



**SONY**

DigitalMaster

## WHY DIGITALMASTER™ FOR HDV?

In an era of high definition, where HDV is recorded on DV tapes only a quarter-inch in width, the need to raise the performance of the media has never been more important. If you consider that a mini-sized tape that traditionally stores 60 minutes of standard definition DV/MiniDV is now commissioned to store 60 minutes of (high definition) HDV, you might wonder, how is that possible? The answer lies in the type of compression employed by HDV that effectively reduces the uncompressed video signal to the same 25Mbps (25 million bits/sec.) video bit rate as that of consumer DV. Although the video bit rates may be the same, the importance placed on each bit, during playback, is not.

### WHAT IS HDV?

The HDV specification embraces two types of high definition recording, 720p at a video bit rate of 19Mbps, or 1080i at a rate of 25Mbps, which is used with Sony HDV hardware. A 1080/60i HDV signal (1440 x 1080) is made up of 1080 lines of vertical resolution (number of lines from the top of the screen to the bottom), each line containing 1440 pixels of horizontal resolution, displayed at a rate of 60 interlaced fields, or 30 frames, per second. Standard definition DV records a 480/60i signal (720 x 480) in NTSC countries, which includes the U.S. These resolutions render the HDV uncompressed video bit rate at roughly 4.5x that of consumer DV. In order to reduce the uncompressed video bit rate to DV's compressed 25Mbps, HDV adopts the same powerful MPEG-2 compression format that is used for digital broadcasts and DVDs. MPEG-2 for HDV combines intra-frame (intra = within frames) compression, used in DV recording with, the more efficient, inter-frame (inter = between frames) compression.

Inter-frame compression organizes frames into groups of pictures (GOPs) or frames, where one GOP is equivalent to about 15 frames, or a half-second of video. Each GOP begins with one intra-frame (I-frame) containing a complete frame of video, similar to a frame of DV video, followed by predictive and bi-directional frames which encode only the changes in the incoming video relative to the complete I-frame. By exploring redundancies within each frame, in addition to between frames, the MPEG codec is capable of compression ratios in excess of 20:1, compared to only 5:1 for DV. This means that less than 5% of the uncompressed HDV video signal is actually recorded to tape, compared to 20% with DV. It also means that the impact of missing data with HDV is much greater than with DV.

The video bit rates may be similar, but the importance of each recorded bit is not. The interdependency of all the frames in the GOP, to successfully reconstruct the GOP in its entirety, puts greater demands on the tape to maintain bit-for-bit signal integrity during playback. Errors and dropouts can not only compromise the reconstruction of a single frame, but can affect the decoding of the entire GOP, causing blocks, freeze frames or audio dropouts to occur. The benefits of HDV are more consistently realized with a high performance tape.

## WHAT IS DIGITALMASTER?

DigitalMaster uses second generation Advanced Metal Evaporated (AME-II) manufacturing technology, a new evaporation method supported by the development of high-density/high-performance Hyper Evaticle IV magnetic grains with smaller magnetic domain structures than those used with DV/DVCAM tapes. Grain diameters were reduced from approximately 8~10nm to 5~7nm, AME to AME-II respectively. Coupled with this new manufacturing development, the application of two magnetic layers, instead of just one used with most DV/DVCAM tapes, minimizes the thickness of an oxidation layer, inherent in the metal evaporation process, while moving the active magnetic Cobalt grains closer to the record/playback heads in the hardware. This positively impacts a tape performance parameter called carrier-to-noise ratio (CNR), the distance between the maximum signal that can be recorded on the tape and the noise floor (when no signal is present). It is within the tape's noise floor that errors can occur during playback because the data may be masked or misinterpreted by the playback head.

## WHY DIGITALMASTER FOR HDV?

With digital video, a stream of ones and zeros, or bits, are recorded to tape. The ability for the head to precisely discern one from the other is critical during playback. A zero can be played back as a one if the noise is too high, while a one can be misinterpreted as a zero if the signal is too low. A lower noise floor reduces the chance of misinterpreted data/errors, while a higher output enables more signal to be played back from the tape. Together they result in a cleaner, more powerful, signal transfer during both record and playback. The improved CNR with DigitalMaster reduces the dropout rate by 60% versus Sony consumer DV tape and 30% versus Sony professional DVCAM tape. Additionally, DigitalMaster has 95% fewer errors versus DV tape and 90% fewer errors versus DVCAM tape. But, don't be fooled. The difference between 90% and 95% is not just 5%, it is the difference between 10:1 and 20:1. DVCAM tape has half the errors versus Sony consumer DV tape.

## DIGITALMASTER TAPE: MEASURABLY BETTER.

Sony DigitalMaster tape...	...versus Sony DV consumer tape	...versus Sony EX consumer tape	...versus Sony HD consumer tape	...versus Sony DVCAM professional tape
<b>Dropouts</b>	60% fewer	60% fewer	30% fewer	30% fewer
<b>Errors</b>	95% fewer	90% fewer	80% fewer	90% fewer
<b>Durability - Diamond-Like Carbon (DLC) Layer</b>	30% greater	30% greater	30% greater	the same
<b>Width Tolerances</b>	50% tighter	50% tighter	50% tighter	the same
<b>Tape Shrinkage</b>	50% less	the same	the same	the same

Although it is true that HDV will record on any mini-size tapes, all tapes are not created equally. A technologically advanced compression codec like MPEG-2 is better served by a technologically advanced media, especially when employed by small-format HD acquisition hardware like HDV. DigitalMaster Tape combines developments in AME-II tape manufacturing with dual-layer technology to improve the carrier-to-noise ratio, significantly reducing dropouts and errors. An ideal match for any HDV hardware.

MODEL NUMBERS	
MINI SIZE:	STANDARD SIZE:
PHDVM63DM	PHDV64DM PHDV124DM PHDV186DM PHDV276DM



For more information, visit [www.sony.com/DIGITALMASTER](http://www.sony.com/DIGITALMASTER)

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