VIDEO CD ON CD-i
Release 3.11

PRODUCT INFORMATION AND
INSTALLATION NOTES

Philips Media

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Philips Electronics N.V.
Philips Media Systems
Mr. G. Smelt
Building SFH-6
P.O. Box 80002
5600 JB Eindhoven
The Netherlands

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 1.1, September 1993", 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 gives a brief description, including the features of the "Video-CD on CD-i" application.
Chapter 2 gives an overview of the functionality and explains how the functions must be used.
Chapter 3 describes the installation procedure.
Chapter 4 indicates how the behaviour of the software can be configured.
Chapter 5 gives the rules for customization of menu screens.
An application note is provided which summarizes requirements and recommendations regarding video encoding and usage of the Video CD system file ENTRIES.VCD .

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, live-concerts, linear movies, Karaoke, product and company presentations. The Video-CD format is standardized by Philips Consumer Electronics B.V. in close cooperation with Victor Company of Japan. The standard, laid down in the document "Video CD Specification, Version 1.1" 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:
*   ease the creation of a Video-CD title and to be flexible towards the specific needs of the content provider
*   be extremely simple to use and easy-to-learn for the end-user.

"Video-CD on CD-i" is a program which can best be described as an empty shell program, or engine. Content-providers can use the program 'as is': they only have to add their MPEG-1 video-assets, and the program takes care for Audio/Video sequence selection and play control. The engine is more versatile however. It can be configured and customized to adapt the behaviour and look.

The engine is capable of playing multiple Digital-Video tracks. Tracks may be divided into "chapters". A track is defined as a video sequence with at least one entry point and exactly one exit point. A chapterized track is defined as a track with more than one entry point (each corresponding to a "chapter").

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
*   * play of all tracks/chapters
*   * select track and return
*   * select chapter and continue
*   * intro-scan
*   * slow motion / freeze frame
*   * stereo / multichannel audio
*   * centring of Digital Video window
*   * multilingual messages (English, French, Japanese)
*   * track / chapter indication
*   * time code (& frame) indication
*   * multi-disc album support
*   * Subtitles in multiple (selectable) languages

Customization & Configuration
* bumper
* unattended usage/ demo mode
* close captioning function
* (multilayered) menu screens, also allowing content-provider's 'private messages'
* cursor colour
* time-out values

Play controls
* play
* pause/continue
* stop
* goto next sequence
* goto previous sequence
* fast scan forward (multispeed)
* fast scan reverse (multispeed)
* slow scan forward (7 speeds)
* single step forward
* step reverse

End user settings
* intro-scan times
* autoplay mode
* audio channel selection
* position video
* select subtitle language

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 is displayed at start-up.
* In case of a disc error a message (in English, French and Japanese) is displayed. The message is: "Your disc may be dirty. Please remove the disc and clean it."
* After a period of user inactivity at a menu screen or settings screen the screen is dimmed. Any pointing device or remote control action brings back the normal intensity screen. Alternatively, instead of the screen dim, the play of a specified sequence may be selected by the content-provider; if however the AUTOPLAY setting is on, all sequences on the disc will be played.
* If the AUTOPLAY setting is on, the application plays all sequences (chapters) on the disc at startup. Any user interaction interrupts this behaviour, and causes full user control. In the case of a multi-volume album the next disc will be automatically requested at the end of the play (if no user interaction).
* Bumper and menu screen(s) are customizable.
* The application can be configured.
* When during a play or scan the control bar is displayed, sequence information is shown at the top of the screen: at the left hand side, the track number and/or chapter number is shown, at the right hand the time-code (& frames) is shown.
* The engine displays the disc identification (name) on the main menu, unless the highest level of customization is used. The fontfile CDI_FONT.FNT must be available to display this identification.
* In the case that another disc has to be inserted, the disc number is displayed on the screen. The fontfile CDI_FONT.FNT must be available to display this identification.
* 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!

Menu Screen(s)

* Select a menu item (action button 1): play the selected sequence (and if it is a chapter, play also all following chapters), or perform a content-provider's defined action (like display of another menu screen).
* PLAY-button control bar: play ALL sequences on the disc. If the disc is part of a multi-volume album (not the last disc) then the user will be asked to insert the next disc at the end of the current disc. If the correct disc is inserted then the system will continue playing, otherwise the player will return to the player shell. PLAY-button pointer device: if the cursor is on a menu-item, activate the item. Else play ALL sequences.
* SCAN-button control bar: play the first N seconds of every track/chapter. The factor N can be adjusted (by the end user) in the settings screen.
* UP-button control bar : display previous menu screen (if present).
* DOWN-button control bar: display next menu screen (if present).
* SETTINGS button control bar: enter the settings screen.

NOTE 1: The standard number selection refers to the menu screen when the engine is used 'as is'. It treats every entry from the system file ENTRIES.VCD as a separate selectable item. Only after the finish of a **track**, the engine returns to the menu screen.

NOTE 2: For customized menu screens the content provider can provide a menu item for UP and DOWN control to go to the previous or next menu screen. The UP and DOWN options in the menu control bar can be suppressed.

Settings Screen

At run-time, the end user can call the settings screen, which allows the modification of the following settings:

* Autoplay: next time when the disc is played, automatically all sequences on the disc are played at startup, thereby suppressing the bumper.
* Audio channel 1/2: select whether the AV sequences are played with the audio from channel 1 or channel 2 (dual channel mode only).
* Scan time (5-10-20 seconds): adjust intro-scan time.
* POSITION VIDEO button: gives access to a screen in which the position of the DV-window can be adjusted (centred).
* OK button: return to the previous screen.

Position-Video

screen

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: keep the current position of the DV-window (also store it for future use), and return to the settings screen.

Control bar during play

The control bar is by default off (that is, not displayed).
* Action button 2 of the pointer device toggles control bar on/off
* Action button 1 of the pointer device selects the button on the control bar, if any, where the cursor is (the button will be highlighted).
* PREVIOUS button pointer device/PREVIOUS-button control bar: play previous sequence. When activated for sequence #1: go back to a menu-screen.
* NEXT button pointer device/NEXT-button control bar: play next sequence. When activated for the last sequence: go back to a menu-screen.
* STOP button pointer device/STOP-button control bar: stop the sequence, return to a menu-screen.
* 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 a/V sequence, or, if already in the pause state, continue normal play. Also the dedicated PLAY button of the pointer device can be used to continue after a PAUSE. 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 while the button is held down. When the button is released the system returns to the PAUSE mode.
* 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.
* SLOW: When the slow button is selected the sequence is played in slow motion, at the speed currently selected. The control bar is removed from the screen.
* SPEED BUTTONS: Selecting one of the 7 slow motion speed buttons changes the speed that the slow motion is to be played at (slowest left button fastest right button). If the sequence is playing in slow motion, then the speed will be changed straight away.
* PLAY button control bar/PLAY button pointer device: continue playing the sequence (after a pause) and removes control bar.

Control bar during scan

The control bar is by default on (that is, displayed).
* Action button 2 of the pointer device toggles the control bar on/off
* PLAY button pointer device/ PLAY-button control bar: aborts the scan and continues play of the sequence. Removes the control bar from the screen.
* PREVIOUS button pointer device/ PREVIOUS-button control bar: go back to the previous AV sequence and continue the scan. When PREVIOUS is activated for the first sequence, a menu-screen is displayed again.
* NEXT button pointer device/NEXT-button control bar: advance to the next sequence and continue the scan. When NEXT is activated for the last sequence, a menu-screen is displayed.
* STOP button pointer device/STOP-button control bar: abort the scan and return to a menu-screen.

Appendix B contains a proposal for a user manual to be supplied with the disc.

Deliverables
* Executable main program: CDI_VCD.APP;1
* Real-time file: CDI_ALL.RTF;1
* Bumper sequence: CDI_BUM.DAT;1
* Font file: CDI_FONT.FNT;1
* Close caption font: CDI_CC.FNT;1
* Change disc screens: CDI_PVOL.DAT;1 and CDI_NVOL.DAT;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.

The A/V sequences may be a mixture of one-track-one-chapter and one-track-multiple-chapters.
The MPEG A/V sequences must be placed in directory MPEGAV and may be called MUSICxx.DAT or AVSEQxx.DAT, except the bumper sequence CDI_BUM.DAT, which must reside in the CDI directory. When needed or desired CDI_BUM.DAT may be replaced by another MPEG-encoded bumper sequence; however, the name must be always be CDI_BUM.DAT.
The entrypoints of the A/V sequences in the MPEGAV directory must be contained in the system file ENTRIES.VCD (which is in the VCD directory).

If desired, the font file CDI_FONT.FNT can be removed. The consequence is that the disc identification string shall not be displayed. In addition the disc number will not be displayed if a new disc has to be inserted.

The close caption font file CDI_CC.FNT;1 can be removed if close captioning is not required on the disc. The close caption font file supplied can also be replaced by a user supplied font file. The file should be a font module in CD-RTOS format with the module name "subvcd".

We strongly recommend to read the application note on video encoding and usage of ENTRIES.VCD.

Addition of Entrypoint lists	The engine provides fast scan forward/reverse and slow reverse without the use of explicit entrypoint lists. However, the performance of the scan functions is much smoother when an entrypoint list is used. Therefore it is highly recommended to add entrypoint lists. By default these functions are not made available if there is no entrypoint list provided (see section on configuration parameters). For each track (named MUSIC01.DAT;1, MUSIC02.DAT;1 or AVSEQ01.DAT;1, AVSEQ02.DAT;1 etc.) an entrypoint list should be placed in the CDI directory. The name of the list is the same as the name of the corresponding A/V sequence (e.g. AVSEQ01.DAT;1 for sequence AVSEQ01.DAT;1). Each entrypoint in the list consists of 5 consecutive bytes. The layout is:

Byte Position	Size(Bytes)	Field name	Contents
M	3	Sector offset	mm:ss:ff
M + 3	2	Byte offset	numerical value

Sector offset
This 3-bytes BCD encoded field contains the position (relative to the begin of the file) of the sector in which the entrypoint is located.
Byte offset
This 2-bytes BCD encoded field contains the position of the entrypoint relative to the begin of the sector addressed by the Sector Offset.

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 is the same as the name of the corresponding A/V sequence with the first 2 characters replaced by "CC" and with the suffix should be replaced by the language code to be used (max 3 chars) (eg. CCSEQ01.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+12	2	Length of text
M+14	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". The timecodes given relate to the time displayed on the screen when the play bar is on, thus it includes any initial time offset given. This means that for a film which covers more than one disc timecodes relative to the start of the film can be used rather than having to recalculate everything to the start of each disc.

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.

Options

The content provider has the option to use the engine 'as is', that is without any tailoring whatsoever. But he also has the option to tailor the behaviour and the look of the engine, by means of configuration and customization. Refer to the next chapters for details.

Warning

The structure of the close caption file is expected to change with the next release of this application (for VCD 2.0).

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 of the cursor, determine whether or not the bumper is interruptible, and when, determine what happens after some time of user inactivity 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

Selection Indicator Colour
Defines the colour of the triangle indicator for menu choices in customized menu-screens. The default colour is red. If however, the menu-screens have a lot of red colours, it can be difficult to track the indicator, this configuration parameter allows the adaption of the indicator colour.
Default Value: RED
Keyword: INDCOL
Value set: WHITE, LOWWHITE, RED, LOWRED, BLUE, LOWBLUE, GREEN, LOWGREEN, YELLOW, LOWYELLOW, BLACK, LOWBLACK, CYAN, LOWCYAN, MAGENTA, LOWMAGENTA
Example: INDCOL=LOWWHITE

Type of replaceable screen
Defines which type of replaceable menu-screen is used: only background screen replaced, with the standard number selection boxes, or a completely customized menu-screen. Inclusion of·this parameter speeds up the response times of the engine with respect ₁to menu transitions.
Default value: None (standard screen, standard number selections)
Keyword: REPLTYPE
Value set: BACKGROUND, MENUSCREEN
Example: REPLTYPE=MENUSCREEN

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Default display of menu control bar

Defines whether the engine provided control bar for menu-screens by default is ON or OFF (that is displayed or not displayed). Only meant for customized menu-screens.

Default value: ON
Keyword: MENUBAR
Value set: ON, OFF, ALWAYS, NEVER
Example: MENUBAR=OFF

Remark: ON means: by default the menubar is displayed, but it can be toggled off/on by the end user

            OFF means: by default the menubar is not displayed, but it can be toggled on/off by the end user

            ALWAYS: the bar is always displayed and cannot be toggled off by the end user

            NEVER: the bar is always turned off, and cannot be turned on by the end user. The content provider has to provide it's own controls on the menu screens.

Timecode preset

Especially meant for disc #2 and later of multivolume albums: a carry-over of the time-code of the previous disc of the album. Defines the DSC time with which the FIRST AV/sequence of the disc should start. The DCS time is defined as 22500 * "number of seconds".

Default value: 0
Keyword: TIMECODE
Value set: 0 - Maximum DSC time
Example: TIMECODE=22545000

Initial track number

Especially meant for disc #2 and later of multivolume albums. This defines the number of the first track on the disc.

Default value: 1
Keyword: INITTRACK
Value set: 1 - 98
Example: INITTRACK=2

Initial chapter number

Especially meant for disc #2 and later of multivolume albums. This defines the number of the first chapter on the disc.

Default value: 1
Keyword: INITCHPTR
Value set: 1 - 500
Example: INITCHPTR=8

Format of track/chapter number

With a disc containing only one MPEG track or a disc containing several tracks with only one entry per track, the entry number is shown on the top left of the screen when the play bar is displayed. If a disc has more than one MPEG track and they contain more than one entry then it is also possible to have the track number and relative entry number displayed. This option is only available with customized menu screens.

Default value: INDEXED
Keyword: TRACKFMT
Value set: LINEAR, INDEXED
Example: TRACKFMT=LINEAR

Initial subtitle language
This defines the initial suffix (max 3 characters) for subtitle files.
Default value: DAT
Keyword: INITLANG
Value set: 0 - 3 chars
Example: INITLANG=NL

remarks: It is recommended that the suffix used corresponds to the 2 character
ISO country codes (ISO 3166).

Examples of often used codes	
United kingdom	GB
United states	US
Germany	DE
France	FR
Italy	IT
Spain	ES
Portugal	PT
the Netherlands	NL

Standard language
The subtitle suffix is determined in the following order:
- NVRAM data activated previously by an action indication in the hot-spot
    file (0, -1, -8, subtitle id)
- INITLANG configuration parameter.
- the default suffix DAT.

With this standard language parameter (STDLANG=CONFIG) the checking of the
NV-RAM can be skipped.
Default value: NVRAM
Keyword: STDLANG
Value set: NVRAM, CONFIG
Example: STDLANG=NVRAM

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 values for each component must lie between 0x10 and 0xEB. If a
value of 0 is given then the colour is transparent.
Default value: EBEBEB
Keyword: SUBTTCOL
Value set: 0, 101010 - EBEBEB
Example: SUBTCOL=10A0EB (Red = 0x10, Green = 0xA0, Blue = 0xEB)

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
text shadow colour. This colour is normally chosen to be a strong contrast to the
text colour. The values for each component must lie between 0x10 and 0xEB. If a
value of 0 is given then the colour is transparent.
Default value: 101010
Keyword: SUBTSCOL
Value set: 0, 101010 - EBEBEB
Example: SUBTCOL=10A0EB (Red = 0x10, Green = 0xA0, Blue = 0xEB)

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
text anti-alias colour. This colour will normally be a shade between the text and
shadow colours. The values for each component must lie between 0x10 and 0xEB.
If a value of 0 is given then the colour is transparent.
Default value: 999999

Keyword: SUBTACOL
Value set: 0, 101010 - EBEBEB
Example: SUBTCOL=10A0EB (Red = 0x10, Green = 0xA0, Blue = 0xEB)

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 values for each component must lie
between 0x10 and 0xEB. If a value of 0 is given then the colour is transparent.
Default value: 0
Keyword: SUBTBCOL
Value set: 0, 101010 - EBEBEB
Example: SUBTCOL= 10A0EB (Red = 0x10, Green = 0xA0, Blue = 0xEB)

Bumper interruption time
Defines the time (in seconds) after which the bumper (either standard or
customized) may be interrupted by the user.
Default value: (total playtime of the bumper; thus not interruptible)
Keyword: BUMPINT
Value set: 0 - (total play time of bumper). Integer value.
Example: BUMPINT=5

Scan functions available
Controls whether the functions fast forward/reverse and slow reverse are available
if there are no entrypoint lists present. The control can be set to make the functions
always available or conditional on the presence of the entrypoints list.
Default value: CONDITIONAL
Keyword: SCAN
Value set: ALWAYS, CONDITIONAL
Example: SCAN=ALWAYS

Track for Centring DV window
Defines which DV-track from the disc must be used for the user operated centring
of the DV window. Normally the first DV-track is used. But if the track 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.
Default value: 1
Keyword: CENTRTRACK
Value set: 1 - (max tracknumber)
Example: CENTRTRACK=3

Time-out value
Defines the time duration (seconds) for which menu-screens are displayed with
normal brightness by absence of user activity. After expiration of the time-out
duration the screen dims (to protect the screen phosphor from burn-in). An
alternative, especially useful for demo or unattended usage, is play of a AV-
sequence instead of screen dimming. This can be achieved by defining a time-out
play. See definition of the time-out track.
Default value: 300
Keyword: TIMEOUTVAL
Value set: <seconds>
Example: TIMEOUTVAL=600

Time-out track
If present, the expiration of the time-out duration invokes play of the specified track,
instead of screen dimming. This option may be useful for demo's, for product
presentations, for promotional purposes etc. Note that if the AUTOPLAY setting is
on, all sequences are played after a time-out!
Default value: -

Keyword: TIMEOUTPLAY
Value set: 1 - (max number of track)
Example: TIMEOUTPLAY=9

Customization

When the engine is used 'as is', the engine provides a standard menu-screen to select A/V tracks from for playing. This default screen consists of a standard background image and superimposed standard number selection boxes. The content provider has the possibility to replace the standard background image only, to replace the entire menu-screen and even to build a hierarchy of menus, including content provider's private message screens. The actions performed as a result of clicking on a content-provider created menu-item can also be defined. This allows a lot of freedom for customization.

This chapter tells you how to customize the menu-screens.

Background image replacement

Replacement of the background image of the standard engine menu-screen is the lowest level of customizing. This option is useful to provide the menu-screens with a background adapted to the style of the production. For sequence selection, the engine displays the standard number selection boxes.

* The content provider should create two DYUV images, one for PAL and one for NTSC.
* The absolute YUV start values for the DYUV images must be 16, 128, 128 (decimal).
* Image sizes: PAL image: 384x280 pixels, NTSC image: 384x240 pixels.
* The PAL image must be stored in a file with the name PBACK.DAT;1, the NTSC image in a file named NBACK.DAT;1. These files must be pure datafiles, not IFF files!
* Both image files must be placed in the directory CDI

If an image for the selected display system (PAL/NTSC) is missing, the application displays the standard background.

Change-disc image

replacement

If a new disc has to be inserted (for multi-volume albums) then a standard message is
displayed in English, French and Japanese. This message tells the user to insert the next disc and press an action button. If desired this screen can be replaced by an image provided by the content provider. To do this the supplied files CDI_PVOL.DAT;1 and CDI_NVOL.DAT;1 should be replaced by images supplied by the content provider. These two files are DYUV images for PAL and NTSC encoded as for the background image.

Basics of menu customization

The highest degree of customization is the creation of the entire menu-screens and associated menu hierarchy by the content provider. This allows maximum adaption of the look to the sphere or nature, and the structure of the title. The content provider has full control over the navigation through menu-screens. It is even possible to implement the functions offered by the standard menu control bar: the action, which results after clicking a menu-item, can be defined. In this way menu-screens can be utilized as 'private messages', like credits, special copyrights, background information, announcements of future productions, etcetera.

The basic idea is that the content provider creates for every menu-screen an image file and an associated menu-definition file, which contains hotspot information, actions to be performed and links to subsequent menu's. In fact, per menu-screen there are two image files and associated menu-definition files, one for PAL and one

for NTSC.

The menu image files must be coded in DYUV; the files must be pure data files, and not IFF.

Menu image files and menu definition files must be placed in the CDI directory. It is the content provider's responsibility to assure that all files are complete, correct and present in the CDI directory.

Preparing menu

image files

* The content provider should provide two sets of DYUV images, one set for PAL and
  one set for NTSC.
* Each set consists of files with DYUV images, with up to 20 menu-boxes (selection items, hotspots) per image.
* The image files must be pure datafiles, not IFF files.
* The absolute YUV start values for the DYUV images must be 16, 128, 128 (decimal).
* The image sizes are:
  For PAL :   384x280 pixels
  For NTSC: 384x240 pixels
  REMARK: Do not include essential information in the left edge 12 pixels and right edge 12 pixels.
* At the bottom of the images, lines can be overlaid with the standard menu control bar. The overlay starts from line 430 on for PAL, and from line 370 on for NTSC (UCM coordinates; these 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). So be careful with menu-items or other crucial information in this bottom region.
* To allow maximum freedom for the art designer, the application suppresses the standard display of the disc identification. If the content provider would like to have the disc identification, it should be an integral part of the images.
* Image files must be named as follows. For the PAL images: PINTRO01.DAT;1, PINTRO02.DAT;1 etc. For the NTSC images: NINTRO01.DAT;1, NINTRO02.DAT;1 etcetera. Note that the numbers in the names (01,02,03 etcetera) are called menu-numbers. They are used in the menu-definition files (see next section).

Preparing menu
definition files

* Each image file must be accompanied by a menu definition file, named PMENU01.DAT;1, PMENU02.DAT;1 etc. (for PAL), and NMENU01.DAT;1, NMENU02.DAT;1 etc. (for NTSC). The numbers in these names must correspond to the associated image files.
* A menu definition file is an ASCII file, which can be created with any text editor. The menu definition file consists of a number of lines. Each line specifies a menu-box in the corresponding image file.

* The following items have to be defined for every hotspot:
- The UCM-coordinates for the left upper corner (x,y) and the right bottom corner (x,y). UCM coordinates are used in the CD-i world and are twice the value of pixel coordinates. The origin 0,0 is in the left upper corner of the screen.
- The action upon activation.
  This action is specified by three integer numbers. These are the codes:

int1,int2,int3	If they are positive: play disc <int1>, track <int2>, chapter <int3>
0, -1, -1	Do nothing, branch to the menu indicated by menulink (see below)
0, -1, -2	Play ALL sequences on the disc
0, -1, -3	Perform an intro-scan (show first x seconds of every sequence on the disc)
0, -1, -4	Branch to the settings screen
0, -1, -5	Exit application
0, -1, -6	Up-link indicator: Do nothing but take menu-link when the user clicks on the standard menu control bar, UP arrow.
0, -1, -7	Down-link indicator. Do nothing but take menu-link when the user clicks on the standard menu control bar, DOWN arrow
0, -1, -8	Subtitle indicator: Do nothing but take subtitle-id as suffix for the subtitle file to be used. An empty string results in the default suffix being used (as defined settings file or the configuration file if this is the first time subtitles have been used). If a file with the given suffix does not exist, then this will result in no sub-titles.
0, -1, -9	Audio-channel indicator (See also "Settings screen"). Do nothing but set the audio-channel to be played to channel 1.
0, -1, -10	Audio-channel indicator (See also "Settings screen"). Do nothing but set the audio-channel to be played to channel 2.
0, -1, -11	Audio-channel indicator (See also "Settings screen"). Do nothing but toggle the audio-channel to be played (to channel 2 if it was 1 or to channel 1 if it was 2).

- A menu-link. This is an integer number indicating a menu number. After finish of the actions 'Play track/chapter' and 'Do nothing' , the application returns to the menu indicated by this menu-link. In other cases, the application returns to the menu from which the action was invoked (except for the "Exit application" action of course); in these cases menu-link is a dummy.
- A Sutitle-id. This is a string of up to 3 ASCII characters which identify the suffix for the subtitle file.

These items must be separated by comma's. Thus the layout of a line in the hotspot definition file is: x1,y1,x2,y2, int1, int2, int3, Menu-link/Subtitle-id

Putting menus on disc

The menu image and definition files must be placed in the CDI directory.
This can be done in the following mutually exclusive ways:
* Place them as raw data files in the CDI directory. That is, as so called "yellow files". Yellow files are generated as DATA sectors in CD-i file number 1, channel 1, coding 0 with no TRIGGER or EOR submode bits; the EOF submode bit is set in the last sector. The yellow file length (as recorded in its directory) is equal to the bytecount of its source.
* Pack the PAL menu-definition and image files in a real-time file named PMENUS.RTF;1 and the NTSC files in NMENUS.RTF;1 in the CDi directory. A record of the real-time file should first contain the menu-definition file and next the menu-image file. The first real-time record should contain the menu data for menu-number 01, the next record for menu-number 02, etc. All data (menu descriptions and images) should be generated in channel 0.
Real-time files have the advantage of faster access: menu screen transitions are thus faster.

Audio/Video sequence or **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.

Bumper is a special A/V sequence which is only played when the application is started (but not in the AUTOPLAY mode). It is a general leader which often contains a logo, like a general Digital Video logo or a content-provider's private logo. The engine provides a simple and general animated Digital Video logo, which can be replaced by the content provider.

Chapter denotes a subsequence of a track.

DYUV Delta-YUV is a high-efficiency image coding scheme for natural pictures used in CD-I. The delta coding takes advantage of the fact that there is a high correlation between adjacent pixel values, making it possible to encode only the differences between the absolute YU or YV pixel values.

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

ENTRIES.VCD is a special file defined in the Video-CD specification version 1.1. It is located at a fixed position on the disc, and it contains start points (=entry points) for Audio/Video sequences.

Intro-scan is a function that can be invoked from the menu control bar: for every A/V sequence, the first N seconds are played. This is a handy function to find quickly a desired sequence.

Hotspot means: 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 is or can be 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 like access to the settings screen, play of all A/V sequences on the disc and Exit of the application. The menu control bar is provided by the engine.

Menu-definition file An ASCII file used for customizing menu-screens. It contains information about each menu-item (menu-box, hotspot) in a menu screen. Per hotspot, the coordinates of the left upper corner and the right bottom corner are defined, the action to be performed upon activation of the hotspot, and a link the menu to be displayed after the specified action. A menu-definition file is always associated with a menu-image file.

Menu-image file Contains an DYUV coded image of a menu screen. Used in customizing menu-screens. The menu-image file is always associated with a menu-definition file.

Menu link Indication of a menu which must be displayed after finishing of an action like play of an A/V sequence.

Menu number A number embedded in the name of menu-image and associated menu-definitions files. The number is used for indicating menu-links.

MPEG-1 is 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.

Multilayered menu: a powerful feature of the engine. It refers to the possibility that the activation of a menu-item can result in the display of an other (lower level) menu. It enables the content provider to build a menu tree, in order to reflect the structure of the title, and to provide for private messages.

Play Control Bar is 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.

Private message is a special information screen which can be used by the content provider to convey a message to the end-user of the disc. Examples of private messages are: special copyright notices, piracy warnings, credits, announcements etcetera. A private message screen is in fact a menu-screen.

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.

Real-time record In CD-i, the smallest amount of real-time data that can be randomly accessed. A logical record in a CD-i file containing audio, video and/or computer data that must be retrieved from a CD-i disc at a precise rate.

Standard Number Selection refers to the way of selecting an A/V sequence when the engine is used 'as is'. The menu screen does only contain numbered boxes to select from. Each numbered box corresponds to a start point in the ENTRIES.VCD file.

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

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 is an abbreviation for Video-CD.

Video encoding

Requirements/recommendations imposed by Video-CD Specification 1.1:
* 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)
    (This are recommendations)
* Intra-coded pictures:
    maximum distance 2 seconds (recommendation)

Requirements/recommendations imposed by the "Video-CD on CD-i" engine:
* MPEG sequences must contain video (only MPEG audio not allowed).
* MPEG audio and video of about the same length. If the audio is significantly longer than time-code indication not updated.
* Recommended: If a 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".

Bumper

The bumper is not bound to the encoding formats as required by the Video-CD standard 1.1. However, it is highly recommended to follow the Video-CD 1.1 formats.

ENTRIES.VCD

The mandatory file ENTRIES.VCD contains the list with start positions (= entry points) in the Audio/Video sequences on the disc, with emphasis on the word **start**. These entry-points are used by the engine to start the play of a sequence or subsequence (=chapter), either as response to a menu selection or as the result of skipping a sequence with the NEXT or PREVIOUS buttons of the play control bar.

**Changes relative
to release 1.0**

2.0

* Play-functionality extended, to cater for Music-CD and Movie-CD
* Styling of buttons, backgrounds and message screens adapted
* Settings screen: "Vocals ON/OFF" changed to "Audio Channel 1/2"
* Terminology of message screens adapted; typos corrected

**Changes relative
to release 2.0**

3.0

* Adherence to the Video-CD standard 1.1
* Video play control functions improved
* Up to 20 selection boxes for menu screens
* Possibility for positioning (centring) of the DV-window added
* Possibility for configuration added
* Customization "replaceable background image with predefined text boxes" removed
* Multilayered selection menu's possible. Consequence: the definition of hotspot files changed

**Changes relative
to release 3.0**

3.01

* Track, chapter and timecode offsets for multi-volume discs
* Close captioning feature
* Configuration of scan functions
* Up / down link

**Changes relative
to release 3.01**

3.1

* Consistency of use of action buttons 1 and 2.
* Fast forward/reverse hold functions
* Multi-speed slow motion function
* Close captioning with 4 colour font
* Change disc function for multi-volume albums
* Changed format for menu definition files
* Text files can use LR or CR as line termination

**Changes relative
to release 3.1**

3.11

* Improved disc function for multi-volume albums
* Channel control in user menu's
* Subtitle preset as publishers option.

Known bugs

The following bugs are known to exist in some versions of the CD-i DV cartridges. Most of these problems are already corrected in the current version of CD-i DV cartridge:

* After selection of a sequence but BEFORE the sequence actually is displayed: fast clicking of action buttons sometimes causes that the sequence is played without audio. The same problem occurs when one switches very fast from one sequence to another. Any action button click lets the audio return.
* Fast clicking on the FORWARD or REVERSE buttons of the play control bar, sometimes causes underflow problems, visible as green image distortions.
* If during PAUSE the picture is frozen on a B-picture, a step reverse lets the picture jump to an I-picture before trying to get the previous scan point. Thus the screen image changes immediately before displaying the correct image.
* Incorrect handling of a ISO_11172_END_CODE when this code is placed immediately after the last mpeg video packet, which results in not normally ending of the track. To handle this problem 1 or more video frames should be left out of the track data so the ISO_11172_END_CODE is generated after a padding packet.
* For some of the older cartridges using the scan functions without entry points does not work correctly for some MPEG sequences. These are MPEG sequences with I frames placed more than 30 frames apart. If this occurs then do not use the parameter SCAN in the configuration file.
* Rapid use of the pause and play functions can sometimes lead to a hang-up in the application.
* Changing the video to slow motion before the first frame has been displayed can lead to the video stopping later during the slow motion.

The following shortcomings are known in the application program:
* If the engine is used "as is": standard numbers for sequence selection above 80 are dynamically generated and have a less sophisticated appearance.
* If customized selection screens are applied, the transition from one screen to another is slow (about 1.5-2 seconds).

APPENDIX A - Example data files

Example CDI_VCD.CFG;1

```
REPLTYPE=MENUSCREEN
MENUBAR=ON
INITLANG=EN
CENTRTRACK=6
```

Example PMENU01.DAT;1

```
 88,  50, 668, 120, 1,  1,  1,  1
 88, 130, 184, 230, 1,  1,  2,  1
210, 130, 306, 230, 1,  1,  3,  1
332, 130, 428, 230, 1,  1,  4,  1
454, 130, 550, 230, 1,  1,  5,  1
576, 130, 672, 230, 1,  1,  6,  1
 88, 240, 184, 340, 1,  1,  7,  1
210, 240, 306, 340, 1,  1,  8,  1
332, 240, 428, 340, 1,  1,  9,  1
454, 240, 550, 340, 1,  1, 10,  1
576, 240, 672, 340, 1,  1, 11,  1
 88, 360, 216, 416, 0, -1, -8, NL
236, 360, 364, 416, 0, -1, -8, FR
384, 360, 510, 416, 0, -1, -8, GB
530, 360, 656, 416, 0, -1, -8, DE
660, 360, 680, 416, 0, -1, -9
690, 360, 710, 416, 0, -1, -10
```

APPENDIX B - 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.

The indication of the disc contents.

In the printed matter that comes with the disc, customers expect to find track/chapter information.

The printing on the disc and other material is to reflect the file ENTRIES.VCD on the Video-CD disc. The ENTRY.VCD file has the same function as the TOC on a CD-DA disc.
The information marked with "1" should describe the first entry of ENTRY.VCD (Start of the first MPEG sequence). "2" should correspond with the second entry in ENTRY.VCD independent from the situation that it is the next track or the second entry in the first MPEG sequence etc.

As the combination of track and chapter data is new we expect some different interpretations in the beginning which might give some confusion.


The following pages give an example of an inlay card, disc label and user guide to be included with a disc.

On-screen Controls
* **To display the on-screen controls,** press action button 2(••) on your remote.
* **To activate an on-sceen button,** move your cursor over the control.
  It will highlight. Press action button I (•) to activate the highlighted control.
* **To remove the on-screen controls,** press action button 2 (••)

Main Control Bar

Settings	Scroll Up	Scroll Down	Play all	Scan	Exit
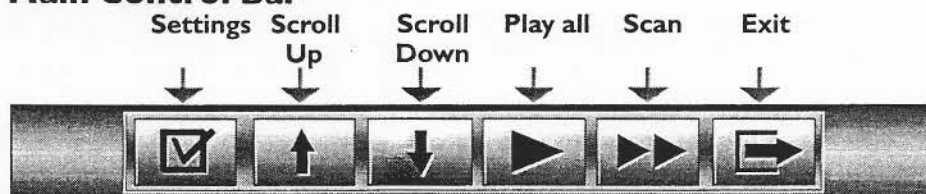
Settings: set autoplay, scantime, audio channel, position-video screen.
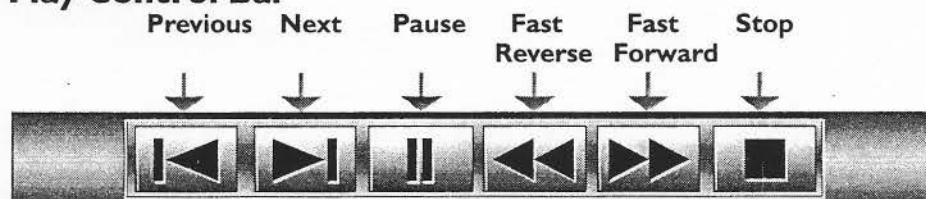**Scroll Up:** if available, see previous menuscreen.
Scroll Down: if available, see next menuscreen.

Play All: plays all sequences in order.
Scan: plays the first part of all sequences.
Exit: ends the application.

Play Control Bar

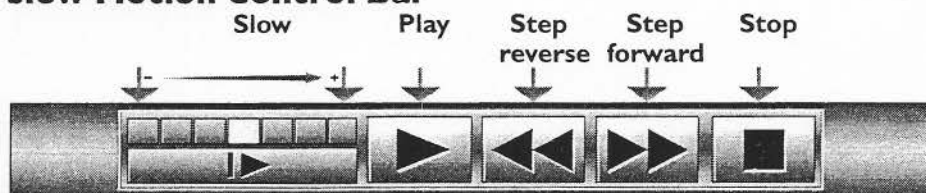| Previous	Next	Pause	Fast Reverse	Fast Forward	Stop

Previous: go to previous sequence.
Next: go to next sequence.
Pause: pause the current sequence and go to slow motion controls.
Stop: end sequence and return to main menu.

Slow Motion Control Bar

Slow	Play	Step reverse	Step forward	Stop

Play: continues the sequence at normal speed and return to play controls.
Slow: slowmotion, speed Select.
Stop: end sequence and return to main menu.

Note: If your player or remote control is equipped with corresponding buttons these may be used instead of the on-screen buttons.

I

Aïda   cat. nr. 123 4567   **VIDEO CD**

COMPACT **disc** DIGITAL VIDEO   COMPACT **disc** Interactive

This disc is fully compatible with all Video-CD players as well as all CD-i players with a digital video extension.

Censorship rating

PAL TV

Plays also on NTSC TV
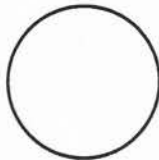
COPYRIGHT© 1994 BY XXXX IOIIO XXX
All rights of the producer and the owner of this work is reserved.
Made in The Netherlands

Publisher
All-Art reklamestudio

(catalogue nr.)
123 4567

BARCODE

(free area for title related information)

Aïda
(t i t l e)

1. Introduction
2. Romanza
3. Duetto
4. Terzetto
5. Scena 'Ritoria Vincitor'
6. Credit & Acknowledgement

WIDESCREEN

◁▷ DOLBY SURROUND
Dolby and the ▢▢ are trademarks of Dolby Laboratories Licensing Corporation.

⟨↔⟩ Approx. 105 min.
2 disc title

Aïda

(title)

COMPACT
disc
DIGITAL VIDEO

Disc 2

Publisher

All-**Art**
*reklame*studio

(catalogue nr.)
123 4567

APPENDIX C - License conditions.

The application program is available under a the following license conditions.

Limited license

A registered version of this software may be applied for either the use or sale of not more than an aggregate of 500 Video CD's comprising any single Video CD title incorporating this licensed software.

For other situations you have to obtain additional license conditions see below.

US$ 0.02 Arrangement

When a production is done over 500 copies, a fee of US$ 0.02 (2 dollarcents) is charged for each copy (minimum charge US$100). You have to send in the reporting form.

Unlimited license

A standard (single brand) unlimited license grants the user any amount of copies for any amount of titles.
There is only one restriction: One label or brand.
This license condition is intended for publishers of titles.

When publishing for other brands the US$0.02 arrangement can be used or an upgrade to a multiple brand unlimited license is to be obtained.

Multiple brand Unlimited license

The multiple brand unlimited license grants the user any amount of copies for any amount of titles. There is no limitation in number of brands.
This license condition is intended for service providers who want to offer their customers disc building service including the rights to duplicate without quantity restrictions.

You have a valid unlimited license (single or multi-brand) for your application only when:
- The supplier of this application has given you such license condition in writing.
- The fees to this license are payed.
- The serial number of the application you use is registered. (important in cases of updates)

For additional questions please contact the address in the chapter Disclaimer & Reproduction Notice.

ROYALTY CALCULATION FOR THE USE OF THE CD I APPLICATION FOR VIDEO CD [1]

(USD 0.02 ARRANGEMENT)

Name of the production company	
Serial number of the CD−i application	
Name of the publisher	
Title of the disc	
EAN/UPC code or ref. number	
Name of the duplicator	

Number of copies	License fee	Amount due in USD
0−500 : .... copies	N.A.	0.00
501−5000 : .... copies	min. USD 100.00	100.00
.... minus 5000 : .... copies	USD 0.02 per copy	
	Total	
	Withholding tax (if any)____%	
	Amount due	

[1]) This document is applicable when you have a limited license or when you are publishing for other brands in case of a single brand unlimited license.

[2]) If you need an invoice please mark here ☐

[3]) Please send this form to the following address, in return you will receive our bank account number into which you can make your payment.

PHILIPS INTERNATIONAL B.V
Mr. P. Speijcken
Corporate Accounting
Technical Assistance and Licenses
Building VO−2
5600 MD Eindhoven
The Netherlands

Signed by: _____   Date: _____

Name: _____

Address: _____

_____

N.B. Please contact the supplier of your toolkit when you want to apply for a single brand or multiple brand unlimited license.

APPENDIX E - Change request and Problem report

If you find undocumented bugs or encounter problems in using the "Video-CD on CD-i" software, or if you would like to propose changes in the product, please use the form given at the end of this document. Return to your supplier or write directly to Philips Electronics N.V.
Philips Media Systems. For the address see the chapter Disclaimer & Reproduction Notice.

VIDEO-CD ON CD-I ENGINE 3.1.1	Date received:
Change request and Problem Report	Report Number:

General Information

Name:

Address:

Phone:

Fax:

Serial number application:

Type number and serial number CD-i player:

Type number and serial number FMV extension:

Date:

Change / Problem Description

Change / Problem Response

Approved / Study / Rejected

Status:

Priority: Date: