Notes to Accompany Digitization Workflow

High End Capture Setup

Joey Heinen (former Digital Production Coordinator) created our setup. He created this diagram to show how it all goes together.

Shinybow Distribution Amplifier- splits the signal into streams that are identical to the source signal

Waveform monitor- measures the brightness of the video signal

A couple things to point out- part of the reason a Mac Pro was chosen because it allows for multiple hard drives. The operating system can be on one drive while video files are on another drive. When I arrived, there was a 1 TB hard drive in the machine. Since we digitize at a high quality (more to come on that later), the files we create a huge (about 1GB per minute of video). This was presenting workflow challenges since the hard drive was constantly full. Jonathan encouraged me to upgrade the machine, and, with the help of our university IT department, I put in a 1 TB SSD for the OS, and a 6 TB server-grade spinning disk hard drive for file storage. Since modern SSDs are smaller than the bays in the Mac Pro, we needed an adaptor. At the same time, I decided to upgrade the RAM from 6 GBs to 32 GBs. While the Mac Pro is a bit on the older side, its customizability and ability to be upgraded makes it a good choice for AV digitization.

Blackmagic

Another issue I ran into was these mysterious diagonal wavy lines that appeared in the capture program. They were there even when the VCR was empty (no tape was playing). I did a little research on the AV Artifact Atlas, and discovered that this is what is called an electrical ground loop interference herringbone. Despite the name, the people on the Association of Moving Image Archivists informed me that it's caused by radio interference on the signal path. We had recently installed a Bookeye 4 planetary scanner in the same area (which gives off radio signals), so I thought that might be the cause. I tried shutting off the scanner, tried replacing the unshielded RCA cables with both shielded RCA cables and with BNC cables with RCA adaptors. However, none of this worked.

I eventually tried replacing the Blackmagic Intensity Shuttle, which is an analog to digital converter. That solved the problem! As far as I could tell, the Blackmagic was exactly the same as the old one, except new, so my theory is that something inside the Blackmagic broke and became unshielded.

Transformatting Considerations

For VHS, we've been recording at a sampling rate of 10 bit for the video, 48Khz for the audio, with a resolution of 640x480pixels, to an MOV wrapper

Bit depth determines the range of possible colors captured. The higher the bit depth, the more gradations are available.

The sampling rate is now often a sample of the audio waveform is taken, in this case, 48,000 samples per second.

I've then been creating an access file to burn to DVD with ffmpeg, a command line for converting and editing video. The resulting file will be deinterlaced, be in the H.264 video codec, and the AAC audio codec. It will also be much smaller than the original file. It will still be in the MOV wrapper.

Interlacing

This image shows the difference between a progressive scan and an interlaced scan. An analog signal will be interlaced because it was meant to be viewed by a CRT monitor. The way a CRT monitor works is that it displays the image by writing in lines, starting in the top left and going left to right and down the screen. In order to make the video smoother, the interlacing is used. The monitor writes the first line and all subsequent odd lines, then goes back and writes the even lines. When we look at a CRT monitor, our eyes combine the images. However, when we convert to digital, the lines become obvious, especially when figures in the video are moving. Running the program to deinterlace turns the video into a progressive scan. Some resolution is lost but it’s less distracting.

Deliverables

Right now we're creating DVDs for the items that we're replacing under Section 108
We purchase DVDs with printable faces so we don't need to use adhesives or Sharpie markers on the DVDs (can degrade the media over time)
I burn a DVD using the Mac Pro and the program Roxio Toast (Toast Titanium)
We duplicate the DVD using a duplicator and then print the title on the DVD

Then the original VHS and DVD go to cataloging and the VHS is stored