

The Interactive Engineer



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Ie editorial staff

■ Editorial

So, number 5 is around the world. This time IE contains a lot on Digital Video. Looking around in other multimedia related publications reveals that DVD is gaining interest. We don't need a crystal ball to predict that DVD once will become the standard. In the meantime, CD-i stays well alive and kicking; we can tell you that Philips Media has 24 titles -with Christmas in mind- in production, where some titles incorporate 'seamless branching', that the introduction of 'CD-Online' opened the whole world for CD-i applications and that a new player, incorporating an IMPEG DV cartridge, 32Kb non-volatile memory and wide screen compatibility will soon see life as the CD-i 740. Even more, Multimedia developers seems to swing towards CD-i, the cost effective Multimedia platform with an international standard instead of the complex CDROM platform. Are we bragging when we say that CD-i is the bridge to the future?

Other good news is that IE is from now on available in electronic form on the PIMC mailserver in the 'PUB/IE' directory. For retrieving an IE volume, send a mail to the mailserver containing the commands 'CD PUB/IE' followed by 'GET IEYY_N.PDF', where YY is the IE's year of publication and N IE's volume number. You'll need Adobe™'s 'Acrobat Reader' to view these documents as we stored IE in the platform independent '.PDF' format. This reader is available on most sites from Adobe™ on Internet (<http://www.adobe.com>) or the Adobe™ forum on CompuServe (GO ACR-41).

Ie editorial staff

■ Building VCD compliant disc

VCD streams are becoming very popular in MediaMogul applications. But because of their 352x288 pixel format, the pictures appear to be horizontally squeezed and have a black border on both sides.

A simple way to correct this problem is to build and burn the disc as a white book VCD. When this disc is played, the DV decoder switches to VCD (white book) playback mode and displays the pictures without black borders and in the correct aspect ratio.

This story describes the procedures to create a VCD compliant disc. This procedure -in a nutshell- consists of making a Media Mogul title ❶, running Script2disc without the Master option ❷, modifying the master scripts ❸ and running VCD master on the modified Master scripts ❹. To do all this, you'll need the following software packages: MediaMogul 2.2.1 to make the CD-i application, Script2disc version 2.2.1 to build the application and VCDMaster version 4.3.1 to master the application as a VCD.

❶ Media Mogul application

Create the Media Mogul CD-i application with VCD streams as usual, including Media Mogul analysis and simulation tests.

❷ Run Script2disc.

Run S2D PC version 2.2.1 with the following parameters selected :

```
CDBUILD -a<alias> -a<alias> -a/= \ -d
-f=8 -xa -S -o=<DiscImage-name>
-m <start-script>
Parameters :
```

- a option: is used for aliasing the pathway for the RTF files -> optional (not necessary when you use mpg files)
- d option: includes all subroutines and font modules in the realtime files.
- m option: runs Script2disc without the MASTER procedure. This option must be included.
- f option: specifies the number of significant characters in script, subroutine / font and parameter file names -> optional.
- xa option: generates a CD-ROM XA disc image. This option is necessary to use in the CDBUILD command.

-S option: builds an unscrambled disc image. This option should also be used in the build command.

-o option: specifies the path list of the discimage other than the default option.

When using Script2disc on PC or Mac, you can't enter the CDBUILD command directly on the command line. However, by selecting options in several menus you can obtain the same result. Use the following 'translation' to enter these commands on PC/MAC:

- a option: select find / replace in the options menu
- d option: select Load subroutines / font in the modes menu
- xa option: select CD-ROM XA image in the modes menu.
- S option: select scrambled disc image in the modes menu.
- o option: set the working directory in the S2d overview screen. This is the directory in which the discimage will be created.
- m option: select the option "Make Realtime files only" in the S2D overview screen. By using this option the Master process won't execute.

These commands will generate all necessary files to build a discimage but will not build the actual discimage because Master wasn't called.

The Media Mogul CD-i application -created in previous step- will be part of that discimage, replacing the standard VCD Cdi-application. The result of the CDBUILD step are three MASTER scripts _master0, _master1 and _master2.

❸ Modifying the Master scripts.

For this purpose, VCD MASTER will not use the "mast_s" or "mast_s_x" master-scripts (standard Media Mogul scripts in the S2D CDIMAGES directory) to generate the final discimage.

Instead, you'll have to create a new VCD MASTER-script, conform to the VCD MASTER specifications. The easiest way to do this is starting from the existing scripts and add the VCD specific lines (shown here in bold). All the existing lines are references to standard master files.

The box on the facing page shows the modified scripts:

```

path="<PC-path following the master-script syntax rules referring to the master
manual>"

<_master0>

volume "TESTVCD" in "<PC-path>/TESTVCD.cd"
avseq_dat file EFKES from mpeg "c:/prod/memo_221/rtfs/track03.mpg"

<_master1>

{

"CDI"
{
"ABSTRACT.TXT;1" protection 0x555 from Abstract
"BIBLIOGR.TXT;1" protection 0x555 from Biblio
"COPYRIGHT.TXT;1" protection 0x555 from Copyright

"DSTATEPR.MM1;1" protection 0x555 from cdi_statepro
"DEXITPR.MM1;1" protection 0x555 from cdi_exitpro
"DDV.MM1;1" protection 0x555 from cdi_dv
"DAPPL_SC.MM1;1" protection 0x555 from _appl_script_

<_master2>

"ZSTATEPR.MM2;1" protection 0x555 from cdi_statepro2
"ZEXITPR.MM2;1" protection 0x555 from cdi_exitpro2
"ZDV.MM2;1" protection 0x555 from cdi_dv2
"ZAPPL_SC.MM2;1" protection 0x555 from _appl_script_2
}

"MPEGAV"
{
"AVSEQ01.DAT;1" from EFKES
}
}
}

```

In addition some remarks concerning the master scripts:

- Save the VCD MASTER script with the extension msc.(example testvcd.msc)
- If you want to make a VCD compliant disc, you must generate at least ONE AVSEQUENCE file for the VCD disc.A very small dummy file (a file containing only a black screen) is enough. The contents of this AVSEQUENCE file must be 100% correct and according the specifications. This means that the streams must be in the appropriate format.
- You can create any other directory beside the directories CDI and MPEGAV to include specific platform applications (eg.PC or MAC).
- Do not include "message.cda" in the VCDMASTER-script.
- You have to be sure that VCD MASTER is run in the same directory as the files created by S2D in MediaMogul because _master0,_master1 and _master2 are referring to that directory.

- You have to be sure that VCD MASTER is pointing to the same directory as S2D in MediaMogul because _master0,_master1 and _master2 are referring to that directory.

④ Run VCD Master:

The command line could look like this:

```
VCDMASTR -VCD -S <VCD-master-
script(xxxxxxxxx.MSC)>
```

You don't need to specify the "-xa" parameter once more as VCD takes care of this.As result you get an <image.cd> file with a <image.toc> file of type VCD (CDBRIDGE)

This VCD disc,which contains a CD-i application with VCD streams,can be played on a CD-I player. Now, the VCD streams doesn't have that horizontally squeezed impression anymore and are displayed without black borders.

Peter Boots

PlayerType [0] July '96	DVC (pins) [2]	Software Changes	CDM version	Board
180	No	cdapdriv		"180"
601/00, /05, /17, /0A 602/00, /05, /17				
611/00, /05, /17 910/00, /05, /37	100 big	cdapdriv with changed chipset	9	maxiMMC
604/00, /17				miniMMC
605/00, /17 605T/20, /37 910/13, /17P, /80 205/00, /05, /11, /17T (CDI2200 Memorex) 220F1/00				
350 and 360-portables				miniMMC-based
200F1/17 (Magnavox) 210F1/00, /05, /17		cdapdriv, changed videochip & systemcontroller		Mono I
220F2/20, /25, /31, /37, /39				
200F2/37 210F2/20, /25, /28, /33, /37		dspdriv, new decoder and chip-set, DSPsolution		Mono II
220F3/40, /41, /45, /57				
200F3/57 210F3/40, /41, /45, /48(Grolier), /53 (Korea), /56(Planeta), /57	120 small	ciapdriv, other seekmechanism etc.	12.4	Mono III
220F4/60, /61, /65, /77				
380/00, /01, /05, /11, /17, /20(=/00+DVC)				Mono III based
450/00, /01, /03 (CDI5000 Magnavox Europe), /04, /05, /11, /17 (Magnavox USA), /19, /80 (GDI-1000 Goldstar USA), /81 (GDI-750 Goldstar Korea), /82 (GDI-750 Goldstar UK), /83(Highscreen Vobis), /84 (GDI-1000 Goldstar GEO Manna Space), /85 (GDI-750 Goldstar Europe), /86 (GDI-750 Goldstar Australia) 550/00, /03 (CDI 9000 Magnavox Europe), /05, /11, /17 (Magnavox USA)		ciapdriv	12.1	Roboco (Mono III based)
210F4/60, /65, /68(Grolier), /73(Korea), /76(Planeta)				Mono IV
220F5/80, /82(CDI100V Grunding Germany) , /83(Grunding Spain) , /85, /97				
470/00, /01, /05, /06(Brasil), /11, /17(Magnavox USA), /20(=/00+DVC), /80(CDI4000SBR), /81(TL2000 Talilaser), /82(brandless)				
615/00, /17 (2 PtDV, 2 Kb(CD-i + AT), 1 parallel, 3 serial and 1 floppy)				
740/00, /05, /17				
	N.d.	N.d.	N.d.	Mono V (Skipped)
470, 740				Mono VI (occ) [3]
370-portable(Korea)	Integrated			N.d.

Production Status	Player shell	8 Pins DIN Connectors usage	8 Pins DIN Connectors Electrical Level	(CD-i) Keyboard 8Pins DIN Connector(s) supported	NVRAM 8Kbytes except
Not supported	N.d.[1]	N.d.	N.d.	N.d	N.d
These players are still in the market, but production has been stalled except for 605T	Older: No CD-Ready recognition	No splitter: - Front: PtDv - Rear: PtDv or Serial	-12V <-> +12V	No splitter: Front & Rear	
	Newer: CD-Ready recognition		TTL(0V<->+5V)		32
On the market, may be in stock		1 Without splitter - Front: PtDv - Rear: Serial 2 With splitter - Front: Splitter - Splitter 1: PtDv - Splitter 2: PtDv - Rear: Serial		Only with splitter: - Front: splitter - Splitter 1: KB	32
In production and on the market		1 Without splitter - Front: PtDv - Rear: No 2 With splitter - Front: Splitter - Splitter 1: PtDv or Serial - Splitter 2: PtDv - Rear: No			32
		1 Without splitter - Front: PtDv - Rear: Serial 2 With splitter - Front: Splitter - Splitter 1: PtDv - Splitter 2: PtDv - Rear: Serial			32
		No splitter: • Front: - Input 1: PtDv - Input 2: PtDv • Rear: Serial		No splitter: Front (Input 2) and Rear (Port 4 AT)	32
In development	N.d.	N.d.		N.d.	
Superseded					N.d.
In development					
On the market		No splitter Input 1: PtDv Input 2: PtDv or Serial	N.d.	No splitter: Input 1 and Input 2	32

■ CD-i player types

CD-i players (and their production process) are constantly being improved. As a result, there are several types and generations of CD-i players existing next to each other. This article gives an overview of these different player types and generations. The centre pages shows a table where all types are listed, together with some technical information about each machine.

The players are identified by their type and slash number, while DV cartridges are commonly identified by their AH number.

Remark [0]: slash number signification

- /00 Europe in PAL
- /01 General overseas
- /05 UK in PAL
- /11 Japan in NTSC
- /17 USA in NTSC
- /19 France in SECAM

Example: 220/77

77 = 3 x 20 + 17 (an increment of 20 indicates a new generation)
17 = USA in NTSC

Remark [1]: N.d. means Not documented

Remark [2]: DV cartridges overview

The table on the bottom of this page given an overview of the DV cartridges.

Example:

22ER9141/20 (MMMMMMMM/SS)
AH009525614288 (AHAAXXXXXXXXXXX)

Model# = MMMMMMMM
Slash# = SS
AH# = AA
N.d. = XX

Remark [3]: OCC: One Chip CD-i

Patrick de Jong

■ Which DV cartridge is in a 605?

If you need to know which DV cartridge is mounted into your 605 CD-i player, without removing the cartridge, open a terminal window to the 605 CD-i player to get information about the DV cartridge.

With a terminal (or a computer running a terminal program) connected to the CD-i player, switch on the player while holding down the keys <shift><f> on the terminal. The 605 CD-i player responds by displaying a menu on the terminal:

```
PHILIPS - CDI          FMV Low Level
Test Rel 1.0
```

0. Exit FMV low level test
1. Writing to a default RAM address
2. ROM parity check
3. DRAM test
4. DRAM test extended
5. Extension DRAM test (1 Mb)
6. Video/Audio Host interface test
7. FMV test menu
8. DSP test menu
- 9 Pal test menu

Please make a selection:

The following items show up at the bottom of the display when 'option 2 (ROM parity check)' is selected.

```
ROM Id:    01      CSUM0: 7FA3
Rel nr:    21      CSUM1: 8EDD
```

The release number of the DV cartridge is shown after 'Rel nr:' and corresponds to the type of cartridge as shown in the next table:

Rel nr	cartridge
0x	AH00
1x	AH01
2x	AH02
3x	AH03
4x	VMPEG

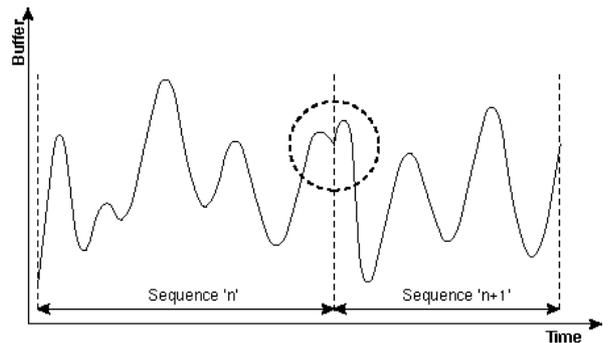
Continued on next page

DVC Type	AH#	Model#	Format #pins	Slash# (/)	Rom version	Production Status	Compatibility
	00	22ER9141 big	100		1.0	Not supported	CDi(Green book)
	01				1.1, 1.2, 1.3		
	02				2.1		
Gate Array 3	03			00	3.0	On the market	CDi(Green book)+VCD (White book)
Vmpeg	00			20,(37)	4.1	Still available	
		22ER9956 small	120	20,(21,37,38,39)	5.3	In production	
Impeg	00			40,(41,57,58,59)	6.3		

The x represents a number from 0 to 9. In this example, the CD-i player is fitted with a AH02 cartridge.

Cartridges with a release number lower than 3 should be upgraded as they aren't VCD compatible and are rather rare in the consumer market.

Rudi Verslegers

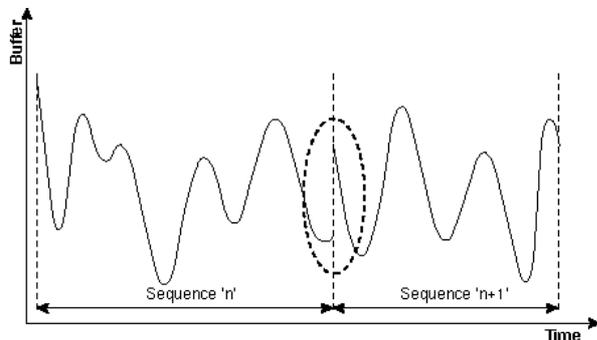


Be sure to take concatenation into account when encoding video streams; the verifier doesn't report any error when beginning and end of concatenated video pieces shouldn't match.

Marc Jozefzack

■ DV with concatenated video streams crashes

With Pink, you can concatenate multiple video streams into one multiplexed file. But simply concatenating files, without taking some basic rules into account will surely crash the system or wreck the screen output. Concatenating video streams is only allowed if the sequences are encoded with matching buffer values, or in other words: the "end-status of sequence n" must be equal to "begin-status of sequence n+1". The next figures show the incorrect concatenation and the correct concatenation:



In this case, the cartridge will certainly get buffer underflows or overflows because it can't maintain a constant bitrate at the transients introduced at the concatenation points. These buffer underflows or overflows causes green flashes or a crash.

The only solution is to encode video streams especially for concatenation. The encoder will then match the last value of stream 'n' with the first value of stream 'n+1'.

■ The CSD file and DV cartridges

The CSD file in the NVRAM of the consumer CD-i player holds a lot of useful information about the external peripherals (in the largest sense of the word) connected to the CD-i player. Entries 90 and 91 in this file hold information about the DV cartridge fitted into the player. As this file is accessible by the application, it can check which cartridge is available and change the program flow if needed.

The entries 90:/mv: and 91:/ma: in the CSD file are, depending on the cartridge in the player, followed by specific information about the cartridge.

- 90:/mv:
91:/ma:

means that the DV cartridge contains a Gate Array video chip and a Gate Array audio chip. The system software is only capable of detecting a White Book title when the 'vcd' module is present.

- 90:/mv:RV="CPT2"
91:/ma:

means that the DV cartridge contains a VMPEG video chip and a Gate Array audio chip (separated Audio and Video decoder). The system software is always capable of detecting a White Book title.

- 90:/mv:RV="CPT3"
91:/ma:RV="CPT3"

means that the DV cartridge contains a IMPEG chip (integrated Audio and Video decoder). The system software is in this case always capable of detecting a White Book title.

If the application thus reads "CTPx" with x lower than two, it should look for the 'vcd' module in order to detect White Book titles. The way around: the player is White Book capable when the 'vcd' module is detected.

The table at the bottom of this page resumes some technical information and an historical overview of the existing Digital Video Cartridges.

DVC	Compatibility	Additional SYS RAM onboard	CSD contents	Slot pinning
'94: AH00 ROM 1.0	GREEN	0 MB	90:/mv: 91:/ma:	100 pins analog
'94: AH01 ROM 1.1, 1.2, 1.3	GREEN	0 MB	90:/mv: 91:/ma:	100 pins analog
'95: AH02 ROM 2.1	GREEN	1 MB	90:/mv: 91:/ma:	100 pins analog
'95: AH03 ROM 3.0, 3.2	GREEN & WHITE	1 MB	90:/mv: 91:/ma:	100 pins analog
'95,'96: VMPEG ROM 4.1 ROM 5.x	GREEN & WHITE	1 MB	90:/mv:RV="CTP2" 91:/ma:	100 pins analog 120 pins digital
'96: IMPEG ROM 6.x	GREEN & WHITE	1 MB	90:/mv:RV="CTP3": 91:/ma:RV="CTP3":	120 pins only

A useful hint when developing titles containing MPEG streams: the 'White Book' cartridges all have a Sample Rate Converter (SRC) on board, converting the MPEG pixel frequency from 15 Mhz (Green Book) to 13.5 Mhz. This results in slightly larger backplane pixels. A film on videoCD - encoded with a width of 352 pixels - will not show full screen on a CD-i in Green Book mode, while showing full screen on a CD-i in White Book mode. 'White Book' cartridges recognise the type of disc inserted into the player and switch to the appropriate mode. Older cartridges, however, can't switch between these modes and will show the videoCD not full screen and in the wrong aspect ratio.

Jan Matejka

■ How to contact PIMC

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