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CR-D10 DVD Recorder

Hitachi Denshi (Europa) GmbH

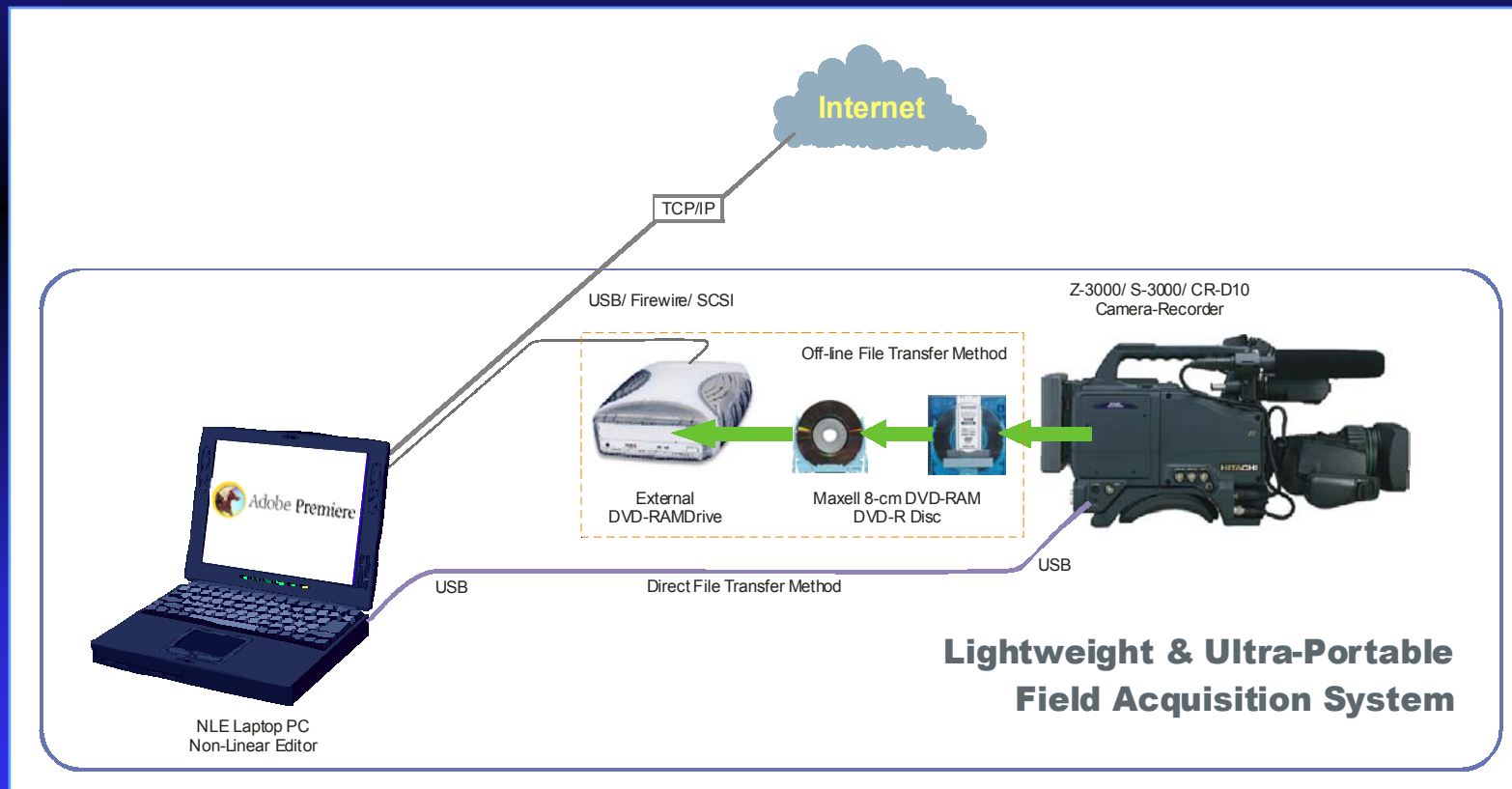http://www.hitachi-service.net

CR-D10 Exterior Overview

CR-D10 Exterior Overview

Application Review

- Professional results with convenient, lightweight, inexpensive, digital field content acquisition and editing system.

Internet

TCP/IP

USB/ Firewire/ SCSI

Z-3000/ S-3000/ CR-D10
Camera-Recorder

Off-line File Transfer Method

External
DVD-RAMDrive

Maxell 8-cm DVD-RAM
DVD-R Disc

Adobe Premiere

USB

Direct File Transfer Method

USB

NLE Laptop PC
Non-Linear Editor

Lightweight & Ultra-Portable
Field Acquisition System

Application Review

- Target customers are small secondary market TV stations, News, Corporate, Educational, Institutional & Government video.

- CR-D10 is replacement of low-end analog tape formats U-matic, VHS, S-VHS, Hi-8, Beta.

- Users that recently acquired DVcam, DVCPro, Beta-SX, D9 need have NLE platform to consider DVD recording.

Advantages of DVD over Tape

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- **Inexpensive** - At less than a (Euro €0.01/Mb) Cent per megabyte, cartridges are extremely inexpensive
- **Durable** – Can be re-used over 100,000 times
- **Phase change technology** - There is no physical contact between the read/write lens and the media, eliminating head crashing and wearing due to frequent reading and repeated access like on hard-disc recorders
- **Reliable** – Mechanically less complex with a minimum 30-year storage life
- **Lightweight & Small** – The disc weights a mere 6oz and has same form factor as a floppy disc.
- **Non-linear access to data** – No need to FFWD or RWD to find and review specific video clips on the recorded DVD-RAM disc
- **Advanced in-recorder functions** – Disc navigation, customized playlists, clip metadata
- **Wider manufacturer base** – Better choice of hardware and peripherals manufacturers to record, playback, and archive professional video using DVD-RAM discs.
- **Impervious** to magnetic fields, RFI/EMI & X-rays.

CR-D10 vs. Hard Disc-based recorders

- ■ DVD disc & drive are mechanically simpler.
- ■ DVD disc replacement cost is less.
- ■ DVD disc is more apt for field use…lightweight, cheap, durable, disposable, widely available anywhere.
- ■ DVD drive laser does wear out or crash…due to no contact with disc like magnetic head on HDR.
- ■ HDR needs specific application software in order to record/ playback…DVD has Forum-established read/ write chipset.
- ■ HDRs are power-hungry…HD disc has more mass
- ■ HDD in camcorder has delicate electrical multi-pin interface which is easily damaged.
- ■ DVD disc can be dropped and still works.
- ■ DVD disc is not affected by EMI, RFI or X-rays.

Application

- **ADVANTAGE**: Disc to drive…obvious method of keeping content digital.
- **ADVANTAGE**: DVD-RAM Drives for Desktop PC/ NLEs are widely supported by many manufacturers.
- **ADVANTAGE**: File transmission capabilities of NLE PC are exploited to make field production faster, cheaper & more efficient.
- **ADVANTAGE**: Can archive edited program back to DVD-R in drive.

NLE PC DVD-RAM Drives

■ Table of External Drives

Mfg	Model	DVD-RAM max Rec Cap	Interface	Specs Link	Price	Status
QPS	QPDVRPN1F	4.7/9.4GB DVD-RAM	Firewire	QPDVRPN1F	€402	
	QPDVDRAM9GFEM	4.7/9.4GB DVD-RAM	Firewire	QPDVDRAM9GFEM	€422	
	QPDVRPN1F	4.7/9.4GB DVD-RAM	SCSI	QPDVRPN1F	€469	
	QPDVRPN1U2	4.7/9.4GB DVD-RAM	USB2.0	QPDVRPN1U2	€390	
LaCIE	LCGR01	4.7/9.4GB DVD-RAM	Firewire	LCGR01	€435	
	LCGR02	4.7/9.4GB DVD-RAM	SCSI	LCGR02	€435	
Fantom	FDRAMFMP	4.7/9.4GB DVD-RAM	Firewire	FDRAMFMP	€412	MAC&Win
	FDRAMUMP	4.7/9.4GB DVD-RAM	USB2.0	FDRAMUMP	€425	MAC&Win
	360204M-H	4.7/9.4GB DVD-RAM	SCSI	360204M-H	€452	MAC
	360204P-H	4.7/9.4GB DVD-RAM	SCSI	360204P-H	€452	Windows
	FDRAMIM	4.7/9.4GB DVD-RAM	ATAPI	FDRAMIM	€349	MAC
	FDRAMIP	4.7/9.4GB DVD-RAM	ATAPI	FDRAMIP	€289	Windows

NLE PC DVD-RAM Drives

■ Table of Internal Drives

Mfg	Model	DVD-RAM max Rec Cap	Interface	Specs Link	Street Price	Status
Panasonic	LF-D321U	4.7/9.4GB DVD-RAM	ATAPI	LF321U	€239	Disc.
	LF-D311	4.7/9.4GB DVD-RAM	ATAPI	LF-D311	€239	
	LF-D211V	4.7/9.4GB DVD-RAM	ATAPI	LF-D211V	€285	
	LF-D201U	4.7/9.4GB DVD-RAM	SCSI	LF-D201U	€556	Disc.
	LF-D291N	4.7/9.4GB DVD-RAM	SCSI	LF-D291N	€385	
	LF-D101U	2.6GB DVD-RAM	SCSI	LF-D101	€400	
Hitachi	GF-2000	4.7/9.4GB DVD-RAM	ATAPI	GF-2000	€385	
	GF-2050	4.7/9.4GB DVD-RAM	SCSI	GF-2050	€385	
Toshiba	SD-W2002	4.7/9.4GB DVD-RAM	ATAPI	SD-W2002	€357	
QPS	QPDVRPN1I	4.7/9.4GB DVD-RAM	ATAPI	QPDVRPN1I	€295	
	QPDVDRAM9GSEM	4.7/9.4GB DVD-RAM	SCSI	QPDVDRAM9GSEM	€350	

Media – Maxell DVD Discs

■ Blank DVD P/N & prices table

P/N	Description	Dealer Price	List Price
567612	8-cm DVD-RAM Camcorder	€17.50	€33.33
635015	8-cm Maxell DVD-R for Authoring	€7.00	€24.44

NLE Comparison chart

Brand	Avid Express 3.5	Avid News Cutter	Adobe Premiere 6.5	AIST Movie Pak eXtreme	Pinnacle DV-500DVD	Canopus DV Storm 2	Ulead Media Studio 6.5	Ulead Video Studio 6.0	Apple
Approx.Price	$1,700	$20,000	$550.00	$1,300	$550.00	$1,080.00	$495.00	$100.00	$999.00
MPEG2 Editing		IMX format I-frame only	Yes	Yes	Yes		Yes	Yes	
Direct DVD-RAM Disc Import	No	No	With Heuris plug-	Yes	No	No	No	Japan Version	No
Digital Port Access	Firewire	Firewire	Firewire	Firewire	Firewire	Firewire	Firewire USB	Firewire USB	Firewire
MPEG2 Rendering	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Optional
DVD Authoring Software	DVDit!		Sonic DVDit LE	Impressions DVD Pro	Impressions DVD SE	DVD Workshop SE	Movie Factory	(built in)	Optional Plug-In
AMD Athlon Optimized		X	X	X	X	X			
Minimum recommended CPU	Pentium IV 1.6 gHz	Pentium IV 2 gHz	Pentium III 800mHz	Pentium III 500mHz	Pentium IV 1 gHz	Pentium III 700 mHz	PIII 500mHz	PIII 500mHz	G4 500mHz
Recommended RAM	512	512	256	256	256	256	256	256	384
Win98 & ME			X	X			X	X	
Win NT				X			X		
Win 2000		X	X	X	X	X	X	X	
MAC version	OS 9 & X		OS 9 & X						OS 9 & 10
Win XP Professional	X		X	X	X	X	X		
Real-Time TV Preview	Yes	Yes	With dual processing	Yes	Yes			No	Yes
Accelerated Rendering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Accelerated DV Output	Yes	Yes	Yes	Real Time	Real Time	Real Time	Real Time	Real Time	Real Time

NLE Software

■ Adobe Premiere 6.0/6.5 for Win & Mac PCs
- ◆ Professional Video Editing Tools
  - ✦ Software Real-time
  - ✦ Adobe Title Designer
  - ✦ Powerful Sound Engineering Tools (Windows only)
  - ✦ Real-Time Two Track Audio Processing (Mac OS only)
  - ✦ Custom-Length Audio Tracks with Updated SmartSound Quicktracks for Adobe Premiere
  - ✦ Windows Media Import (Windows only)
- ◆ Extensive Hardware Support
  - ✦ Expanded Support for Digital Video Devices
  - ✦ Broad Support for Real-time Hardware
  - ✦ Windows XP and Mac OS X Support

NLE Software

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- ■ Adobe Premiere 6.0/6.5 for Win & Mac PCs
  - ◆ Flexible Export Options
    - ✦ Adobe MPEG Encoder (Windows only)
    - ✦ DVD Authoring (Windows only)
    - ✦ Integration with Apple iDVD and Apple DVD StudioPro (Mac OS only)
    - ✦ Enhanced Windows Media Export (Windows only)
- ■ PC System Requirements
  - ◆ Both Windows and Mac machines require above average CPU, Memory and Storage.
  - ◆ Real-time software previews require additional RAM and more robust hardware.

NLE Software

- Heuris DVDconnexIt Plug-in for Adobe Premiere
  - "Helper" 3rd party program.
  - Adds functionality to be able to read DVD-VR files right from the drive.
    - Decode MPEG-2 transport stream
    - Interpret DVD-VR file system
    - Interface to PC OS using UDF
  - Independent of Adobe Inc. but certified for use with Premiere.
  - Only app which successfully works as of now.
  - Sold as a download for €250 or from HDEG.

NLE Software

■ Concerns about future NLE products that may support DVD-VR

◆ CR-D10 use concerns only input to NLE. Output files or authoring app of NLE are not HDA concern.

◆ Output file format of NLE only becomes important if user needs to record back to DVD-RAM/ DVD-R internal disc drive. CR-D10 only has analog A/V inputs.

◆ Clip management and preview should be seamless integration into the NLE program.

◆ Support of popular graphics cards/ chipsets is a must to view PAL previews and renders on external monitor.

◆ Multiple OS support (Windows, Apple, Linux, Unix)

◆ Scalable architecture and open APIs.

CR-D10 Basic Product Specifications

■Refer to Specifications document

- ◆ Video Record
- ◆ Audio Record
- ◆ Video Playback
- ◆ Audio Playback

DVD-RAM…not a tape format !!!

- There are only 3 Types of DVD recognized by the DVD Forum
  - DVD-RAM/ DVD-VR
  - DVD-R
  - DVD-RW
- DVD Video format (consumer playback only format)
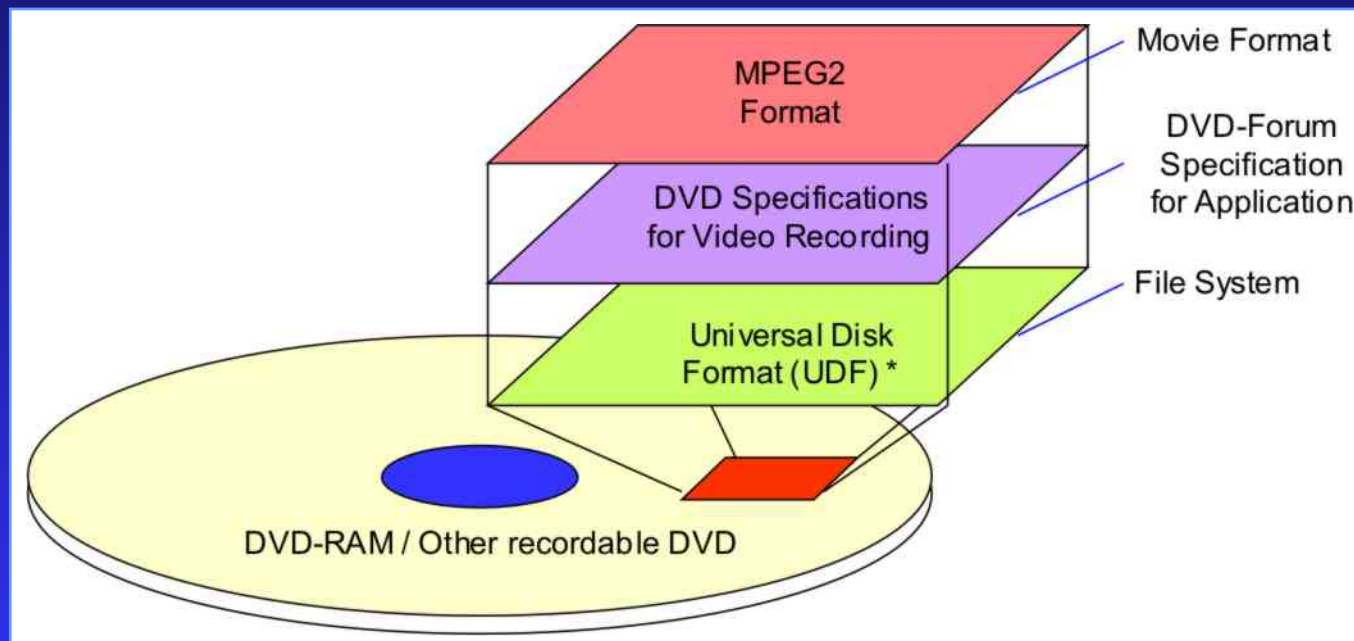- All other flavors of "DVD+" are consortiums of mfgs promoting their own interests in that format.

DVD-RAM...not a tape format !!!

- Comparison of DVD Forum approved formats

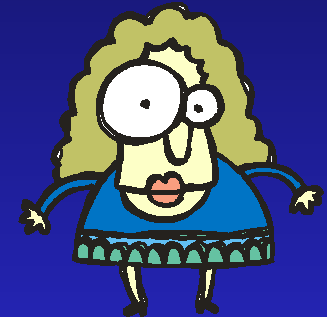| Format	DVD-RAM	DVD-R	DVD-RW
Media Type	Rewritable	Write-once	Re-recordable
Rewritable	>100,000X	No	>1,000X
Track Width/ Formatting	0.74•m /Zoned CLV	0.8•m /CLV	0.8•m /CLV
Disc Sides	1 or 2 sides	1 or 2 sides	1 side
Cartridge/ Non-cartridge	No/ Yes	No	No
Disc Capacity - 1st Generation	2.6 - 5.2 Gb	3.95 Gb (single sided)	4.7 Gb
Disc Capacity - 2nd Generation	4.7 - 9.4 Gb	4.7 Gb (single sided)	4.7 Gb
		Authoring & General use	
Recording Medium	Phase-change	Organic Cyanine Dye	High reflectivity phase-change
Read Access	Random	Random	Random
Write Access	Random	Sequential	Sequential
Market	Computer, Network Server, Professional & Consumer Storage and Archiving	Professional Distribution & Archiving, Lower-priced 4.7Gb drive, DVD-R for general use, supports the For General discs only - consumer market	Professional & Consumer
Supported Playback	CD-Audio, CD-ROM/R/DVD-Video/ Audio	DVD-ROM	CD-Audio, CD-ROM/R/RW, DVD-ROM/R/DVD-Video/ Audio

DVD-RAM Disc Format

■ Consists of 3 distinct layers of technology
- ◆ Movie Format: MPEG2 MP@ML
- ◆ DVD-VR: Specs for real-time A/V record
- ◆ File System: UDF interface into PCs OS

Movie Format

■ **What is MPEG2 compression?**

◆ Better utilizes existing bandwidth to deliver video information.

◆ Exploit limitations of Human Visual System.

✦ Limited luminance and less color response

✦ Limited ability to track rapidly moving objects

✦ Limited "noise" sensitivity

- immediately after scene changes
- in bright areas or highly detailed areas of scene
- at high frequencies (e.g. edges of objects)

◆ Goal is to throw away bits in a manner that appears loss-less to the HVS.

◆ Remove spatial and temporal redundant information which exists in video imagery.

Movie Format

- **MPEG2 Compression Strategy**
  - ◆ Remove Redundancy!
    - ✦ Step 1: Color Redundancy/ Chroma sub-sampling (4:2:0, 4:2:2)
    - ✦ Step 2: Temporal Redundancy (Motion Estimation)
    - ✦ Step 3: Spatial (color & brightness) Redundancy (Discrete Cosine Transform)
    - ✦ Step 4: Statistical Redundancy (improvement of coding efficiency by Zig-Zag scan & Huffman coding)

DVD Forum Specs for Application

■ What is DVD-VR?

- ◆ Specification for real-time video recording.
- ◆ Covers a range of applications including video camcorders, home recording and recording video on PCs.
- ◆ Basic features comprise Record, Playback, Delete and Edit.
- ◆ Navigation data and the use of video objects which are video files labeled VR_MOVIE.VRO (video recording object)
- ◆ *.VRO files could be MPEG1 or MPEG2 encoded.
- ◆ Audio encoding can be Dolby Digital, MPEG or LPCM but multi-channel is not possible with LPCM.
- ◆ Navigation data can include playlists and use program chains.

File System

- **What is the UDF system (Universal Disc File)?**

- **Developed by OSTA (Optical Storage Technology Association)**

  - OSTA specifically defines what information shall be recorded on disk for a particular operating system and how other systems are to treat this information.

  - UDF was developed by an industry consortium of leading companies in the optical storage industry.

  - Through the use of UDF, DVD entertainment based and computer based content can reside on the same disk and be accessed by a wide variety of computer systems as well as the consumer DVD player in the home.

File System

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- UDF is:
  - Built on the foundation of the ISO/IEC 13346 standard
    - A practical subset of the ISO/IEC 13346 standard.
    - Fully compliant with ISO/IEC 13346.
  - Simple and universal, defining support for multiple operating systems
    - Defines what information must be stored on disk by all operating
    - Systems.
    - Defines what information must be stored on disk for each particular operating system.
    - Defines how information stored on the disk by one operating system is to be processed by another operating system.
    - Provides support of, and data interchange among, the major commercial operating systems, including
      - DOS/ Windows 95, 98, NT, 2000, XP
      - Apple OS/2
      - Linux
      - Unix
    - Expandable to include support for future operating systems.

Sales Features Review

- DVD discs
- CR-D10 recorder & other hardware
- Field acquisition & editing
- Content management
- Future product compatibility