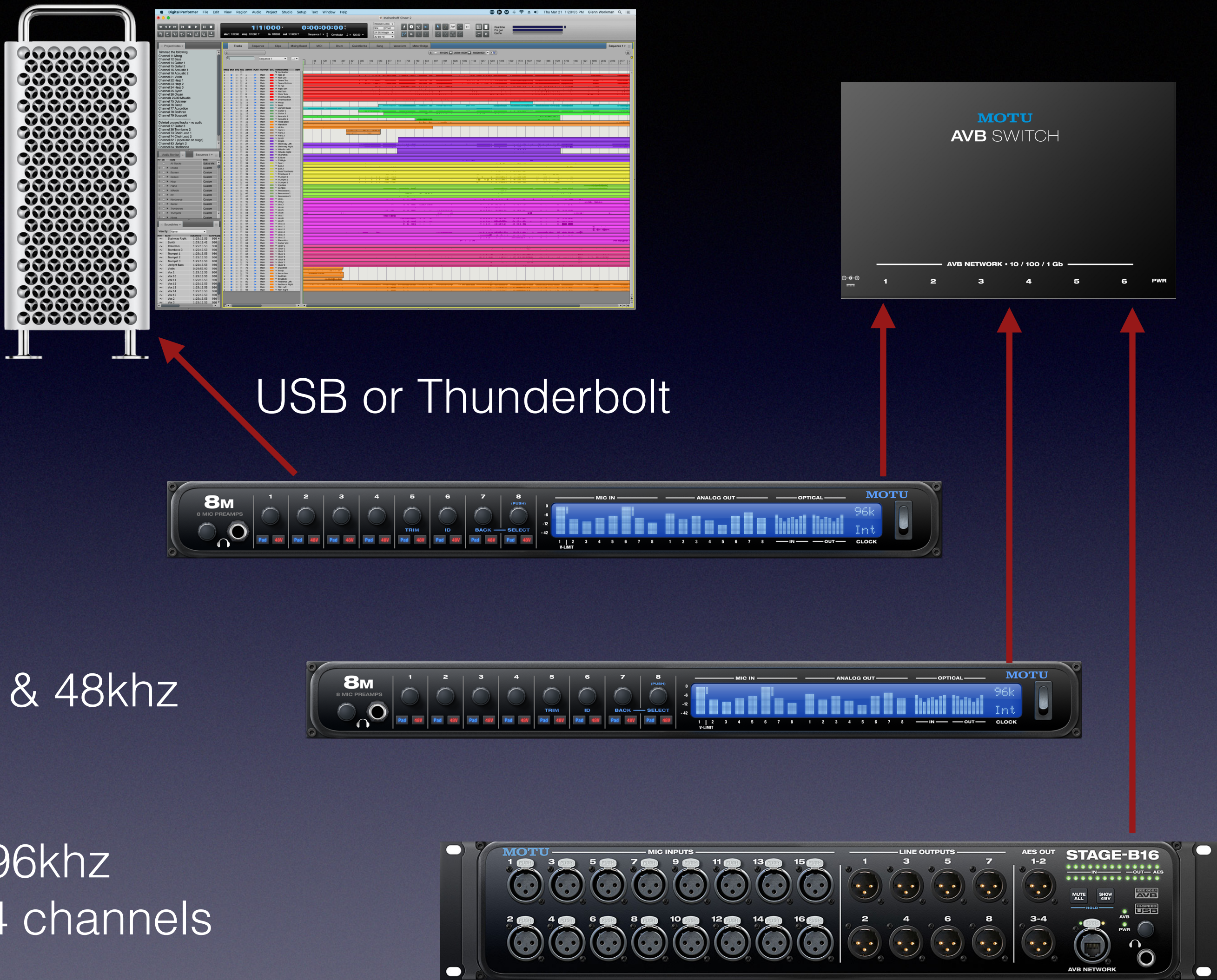
Connected by Thunderbolt

- 16 AVB Streams in and out available all the time
- 44.1khz to 96khz - 128 channels to/from computer
- 176.4khz/192khz - 64 channels to/from computer

8M Lightpipe inputs are 8 channels each at 44.1khz & 48khz  
Each 8M can produce 3 AVB streams at those rates

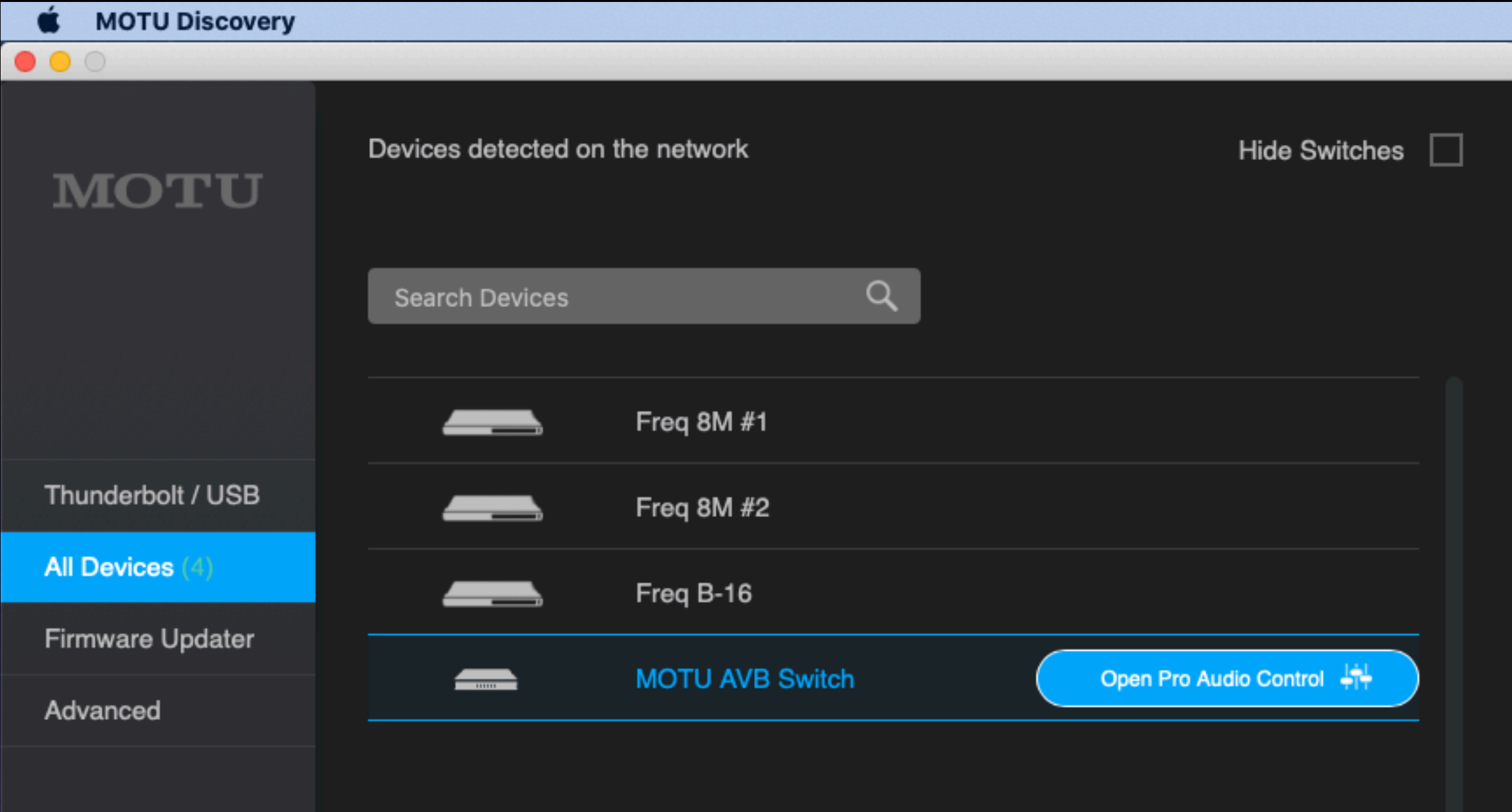
8M SMUX inputs are 4 channels each at 88.2khz & 96khz  
At those rates 2 of the AVB streams are reduced to 4 channels

Stage B-16 has a maximum sample rate of 96kz  
It has 2 AVB in & out streams at any rate from 44.1khz to 96khz

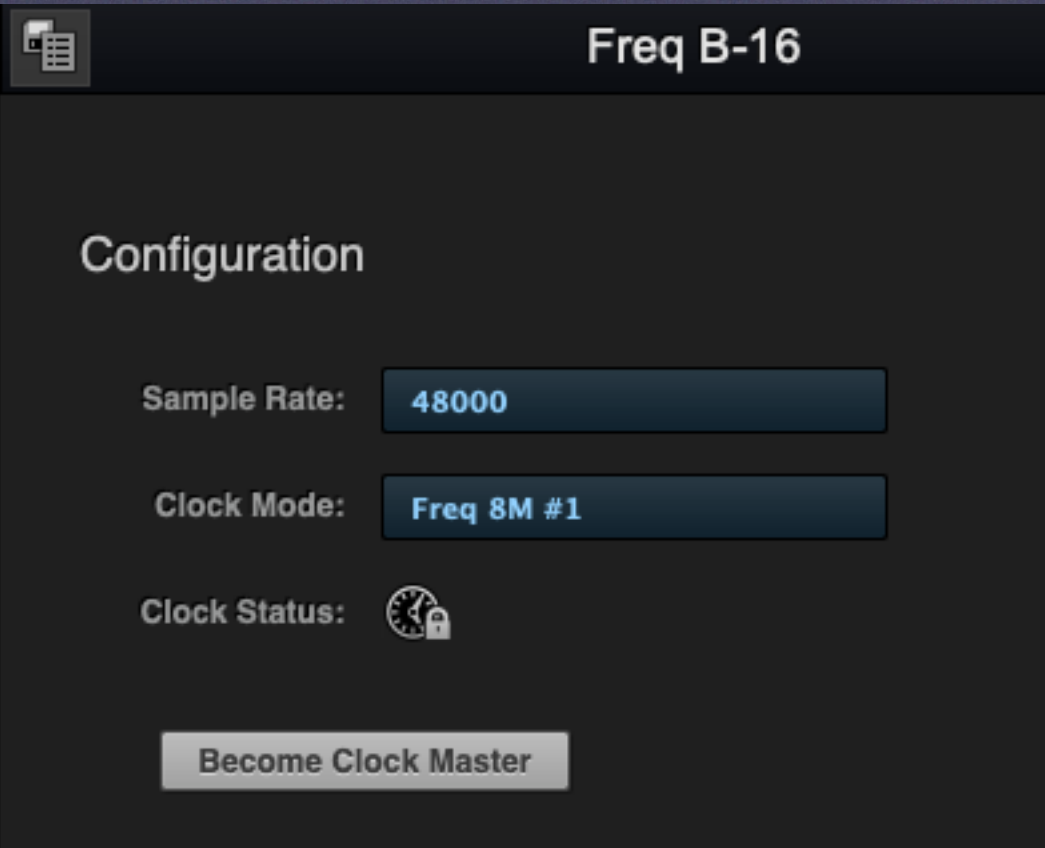
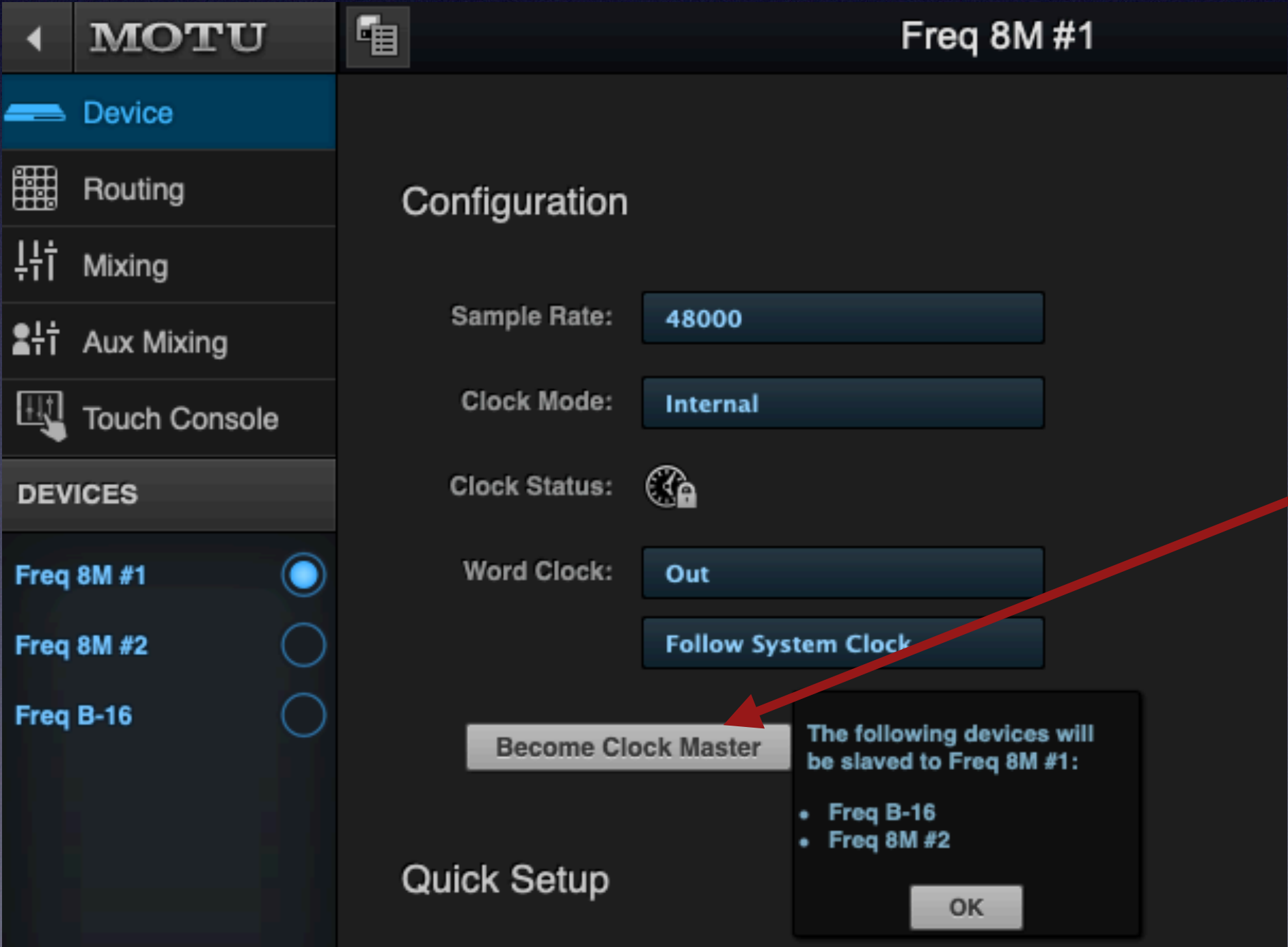




The MOTU Discovery app will show you all the devices connected to your computer. Hovering your mouse over any device gives you the option to open Pro Audio Control.



In this configuration the Freq 8M #1 is set to Become Master Clock. The other AVB devices sync to that as shown below.





Enable only the number of streams you'll need during the recording. Disable any Inputs and Outputs you don't need during recording. This routing screen shows 2 input streams from the B-16 and 3 from 8M #2. There are a total of 64 inputs available from the 3 interfaces, so set the To Computer number to match.

MOTU

Device

Routing

Mixing

Aux Mixing

Touch Console

DEVICES

Freq 8M #1

Freq 8M #2

Freq B-16

ENABLE INPUTS

Mic Inst

Optical A

Optical B

From Computer

ENABLE OUTPUTS

Phones

Analog

Optical A

Optical B

To Mixer

To Computer

AVB CONFIGURATION

Input Streams

Output Streams

INPUT CONNECTIONS

Output

Source

To Computer 1

To Computer 2

To Computer 3

To Computer 4

To Computer 5

To Computer 6

To Computer 7

To Computer 8

To Computer 9

To Computer 10

To Computer 11

To Computer 12

To Computer 13

To Computer 14

To Computer 15

To Computer 16

To Computer 17

To Computer 18

To Computer 19

To Computer 20

To Computer 21

To Computer 22

To Computer 23

To Computer 24

To Computer 25

To Computer 26

To Computer 27

To Computer 28

To Computer 29

To Computer 30

To Computer 31

To Computer 32

To Computer 33

To Computer 34

To Computer 35

To Computer 36

To Computer 37

To Computer 38

To Computer 39

To Computer 40

To Computer 41

To Computer 42

To Computer 43

To Computer 44

To Computer 45

To Computer 46

To Computer 47

To Computer 48

Mic

B3 Low

B3 Left

B3 Right

K2600 Left

K2600 Right

K2500 Left

K2500 Right

Matrix12 Left

Matrix 12 Right

Matrix 6

Matrix 1000

Kawai K5 Left

Kawai K5 Right

Kawai K3

Kawai K1

Proteus Left

Proteus Right

Proteus 2000 Left

Proteus 2000 Right

Procussion Left

Procussion Right

Yamaha TX7

Rockman

From Computer 1

From Computer 2

Kick

Snare Top

Snare Bottom

Hi Hat

Rack Tom

Floor Tom

Overhead Left

Overhead Right

JC 77 Left

JC77 Right

Fender ProVerb

Yamaha G212

Wurlitzer

Rhodes

K250 Left

K250 Right

Vocal 1

Vocal 2

Vocal 3

Sax

Trumpet

Trombone

Acoustic Neck

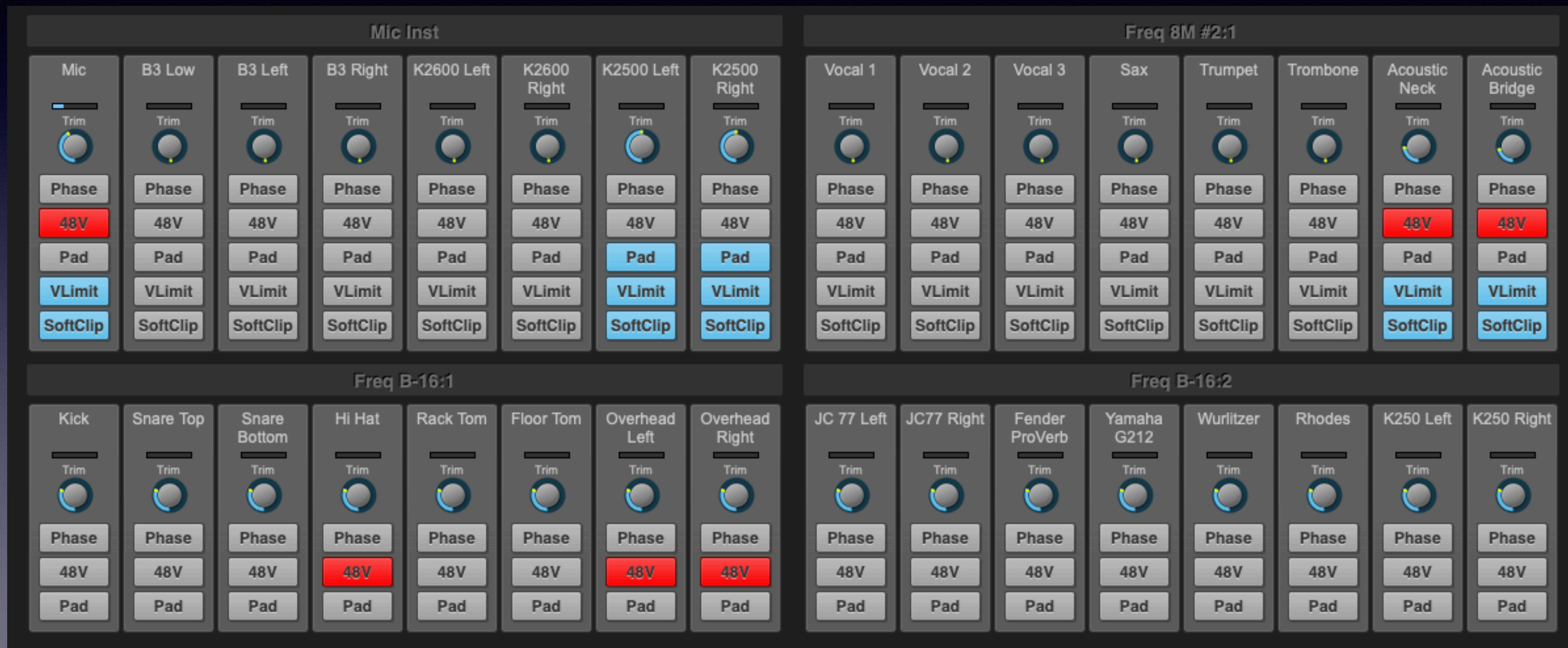
Acoustic Bridge

Outputs

To Computer (USB)



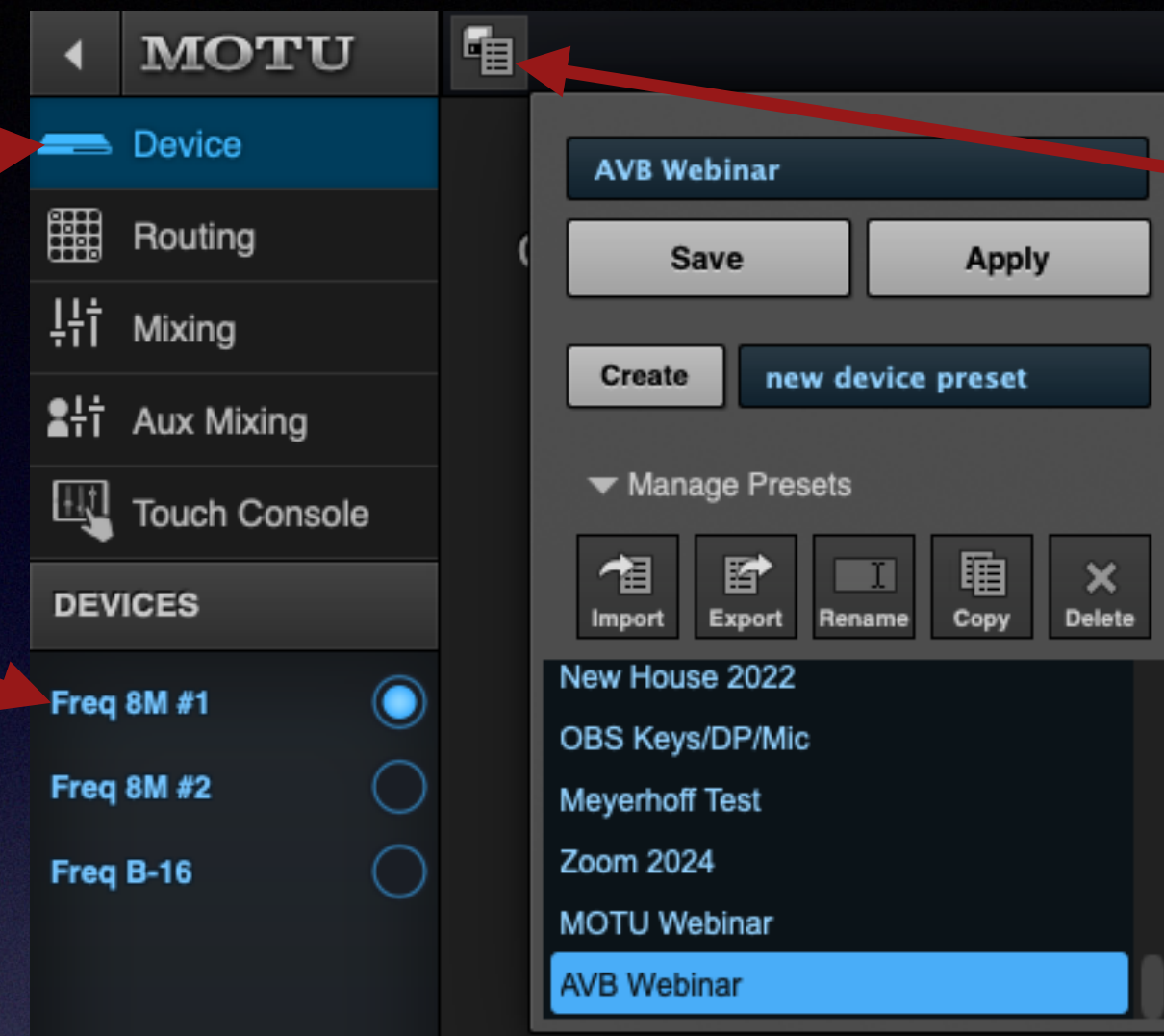
The Devices page of the Clock Master in this configuration puts all the analog input controls on one page. Here you can adjust input trim, add phantom power, insert a pad, and reverse phase on any channel. The 8M mic channels also have V-Limit™ - a hardware limiter that adds +9dB of protection to help prevent clipping, and SoftClip™ which engages just before clipping to reduce perceptible distortion.





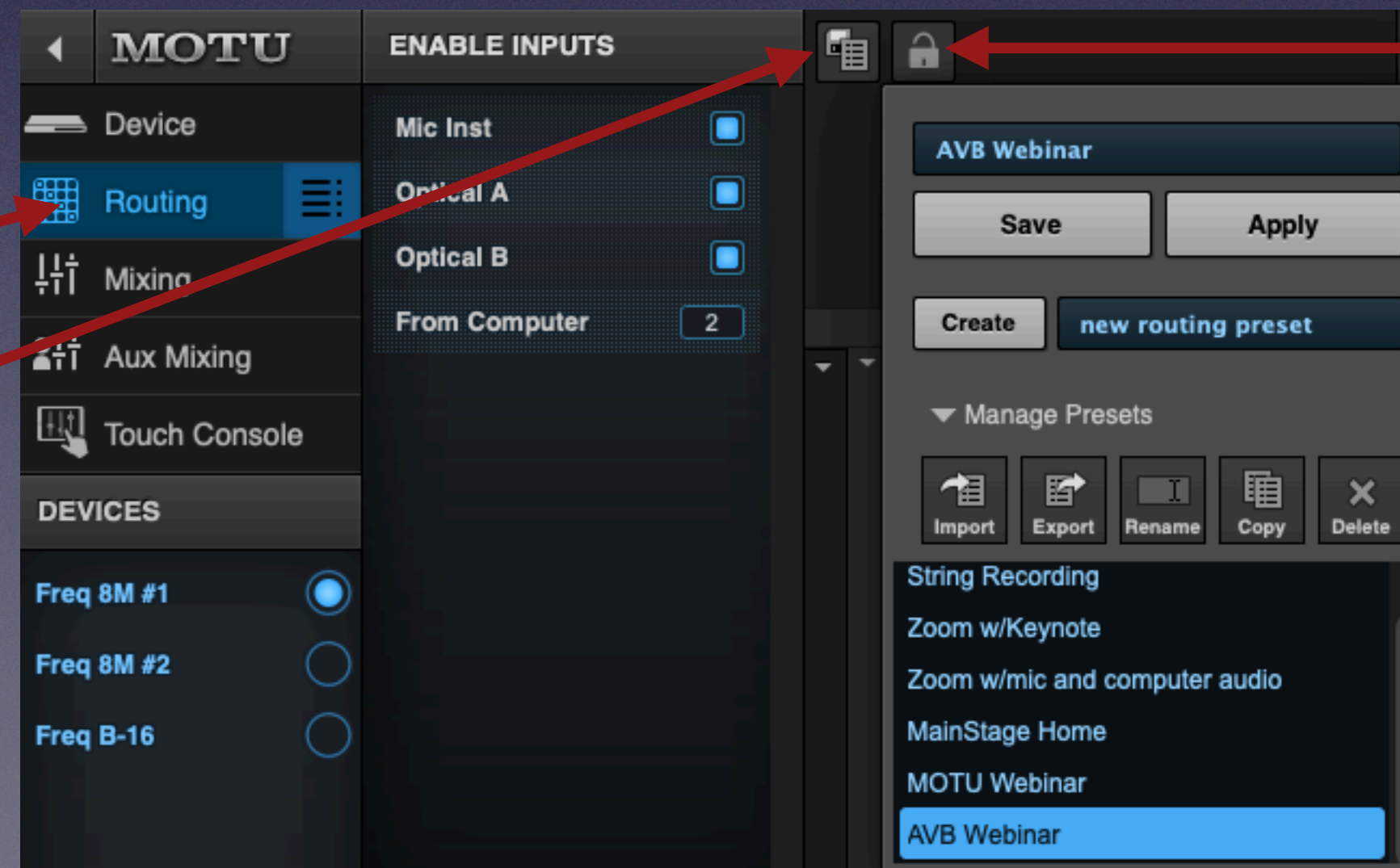
Once everything is configured for your session you can follow the steps below so you can recall them for future recordings.

1) Click Device then select the interface by clicking the name



2) Click the file icon and Save the Device preset

3) Click Routing then click the file icon and Save the Routing preset



4) You can click the padlock icon to prevent accidental routing changes

5) Repeat steps 1-4 for each interface in your system

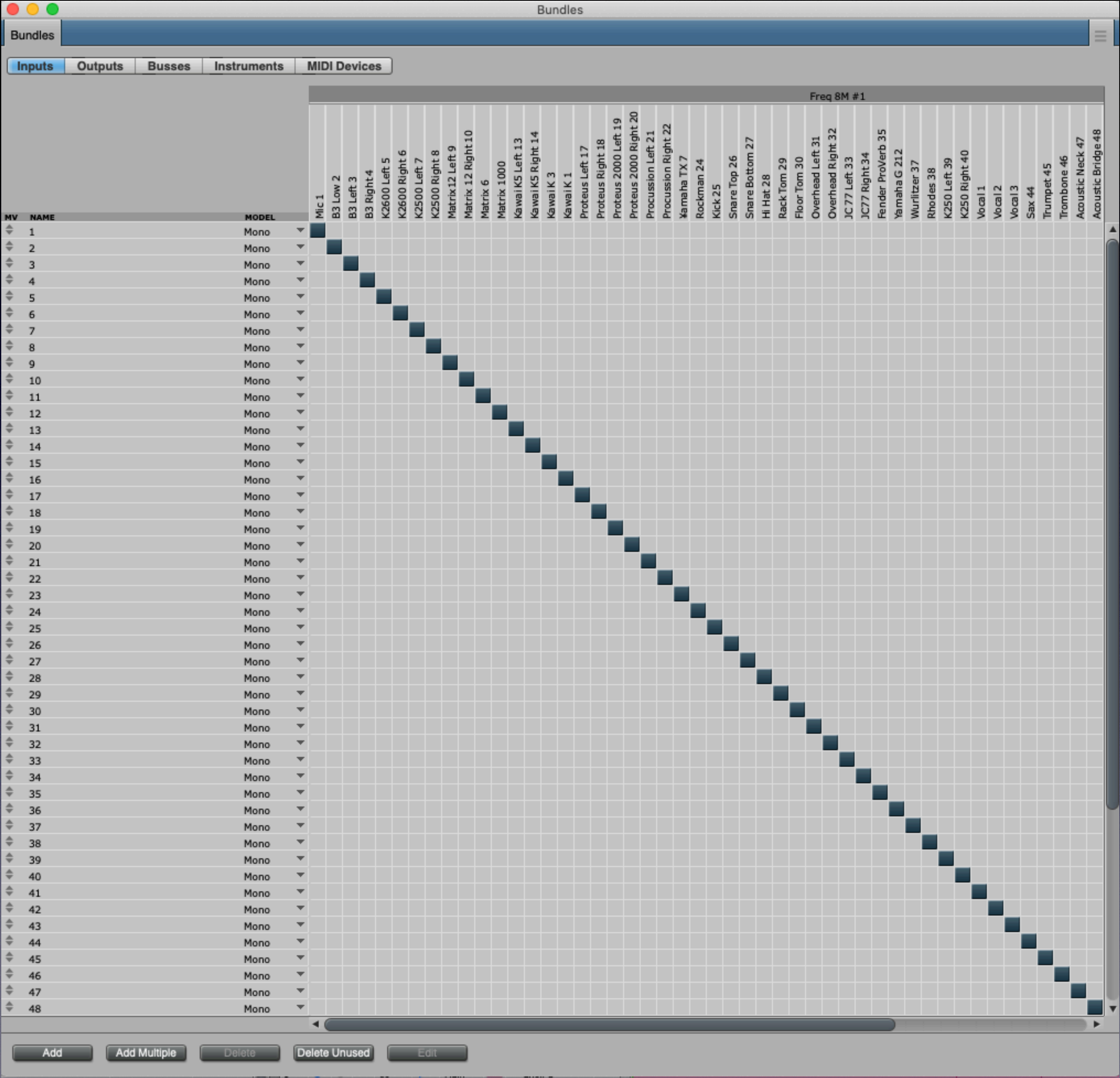
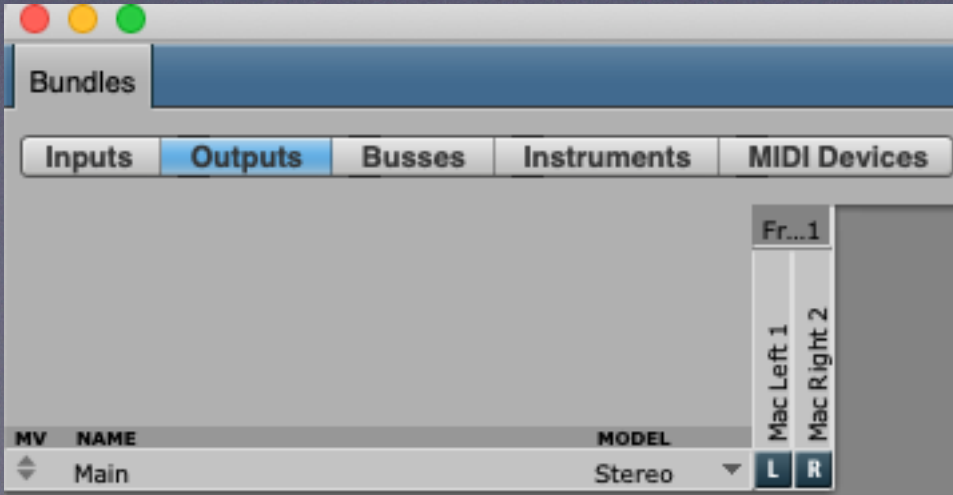


In the DP Bundles window create the number and type of input connections from your AVB network

If you created names for the channels in Pro Audio Control, they will appear across the top of the window

You can double click items in the Name column to give them more descriptive names in DP

Outputs can be kept to a minimum for monitoring during the recording





On a day before the show do a stress test recording with the maximum number of tracks you're expecting to need for as long as the show might be, and add an extra half hour for good measure. You can set a stop time when running this test so you can leave it unattended.

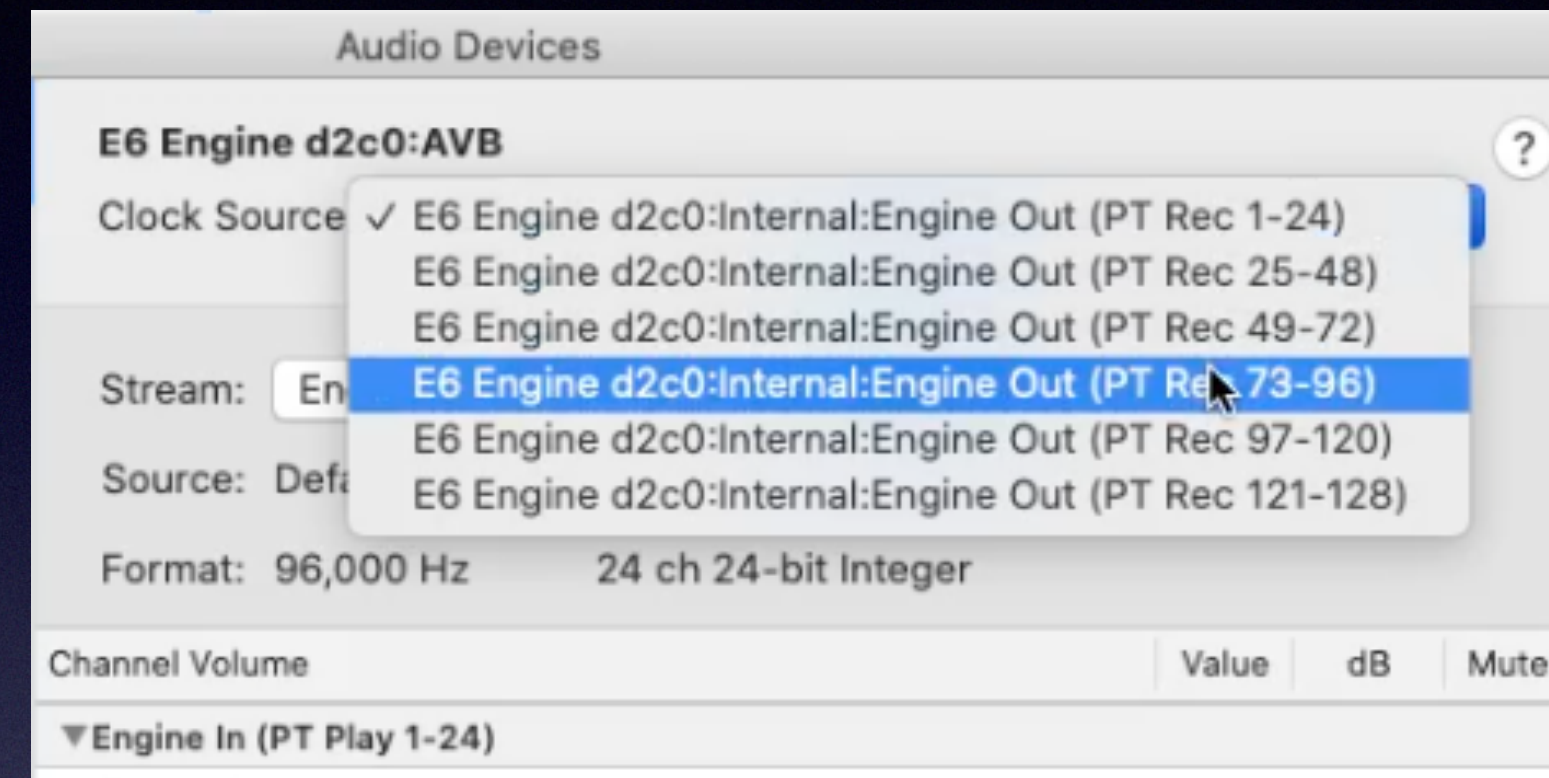
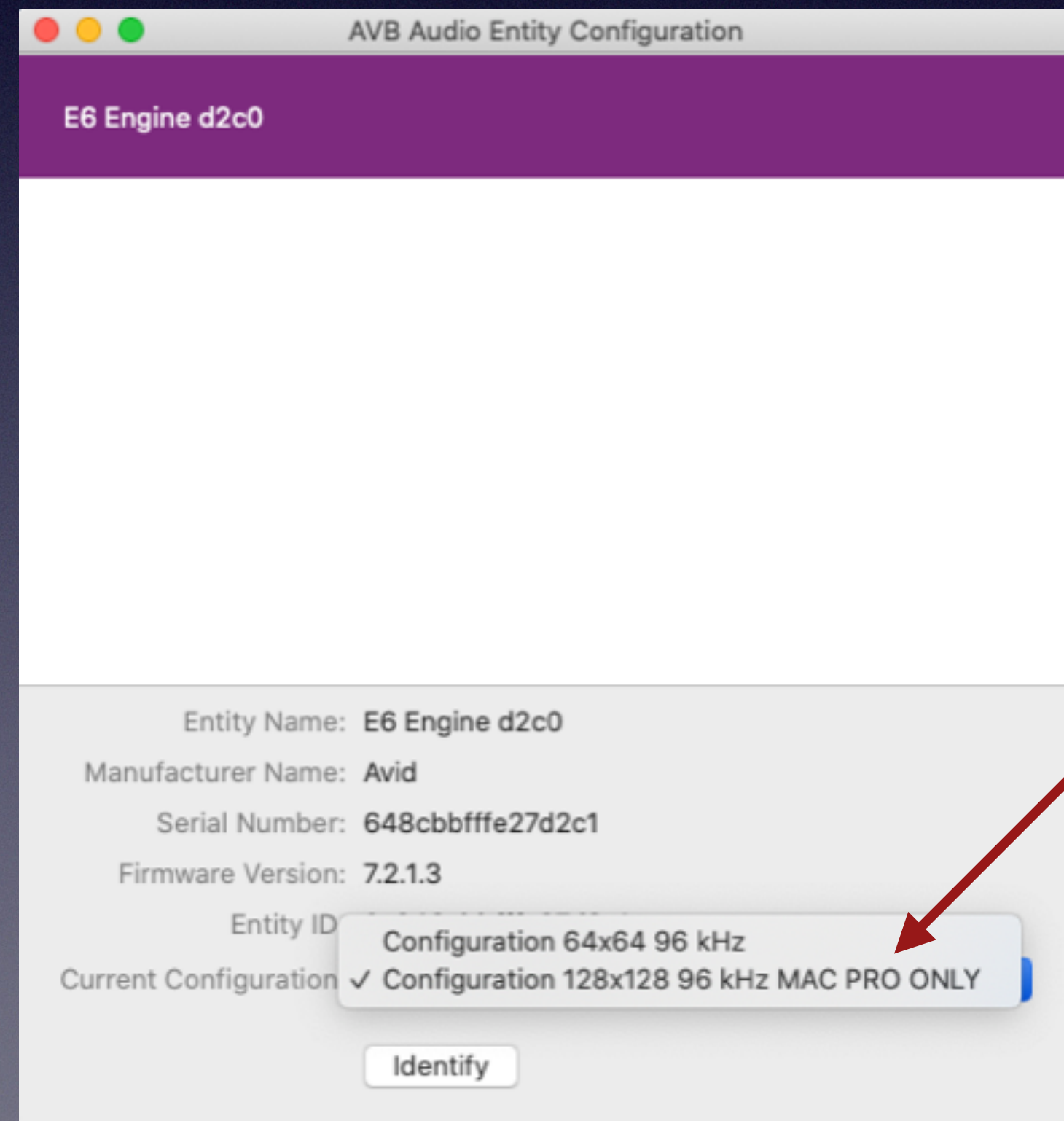
The screenshot displays the Digital Performer software interface on a Mac. The top menu bar includes Apple, Digital Performer, File, Edit, View, Region, Audio, Project, Studio, Setup, Text, Window, and Help. The status bar at the top right shows the date and time: Wed Mar 20 11:54 PM. The MOTU Webinar logo is visible in the top center.

The main interface is divided into several sections:

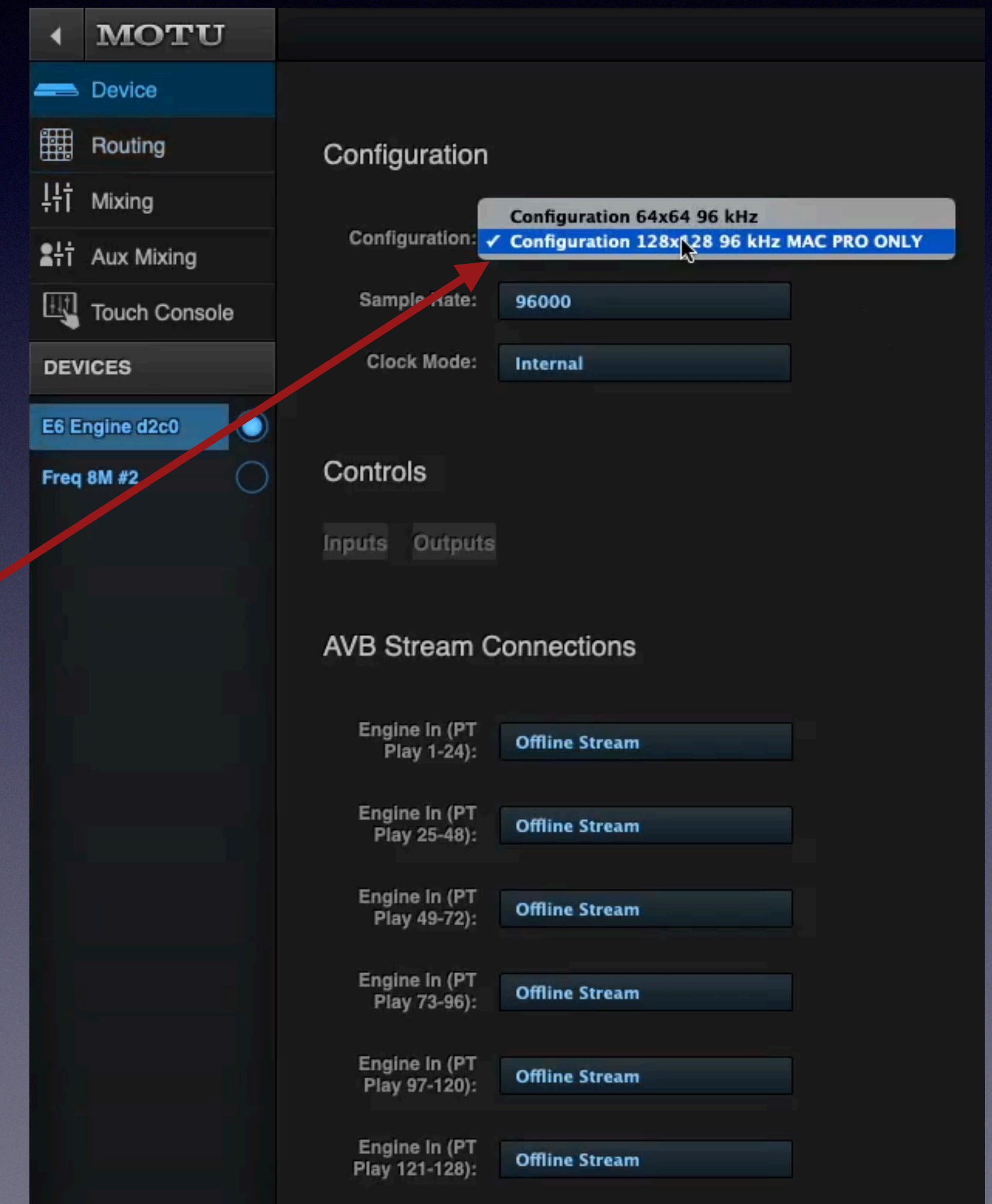
- Transport and Controls:** Located at the top, it includes playback controls (stop, previous, play, next, record), a large time display showing 0:03:07, and various settings like Internal Clock, 96k, 2048, 24 Bit Integer, and 30 fps nd.
- Audio Monitor:** On the left, it shows a list of tracks with their names and durations. The list includes tracks 53 through 103, with names like "I", "now", "have", "exactly", "16", "audio", "tracks", "armed", "to", "record", "using", "24 bits", "and", "96k", "sample", "rate", "Audio-17", "Audio-18", "Audio-19", "Audio-20", "Audio-21", "Audio-22", "Audio-23", "Audio-24", "Audio-25", "Audio-26", "Audio-27", "Audio-28", "Audio-29", "Audio-30", "Audio-31", "Audio-32", "Audio-33", "Audio-34", "Audio-35", "Audio-36", "Audio-37", "Audio-38", "Audio-39", "Audio-40", "Audio-41", "Audio-42", "Audio-43", "Audio-44", "Audio-45", "Audio-46", "Audio-47", "Audio-48", "Audio-49", "Audio-50", and "Audio-51".
- Tracks:** The central section shows a list of tracks with columns for MVE, TAKE, STC, REC, INPUT, COL, PLAY, OUTPUT, LEVEL, TRACK NAME, and ATO. The tracks are numbered 1 through 103, with names like "Master-1", "Conductor", "I", "now", "have", "exactly", "16", "audio", "tracks", "armed", "to", "record", "using", "24 bits", "and", "96k", "sample", "rate", "Audio-17", "Audio-18", "Audio-19", "Audio-20", "Audio-21", "Audio-22", "Audio-23", "Audio-24", "Audio-25", "Audio-26", "Audio-27", "Audio-28", "Audio-29", "Audio-30", "Audio-31", "Audio-32", "Audio-33", "Audio-34", "Audio-35", "Audio-36", "Audio-37", "Audio-38", "Audio-39", "Audio-40", "Audio-41", "Audio-42", "Audio-43", "Audio-44", "Audio-45", "Audio-46", "Audio-47", "Audio-48", "Audio-49", "Audio-50", "Audio-51", "Audio-52", "Audio-53", "Audio-54", "Audio-55", and "Audio-56".
- Waveform:** On the right, it shows a large waveform display with a red background and a green line indicating the current position. The waveform is labeled with track numbers 81 through 97.



An Avid S6L console was being used for the show that prompted this visit to AVB World. It does have 128 AVB channel output, but it is configured in five 24 channel streams and one 8 channel stream. It is currently not able to be reconfigured to all 8 channel streams, so would not connect directly to a MOTU system without skipping groups of channels.



The only way to record directly into DP was with a Mac Pro over Ethernet.





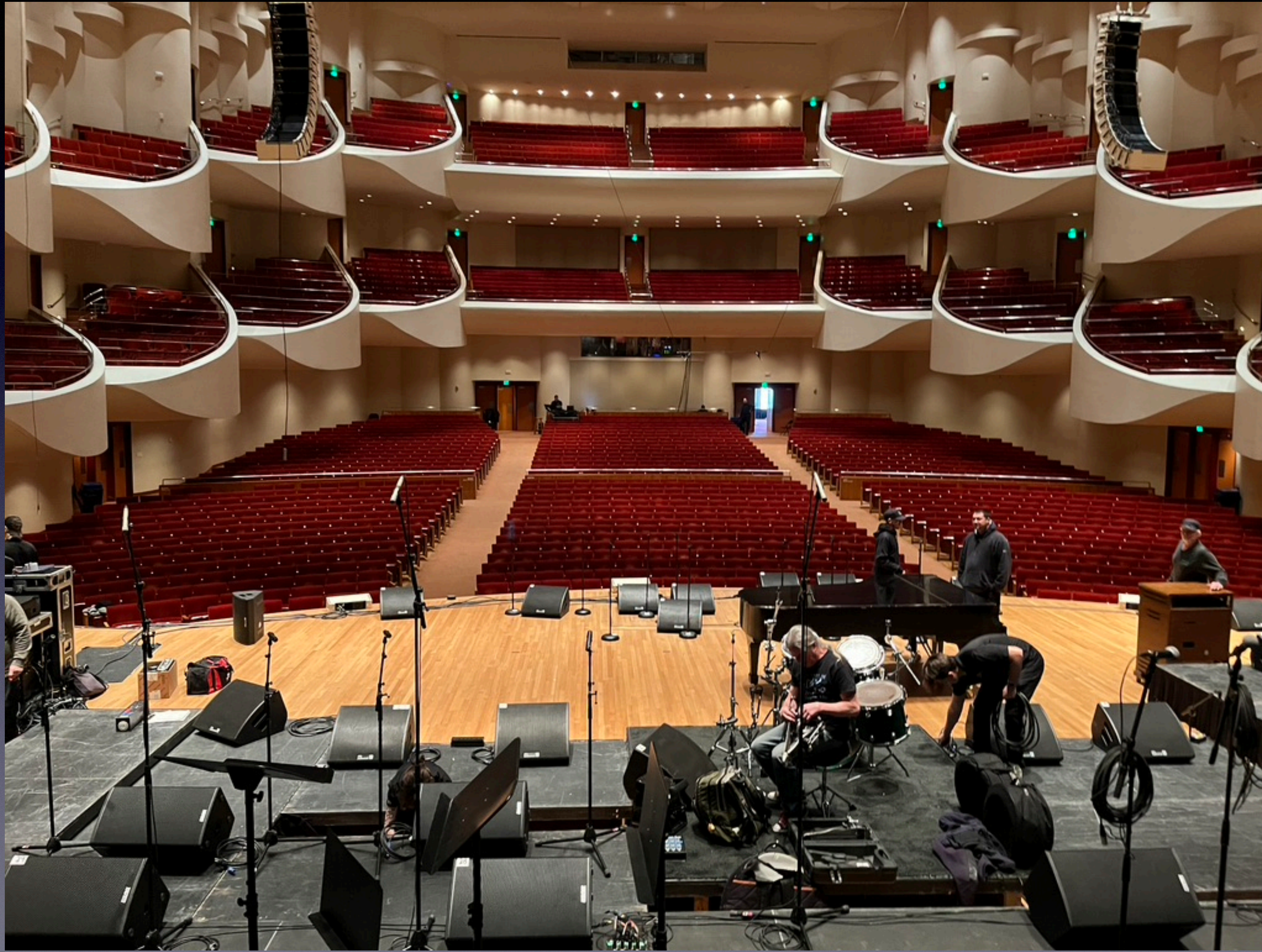
The Avid console shown below courtesy of Evan Kirkendall & Harford Sound

Now on with the show





Set up the day of the show at the Meyerhoff Symphony Hall in Baltimore MD









A MOTU M4  
handling audio  
chores for the  
mighty Theremini











MOTUnity's™ own  
Jim Jones at the  
piano - Jim was the  
musical director for  
the concert









The better your prep work,  
the easier the gig will be.  
Try to get an input list so  
you can name all the  
tracks before recording  
starts. Audio files use the  
track names, so this  
prevents having files  
called Audio1, Audio2, etc.

Any comments,  
suggestions, or  
improvements to this are  
welcome - Glenn Workman

