VIDEO CD ON CD-i
Release 4.1

For playback of Video CD 2.0 discs on CD-i players

PRODUCT INFORMATION AND INSTALLATION NOTES

For more info about Video CD on CD-i, and to download the latest updates, please check the New International CD-i Association website at www.icdia.org

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LEGAL INFORMATION

Copyright Information

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BEFORE YOU BEGIN

Manual objectives

This document describes an application program to play a Video-CD on CD-i. It tells how the application should be used by the content provider, how it can be configured and customized, and what it offers for the end user. It is strongly recommended to read the entire manual before usage of the software.

Intended Audience

This manual is intended for content providers who want to use this application as the CD-i program which must, according to the "Video-CD standard, version 2.0, July 1994", be present on a Video-CD. Knowledge of the mentioned Video-CD standard is assumed, as well as basic knowledge of Digital Video according to the MPEG-1 standard, and of the CD-i Full Functional Specification.

Structure of manual

Chapter 1 PRODUCT DESCRIPTION gives a brief description, including the features of the "Video-CD on CD-i" application.

Chapter 2 FUNCTIONALITY gives an overview of the functionality and explains how the functions must be used.

Chapter 3 PRODUCT INSTALLATION describes the installation procedure.

Chapter 4 CONFIGURING THE BEHAVIOUR OF THE ENGINE describes how the behaviour of the software can be configured.

Chapter 1
PRODUCT DESCRIPTION

Video-CD

Video-CD is a compact disc format for low-interactive programs featuring Digital Video based upon the MPEG-1 (Moving Pictures Expert Group) standard. It allows programs like music clips and live-concerts. It is published by Philips Consumer Electronics B.V. and has been prepared in close cooperation with Matsushita Electrical Industrial Co., Sony Corporation and Victor Company of Japan. The standard, laid down in the document "Video CD Specification, Version 2.0" ensures that any Video-CD plays on dedicated Video-CD players, CD-i players and other systems that conform to this standard.

Video-CD on CD-i

To allow the play of Video-CD's on a CD-i player, the Video-CD standard requires that a CD-i application program must be present. Philips Consumer Electronics has designed such a `Video-CD on CD-i' application program. The program is designed to

- provide full play back control as defined in the PSD of the standard
- be extremely simple to use and easy-to-learn for the end-user

The program has been designed for Video CD 2.0 discs that contain a PSD file for play back control. For Video CD 2.0 discs without a PSD file a different program is provided by Philips.

The program runs on CD-i players equipped with the CDRTOS 1.1(.1) operating system and a Digital Video extension cartridge.

General Features

- NTSC / PAL compatible
- full PSD playback control
- slow motion / freeze frame
- fast forward / reverse
- stereo / multichannel audio
- centring of Digital Video window
- multilingual messages (English, French, Japanese)
- subtitles in multiple (selectable) languages
- multi-disc album support
- scene number indication (PSD list id)
- time code (& frame) indication

Customization & Configuration

- close captioning function
- auto play mode
- cursor colour / shape

Play Controls

- pause / continue
- fast scan forward (multispeed)
- fast scan reverse (multispeed)
- slow motion
- single step forward
- step reverse
- play (as in VCD 2.0 standard)
- stop (as in VCD 2.0 standard)
- next (as in VCD 2.0 standard)
- previous (as in VCD 2.0 standard)

End user settings

- audio channel selection
- position video
- select subtitle language

Chapter 2
FUNCTIONALITY

General

- If the player is not equipped with a DV cartridge, a screen message appears that the application requires a DV extension. The message is in English, French and Japanese, and displayed at start-up
- In case of a disc error a multilingual message is displayed. The contents of the message is : "Your disc may be dirty. Please remove the disc and clean it".
- The application can be configured.
- When the application is started it starts playing the first item in the PSD. The play control bar will appear on the bottom of the screen. There are two control bars, one with numeric items for selection lists and one with scan control functions for play lists. Normally there is no need for the user to manually change between the two control bars or remove the control bar, however the control bars can be toggled by pressing action button 1.
- When the control bar is displayed, sequence information is shown at the top of the screen. The current list id number (scene) is shown. When appropriate the time-code (& frames) of the item that is playing is shown.
- Each engine delivered contains a unique serial number. This can be made visible only at the display of the engine's copyright screen when exiting the application: Press the STOP button of the CD-i's Remote Control, subsequently press one of the action buttons.

IN THE FOLLOWING SECTIONS REFERENCE IS MADE TO THE DEDICATED BUTTONS OF A POINTER DEVICE. NOTE THAT CORRESPONDING BUTTONS ON THE PLAYER ITSELF HAVE THE SAME EFFECT!

Control bar during play

- FAST FORWARD: fast forward scan in the sequence. The fast forward accelerates to a higher speed. If the button is pressed for less than one second then the system remains in fast forward mode until another action button is pressed. If the action button is held down for more than one second then the FAST FORWARD remains active only while the button is held down.
- FAST REVERSE: fast reverse scan in the sequence. This function works in the same way as the FAST FORWARD function.
- PAUSE button control bar/PAUSE button pointer device: pause an ongoing play of an A/V sequence, or, if already in the pause state, continue normal play. Within the PAUSE mode slow motion and step functions are available and thus a different control bar is displayed.
- STEP FORWARD: The sequence steps frame by frame when the button is depressed.
- STEP REVERSE: The sequence step backwards in small steps (about 1 second) while the button is held down. When the button is released the system returns to PAUSE mode.
- OPTIONS: When this button is selected the engine stops interpreting the PSD and goes to the OPTIONS screen which allows the user to set various settings, start the disc again or exit the application.

- SLOW: When the slow button is selected the sequence is played in slow motion.
- PLAY: button control bar/PLAY button pointer device: Performs the default selection item of the selection list as specified in the Video CD 2.0 standard.
- PREVIOUS button pointer device/PREVIOUS-button control bar: Performs the next item in the PSD as specified in the Video CD 2.0 standard.
- NEXT button pointer device/NEXT-button control bar: play next sequence. Performs the next item in the PSD as specified in the Video CD 2.0 standard.
- STOP button pointer device/STOP-button control bar: Performs the return item in the PSD as specified in the Video CD 2.0 standard.

Options Screen

At run-time, the end user can call the options screen, which allows the following options:

- Settings: goes to settings screen where the user can set a number of options for the engine.
- Play: Starts playing the disc from the beginning of the PSD.
- Resume: resumes the playing of the disc from the PSD entry that was last played
- Exit: Exits the application

Settings Screen

- The settings screen allows the user to position the video on the screen, select the audio channel in the case of dual channel audio and to select the preferred subtitle language.
- Audio channel 1/2: select whether the AV sequences are played with the audio from channel 1 or channel 2 (dual channel mode only).

Though the engine tries to centre the DV-window on the screen, it might happen that for some television-sets an adjustment of the DV-window position is needed. For the adjustment procedure, a DV-sequence is played (and repeated if necessary). The first sequence of the disc is used, unless another sequence is defined by the content provider. The image is overlaid by control buttons for the position adjustment:

- UP-button: move the DV-window slowly upwards. If the pointer device's action button is kept pushed down the move accelerates.
- DOWN-button: move the DV-window slowly downwards. If the pointer device's action button is kept pushed down the move accelerates.
- LEFT-button: move the DV-window slowly to the left. If the pointer device's action button is kept pushed down the move accelerates.
- RIGHT-button: move the DV-window slowly to the right. If the pointer device's action button is kept pushed down the move accelerates.
- OK button: return to the options screen.

Chapter 3
PRODUCT INSTALLATION

Deliverables

- Executable main program: CDI_VCD.APP;1
- Real-time file: CDI_IMAG.RTF;1
- Text font: CDI_TEXT.FNT;1

Installation

These files must be installed in the CDI directory of the Video-CD.
To start the application, execute CDI/CDI_VCD.APP;1. Note that this program name should be included in the Primary Volume Descriptor as the application identifier.
We strongly recommend to read the application note on video encoding.

Addition of close captioning

The engine will provide close captioning if it detects a close caption file in the CDI directory. For each track (named MUSIC01.DAT;1, MUSIC02.DAT;1 or AVSEQ01.DAT;1 AVSEQ02.DAT;1 etc.) a close caption file should be placed in the CDI directory. The file name should be "CAPT" extended with the corresponding A/V sequence number and with the suffix replaced by the language code to be used (max 3 chars) (e.g. CAPT01.GB;1 for sequence AVSEQ01.DAT;1). It is recommended that the suffix used should correspond the 2 character ISO country codes. The file is split into 2048 byte blocks, each block has header information and a number of captions.

The format for each block is as follows:

Byte Position	Size (Bytes)	Contents
0	4	Timecode in of first caption in block
4	4	Timecode out of last caption in block
M	1	Reserved - always 0
M+1	1	Multiple line flag
M+2	2	X position for caption (0-766)
M+4	2	Y position for caption (0-558)
M+6	4	Timecode in for caption
M+10	4	Timecode out for caption
M+14	2	Length of text
M+16	2	Text string, terminated by 0 byte
END	2	Padding 0xFF (0xEE for last block)

There must always be a minimum of 2 padding bytes per block. The length of the string must always be an even number. An extra null byte can be used to pad out the string. All timecodes are specified as 22500 * "number of seconds".

It is the responsibility of the content provider to ensure that the text given will fit onto the display at the coordinates given. No re-positioning or line wrapping of the text is performed. The font file supplied for close captioning has an 8 bit character set conforming to ISO 8859-1.

The coordinates for the text are given in UCM high resolution for PAL and are converted by the engine if NTSC is used. This conversion is performed by transforming the Y coordinates to 6/7 of the PAL coordinates, this can result in lines overlapping each which were on top of each other in PAL. The content provider is responsible for the positioning of the close caption text and take this conversion factor into account.

Chapter 4
CONFIGURING THE BEHAVIOUR OF THE ENGINE

Introduction

The engine works perfectly well when used `as is'. However, the behaviour of the engine can be adapted by the content provider. You can adapt the colour and / or the shape of the cursor and lots more.

Configuration

The content-provider has the option to configure the VCD application. Therefore, he has to create the configuration file CDI_VCD.CFG;1. This is an ASCII file, which can be created by any text editor. The configuration file must be placed in the CDI directory.

Every line of CDI_VCD.CFG;1 should start with a predefined keyword, which is an abbreviation for the parameter it defines. After the keyword, the parameter value is defined, preceded by the = sign.

In keywords and values, lowercase and uppercase characters are treated equal.
If CDI_VCD.CFG;1 is absent, the parameters are set to default values as given below.

Configuration parameters

Cursor colour

Defines the colour of the pointer cursor. As the default colour is red, it might be difficult to track the cursor when menu-screens have a lot of red colours. This parameter allows you to change the cursor colour.

Default value: RED
Keyword: CURCOL
Value set: WHITE, LOWWHITE, RED, LOWRED, BLUE, LOWBLUE, GREEN LOWGREEN, YELLOW, LOWYELLOW, BLACK, LOWBLACK,CYAN, LOWCYAN, MAGENTA, LOWMAGENTA
Example: CURCOL=GREEN

Cursor colour for Play Sequence Descriptor hotspots

Defines the colour of the pointer cursor when located above a hotspot defined in the Play Sequence Descriptor.

Default value: RED
Keyword: PSDCURCOL
Value set: WHITE, LOWWHITE, RED, LOWRED, BLUE, LOWBLUE, GREEN LOWGREEN, YELLOW, LOWYELLOW, BLACK, LOWBLACK,CYAN, LOWCYAN, MAGENTA, LOWMAGENTA
Example: PSDCURCOL=YELLOW

Cursor shape for Play Sequence Descriptor hotspots

Defines the shape of the pointer cursor when located above a hotspot defined in the Play Sequence Descriptor. A arrow shape is used as the default pointer cursor shape.

Default value: ARROW
Keyword: PSDCURSHAPE
Value set: CROSS, STAR, VCD, ARROW
Example: PSDCURSHAPE=STAR

Initial subtitle language

This parameter defines the initial suffix (max 3 characters) for subtitle files. It is recommended that the suffix used corresponds to the 2 character ISO country code (ISO 3166).

Examples of often used country codes: GB United Kingdom, US United States, DE Germany, FR France, IT Italy, ES Spain, NL The Netherlands NL, PT Poriugal

Default value: DAT
Keyword: INITLANG
Value set: 0 - 3 chars
Example: INITLANG=FR

Subtitle type

This parameter defines if subtitles can be turned on and off. As default (OVERLAYED) the subtitles can be turned off.

Keyword: SUBTTYPE
Value set: OVERLAYED, BLITTED
Default value: OVERLAYED
Example: SUBTTYPE=BLITTED

Subtitle text colour

This is used when the subtitle facility of the engine is used. The parameter is a hexadecimal number which specifies the red, green and blue components of the text colour. The value for each component must lie between 0x10 and 0xeb. If a value of 0 is given then the colour is transparent.

Keyword: SUBTTCOL
Value set: 0, 101010 - EBEBEB
Default value: EBEBEB
Example: SUBTTCOL=EB10EB

Subtitle shadow colour

This is used when the subtitle facility of the engine is used. The parameter is a hexadecimal number which specifies the red, green and blue components of the shadow colour. This colour is normally chosen to be a strong contrast to the text colour. The value for each component must lie between 0x10 and 0xeb. If a value of 0 is given then the colour is transparent.

Keyword: SUBTSCOL
Value set: 0, 101010 - EBEBEB
Default value: 101010
Example: SUBTSCOL=1010EB

Subtitle anti-alias colour

This is used when the subtitle facility of the engine is used. The parameter is a hexadecimal number which specifies the red, green and blue components of the anti-alias colour. This colour will normally be a shade between the text and shadow colours. The value for each component must lie between 0x10 and 0xeb. If a value of 0 is given then the colour is transparent.

Keyword: SUBTACOL
Value set: 0, 101010 - EBEBEB
Default value: 999999
Example: SUBTACOL=404080

Subtitle background colour

This is used when the subtitle facility of the engine is used. The parameter is a hexadecimal number which specifies the red, green and blue components of the background colour behind the subtitles. The value for each component must lie between 0x10 and 0xeb. If a value of 0 is given then the colour is transparent.

Keyword: SUBTBCOL
Value set: 0, 101010 - EBEBEB
Default value: 0
Example: SUBTBCOL=404080

Track for centring DV window

Defines which List-id from the Play Sequence Descriptor must be used for the user operated centring of the DV window. Normally the first List-id is used. But if the track defined within the list-id is very short, or if it contains a lot of black, it may be difficult to centre, as the screen borders are also black. This configuration parameter allows the selection of an other track for centring.

Keyword: CENTRTRACK
Default value: 1
Value set: 1 - (max listnumber)
Example: CENTRTRACK=3

Autoplay

This parameter defines if the application has to start automatically with the interpretation of the Play Sequence Descriptor at start-up.

Keyword: AUTOPLAY
Value set: AUTO_ON, AUTO_OFF
Default value: AUTO_ON
Example: AUTOPLAY=AUTO_OFF

Dual channel

Select whether the Audio / Visual sequences can be selected with the audio from channel 1 or 2 (dual channel mode only).

Keyword: DUALCHAN
Value set: DUAL_ON, DUAL_OFF
Default value: DUAL_ON
Example: DUALCHAN=DUAL_OFF

X-position Timecode

Defines the X-coordinate of the left upper corner of the timecode. It is the responsibility of the contents provider that a proper value is entered.

Keyword: TIMECODE_X
Default value: 64
Value set: 0 - 768
Example: TIMECODE_X=512

Y-position Timecode

Defines the Y-coordinate of the baseline of the timecode. It is the responsibility of the contents provider that a proper value is entered.

Keyword: TIMECODE_Y
Default value: 100
Value set: 0 - 560
Example: TIMECODE_Y=480

X-position List Offset Table ID

Defines the X-coordinate of the upper left corner of the List Offset Table identification. It is the responsibility of the contents provider that a proper value is entered.
Keyword: LOTID_X
Default value: 64
Value set: 0 - 560
Example: LOTID_X=512

Y-position List Offset Table ID

Defines the Y-coordinate of the baseline of the List Offset Table ID. It is the responsibility of the contents provider that a proper value is entered.

Keyword: LOTID_Y
Default value: 64
Value set: 0 - 560
Example: LOTID_Y=480

Next / Previous function behaviour

Defines whether the applications behaviour for the next and previous function are conform the Video-CD 2.0 standard or should be interpreted for linear movie playback. In case of a linear playback functionality the application jumps to the next or previous entrypoint within the current play item, otherwise the next and previous functions are performed as defined within the Video-CD 2.0 standard.

Keyword: ALBUM
Default value: STANDARD
Value set: FILM, STANDARD
Example: ALBUM=FILM

RELEASE NOTES

Known Bugs

The following bugs / shortcommings are known in the application program:

- The pause / continue button will not toggle during play back of a CDDA-track.

APPENDIX A
Printed matter

To avoid differences in information and the way it is presented in the printed matter a checklist and examples are provided.

Video-CD disc label requirements

To have a good recognition by the user of the type of disc, it should contain the correct identification. The following data should be on the disc:

- The Compact disc Digital Video logo.
- Name of the disc.
- Publishers name/logo.
- Volume/album number.
- Reference/order number.
- Copyright holder name and date.
- All rights reserved with copy/reproduction notice.
- Made in statement.
- If applicable censorship rating.

Video-CD packaging requirements

To have a good recognition by the user of the type of disc at point of purchase, the following data should be present on the front:

- The Compact disc Digital Video logo.
- Name of the disc.

The rear side of the packaging should contain:

- Compatibility text
- PAL TV logo with text "plays also on NTSC TV" or NTSC TV logo with text "plays also on PAL TV" (depending on optimization, TV logo should represent the optimised format)
- Title related information
- Publishers name/logo.
- Reference/order number.
- Copyright holder name and date.
- All rights reserved with copy/reproduction notice.
- Made in statement.
- Playing time

- If applicable the following indications
  - Censorship rating/minimum age
  - Wide screen
  - Dolby Surround sound
  - Subtitling information with languages
  - Multilingual or background/foreground vocal (for Karaoke)
  - Number of volumes in the album
- Discs intended for resale need also an EAN or UPC.

The spine (two small sides of the CD packaging) should contain:

- Name of the disc.
- The text "Video CD".
- Reference / order number

APPENDIX B
Glossary of terms

Audio/Video sequence
A/V sequence for short, is a Digital Video sequence or subsequence coded according to the MPEG-1 standard for audio and video data compression. The start point (=entry point) must be contained in the ENTRIES.VCD file on the disc.

Close Caption
Close Captioning means subtitling. A text is displayed for a certain time to translate the spoken text.

Engine
A software program which is a template or empty shell for realizing Video CD titles.

ENTRIES.VCD
A special file defined in the Video-CD specification version 2.0. It is located at a fixed position on the disc, and it contains start points (=entry points) for Audio/Video sequences.

Hotspot
A particular area of the screen which is sensitive for clicks of the pointer device. A hotspot is associated with a on-screen-button, a menu-item etcetera. A hotspot is characterized by the coordinates of the left upper corner and the right bottom corner.

Menu Control Bar
Displayed at the bottom of a menu screen. It offers a number of buttons the user can click on with a pointer device, and which activate general functions. The menu control bar is provided by the engine.

MPEG-1
An ISO standard which describes coding of moving pictures and associated audio for digital storage media up to about 1,5 Mbit/s. The MPEG-1 compression/ decompression method is the basis for the A/V sequences of Video-CD. MPEG means: Motion Picture Experts Group.

Play Control Bar
A means with which the user can control the play of an A/V sequence. The control bar is displayed by the engine at the bottom of the screen, and consists of buttons the user can click on with a pointer device.

Real-time file
A CD-i file containing data which is directly taken from the disc, and whose flow cannot be interrupted or stopped within the bounds of a real-time record.

Subtitling
A text displayed on the screen in a certain language to translate or visualize the spoken text.

Track
A Digital Video sequence coded according to the MPEG-1 standard for audio and video data compression. It may have sub-sequences (chapters). Start points (= entry points) for the sequence and possibly subsequences must be contained in the ENTRIES.VCD file on the disc.

UCM-coordinates
UCM-coordinates are used in the CD-i world to indicate a certain screen position. UCM coordinates have twice the value of the pixel coordinates. The origin is in the top left corner of the screen.

VCD
An abbreviation for Video-CD.

APPENDIX C
Video encoding

Requirements/recommendations imposed by Video-CD Specification 2.0:

Picture size/ Picture rate

352 x 240 / 29.97 Hz
352 x 240 / 23.976 Hz
352 x 288 / 25 Hz

Bit rate:

Maximum 1151929.1 bits/sec

Pixel aspect ratio:

1.0950 (if picture size is 352 x 240)
0.9157 (if picture size is 352 x 288)
(These are recommendations)

Intra-coded pictures:

Maximum distance 2 seconds (recommendation)

Requirements/recommendations imposed by the "Video-CD on CD-i" engine: if an MPEG stream contains a lot of EOS markers, patch them to all zero, except for the last EOS in the stream. The MPEG decoder might have problems when there are too much EOS markers in the stream. The MPEG streams must not contain "user data".