Avid Symphony versus Avid Media Composer:

Universal Mastering

The difference between Avid Media Composer and Avid Symphony boils down to two features. One is advanced color correction, relational color correction, and secondary color correction, which Dylan Reeve posted an informative video about on his website. The other is Universal Mastering.

Note that Universal Mastering is a Symphony-only feature, but you need to be on Nitris DX hardware (or "Classic Nitris" up to Symphony 5.5) for it to work. The feature is not available in software-only mode, it's not available if you use third party hardware with Open I/O, and it will not even work with Mojo DX.

Also note that with the release of Media Composer version 7 (2013), "Symphony" will no longer be a standalone product, but rather a paid option for Media Composer 7 and later. This option still gives you advanced color correction features, relational color correction, secondary color correction and Universal Mastering (provided you're on Nitris DX).

What is it?

Universal Mastering is not an official industry term, but it is understood to be the ability to take a (progressive) master (tape or NLE sequence) and output that to multiple delivery formats. Some tape decks allow for 23.976p/24p/25p/50i/59.94i conversions.

What Universal Mastering allows Symphony users to do is create multiple masters - in the Digital Cut tool - from a 23.976p, 24p or 25p SD or HD timeline. If you look at the Digital Cut tool in - for example - a project that is 1080/24p, you will find that Symphony offers an extra feature that is not available in Media Composer's **DIgital Cut tool**, and that option is labeled "**Output Format**":
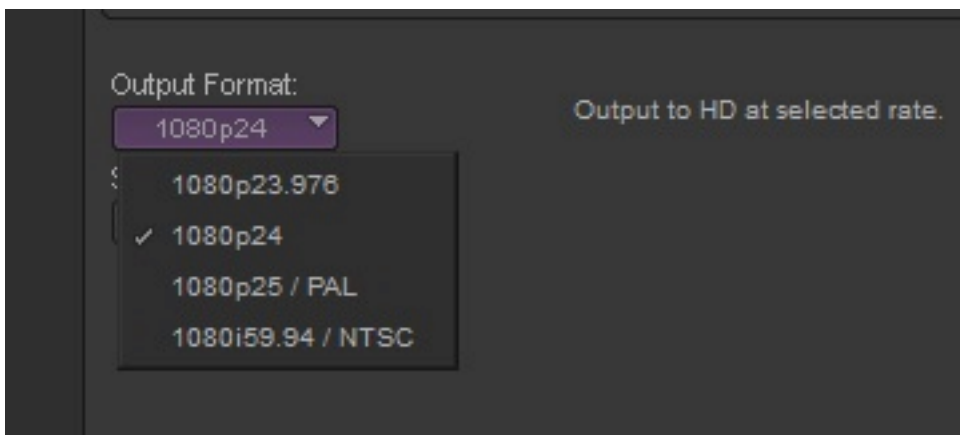

As you see, you can choose to output yout **1080/24p** sequence as **1080p23.976**, **1080p24**, **1080p25 / PAL** or **1080i59.94 / NTSC**.

It means that if you choose **1080p23.976**, the sequence will be slowed down 0.001% (both picture and sound) and can be recorded at 23.976fps. A simultaneous output to NTSC at 525/59.94i unfortunately is not possible:
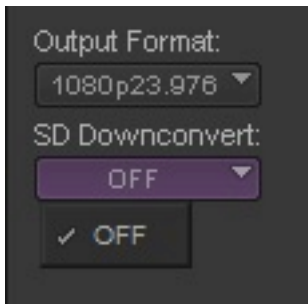

If you choose **1080p24**, the output will remain unchanged from its native format (which in our example was 1080p24 already). As there is no compatible SD format available, you will not have the option to do a simultaneous SD downconverted output:
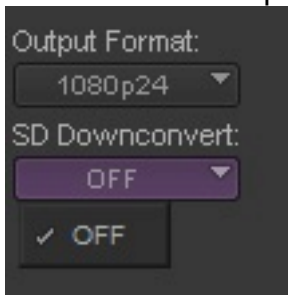
If you choose **1080p25 / PAL**, the sequence will be speeded up 4.1667% so that each original frame will be output as a single frame, but so much faster that 25 frames will be output for each second of real time. This frame rate is compatible with PAL 625/50i, so you will have an additional option to simultaneously output a PAL downconverted output in either Anamorphic, Letterbox, or Center Cut aspect ratio:
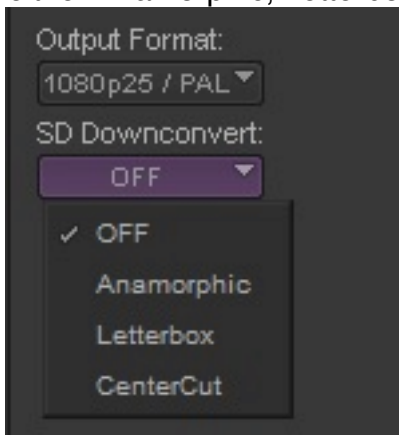
If you choose **1080i59.94**, the sequence will be slowed down 0.001% to 23.976 fps, and a standard 2:3 pulldown will be added to the output. This frame rate is compatible with NTSC 525/59.94i, so you will have an additional option to simultaneously output an NTSC downconverted output in either Anamorphic, Letterbox, or Center Cut aspect ratio:

Output Format:
180i59.94 / NTS ▾

SD Downconvert:
Anamorphic ▾

RS-422 Output: LTC Output:
Non-Drop ▾   Non-Drop ▾
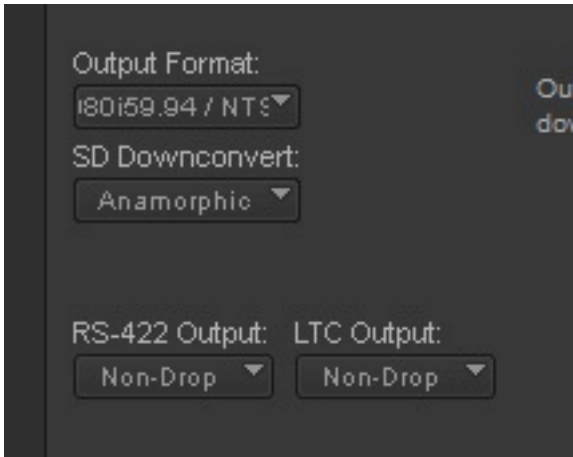
The Symphony Editing Guide shows a table that explains which output options can be chosen from which project types (red notes by JtB):

Project Format	Output Formats	
1080p23.976	1080p23.976	
	1080p24	with ±0.01% speed-up
	1080p25/PAL	with ±4.27% speed-up
	1080i59.94/NTSC	no speed-up, 2:3 pulldown added
1080p24	1080p24	
	1080p23.976	with 0.01% slow-down
	1080p25/PAL	with ±4.1667% speed-up
	1080i59.94/NTSC	with 0.01% slow-down and 2:3 pulldown added
1080p25	1080p25 PAL	
	1080p23.976	with 4.096% slow-down
	1080p24	with 4% slow-down
	1080i59.94 NTSC	with 4.096% slow-down and 2:3 pulldown added
1080i50	1080i50 PAL 25i	
1080i59.94	1080i59.94 NTSC 30i	

In order to do a proper Digital Cut with speed-up or slow-down, you need to treat the audio first (Symphony will warn you that you need to do this as soon as you try to output with a speed-up or slow-down).

See the Symphony Editing Guide for instructions on how to perform a Sample Rate conversion on your sequence to prepare it for Universal Mastering.

Also, you will likely want to use an appropriate reference (BBGEN) to feed both the deck and the Nitris DX to sync to. I personally recommend the [Mutec MC 3.2 Smart Clock HD](#), which allows you to sync audio, SD video and HD video across different frame rates (most other devices won't allow certain combinations, whereas the Mutec allows pretty much any combination of SD and HD frame rates and audio, plus its latest versions can do both P and PsF sync).

Note that the above is about *HD* Universal Mastering, which was introduced somewhere around Symphony Nitris (and later Nitris DX) v3 or v3.5 (need to verify).

Universal Mastering in *SD* has been a Symphony feature for much longer, even on (SD-only) Meridien systems. The Symphony Editing Guide shows the following output format options for 23.976p, 24p or 25p SD projects:

Digital Cut Tool Output Format (Play Rate)	Target Project or System, and Recording Media	Description
23.976 (NTSC)	NTSC TV; video screenings; digital audio workstations (DAWs) that support pulldown Picture and sound to NTSC tape; sound to video-referenced audiotape	Plays back the sequence at 23.976 fps (film rate). This play rate tells your Avid editing application to replicate a telecine transfer with perfect 2:3 pulldown. Your Avid editing application adds frames and slows the playback speed to create a digital cut to 29.97 fps. Use this option for NTSC video output, such as broadcast masters. For 25p, the media is slowed down by 4.1 percent. Pulldown is set to On (0.99).
24 (NTSC)	Audio for film projection; DAWs (video for reference only) Picture and sound to NTSC tape; sound to DAT or mag tape	Plays back the sequence at 24 fps (film rate). This play rate tells your Avid editing application to record audio at the film rate. If your Avid editing application records video, it maintains sync by adding pulldown fields and dropping every 1000th frame. This video should be used for reference only. Use this setting for direct audio output to be used in sync with film projection. Also use this setting when audio media files are being used in a digital audio workstation (DAW) and you need a digital cut for picture reference. For 25p projects, video and audio are slowed down 4 percent. Before you output the digital cut, make sure you select the correct destination timecode rate. See "Indicating the Destination Timecode Rate" on page 1049. Pulldown is set to Off (1.00).

Digital Cut Tool Output Format (Play Rate)	Target Project or System, and Recording Media	Description
29.97 (NTSC)	Animation projects; negative cutting with lockbox; some kinescope printing Picture and sound to NTSC tape (sound for reference only)	Plays back the sequence at 29.97 fps. This play rate tells your Avid editing application to speed up the playback speed without adding pulldown fields. As a result, the sequence plays faster (25 percent faster for 24p, 20 percent faster for 25p). Use this option for animations and tape-to-film transfers where the pulldown needs to be removed to have an exact frame-to-frame relationship between the film and video. Pulldown is set to On (0.99).
24 (PAL)	Audio for film projection; DAWs (video for reference only) Picture and sound to PAL tape; sound to DAT or mag tape	Plays back the sequence at 24 fps. This play rate tells your Avid editing application to record audio at the film rate. For 25p projects, audio is slowed down 4 percent. Video, when output to tape, can be used only for reference because, to maintain sync, your Avid editing application replicates a pulldown telecine transfer with one extra pulldown field occurring every 12th and 24th frame. Use this option when audio media files are being used for film projection (PAL Method 2) or in a DAW, and you need a digital cut for picture reference. Pulldown is set to Off (1.00).
25 (PAL)	PAL TV; video screenings Picture and sound to PAL tape; sound to DAT or mag tape	Plays back the sequence at 25 fps. For 24p projects, this play rate tells your Avid editing application to speed up the sequence by 4.1 percent, creating a frame-to-frame relationship between film and video (PAL Method 1). For 25p projects, there is no change in playback speed. There are no pulldown frames with this setting. Use this option for PAL video output, such as a broadcast master. Pulldown is set to Off (1.00)

What's the use?

So, why and when would you use Universal Mastering? For instance, you could be working on a 23.976p project and have the need to do a Digital Cut to a PAL tape for a screening or delivery. Or you could be working on a 1080p24 sequence, meant for theatrical release in 1080p24, but also require delivery of a 59.94i NTSC tape. And so on.

How is it different from Mix&Match framerates in Media Composer?

The main differences are *speed change* and *pulldown consistency*.

If, for example, you take a 24p sequence, and open it up in a 25p sequence, this will cause motion adapters to be applied to each 24p clip in the original sequence. This will NOT cause a speed change, and therefore, the 24 original frames will be divided over 25 destination frames. This means that some motion stutter will occur. Generally, that will not be accepted as a broadcast master or video release master. In the 50Hz-based world, broadcast masters and video release masters from 24p or 23.976p projects are most commonly created by speeding the original up so that a frame stays a frame; Universal Mastering allows you to do precisely that.

And if, for example, you take a 23.976p sequence and open it up in a 59.95i project, motion adapters will be added to each individual clip on the timeline, dividing 23.976 frames over 59.94 fields for each second of duration. However, when you output this to tape, then later need to insert a change to this tape, there's no way to guarantee a consistent 2:3 pulldown when you use this method. Supposedly, with Universal Mastering, you should have a consistent pulldown throughout the entire sequence and playouts thereof (need to confirm).

Notes on missing functionality between SD and HD

Beware the following (many thanks to Terrence Curren and Michael Phillips):
Universal HD Mastering is not fully up to par with Universal SD Mastering. The HD version is lacking the following:

- **Preserving proper continuous cadence** when going to 59.94 interlace formats when performing an insert edit. In SD, Symphony would go to nearest previous "A" frame and end and next nearest "D" frame automatically.
Sometimes it won't make the edit to tape until you select a proper "A" frame. No warning, it just won't do anything.
Other times, like inserting, it will make the edits on the wrong frame if you don't select a proper "A" frame enter point on tape. In SD, you get a warning and it won't go in and out on the wrong frame. In HD, that dialog doesn't work.

- **Ability to set playback/edit rate** in the Film/24p settings to be 23.976/24 or 24/25 (this can be done in SD film projects

- In the SD days, there was **no need to prepare audio elements** ahead of time as a mix down (this has likely been changed to ensure that audio clock is the reliable sync source for the playout, but can be a severe limitation in some cases).

Finally, it is a pity that there is no equivalent of Universal Mastering for file-based delivery in Symphony and/or Media Composer.

Hope this helps folks understand a bit about what Universal Mastering may or may not bring them.

Job ter Burg,
May 2012, updated April 2013.