Interactive Media Systems

CD-I

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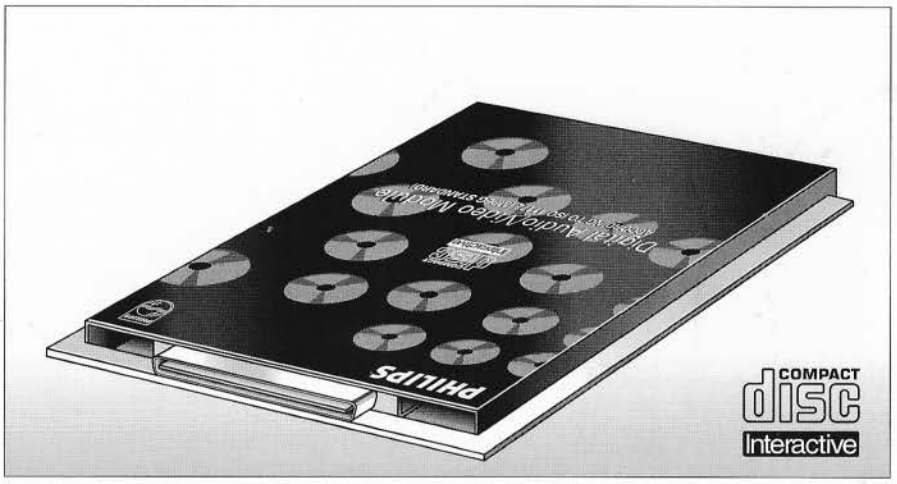
TECHNICAL INFO

Philips Consumer Electronics B.V. Interactive Media Systems. Bld. SFH-6. P.O. Box 80002 5600 JB EINDHOVEN.

CD-I to be extended with Full-Motion Video



Digital Audio/Video according to MPEG standard

Compact Disc-Interactive, or CD-I, as laid down by Philips in cooperation with Sony and Matsushita, is showing itself to be a unique, well-balanced interactive system featuring spectacular combinations of audio and video.

CD-I is conceived as a world-standard, future-oriented multi-media system with a lot of flexibility. Philips has already demonstrated this flexibility by adding the Photo-CD capability for photographic images to the CD-I repertoire.

Now Philips is extending CD-I in a very different way, by adding Full-Motion Video (FMV) capability to CD-I players. This is a positive response to the strenuous pressure exerted for some time now by the software industry.

Philips always aim to introduce consumer (electronics) products in accordance with world standards supported by the whole industry. This ensures the highest achievable stability and continuity in the development of both hardware and software, and so benefits both the consumer and the industry. As a natural consequence of this policy, we have adopted the "MPEG standard on coding of moving pictures and associated audio" for CD-I FMV.

Initially, Philips CD-I players will feature a simple FMV upgrade facility, allowing buyers of CD-I players to add full FMV functionality by just plugging a cartridge module into the player. This cartridge will appear on the market at the same time as the first CD-I software with FMV. We further expect to introduce CD-I players with integrated FMV by the second half of 1992.

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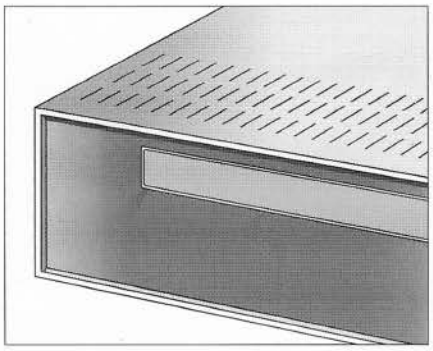
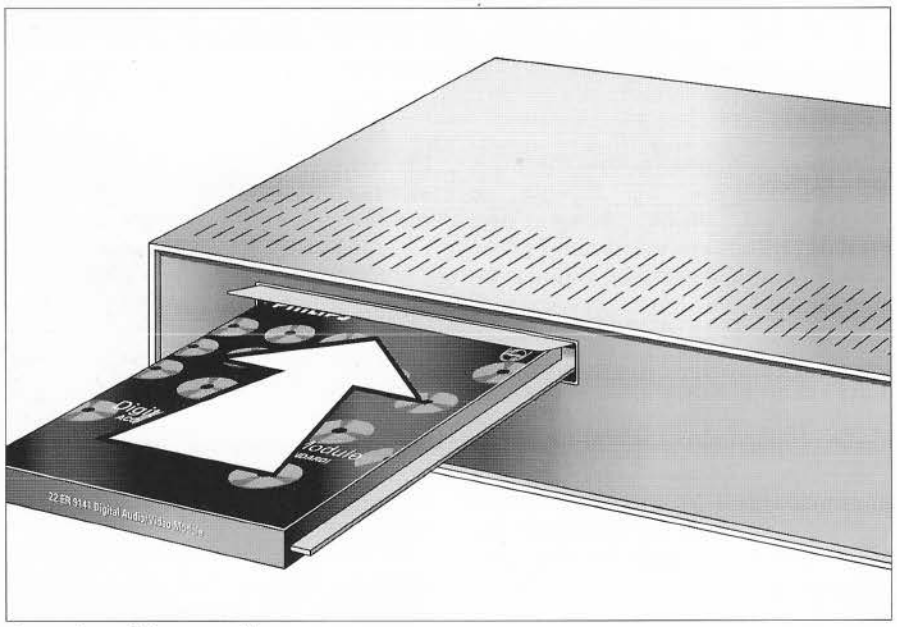
HOW TO UPGRADE TO FMV

Philips CD-I players currently in production feature an extension socket which can be used to upgrade the players to FMV functionality. The FMV cartridge simply plugs into this socket.



The extension socket lies behind a spring-loaded door on the rear panel. The design is such that the FMV cartridge, when fully inserted, sits flush with the rear panel, behind the door. This approach has several advantages:

- Simple insertion by the user, who just opens the door and pushes in the FMV cartridge.
- Simple but positive mechanical fixing.
- Reliable electrical connection allowing no possibility for bad contacts when the cartridge is fully inserted.
- No increase in player dimensions.
- Effective protection against dust and mechanical damage.



insertion of the cartridge

- No need to remove the cartridge for transport or storage.
- Polarized design making it impossible to insert the cartridge incorrectly.

WHAT FMV OFFERS

FMV functionality extends CD-I players with the capability to play moving natural pictures interactively on a full screen, along with sound of a quality indistinguishable from CD-Audio (Compact Disc).

The designed-in flexibility of the CD-I system allows easy integration of FMV into CD-I titles. This integration means that CD-I players will be able to feature highly interactive FMV presentations. Anything from a "talking head" linear play sequence up to a full-motion full screen digital video can be incorporated. In a full motion sequence, the viewer can even dictate the course of events and decide, for example, whether to have a happy ending or a sad one. This new range of FMV options considerably extends the scope of the creative choices available to CD-I title designers.

The MPEG audio and video coding algorithms adopted for FMV allow CD-I title designers to use video sequences in several picture formats, and in combination with a variety of audio qualities.

Although FMV images normally fill the screen, they can also be presented in smaller rectangular "windows" of various sizes, shapes and positions. The images appear in a video plane that can be mixed with the two standard CD-I image planes, allowing FMV data to be seamlessly incorporated into CD-I titles.

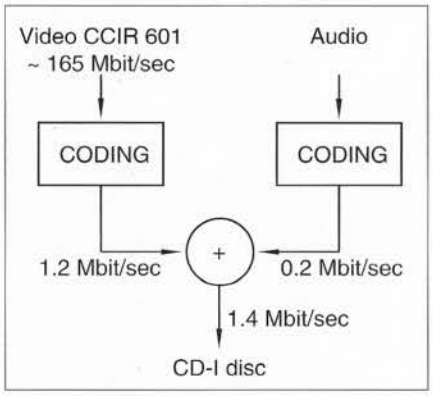
For the screen display, the FMV plane and the normal CD-I planes are selected by the application as required. Switching within pictures is possible down to pixel level.

HOW FMV WORKS

As well as source material in both 25 and 30fps (frames per second) video, FMV supports 24fps film.

Linearly-encoded real-time video requires a high data delivery rate. For example, the data delivery rate for natural pictures, as specified by CCIR 601, is 165 Mbit/sec. For Compact Disc audio, the data delivery rate is 1.4 Mbit/sec. The ingenious achievement of FMV lies in compressing such data rates to within the 1.4 Mbit/sec data delivery capacity of CD-I.

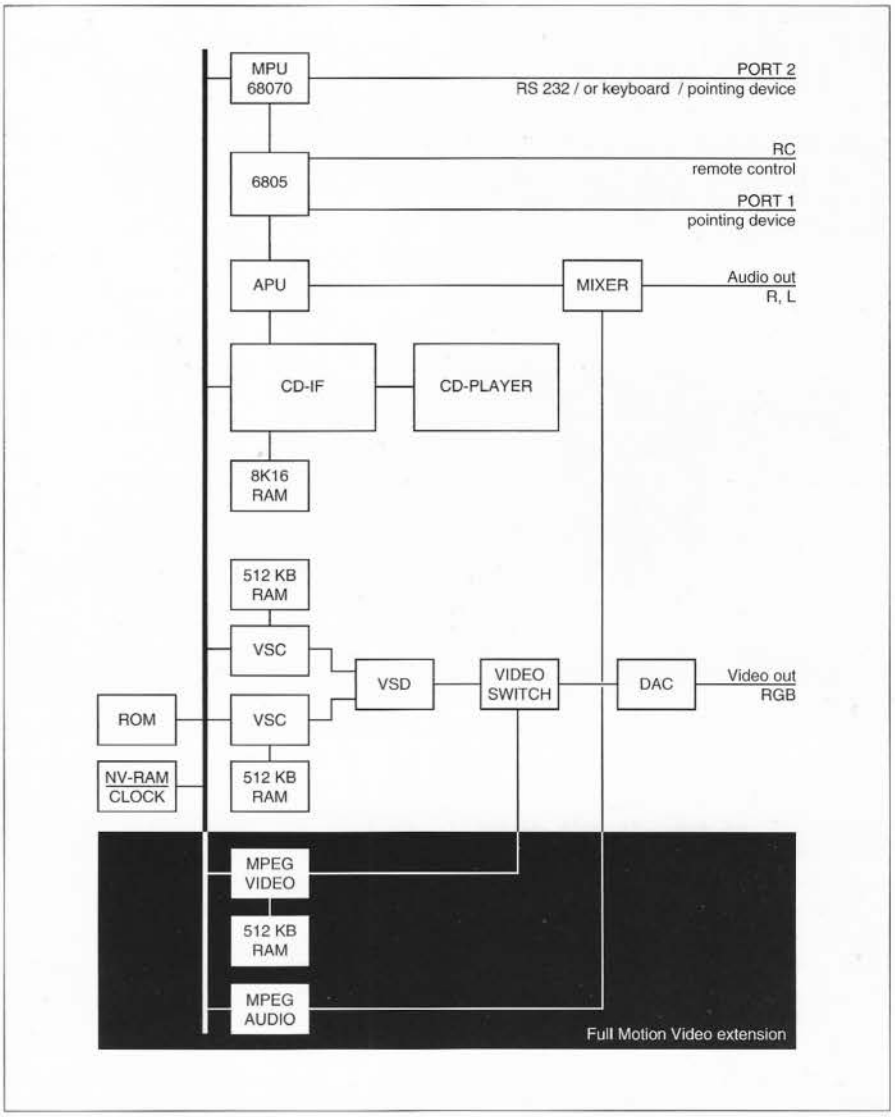
The necessary compression is supplied by the MPEG coding algorithms. The video algorithm can



bit rate compression

compress natural pictures coded at the CCIR 601 data rate of 165 Mbit/sec into 1.2 Mbit/sec - a compression ratio of 140:1. For the lower picture qualities that are acceptable in many applications, even higher compression is possible. Similarly, the audio algorithm can compress a stereo Compact Disc bitstream at 1.4 Mbit/sec into 0.2 Mbit/sec - a ratio of 7:1. Again, audio quality can be traded off for higher compression.

The CD-I capacity for data delivery from the disc is thus sufficient to support FMV encoding of full-screen natural pictures, together with stereo audio that is indistinguishable from CD-Audio, even to practised ears. Furthermore, additional audio and video channels or other program data



block diagram CD-I player

can be added to the application by reducing the picture size or quality levels. These choices are available to title designers right up to the moment of encoding.

The FMV extension provides for universal discs to run on both 50Hz (PAL) and 60Hz (NTSC) players.

For playback, a demultiplexer in the player distributes the data from the CD-I disc to the appropriate processors as shown in ? Normal CD-I audio and video data are passed to the CD-I audio and video sections, while FMV data is directed to the separate FMV audio and video decoders. Other data goes to the system controller, which handles the whole interactive presentation.

The full-motion video decoder distinguishes five modes: play forward, freeze, single step forward, slow motion forward and scan. During scan mode, a sequence may be scanned in forward or reverse directions; each scanned picture is displayed briefly as a still picture.

The full motion audio decoder distinguishes two modes: play forward and mute.

THE COMPLETE INTERACTIVE SYSTEM

With the addition of full-screen, full-motion video technology, CD-I becomes the complete interactive multimedia system in a consumer electronics package. This worldwide system, using standard audio and video components already available in the marketplace, will support a wide variety of exciting entertainment, educational and industrial applications.

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