KENWOOD

CD-R SYSTEM | CD ENCODER DA-7000A CD WRITER DD-7200A

Record live music directly onto a CD. Store massive amounts of data as CD-ROM. Kenwood's new CD-R recording system makes it easy to produce original compact discs for music or optical data storage.

The Kenwood CD-R is a revolutionary system that is capable of recording music or data directly onto compact discs. It provides professional capabilities for a fraction of the investment. Now it is easy to record a musical performance on a disc and make any number of copies — all with the same high quality as commercially available discs. With CD-R it is also possible to use a blank disc to quickly prepare archive-quality Orange Book-compatible CD-ROM discs from a database. Use CD-R to create musical sampler discs or simulations of computer games. Or record live music. It's ideal for creating promotional discs for giveaways. The CD-R recording system (CD-WO) has potential uses in a wide range of fields — from engineering design support to creating archives of published materials for easy storage and access. CD-R is the ideal business partner. It can assist in organizing and simplifying complex filing systems, or help manage orders more efficiently.

CD-R SYSTEM

CD-R makes it easy to create high-quality music CDs
Create original music compact discs — or information discs containing graphics — from a wide variety of sources.

The Kenwood CD-R recording system (CD-WO) makes it easy to create multiple compact discs of original material from a U-Matic VCR-PCM audio processor of the sort used for CD mastering, a DAT deck or a CD player designed for professional use. Incorporating the DA-7000A CD encoder and the DD-7200A CD writer, the CD-R recording system (CD-WO) is controlled by the S-700 system software package, which runs on an NEC 9800 series and the S-701 for an IBM PS2/AT or IBM compatible personal computer. All operations are performed using simple keyboard commands.

What's more, SD-IF and AES/EBU digital I/O interfaces are available for importing data. SD-IF is suitable for making direct line recordings from a U-Matic VCR-PCM audio processor. The digital I/O interface is the logical choice when recording from a professional DAT deck or CD player.

The system can be used either for making digital-to-digital recordings or, with the addition of an optional A/D converter, for recording CDs from analog sources.

And this doesn't exhaust the list of possibilities. By connecting an existing CD-G (graphics) editor with the optional CD graphics unit, still-frame images can be recorded on CD. Naturally discs created with the Kenwood CD-R recording system (CD-WO) can be played on any standard CD or CD-G player.

Easy preparation of high-quality CD-ROM discs
Create optical storage discs in real time.

The CD-R recording system (CD-WO) allows the preparation of CD-ROM discs simply by connecting the database host and CD encoder to the optional CD-ROM/I formatter. This means that a CD-ROM optical storage disc can be created directly from a database in real time — in virtually the same format as the original data — without the need for extensive data arithmetic and processing by a host computer.

The range of applications is endless. Software development firms can use the CD-R to prepare sample discs or simulations of their game programs. Publishing houses can use it to store publications on disc. Manufacturers can enter frequently-used design and circuitry-related data for use by individual terminals — saving access time on the host machine. Corporate sales divisions can input product and parts codes to simplify the management of orders from personal computer terminals at offices and dealer locations across the country.

Whatever the application, the CD-R recording system (CD-WO) provides an unparalleled edge in achieving greater business efficiency and sophistication.

Make 13 superior quality discs at once.
Multi-disc recording using up to 13 CD writers

Up to 13 CD writers can be connected in parallel to a single DA-7000A CD encoder for simultaneous multi-disc recording. This capability is ideal for making a large number of copies of the same disc.
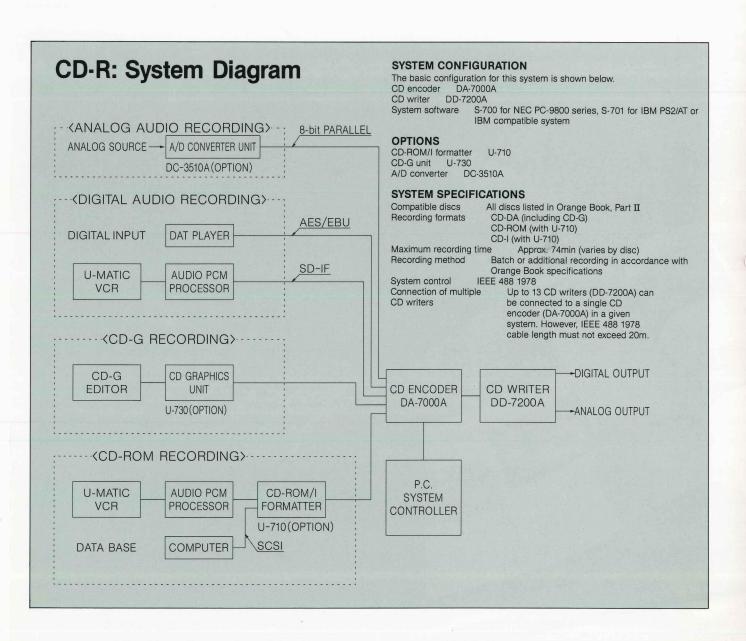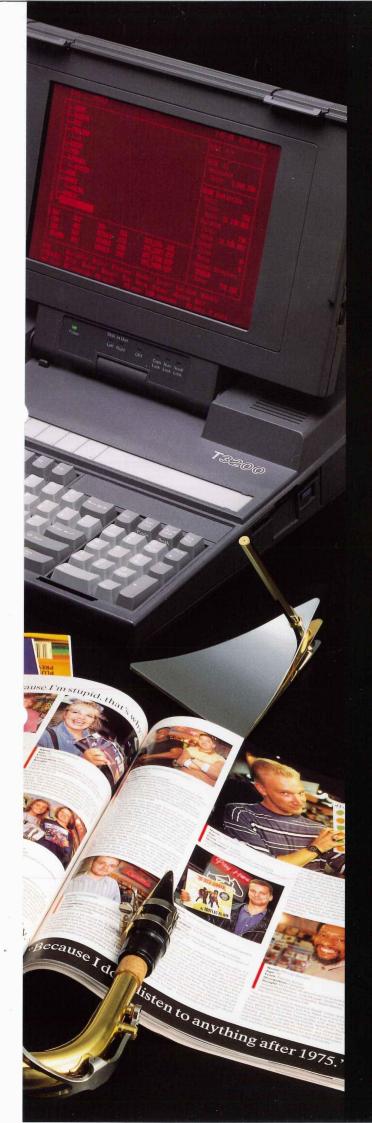
DD-7200A Display

The DD-7200A CD Writer combines with the DA-7000A CD Encoder to form an Orange Book-compatible CD production system. Both block and part-by-part recording are available. And two replay functions allow reproduction of both ordinary CDs and partial discs.

■EFM signal input Only signal input from the DA-7000A is accepted. ■EFM signal output Up to 13 CD Writers can be connected in parallel to the CD Encoder for recording. Here, the EFM signal output from the first writer connects to the EFM signal input of the second writer. The output from this unit then connects to the input of the thrid, and so on. ■Clock modes In the external mode, selected only during recording, FS signals from the CD Encoder connect to the FS signal input. During reproduction, the internal mode is also available. ■FS signal input Up to 13 CD Writers can be connected in parallel to the CD Encoder for recording. Here, the FS signal output from the first writer connects to the FS signal input of the second writer. The output from this unit then connects to the input of the third, and so on. ■Audio monitor output The DD-7200A has an 18-bit D/A converter, low-pass filter, and balanced output circuit to allow monitoring of the audio signal during recording and reproduction. ■Digital data output The DD-7200A supports digital data output based on the AES/EBU digital audio interface. ■Start/Stop signal output from CD Encoder This output starts and stops subcode generation by the CD Encoder during recording. ■GP-IB interface All four operating modes — block recording, part-by-part recording, CD replay, and partial disc replay — are controlled through a GP-IB bus by a dedicated software packages, S-700 that runs on NEC PC-9800 series computers, and S-701 an IBM PS2/AT or IBM compatible computers.

Combining with the DD-7200A CD Writer to form the CD-R system, the DA-7000A CD Encoder converts music (from U-Matic VCRs or professional DAT decks) or CD-ROM data into standard EFM signals.

■Compatible with Red, Yellow and Orange Book specifications, the DA-7000A can encode both CD-DA and CD-ROM. Together with the DD-7200A CD Writer, it forms the heart of the CD-R recording system (CD-WO). ■Necessary control functions include subcode generation, and all functions are controlled through a GP-IB bus. This interface also supports VCRs and DAT decks, allowing easy system configuration. ■Maximum integration simplifies circuits and boosts reliability. ■The DA-7000A supports three types of data interface: SD-IF, digital audio, and parallel input. This allows easy connection with U-Matic VCRs and professional DAT decks.

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CD-R: System Diagram

SYSTEM CONFIGURATION
The basic configuration for this system is shown below.
CD encoder   DA-7000A
CD writer   DD-7200A
System software   S-700 for NEC PC-9800 series, S-701 for IBM PS2/AT or IBM compatible system

OPTIONS
CD-ROM/I formatter   U-710
CD-G unit   U-730
A/D converter   DC-3510A

SYSTEM SPECIFICATIONS

Compatible discs	All discs listed in Orange Book, Part II
Recording formats	CD-DA (including CD-G)
	CD-ROM (with U-710)
	CD-I (with U-710)
Maximum recording time	Approx. 74min (varies by disc)
Recording method	Batch or additional recording in accordance with Orange Book specifications
System control	IEEE 488 1978
Connection of multiple CD writers	Up to 13 CD writers (DD-7200A) can be connected to a single CD encoder (DA-7000A) in a given system. However, IEEE 488 1978 cable length must not exceed 20m.

<ANALOG AUDIO RECORDING>
ANALOG SOURCE → A/D CONVERTER UNIT   8-bit PARALLEL
DC-3510A (OPTION)

<DIGITAL AUDIO RECORDING>
DIGITAL INPUT DAT PLAYER   AES/EBU
U-MATIC VCR AUDIO PCM PROCESSOR   SD-IF

<CD-G RECORDING>
CD-G EDITOR CD GRAPHICS UNIT
U-730 (OPTION)

<CD-ROM RECORDING>
U-MATIC VCR AUDIO PCM PROCESSOR CD-ROM/I FORMATTER
U-710 (OPTION)
DATA BASE COMPUTER SCSI

CD ENCODER DA-7000A CD WRITER DD-7200A →DIGITAL OUTPUT →ANALOG OUTPUT

P.C. SYSTEM CONTROLLER

The Kenwood CD-R recording system (CD-WO) makes it easy to create Orange Book-compatible CD-ROM disks in real time from a variety of sources. Say goodbye to costly and time-consuming CD-ROM arithmetic processing by a mainframe machine. Use the CD-R to simulate game software, or to help engineers in design work. Use it to store published materials, or clean up the business's books. Whatever the field, the CD-R can provide powerful backup.

The Kenwood CD-R recording system (CD-WO) makes it possible to record music CDs (CD-DA) simply by connecting a U-Matic VCR-PCM audio processor. Copy from professional DAT decks or CD players with digital-to-digital recording. Use the CD-R to record broadcasts and radio spots, or make promotional disks in the studio. It can even record live performances.

Still-frame video images can be recorded simply by combining a CD-G graphics editor with the optional CD Graphics Unit. Store books, photographs, and illustrations with archive quality, or record events for future use. Plus, up to 13 CD writers can be connected to the CD-R in parallel, making it possible to produce up to 13 copies at the same time.

DD-7200A

Code format	Conforms to CD Red/Yellow/Orange Book standards
Recording method	Optical modulation by laser
Recording wavelength	780-790nm
Recording power	Approx. 4mW to 8mW, set automatically by ATIP code
Playback power	Approx. 0.5mW
Recording range	44 — 118mm diameter
Rotation	During recording: CLV using WOBBLE signal
	During playback: CLV using EFM signal
CLV range	1.2m/s to 1.4m/s
Recording position control	Time control by WOBBLE signal ATIP
C1 error rate for recorded disc	Less than 3×10^{-2} (using Kenwood-recommended discs)
3T jitter of EFM signal on recorded disc	Less than 30ns (using Kenwood-recommended discs)
Synchronization error	±2EFM between ATIP and subcode
Connection during additional recording	26EFM ±1EFM FRAME
Input/output signals	EFM signal: TTL level 50Ω input/output (BNC connector)
	Synchronization signal: 44.1kHz, TTL level 50Ω input/output (BNC connector)
	EFM start: C-MOS level output (BNC connector)
	Control signal: GP-IB (IEEE 24-pin multiconnector)
	Digital output: AES/EBU standard (XLR3-32 connector)
	Audio output: 600Ω balanced (XLR3-32 connector)
GP-IB control	Conforms to: IEEE 488 1978
Disc loading	Front loading with OPEN/CLOSE key
Power requirements	AC 100/120/220/240V, 50/60Hz, approx. 30W
Dimensions (W × H × D)	426 × 133 × 480mm
Weight	Approx. 14kg
Rack mounting	Possible
Operating environment	Temperature: 15°C — 35°C,
	Humidity: 25% — 80% RH
Accessories	Instruction manual (1), power cord (1)

DA-7000A

Code format	Conforms to CD Red/Yellow/Orange Book standards
Basic clock	8.6436MHz internal/external switchable
EFM output	Symmetry-adjusted EFM/EFM (one output each)
	50Ω TTL level output (BNC connector)
Data input using digital-audio interface	Input format: Balanced (Canon connector)
	External synchronization clock: 44.1kHz, 50Ω TTL level output (BNC connector)
SD-IF data input	WORD SYNC: 75Ω TTL level output (BNC connector)
	DEC CH1: 75Ω TTL level output (BNC connector)
	DEC CH2: 75Ω TTL level output (BNC connector)
Parallel data input	Data format: 8-bit units, positive logic, 2's complement
	Input level: TTL level pull-up 330Ω/pull-down 390Ω
	Connector: 50-pin miniature delta ribbon receptacle
RS-422 communications terminal	Connector: 9-pin D-sub connector
GP-IB control	Conforms to: IEEE 488 1978
Power requirements	AC 85-250V, 50-440Hz, approx. 10W
Dimensions (W × H × D)	426 × 133 × 480mm
Weight	Approx. 10kg
Rack mounting	Possible
Operating environment	Temperature: 15°C — 35°C,
	Humidity: 25% — 80% RH
Accessories	Instruction manual (1), power cord (1)