

AVID GUIDE for
AMA Workflow

HDCAM SR

Media Composer 6.5
Symphony 6.5
NewsCutter 10.5

Avid Editing Systems

AMA for HDCAM SR

Features in Media Composer 6.5,
Symphony 6.5, NewsCutter 10.5 and later.

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CORRECTIONS AND SUGGESTIONS

Feedback, advice and corrections are always appreciated.
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Be sure to visit
WWW.AVID.COM/AMA

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INTRODUCTION

AMA (Avid Media Access) is the Avid architecture for linking to file based media rather than ingesting it. This document is specifically about linking to Sony HDCAM SR {SRMASTER} files in your Avid Editing Environment.

The Guide you are reading now covers the specifics of Sony HDCAM SR within the AMA architecture. It assumes you are familiar with the AVID AMA feature.

OTHER AMA RESOURCES

You have many other resources for AMA information.

- **AVID HDCAM SR PLUGIN GUIDE**
The PLUGIN, which you must install, has an accompanying guide with details for its use. This is available at www.avid.com/ama
- **Avid Editing Guide for your Editing System**
This came with your editing system, or can be downloaded from the Avid Knowledgebase, www.avid.com/support
- **Avid Editing Application HELP**
This is, in effect, the Avid Application manual online at your editing computer. The HELP contains all the information in the official manual, and is easily accessible to answer your questions.

WHO AM I?

I am Paul Sampson, a freelance trainer, an Avid Certified Instructor (ACI) and an Avid Certified Support Rep (ACSR) living in Canada. I have experience with many clients, different environments and a variety of hardware.

Quick Answers

WHICH AVID OPERATIONS ARE POSSIBLE WITH AMA AND HDCAM SR?

AMA Link to File(s)...	✓
AMA Link to Volume...	✗
Import	✗
Consolidate	✗
Transcode	✓

HOW DO I EDIT WITH HDCAM SR?

Within the Avid environment, HDCAM SR is accessed by AMA LINKING to FILE and editing using this linked media, or AMA LINKING to FILE and TRANSCODING into an Avid codec.

WHAT FORMATS DOES THE HDCAM SR PLUGIN SUPPORT?

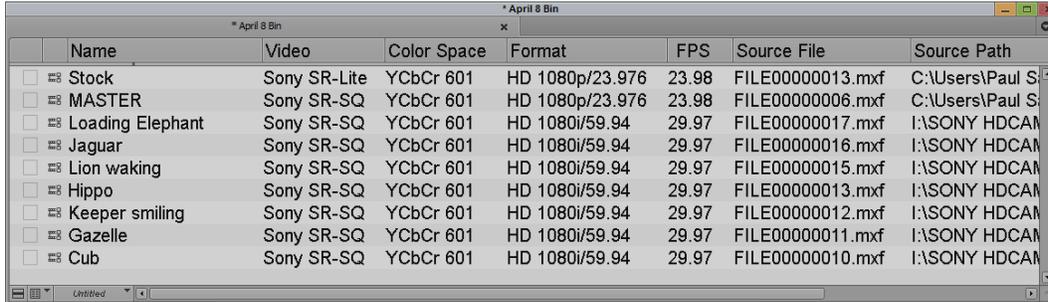
	DATARATE at 30 fps	SAMPLING	ENCODING/FILE
SR-Lite	220 Mbps	4:2:2 10 bit YCrCb	MPEG-4 part 2, SStP, 10 bit MXF OP1a interleaved V and A
SR-SQ	440 Mbps	4:2:2 10 bit YCrCb	
SR-SQ	440 Mbps	4:4:4 10 bit RGB	

WHAT FORMAT DOES THE HDCAM SR PLUGIN NOT SUPPORT?

	DATARATE	SAMPLING	ENCODING/FILE
SR-HQ	880 Mbps	4:4:4 12 bit RGB	MPEG-4 part 2, SStP, 12 bit MXF OP1a interleaved V and A

WHAT COLOR SPACE SHOULD MY PROJECT USE?

Avid projects use Video component (YCrCb) color levels or uncompressed (RGB) color levels. If you are working uncompressed (SR-HQ 440 RGB) select RGB levels when creating your project, otherwise select YCrCb levels.. The format of the HDCAM material you are editing with can be verified by displaying `COLOR SPACE` column data in a bin:



	Name	Video	Color Space	Format	FPS	Source File	Source Path
<input type="checkbox"/>	Stock	Sony SR-Lite	YCbCr 601	HD 1080p/23.976	23.98	FILE00000013.mxf	C:\Users\Paul S
<input type="checkbox"/>	MASTER	Sony SR-SQ	YCbCr 601	HD 1080p/23.976	23.98	FILE00000006.mxf	C:\Users\Paul S
<input type="checkbox"/>	Loading Elephant	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000017.mxf	I:\SONY HDCAM
<input type="checkbox"/>	Jaguar	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000016.mxf	I:\SONY HDCAM
<input type="checkbox"/>	Lion waking	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000015.mxf	I:\SONY HDCAM
<input type="checkbox"/>	Hippo	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000013.mxf	I:\SONY HDCAM
<input type="checkbox"/>	Keeper smiling	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000012.mxf	I:\SONY HDCAM
<input type="checkbox"/>	Gazelle	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000011.mxf	I:\SONY HDCAM
<input type="checkbox"/>	Cub	Sony SR-SQ	YCbCr 601	HD 1080i/59.94	29.97	FILE00000010.mxf	I:\SONY HDCAM

CAN I EDIT WITH HDCAM SR 2K AND 4K FRAME SIZES WITHIN AVID?

These formats use DPX files, one per frame.

(looking into how to edit this on avid with version 7. While it allows AMA access to high resolution frames, I don't believe DPX is supported directly. Will confirm)

HDCAM FAMILY

The HDCAM line has undergone three generations of growth.

HDCAM was a tape based format introduced in 1997 which recorded anamorphic (1440 x 1080), 8 bit video at 144 Mbps. The tapes looked much like Betacam cassettes.



HDCAM SR (SMPTE 409M) is also a tape based format introduced in 2003 recording a full frame image at higher quality than HDCAM. The SR stands for Superior Resolution. It supports currently three record formats differentiated by their data rates- SR-Lite, SR-SQ and SR-HQ. HDCAM-SR uses MPEG-4 part 2 Simple Studio Profile (SStP) with 12 audio tracks (48 kHz / 24 bit).



SRMASTER is the latest incarnation of this family of formats. This is a file based architecture which still uses the HDCAM SR compression formats mentioned previously. It adds to this both 4k and 2k frame size recording, captured as uncompressed DPX files. The HD format codecs supported by SRMASTER are shown below. The Sony HDCAM SR AMA Plugin supports all except for SR-HQ:



	DATARATE at 30 fps	SAMPLING	ENCODING/FILE
SR-Lite	220 Mbps	4:2:2 10 bit YCrCb	MPEG-4 part 2, SStP, 10 bit bit MXF OP1a interleaved V and A
SR-SQ	440 Mbps	4:2:2 10 bit YCrCb	
SR-SQ	440 Mbps	4:4:4 10 bit RGB	
SR-HQ	880 Mbps	4:4:4 12 bit RGB	MPEG-4 part 2, SStP, 12 bit MXF OP1a interleaved V and A

For the purposes of this paper we are interested in the HDCAM-SR SRMASTER family of products, as they produce the HD files which we AMA link to. There are 5 products in the SRMASTER line currently, and none of them is a camera! The product line includes recording devices to capture an HD-SDI stream from any imaging device, ingest tools, file servers and networking devices.

Record Medium: SRMemory

SRMASTER recording is done to proprietary solid state flash memory devices from Sony called SRMemory modules. They are currently available in 3 capacities and three speeds. The higher speed modules are required for higher data rates and quality.

While HDCAM-SR Tape records 12 audio channels, SRMemory can record 16 channels. SRMemory also supports the recording of non-tape formats such as 4k and 2k frames as uncompressed 16 bit RAW (DPX) files.

The memory modules are designated by capacity and speed, and this is reflected in their designation. A memory module labeled as *SR-512 S 25* is 512 GB of storage operating at 2.5 Gbps data rate.



The sizes are 256GB, 512GB and 1TB running at Speed (S) of 15, 25 and 55 (1.5, 2.5 and 5.5 Gbps). At the fastest speed sustained transfer times of 5 Gbps are possible, over 6x faster than HDCAM-SR tape data rates.

There is a plastic cover around each SRMemory card (blue above), and this indicates the speed of the device. This is also an indication of its capabilities.

ORANGE	1.5 Mbps	HDCAM
BLUE	2.5 Mbps	HDCAM-SR and HDCAM
BLACK	5.5 Mbps	16 bit RAW and HDCAM-SR and HDCAM

The table below provides a full description of the cards available:

MODEL	CAPACITY	SPEED	COLOR	Minimum Format
SR-256S15	256 Gb	1.5 Gbps	Orange	HDCAM
SR-256S55	256 Gb	5.5 Gbps	Black	16 bit RAW
SR-512-25	512 Gb	2.5 Gbps	Blue	HDCAM-SR
SR-512-55	512 Gb	5.5 Gbps	Black	16 bit RAW
SR-1TS25	1 T	2.5 Gbps	Blue	HDCAM-SR
SR-1TS55	1 T	5.5 Gbps	Black	16 bit RAW

The modules have a custom connector for docking to Sony SRMemory devices. There is no direct connection possible from your editing client to the SRMemory modules. Sony docking devices are used which allow Ethernet (both GigE and 10GigE) and eSATA connections for fast offloading of data to more conventional storage. It is most likely you will receive images of the original cards on a server or standalone drive. The transfer would have been done using the SR-R1000, SRPC-4 or SRPC-5, described next.

SRMASTER PRODUCTS

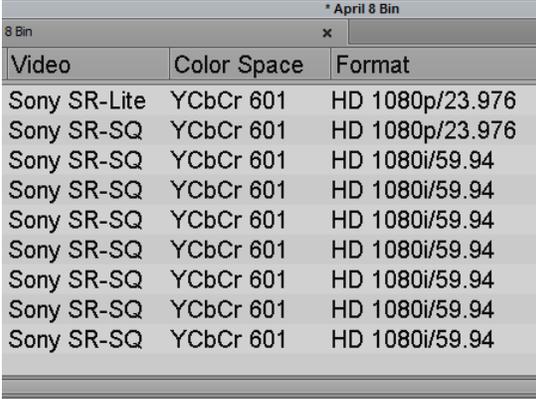
		File Formats	Connects to	NOTES
 <p>SR-R1</p>	Standalone Field Recorder with HD-SDI input	SR-Lite 220 Mbps SR-SQ 440 Mbps SR-HQ 880 Mbps (option)	Any HD-SDI output device such as F35, SRW-9000, PMW-F3	23.98, 24, 25, 29.97, 50, 59.94 fps 4:2:2 and 4:4:4 Optionally records native DPX
 <p>SR-R4</p>	For F65 Cinematography Camera only	4k and 2k frames, 16 bit SRRAW files	Direct dock to F65 camera only	1 to 60 fps in 4k 1 to 120 fps in 2k 23.98, 24, 25, 29.97, 59.94 fps
 <p>SR-R1000</p>	Record, playback and Ingest from SRMemory or internal server	SR-Lite 220 Mbps SR-SQ 440 Mbps SR-HQ 880 Mbps	HD-SDI or Ethernet	8T internal storage 4 SRMemory card slots FTP file transfer from internal memory or SRMemory cards
 <p>SRPC4</p>	Portable Screening and FTP Ingest device for SRMEMORY cards.	SR-Lite 220 Mbps SR-SQ 440 Mbps	1 SRMemory card slot	1 GigE network connector, PCIe slot for eSATA card and hard drive connection, or 10GigE Interface card HD-SDI output for screening Web interface for browsing and configuration Can be file server on a network (after copying SRMemory card to internal memory)
 <p>SRPC-5</p>	Rack mounted Screening and FTP Ingest device for SRMemory cards.	Similar to SRPC4 (above), with more I/O and in a rack mountable configuration		

SRMASTER Files

There is nothing unique about the SR file structure on the SRMemory card. Because of this, there is no way to automatically identify a disc or a folder as an SR Volume. This means `Link To AMA Volume...` will not work. We will use `Link to AMA Files...` When linking to files, of course you can select multiple files or indeed the full contents of a folder.

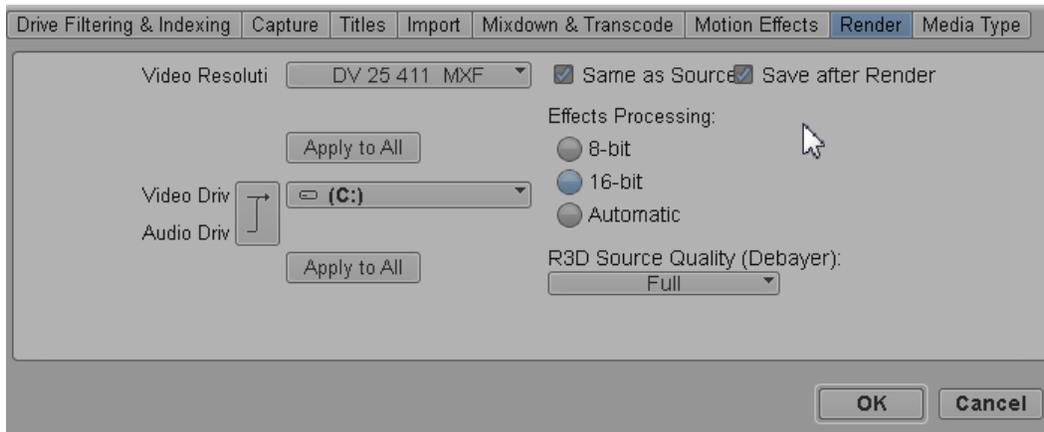
The SR-SQ recordings can be YCbCr or RGB. It's important you know which so you can setup your project type and effects processing to match the most common media type in your project. You will want to do this to preserve the quality in the RGB recordings, or not use more storage than necessary by putting YcbCr files in RGB containers.

If you are not sure of the exact nature of some files, link to them and look at these column headings in your bin. This will allow you to easily identify SR-Lite, SR-SQ and the Color Space of the SR-SQ clips.



Video	Color Space	Format
Sony SR-Lite	YCbCr 601	HD 1080p/23.976
Sony SR-SQ	YCbCr 601	HD 1080p/23.976
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94
Sony SR-SQ	YCbCr 601	HD 1080i/59.94

Since the Codec is 10 bit, you might want to set the Effects Render Processing to high quality (16 bit) in your project. This is done in the Media Creation setting, Render Tab.



With appropriate hardware (such as Nitris DX I/O box) you can select 10 bit video output from your timeline as well. This takes more processing power, but will provide the higher quality that 10 bits offers.

FILE NAMING

Originally, files were recorded at the root of the SRMemory module, and named numerically in the form `FILE00000006.mxf`.

Current firmware versions of equipment can continue to use this naming format, but also offer an alternative for custom naming. This naming method was first introduced in the F65 camera, and has made its way into the R1 and R4 units:

AxxxCyyy_zzzzzz

- A: CAMERA ID
- xxx: REEL number
- C: Stands for CLIP, what follows is unique Clip data
- yyy: SHOT number
- zzzzzz: Recording Year, Month and Day

SR-R1 and XDCAM-EX

When the SR-R1 is used on a PMW-F3, the file naming can be set so the SR-R1 file names will be the same as the file names recorded on the SxS card in the PMW-F3. In this case you will have an SxS card recording and an SRMemory recording of the same material with the same name. This might be useful for having easy-to-screen and easy-to-store XDCAM-EX copies of your SRMemory master material. It also offers a path to an Offline / Online workflow where the initial edit is done on XDCAM (using 35 Mb/s media) and the online conform is done using HDCAM-SR (possible at 440 Mb/sec)

Performing the AMA Link

As mentioned, we link to HDCAM-SR media using `Link To AMA File(s)...` The other linking option, `Link To AMA Volume...` will not work. Use either of these methods to create a file link:

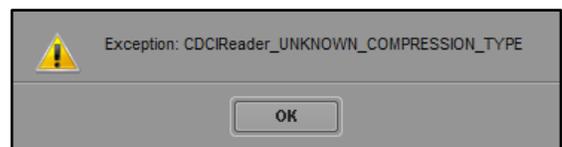
- From the FILE menu choose `Link to AMA File(s)...` and navigate to the file or files to link to
- Right Click in an empty part of the bin (with nothing selected in the bin) and choose `Link To AMA File(s)` in the context menu

You may Transcode HDCAM-SR into another AVID format, but HDCAM-SR Files will not Consolidate (they are not Avid native) nor will they Import.

AMA Link to File(s)...	✓
AMA Link to Volume...	✗
Import	✗
Consolidate	✗
Transcode	✓

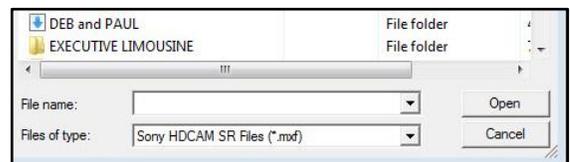
Plugin Fails

With some version combinations of the Editing System and the Plugin, the plugin may appear to fail to work. Trying to link to HDCAM-SR files will generate the error message shown here.



If this happens, then you need to follow this procedure to 'wake up' the plugin on your editing system; in the `Link To AMA File(S)...` dialogue, select in the "Files of type" section at the bottom of the dialogue the HDCAM-SR file plugin.

You should now see the HDCAM-SR files, and they should import OK.



This procedure need only be performed once to invoke the plug-in.

AMA FILE EXPORT

The initial beauty of AMA is that it enables you to link directly to external files for editing, without ingesting, importing, or transcoding the media first. With the latest versions of the Media Composer family, you can now use AMA plug-ins to *export* material from your editing system too. You can export completed work back to manufacturers’ original volumes or to virtual volumes on hard drives and servers.

For example, you can export an edited show back to a Sony XDCAM ProDisc using a feature called “Export To Device,” but what if you want to export to a compatible file structure on a hard drive, a Virtual Volume? We can use a separate AMA plugin, an AMA Export Plugin to export a file—in the manufacturer’s file format—to any destination you choose, not just to designated products in the hardware line. .

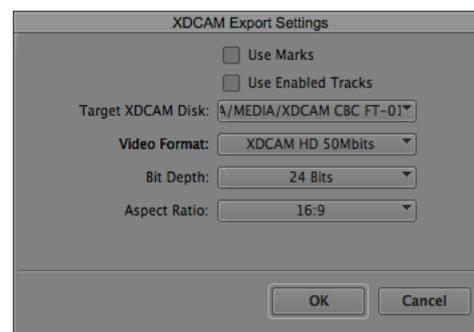
Device Export for XDCAM and P2 media

Exporting to a device involves more than just sending a compatible movie to the target media. Manufacturers’ devices have a very specific and unique structure, so the media must be exported to the correct locations within the file organization. There are also a variety of accompanying data files on the media volumes that need to be updated, such as various indexes and sidecar files.

The Avid AMA Device Export feature creates compatible media, but also deposits it on the manufacturer’s media in a fully compliant manner. This allows for easy content distribution across the various manufacturer’s media.

To perform an Export to an XDCAM device, right-click on a sequence or clip in the bin, and choose EXPORT TO DEVICE > XDCAM. A dialog box will appear for you to choose some basic export options. Fill this form out and click OK.

This feature works with sequences and clips. You may also choose single or multiple objects for export at once.



AMA File Export

The AMA File Export feature enables you to export your clips or sequences to a file using a manufacturer's specific codec. While your software's classic Export command offers a lot of options, the AMA File Export choices are more specialized and industry-specific. To use this feature, you will need the manufacturer's AMA Export plug-in for the format in which you wish to work—you can download plug-ins from each company's website. So far, Sony has released its updated HDCAM-SR plug-in, and we expect the number of available Export plug-ins to grow as more manufacturers create plug-ins that enable media export in their file formats.

Like standard ("linking") AMA plug-ins, the AMA File Export plug-ins will be displayed when you use the console command `ama_listplugins`. The Sony HDCAM-SR plug-in appears as follows:

```
MVP_MSP_SonySRDeck_64bit Sony Corporation x.xx
```

To use AMA File Export, you'll find the command available in the contextual menu—simply right-click in the Source monitor, Record monitor, or on one or more selected items in the bin.

Once you do, the AMA File Export dialog will appear with these options:

File Type: Choose the plug-in to use for your export from the drop-down menu.

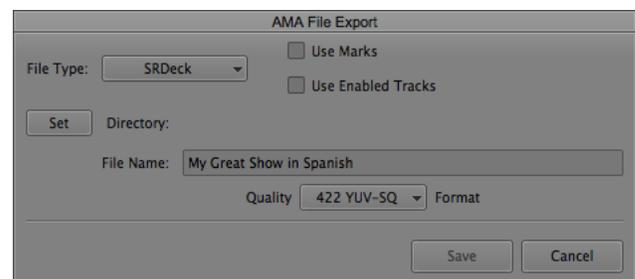
Use Marks: Select this option to only export material between the mark IN and mark OUT points in your clip or sequence.

Use Enabled Tracks: Select this option to export only the enabled tracks (those turned on) in the clip or sequence.

Set Directory: Click the Set button to navigate to and select the destination for your exported file.

File Name: Edit or enter a new file name for your export.

Quality: Choose the desired quality for the file from the drop-down menu.



Offline Workflow

HDCAM-SR does not support separate proxy video. It is still possible to undertake an Offline / Online workflow by transcoding your HDCAM-SR to a 'smaller' codec, doing your editing, and then relinking your timelines Video and Audio to the original AMA linked clips.

Known Issues and Limitations

As always, your best guide for issues and limitations are the Sony Release notes for the plugin and the Avid release notes for the particular Editing System version you are working with. For Media Composer / Symphony 7, please note :

- The higher end codecs can be demanding of your editing system. In some circumstances, multiple stream playback and real time effects may require working in Draft mode or rendering.
- 59.94i 444 footage cannot be batch captured when Video Quality Menu is set to Draft Quality with Avid 6.0. In that case, please set Video Quality Menu to something other than Draft Quality.

Output of HDCAM-SR Media

Output to tape is possible as long as the number of layers and effects are manageable for the system. Rendering may be required for higher data rate codecs.

Linked HDCAM-SR files can be exported in the same ways as other media, although QuickTime Same as Source is not supported.

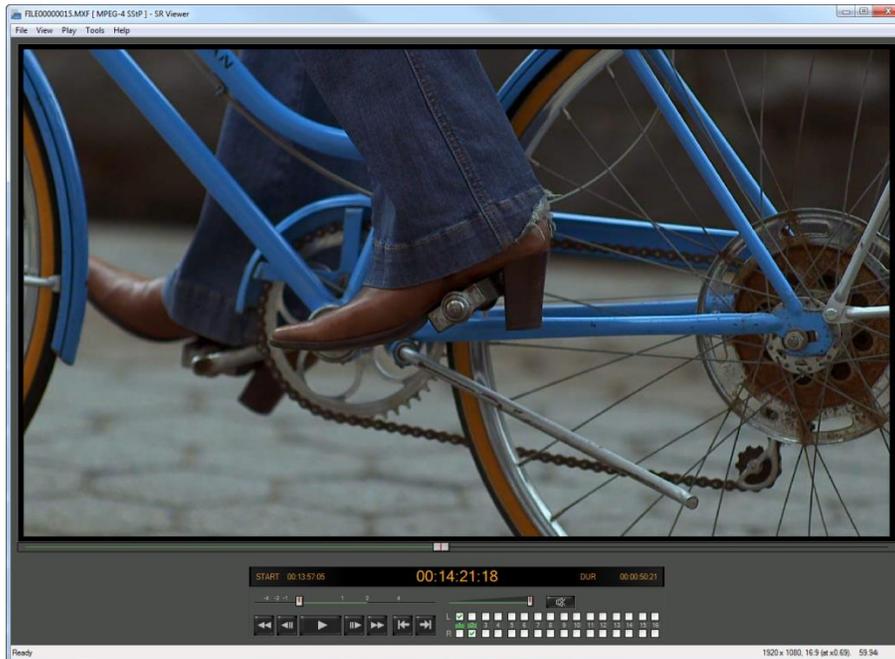
SRC-10 Viewing Software

This is screening software available on the SONY website for both MAC and PC platforms. It allows the user to:

- Screen some SRMASTER files (SR-Lite and SR-SQ, not SR-HQ)
- See Thumbnails for these SR files in Mac Finder / Windows Explorer
- View Metadata for clips
- Export DPX files, or MXF files using IN and OUT points on the clip

There are many other expected options within the program. For example you can hide and show controls, view full screen, play clips sequentially and adjust aspect ratio.

The software offers an economical way to pre-screen footage before the edit, as well as export and compile selects.



When screening, several AVID editing system shortcuts will work. For example:

J K L	Multispeed Play
Arrow Keys	One Frame FWD or one frame REV
Goto TOP / TAIL	HOME and END keys

Typical SRMASTER Record Devices

The following table shows how recordings from various Sony HDCAM-SR cameras can be recorded as SRMASTER file based material onto SRMemory modules. The F65 is grayed out as it does not directly record HDCAM-SR files in its most common SR-R4 connected configuration.

<p>F65</p> 	<p>Cine Camera, 4k and 2k recordings Records in SRRaw format on SR-R4 Connect via HD-SDI to SR-R1 for SRMASTER recording</p>	<p>23.98P 24P 25P 29.97p 59.94p</p>
<p>F23</p> 	<p>Cinema Camera HD Resolution, 1920 x 1080 Progressive and Interlaced recording 4:4:4 RGB or 4:2:2 YCbCr. 1 to 30 fps in RGB 4:4:4 1 to 60 fps YcbCr 4:2:2 Extended variable frame rate recording available Connect via cable to SR-R1 for SRMASTER recording</p>	<p>23.98P 24P 25P 29.97P 50P 50i 59.94i</p>
<p>F35</p> 	<p>Cinema Camera Film style Super 35mm sensor PL Lens mount for Cinema lenses HD Resolution, 1920 x 1080 4:4:4 RGB or 4:2:2 YCbCr. 1 to 30 fps in RGB 4:4:4 1 to 50 fps YcbCr 4:2:2 Extended variable frame rate recording available Connect via cable to SR-R1 for SRMASTER recording</p>	<p>23.98P 24P 25P 29.97P 50P 50i 59.94i</p>

HDCAM-SR REFERENCES

SONY Website	www.sony.com/srmaster www.sony.com/hdcamsr
Wikipedia HDCAM page	www.en.wikipedia.org/wiki/HDCAM
AVID AMA Page	www.avid.com/ama