

Section D - HD Hardware

D.1 ProHD*, HDV_{TM} and HDV1 & HDV2 are explained

ProHD

ProHD is JVC's marketing concept which embraces all those JVC professional products which use or display HDV1, which is the 720p progressive implementation of the HDV format, as established in 2003 principally by Victor Company of Japan (JVC) and Sony.

One key aspect of ProHD is that it should put HD production within reach of modest budgets, whilst offering a strong and distinctive professional look & feel. Another key aspect of JVC's ProHD launch products (two camcorders, a hard-disk recorder and a desktop player and recorder) is that they are equally efficient in SD as in HD, which is to say in DV as in HDV.

HDV – A brief explanation

The main tenet of the HD format is that it would not differ from the DV format in certain basic regards. Its data stream would not exceed 25Mbps, meaning that the cassette durations for DV and HDV recording would be identical. From the outset, when the format was first specified, it was acknowledged that JVC would implement the progressive scanning version of HDV and Sony the interlaced scanning version, now known respectively as HDV1 and HDV2.

| | HDV1 (720p specification) | HDV2 (1080i specification) |
|---|---|-----------------------------------|
| Media | DV Tape | |
| Video signal | 720/25p, 720/50p, 720/30p, 720/60p | 1080/50i, 1080/60i |
| Number of pixels | 1280 x 720 | 1440 x 1080 |
| Aspect ratio | 16:9 | |
| Compression (video) | MPEG-2 Video (Profile & level: MP@H-14) | |
| Sampling frequency for luminance | 74.25 MHz | 55.6875 MHz |
| Sampling format | 4:2:0 | |
| Quantisation | 8 bit | |
| Bit rate after compression (video) | 19 Mbps | 25 Mbps |
| Compression (audio) | MPEG-1 Audio layer II | |
| Sampling frequency | 48 kHz | |
| Quantisation | 16 bit | |
| Bit rate after compression (audio) | 384 kbps | |
| Audio mode | Stereo (2-ch) | |
| Data format | MPEG-2 system | |
| Stream type | Transport Stream | Packetised Elementary System |
| Stream interface | IEEE 1394 (MPEG-2 TS) | |

Aspects of *ProHD*

A Brief History of HDV

In July 2003 JVC, Canon, Sharp and Sony announced a joint proposal for the basic specifications of the HDV format.

The four companies agreed to promote the format throughout the industry and then to finalise the specifications in September 2003. The basic tenets were:

1. The ability to record and playback high definition video on the internationally accepted DV format tape cassettes.
2. The recording durations of DV and HDV would be identical, using the same cassettes.
3. The HDV format would have two variants: (i) 720 scanning lines progressive by 1280 horizontal pixels; 720p / 60, 30, 50, 25 and (ii) 1080 scanning lines interlaced by 1440 horizontal pixels; 1080i / 60i, 50i.
4. Improved error correction by sampling multiple tracks. (This was necessary because MPEG-2 is interframe with GOP structure, as opposed to DV which is intraframe)
5. Added data for certain forms of playback, because video signals that are MPEG encoded do not support image display during special playback such as Fast Search or Slow Motion.



Already by September 2003 JVC, besides completing their progressive side of the format specification, had already produced its first HDV camcorder, JY-HD10U, which was available only in 60Hz operation, aimed as such at the North American market. It had an innovative design and, above all, it was affordable, yet, for all it was clearly aimed at video professionals, it still carried vestiges of a consumer camcorder. However, what it did achieve was the opening of serious discussions around the world as to how a professional HDV camcorder should ideally look and feel to be attractive to a broad base of professional users. JVC did their research and homework extensively in Europe, Australia and USA. The result is the GY-HD100.

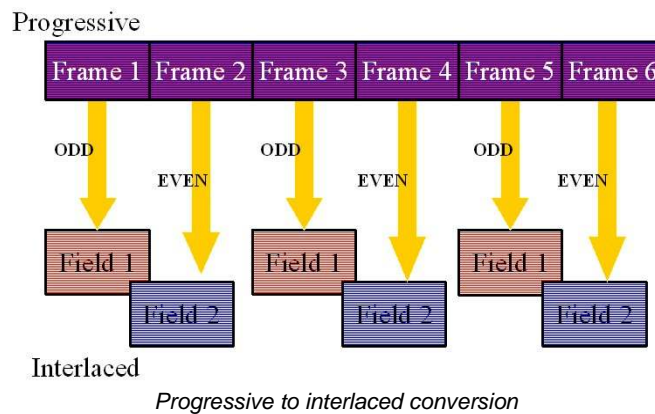
The 720p/30 video footage created by the early camcorder JY-HD10 in 2003 had sent out a message to the NLE manufacturers, who responded with interfaces. They have equally responded in 2005 to the presence of 720p/25.

Aspects of ProHD

Further aspects of HDV1 progressive

- **Quick and straightforward signal conversion**

It is a relatively simple task to convert from progressive to interlaced, but not so in the other direction. A progressive scan picture is converted to interlaced by taking the odd lines of progressive Frame 1 and then the even lines from progressive Frame 2 to create the two Fields that are required for each interlaced frame.



The native recording format of the HDV1 format is progressive, so besides outputting live video at 720/50p, the built-in converter will allow the signal to be up-converted to 1080/50i or down-converted to SD.

To convert from interlaced to progressive is much more difficult to achieve, and it requires both hardware and software (for motion analysis) to achieve satisfactory results.

- **Recording to DVD**

Another difference is the MPEG-2 stream type that is used for the IEEE1394 (FireWire) signal of 720p. This allows the digital output to go for recording purposes onto the new generation of DVD formats. In Europe the progress in the DVD market means that soon we will be able to record HD on higher capacity disks for programs longer than the 1 hour tape capacity of the MiniDV cassette in the camcorder. But there are different incompatible formats that are being supported by different groups of manufacturers.

There are currently two options, one is HD-DVD developed by Toshiba and NEC and the other is Blu-ray developed by the Blu-ray Disk Founders (BDF) a group of eleven leading consumer electronic companies, including Hitachi, LG Electronics, Matsushita, Mitsubishi, Pioneer, Philips, Samsung, Sharp and Sony. What is the difference between Blu-ray and HD-DVD ?

| | BD | BD | HD-DVD | HD-DVD |
|--------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Storage capacity | 25GB | 50GB | 15GB | 30GB |
| No of layers | Single | Dual | Single | Dual |
| Laser wavelength | 405nm | 405nm | 405nm | 405nm |
| Data transfer rate | 36Mbps | 36Mbps | 36Mbps | 36Mbps |
| Video compression | MPEG-2 MPEG-4 AVC VC-1 | MPEG-2 MPEG-4 AVC VC-1 | MPEG-2 MPEG-4 AVC VC-1 | MPEG-2 MPEG-4 AVC VC-1 |

As indicated in the table above the main difference is the capacity of the disk.

Aspects of **ProHD**

Blu-ray will have a higher storage capacity which will allow over 2 hours of HD or about 13 hours of SD

The recorders will be fitted with the IEEE 1394 connectors that will supports direct recording of MPEG-2 TS Transport Stream which will ensure there will be no quality loss or extra encoding.

The HDV1 format uses MPEG-2 TS and so will interface directly with the new DVD formats.



ENDS

**ProHD*

ProHD is a concept of JVC's affordable high definition solution and its format HDV. From the outset all ProHD models have been designed strictly for professional use and JVC has implemented professional features in areas such as timecode and audio.

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