Information on CD-ROM

This information is gleaned from from various freely available sources. Where I know who the author is, I have given credit.

General information:
Frequently asked questions about CD-ROMs rab@cdrom.com
INTRODUCTION TO MULTI MEDIA DESIGN by Jay Silber
LITTLE EDITORIAL ON RECENT NEWS (MPC)
Nimbus Information Systems
OPTICAL GLOSSARY FOR INFORMATION USERS VLS Inc.

Information on specific drives:
DAK Introduces $199 BSR External CD-ROM Drive
CM205 single-session XA
Hitachi help
Mitsumi CD-ROM drives
Pioneer DRM-604X
Sony Laser Library by Kevin Kelly

Information on specific discs:
Computers By Design price list
DeLorme's Detailed CD-ROM Street Atlas
Listing of Data Available on CD-ROM from NASA
Microsoft Programmer's Library
Ultimate MOD Collection CD-ROM

The High Sierra document

Compiled and adapted by: Neil G. Rowland, Jr.

Questions and Answers about the Pioneer DRM-604X
(Specifications at end)

Q: What is the Pioneer DRM-604X?

A: The DRM-604X is a quadruple speed (600 KB/s) six disc CD-ROM minichanger. The discs are contained in a removable magazine. The magazine is a ruggedized version of the Pioneer-patented six- disc magazines used in audio CD changers.

Q: How is the 600 KB/s data transfer rate achieved?

A: Pioneer's Quadraspin(tm) technology spins the disc at four times the normal CD rotation speed of 200-500 rpm. Quadraspin is made possible by Pioneer-proprietary VLSI error correction chips, a new optical head and servo system, and a high-torque spindle motor.

Q: Does the drive support Kodak's PhotoCD?

A: Single session PhotoCD discs are currently supported. Kodak is presently (Mid Jan 93) testing the drive for Multisession compliance.

Q: Will an upgrade be available for current DRM-604X owners?

A: Yes. Pioneer will make the upgrade drive PROMs available at a nominal cost.

Q: Will the drive work with OS/2?

A: Yes. The DRM-604X works with the OS2CDROM.DMD BaseDev. (Users must add "/ET" as the first parameter to the SCSI adapter .ADD line in CONFIG.SYS to enable LUN support.)

Q: What comes with the drive?

A: DOS device drivers for Future Domain and IBM SCSI/A host adapters, an ASPI driver, Microsoft CD ROM Extensions (MSCDEX), Macintosh drivers, audio and power cables, one magazine, installation software, manuals.

Q: What is the drive interface?

A: SCSI. The DRM-604X has two 50 pin Centronics connectors.

Q: Is it SCSI-2 compatible?

A: Yes, but SCSI-2 audio functions are not yet supported. The DRM- 604X currently emulates a DRM-600A (Pioneer's single speed six disc changer). Upgrades for SCSI-2 audio functions will be available 2Q93.

Q: Can the the DRM-604X be daisy-chained with other drives?

A: Yes. The DRM-604X has switchable termination and push-button SCSI ID setting for easy daisy-chaining.

Q: Will it work with my "XXXX" SCSI host adapter?

A: Using the ASPI driver supplied with the drive, the DRM-604X can be used on Adaptec, Buslogic, Trantor, Ultrastor and other cards that have ASPI managers. Contact the adapter vendor for ASPI manager availability.

Q: How do you switch discs?

A: Under OS/2 and DOS, each disc is a drive letter. The drive switches discs as necessary when a drive letter is accessed. No user intervention is required. On the Mac, six disc icons appear on the desktop, and the drive switches as necessary.

Q: Can you use it on a network server?

A: Many customers are using the DRM-604X on servers, although Pioneer does not generally recommend this. The drive is, of course, a changer, and only one disc may be read at any one time. When multiple users are accessing multiple discs simultaneously, the drive will switch discs to satisfy read requests as they arrive. Because of the time needed to switch discs, performance will suffer. The drive may be suitable for low-load situations (no more than one user at a time), or in special applications where requests are queued by the server. You may wish to investigate several packages that allow network access:

Access CD(Appleshare)	Optical Access Intl	1.617.937.3910
Map Assist	Fresh Technology	1.602.497.4200
Optinet	Online Systems	1.301.428.3700
SCSI Express	Micro Design Intl	1.407.677.8333

NOTE: Pioneer makes no recommendations regarding these packages. The user is responsible for determining the suitability for his/her needs.

Q: What is the disc exchange time?

A: Five seconds, maximum.

Q: Does the DRM-604X meet the MPC specifications?

A: Easily!

Q: How does the drive handle audio discs?

A: The drive recognizes audio tracks and slows to normal speed for audio functions.

Q: Does it support XA?

A: Yes, the drive supports all XA data formats.

Q: Will the drive play XA (compressed) audio?

A: No. The drive transfers the data to the host for decompression and conversion.

Q: What if my disc will only work at "normal" speed?

A: Although we have not encountered such a disc, DIP switch and software commands allow the drive to be set to "normal" (150KB/s) speed.

Q: Does the drive handle split audio, such as National Geographic Mammals?

A: Yes.

Q: WIll the DRM-604X read CD-R (CD-WO) discs?

A: Yes.

Q: Does Pioneer maintain a BBS?

A: Yes, 408.748.2105 (USR-DS N81)

Q: Can the DRM-604X be used on computers other than PCs and Macs?

A: Yes. The drive is being used on Sun, Silicon Graphics, VAX, Amiga, and others.

Q: Will the drive work with Windows NT?

A: Yes. The DRM-600A is currently certified for Win NT. The DRM- 604X has not yet been certified, but is compatible with the DRM- 600A. Certification is expected in 1Q93.

DRM-604X Specifications

Media Type	CD-Audio, CD-ROM, XA Mode 2 Forms 1 & 2
Disc Diameter	120mm
Capacity	680MB/disc, 4.1 GB/magazine
Interface	SCSI-2
Block Size	2048 / 512 byte selectable
Access Time	300 mSec
Buffer Size	128 KB
Data Transfer Rate	612 / 153 kilobyte/sec (continuous)
	4.2 MB/s (burst)

Disc Exchange Time	5 seconds maximum
MTBF	20,000 Hours
Regulatory Approvals	UL, CSA, FCC B, VDE, TUV, SEMKO, BEAB, NEMKO, DEMKO, FIMKO, SEV

Audio Frequency Response	4-20000 Hz +/- 2dB
THD	< 0.1%
Audio Output (Line Out)	1.7 v rms +/- 0.5 v (10k ohms)

Dimensions (WxHxD)	210 x 104.7 x 370.5 mm
Weight (net)	4.1 Kg
Weight (shipping)	6.0 Kg
Operating Voltage	100 - 240 V 50/60 Hz
Rated Current Comsumption	120V 0.4A
	240V 0.2A
Maximum Current Consumption	120V 0.5A
	240V 0.25A

Operating Temperature	5 ~ 40 C
Storage Temperature	-20 ~ 60 C
Humidity (Non-Condensing)	5 ~ 85% RH

List Price $1795.00

Pioneer Communications of America, Inc
Optical Memory Systems Division
3255-1 Scott Blvd
Santa Clara, CA 95054-3013

408.988.1702
FAX: 408.988.1848

(1/7/93)

For More Information Contact:
Ann Semonite
Public Relations
(207) 865-1234

FOR IMMEDIATE RELEASE
December 10, 1991

DeLorme's Detailed CD-ROM Street Atlas
Covers Entire USA

DeLorme's Street Atlas USA, a new compact disc/read-only memory (CD-ROM) product introduced by DeLorme Mapping of Freeport, Maine, allows users of DOS personal computers to access maps that contain every street in every city, town and rural area in the entire United States. That is, highly detailed maps of all fifty states are stored on a single CD-ROM. Users can view the whole country on the screen or zoom down to state, region, neighborhood or street-corner views anywhere in the US.

Designed for business, school and personal use, Street Atlas USA is offered for only $99.

Street Atlas USA is a massive geographic database. It contains over a million maps. If printed out, it would create a detailed map of the United States covering more than 10 football fields - hundreds of pounds of paper maps on a one- ounce CD-ROM. If purchased in paper form, these maps would cost over five thousand dollars.

Street Atlas USA displays full color maps that look like high quality paper maps. It is very easy to use: the user simply types in a phone number, a place name or a zip code to view any area of the country. Zoom in for street-level detail or zoom out for a bigger picture - all with the click of a mouse or keyboard. Maps include city and town names; highway symbols, street and road names; railroads; mountains, rivers, lakes and streams; and more. Any map from Street Atlas USA can be printed out for easy reference: trip planning, laying out sales territories, etc.

Street Atlas USA is Microsoft Windows 3.0 compatible and is easy to install and use. It will operate on any computer that is set up to run MS Windows 3.0 in standard or enhanced modes - generally a 286, 386 or 486 computer, gray scale or color VGA graphics, 40 megabyte hard drive with 2 megabytes RAM. Any standard CD-ROM drive can be used.

DeLorme Mapping, established in 1975, publishes detailed state atlases and has a full line of mapping software and geographic data products, developed for government and commercial applications. Street Atlas USA combines software and data on a single CD-ROM, and is the first in a line of general-use products planned for introduction over the next 12 months.

Street Atlas USA is available directly from DeLorme Mapping for $99. For more information, please contact DeLorme Mapping, P.O. Box 298, Freeport, ME 04032, (207) 865-1234.

C O M P U T E R S B Y D E S I G N

June 1st, 1993

Available CD-ROM Price List

Name/Description	Price
1992 COLLEGE HANDBOOK Database of over 2700 American colleges, with information by categories	$39.00
ACTION!/AUTHORWARE STAR	$55.00
ADVENTURES OF WILLY BEAMISH The Very Popular Adventure Game from Sierra	$32.00
AM SOFT Ham Radio Shareware. Thousands of programs	$50.00
AMERICA'S PREMIER SHAREWARE	$39.00
AMERICAN BUSINESS PHONE BOOK #2 Telephone listing of 9.2 million businesses	$32.00
AMERICAN FAMILY PHYSICIANS '85/91 6 Years of the journal of American Academy of Family Physicians	$245.00
AMERICAN VISTA MPC	$79.00
ANIMALS MPC Special Exhibits, guided tours, stories set from San Diego Zoo Many Multimedia extras	$49.00
ANNABEL'S DREAM MPC (NEW) Annabel the cat discovers Egypt. Childrens.	$69.00
ARTHUR'S TEACHER TROUBLE (NEW) Kid's learn how to spell in this interactive story	$42.00
ATLAS OF U.S. PRESIDENTS (MPC)	$48.00
BAKER'S DOZEN GAME PACK I Collection of Windows/Dos Based Games	$19.00
BARNEY BEAR GOES TO SCHOOL Ages 3-8 Educational Program for Early Math	$35.00
BARNEY BEAR GOES TO SPACE Ages 3-8, Animation games & stories to present facts about space. 96 NASA photo's w/ narration	$35.00
BATTLE CHESS ENHANCED Enhanced W/ Great CDROM Sounds and much more	$39.00

BEAUTY & THE BEAST (MPC) $45.00

BIBLE LIBRARY $45.00
9 Bibles & 20 reference books, Concordance,
5 word studies, 3000 outlines, 8 dictionaries

BIBLES & RELIGION $25.00
New & old testament. Book of morman, Judiaism, Islam.
With Study Guides, Greek Translations, Etc.

BIRDS IN AMERICA $49.00
1840 ed of Audubon's Octavio set of Birds of America

BRITANICA FAMILY CHOICE $49.00

BRITANICA SELECT SOFTWARE $49.00

BUSINESS BACKGROUNDS $39.00

BUSINESS MASTER NEW EDITION $35.00
1100 quality programs, Over 600MB, lot's of clip art
Run directly from CDROM

CAPSTONE GAMES $29.95
Castle 1&2, Bill & Ted's Excellant Adventure, Search
For The Titanic, and Exotic Car Showroom

CASE OF THE CAUTIOUS CONDOR $59.00

CDROM COLLECTION W/CIA FACTBOOK 1992 $19.00

C.D. CAD 3.7 W/MANUAL $45.00
Good cad program completly on CD

C.D. POWERBOX $45.00
621MB (Mostly 1992) 6800 files, BBS Ready. Easy
Install, Doors, utils, games, OS/2, etc.

C.I.A. World Factbook #2 $40.00
Maps & Facts on 248 countries, plus 750 other useful
programs. New Release. Unzipped Files.

CIVIL WAR $45.00

CHESSMASTER 3000 $42.00
Multimedia Chess Game

CINEMANIA FROM MICROSOFT $69.00
Large database of movies w/ info on the stars & more

CLIP ART GALORE $39.00

CLIP ART GOLITH $29.00
11,000 Images. PCX & TIF. Hundreds of Subject titles

COLOSSAL COOKBOOK $29.00

Over 4000 recipes. Cross Reference & Search.
Meal Planning

COMPLETE BOOKSHOP $45.00
An entire bookshop on CDROM! Includes classics, poetry, humor, cookbooks, American history and founding doc's

COMPLETE HISTORY OF DESERT STORM $39.00
Desert Storm from start to finish. MPC

COMPTON'S INTERACTIVE ENCYCLOPEDIA $325.00

COMPTON'S MULTIMEDIA ENCYCLOPEDIA $95.00

COMPOSER'S QUEST $65.00

CONAN $45.00

DEATHSTAR ARCADE BATTLES $39.00
Exciting arcade & action games. Auto/Horse racing, Casino Gambling, Space wars & much more.

DELUXE SCRABBLE (COMING MAY 1993) $45.00

DESERT STORM COALITION COMMAND $48.00
Collection of Desert Storm Info for Windows/DOS

DICTIONARIES & LANGUAGES $35.00
Dictionaries, thesauruses, style & syntax checkers.

DIGITAL TOURS: WORLD OF TRAINS $45.00
Collection of Pictures of trains from past to present

DIGITAL TOURS: WORLD OF FLIGHT $45.00
Collection of photo's of aircraft of all kinds

DINOSAUR ADVENTURE (NEW) $59.00
Interactive Story of dinosaurs, with full animation, sound and more.

DUNE $59.00

EDUCATION MASTER NEW EDITION $39.00
Over 1000 educational programs. Preschool to college level. Home Schooling & classroom instruction

ELECTRONIC HOME LIBRARY $56.00
250 complete works by the greatest writers.

EMPIRE CLIP ART $49.00
Thousands of various clipart files in 12 formats

ENCYCLOPEDIA OF CLIP ART $49.00
12,000 files. 51 Directories, 610MB, BBS Ready.
183 Color Files, 58 Adult Clips, Keyword Search

ENCYCLOPEDIA OF SOUND $39.00
Sound effects, voices, music clips, full length scores, digitally recordeed in full stereo

FAMILY DOCTOR $44.00
1500 frequently asked questions. Complete data on 1600 prescription drugs. Color Images. Mac & DOS

FAMILY EDUCATION PAK $49.00
Includes First Byte, Early Learning, Vocabulary, Spelling, Math & Spanish

FAMILY PRACTICE LIBRARY $795.00
NE Journal of Medicine, Year Book on Disc

FONTS #1 $45.00
Collection of type fonts for various programs

FONTMASTER II $45.00

GAMEMASTER NEW EDITION $45.00
Over 500 games. Many play off CD. Sports, Adventure, Cards, Arcade, etc. CGA/EGA/VGA

GAMES 1993 (NEW) $49.00
6000+ Game Files, Over 500MB, as new as April 1993, Includes Sports, Cards, Adventure, Cards & More

GIF'S GALORE $45.00
1000's of color images. Viewers for DOS/MAC/AMIGA

GOLDEN IMMORTAL $45.00

GOLF GUIDE CALIFORNIA/HAWAII $50.00

GRAMMY AWARDS $55.00

GREAT LITERATURE $55.00
Full Color illustrations & spoken passages enhance the classics

GROLIERS ENCY. 5.0 FOR DOS $89.00
Picture encylopedia on CD Rom. New Multimedia

GROLIERS ENCY. FOR WINDOWS $79.00
Illustrated encylopedia MPC version of Windows

GUINNESS DISC OF RECORDS (DOS) $50.00

GUINNESS 1992 MPC $57.00
Over 6,000 records w/ graphics & sound.

GUY SPY $45.00

HAM CALL (April 1992) $55.00
Ham Radio users guide and international directory.

HAM RADIO 3.0 $35.00
Excellent collection of HAM and SWL programs and data! Includes packet radio, satellite, communications, freq lists, equipment seervice, and much more

HOUSE OF GAMES (NEW) $49.00
100's of exciting action, adventure & suspense games. 90% play directly off CD.

INTRACORP DELUXE GAME PACK $39.00

JETS & PROPS $55.00
Multimedia book of aircraft for DOS/WIN/MAC

JONES IN THE FAST LANE $35.00
Another Great Kids Adventure Game from Sierra

JUST FONTS $35.00

JUST GRANDMA AND ME $49.00
Help kids learn to read with this lively adventure

KING'S QUEST V $35.00
Smash Hit Series from Sierra - Enhanced CDROM

KGB/CIA WORLD FACTBOOK $49.00

LION SHARE $50.00
4000 compressed files. All 91 & 92. BBS Ready

MACMILLAN DICTIONARY CHILDREN (MPC) $55.00

MANTIS $79.00

MAVIS BEACON TEACHES TYPING (MPC) $54.00
Interactive version of the world's premier typing prg

MAYO CLINIC $49.00
Family Health Book. Interactive. Windows Req.

MICROSOFT BOOKSHELF $75.00

MIXED UP MOTHER GOOSE $45.00
Interactive children's game, based on fairy tales.

MONARCH NOTES $59.00
Multimedia guide to understanding the literay classics

MONEY, MONEY, MONEY $45.00

MONKEY'S ISLAND $45.00
Multimedia pirate adventure by LucasFilm

MONSTER DISK - (2 Disc Set) $55.00
1300 MB Jan 1992/Feb 1993, List, View, Tag, Copy/Unzip search, Manual w/complete description

MOTHER EARTH #2 $45.00
Many high res pictures of nature scenes. Excellant quality graphics.

MPC WIZARD $20.00

MURDER MAKES STRANGE DEADFELLOWS $55.00

NATIONAL PARKS: FAMILY GUIDE $45.00

NEW BASICS ELECTRONIC COOKBOOK $69.00

NEW ENGLAND JOURNAL OF MEDICINE $325.00
The world's oldest continuously published medical journal

NIGHT OWL SHAREWARE V7.0 $45.00
The latest shareware CD from Night Owl. BBS Ready.

NIGHT OWL SHAREWARE V8.0 $49.00
Another fine shareware CD Disc from Night Owl. BBS Ready.

OUR SOLAR SYSTEM $29.00
Nasa photos of planets, moons, comets, earth. Star locators, Voyage simulators, astronmical data

OXFORD TEXTBOOK OF MEDICINE $525.00
Total source for those studying or practicing clinical medicine

PACIFIC ISLANDS $49.00

P.C. MEDIC $49.00
The latest utilities, reference manuals, tutors and complete set of diagnostic tools

PC SIG VERSION 11 $45.00
Extremely Well Done w/ user interface. BBS Ready.

PC SIG GAMES $45.00
Games from any category you can think of. including over 60 for windows. Fantastic interface.

PEDIATRICS ON DISC $345.00
Complete/Original Text/Images: American Academy Pediatrics

PETER & THE WOLF $49.00

PHEONIX VERSION 3.0 $39.00
12,000 public domain programs. 160 educational. Zip Files.

PIER SHAREWARE #1 (NEW) $45.00
Nearly 6000 programs, easy file access interface, all files are ASP 1992 files.

PLAYING W/ LANGUAGE: FRENCH (MPC) $59.00

Interactive learning on how to speak, read & write

PLAYING W/ LANGUAGE: SPANISH (MPC) $59.00
Interactive learning on how to speak, read & write

POWER PAK GOLD $45.00
Over 7000 files, Sblaster Front loader, Easy Menu, BBS Ready

PROPHONE 1992 $95.00
3 Disk Set - National Directory of residential & Business. Address, Phone, business heading and S.I.C. Codes

PROPHONE 1993 (7-Disc Set) $225.00
National Phonebook lists for Residential and Business W/Address, Phone and much more.

PUBLISH-IT! V2.0 FOR DOS $39.00
Timeworks Popular Desktop Publish on CD for DOS

PUBLISH-IT FOR WINDOWS $69.00

PUBLISHER'S DREAM DISK $59.00
184 Pg Manual showing fonts & clipart included.
3700 PCX files, 550 TT, 400 Downloadable HP fonts

PUBLISHER'S PARADISE $45.00
Over 1000 clip art images of Professional Quality for Windows, Word Perfect, etc. 150 Fonts

READER'S LIBRARY $39.00

RETURN TO THE MOON $49.00

ROTOR/TIME BANDIT/AIRBALL $29.00
Collection of 3 popular games on one CD

SHAKESPEARE $39.00

SHAREWARE 1993 $45.00
6000+ Shareware programs up to April 1993. BBS Ready.

SHAREWARE EXTRAVAGANZA (4-Disc Set) $65.00
Excellant Follow Up to Smash Seller, Vol 1.
2 Gigabytes of Compressed Files!

SHAREWARE EXPLOSION $45.00
Excellant shareware offering for single and BBS use

SHAREWARE GALORE $46.00

SHAREWARE OVERLOAD $35.00
550MB of compressed data, emphasis on games & windows.

SHAREWARE STUDIO $45.00
640MB of BBS Ready Shareware. Excellant collection.

SHAREWARE TIGER $49.00
685MB all files less than a year old. Games, business, fonts windows files, desktop and more.

SHERLOCK HOLMES I $48.00
Interactive detective game.

SHUTTLE $45.00

SIMTEL 20 $45.00
8500 files. Util & programming tools. Source Codes languages, communication.

SLEEPING BEAUTY $49.00

SOFTWARE VAULT $45.00
625MB Over 1200 files. Librarian let's you search/ creates files for SysOps. Excellant disc.

SO MUCH SCREENWARE $45.00
From the same people who brought you shareware and stareware. 500MB of brilliant pictures. VGA

SO MUCH SHAREWARE #2 $48.00
The best of - Collection of fonts, graphics, clips, games. Over 1 Gig. Zip Files.

SOUND SENSATIONS $39.00
Tons of sound effects, music files, jukeboxes, voices, sound clips, in a variety of file formats. For Adlib, SoundBlaster, Covox and virtually all sound cards.

SOUNDWAV $45.00
Contains over 600MB of royalty free original .WAV files. Recorded Live. High quality

SPACE QUEST IV $37.00
Sierra's Smash Hit Space Adventure Goes CDROM!

SPIRIT OF EXCALIBUR $45.00
Virgin Software's Medevil Adventure Games

STELLAR 7 $37.00
Sierra's Space Action Adventure Game on CD

STORYTIME #1 $50.00
Interactive - Goldilocks, Little Red Hen, Boy & Donkey

STORYTIME # 2 $50.00
Boy Who Cried Wolf, Milkmaid, Belling the Cat

STREET ATLAS U.S.A. $125.00
Windows Software W/ Street Maps all Across America

SUPER CD $49.00

TALES OF PETER RABBIT $44.00
Interactive talking Story-Book

TALKING CLASSIC TALES $45.00

TALKING JUNGLE SAFARI $45.00

TALKING SCHOOLHOUSE $45.00

TECHNOTOOLS $39.00
Programmers Dream. Routines, utilities, debuggers, troubleshooters and other tools

TEMPRA ACCESS $39.00

TIME TABLE OF ARTS & ENTERTAINMENT $69.00

TIME TABLE OF BUSINESS, POLITICS $69.00

TIME TABLE OF SCIENCE & INNOVATIONS $50.00
Images & Sounds of 6,000 historical major events. Require VGA

TOO MANY TYPEFONTS $29.00
Typefonts in all formats. Printer Utilities, Truetype, ATM

TOP 2000+ 1993 $35.00

TOOLWORKS REFERENCE LIBRARY $55.00
Webster's Dictionary, Thesaurus, Spelling Checker, Desk Reference, Legal Forms, 9 volumes.

TOTAL BASEBALL $45.00

ULIMATE SHAREWARE COLLECTION $45.00

U.S. ATLAS OF PRESIDENTS $45.00
Multimedia software that tell about the US Presidents

U.S. ATLAS WITH AUTOMAP $55.00
Atlas of the United States. Plans routes, prints maps.

U.S. HISTORY $55.00
Combines 107 books & 1000 images. From the mayflower to the moon.

U.S. / WORLD ATLAS $30.00
Almanac & fact book. Lots of statistics.

USA WARS: VIETNAM $59.00
Multimedia presentation of the longest war in US History

VGA SPECTRUM $29.00

VGA SPECTRUM #2 $45.00

680MB that runs from CD. Animation & Sound Galore. Top 20 games. Multimedia Shareware.

VINTAGE ALOHA $29.00

VITAL SIGNS $69.00
The Good Health Resource: a comprehensive illustrated Library

WHALE OF A TALE (MPC) $65.00
Interactive children's story with sound & animation

WHERE IN THE WORLD IS CARMEN SANDIEGO $55.00
Interactive - #1 Education Game

WILD PLACES $45.00

WINDOWS MASTER $34.00

WINDOWS 1993 $35.00
680MB 7000 files. BBS Ready. Corel Draw utils, wallpaper, games, icons & fonts, clip art & more

WINDOWS SHAREWARE GOLD $49.00
Vast collection of Windows programs & aids. Utilities, Icons Clip Art, Wallpaper, Macro's, etc.

WINDOWARE $39.00
Packed with tons of useful programs; Typefonts, Font installers, games, home, business, education, icons, system optimizers, wallpaper, and more.

WING COMMANDER & ULTIMA VI $45.00
Two Popular arcade games on one disc

WORLD TRAVELER $39.00
Extensive collection for a breathtaking multimedia slide show.

WORLD VIEW (DOS) $49.00

WORLD VISTA (MPC) $79.00

WRATH OF THE DEMON $55.00

Article 5484 of comp.multimedia:
>From: rab@cdrom.com
Newsgroups: alt.cd-rom,comp.multimedia,alt.answers,comp.answers,news.answers
Subject: alt.cd-rom FAQ
Summary: **Frequently asked questions about CD-ROMs**
Message-ID: <1rikc8$g22@agate.berkeley.edu>
Date: 27 Apr 93 06:38:00 GMT
Reply-To: rab@cdrom.com
Followup-To: alt.cd-rom
Organization: University of California, Berkeley
Lines: 2053
Approved: news-answers-request@MIT.Edu
NNTP-Posting-Host: sabotage.berkeley.edu
Status: RO

Archive-name: cdrom-faq
Last-modified: 1993/04/26

========== FAQ alt.cd-rom ==========

FAQ for the alt.cd-rom usenet newsgroup. This list is posted to alt.cd-rom every month. The latest version is available via anonymous ftp from cdrom.com: /pub/faq. This file is freely redistributable.

ADMIN NOTE: This FAQ is getting very long. I am considering partitioning it into two or more postings. I thought about splitting it by hardware/ software, but that is not really a clean break since a lot of information pertains to both software and hardware. I am leaning toward putting the stuff about CD-ROM publishing and technical info about standards into a separate posting. That way consumers looking for a new drive, or a couple new titles won't have to wade through info on the Yellow Book specs and CD-WO recorders; and publishers and techies will be able to get the information that interests them in a more condensed form.

==========

0. What is a CD-ROM?

1. What are some good sources of CD-ROM discs?
1a. What are some good sources of CD-ROM discs in North America?
1b. What are some good sources of CD-ROM discs in Europe?
1c. What are some good sources of CD-ROM discs in the Mid-East?
1d. What are some good sources of CD-ROM discs in Asia?
1e. What are some good sources of CD-ROM discs in Australia and New Zealand?

2. Can you recommend a good CD-ROM drive?

FAQs 3-8
3. Where can I get caddies?
4. Are there any good periodicals and publications on CD-ROMs?
5. Why are CD-ROM drives so slow?
6. Is it important to have a fast CD-ROM? Does 300ms vs. 700ms really matter?
7. Is it important to buy a fully SCSI compatible drive?

8. Where can I get information on SCSI controllers for CD-ROM drives?

Publishing - FAQs 9-16

9. How much does it cost to make a CD-ROM?
10. I have a great idea for a CD-ROM but no money. What can I do?
11. Where can I get a CD-ROM published?
12. Where can I find equipment to make my own CD-ROMs?
13. Where can I get blank media for my CD-ROM recorder?
14. I have 10000 paper documents that I want to put on a CD-ROM. Who can help?
15. Are there any organizations of CD-ROM Publishers?
16. Where can I get more information about CD-ROM publishing?

FAQs 17-20

17. How much information will fit on a CD-ROM?
18. Why doesn't MSCDEX work with DOS 5.0?
19. Where can I get the latest version of MSCDEX?
20. I bought a used drive at a garage sale. Where can I find a driver for it?

Standards - FAQs 21-33

21. What is the difference between `High Sierra' and ISO-9660?
22. Where can I get a copy of the ISO-9660 standard?
23. What is an HFS disc?
24. Can you give a short explaination of ISO-9660?
25. What the heck does `Red Book' and `Yellow Book' mean?
26. What is CD-I?
27. What is CD-ROM/XA?
28. What are the Rock Ridge extensions?
29. What is ECMA 168?
30. Is a short technical introduction to these standards available?
31. Who comes up with these standards? Can I have any input to the process?
32. Are there any ftp sites with good stuff related to CD-ROMs?
33. How do I write an MSDOS program that can access a cdrom using MSCDEX?

FAQs 34-42

34. How do I mount an ISO-9660 disc on a Sun?
35. How do I use a CD-ROM with OS/2?
36. Which CD-ROM Drives will work with MicroSoft Windows-NT?
37. How do I read an audio cd track as digital data?
38. Why do CD-ROMs cost so much?
39. Why do all the bundle deals require me to buy a drive? What if I already have a drive?
40. Are alt.cd-rom archives available anywhere?
41. What is the shelf-life of a CD-ROM?
42. How should I handle my CD-ROMs? How do I clean them?

Photo CD - FAQs 43-46

43. Which drives will work with Kodak Photo CD?
44. What is a "Multisession" CD drive?
45. How does Photo CD work?
46. Where can I get more information about the Kodak Photo CD?

FAQs 47-54

47. Where can I get maps of the US on CD-ROM?
48. How do I put a CD-ROM Drive on a Novell network?
49. Are any CD-ROM Jukeboxes available?

50. Can I speed up my CD-ROM by using a cache?
51. Do you have any info about the CD-ROM filesystems for Amigas?
52. What are the most popular CD-ROMs?
53. What are some good references to CD-ROM reviews?
54. ???? Please send any other questions (and answers) that should
be included in this FAQ to rab@cdrom.com.

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0. What is a CD-ROM?

CD-ROM means "Compact Disc Read Only Memory". A CD-ROM is physically identical to a Digital Audio Compact Disc used in a CD player, but the bits recorded on it are interpreted as computer data instead of music. You need to buy a "CD-ROM Drive" and attach it to your computer in order to use CD-ROMs.

A CD-ROM has several advantages over other forms of data storage, and a few disadvantages. A CD-ROM can hold about 650 megabytes of data, the equivalent of thousands of floppy discs. CD-ROMs are not damaged by magnetic fields or the xrays in airport scanners. The data on a CD-ROM can be accessed much faster than a tape, but CD-ROMs are 10 to 20 times slower than hard discs.

You cannot write to a CD-ROM. You buy a disc with the data already recorded on it. There are thousands of titles available.

1. What are some good sources of CD-ROM discs?

(Part of **Frequently asked questions about CD-ROMs**)

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1. What are some good sources of CD-ROM discs?

Jim Raehl has compiled an excellent list of sources for inexpensive CD-ROMs. His list is periodically posted to alt.cd-rom, and is available via anonymous ftp from cdrom.com:/pub/faq_disc.

You can get a list of about 85 CD-ROM titles by sending a blank message to CD-ROM@micromed.net.netcom.com [Several people have had trouble getting the list, so I have made it available for anonymous ftp from cdrom.com:/pub/micro.med]

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1a. What are some good sources of CD-ROM discs in North America?

Buckmaster Publishing
Route 3, Box 56
Mineral, VA 23117
703-894-5777 or 800-282-5628
A ham radio callbook database and 5000 public domain programs: $50

Bureau of Electronic Publishing
141 New Road
Parsippany, NJ 07054
1 800 828-4766, 201-808-2700, Fax: 201-808-2676
Publish lots of CD-ROM titles. Call them for a catalog.

CD-ROM INC
1667 Cole Blvd, Suite 400
Golden, CO 80401
1 800 821-5245
Many discs, drives and accessories. Call for free catalog.

The CD-ROM Source
PO Box 20158
Indianapolis, IN 46220
Phone: (317) 251-9833

CDROMS Unlimited
P.O. Box 7476
Fremont, CA 94537-7476
1 510 795-4286 Call for catalog

CD-ROM User's Group
Post Office Box 2400
Santa Barbara, CA 93120
805-965-0265
Bundle of 10 discs for $99.

Compustuff

2759 Medina Rd., Plaza 71
Medina, OH 44258
216-725-7729

Computer Man
18546 Sherman Way, Suite B
Reseda, CA 91335
818-609-0556

Computers At Large
18728 Cabernet Drive
Saratoga, CA 95070-3561
(408)255-1081, (408)255-2388 - FAX

Crazy Bob
ERM Electronic Liquidators
37 Washinton
St. Melrose, Mass 02176
Order line: 800-776-5865
Sells mostly outdated or surplus discs at low prices

EBSCO Subscription Services (CD-ROM Handbook)
P.O.Box 325
Topsfield, MA 01983
508-887-6667 800-221-1826 508-887-3923 (Fax)

EDUCORP
7434 Trade Street
San Diego, CA92121-2410
1-800-843-9497

Faxon Co., Inc. (Access Faxon)
15 Southwest Park
Westwood, MA 02090
617-329-3350 800-225-6055 617-461-1862 (Fax)

JANA Publishing
(800) 363-2083
TAMIL@QUCDN.QueensU.CA
Bimonthly CD-ROMs of NeXT and Linux software

Knowledge Media
436 Nunneley Rd Suite B
Paradise, CA 95969
+1 916 872 3826, +1 916 872 3826 FAX, email: pbenson@ecst.csuchico.edu
Graphics software CD-ROM, Audio Resource Library CDROM

Mail Boxes Etc.
7657 Winnetka Ave.
Conoga Park, CA 91306
818-700-1800

Mr. CD Rom
PO Box 1087
Winter Garden, FL 34777

800-444-mrcd
407-877-3834 FAX

NASA Space Science Data Center
Code 933.4
NASA Goddard Space Flight Center
Greenbelt, MD USA 20771
Phone (voice) 301 286 6695
CDROMs of data from Voyager, Magellan and Viking for $6 each.
If you have ftp capability, you can sample images from the two currently
mounted CDROMS at ames.arc.nasa.gov in the directory SPACE/CDROM.

Nautilus
7001 Discovery Blvd
Dublin, OH 43017-8066
1-800-637-3472
Provides a CD-ROM of the month subscription. 13 CD-ROM's for $138.

Oxford University Press
2001 Evans Rd
Cary, North Carolina 27513
800 451-7556
Oxford English Dictionary on CD-ROM

Pacific HiTech, Inc.
4530 Fortuna Way
Salt Lake City, UT 84124
(800) 765-8369, (801) 278-2042, FAX: (801) 278-2666
71175.3152@CompuServe.com.
Info-Mac Sumex-aim Macintosh CDROM, Educational Gameland CDROM (for PCs)

Prime Time Freeware
370 Altair Way, Suite 150
Sunnyvale, CA 94086
(408) 738-4832, (408) 738 2050 FAX, ptf@cfcl.com
UNIX-related source code on CD-ROM

ProComp Computer
12503 Sherman Way
No. Hollywood CA 91605

Profit Press
2956 N. Campbell Ave.
Tucson, AZ 85719
1-800-843-7990, 602-577-9624 FAX, 602-299-0693 BBS
MEGA-Rom, 600+ meg MSDOS, $79

Raynbow Software, Inc.
P. O. Box 327
Rapid City, SD 57709
(605) 394-8227, louis@ce.ucsc.edu, CompuServe: 70410,413
5000 GIFs on CD-ROM with Search Engine for $55

Reed Reference Publishing
Bowker Electronic Publishing

121 Chanlon Road
New Providence, NJ 07974
1-800-323-3288
908-464-6800, 212-645-9700, 1-800-323-3328, info@bowker.com
"Books in Print" on CD-ROM, bi-monthly subscription $1095, w/reviews $1595

ROM-BO
1300 Mohawk Blvd
Springfield, OR 97477
800-536-DISK

Sound Electro Flight
4545 Industrial St. 5N
Simi Valley, CA 93063
800-279-4824

Stanford University Press
415-723-1593
CD-ROM with authoring system containing four books illustrating its use: $17

Sterling Software
1404 Ft. Crook Rd. South
Bellevue, NE 68005-2969
800 643-NEWS, 402 291-2108, 402 291-4362, cdnews@Sterling.COM
uunet!sparky!cdnews, ftp.uu.net:/vendor/sterling
NetNews/CD: Usenet news on CD-ROM

TCM Computing (703) 439-8032
Rt. 2 Box 130 (703) 439-8237 Fax
Midland, Va. 22728 (703) 439-3060 BBS
ray.herold@channel1.com
Night Owl CD-ROMM

TechCity
17706 Chatsworth St.
Granada Hills, CA 91344

TigerSoftware
800 Douglas Entrance
Executive Tower, 7th FLoor
Coral Gables, Florida 33134
24-hour FAX: (305) 529-2990

Updata Publications, Inc. (CD-ROM Guide)
1736 Westwood Blvd
Los Angeles, CA 90024
310-474-5900 800-882-2844 310-474-4095 (Fax)

Walnut Creek CDROM
1547 Palos Verdes Mall, Suite 260
Walnut Creek, CA 94596
1 800 786-9907, 1 510 674-0783, 1 510 674-0821 FAX
Snapshots of major internet archives on CD-ROM

Wayzata Technology Inc.

P.O. Box 807
Grand Rapids MN 55744
1 800 735-7321 Call for catalog

Yggdrasil Computing, Incorporated
PO Box 8418
Berkeley CA 94707-8418
(510) 526-7531, fax: (510) 528-8508, yggdrasil@netcom.com
Linux Operating system on CD-ROM

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1b. What are some good sources of CD-ROM discs in Europe?

Apex Software
PO Box 174
Battle
East Sussex
TN33 9AQ
International: +44-424-830025 (voice or fax), UK: 0424-830025 (voice or fax)
email: vincea@cix.compulink.co.uk

BECO Link Ltd.
Jindrisska 276
530 02 Pardubice
Czech Republic
Tel/Fax: +42 40-518 566

British Software Licensing
280 (T/L) West Princes Street
Woodlands
Glasgow G4 9EU
United Kingdom
+44-41-339-7264, Fax +44-41-334-1675, graham@gimble.demon.co.uk
---
CD-ROM Jacob
Aarstrasse 98
CH-3005 Bern
Switzerland

CD ROM (UK) Ltd
8 Sheep St, Highworth
Swindon, Wiltshire SN6 7AA
United Kingdom
44-0793-861146, 44-0793-765331 (Fax)

EBSCO Subscription Services
3 Tyers Gate
London SE1 3HX
United Kingdom
44-71-357-7516

Faxon Europe, B.V.
Postbus 197
1000 AD Amsterdam

The Netherlands
31 (20) 91-05-91, 31 (20) 91-17-35 (Fax)

Micro Haus Limited
P.O. Box 149
Gloucester
GL3 4EF
United Kingdom

Mountain Rose Multi Media
Kikkerveen 331
3205 XC Spijkenisse
The Netherlands
Phone: +31 1880 33083 / Fax: +31 1880 41551 / Email: sterbbs@sus.eur.nl
---
Public Domain & Shareware Library
Winscombe House,
Beacon Road. Crowborough,
Sussex, TN6 1UL, United Kingdom
+44 892 663298, +44 892 667473 FAX
Libris Britannia, an entire library of PD/Shareware on CD-ROM

STARCOM
International Computer Services
Limburggasse 45
A-9073 Klagenfurt-Viktring
Austria
+43 (463) 29 67 22, +43 (463) 29 67 24 FAX

UNICA Ltd
39a Hall St, Stockport
Cheshire, SK1 4DA, UK
+44 61 429 0241, +44 61 477 2910 FAX

WasaWare Oy
Palosaarentie 31
SF-65200 VAASA
Finland
Telephone & Fax: +358 61 173 025, Email: hv@uwasa.fi

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1c. What are some good sources of CD-ROM discs in the Mid-East?

ACTCOM - Active Communication Ltd.
14 Pinsker St., Haifa 32715, Israel
+972-4-326857, +972-4-231211 (FAX)
E-mail: amir@actcom.com

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1d. What are some good sources of CD-ROM discs in Asia?

Cache Computer
Shop 29, G/Fl., Golden Shopping Centre
146-152 Fuk Wah st., Shamshuipo

Kowloon
Hong Kong
Voice: (852) 361-9975, FAX: (852) 387-9935

Software Studio
Shop 217
Olympia Shopping Center
255 King's Road
North Point
Hong Kong
+852 510 7470 FAX

UniForce System Ltd.
903 Kin Tak Fung Comm. Bldg
467-473 Hennessy Road
Hong Kong
Voice: (852)838-6048 Fax: (852)572-4778

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1e. What are some good sources of CD-ROM discs in Australia/New Zealand?

CompuCD
GPO Box 1624
Canberra City
ACT 2601
Australia
fax: +61 06 2319771

Ilb Computing
48 Nebo Drive
Figtree Heights
NSW 2525
Australia
+61 42 28 5827

Logicware
1 Riverbank Off. Vil.
Cnr 1st St. & O'Shea Ter.
Katherine, N'rn Terr. 0850
Australia
fax: +61 89 72 3412

Shareware Distribution NZ
PO Box 2009
Wellington
New Zealand
BBS: +64 4 5643429 V22b, +64 4 564-5307 Voice/FAX, clear@cavebbs.gen.nz

2. Can you recommend a good CD-ROM drive?

(Part of **Frequently asked questions about CD-ROMs**)

==========

2. Can you recommend a good CD-ROM drive?

The NEC CD-ROM drives 336,37,73,74,83, etc. have received many favorable recommendations. NEC CD-ROM drive information can be FAX'ed to you. Call NEC Fastfacts at 800-366-0476, and then follow the directions. You will be prompted for a Catalog or Product Number. Catalog Number 2 is for CD-ROM and Product Number 730101 is for the CRD-73M and 730100 is for the CDR-73. Similarly for the CDR-37. No information was available on the CD-74. You will be prompted for your 10-digit FAX number and your local voice telephone number. If you haven't received your FAX with 30 minutes try again. For international callers, the Fastfacts FAX number is +1 708 860-9500x2621. You can get documents, and drivers, from the NEC BBS at +1 508 635-6328.

You can get information on Mitsumi drives by calling their US HQ at (516) 752-7730. The Mitsumi office dealing with the SouthEast is in Dallas. (214) 550-7300, FAX: (214) 550-7424. In California, call (408) 970-0700. A FAQ on Mitsumi drives is available by anonymous ftp from cdrom.com: /pub/mitsumi.faq.

A FAQ on the Pioneer DRM-604X is available by anonymous ftp from cdrom.com: /pub/drm_604x.faq

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Here is a matrix of information on a number of CD-ROM drives. Please send me any additions or corrections.

Column
A. Manufactuer
B. Model Number
C. Internal/External/Both
D. Caddies N=No, S=Sony, P=Philips, X=NEC, O=Other
E. Seek time in milliseconds
F. Transfer rate in kilobytes/second
G. SCSI - N/Y/2-scsi 2
H. CDROM XA / PhotoCD compatable (N=No, S=Single-Session, M=multi-session)
I. OS/2 Compatible - Y/N
J. Windows NT Compatible - Y/N
K. MPC Compatible - Y/N
L. Quicktime Compatible - Y/N
M.
N. Approximate Street Price, in US dollars
O. Recommended #yes/#no (Send email to recommend either yes or no)
P. Phone #
Q. Comments

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Apple	CD 150	E	S	---	---	Y	S	-	-	-	Y	-	400	0/0	408-996-1010	
Apple	CD 300	-	S	---	---	Y	M	-	-	-	Y	-	---	0/0	408-996-1010	
Apple	CD 300i	-	S	---	---	Y	M	-	-	-	Y	-	---	0/0	408-996-1010	
Apple	CD SC	-	S	---	---	Y	-	-	-	-	-	-	---	0/0	408-996-1010	

```
Apple     CD SC+      - S --- --- Y - - - - - - --- 0/0 408-996-1010
CDRM Inc  CR 1000i    - - --- --- - - - - - - - --- 0/0 303-231-9373
Chinon    CDS-431     I - --- 150 - - - - - - - --- 0/1 310-533-0274
Chinon    CDX-431     E - --- 150 - - - - - - - --- 0/1 310-533-0274
Chinon    435         E S 350 150 Y S - - Y Y - --- 0/0 310-533-0274
Chinon    435         I S 350 150 Y S - - Y Y - 369 0/0 310-533-0274
Chinon    431         - S 350 --- Y S - Y Y Y - --- 0/0 310-533-0274
Chinon    CDX-535     E S 280 300 - M - - Y Y - --- 0/0 310-533-0274
Chinon    CDS-535     I S 280 300 - M - - Y Y - --- 0/0 310-533-1727-fax
Denon     DRD-253     - - --- --- - - - - - - - --- 0/0 201-575-7810
Hitachi   CDR-1700S   - - --- --- - - - - - - - --- 0/0 415-589-8300
Hitachi   CDR-1702    E N 450  40 N N N N N N   200 0/1 415-589-8300 Obsolete
Hitachi   CDR-1750S   - - --- --- - - - - - - - --- 0/0 415-589-8300
Hitachi   CDR-3600    - - --- --- - - - - - - - --- 0/0 415-589-8300
  A           B       C D  E   F  G H I J K L M  N   0       P           Q
=====     ========    = = === === = = = = = = = === === ============ ==========
Hitachi   CDR-3650    I S 350  50 Y N - - N - - 300 1/0 415-589-8300 workhorse
Hitachi   CDR-3700    I - 300 --- - - - - - - - --- 0/0 415-589-8300
Hitachi   CDR-3750    - - --- --- - - - - - - - --- 0/0 415-589-8300
Magnavox  CDD461RS    E N 700 --- - - - - - - - 329 0/0 ------------
Magnavox  CDD462RS    E N 400 --- - M - - Y - - --- 0/0 ------------
Matsushita CD-521     I S 390 150 N S - - - - - 299 1/0 ------------
Mitsumi               - N 500 150 N - N N - N - 169 0/2 516-752-7730
Mitsumi   CRMC-LU005S I N 350 150 N M - - Y - - 199 5/0 516-752-7730
MtOptech  SI-680      - - --- --- - - - - - - - --- 0/0 303-444-2851  Ruggedized
NEC       CDR 36      - - 500 150 Y - - - - - - --- 0/0 508-264-8000  Portable
NEC       CDR 37      - - 450 150 - - - - - - - --- 0/0 508-264-8000  Portable
NEC       CDR-73      E S 300 150 Y - - - - - - 649 0/0 508-264-8000
NEC       CDR-73M     E S 280 300 Y - - - - - - --- 0/0 508-264-8000  Fast
NEC       CDR-74      E S 300 300 - S - - - Y - --- 0/0 508-264-8000
NEC       CDR-74-1    E S 280 300 2 M - - - Y - --- 0/0 508-264-8000
NEC       CDR-80      - X --- --- - - - - - - - --- 0/0 508-264-8000
NEC       CDR-83      I S 300 150 Y - - - - - - 599 0/0 508-264-8000
NEC       CDR-83M     I S 280 300 Y - - - - - - --- 0/0 508-264-8000
NEC       CDR-84      I S 300 300 - S - - - Y - --- 0/0 508-264-8000
NEC       CDR-84-1    I S 280 300 2 M - - - Y - 519 0/0 508-264-8000
  A           B       C D  E   F  G H I J K L M  N   0       P           Q
=====     ========    = = === === = = = = = = = === === ============ ==========
NEC       CDXG1       E - 500 --- - - - - - - - --- 0/0 508-264-8000
Philips   CDD-461     E N --- --- - - - - - - - --- 0/0 615-521-4499
Philips   CDI-601     E - --- --- - - - - - - - --- 0/0 615-521-4499
Philips   CDI-602     E - --- --- - - - - - - - --- 0/0 615-521-4499
Philips   CM205       I N 375 150 N N N - - - - --- 1/0 615-521-4499
Pioneer   DRM-600     E O 600 150 Y S - - - - - 925 1/0 408-988-1702
jukebox(x6)
Pioneer   DRM-604X    E O --- 600 Y S Y - - - - --- 1/0 bbs4087482150
jukebox(x6)
Sanyo     ROM 3000    E S 650  40 N N N N N N - --- 0/1 801-225-6888  slow
Sony      CDU-531     I S --- 150 N S - - - - - --- 0/0 800-352-7669
Sony      CDU-535     I S 340 150 N S - - - - - 200 0/0 408-944-4335
Sony      CDU-541     - S --- 150 Y S - - - - - --- 0/0 408-434-6644
Sony      CDU-561     I S 300 300 Y M - Y Y Y - --- 0/0 408-434-6644
Sony      CDU-6201    - S --- 150 N S - - - - - --- 0/0 408-434-6644
Sony      CDU-6205    - - --- --- - - - - - - - --- 0/0 408-434-6644
Sony      CDU-6211    - S --- 150 Y - - - - - - --- 0/0 408-434-6644
Sony      CDU-7204    - - --- --- - - - - - - - --- 0/0 408-434-6644
Sony      CDU-7205    E - --- --- - - - - - - - --- 0/0 408-434-6644
```

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Sony	CDU-7211	-	S	---	150	Y	-	-	-	-	-	-	---	0/0	408-434-6644	
Sony	CDU-8012	-	S	---	150	Y	S	-	-	-	-	-	---	0/0	408-434-6644	
Talon	TA-100	-	-	360	150	-	-	-	-	-	-	-	---	0/0	----------	
Talon	TA-200	-	-	280	300	-	-	-	-	-	-	-	---	0/0	----------	
Tandy	CDR-1000	I	N	800	175	N	N	-	-	-	-	-	200	1/0	817-390-3700	Nice, Cheap
Texel	DM3021	-	-	340	---	-	-	-	-	-	-	-	---	0/0	800-886-3935	
Texel	DM3024	I	-	265	300	Y	S	-	-	-	-	-	439	0/0	800-886-3935	
Texel	DM5024	E	-	265	300	Y	S	-	-	-	-	-	549	0/0	800-886-3935	
Toshiba	TX-M3301	-	-	---	---	-	-	-	-	-	-	-	---	0/0	714-455-0407	
Toshiba	XM3300	-	-	---	---	-	-	-	-	-	-	-	---	0/0	714-455-0407	
Toshiba	XM3301	-	-	325	150	Y	-	-	-	-	-	-	---	0/0	714-455-0407	
Toshiba	XM3301B	I	S	325	150	Y	M	-	Y	Y	-	-	499	2/0	714-455-0407	Works great
Toshiba	XM3301E1	-	-	---	---	-	-	-	-	-	-	-	---	0/0	714-455-0407	
Toshiba	3401	I	S	200	330	2	M	-	-	Y	-	-	399	2/0	714-455-0407	Very fast
Trantor	T128	B	-	---	---	Y	S	-	N	-	-	-	100	1/0	415-770-1400	

The NeXT CD-ROM is a Sony CDU-541.
The Sony CDU-6211 is the same as the Sony CDU-7211.

FAQs 3-8

(Part of **Frequently asked questions about CD-ROMs**)

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3. Where can I get caddies?

Here are a few sources of caddies:

CD-ROM INC
1667 Cole Blvd
Suite 400
Golden, CO 80401
1 800 821-5245
Call for the latest price.

EDUCORP
7434 Trade Street
San Diego, CA 92121-2410
1-800-843-9497
$55 for 10

QB Products
1260 Karl Court
Wauconda, IL 60084
1 800 323-6856 +1 708 487-3333
Sony Caddies "Made in USA", 10 for $54, 1000 for $3900

Walnut Creek CDROM
1547 Palos Verdes Mall, Suite 260
Walnut Creek, CA 94596
1 800 786-9907, +1 510 674-0783, +1 510 674-0821 FAX
Sony caddies "Made in Japan" - $4.95 each, $450 for 100

==========

4. Are there any good periodicals and publications on CD-ROMs?

A catalog describing CD-ROM publications and the "Multimedia and Videodisc Monitor" newsletter is available from

Future Systems
P.O. Box 26
Falls Church, VA 22040

Telephone 800-323-DISC or 703-241-1799
One of their books contains a list of about 1500 CD-ROM's.

CD-ROM Professional is a bi-monthly magazine with product reviews, technical articles, industry news, etc. This is a "must read" for anyone in the CD-ROM business. $39.95/year

CD-ROM Professional Magazine
462 Danbury Road
Wilton, CT 06897
1 800 248-8466

"CD-ROM Collecion Builder's Toolkit, 1992 Edition"
Paul T. Nicholls
Eight Bit Books, Weston, CT
ISBN: 0-910-96502-1
$39.95

CD-ROMS IN PRINT 1992
  An International Guide to CD-ROM, CD-I, CDTV & Electronic Book Products
Meckler Publishing
11 Ferry Lane West
Westport, CT 06880

Newsgroups and mailing lists:

On the internet, the best source of information is the newsgroup alt.cd-rom, which is linked to the BITNET list CDROM-L.

Those subscribing to CDROM-L may now choose to receive a daily digest of CDROM-L postings or an index to the daily digest. From the index one may easily request the full text of a posting.

To receive the INDEX, send the following note to listserv@uccvma or listserv@uccvma.ucop.edu (the subject is ignored):

  set cdrom-L index

To receive the DIGEST, send the following:

  set cdrom-L digest

DO NOT send to cdrom-L. Because of the high noise level of this list, I recommend that people try the index.

The newsgroup aus.cdrom provides a forum for discussion of cdrom related issues to Australian users that are otherwise lost in the morass of postings in the US based groups.

The internet newsgroup comp.multimedia is a good source of information on multimedia topics.

CDROMLAN (available on usenet as bit.listserv.cdromlan) covers the use of CD-ROM products on local area or wide area networks. You can join the list be sending the following command to LISTSERV@IDBSU.IDBSU.EDU:
        SUBSCRIBE CDROMLAN Your full name

CD-ROMs are in heavy use in libraries and government document repositories, both for access to indexes and for distribution of government data. The relevant lists are PACS-L (bit.listserv.pacs-l) and GOVDOC-L (bit.listserv.govdoc-l).
Send to LISTSERV@PSUVM.PSU.EDU:
        SUBSCRIBE GOVDOC-L Your full name
Send to LISTSERV%UHUPVM1.BITNET@VM1.NODAK.EDU
        SUBSCRIBE PACS-L Your full name

Discussions of music on CD can be found in rec.music.cd.

For those who are contemplating buying a CD-ROM drive or just getting your feet wet, Tony Thomas wrote a pamphlet on the subject which he will be glad to send you FREE OF CHARGE while supplies last.

To receive "GETTING STARTED WITH CD-ROM", send a self-addressed, stamped #10 envelope with 29 cents US postage to:

Tony Thomas
4421 Granada Blvd. #415
Warrensville Heights, OH 44128

Topics covered include:

How to Buy a CD-ROM Drive
Different Types of Drives
What You Need
Setup

A list of suppliers of CD-ROM hardware and software is also included.

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5. Why are CD-ROM drives so slow?

Compact discs were originally designed for music. When you are listening to "Willie Nelson's Greatest Hits", you are accessing the data sequentially and at a very regular speed. The only time you need to seek is when you decide to skip over a song, or back up and listen to "Always on my Mind" one more time.

In order to fit as much music as possible onto the disc, the data is recorded at the same linear density near the outer edge of the disc as it is near the center, so there is more information in the outside tracks than in the inside tracks. In order to deliver a steady rate of data, the linear velocity of the disc moving under the head is constant, so the angular velocity of the disc changes when the head moves from the center toward the outside tracks. This is no big deal when you are playing music, but when you are trying to do random access to a CD-ROM, the need to accelerate and decelerate the disc is the biggest obstacle to making it faster. Most magnetic discs spin at a constant angular velocity, so the data density decreases toward the outside of the disk, but seeks are faster.

A few other reasons that CD-ROMs are slow: Optical disc heads tend to be heavier than magnetic disk heads, so they have more inertia, and take longer to stablize onto a new track. Many CD-ROMs contain too much data to make effective use of RAM caches.

As time goes by, CD-ROM drives will get a little faster, but don't expect any miracles.

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6. Is it important to have a fast CD-ROM? Does 300ms vs 700ms really matter?

It depends on what applications you will be using. Many CD-ROMs are just big archives of stuff, and you can copy individual programs to your hard disk before using them so speed is not really very important. But if you are going to be using large ramdom-access databases, or any kind of interactive multi-media applications, then the speed difference is very noticeable.

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7. Is it important to buy a fully SCSI compatible drive?

Several CD-ROM drives only support a sub-set of SCSI, and usually come with their own semi-SCSI controller card. Full SCSI compatible drives usually cost more, but are better if you already have a SCSI controller and want to daisy chain several devices, or if you want to be able to use the drive on different machine types.

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8. Where can I get information on SCSI controllers for CD-ROM drives?

Many SCSI drive vendors recommend the Adaptec 1542-B SCSI Card. The phone number for Adaptec is 800-959-7274 or 408-945-2550.

[If anyone sends me info on other scsi controllers, I will include the info here.]

Publishing - FAQs 9-16

(Part of **Frequently asked questions about CD-ROMs**)

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9. How much does it cost to make a CD-ROM?

You can get a master made for about $1300, and then about $1.50 per disc for duplication. So to make 1000 discs, it will cost you about ($1300 + (1000 * 1.50)) = $2800. Publishers often have `first-timer' specials with steep discounts off the list price. For instance, DMI recently had a special of mastering, 50 discs, and two hours of tech support for $750.

If you only want a few discs, you can have single ISO-9660 `one-offs' made for about $200 for the first disc, and $100 for additional copies.

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10. I have a great idea for a CD-ROM but no money. What can I do?

You can author a CD-ROM, and have someone else publish it and pay you royalties. One company that does this is Walnut Creek CDROM. Their author guidelines are available by anonymous ftp from cdrom.com in the file /pub/author.txt.

==========

11. Where can I get a CD-ROM published?

I have used both of these companies, and highly recommend either:

Digital Audio Disc Corporation
1800 North Fruitridge Avenue
Terre Haute, IN 47803
812-462-8100, 812-466-9125 FAX

Disc Manufacturing Inc.
4905 Moores Mill Road
Huntsville, AL 35810
800-433-DISC, 205-859-9042, 205-859-9932 FAX

DADC is a subsidiary of Sony, and DMI is a subsidiary of Philips.

A more detailed list of 25 publishers in 8 countries is available via anonymous ftp in cdrom.com:/pub/publshrs.

There are now over 10 manufacturing facilities active in CDROM in North America, and another growing collection of write-once service bureaus. These are listed in MFG.TXT in Lib #8 of the Compuserve CDROM Forum.

If you only want to make one disc, or just a few copies, there are several companies that offer this service:

On-Site CD
13901 Lynde Avenue
Sartoga, CA 95030

(408) 867-0514, 408 867-0518 FAX
ISO-9660, Mac HFS, Call for price

Optical Media International
San Jose, CA
(408) 376-3511, 408-376-3519 FAX
omi@applelink.apple.com
ISO-9660, Mac HFS, Call for price

Walnut Creek CDROM
1547 Palos Verdes Mall, Suite 260
Walnut Creek, CA 94596
1-800-786-9907, +1 510 674-0783, FAX: +1 510 674-0821, info@cdrom.com
ISO-9660, Rock Ridge (Unix), $195, $95 each for additional copies

Young Minds Inc.
1910 Orange Tree Lane, Suite 300
Redlands, CA 92374
714 335-1350, 714 798-0488 FAX, yngmnds!ayoung@ucrmath.ucr.edu
Rock Ridge (Unix), $950

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12. Where can I find equipment to make my own CD-ROMs?

If you want to do single copy `one-offs', or low volume CD production, there are recorders announced by JVC, Philips, Sony, Yamaha and Pinnacle Micro.

JVC Personal ROM-Maker	$12500	(complete system, including software)
Philips CDD-521	$5500	(+ $1900 for software)
Sony CDW-900E	$10000	(???)
Yamaha	????	????
Pinnacle Micro	$3995	ISO 9660 and HFS software for Macs

Kodak remarkets the Philips drive as their PCD Writer 200.

Pinnacle Micro announced at MacWorld Expo in San Francisco a new, recordable CD-ROM drive with a list price of $3,995! This price includes ISO 9660 and HFS software for Macs. PC interface kit and software is extra $200.

Here are some phone numbers you can call for more info:

JVC Product Information:	+1 714 965-2610
Philips Consumer Electronics:	+1 615 475-8869
Sony Computer Peripheral Products:	1 800 352-7669
Pinnacle Micro	1 800 553-7070, +1-714-727-1913 (fax)

You can buy the Philips drive with CDGEN software for ISO-9660 discs from DataDisc (1-800-328-2347, FAX: +1 703-347-9085) for $7895. They recommend that you use it with the Adaptec 1542 SCSI Card.

Optical Media International (1-408-376-3511, omi@applelink.apple.com) has Macintosh HFS premastering software for the Philips CDD-521. The

program is called "Quicktopics" and the cost is $2500.

The JVC drive comes with software for making ISO-9960, Apple HFS, and hybrid ISO-9660/HFS discs. [If anyone knows anything more about these hybrid discs, please let me and I will include the information here.]

Additional third party integrators are: Meridian Data 408-438-3100; CD-ROM Strategies 714-733-3378; and Interactive Support Group 818-709-7387.

Here is a list of software vendors

CD-ROM Strategies	CD-GEN	1	714 733-3378
DataDisc	CD-Gen	1	800 328-2347
Dataware Technologies, Inc.	CD Make	1	510 942-3111
JVC	RomMaker	1	714 965-2610
Meridain Data	CD Publisher	1	408 438-3100
OnLine Business Systems	CD-Formatter	?	??? ???-????
Optical Media International	Topix	1	408 376-3511
PoINT Software and Systems	CDWRITE	?	??? ???-????
Young Minds, Inc.	CD Studio	1	714 335-1350

Authoring Software:

Dataware Technologies, Inc.	CD Author	1	510 942-3111
Dataware Technologies, Inc.	ReferenceSet	1	510 942-3111
Electronic Text Corporation	WordCruncher	?	??? ???-????
Executive Technologies, Inc.	Search Express	?	??? ???-????
Folio Corporation	Folio Previews	?	??? ???-????
I-MODE Retrieval Systems, Inc.	I-SEARCH	?	??? ???-????
Knowledge Access International	KAware	?	??? ???-????
Nimbus Information Systems	Romware	?	??? ???-????
OnLine Business Systems	CD-Build	?	??? ???-????
Retrieval Technologies, Inc.	re:Search	?	??? ???-????
Textware Corporation	Textware	?	??? ???-????
TMS, Inc.	InnerView	?	??? ???-????

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13. Where can I get blank media for my CD-ROM recorder?

The blank discs for CD Recorders are not the same as a normal CD. The metal data surface is gold instead of aluminum. The recorder uses a high powered laser to modify a dye layer which is between the gold and the plastic. This dye is somewhat photo sensitive so write once CDs should be stored in a dark place. They should be stored in an area that does not rise above 40 Celsius (104 F). It takes about half an hour to burn each disc.

The blanks come in two sizes. 63 minute, and 74 minute. The time refers to the amount of digital audio that can be recorded. Since DA is read from the discs at a constant rate of 150 kb/sec, it is easy to calculate the amount of data they will hold. The 63' discs will hold about 600 meg, and the 74' discs will hold about 650 meg.

Here are several sources for blank discs:

DataWare (1-510-942-3111, ask for Jeff Caplan). 74 minute (650 meg) blanks for $31 quantity ten, $29 quantity 100, and $27 quantity 500.

DataDisc (1-800-328-2347, 1-703-347-9085 FAX). 74 minute $27 quantity 10. 63 minute $19 quantity 25.

Sonic Solutions 415-485-4800. Their April 1992 price list shows CD-R74 quantity 100 as $27.50, CD-R63 quantity 100 as $25.00.

The U.S. sales office for DIC (a Japanese ink and chemical company) can be reached at 201-224-9344. DIC claims a useful life in excess of 75 years for their discs.

APDC sells blanks discs, magneto-optical disks, 8mm and 4mm tapes. 800-522-7232, ask for Susan Bradley.

Some other source for blank discs (sorry, no phone numbers): Mitsui Toatsu, TDK, JVC, Ricoh, Taiyo Yuden, Kodak, Mitsubishi Chemicals

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14. I have 10000 paper documents that I want to put on a CD-ROM. Who can help?

Check the classified ads in the back of CD-ROM Professional Magazine. There are several companies that will do large scale scanning, OCRing, and data entry. Because these things are so labor intensive, most of work is done offshore, usually in Malaysia or India.

Agro Computer Systems can process several thousand pages a day, and claims an error rate of less than 10E-6. For more information contact

Mr. G. M. Mahindra
Agro Computer Systems
28 Lalbagh (Mission) Road
Bangalore 560 027
India

Phone: +91 812 235083, FAX: +91 812 2241158

For smaller jobs that need a quick turn around I have used a company called "Quick-Set" (+1 510 685-9611) that does data entry, scanning, and OCRing.

==========

15. Are there any organizations of CD-ROM Publishers?

The Optical Publishing Association is a non-profit trade and professional organization for CDROM and other digital media publishers. They have been around since 1988, publishing newsletters and backgrounders for publishers, and promoting profitable practices for the business.

OPA, PO Box 21268, Columbus OH 43221 USA, 614/442-8805, 614/442-8815 (fax)
CIS address 71333,1114, 71333.1114@compuserve.com, AppleLink r.bowers.

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16. Where can I get more information about CD-ROM publishing?

Subscribe to CD-ROM Professional Magazine, 1 800 248-8466, $39.95/year

There is a mailing list devoted to CD-ROM publishing. For more information send a message to Mail-Server@knex.via.mind.org with the word "HELP" in the body of the email text.

There are several files pertaining to CD-ROM publishing available for anonymous ftp from cdrom.com.

FAQs 17-20

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17. How much information will fit on a CD-ROM?

It depends on the drive. Almost all CD-ROM drives will handle up to 620 megabytes with no problems. Many newer drives can read discs with over 700 megs.

The CD-ROM Users Group (see above) has a diagnostic CD-ROM that will tell you how much information your drive can handle.

==========

18. Why doesn't MSCDEX work with DOS 5.0?

You must use SETVER with MS-DOS 5.0, to make MSCDEX 2.20 work properly. Otherwise you will get an incorrect DOS version message. See the MS-DOS 5.0 documentation on how to use SETVER. MSCDEX 2.21 works with MS-DOS 5.0 without SETVER.

==========

19. Where can I get the latest version of MSCDEX?

Call MS BBS at 206-936-4082. Choose F for file library, S UPDATES, F to list files, then D MSCDEX.ZIP to download the file. (Microsoft may have deleted this file.)

You can get the latest version of MSCDEX (2.21) in a self-extracting zip archive via anonymous ftp from cdrom.com:/pub/cdext.exe.

It is also available in the MSL library on CompuServe, as CDEXT.EXE.

==========

20. I bought a used drive at a garage sale. Where can I find a driver for it?

Many CD-ROM manufacturers maintain BBS's where you might be able to find drivers for their drives:

```
NEC BBS:      +1 508 635-6328
Philips BBS:  +1 310 532-6436
Sony BBS:     +1 408 955-5107 or +1 408 372-7426
Pioneer:      +1 408 748 2105 (9600/HST/8N1)
```

Standards - FAQs 21-33

(Part of **Frequently asked questions about CD-ROMs**)

==========

21. What is the difference between `High Sierra' and ISO-9660?

Not much. When the standard was first proposed, it was given the name "High Sierra'. Later it was adopted as an offical standard, with a few minor modifications, and was designated ISO-9660. Usually when someone says "High Sierra", they really mean ISO-9660.

==========

22. Where can I get a copy of the ISO-9660 standard?

You can order a copy of the ISO-9660 standard from

ANSI
Attn: Sales
11 West 42nd Street
New York, NY 10036
212-642-4900

Cost to US destinations is $50, plus $6 shipping, check or money order.

Another source of a wide variety of standards documents is Global Engineering. Their service is often faster than ANSI. They also have offices in Europe and Asia.

Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112-5704
(800) 854-7179 (same)
(303) 792-2181
fax (303) 792-2192

==========

23. What is an HFS disc?

HFS is the Macintosh's Hierarchical Filing System. It is unrelated to High Sierra and ISO-9660 formats. Most CD-ROMs intended for the Macintosh are created in the HFS format, since HFS does support the Mac's resource and data forks and file information.

There are drivers made by AsimWare (AsimCDFS) and Xetec that allows HFS discs to be read on an Amiga. There is a list of differences that the drivers contends with, such as non-standard characters and 32 character filenames (Amiga supports only 30).

"New Inside Macintosh: Files" published by Addison-Wesley, has the most complete description of HFS format.

Inside Macintosh: Files

By Apple Computer, Inc.
Addison-Wesley Publishing Company
ISBN 0-201-63244-6

In Chapter 2, the section on "Data Organization on Volumes" pages 2-52 to 2-76 contains as complete a description of HFS as is available.

This book can be ordered from APDA (Apple Programmers & Developers Association) or any bookstore.

```
APDA
P.O. Box 319
Buffalo, NY 14207-0319
1-800-282-2732    U.S.
1-800-637-0029    Canada
(716) 871-6555    International
(716) 871-6511    Fax
AppleLink         APDA
America Online    APDA
CompuServe        76666,2405
Internet          APDA@applelink.apple.com
```

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24. Can you give a short explaination of ISO-9660?

ISO-9660 is an international standard that defines a filesystem for CD-ROMs. Almost all systems support ISO-9660.

Level one ISO-9660 is similar to an MS-DOS filesystem. Filenames are limited to eight single-case characters, a dot, and a three character extension. Filenames cannot contain special characters, (no hyphens, tildes, equals, or pluses). Only single case letters, numbers, and underscores. Directory names cannot have the three digit extension, just eight single-case characters.

All alphabetics are in UPPER case; some software maps this to lower case. Either the file name or the extension may be empty, but not both ("F." and ".E" are both legal file names).

There is a "File Version Number" which can range from 1-32767, and is separated from the extension by a semi-colon. The file version number is ignored on many systems.

Here are some examples of legal and illegal filenames:

Legal	Illegal	Why
TEST_1C.TXT	TEST-1C.TXT	hyphen
TEST1C.TXT	TEST 1C.TXT	space
TEST.1C	TEST.1C.TXT	more than 1 period
README	Readme	not single case

Subdirectories are allowed to nest up to eight levels deep.

Level two ISO-9660 allows longer filenames, up to 32 characters. But many of the other restrictions still apply. Level two discs

are not usable on some systems, particularly MS-DOS.

==========

25. What the heck does `Red Book', `Yellow Book', etc. mean?

"Red Book" is the common name of the "Compact Disc Digital Audio Standard". When a disc conforms to the red book standard, it will usually have "digital audio" printed below the "disc" logo. Most music CDs conform to this standard.

"Yellow Book" is the standard for CD-ROM. When a disc conforms to the yellow book, it will usually say "data storage" beneath the "disc" logo.

"Green Book" is the CD-I (compact disc interactive) standard.

"Orange Book" is the standard for write-once compact discs.

"Blue Book" is the standard for LaserDisc.

You can get the Red Book and Yellow Book from

ANSI
Attn: Sales
1430 Broadway
New York, NY 10018
(212) 642-4900

Red Book: CEI IEC 908
Yellow Book: ISO 10149:1989

You can get the Green Book from

American CD-I Association
11111 Santa Monica, Suite 750
Los Angeles, CA 90025
(213) 444-6619

The Orange Book is still proprietary to Philips and Sony, and available only to their licensees.

[If anyone can tell me where the other standards are available, I will include that information here.]

==========

26. What is CD-I?

CD-I means "Compact Disc Interactive". It is meant to provide a standard platform for mass consumer interactive multimedia applications. So it is more akin to CD-DA, in that it is a full specification for both the data/code _and_ standalone playback hardware: a CD-I player has a CPU, RAM, ROM, OS, and audio/video/(MPEG) decoders built into it. Portable players add an LCD screen and speakers/phonejacks.

If you want information about Philips CD-I products, you can call these

numbers:

US: Consumer hotline: 800-845-7301
For nearest store: 800-223-7772
Developers hotline: 800-234-5484

UK: Philips CD-I hotline: 0800-885-885

"Discovering CD-I" is a book available for $45 from:

"Discovering CD-I"
Microware Systems Corporation
1900 NW 114th Street
Des Moines, IA 50325-7077
1-800-475-9000

There are three books by Philips IMS and published by Addison Wesley:
"Introducing CD-I" ISBN 0-201-62748-5
"The CD-I Production Handbook" ISBN 0-201-62750-7
"The CD-I Design Handbook" ISBN 0-201-62749-3

Lex van Sonderen periodically posts a CD-I FAQ to comp.multimedia. The latest version of this FAQ is available by anonymous ftp from cdrom.com: /pub/cdi.faq.

==========

27. What is CD-ROM/XA?

CD-ROM/XA is an extension to the Yellow Book Standard. A track on a CD-ROM/XA disc can contain computer data, compressed audio data, and video/picture data. Many CD-ROM drives do not support CD-ROM/XA.

CD-ROM/XA extends CD-ROM by adding some of the CD-I disc features (such as using Mode 2 tracks with interleaved compressed-audio and other data). Thus CD-ROM/XA (eXtended Architecture) is often called the "Bridge" format between CD-ROM and CD-I... though the relationship is mostly the sector types. CD-ROM/XA applications still require specific code for each target platform.

CDROM-XA specifies a `bridge format' so that a CDROM-XA disc can be read on a CD-I player as well as on a PC under MSCDEX (provided that you use a conforming (.SYS) driver. On a normal yellow-book CDROM, a data track contains only mode-1 data sectors. On a CDROM-XA, a (the) data track contains only mode-2 data sectors. A mode-2 sector can be of two formats, form-1 and form-2. A form-1 sector contains 2048 bytes of user data, together with EDC and ECC bytes. A form-2 sector contains 2324 bytes of raw data (e.g. ADPCM audio or video data). If the device driver delivers 2048 bytes of data when MSCDEX asks for it, regardless whether the sector is mode-1 or mode-2/form-1, the PC is CDROM-XA compatible.

==========

28. What are the Rock Ridge extensions?

The Rock Ridge extensions use some undefined fields in the ISO-9660 standard to allow full unix-like filenames, symbolic links, and deep directories.

"Rock Ridge" is named after the town in the movie "Blazing Saddles" for no particular reason.

To receive a copy of the current version of the Rock Ridge specifications, please contact Bob Niland, e-mail rjn@fc.hp.com, fax 303 229 4545. You can ftp the Rock Ridge specs from cdrom.com: /pub/rockridge.

For information on Rock Ridge at Sun, try rrinfo@Eng.Sun.COM or cdgroup@fantasy.eng.sun.com.

For information on Unix-based premastering software supporting the Rock Ridge extensions contact:

Young Minds Inc.
1910 Orange Tree Lane
Suite 300
Redlands, CA 92374
714 335-1350
714 798-0488 FAX
yngmnds!ayoung@ucrmath.ucr.edu

Rock Ridge is expected to be approved as an ISO standard during the first quarter of 1993.

==========

29. What is ECMA 168?

ECMA 168 is a volume and file format standard for write-once CD and CD-ROM. It was approved as a European standard by the ECMA General Assembly in June of 1992. It provides for full Orange Book functionality, including multisession recording, track-at-once recording, and packet recording. When used with an Orange Book writer, this will allow write-once CD to be used more like a general-purpose storage peripheral than is possible using ISO 9660. ECMA 168 also incorporates the functionality of Rock Ridge: the ability to use Unix-style filenames, Unix permissions, and deep directory hierarchies. Much thought was put into character set issues, and ECMA 168 accommodates multiple-byte character sets such as ISO 10646. Although ECMA 168 is not upward-compatible with ISO 9660, it is possible to write a "conformant disc" containing both sets of volume and file structures. If such a disc is Yellow Book compatible (a CD-ROM or a CD-WO written disc-at-once), it could be read on either an ISO 9660 system or an ECMA 168 system. There are many common elements between ECMA 168 and ECMA 167, which is a new standard intended primarily for WORM and erasable optical disks. Hopefully this will encourage developers to support both standards.

The title of the standard is "Volume and File Structure of Read-Only and Write-Once Compact Disc Media for Information Interchange". This standard expands upon the ISO-9660 CD-ROM standard.

At the current time, I do not know of any companies which support ECMA 168 in their products.

A new draft international standard on CD-ROM/CD-WO format:

ISO/IEC DIS 13490 Volume and File Structure of Read-only
and Write-once Compact Disc Media for Information Interchange

is currently undergoing letter ballot process and voting may
end at end of August, 1993.

DIS 13490 is also the ECMA Standard 168, which is derived from
the Frankfurt Group proposal. Copies of this draft standard
should be available at the ANSI or ECMA office.

DIS 13490 is designed to support both the CD-ROM (yellow book) and
CD-WO (orange book) conforming media. In addition, DIS 13490 removed
many unnecessary restrictions of ISO 9660, and is compatible
with ISO 9660 at the directory and file structures level.
DIS 13490 conforming discs can also be made to be read
by both ISO 9660 and DIS 13490 conforming receiving systems.

==========

30. Is a short technical introduction to these standards available?

The file ftp.apple.com(130.43.2.3): /pub/cd-rom/cd-rom.summary gives
a short techie introduction to compact disc technology.

There is a good short general article on CD-Rom and its's many
variations (CD-XA, CD-I, CDTV, PhotoCD) called MULTIMEDIA IN A MUDDLE
by Barry Fox in the New Scientist (London, ISSN# 0262-4079) vol. 131
no. 1787 (Sep 21, 1991) pp.35-38

There is a very good article by Bill and Lynne Jolitz "Inside the
ISO-9660 Filesystem Format" in the December 1992 Dr. Dobbs Journal.
Detailed source code examples are provided. They are planning followup
articles covering Rock Ridge, CDI and CDROM-XA.

The SAMS book "Principles of Digital Audio" by Ken C. Pohlmann (ISBN
0-672-22634-0) deals primarily with audio CDs but there are sections
dealing with CD-ROM, CD-I, DVI, CD-V, CD-WO, Erasable CD, CD + G and
CD + MIDI.

There is a good brief explaination of all these standards in the paper

"Compact Disc Terminology"
Nancy Klocko
Disc Manufacturing Inc.
1409 Foulk Road, Suite 202
Wilmington, DE 19803
1-800-433-DISC

Here is some information from the paper:

Standards:

Red Book == CD-Audio

Yellow Book == CD-ROM
Mode-1 is for computer data
Mode-2 is for compressed audio data and video/picture data

CD-ROM/XA == an EXTENSION to Yellow Book and defines a new type of track.

CD-ROM Mode 2, XA Format, is used for computer data, compressed audio data, and video/picture data. A CD-ROM / XA track may interleave Mode 2 compressed audio and Mode 2 data sectors. Additional hardware is needed to separate these when playing the disc. The hardware is programmed to separate the audio from the data, decompress the audio and play it out through the audio jacks. At the same time, the hardware passes the data to the computer.

NOTE: Additional hardware is needed to play a CD-ROM / XA disc. Several vendors offer an XA interface board that will allow an existing CD-ROM drive to play CD-ROM / XA discs.

Green Book == Compact Disc Interactive (CD-I)

Orange Book == Recordable Compact disc Standard
Part I - CD-MO (Magneto Optical)
Consists of optional Pre-Mastered (READ-ONLY) area and a Recordable (re-writable) user area.
Part II - CD-WO (Write Once)
Orange Book Part II also defines a second type of CD-WO disk called a "Hybrid Disc". This disc consists of a Pre-recorded Area and a Recordable Area. The Pre-recorded area is a READ ONLY area where the information is manufactured into the disc. (This area is written per the Red, Yellow, and Green Book specifications, and can be played on any CD-Player.) The Recordable areas are where additional recordings can be made in one or more sessions. Only the first session on the disc is readable by todays CD-Players; additional software will be needed to read the additional sessions.

A TOC (Table of Contents) is written during each recording session. Disc will have multiple TOCs, one for each recording session.

Photo-CD is an example of a "Hybrid Disc".

CD-Bridge Disc

The CD-Bridge Disc defines a way to add additional information in a CD-ROM / XA track in order to allow the track to be played on a CD-I player. the result is a disc that can be played on both a CD-I player connected to a TV set and on a CD-ROM / XA player connected to a computer.

An example of a CD-Bridge Disc is the new Photo-CD disc. The Photo-CD disc will be playable in CD-I players, Kodak's Photo CD players and in computers using CD-ROM/XA drives.

Photo-CD

The Photo CDs will be Mode 2 Form 1 sectors per the CD-ROM / XA specifications. The disc will be written per the Orange Book Part II "Hybrid Disc" specifications. This will allow photographs to be written to the disc in several different sessions. Additionally, the disc will use the CD-Bridge disc format to allow the disc to be readable by both CD-I and CD-ROM / XA players.

The photographs written to the disc in the first session will use the ISO 9660 format. These photographs will be readable with the existing CD-ROM / XA players connected to a computer running new software written for the Photo CD picture structure. Additionally, the photographs will be displayable on CD-I Players and Photo CD Players connected to a TV set.

Photographs written to disc after the first session will be displayable on CD-I Players and Photo CD players. New software and/or firmware will be needed to read these additional photographs with existing CD-ROM/XA players.

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31. Who comes up with these standards? Can I have any input to the process?

In the case of the colored books, they have been developed by engineers within Philips and Sony. Few people outside these companies have input into the process.

The file format standards (ISO 9660, Rock Ridge, and ECMA 168) have all been developed originally by ad-hoc groups of interested people from various companies in the industry, then have been submitted to established standards organizations (ECMA, ANSI, ISO) for further work there.

The CD-ROM Architecture Working Group is an official Standards working Group under the auspices of the IEEE Computer Society by way of the Standards Committee for Optical Disks and Multimedia Platforms (SCODMP) chaired and sponsored by Dr. Lawrence Welsch, PhD. Mike Rubinfeld is presently the Chair of the working group. They are working in accordance with a Project Authorization Request (PAR) for the development of a CD-ROM architecture profile that hopefully will be made into an international standard. The PAR was approved by the Standards Activity Board (SAB) of the IEEE/CS last June and the Architecture Profile will probably be ready for balloting by August, 1993.

For more information, contact:

Mike Rubinfeld
NIST
Bldg. 225, MS:B266
Gaithersburg, MD 20899
(301) 975-3064

Email: miker@mml.ncsl.nist.gov

==========

32. Are there any ftp sites with good stuff related to CD-ROMs?

A couple of sites with cdrom related stuff are

cdrom.com (192.153.46.254): /pub [This site is maintained by me.]

cs.uwp.edu (131.210.1.4): /pub/cdrom

==========

33. How do I write an MSDOS program that can access a cdrom using MSCDEX?

The MSCDEX interface documentation is available on the Microsoft Programmer's Library CD-ROM. This also has detailed specifications for drivers that talk to MSCDEX. It even provides solutions to a number of sticky problems.

The file mscdex21.zip contains Microsoft's info on how to talk to the CD-ROM extensions (MSCDEX.EXE) and a sample DOS application which is crude but effective in playing audio tracks. This file is available via anonymous ftp from ftp.cica.indiana.edu:/pub/pc/win3/uploads/mscdex21.zip or cdrom.com:/pub/mscdex21.zip.

MSCDEX programming information can be found in INTER31?.ZIP. Ralf Brown's interrupt bible. The information is very complete. The interrupt list is available via anonymous ftp from Simtel20 (wsmr-simtel20.army.mil) or from the mirror site wuarchive.wustl.edu: /mirrors/msdos/info/inter31?.zip.

There is a book by Ray Duncan (Microsoft Press) detailing all extensions to Dos (XMS, LIM EMS, MSCDEX etc..) which should be available in book stores. The title is "MS-DOS EXTENSIONS" ISBN 1-55615-212-4.

FAQs 34-42

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34. How do I mount an ISO-9660 disc on a Sun?

Su to root and run this command,

```
# mount -r -t hsfs /dev/sr0 /cdrom
```

or even better, put the following line in your /etc/fstab

```
/dev/sr0    /cdrom hsfs ro 0 0
```

and then run

```
# mount /cdrom
```

Don Trimmer, of Delta Microsystems, has written a program that allows safe mount/umount operations without requiring super user permissions. You can get his program by anonymous ftp from cdrom.com:/pub/mount.c

==========

35. How do I use a cdrom with OS/2?

What you need to do to make your cdrom drive work under os/2 is:

1) make a bootable msdos floppy disk which is configured so that you can use the cdrom after booting from this floppy.

2) copy the files fsaccess.sys and fsfilter.sys onto the floppy and then add DEVICE= statements to the CONFIG.SYS for the floppy.

3) copy the floppy disk to the os/2 hard disk using the VDISK command.

4) create an icon with the "boot from drive" option set to the name of the file created by the VDISK command.

5) Click on the icon.

OS/2 has builtin support for IBM drives, and for SCSI third party drives. The Sony CDU 541 works well.

What you need to do if you don't have one of the supported drives, is use the OS/2 command VMDISK to create a bootable "diskette image" on your hard disk. On the diskette image file, you will copy a CONFIG.SYS file, an AUTOEXEC.BAT, and the drivers you require for your CDROM. This feature allows you use any driver with OS/2. The down side is that you can't access the device in the image box from any OS/2 window. You have to use the bootable image box to copy files back and forth between the image box and any other. If you have one of the supported drives, you can access it from any box.

The VMDISK technique is only needed for unsupported, mainly non-SCSI drives. Some unsupported SCSI drives, such as the NEC CDR-84, work fine with OS/2

The only thing to do in order to make some unsupported SCSI CD-ROM drives work (as a data CD-ROM, MM is another problem) is to patch the vendor ID string into .SYS. Simply replace "TOSHIBA " by "NEC ", etc. i.e. with blank-padding to eight characters. This is known to work with NEC and SONY drives. It does not work with some Matsushita (Panasonic) drives.

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36. Which CD-ROM Drives will work with MicroSoft Windows-NT?

The Microsoft(R) Windows NT(TM) operating system is designed to support a broad range of hardware. This is a preliminary list of hardware that we have run Windows NT on to date. This is a subset of the hardware we expect to support in the final product.

The following hardware has undergone preliminary testing for this release. We have not tested every machine and/or device in all possible configurations. Microsoft makes no warranties express or implied in this document.

disk controllers:
- 100% Register Compatible with WD1003 - ESDI, IDE, WD1003
- Compaq Intelligent Drive Array
- SCSI(R)
- Adaptec AHA-1540b, AHA-1542b, AHA-1640, AHA-1740
- Future Domain TMC-845, TMC-850, TMC-850M(ER), MCS-700 (7), TMC-1660 (7) TMC-1680 (7), TMC-7000EX
- IBM SCSI Host Adapter (10)
- Maynard 16 Bit SCSI Adapter (11)
- NCR 53C700
- Olivetti ESC - 1 Adapter
- Built-in SCSI on MIPS ARC/R4000 systems from : Acer, MIPS and Olivetti

CD-ROM devices:
- CD Technology CD Porta-Drive T-3301
- Chinon CDX-431
- Denon(R) DRD 253
- Hitachi(R) CDR-1750S
- NEC Intersect CDR-73(M), Intersect CDR-84
- Pioneer(R) DRM-600
- Sony(R) CDU-541, CDU-6211, CDU-7211
- Toshiba XM-3201, TXM-3301

(7) A driver that supports both Setup and File I/O for the Future Domain MCS-700, and TMC-16X0 series controllers will be posted to CompuServe in the WINNT forum, Lib 2 "Fixes and Updates".

(10) Earlier versions of this controller have proven to have problems with various CD-Rom drives. The Chinon CDX-431 and NEC Intersect CDR-73 are known to work with this version of controller.

(11) The Maynard SCSI Adapter can be used as a general purpose SCSI controller for all tasks but graphical setup.

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37. How do I read an audio cd track as digital data?

Most CD-ROM drives cannot decode audio information. There are firmware and data path reasons why it doesn't work. The drive vendors could make drives that allow this feature.

There are only a few drives with the capability to read audio tracks as data: The AppleCD 300, the Sony CDU-561 and the CD-ROM drive sold by Silicon Graphics for use with their Indigo workstation. The SGI drive is a modified Toshiba 3301B.

For the Toshiba drives, you issue a MODE SELECT command with density code 0x82 and then all read's with an lba inside a digital audio track will return 2352 bytes audio samples / block.

Both Sony and Toshiba may support reading audio (red book) CD's on their next generation drives (the dual speed ones), at least, as an option.

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38. Why do CD-ROMs cost so much?

Here are several answers, take your pick:

A. Because too many people are willing to pay the high prices.

B. They are not really very expensive when you consider how much data they contain. Even the most expensive CD-ROMs are often cheaper than the least expensive floppies when you figure the cost per byte.

C. Because there isn't enough competition. The prices will come down when more people buy drives, and more CD-ROM titles are available.

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39. Why do all the bundle deals require me to buy a drive? What if I already have a drive?

Many disc producers sell outdated or surplus discs at steep discounts to be bundled with new drives. The theory is that the new drive owner will find the discs useful, and order the latest version at full price.

There are some bundle deals that do not require you to buy a new drive. For instance, the CD-ROM User's Group (see above) has a bundle of ten discs for $99.

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40. Are alt.cd-rom archives available anywhere?

I don't know if there is an ftp site anywhere that archives alt.cd-rom, but you can retrieve old articles via email:

For a list of files available, send the message

INDEX CDROM-L
as the first line of your e-mail message to:
LISTSERV@UCCVMA.BITNET
or the Internet form of address:
LISTSERV@UCCVMA.UCOP.EDU

To retrieve an archived message, send the e-mail message
GET CDROM-L LOGyymm
or SENDME CDROM-L LOGyymm as above
where yymm is the year and month of the archive wanted.
e.g. LOG9110 = Log of October 91 messages.

==========

41. What is the shelf-life of a CD-ROM?

If a CD-ROM is not manufactured properly, the lifetime can be very short, perhaps only a few years. This can happen if the edge of the disc is not properly sealed, and oxygen reaches the metal surface.

If the disc is manufactured properly, it will last a very long time. Most CD-ROMs should last for more than a human lifetime.

Philips has proposed new standards for testing CD-ROMs that are expected to result in discs that will enjoy a life span of more than a thousand years. For more information see Fox, Barry "CD Makers Perform in Unison to Stop the Rot" New Scientist 134(1815) (April 4, 1992):19.

The laser used in a CD-ROM drive is very low power, and does not harm the disc in any way. Reading the disc will not shorten the lifetime.

==========

42. How should I handle my CD-ROMs? How do I clean them?

The following guidelines represent the current thinking for the care and handling of CD-ROM discs, by a number of CD-ROM disc and drive manufacturers. The validity and usefulness of most of these guidelines have not been substantiated by government testing and therefore are presented for information only.

Wash your hands before contact with the disc. If available, wear lint-free cloth gloves, finger cots, or talc-free latex gloves.

If you must wipe the disc, do so with a soft, dry, lint-free cloth in a radial motion- that is from the inner to the outer hub- not in a circular motion around the disc like you might do for a phonograph record. The most devastating scratches are those which occur along a circular arc of the disc which can obscure a long stream of pits.

Certain cleaning agents and solvents can damage the discs. Some of these include: gasoline, paint thinners, benzine, acetone, carbon tetrachloride, chlorinated cleaning solvents, ammonia, and household detergents which contain ammonia. Do not clean with a water soaked

cloth. The use of Isopropyl alcohol, the ingredient in many commercial CD cleaning products, as well as certain waxes and acrylic liquids, is still questionable.

Do not clean the label side of the disc.

Use of a CD-ROM caddy is highly recommended during transport and operation. Limit the amount of physical contact with the disc.

Always handle the disc by the outer edge and/or the inner (hole) edge. Never touch the data surface.

Discs like to "live" in the same conditions that people do; that is:
They don't like to be manhandled
They don't like exposure to temperature extremes
They don't like exposure to excess humidity
They don't like exposure to high intensity UV light

Ron Kushnier, Chairman
Compact Disc- Reliability & Integrity of Media Working Group of
The Special Interest Group on CD-ROM Applications and Technology
Code 5053
Naval Air Warfare Center
Warminster, PA. 18974
(215) 441-1624
FAX (215) 441-7271

Photo CD - FAQs 43-46

(Part of **Frequently asked questions about CD-ROMs**)

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43. Which drives will work with Kodak Photo CD?

According to Kodak, the following drives are compatible. To view more than just the first recorded session, you need a multisession drive. Most of these drives are single session only.

```
Magnavox CDD461    - single session
         CDD462RS  - multi session
Sony CDU-6205      - single session
     CDU-535       - single session
     CDU-561       - multi session
NEC CDR-73         - single session
    CDR-37         - single session
Apple 300CD        - multi session
```

The NEC CDR-74/84 works fine with PhotoCD. Older models that have a firmware revision of 1.0 should be sent back to NEC for a FREE refit, that upgrades the firmware to 1.0a, and may update some other components. NEC should be called at 1-(800)-388-8888 follow the recorded messages to get them to sent the info required for the refit (or hit 6 then 1 to get there instantly). You will get your drive back in 3-4 business days.

The Kodak Information Center is maintaining a file on the compuserve CDROM forum of compatible drives, and it has become quite extensive. They also specify compatible SCSI boards, drivers, and cable configurations. There are also a couple of subtle issues in compatibility that are still being worked out. For example, the NEC drives are single session compatible, but not multi. There are also drives which have been certified as compatible which are not XA, and there is some indication that this makes them useful for pictures alone, but not for mixed media Photo-CD productions in the future.

==========

44. What is a multisession CD drive?

A CD has an "index" area which contains track details; this is what is read when you first stick an audio CD into a player. Photo-CDs have a separate index area each time they are written (because it is impossible to "update" the index area). A multisession drive is one that knows to look for multiple index areas. The full details are contained in the Philips/Sony/Kodak "Orange Book" standard for writable CDs.

==========

45. How does Photo CD work?

In a nut shell, 35mm film (negative, slide, B&W, internegative) is scanned by an image scanner and transfered to XA-formatted CD-ROM discs. These discs are manufactured by burning (writing) -- not by pressing.

Each scanned image on the disc is kept in five resolutions. These five

resolutions are called: Base/16, Base/4, Base, 4Base, and 16Base. As examples, Base/16 is one sixteenth the resolution of the "Base" image, and 16Base is sixteen times the resolution of "Base". (These are not simply larger picture elements. There are in increased number of scan lines.)

The 4Base and 16Base images are are compressed using Huffman encoding. You need the decompression software to pull the higher resolutions out of the image. You would typically need these higher resolutions if you want enlargements or if you intend to use an HDTV as a display device.

==========

46. Where can I get some information about the Kodak Photo CD?

To learn more about Photo CD products or other KODAK desktop color imaging products, contact Eastman Kodak Company at 1-800-242-2424 Ext 51 or 716-724-1021, ext. 53.

Or send inquiries to the following address:

EASTMAN KODAK COMPANY
Kodak Information Center
Dept. E. 343 State Street
Rochester, NY 14650-0811

Information about PhotoCD is available by anonymous ftp from cdrom.com:/pub/photo_cd.

There is an excellent article on PhotoCD in the Sept 92 issue of Photographic Magazine.

Eastman Kodak Co recently released Photo CD Access, which is designed to allow users to integrate CD images into any Windows or Macintosh Application. Requires a CD ROM XA (Extended Architecture) drive. Most popular image formats are supported, including TIFF, GIF, TARGA and PICT. Kodak sells the software directly. $39.95, 1-800-242-2424.

A developer's kit is available for $695 and includes source code as well as object for PC/MAC.

Dick Phillip's Photo-CD application for NeXTs is now loaded in the pub/next/submissions directory at sonata.cc.purdue.edu. The following files are available:

```
pCD.README
pCD.tar.Z.TAKEME                application
README.pCD
photo_cd.tar.Z                  test data - simulated photo-CD
photo_cd.tar.Z.README
```

The maximum resolution is 3072 X 2048, 24 bit color.

FAQs 47-54

(Part of **Frequently asked questions about CD-ROMs**)

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47. Where can I get maps of the US on CD-ROM?

The USGS is producing a series of cds that contain 1:100,000 scale digital line graph (DLG) data. Presently, only Florida is available. Also, 1:2,000,000 DLG cd is available for the US. Call 1-800-USA-MAPS for more info.

You can also get topo data (with AVHRR coverage) on CD-ROM for $32. This is DEM (30" elevation data) for the whole US. Contact: EROS Data Center, Sioux Falls, SD 605-594-6507, or 6511

The Digital Chart of the World (DCW), produced by your Defense Mapping Agency, is generally acknowledged to be the best data set providing world-wide coverage. It is at a scale of about 1:1 000 000, and it is unlikely that you will find data at a larger scale for much of the world. At $200.00 for the set of 4 CD-ROMs and viewing data, it is considered to be a steal by most professional users, though it might be a bit of an overkill for domestic use. You can obtain it from:

U S Geological Survey
Distribution Center
Building 810
Box 25286
Denver, CO 80225

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48. How do I put a CD-ROM Drive on a Novell network?

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1. SCSI Express. SCSI drives only, NLM only.

2. OptiNet by OnLine in Germantown, MD. Both NLM and separate CD-Server. Any type of drive supported. Up to 128 drives per server.

3. CD-Net by Meridian in Colorado. Software only version of the Meridian CD-Server. Used to be limited to 21 drives, but may have been upgraded. Not sure if NLM version is currently available.

Also, CBIS has a hardware/software solution that supports up to 21 drives per server. No NLM.

All the packages run about $700 for 8 users or less.

[If anyone has used any of these products, and would like to recommend yes or no, please let me know.]

Corel sell a SCSI driver package that include NLM's to put worm drives,CD-Roms etc on a 3.1+ server. The package also includes dos drivers for just about every device you would want to connect to SCSI.

Only costs about $70.

==========

49. Are any CD-ROM Jukeboxes available?

There is a Pioneer DRM600 CD-ROM jukebox. It will hold 6 CD's in a cartridge, costs around $900-$1000, but has a slow drive. Pioneer also has a new drive coming out in December that is the same 6-CD changer, but with a 340ms, 600K/Sec drive in it. That will be more like $1400.

It is available from:

Kintronics Computer Products
3 Westchester Plaza
Elmsford, NY 10523
914-347-2530 or 800-431-1658 attention Neal Allen

It is also distributed by Peripheral Solution, in Santa Cruz, 408-425-8280

A jukebox that handles 240 discs is available from

Kubik Technologies Ltd.
200-3900 Viking Way
Richmond, BC V6V 1V7
604-273-0400

There is a German firm called NSM that sells CD-jukeboxes for bars, etc. They have their fast 100-disk changer also available for consumer purposes and a CD-ROM version. In Holland it is sold by:

LaserMusic Nederland
Leeuwenstein 44
2627 AM Delft, the Netherlands.

The Lotus CD/Networker can have up to 28 CD-ROM drives installed in it. Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142.

Todd Enterprises has a box that can have up to 64 CD-ROM drives mounted.

Another jukebox is available from Microboards (MBi of America), 308 Broadway, PO Box 130, Carver MN 55315, 612/448-9800, 612/448-9806 (fax), contact Kathleen Davies

==========

50. Can I speed up my CD-ROM by using a cache?

There are several programs that cache information from the CD-ROM onto your hard disk. Since magnetic discs are often more than 10 times faster than a CD-ROM, this can result in dramatic improvements under some circumstances.

Most of the programs cache the directory information, so you can traverse subdirectories quickly. They also cache the most recently accessed blocks of data. So if you use the same files over and over, or access the same records in a database, your CD-ROM will seem much faster. But when you

access the information for the first time, it will be just as slow as ever.

SpeedCache+ from Future Systems has been recommended as a pretty good caching program.

Future Systems, Inc
0420 South 500 East
Bluffton, IN 46714
(219) 824-4963

On the Macintosh a prescanning (Directory, file atrributes, icons, etc) cache to accelerate the Mac with CD-ROMs exists from two companies SpeedyCD 1.22 and FWB CD-ROM ToolKit 1.0. FWB seems much faster than SpeedyCD and can prescan any type of CD-ROM volumes (ProDos, Mac HFS, MS DOS, ISO9660, PhotoCD etc.) It prescans in the background.

==========

51. Do you have any info about the CD-ROM filesystems for Amigas?

The following information is taken from the Winter '93 "AC's Guide to the Commodre Amiga" (pages 112, 253, 262, 149)

AsimCDFS
This CD_ROM FIleSystem allows an Amiga/CDTV to access any ISO9660, **High Sierra**, or Mac HFS formatted disc. CDTV discs also accessible. Comes with FishMarket, a disc containing Fred Fish disks 1-637, and AsimTunes, an intuition-based AudioCD controller program with ARexx capability. Includes a manual and a painless install procedure. Supports a number of CD-ROM drives. Requires SCSI controller compatible with Commodore SCSI-Direct Standard. For 68000,010,020, 030,040 processors. Minimum 512K, more recommended for buffering. AmigaDOS 1.3/2.0 compatible. $79.00
Asimware Innovations, 101 Country Club Dr,
Hamilton, Ontario L8K 5W4, Canada, (416) 578-4916 FAX(416) 578-3966

CDx Disk Set
All software needed to attach a SCSI CD-ROM drive to most popular SCSI controllers, plus a printed manual and two CD-ROM discs (Fish & More Vols. I and II). Software consists of: CDxFileSystem for access to ISO 9660, **High Sierra**, and Mac HFS discs, CDTV emulation software to run most CDTV titles (1MB chip RAM recommended), audio CD player software, an assembly/C/Arexx-compatible device for developers, and more. NTSC/PAL compatible, Requires SCSI controller, SCSI CD-ROM drive. AmigaDOS 2.0 compatible. $50.00
Xetec, Inc., 2804 Arnold Road, Salina, KS 67401,
(913) 827-0685, FAX(913) 827-6023

CDROM-FS
CDROM-FS version 702 enables Amiga owners to connect most SCSI CD ROM drives to an Amiga with a SCSI interface. This software provides support for industry standard ISO 9660/**High Sierra** format CD ROM discs. It comes with clear concise instructions, making it easy to install and use.

Requires A590, A2091, A3000, Microbotics Hardframe or GVP. $49.95.
Canadian Prototype Replicas, P.O. Box 8, Breslau,
Ontario, Canada N0B 1M0, (519) 884-4412

==========

52. What are the most popular CD-ROMs?

Here are the hottest-selling CD-ROM titles in the USA in October, according to PC Research. This is a good indication what Christmas sales were like.

10.	CD Game Pack	Software Toolworks
9.	Where in the World is Carmen Sandiego	Broderbund
8.	Murmurs of the Earth	Warner New Media
7.	King's Quest V	Sierra On-Line
6.	**Street Atlas USA**	Delorme
5.	World View	Brittanica
4.	Sherlock Holmes, Detective	Icom
3.	Wing Commander / Secret Missions I & II	Origin
2.	Cinemania	Microsoft
1.	Battle Chess Enhanced CD-ROM	Interplay

==========

53. What are some good references to CD-ROM reviews?

Drive reviews:

"PC-Computing" December 1992
"Macworld", October 1992
"PC-Computing", October 1992
"Computer Shopper", October 1992

CD-ROM LAN Server reviews:

"LAN Times", January 11, 1993
"PC Magazine", December 31, 1991

Jan Schwenk, the president and CEO of Resource International, runs a BBS containing many CD-ROM reviews. The number is (817)-582-0672 at 8N1. Admission is free.

==========

54. How do I put a CD-ROM Drive on a Ethernet by using a unix system (e.g. a SUN) as a server and PCs as clients.

[??? answer was missing in the original file - NGR]

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There's a new device-driver which allows Philips CM205 user to read single-session Photo-CDs.

The device-driver is not a replacement for the original driver but a supplemental to support Photo-CDs. It works between MSCDEX and the DD250.SYS and gives MSCDEX the correct picture or CD-ROM data according to the disc inserted in the drive. Version 1.0 of the driver will be able to distinguish between normal CD-ROMS and Photo-CDs automatically so you can use the drive without any changes in handling.

Installation:

```
CONFIG.SYS:

Line 1:    DEVICE=C:.SYS /D:MSCD001                 <-- Original driver
Line 2:    DEVICE=C:SS.SYS /L:MSCD001 /M:PHOTO$CD   <-- New driver
```

The /L: driver name is NOT for replacement but for communication with the old driver and therefore both driver names must be the same! It's important that the old driver comes BEFORE the new driver in the CONFIG.SYS.The /M: name is for MSCDEX to communicate with the CM205SS.SYS.

```
AUTOEXEC.BAT:

                  C:.EXE /D:PHOTO$CD /L:K /M:12

Driver chain:

                        MSCDEX.EXE
                             3
                             3   driver name: PHOTO$CD
                             3
                        CM205SS.SYS
                             3
                             3   driver name: MSCD001
                             3
                        DD250.SYS
```

The CM205SS.SYS is compatible with Kodak's Access Software and Virtual Bookmaker's PCD Access. It's also possible to use Photo-CDs and normal CD-ROMs under Windows.

The size of the driver is 36KB and it can be loaded in Upper-Memory.

Version 1.0 will be available by December, 2nd 1992. The price will be about $30.

At the beginning of the next year there will probably be a Firmware-Upgrade for reading multi-session Photo-CDs with the CM205.


```
More infos:
                totronik
                Torsten Droste
                Hauptstaetterstr. 35   D-7000 Stuttgart 1  Germany
                Tel: 0711-244272       Fax: 0711-6406815
```

CIS: 100064,1346 Fido: 2:244/40.17

CONTENTS.DOC **Microsoft Programmer's Library** March 1991
Volume #2 Issue #1

Programmer's Library is a comprehensive collection of the most useful reference information available for programmers in Microsoft Windows, MS-DOS and Microsoft OS/2 environments.

With Programmer's Library you can instantly get authoritative information about programming from books, manuals, and sample code in these categories:

- Microsoft Windows application development
- Microsoft OS/2 application development
- MS-DOS application development
- Networks (Microsoft LAN Manager & Microsoft SQL Server)
- Microsoft Systems Journal
- Hardware (Microsoft Mouse, CD-ROM Extensions, LIM, Intel CPU's)
- Microsoft C and Microsoft Quick-C
- Microsoft Macro Assembler and Microsoft QuickAssembler
- Microsoft BASIC and Microsoft QuickBASIC
- Microsoft Pascal and Microsoft QuickPascal
- Microsoft FORTRAN

PROGRAMMER'S LIBRARY REFERENCES

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* - Indicates new updated material since Programmer's Library, v1.2a
+ - Indicates material editorially revised since Programmer's Library, v1.2a

Windows References

References from the Microsoft Windows Software Development Kit, version 3.0:

+Microsoft Windows Software Development Kit Guide to Programming
+Microsoft Windows Software Development Kit Installation & Update Guide
+Microsoft Windows Software Development Kit Programmer's Reference, Volume 1
+Microsoft Windows Software Development Kit Programmer's Reference, Volume 2
+Microsoft Windows Software Development Kit Tools
*Microsoft Windows Articles
- Microsoft Product Support Top 20 Questions & Answers
- Object Linking & Embedding Specification
- Documentation on Windows Libraries for OS/2

References from the Microsoft Windows Device Driver Kit, version 3.0:

+Microsoft Windows Device Driver Kit Install & Update Guide
+Microsoft Windows Device Driver Kit Adaptation Guide

+Microsoft Windows Device Driver Kit Virtual Device Adaptation Guide
+Microsoft Windows Device Driver Kit Printer & Font Kit
*Programming Windows, by Charles Petzold (New Edition)
Selected Windows Sample Code
Microsoft Product Support KnowledgeBase for Windows application development issues

[Windows is a Registered Trademark of Microsoft Corporation].

OS/2 References

References from the Microsoft OS/2 Presentation Manager Tool Kit, version 1.2.1:

Microsoft OS/2 Getting Started
Microsoft OS/2 Learning Guide
Microsoft OS/2 User's Guide
Microsoft OS/2 Desktop Reference
Microsoft OS/2 Programmer's Reference, Volume 1
Microsoft OS/2 Programmer's Reference, Volume 2
Microsoft OS/2 Programmer's Reference, Volume 3
Microsoft OS/2 Programmer's Reference, Volume 4
Microsoft OS/2 Device Driver Reference

Inside OS/2, by Gordon Letwin
Programming the OS/2 Presentation Manager, by Charles Petzold
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Microsoft LAN Manager, Version 2.0 References:

+Microsoft LAN Manager Installation Guide
+Microsoft LAN Manager User's Guide for OS/2
+Microsoft LAN Manager User's Guide for MS-DOS
+Microsoft LAN Manager Administrator's Guide
+Microsoft LAN Manager Administrator's Reference
+Microsoft LAN Manager Programmer's Reference
+Microsoft LAN Manager Network Device Driver Guide

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+Microsoft SQL Server Installation Guide
+Microsoft SQL Server Learning TRANSACT-SQL
+Microsoft SQL Server Language Reference
+Microsoft SQL Server Programmer's Reference
+Microsoft SQL Server System Administrator's Guide

MS-DOS References

MS-DOS 4.0 Programmer's Reference
MS-DOS 3.3 Programmer's Reference

The MS-DOS Encyclopedia
Advanced MS-DOS Programming, by Ray Duncan
The New Peter Norton Programmer's Guide to the IBM PC & PS/2,
by Peter Norton and Richard Wilton
Selected MS-DOS Sample Code

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*Microsoft Systems Journal Volume #6 (Issue #1)
*Microsoft Systems Journal Volume #5 (Issues 4-6 Added)
+Microsoft Systems Journal Volume #4
Microsoft Systems Journal Volume #3
Microsoft Systems Journal Volume #2
Microsoft Systems Journal Volume #1
*Microsoft Systems Journal Sample Code

Hardware References
Microsoft Mouse Programmer's Reference
Microsoft CD-ROM Extensions
Programmer's Guide to IBM PC & PS/2 Video Systems
LIM 4.0 Expanded Memory Specification
Intel 386 Programmer's Reference
Intel 387 Programmer's Reference
Intel 286 Programmer's Reference
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+Microsoft C Advanced Programming Techniques
+Microsoft C Installing & Using the P.D.S.
+Microsoft C Reference
+Microsoft C Run-Time Library Reference
*Microsoft C: Developer's Toolkit Reference
References from Microsoft QuickC, version 2.5:
+Microsoft QuickC Tool Kit
+Microsoft QuickC C for Yourself
+Microsoft QuickC Up and Running
+Microsoft QuickC Update
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Microsoft CodeView & Utilities User's Guide
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Microsoft Editor User's Guide
Microsoft OnLine User's Guide
Proficient C, by Augie Hansen
Microsoft QuickC Programming, by The Waite Group
Selected C Language Sample Code
*Microsoft Product Support KnowledgeBase for C-Language Issues

Macro Assembler (MASM) References:
*Microsoft Macro Assembler 6.0
*Installing and Using Microsoft Macro Assembler 6.0

*Microsoft Macro Assembler 6.0 Reference
*Microsoft Macro Assembler 6.0 Programmer's Guide
*Microsoft Macro Assembler 6.0 White Paper
Microsoft QuickAssembler 2.01 Programmer's Guide
Microsoft CodeView & Utilities User's Guide
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Microsoft BASIC Professional Development System, version 7.1:
Microsoft BASIC Programming Guide
Microsoft BASIC Language Reference
Microsoft BASIC Getting Started
Microsoft QuickBASIC, version 4.5:
Learning to Use Microsoft QuickBASIC
Microsoft QuickBASIC Language Reference
Microsoft QuickBASIC Programming in BASIC
Microsoft CodeView & Utilities User's Guide
Microsoft Mixed-Language Programming Guide
Microsoft Editor User's Guide
Microsoft OnLine User's Guide
Microsoft QuickBASIC Programmer's Toolbox, by John Clark Craig
Selected BASIC Sample Code
*Microsoft Product Support KnowledgeBase for BASIC-Language Issues

Pascal Language References
Microsoft Pascal Compiler 4.0
Microsoft PASCAL Compiler 4.0 Update
User's Guide
Reference Manual
Microsoft QuickPASCAL by Example
Microsoft CodeView & Utilities User's Guide
Microsoft Mixed-Language Programming Guide
Microsoft Editor User's Guide
Microsoft OnLine User's Guide
Selected Pascal Sample Code
*Microsoft Product Support KnowledgeBase for Pascal Language issues

FORTRAN Language References
Microsoft FORTRAN Optimizing Compiler 5.0
Microsoft FORTRAN Language Reference
Microsoft FORTRAN Advanced Topics
Microsoft CodeView & Utilities User's Guide
Microsoft Mixed-Language Programming Guide
Microsoft Editor User's Guide
Microsoft OnLine User's Guide
Selected FORTRAN Sample Code

*Microsoft Product Support KnowledgeBase for FORTRAN Language issues

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O T H E R C O N T E N T S

Subdirectory	Contents
BOOKS & MSLIB	Software & Content used by Programmer's Library
DRIVERS	Hardware and other drivers relevant to CD-ROM operation
-MOUSE625	Microsoft Mouse driver: version 6.25 (For users experiencing problems with older mouse drivers when using Programmer's Library) Note: The "current" Mouse version is available with the newest version of the Microsoft mouse from your software retailer.
-SCSI	Misc. SCSI support
-FUTRDOMN	Future Domain's OEM development kit for SCSI drive development. This kit is included as a convenience for Programmer's Library users, and has not been tested by Microsoft in any way.
QH	QuickHelp data bases (for users who want to access help libraries from the CD-ROM disc and save hard disk space).
-BASIC71	Microsoft BASIC version 7.1 (Professional Development System)
-C6	Microsoft C version 6.0 (Professional Development System)
-OS2	OS/2 v1.2.1 Software Development Kit
SAMPCODE	Sample Code Directories ********** NOTE: Sample code is provided for your convenience. While most samples developed by (or in association with) Microsoft have been tested, no warranties are stated or implied regarding the performance, efficiencies or compilability of code under various development environments. Sample programs are not supported by Microsoft Product Support.

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-ADVMSDOS       Sample source code from Advanced MS-DOS Programming,
                   by Ray Duncan

-ADVOS2         Sample source code from Advanced OS/2 Programming,
                   by Ray Duncan

-ALDE_C         Sample source code from the Alde C CD-ROM disc
                 **This code is SHAREWARE, and was not generated
                    by Microsoft**

-AUDIO          Source code used to play CD AUDIO from the
                     CD-ROM drive using the CD-ROM Extensions

-BASIC          Source code from Microsoft BASIC Professional
                     Development System

-C              Sample "C" source code from Microsoft
                 MSC51   Microsoft-C v5.1 Optimizing Compiler
                 MSC60   Microsoft-C v6.0 Prof. Development System
                 OTHER   Misc. Sample Source code from Microsoft

-DOS_ENCY       Sample source code from The MS-DOS Encyclopedia

-FORTRAN        Sample source code from Microsoft FORTRAN Products

-MASM           Sample source code from Microsoft Macro Assembler
                   Products
                 MASM6   Microsoft Macro Assembler v6.0
                 MASM5   Microsoft Macro Assembler v5.1

-MOUSE          Sample source code from the Microsoft Mouse
                   Programmer's Reference

-MSJ            Sample source code from Microsoft Systems Journal

-OLE            Sample source code for Object Linking & Embedding

-OS2SDK         Sample source code from the OS/2 Development Kits:
                 OS2SDK10    OS/2 version 1.03
                 OS2SDK11    OS/2 version 1.1
                 OS2SDK12    OS/2 version 1.2

-PASCAL          Sample source code from Microsoft Pascal Products

-PROF_C          Sample source code from Proficient C,
                   by Augie Hansen

-PROGWIN         Sample source code from Programming Windows,
                   by Charles Petzold

-PROG_PM         Sample source code from Programming the OS/2
                   Presentation Manager, by Charles Petzold

-QB              Sample source code from Microsoft QuickBASIC Products
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-QC	Sample source code from Microsoft QuickC Products QC20 QuickC version 2.0 QC25 QuickC version 2.5
-QC_PROG	Sample source code from Microsoft QuickC Programming, by the Waite Group
-VIDEO	Sample source code from The Programmer's Guide to IBM PC & PS/2 Video Systems, by Richard Wilton
-WIN_LRN	Sample source code from Microsoft Product Support illustrating Windows Programming techniques
-WIN_SDK	Sample source code from the Windows 3.0 SDK

DAK Introduces $199 BSR External CD-ROM Drive

CANOGA PARK, Calif.-- DAK Industries today announced a new BSR front-loading caddyless CD-ROM drive retailing for $199. DAK's price includes interface card, interface cable, software drivers and programmable launchers for both CD-ROM applications and music CDs.

The BSR caddyless CD-ROM drive features 150K bytes/second average transfer rate, motorized disc tray, headphone jack with volume control, power lamp, busy lamp, tray open/close button, stereo line output jacks and AC power switch.

"I think the CD-ROM is the most significant computer innovation since the invention of the microchip. I've finally found an industrial-quality CD-ROM drive reliable enough to be in the DAK catalog", said Drew Kaplan, President of DAK Industries. "And with DAK's lowest-in-the-industry price of $199, now all computer users can tap into the power of CD-ROM."

Customers who order the BSR caddyless CD-ROM drive can also order a special bundle of three CD-ROM applications (a $537 retail value) for $49.90. The applications include 1991 Microsoft Bookshelf, The Family Doctor and Battle Chess.

BSR CD-ROM owners are entitled to other collections, including:

Collection #1 for $299 (a $1005 retail value) - Toolworks Illustrated Encyclopedia, Library of the future, Toolworks Reference Library, Monarch Notes, U.S. Atlas and World Atlas.

Collection #2 for $149 (a $1,548 retail value) - Microsoft Small Business Consultant with Stat Pack, Magazine Rack, U.S. History on CD-ROM, The Bible Library, and Time Compact Almanac.

Collection #3 for $129.90 (a $277 retail value) - National Geographic's Mammals Multimedia Encyclopedia, Audubon's Multimedia Birds of America and Audubon's Multimedia Mammals.

Of the optional bundles, Kaplan said, "When you order a CD-ROM drive from DAK you're entitled to order any or all of DAK's Bonus CD-ROM collections and get as many as 17 top-rated programs for pennies on the dollar. And that's just the beginning. I've got 25 more programs I'll be offering in the near future. That separates DAK from any other hardware supplier."

The BSR caddyless CD-ROM drive includes free, unlimited toll- free technical support plus DAK's exclusive "non-computereze" step-by-step instruction manuals.

DAK Industries markets state-of-the-art computers, software, audio and other electronic products. Customers may receive detailed information in a free catalog by calling 1-800-325-0800 or writing to DAK Industries, 8200 Remmet Ave, Canoga Park, CA 91304.

MEDIA CONTACT: DAK Industries, Inc., Canoga Park, CA
Bryan Eggers, 818/716-6219

See also: Mitsumi discussion

OPTICAL GLOSSARY FOR INFORMATION USERS

VLS Inc.
310 S. Reynolds Rd.
Toledo, Ohio 43615

Access software: See Search and retrieval software.

Access time: The time span from search command to display of optical text on the screen.

Analog: An infinitely variable characteristic or signal such as time, temperature, or movie video, as opposed to a discretely variable digital characteristic or signal such as a pulse, digitized image, or animated video.

Application software: Software programs designed to perform specific tasks such as search and retrieval of optical text, database management, or word processing.

Baud: The number of bits per second transmitted over a communications connection. As an example, at 1200 Baud data is transmitted at the rate of 150 typed characters per second. See Bit and Byte.

Bibliographic database: A collection of bibliographic material in the form of bibliographic references to original books, articles, or other literature.

Bit: Binary digit. The smallest unit of compuer data, represented by 1 (on) or 0 (off). See Baud and Byte.

Boolean operators: These AND, OR, and AND NOT connectors comprise a class of key word search commands enabling one to search for combinations or exclusions of certain specified words or phrases. They are used by more experienced searchers to achieve a higher degree of search selectivity.

Byte: A sequence of bits generally eight bits long. One byte represents one typed character. See Baud and Bit.

CAV: Constant Angular Velocity. On CAV discs, data is recorded on concentric tracks. This format is used to store analog signals (movies) on 12" videodiscs.

CD (Compact Disc): This is the standard 12cm (4.72") plastic disc created by Philips and Sony to store digital information in microscopic pits which can be read by a laser beam. This disc, originally designed to store high fidelity music (standardized as the Red Book Standard), is now also becoming widely used to store optical text (CD-ROM) in the new field of electronic publishing.

CD-I (Compact Disc-Interactive): This is a standard compact disc containing prerecorded digital video, audio, and optical text data. Also known as the Green Book Standard. The data cannot be erased or modified. This type of disc is expected to be used extensively in home consumer applications when it becomes available in 1988. Standards have been established by Philips and Sony so that CD-I players will also play CD-ROM discs as well as CD-I discs.

CD-ROM (Compact Disc-Read Only Memory): This is the same disc as the audio compact disc except that it contains optical information instead of audio information. Also known as the Yellow Book Standard. Extremely large volumes of up to 552 megabytes of optical text are compressed onto small compact discs which can be machine searched to instantly locate and retrieve any desired information upon demand. "Read Only Memory" means that the

recorded data cannot be erased or altered. This format is ideally suited for storage/access of large reference information databases.

CD-ROM disc player: A standard type of laser disc player used to play CD-ROM discs. It is connected to a personal computer by a controller card attached to an expansion slot in the computer. Disc player mechanicals are of the low load type and virtually maintenance-free. Discs do not become worn because the player reading mechanism does not make contact with the discs.

CD-ROM operating system: See Disk operating system.

Circuit board: See Controller card.

CLV: Constant Linear Velocity. On CLV discs, data is recorded on one long spiral track. This format is used to store digital optical text on CD-ROM discs, on a spiral track approximately three miles long .

Compression: This refers to techniques used to store information in less than the normal amount of space, generally by removing redundancy of characters, spaces and gaps. This is becoming increasingly important in CD-ROM publishing because of the enormous amounts of memory required to store digitized images. All compressed information must be expanded by a reverse operation called decompression.

Controller card (circuit board): An interface device connecting a CD-ROM player to one of the expansion slots in a personal computer. It controls the flow of information between the computer and the disc player. Controller cards are normally provided along with the CD-ROM players.

Data preparation: This is the first stage in the production of CD-ROM discs. It includes converting the data into machine readable format, building the files and file directories, and transferring the data to magnetic tape. This is then followed by pre-mastering to master tape, mastering to master CD-ROM disc, and disc replication.

Database: A relatively large and complete collection of stored, machine readable information of the same information category.

Database management system: A software program designed to create and to organize a database, to store information to the database, and to retrieve information from the database.

Device driver: A small software program needed for a computer to communicate with any external device such as a CD-ROM player or printer. This is normally supplied on a floppy diskette along with the CD-ROM player, and may also be incorporated into the software supplied along with some types of CD-ROM disc products.

Digital: A discretely variable signal or characteristic such as a pulse, digitized image, or animated video, as opposed to an infinitely variable analog signal or characteristic such as time, temperature, or movie video.

Digitizer: A device used to transform two dimensional textual or graphic information into digital format. See Scanner.

Digitizing: The process of transforming two dimensional textual or graphic information into digital format. See Scanner.

Disc drive: Another name for disc player (see CD-ROM disc player).

Disk drive: A computer device used to read from, and write to, floppy diskettes and hard disks.

Disk operating system (DOS): A software program that instructs a computer how to transfer information to and from peripheral input/output devices. MS-DOS, the predominant standard personal computer operating system, must be extended or amplified to operate as a CD-ROM operating system. CD-ROM operating systems include TMS's LaserDOS, Microsoft's MS-DOS with CD-ROM extensions, Digital Equipment Corp.'s Uni-File, and Reference Technology's STA/File. The trend is toward CD-ROM operating systems which are compatible with the proposed High Sierra Group CD-ROM standards.

Electronic publishing: The storage and distribution of information in a machine readable electronic format made accessible to users for viewing on screen, printing, or down loading to storage. The major forms of electronic publishing now include CD-ROM discs and online information services. Several other electronic publishing media, such as videotext (transmission via television programming to TV sets), have not yet become commercially successful. Future electronic publishing media may include new developments such as transmission via satellite to mass storage devices. Erasable: In the production of CD-ROM, audio CD, and CD-I discs, lasers physically burn small pits into the discs to represent bits of data. The data is then read by lasers scanning the track and identifying the pits. This procedure produces a permanent record which cannot be erased or altered. Several companies are working on erasable products but none are yet commercially available.

Error correction: During CD-ROM premastering, an error correction code is added to each physical block of data (2048 bytes) to ensure detection of any erroneous data.

Expansion slots: Slot-like openings in a personal computer into which controller cards (circuit boards), such as CD-ROM disc player controller cards, can be plugged to add functions to the original equipment. For example, the IBM PC/XT/AT and compatibles contain both long slots for 13-1/8" long cards (Philips CD-ROM players) and short slots for 4-3/8" long cards (Hitachi CD-ROM players).

Full text database: A database containing the full original text of the subject information.

Gigabyte: 1,000 megabytes.

Graphics: Information which is not character-related, such as maps, charts, graphs, and all photographs and pictorial representations. In order to be storable in a database, graphics must be digitized using a scanner. This produces a series of dots which can be handled by a computer but requires large amounts of storage space unless compressed (see Compression).

Green book standard: See CD-I (Compact Disc-Interactive).

High Sierra Group Standard: This is the informal name of the draft NISO Standard ANS Z39.60-198X, "Proposed American National Standard for Information Sciences--Volume and File Structure of CDROM for Information Interchange" (see NISO). The trend is definitely toward CD-ROM products which are compatible with this standard. Detailed background information on this draft standard, including its full text, is publicly available on the VLS, Inc. CD-ROM Information Board 419-536-5967, 300/1200 baud, 8-N-1 protocol.

Index: The indexing of a CD-ROM disc is similar to that of a printed book except in degree. The subject index at the rear of many printed reference texts includes the primary locations

of the more important book subjects. A CD-ROM disc, by comparison, contains indexes which locate each and every word appearing on the disc (excepting only "noise" words such as "the", "an", "to", etc.).

Interactive media: An information storage/access format, such as the CD-ROM format, capable of delivering user-requested information in a sequence specified by the user. This represents a significant advancement over the linear format which delivers information in only one sequence starting at the beginning and continuing to the end, such as audio tape cassettes or records.

Interface: A link between two systems, such as the controller card connecting a CD-ROM player to a personal computer (see Controller card).

Jukebox: A disc playing system, similar to the well known record jukebox, that can hold more than one disc for access one at a time. Prototype models now exist and commercial models are expected to appear soon. This is one of the two most likely types of multiple disc CD-ROM player systems expected to predominate in university and public libraries. The other is the multi-player system (see Multi-player).

Keyword: Any word in an electronic database which is indexed to allow its location(s) in the database to be identified on-screen at the user's command. On CD-ROM discs, more than 99 percent of all words are keywords.

Keyword combination: A selective combination of keywords located by advanced keyword searching techniques. See Boolean operators and Proximity connectors.

Keyword searching: The process of electronically searching a database on a CD- ROM or other optical disc or online information service for all locations of any specified keywords or keyword combinations within the database.

Laser (Light amplification by stimulated emission of radar): A device which processes a beam of light through a special crystal so as to produce an extremely narrow coherent beam of vastly increased power. Stronger level laser beams are used to record information onto CD-ROM discs by burning microscopic pits into the surfaces of the discs. Weaker level laser beams are then used to read the discs.

Laser card: A plastic card about the size of a credit card containing 2-10 megabytes of non-erasable machine readable information.

Machine readable information: This is digital information electronically stored in a computer or mass storage device which can be key word searched and manipulated by means of appropriate software programs.

Mass storage device: A device which can hold vast amounts of machine readable information for electronic access upon demand, such as a CD-ROM disc.

Mastering: The process of producing an original recording on tape or disc. The stages in producing CD-ROM discs consist of data preparation, pre-mastering to master tape, mastering to master CD-ROM disc, and disc replication.

Megabyte: A term for 1,048,576 characters of information, or approximately one million bytes. The storage capacity of a CD-ROM disc is 552 megabytes.

MS-DOS: A disk operating system distributed by MicroSoft (see Disk operating system).

Multi-player: A disc playing system consisting of an eight (the most popular number) CD-ROM player unit assembly which can be connected to and controlled by a single personal computer. The user can choose to access any or all of the eight CD-ROM discs at the same time. The first models are now commercially available. This is one of the two most likely types of multiple disc CD-ROM player systems expected to predominate in university and public libraries. The other is the jukebox system (see Jukebox).

NISO: Establishes U.S. national standards for libraries, information sciences, and publishing, including CD-ROM (see **High Sierra Group** Standard). National Information Standards Organization, National Bureau of Standards, Gaithersburg, MD., 301-975-2814.

Notepad: This is an electronic work and storage space with word processing capabilities incorporated into certain published CD-ROM discs. This enables one to type in ideas or comments in combination with information extracted from the database to produce letters, reports, or memos for printing or storage.

Operating system: See disk operating system.

OPTEXT(TM): A trade name for the series of legal databases published on CD-ROM discs by VLS, Inc., Toledo, Ohio.

Optical disc: An information storage device which has been recorded using lasers and is read using lasers. This includes both analog video/audio information discs (movies and interactive video) and digital audio/graphics/textual information discs (CD-ROM, CD-I, WORM, Laser cards).

Optical publishing: See electronic publishing.

Optical scanner: See Scanner.

Overhead: The amount of storage space required by the index of a full text database, normally 40-50% of the storage space required for the information contained in the database.

Prefix operator: This is a useful key word searching feature incorporated into certain published CD-ROM discs to locate all words with common beginnings but different endings.

Pre-mastered tape: A magnetic master tape ready for recording on an optical master disc.

Pre-mastering: The process by which information is prepared for mastering on optical discs. This includes formatting the data, inverting the files for indexing, and other technical tasks. The stages in producing CD-ROM discs consist of data preparation, pre-mastering to master tape, mastering to master CD-ROM disc, and disc replication.

Proximity connectors: These W/n, PRE/n, and NOT W/n connectors comprise a class of key word search commands which enable one to search for certain specified words or phrases occurring within/not-within a specified number of words. They are used by more experienced searchers to achieve a higher degree of search selectivity.

Red book standard: See CD (Compact Disc).

Replication: The process of mass producing copies of CD-ROM discs.

Resolution: A measure of the density of dots per unit of area of a digitized image. More dots per unit area means higher resolution and a better picture.

ROM (Read Only Memory): The type of memory or storage device for prerecorded permanent information which cannot be erased or altered.

Scanner: Scans and digitizes two dimensional information consisting of pictures, graphics or text into a stream of bits. Also called optical scanner. Scanners are incorporated into several different types of devices such as WORM drives.

Search and retrieval software: This is a software program enabling one to use the CD-ROM discs supplied by a particular publisher. Most publishers claim their software to be superior and it does not appear likely that one universal standard search and retrieval software program will evolve. This is not a serious problem, however, inasmuch as all CD-ROM discs produced in accordance with the proposed **High Sierra** Standard can be played on the same standard disc players controlled by the same computers.

Search hit: The product of a successful keyword search; i.e., each location of the keyword or keyword combination retrieved and displayed on the screen.

Sideways search: This is a useful key word searching feature incorporated into certain published CD-ROM discs. The user can initiate a secondary, or "sideways", search from within the text of the database and return to the same point when sideways searching has been completed.

Video disc: This is a 12 inch diameter laser disc used for years for recording analog video and audio, mostly movies. This disc is now being used successfully for interactive video, primarily for training and educational purposes. This disc is also now being used to a limited extent for recording digital information in both the 8 inch and 12 inch diameter sizes.

WORM (Write Once Read Many): This is a laser disc system for custom database creation. The user begins with a blank disc and scans or writes in any information desired, such as employee medical records, etc. This system uses a 5.25 inch diameter disc and a different disc player and so is not compatible with CD-ROM. WORM systems are now commercially available.

Yellow book standard: See CD-ROM.

This document (HIGHSI.SPC, HIGHS2.SPC, HIGHS3.SPC, HIGHS4.SPC) was provided in machine readable form by:

VLS Inc.
310 S. Reynolds Rd.
Toledo, Ohio 43615

Preamble

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Scope and Field of Application
Conformance
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Definitions
Notation

SECTION II: REQUIREMENTS FOR THE MEDIUM
Volume Structure
Directory Structure
File Structure
Record Structure
Recording of Descriptor Fields
Volume Descriptors
File and Directory Descriptors
Levels of Interchange

SECTION III: SYSTEM REQUIREMENTS
Requirements for the Description of Systems
Requirements for an Originating System
Requirements for a Receiving System

Appendix A: **STANDARD ECMA-6**

(Part of **High Sierra**

NOTE: This document is over a year old. A final version of it is expected in May or June of 1988. As soon as it is available we will place a copy on line. The data layouts in this document are close to, but not exactly the same as those in the final version (which are the same as the layouts in ISO/9660). Please contact the National Information Standards Organization if exact data layouts are required at this time.

ANS Z39.60-198X

Proposed American National Standard for Information Sciences-- Volume and File Structure of CDROM for Information Interchange

Draft Circulated for ballot to the Voting Members of the National Information Standards Organization and to other Interested Parties for comment
January 2, 1987 - March 6, 1987

Developed by the National Information Standards Organization

ABSTRACT

This standard specifies the volume and file structure of compact read only optical disks for the interchange of information between users of information processing systems. The standard specifies: the attributes of the volume and the descriptors recorded on it; the relationship among volumes of a volume set; the placement of files; the attributes of the files; record structures intended for use in the input or output data streams of an application program; three nested levels of interchange; requirements for the processes which are provided within information processing systems to enable information to be interchanged between different systems.

M E M O R A N D U M

TO: NISO Voting Members
NISO Information Members
Observers to NISO Standards Committee EE
Other Interested Parties

FROM: Martin Hensel, Chairperson
Standards Committee EE Compact Disk Data Format

DATE: January 2, 1987

RE: Request for your comments and ballot on proposed standard for CDROM Volume and File Structure

NISO needs your comments to complete its work on establishing a format standard for compact disk publishing.

There has been great interest in establishing these standards because widespread use of compact disks for publishing depends upon our success.

This proposal is compatible with both CDROM and CDI formats. Readers are also advised that in the final version of the U.S. standard all references in the text of the standard to CDROM will be replaced by 'Read Only Optical Media.'

Many organizations and individuals have participated in the development of this document. Notable have been the contributions of computer and peripheral manufacturers, and software companies and services, as well as numerous publishers, library organizations, and consultants. Attached is a list of the committee members who contributed to the development of this proposal. In addition, more than 300 organizations and persons observed the committee's progress.

This proposal has been approved by the European Computer Manufacturers Association (ECMA) and will be submitted to the International Organization for Standardization for consideration as an international standard. NISO will be participating in the formulation of the U.S. vote on the international standard. Your comments are welcomed as this document moves toward final approval.

Every standard is living in the sense that amendments are made over its lifetime. The initial form and content, however, are very important. I urge you to comment -- and if you are a NISO voting member to return your ballot -- as soon as possible on this proposed standard. All ballots and comments should be returned by March 6, 1987 to the NISO office: NISO, NBS, Administration 101, RIC E-106, Gaithersburg, MD 20899.

Members of NISO Standards Committee EE
Compact Disk Data Format

Chairperson:
Martin Hensel
Robert Bentley, Inc., Boston, MA

Vice-chairperson:
Philip Lord
Elsevier Publishers, Amsterdam, The Netherlands

Committee Members:

Constance Bailey
3M, St. Paul, MN

John Einberger
Reference Technology, Boulder, CO

Bert Gall
Philips Subsystems and Peripherals, Knoxville, TN

Karen Glatt
Wang, Lowell, MA

Lois Granick
American Psychological Associaton, Washington, DC

Michael Janus
Mead Data Central, Menlo Park, CA

Howard Kaikow
Digital Equipment Corporation, Nashua, NH

Parke Lightbown
UTLAS, Berkeley, CA

Bill Nugent
Library of Congress, Washington, DC

Gerald Peterson
West Publishing, St. Paul, MN

Andy Poggio
Apple Computers, Cupertino, CA

Judith Russell
Russell Associates, Washington, DC

Jack Speer
Buckmaster, Inc., Mineral, VA

Howard Turtle
OCLC, Inc., Dublin, OH

Pat Wemberly
IHS, Inc., Englewood, CO

Joseph Worth
AT & T Bell Laboratories, Murray Hill, NJ

E C M A
EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-119

VOLUME AND FILE STRUCTURE OF CDROM FOR INFORMATION INTERCHANGE

December 1986

Brief History

In the past years compact disks originally developed for recording music have also been used for recording data as they allow recording of large amounts of information in a reliable and economic manner. As a read-only medium they are particularly suitable for use in applications such as auditing and legal documents. It appeared very quickly that there is an urgent need for a stable standard for the structure of such compact disks and of the files recorded thereon.

In October 1985 a number of industrial and software companies in the USA invited experts to participate in the elaboration of a working paper for such a project. The result of this work, in which also expert members of ECMA/TC15 as well as from Japan participated, was a report dated May 1986 and known as the 'High Sierra Group' proposal.

This proposal was submitted in Europe to ECMA for their consideration. ECMA TC15, in collaboration with experts from user organizations, invested a considerable amount of work into this proposal in order to clarify and complete its technical contents and to re-edit it in a form suitable for an international standard. Particular attention was given to conformance aspects by applying the same editing principles as for the other standards for labeling, such as ECMA-13 (ISO 1001) and ECMA-107 (ISO 9293). As a result the present standard was produced.

This ECMA Standard has been submitted by ECMA to ISO for further processing as an international standard under the ISO fast-track procedure with a view to issuing an ISO standard possibly as soon as 1988.

(Adopted as an ECMA Standard by the General Assembly of Dec. 11, 1986.)

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APPENDIX A - **STANDARD ECMA-6**: INTERNATIONAL REFERENCE VERSION (IRV) 48

SCOPE AND FIELD OF APPLICATION

(Part of **High Sierra**

1. SCOPE AND FIELD OF APPLICATION

This Standard specifies the volume and file structure of compact read only optical disks (CDROM) for the interchange of information between users of information processing systems.

This Standard specifies:

- the attributes of the volume and the descriptors recorded on it;

- the relationship among volumes of a volume set;

- the placement of files;

- the attributes of the files;

- record structures intended for use in the input or output data streams of an application program when such data streams are required to be organized as sets of records;

- three nested levels of interchange;

- requirements for the processes which are provided within information processing systems, to enable information to be interchanged between different systems, utilizing recorded CDROM as the medium of interchange; for this purpose it specifies the functions to be provided within systems which are intended to originate or receive CDROM which conform to this Standard.

CONFORMANCE

2. CONFORMANCE

2.1 Conformance of a CDROM

A CDROM conforms to this Standard when all information recorded on it conforms to the specifications of Section II of this Standard. A statement of conformance shall identify the lowest level of interchange to which the contents of the CDROM conform.

A prerequisite to such conformance is conformace of the CDROM to a standard for recording (see 4.15).

2.2 Conformance of an Information Processing System

An information processing system conforms to this Standard if it meets the requirements specified in Section III of this Standard either for an originating system, or for a receiving system, or for both types of system. A statement of conformance shall identify which level of these requirements can be met by the system.

REFERENCES

3. REFERENCES

ECMA-6: 7-Bit Coded Character Set
ECMA-35: Code Extension Techniques
ECMA-43: 8-Bit Code - Structure and Rules
ISO 1539: Programming languages - FORTRAN
ISO 2375: Data processing - Procedure for registration of escape sequences

International Register of Coded Character Sets to Be Used With Escape Sequences

Standards for recording: This standard assumes the existence of a standard for recording (see 4.15).

DEFINITIONS

(Part of **High Sierra**)

4. DEFINITIONS

For the purposes of this Standard, the following definitions apply:

4.1 Application Program

A program that processes the contents of a file, and may also process selected attribute data relating to the file or to the volume(s) on which the file is recorded.

Note 1. An application program is a specific class of user, as defined in this Standard.

4.2 Byte

A String of eight binary digits operated upon as a unit.

4.3 Data Field of a Sector

A fixed-length field containing the data of a sector.

4.4 Data Preparer

A person or other entity which controls the preparation of the data to be recorded on a volume group.

Note 2. A data preparer is a specific class of user as defined in this Standard.

4.5 Descriptor

A structure containing descriptive information about a volume or a file.

4.6 Extent

A set of logical blocks, the logical block numbers of which form a continuous ascending sequence.

4.7 File

A named collection of information.

4.8 File Section

That part of a file that is recorded in any one extent.

4.9 Implementation

A set of processes which enable an information processing system to behave as an originating system, or as a receiving system, or as both types of system.

4.10 Logical Block

A group of 2 to the (n+9) power bytes treated as a logical unit, where n equals 0 or a positive integer.

4.11 Originating System

An information processing system which can create a set of files on a volume set for the purpose of data interchange with another system.

4.12 Record

A sequence of bytes treated as a unit of information.

4.13 Receiving System

An information processing system which can read a set of files from a volume set which has been created by another system for the purpose of data interchange.

4.14 Sector

The smallest addressable part of the recorded area on a CDROM that can be accessed independently of other addressable parts of the recorded area.

4.15 Standard for Recording

A standard that specifies the recording method and the addressing method for the information recorded on a CDROM.

The specifications of the standard for recording that are relevant for this Standard are:

- a unique Physical Address for each recorded sector;

- the location of the Data Field within each sector;

- the length of the Data Field within each sector;

Note 3. The standard for recording used in conjunction with this Standard is subject to agreement between the originator and the recipient of the volumes.

4.16 User

A person or other entity (for example, an application program) that causes the invocation of the services provided by an implementation.

4.17 Volume

A dismountable CDROM.

4.18 Volume Set

A collection of one or more volumes, on which a set of files is recorded.

NOTATION

5. NOTATION

The following notation is used in this Standard.

5.1 Decimal and Hexadecimal Notations

Numbers in decimal notation are represented by decimal digits, viz. 0 to 9.

Numbers in hexadecimal notation are represented by hexadecimal digits, viz. 0 to 9 and A to F, shown in parentheses.

5.2 Other Notation

BP	Byte position within a descriptor, starting with 1.
RBP	Byte position within a descriptor field, starting with 1.
ZERO	A single bit with the value 0.
ONE	A single bit with the value 1.
Digit(s)	Any digit from DIGIT ZERO to DIGIT NINE.

(Part of **High Sierra**)

6. VOLUME STRUCTURE

6.1 Arrangement of Data on a CDROM

6.1.1 Physical Addresses

Each sector shall be identified by a unique Physical Address as specified in the relevant standard for recording.

6.1.2 Logical Sector

The sectors of a volume shall be organized into Logical Sectors. Each Logical Sector shall consist of 2 to the (n+11) power bytes, where n either equals zero, or is a positive integer such that 2 to the (n+11) power is less than, or equal to, the number of bytes in the Data Field of any sector recorded on the volume. The number of bytes in a Logical Sector shall be referred to as the Logical Sector Size. Each Logical Sector shall begin in a different sector from any other Logical Sector, and shall begin with the first byte of the Data Field of the sector in which it begins. If a Logical Sector comprises more than one sector, the set of the Physical Addresses of its constituent sectors shall form a consecutive ascending sequence. The data of a Logical Sector shall be recorded in the Data Fields of its constituent sectors.

Each Logical Sector shall be identified by a unique Logical Sector Number. Logical Sector Numbers shall be integers assigned in an ascending sequence, in order of ascending Physical Addresses of the constituent sectors, starting with 0 for the Logical Sector containing the sector having the lowest Physical Address which may contain recorded information. The numbering shall continue through successive Logical Sectors, each of which begins with the sector with the next higher Physical Address than that of the last sector constituting the previous Logical Sector.

6.1.3 Volume Space

The information on a volume shall be recorded in the set of all Logical Sectors on the volume. This set shall be referred to as the Volume Space of the volume.

The bytes in the Volume Space shall be numbered consecutively. The numbering shall start with 1, which shall be assigned to the first byte of the first Logical Sector of the Volume Space. The numbering shall continue through successive bytes of the first Logical Sector, and then through successive bytes of each successive Logical Sector, of the Volume Space.

6.2 Arrangement of the Volume Space

6.2.1 System Area and Data Area

The Volume Space shall be divided into a System Area and a Data Area.

The System Area shall occupy the Logical Sectors with Logical Sector Numbers 0 to 15. The System Area shall be reserved for system use. Its content is not specified by this Standard.

The Data Area shall occupy the remaining Logical Sectors of the Volume Space.

6.2.2 Logical Block

The Volume Space shall be organized into Logical Blocks. Each Logical Block shall consist of 2 to the (n+9) power bytes, where n equals 0 or a positive integer. The number of bytes in a Logical Block shall be referred to as the Logical Block Size which shall not be greater than the Logical Sector Size. The data of a Logical Block shall be recorded in the Data Fields of its constituent Logical Sectors.

Each Logical Block shall be identified by a unique Logical Block Number. Logical Block Numbers shall be integers assigned in ascending order starting with 0. Logical Block Number 0 shall be assigned to the Logical Block which begins with the first byte of the Volume Space. Each successive Logical Block Number, shall be assigned to the Logical Block which begins with the byte in the Volume Space immediately following the last byte of the preceding Logical Block.

6.3 Arrangement of the Data Area

File Sections shall be recorded in the Data Area. More than one File Section of a file may be recorded on the same volume.

The following types of descriptors shall be recorded in the Data Area to describe the use of the Data Area:

- Volume Descriptors
- File Descriptors
- Directory Descriptors
- Path Tables

The Volume Descriptors shall be recorded in consecutively numbered Logical Sectors starting with the Logical Sector having Logical Sector Number 16. The Logical Sectors in the Data Area shall be available for the assignment of Volume Partitions and the recording of File Sections, File Descriptors, Directory Descriptors and Path Tables.

Each File Section shall be recorded in an Extent, and shall be identified by a descriptor in a directory. An Extended Attribute Record can be associated with the File Section. If present, it shall be recorded in the same Extent and identified by the same descriptor. Each directory shall be recorded as a file in a single Extent, and shall be identified by a Directory Descriptor either in another directory or in a Volume Descriptor. Each directory shall also be identified by a record in a Path Table. Each Path Table shall be identified in a Volume Descriptor.

Space within the Data Area may be assigned to one or more Volume Partitions. Each Volume Partition shall be recorded in an Extent and

shall be identified by a Volume Descriptor.

6.4 Arrangement of Extents

6.4.1 Extent

An Extent shall be a set of Logical Blocks, the Logical Block Numbers of which form a continuous ascending sequence.

6.4.2 Mode of Recording a File Section

A File Section, and its associated Extended Attribute Record if any, shall be recorded in an Extent either in interleaved mode or in non-interleaved mode.

6.4.3 Interleaved Mode

6.4.3.1 File Unit

A File Unit shall comprise a set of Logical Blocks that are within an Extent and the Logical Block Numbers of which form a continuous ascending sequence.

When a File Section is recorded in interleaved mode, one or more File Units, each consisting of the same number of Logical blocks, shall be assigned to the File Section within the same Extent. The number of Logical Blocks in the File Unit shall be the assigned File Unit Size for the File Section.

More...

(Continuation of **High Sierra - VOLUME STRUCTURE**)

(Page 6) The first Logical Block of Each File Unit shall have a Logical Block Number which is the lowest Logical Block Number in the Logical Sector that contains that Logical Block.

The sequence of the File Units in an Extent shall correspond to the sequence of the Logical Block Numbers of the first Logical Block of each File Unit.

Note 4. The Logical Blocks comprising a File Unit assigned to a File Section may:

- also each be assigned to a different File Section, and/or

- comprise part of one or more Volume Partitions.

6.4.3.2 Interleave Gap

The set of Logical Blocks the Logical Block Numbers of which lie between the last Logical Block Number of a File Unit and the first Logical Block Number of the next File Unit, if any, in the sequence, shall be an Interleave Gap. All Interleave Gaps between the File Units assigned to a File Section shall comprise the same number of Logical Blocks. This number shall be the assigned Interleave Gap Size for the File Section.

Note 5. The Logical Blocks comprising an Interleave Gap between the File Units assigned to a File Section may:

- each be assigned to a different File Section, and/or

- comprise part of one or more Volume Partitions.

6.4.3.3 Relation of File Section to File Unit

When a File Section is recorded in interleaved mode, the File Section, and its associated Extended Attribute Record, if any, shall be recorded over the sequence of File Units assigned to the File Section.

6.4.3.4 Recording of an Extended Attribute Record

If an Extended Attribute Record is recorded it shall be recorded in the first File Unit of the sequence. The recording shall begin at the first byte of the first Logical Block of the File Unit. It shall continue through successive bytes of that Logical Block, and then through successive bytes of successive Logical Blocks, if any, of the File Unit, until all of the Extended Attribute Record is recorded.

The assigned Extended Attribute Record length shall be equal to the assigned File Unit Size.

6.4.3.5 Recording of a File Section

The successive parts, if any, of the File Section shall be recorded in successive File Units, starting from the second File Unit in the sequence if an Extended Attribute Record is recorded, and starting from the first File Unit in the sequence if no Extended Attribute Record is recorded.

6.4.3.6 Data Space

The set of File Units in which the successive parts of the File Section are recorded shall be in the Data Space of the File Section.

The bytes in the Data Space shall be numbered consecutively. The numbering shall start from 1 which shall be assigned to the first byte of the first Logical Block of the first File Unit, if any, of the Data Space. The numbering shall continue through successive bytes of that Logical Block, then through successive
(Page 7) bytes of each successive Logical Block, if any, of the first File Unit, and then through successive bytes of the Logical Block(s) of each successive File Unit, if any, assigned to the File Section.

The numbering shall end with a number equal to the product of the number of bytes in a Logical Block, the number of Logical Blocks in the File Unit, and the number of File Units assigned to the File Section; or shall equal zero if there are no bytes in the Data Space.

6.4.4 Non-Interleaved Mode

When a File Section is recorded in non-interleaved mode the File Section, and its associated Extended Attribute Record, if any, shall be recorded over the sequence of Logical Blocks in an Extent.

6.4.4.1 Recording of an Extended Attribute Record

If an Extended Attribute Record is recorded, it shall be recorded over one or more Logical Blocks, the Logical Block Numbers of which form a continuous ascending sequence. The recording shall begin at the first byte of the first Logical Block of the Extent. It shall continue through successive bytes of that Logical Block, and then through successive bytes of successive Logical Blocks, if any, of the Extent, until all of the Extended Attribute Record is recorded.

The number of Logical Blocks over which the Extended Attribute Record is recorded shall be the assigned Extended Attribute Record length for the File Section.

Note 6. The Logical Blocks comprising an Extended Attribute Record assigned to a File Section may:

-

- also each be assigned to a different File Section, and/or
- comprise part of one or more Volume Partitions.

6.4.4.2 Recording of a File Section

The File Section shall be recorded over zero or more Logical Blocks, the Logical Block Numbers of which form a continuous ascending sequence. If no Extended Attribute Record is recorded, the sequence shall start with the first Logical Block of the Extent. If an Extended Attribute Record is recorded, the sequence shall start with the first Logical Block, if any, immediately following the last Logical Block over which the Extended Attribute Record is recorded.

6.4.4.3 Data Space

The set of Logical Blocks over which the File Section is recorded shall be the Data Space of the File Section.

The bytes in the Data Space shall be numbered consecutively. The numbering shall start from 1 which shall be assigned to the first byte of the first Logical Block, if any, of the Data Space. The numbering shall continue through successive bytes of that Logical Block, and then through successive bytes of each successive Logical Block, if any, of the Data Space.

The numbering shall end with a number equal to the product of the number of bytes in a Logical Block, and the number of Logical Blocks in the Data Space; or shall equal zero if there are no Logical Blocks in the Data Space.

6.4.5 Data Length of a File Section

The data length of a File Section shall be the number of consecutive bytes in the Data Space, starting from the first byte, if any, that are intended for interchange. If this number is less than the number of bytes in the Data Space, then any remaining bytes in the Data Space shall be ignored in interchange.

6.4.6 Relation of Extended Attribute Record to File Section

An Extended Attribute Record may be associated with a File Section. If present, the Extended Attribute Record shall identify certain attributes of the file of which the File Section forms a part.

A subset of those attributes shall apply to all File Sections of a file that contains records according to 6.10. If any of those attributes are assigned to the file, an Extended Attribute Record shall be recorded in association with each of the File Sections of the file.

The other attributes identified in an Extended Attribute Record shall apply to that File Section and all preceding File Sections of the file (see 6.5.1). If no Extended Attribute Record is recorded in association with the last File Section of a file, then these attributes are not specified for the file.

6.4.7 Recording of a Volume Partition

If a Volume Partition is recorded, it shall be recorded over one or more Logical Blocks, the Logical Block Numbers of which form a

continuous ascending sequence. The recording shall begin at the first byte of the first Logical Block of the Extent. It shall continue through successive bytes of that Logical Block, and then through successive bytes of successive Logical Blocks, if any, of the Extent, until all of the Volume Partition is recorded. The first Logical Block of each Volume Partition shall have a Logical Block Number which is the lowest Logical Block Number in the Logical Sector that contains that Logical Block.

The number of Logical Blocks over which the Volume Partition is recorded shall be the assigned Volume Partition Size for the Volume Partition.

6.5 File Structure

6.5.1 Relation to File Sections

Each file shall consist of one or more File Sections. Each File Section of a file shall be identified by a record in the same directory. The sequence of the File Sections of a file shall be identified by the order of the corresponding records in the directory.

A File Section may be part of more than one file and may occur more than once in the same file. A File Section may be identified by more than one record in the same or a different directory.

Each File Section of a file may be recorded on a different volume.

6.5.2 File Space

The set of Data Spaces over which a file is recorded shall be the File Space of the file.

The bytes in the File Space shall be numbered consecutively. The numbering shall start from 1 which shall be assigned to the first byte of the first Data Space, if any. The numbering shall continue through successive bytes of that Data Space, and then through successive bytes of each successive Data Space, if any, of the file.

 The numbering shall end with a number equal to the sum of the number of bytes in all Data Spaces of the file.

6.5.3 Contents of a File

The information in a file shall be interpreted according to the relevant standards for the coded representation of information.

Note 7. The identification of these standards is the subject of an agreement between the originator and the recipient of the file.

6.5.4 Associated File

An Associated File has a relationship not specified by this Standard to another file that has been assigned the same File Identifier as that of the Associated File in the same directory.

6.6 Volume Set

A Volume Set shall be the set of volumes on which a set of files is recorded.

A Volume Set shall consist of one or more volumes having a common Volume Set Identifier. All volumes in a Volume Set shall be numbered consecutively starting from 1.

A Volume Group within a Volume Set shall consist of one or more consecutively numbered volumes the contents of which are established at the same time. The sequence number of the volume that has the highest sequence number within the Volume Group shall be the assigned Volume Set Size.

Each volume of a Volume Set shall contain a description of all the directories and files that are recorded on those volumes the sequence numbers of which are less than, or equal to, the assigned Volume Set Size of the volume.

Note 8. Such description recorded on a volume shall supersede the description recorded on any volume of the Volume Set having a lower assigned Volume Set Size.

The Logical Block Size shall be the same for all volumes of a Volume Set.

6.7 Volume Descriptors

A Volume Descriptor shall be one of the following types:

- Primary Volume Descriptor
- Supplementary Volume Descriptor
- Volume Partition Descriptor
- Boot Record
- Volume Descriptor Set Terminator

6.7.1 Volume Descriptor Set

A Volume Descriptor Set shall be a sequence of volume descriptors recorded in consecutively numbered Logical Sectors starting with the Logical Sector with Logical Sector Number 16. Each successive Volume Descriptor shall be recorded in the Logical Sector with the next higher Logical Sector Number than that of the Logical Sector in which the previous Volume Descriptor is recorded. The sequence shall consist of two or more volume descriptors consecutively recorded as follows.

6.7.1.1 The sequence shall contain one Primary Volume Descriptor (see 8.4) recorded at least once.

(Page 10) The Primary Volume Descriptor shall describe the Volume Space, and identify the attributes of the volume, the locations of a Root Directory and of a group of Path Tables, and the number of volumes in the Volume Set.

6.7.1.2 The sequence may contain zero or more Supplementary Volume

Descriptors (see 8.5) each recorded at least once.

A Supplementary Volume Descriptor shall describe the Volume Space, and identify the attributes of the volume, the locations of a Root Directory and of a group of Path Tables, and the number of volumes in the Volume Set. It shall also identify the coded graphic character set used within selected fields of this descriptor, and of the records in associated File Descriptors, Directory Descriptors and Path Tables.

6.7.1.3 The sequence may contain zero or more Volume Partition Descriptors (see 8.6).

A Volume Partition Descriptor shall identify a Volume Partition within the Volume Space, its position and size, and its attributes.

6.7.1.4 The sequence may contain zero or more Boot Records (see 8.2).

A Boot Record shall contain information which may be used to achieve a specific state in a receiving system or an application program.

6.7.1.5 The sequence shall be terminated by the recording of one or more Volume Descriptor Set Terminators (see 8.3).

6.8 Directory Structure

6.8.1 Directory

A directory shall be recorded as a file containing a set of records each of which identifies a File Section or another directory. A directory shall not be recorded as an Associated File, shall not be recorded in interleaved mode and shall consist of only one File Section.

The identification of a file shall be different from the identification of any other file, unless the file is an Associated File (see 6.5.3), or of any directory identified in the same directory. The identification of a directory shall be different from the identification of any file or of any other directory identified in the same directory.

The first Logical Block of the Extent in which a directory is recorded shall have a Logical block Number which is the lowest Logical Block Number in the Logical Sector that contains that Logical Block.

6.8.1.1 Directory Record

A Directory Record shall contain:

- information to locate a File Section,

- information to locate any Extended Attribute Record associated with the File Section,

- the identification of the file,

- certain attributes of the file,

- certain attributes of the File Section.

The first or only Directory Record recorded in a Logical Sector shall begin at the first byte of the first Data Field of that Logical Sector. Each subsequent Directory Record recorded in that Logical Sector shall begin at the byte immediately following the last byte of the preceding Directory Record in that Logical Sector. Each Directory Record shall end in the Logical Sector in
(Page 11) which it begins. Unused positions after the last Directory Record in a Logical Sector shall be set to (00).

6.8.1.2 Order of Directory Records

The records in a Directory shall be ordered according to 9.3.

The order of the directory records for a file in a directory shall specify the order of the File Sections in the File Space of the file.

6.8.1.3 Directory Length

The length of a directory shall be the sum of:

- the lengths of all Directory Records in the directory;

- the number of unused positions after the last Directory Record in all Logical Sectors in which the directory is recorded.

6.8.2 Directory Hierarchy

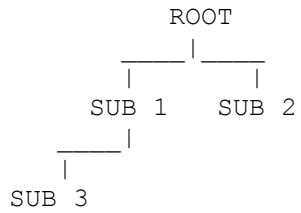
A Directory Hierarchy shall be a set of directories related to each other as follows.

The Root of the hierarchy, called the Root Directory, shall be a directory identified either in a Primary Volume Descriptor or in a Supplementary Volume Descriptor.

Each directory, other than the Root Directory, shall be identified by a record in another directory.

A directory identifying another directory shall be called the Parent Directory of the identified directory. Each directory shall contain a record which identifies its Parent Directory. Different directories may have the same Parent Directory.

A hierarchical relationship shall exist between the Root Directory and all other directories:



The hierarchy shall consist of a number of levels (i.e. for n levels: level 1, level 2, ..., level n). The Root Directory shall be the one and only directory at level 1 of the hierarchy.

If a Directory is at level m of the hierarchy, its Parent Directory shall be at level (m-1). The Parent Directory of the Root Directory shall be the Root Directory.

6.8.2.1 Depth of the Directory Hierarchy

The number of levels in the hierarchy shall not exceed eight. In addition, for each file recorded, the sum of the following shall not exceed 255:

- the length of the File Identifier (see 7.5.2),

- the length of the Directory Identifiers of all relevant directories,

 - the number of relevant directories.

6.8.2.2 Identification of Directories

For a Root Directory:

- the first Directory Record of the Root Directory shall describe the Root Directory and shall have a Directory Identifier consisting of a single (00) byte;

- the second Directory Record of the Root Directory shall describe the Root Directory itself and shall have a Directory Identifier consisting of a single (01) byte;

- a Directory Record describing the Root Directory shall be contained in the Root Directory field of the volume descriptor that identifies the directory hierarchy.

For each directory other than the Root Directory:

- the first Directory Record of the directory shall describe that directory and shall have a Directory Identifier consisting of a single (00) byte;

- the second Directory Record of the directory shall describe the Parent Directory for that directory and shall have a Directory identifier consisting of a single (01) byte;

- a Directory Record in its Parent Directory shall describe the

directory.

6.8.3 Relation of Directory Hierarchies

One or more Directory Hierarchies shall be recorded on a volume.

A Directory Hierarchy shall be identified in the Primary Volume Descriptor.

Each additional Directory Hierarchy shall be identified in a Supplementary Volume Descriptor.

The directories within each hierarchy shall identify zero or more of the files that are recorded in those volumes, the sequence numbers of which are less than, or equal to, the assigned Volume Set Size of the volume.

A directory shall not be a part of more than one Directory Hierarchy.

6.9 Path Table

A Path Table recorded on a volume of a Volume Set shall contain a set of records describing a directory hierarchy for those volumes of the Volume Set the sequence numbers of which are less than, or equal to, the assigned Volume Set Size of the volume.

For each directory in the directory hierarchy other than the Root Directory, the Path Table shall contain a record which identifies the directory, its Parent Directory and its location. The records in a Path Table shall be numbered starting from 1. The first record in the Path Table shall identify the Root Directory and its location.

The directory number of a directory shall be the ordinal number of the Path Table Record that identifies the directory.

6.9.1 Order of Path Table Records

The records in a Path Table shall be ordered by the following criteria in descending order of significance:

- in ascending order according to level in the directory hierarchy;

(Page 13) - in ascending order according to the directory number of the Parent Directory of the directory identified by the record;

- in ascending order according to the relative value of the Directory Identifier field in the record, where the Directory Identifiers shall be valued as follows:

  . If the two Directory identifiers do not contain the same number of byte positions, the shorter Directory Identifier shall be treated as if it were padded on the right with all padding bytes set to (20), and as if both Directory Identifiers contained the identical number of byte positions.

  . After any padding necessary to treat the Directory Identifiers

as if they were of equal length, the characters in the corresponding byte positions, starting with the first position, of the Directory Identifiers are compared until a byte position is found that does not contain the same character in both Directory Identifiers. The greater Directory Identifier is the one that contains the character with the higher code position value in the coded graphic character set used to interpret the Directory Identifier of the Path Table Record.

6.9.2 Path Table Group

A Path Table shall be either Type L Path Table or a Type M Path Table.

In a Type L Path Table, a numerical value shall be recorded according to 7.2.1 if represented as a 16-bit number and according to 7.3.1 if represented as a 32-bit number.

In a Type M Path Table, a numerical value shall be recorded according to 7.2.2 if represented as a 16-bit number and according to 7.3.2 if represented as a 32-bit number.

A Path Table Group shall comprise one or two identical Type L Path Tables and one or two identical Type M Path Tables.

6.9.3 Recorded Occurrences of the Path Table

One or more Path Table Groups shall be recorded on a volume. The Primary Volume Descriptor shall identify the size and locations of the constituent Path Tables of a Path Table Group. These Path Tables shall identify the directories in the Directory Hierarchy which is identified by the Primary Volume Descriptor.

Corresponding to each additional Directory Hierarchy recorded on a volume an additional Path Table Group shall be recorded on the volume. For each such Path Table Group the corresponding Supplementary Volume Descriptor shall identify the size and locations of its constituent Path Tables. These Path Tables shall identify the directories in the corresponding Directory Hierarchy.

6.9.4 Consistency of Path Tables between Volumes of a Volume Group

6.9.4.1 The contents of a Type L Path Table identified in a Primary Volume Descriptor shall be identical with the contents of any other Type L Path Table identified in a Primary Volume Descriptor on a volume of the same Volume Group.

The contents of a Type M Path Table identified in a Primary Volume Descriptor shall be identical with the contents of any other Type M Path Table identified in a Primary Volume Descriptor on a volume of the same Volume Group.

6.9.4.2 The contents of a Type L Path Table identified in a Supplementary Volume Descriptor shall be identical with the contents of any

other Type L Path Table identified in a Supplementary Volume Descriptor, having the same volume set identification and identifying the same coded graphic character set for use within selected descriptor fields (7.4), on a volume of the same Volume Group.

The contents of a Type M Path Table identified in a Supplementary Volume Descriptor shall be identical with the contents of any other Type M Path Table identified in a Supplementary Volume Descriptor, having the same volume set identification and identifying the same coded graphic character set for use within selected descriptor fields (7.4), on a volume of the same Volume Group.

6.10 Record Structure

The information in a file may be organized as a set of records according to this clause of this Standard.

6.10.1 Characteristics

A record shall be a sequence of bytes treated as a unit of information.

The length of a record shall be the number of bytes in the record.

A record shall be either a fixed-length record, or a variable-length record.

All records in a file shall be either fixed-length records or variable-length records.

6.10.2 Measured Data Units (MDU)

A Measured Data Unit shall contain either a fixed-length record or a variable-length record. A MDU shall comprise an even number of bytes.

6.10.2.1 Relationship to File Space

Each MDU shall be recorded in successive bytes of the File Space. The first or only MDU shall begin at the first byte of the File Space. Each successive MDU shall begin at the byte in the File Space immediately following the last byte of the preceding MDU.

6.10.3 Fixed-Length Records

A fixed-length record shall be a record contained in a file that is assigned to contain records that all must have the same length.

A fixed-length record shall be contained in an MDU. The MDU shall consist of the fixed-length record, immediately followed by a (00) byte if necessary to give the MDU an even length.

The minimum assigned length of a fixed-length record shall be 1.

6.10.4 Variable-Length Records

A variable-length record shall be a record contained in a file that is assigned to contain records that may have different lengths. The value recorded in the Record Format field of an Extended Attribute Record for a file containing variable-length records shall contain the same value as that recorded in the Record Format field of any other Extended Attribute Record of that same file.

A variable-length record shall be contained in an MDU. The MDU shall consist of a Record Control Word (RCW) immediately followed by the variable-length record, immediately followed by a (00) byte if necessary to give the MDU an even length.

(Page 15) The RCW shall specify as a 16-bit number the length of the record. The RCW shall be recorded according to:

- 7.2.1, if the value in the Record Format field of the Extended Attribute Record describing the Extent is 2, or

- 7.2.2, if the value in the Record Format field of the Extended Attribute Record describing the Extent is 3.

A maximum record length shall be assigned for a file. The length of any record in the file shall not exceed this value. The assigned maximum record length shall be in the range 1 to 32767.

The minimum length of a variable-length record shall be 0.

RECORDING OF DESCRIPTOR FIELDS

7. RECORDING OF DESCRIPTOR FIELDS

7.1 8-Bit Numerical Values

A numerical value represented in binary notation by an 8-bit number shall be recorded in a field of a descriptor in one of the following two formats. The applicable format is specified in the description of the descriptor fields.

7.1.1 8-Bit Unsigned Numerical Values

An unsigned numerical value shall be represented in binary notation by an 8-bit two's complement number recorded in a one-byte field.

7.1.2 8-Bit Signed Numerical Values

A signed numerical value shall be represented in binary notation by an 8-bit number recorded in a one-byte field.

7.2 16-Bit Numerical Value

A numerical value represented in binary notation by a 16-bit number shall be recorded in a field of a descriptor in one of the following three formats. The applicable format is specified in the description of the descriptor fields.

7.2.1 Least Significant Byte First

A numerical value represented by the hexadecimal representation (wx yz) shall be recorded in a two-byte field as (yz wx).

Note 9. For example, the decimal number 4660 has (12 34) as its hexadecimal representation and shall be recorded as (34 12).

7.2.2 Most Significant Byte First

A numerical value represented by the hexadecimal representation (wx yz) shall be recorded in a two-byte field as (wx yz).

Note 10. For example, the decimal number 4660 has (12 34) as its hexadecimal representation and shall be recorded as (12 34)

7.2.3 Both Byte Orders

A numerical value represented by the hexadecimal representation (wx yz) shall be recorded in a four-byte field as (yz wx wx yz).

Note 11. For example, the decimal number 4660 has (12 34) as its hexadecimal representation and shall be recorded as (34 12 12 34).

7.3 32-Bit Numerical Values

A numerical value represented in binary notation by a 32-bit number shall be recorded in a field of a descriptor in hexadecimal notation in one of the following three formats. The applicable format is specified in the description of the descriptor fields.

7.3.1 Least Significant Byte First

A numerical value represented by the hexadecimal representation (st uv wx yz) shall be recorded in a four-byte field as (yz wx uv st).

Note 12. For example, the decimal number 305419896 has (12 34 56 78) as its hexadecimal representation and shall be recorded as (78 56 34 12).

7.3.2 Most Significant Byte First

A numerical value represented by the hexadecimal representation (st uv wx yz) shall be recorded in a four-byte field as (st uv wx yz).

Note 13. For example, the decimal number 305419896 has (12 34 56 78) as its hexadecimal representation and shall be recorded as (12 34 56 78).

7.3.3 Both Byte Orders

A numerical value represented by the hexadecimal representation (st uv wx yz) shall be recorded in an eight-byte field as (yz wx uv st st uv wx yz).

Note 14. For example, the decimal number 305419896 has (12 34 56 78) as its hexadecimal representation and shall be recorded as (78 56 34 12 12 34 56 78).

7.4 Character Sets and Coding

7.4.1 d-Characters and a-Characters

The characters in the descriptors shall be coded according to ECMA-6 (see Appendix A), except as specified in 7.4.4.

The 37 characters in the following positions of the International Reference Version are referred to as d-characters:

3/0 to 3/9
4/1 to 5/10
5/15

The 57 characters in the following positions of the International Reference Version are referred to as a-characters:

2/0 to 2/2
2/5 to 2/15
3/0 to 3/15
4/1 to 4/15
5/0 to 5/10
5/15

The applicable set of characters is specified in the description of the descriptor fields.

7.4.2 c-Characters

The characters of the coded graphic character sets identified by the escape sequences in a Supplementary Volume Descriptor are referred to as c-characters.

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7.4.2.1 a1-Characters

A subset of the c-characters will be referred to as a1-characters. This subset shall be subject of agreement between the originator and the recipient of the volume.

More...

7.4.2.2 d1-Characters
A subset of the a1-characters will be referred to as d1-characters. This subset shall be the subject of agreement between the originator and the recipient of the volume.

7.4.3 Separators
The characters separating the components of a File Identifier shall be:

SEPARATOR 1 represented by the bit combination (2E)
SEPARATOR 2 represented by the bit combination (3B)

7.4.4 Use of Characters in Descriptor Fields
The characters in the fields of the following descriptors shall be a-characters or d-characters as specified in 9.

- Directory records within a Directory Hierarchy that is identified in a Primary Volume Descriptor.

- Path Table records within a Path Table Group identified in a Primary Volume Descriptor.

- Extended Attribute records identified in a directory of a Directory Hierarchy that is identified in a Primary Volume Descriptor.

The characters in the fields in the following descriptors shall be a1 or d1-characters as specified in 9.

- Directory records within a Directory Hierarchy that is identified in a Supplementary Volume Descriptor.

- Path Table records within a Path Table Group identified in a Supplementary Volume Descriptor.

- Extended Attribute records identified in a directory of a Directory Hierarchy that is identified in a Supplementary Volume Descriptor.

7.4.5 Justification of Characters
In each fixed-length field the content of which is specified by this Standard to be characters, the characters shall be left-justified and any remaining positions on the right shall be set to (20).

7.5 File Identifier

7.5.1 File Identifier Format
A File Identifier shall consist of the following sequence:

- File Name: A sequence of zero or more d-characters or d1-characters;

- zero or one SEPARATOR 1;

- File Name Extension: A sequence of zero or more d-characters or d1-characters;

- zero or one SEPARATOR 2;

- File Version Number: Digits representing a number from 1 to 32767.

(Page 18) This sequence shall meet the following requirements:

- If no characters are specified for the File Name then the File Name Extension shall consist of at least one character.

- If no characters are specified for the File Name Extension then the File Name shall consist of at least one character.

- If the File Version Number is not specified then it shall be assumed to be 1.

- If the File Name Extension is specified then the SEPARATOR 1 shall be present.

- If the File Version Number is specified then the SEPARATOR 2 shall be present.

- The sum of the following shall not exceed 31:
  . if there is a File Name, the length of the File Name.
  . if there is a File Name Extension, the length of the File Name Extension.
  . if there is a SEPARATOR 1, + 1.

NOTE 15. If the File Name Extension is not specified, the SEPARATOR 1 may be present. If the File Version Number is not specified, the SEPARATOR 2 may be present.

7.5.2 File Identifier Length
The length of the File Identifier shall be the sum of the following:

- if there is a File Name, the length of the File Name,

- if there is a File Name Extension, the length of the File Name Extension,

- if there is a File Version Number, the number of digits in the File Version Number,

- the number of SEPARATORS.

7.6 Directory Identifier

7.6.1 Directory Identifier Format
A Directory Identifier shall consist of a sequence of one or more d-characters or d1-characters (see 7.4.4), except as specified in 7.6.2.

7.6.2 Reserved Directory Identifiers
- The Directory Identifier of the Directory Record embedded in a Volume Descriptor describing the Root directory shall consist of a single (00) byte.

- The Directory Identifier of the Directory Record of each directory shall consist of a single (00) byte.

- The Directory Identifier of the second Directory Record of each directory shall consist of a single (01) byte.

7.6.3 Directory Identifier Length

The length of a Directory Identifier shall not exceed 31.

(Part of **High Sierra**)

8. VOLUME DESCRIPTOR

The Volume Descriptors shall identify the volume, the partitions recorded on the volume, the volume creator(s), certain attributes of the volume, the location of other recorded descriptors and the version of the standard which applies to the volume descriptor.

8.1 Format of a Volume Descriptor

BP	Field Name	Content
1	Volume Descriptor Type	numerical value
2-6	Standard Identifier	CD001
7	Volume Descriptor Version	numerical value
8-2048	(Depends on Volume Descriptor Type)	(Depends on Volume Descriptor Type)

8.1.1 Volume Descriptor Type (BP 1)

This field shall specify as an 8-bit number the Volume Descriptor Type.

Number 0	shall mean that the Volume Descriptor is a Boot Record.
Number 1	shall mean that the Volume Descriptor is a Primary Volume Descriptor.
Number 2	shall mean that the Volume Descriptor is a Supplementary Volume Descriptor.
Number 3	shall mean that the Volume Descriptor is a Volume Partition Descriptor.
Numbers 4-254	are reserved for future standardization.
Number 255	shall mean that the Volume Descriptor is a Volume Descriptor Set Terminator.

This field shall be recorded according to 7.1.1.

8.1.2 Standard Identifier (BP 2-6)

This field shall specify an identification of this Standard.

The characters in this field shall be CD001.

8.1.3 Volume Descriptor Version (BP 7)

This field shall specify as an 8-bit number the version of the specification for the Volume Descriptor.

The content and the interpretation of this field shall depend on the content of the Volume Descriptor Type field.

This field shall be recorded according to 7.1.1.

8.1.4 Depends on Volume Descriptor Type (BP 8-2048)

The content and the interpretation of this field shall depend on the Volume Descriptor Type field.

8.2 Boot Record

The Boot Record shall identify the system that specified the content of the field reserved for boot system use in the Boot Record, and shall contain information which is used to achieve a specific state for a system or for an application.

BP	Field Name	Content
1	Volume Descriptor Type	numerical value
2-6	Standard Identifier	CD001
7	Volume Descriptor Version	numerical value
8-39	Boot System Identifier	a-characters
40-71	Boot Identifier	a-characters
72-2048	Boot System Use	not specified

8.2.1 Volume Descriptor Type (BP 1)

This field shall specify an 8-bit number indicating that the Volume Descriptor is a Boot Record.

The number in this field shall be 0.

This field shall be recorded according to 7.1.1.

8.2.2 Standard Identifier (BP 2-6)

This field shall specify an identification of this Standard.

The characters in this field shall be CD001.

8.2.3 Volume Descriptor Version (BP 7)

This field shall specify as an 8-bit number the version of the specification for the Boot Record structure.

1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

8.2.4 Boot System Identifier (BP 8-39)

This field shall specify an identification of a system which can recognize and act upon the content of the Boot Identifier and Boot System Use fields in the Boot Record.

The characters in this field shall be a-characters.

8.2.5 Boot Identifier (BP 40-71)

This field shall specify an identification of the boot system specified in the Boot System Use field of the Boot Record.

The characters in this field shall be a-characters.

8.2.6 Boot System Use (BP 72-2048)

This field shall be reserved for boot system use. Its content is not specified by this Standard and shall be ignored in interchange.

8.3 Volume Descriptor Set Terminator

The recorded set of Volume Descriptors shall be terminated by a sequence of one or more Volume Descriptor Set Terminators.

BP	Field Name	Content
1	Volume Descriptor Type	numerical value
2-6	Standard Identifier	CD001
7	Volume Descriptor Version	numerical value
8-2048	(Reserved for future standardization)	(00) bytes

8.3.1 Volume Descriptor Type (BP 1)

This field shall specify an 8-bit number indicating that the Volume Descriptor is a Volume Descriptor Set Terminator.

The number in this field shall be 255.

This field shall be recorded according to 7.1.1.

8.3.2 Standard Identifier (BP 2-6)

This field shall specify an identification of this Standard.

The characters in this field shall be CD001.

8.3.3 Volume Descriptor Version (BP 7)

This field shall specify as an 8-bit number the version of the specification for the Volume Descriptor Set Terminator.

1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

8.3.4 Reserved for Future Standardization (BP 8-2048)

This field shall be set to (00).

8.4 Primary Volume Descriptor

The Primary Volume Descriptor shall identify the volume, the system specifying the content of the Logical Sectors with Logical Sector Numbers 0 to 15, the size of the Volume Space, the version of the standard which applies to the Volume Descriptor, the version of the specification which applies to the directory records and the Path Table records and certain attributes of the volume.

BP	Field Name	Content
1	Volume Descriptor Type	numerical value
2-6	Standard Identifier	CD001
7	Volume Descriptor Version	numerical value
8	Unused Field	(00) byte
9-40	System Identifier	a-characters
41-72	Volume Identifier	d-characters
73-80	Unused Field	(00) bytes
81-88	Volume Space Size	numerical value
89-120	Unused Field	(00) bytes
121-124 (Page 22)	Volume Set Size	numerical value
125-128	Volume Sequence Number	numerical value
129-132	Logical Block Size	numerical value
133-140	Path Table Size	numerical value
141-144	Location of Occurrence of Type L Path Table	numerical value
145-148	Location of Optional Occurrence of Type L Path Table	numerical value
149-152	Location of Occurrence of Type M Path Table	numerical value
153-156	Location of Optional Occurrence	

	of Type M Path Table	numerical value	
157-190	Directory Record for Root Directory	34 bytes	
191-318	Volume Set Identifier	d-characters	
319-446	Publisher Identifier	a-characters	
447-574	Data Preparer Identifier	a-characters	
575-702	Application Identifier	a-characters	
703-739	Copyright File Identifier	d-characters, SEPARATOR 1, SEPARATOR 2	
740-776	Abstract File Identifier	d-characters, SEPARATOR 1, SEPARATOR 2	
777-813	Bibliographic File Identifier	d-characters, SEPARATOR 1, SEPARATOR 2	
814-830	Volume Creation Date and Time	Digit(s), numerical value	
831-847	Volume Modification Date and Time	Digit(s), numerical value	
848-864	Volume Expiration Date and Time	Digit(s), numerical value	
865-881	Volume Effective Date and Time	Digit(s), numerical value	
882	File Structure Version	numerical value	
883	(Reserved for future standardization)	(00) bytes	
884-1395	Application Use	not specified	
1396-2048	(Reserved for future standardization)	(00) bytes	

8.4.1 Volume Descriptor Type (BP 1)

This field shall specify an 8-bit number indicating that the volume descriptor is a Primary Volume Descriptor.

The number in this field shall be 1.

This field shall be recorded according to 7.1.1.

8.4.2 Standard Identifier (BP 2-6)

This field shall specify an identification of this Standard.

The characters in this field shall be CD001.

8.4.3 Volume Descriptor Version (BP 7)

This field shall specify as an 8-bit number an identification of the

version of the specification for the Primary Volume Descriptor.

(Page 23) 1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

8.4.4 Unused Field (BP 8)

This field shall be set to (00).

8.4.5 System Identifier (BP 9-40)

This field shall specify an identification of a system which can recognize and act upon the content of the Logical Sectors with Logical Sector Numbers 0 to 15 of the volume.

The characters in this field shall be a-characters.

8.4.6 Volume Identifier (BP 41-72)

This field shall specify an identification of the volume.

The characters in this field shall be d-characters.

8.4.7 Unused Field (BP 73-80)

This field shall be set to (00).

8.4.8 Volume Space Size (BP 81-88)

This field shall specify as a 32-bit number the number of Logical Blocks in which the Volume Space of the volume is recorded.

This field shall be recorded according to 7.3.3.

8.4.9 Unused Field (BP 89-120)

This field shall be set to (00).

8.4.10 Volume Set Size (BP 121-124)

This field shall specify as a 16-bit number the assigned Volume Set Size of the volume.

This field shall be recorded according to 7.2.3.

8.4.11 Volume Sequence Number (BP 125-128)

This field shall specify as a 16-bit number the ordinal number of the volume in the Volume Set of which the volume is a member.

This field shall be recorded according to 7.2.3.

8.4.12 Logical Block Size (BP 129-132)

This field shall specify as a 16-bit number the size, in bytes, of a Logical Block.

This field shall be recorded according to 7.2.3.

8.4.13 Path Table Size (BP 133-140)

This field shall specify as a 32-bit number the length in bytes of a recorded occurrence of the Path Table identified by this Volume Descriptor.

This field shall be recorded according to 7.3.3.

8.4.14 Location of Occurrence of Type L Path Table (BP 141-144)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an
(Page 24) occurrence of the Path Table. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the least significant byte first.

This field shall be recorded according to 7.3.1.

8.4.15 Location of Optional Occurrence of Type L Path Table (BP 145-148)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an optional occurrence of the Path Table. If the value is 0, it shall mean that the Extent shall not be expected to have been recorded. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the least significant byte first.

This field shall be recorded according to 7.3.1.

8.4.16 Location of Occurrence of Type M Path Table (BP 149-152)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an occurrence of the Path Table. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the most significant byte first.

This field shall be recorded according to 7.3.2.

8.4.17 Location of Optional Occurrence of Type M Path Table (BP 153-156)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an optional occurrence of the Path Table. If the value is 0, it shall mean that the Extent shall not be expected to have been recorded. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the most significant byte first.

This field shall be recorded according to 7.3.2.

8.4.18 Directory Record for Root Directory (BP 157-190)

This field shall contain an occurrence of the Directory Record for the Root directory.

This field shall be recorded according to 9.1.

8.4.19 Volume Set Identifier (BP 191-318)

This field shall specify an identification of the Volume Set of which the volume is a member.

The characters in this field shall be d-characters.

8.4.20 Publisher Identifier (BP 319-446)

This field shall specify an identification of the user who specified what shall be recorded on the Volume Group of which the volume is a member.

If the first byte is set to (5F), the remaining bytes of this field shall specify an identifier for a file containing the identification of the user. This file shall be described in the Root Directory. The File Name shall not contain more than eight d-characters and the File Name Extension shall not contain more than three d-characters.

If all bytes of this field are set to (20), it shall mean that no such user is identified.

The characters in this field shall be a-characters.

8.4.21 Data Preparer Identifier (BP 447-574)

This field shall specify an identification of the person or other entity which controls the preparation of the data to be recorded on the Volume Group of which the volume is a member.

If the first byte is set to (5F), the remaining bytes of this field shall specify an identifier for a file containing the identification of the data preparer. This file shall be described in the Root Directory. The File Name shall not contain more than eight d-characters and the File Name Extension shall not contain more than three d-characters.

If all bytes of this field are set to (20), it shall mean that no such data preparer is identified.

The characters in this field shall be a-characters.

8.4.22 Application Identifier (BP 575-702)

This field shall specify an identification of the specification of how the data are recorded on the Volume Group of which the volume is a member.

If the first byte is set to (5F), the remaining bytes of this field shall specify an identifier for a file containing the identification of the application. This file shall be described in the Root Directory. The File Name shall not contain more than eight d-characters and the File Name Extension shall not contain more than three d-characters.

If all bytes of this field are set to (20), it shall mean that no such application is identified.

The characters in this field shall be a-characters.

8.4.23 Copyright File Identifier (BP 703-739)

This field shall specify an identification for a file described by the Root Directory and containing a copyright statement for the Volume Set. If all bytes of this field are set to (20), it shall mean that no such file is identified.

The File Name of a Copyright File Identifier shall not contain more than 8 d-characters. The File Name Extension of a Copyright File Identifier shall not contain more than 3 d-characters.

The characters in this field shall be d-characters, SEPARATOR 1 and SEPARATOR 2.

This field shall be recorded as specified in 7.5.

8.4.24 Abstract File Identifier (BP 740-776)

This field shall specify an identification for a file described by the Root Directory and containing an abstract statement for the Volume Set. If all bytes of this field are set to (20), it shall mean that no such file is identified.

The File Name of an Abstract File Identifier shall not contain more than 8 d-characters. The File Name Extension of an Abstract File Identifier shall not contain more than 3 d-characters.

The characters in this field shall be d-characters, SEPARATOR 1 and SEPARATOR 2.

This field shall be recorded as specified in 7.5.

8.4.25 Bibliographic File Identifier (BP 777-813)

This field shall specify an identification for a file described by the Root Directory and containing bibliographic records interpreted according to standards that are the subject of an agreement between the originator and the recipient of the volume. If all bytes of this field are set to (20), it shall mean that no such file is identified.

The File Name of a Bibliographic File Identifier shall not contain more than eight d-characters. The File Name Extension of a Bibliographic File Identifier shall not contain more than three d-characters.

The characters in this field shall be d-characters, SEPARATOR 1 and SEPARATOR 2.

The field shall be recorded as specified in 7.5.

8.4.26 Volume Creation Date and Time (BP 814-830)

This field shall specify the date and the time of the day at which the information in the volume was created. It shall be recorded according to 8.4.26.1.

8.4.26.1 Date and Time Format

The date and time shall be represented by a 17-byte field recorded as follows.

RBP	Interpretation	Content
1-4	Year from 1 to 9999	digits
5-6	Month of the year from 1 to 12	digits
7-8	Day of the month from 1 to 31	digits
9-10	Hour of the day from 0 to 23	digits
11-12	Minute of the hour from 0 to 59	digits
13-14	Second of the minute from 0 to 59	digits
15-16	Hundredths of a second	digits
17	Offset from Greenwich Mean Time in number of 30 minute intervals from -24 (West) to +24 (East) recorded according to 7.1.2	numerical value

If all characters in RBP 1-16 of this field are the digit ZERO and the number in RBP 17 is zero, it shall mean that the date and time are not specified.

8.4.27 Volume Modification Date and Time (BP 831-847)

This field shall specify the date and the time of the day at which the information in the volume was last modified.

This field shall be recorded according to 8.4.26.1.

8.4.28 Volume Expiration Date and Time (BP 848-864)

This field shall specify the date and the time of the day at which the information in the volume may be regarded as obsolete. If the date and time are not specified then the information shall not be regarded as obsolete.

This field shall be recorded according to 8.4.26.1.

8.4.29 Volume Effective Date and Time (BP 865-881)

This field shall specify the date and the time of the day at which

the information in the volume may be used. If the date and time are not specified then the information may be used at once.

This field shall be recorded according to 8.4.26.1.

8.4.30 File Structure Version (BP 882)

This field shall specify as an 8-bit number the version of the specification for the records of a directory and of a Path Table.

1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

8.4.31 Reserved for future standardization (BP 883)

This field shall be set to (00).

8.4.32 Application Use (BP 884-1395)

This field shall be reserved for application use. Its content is not specified by this Standard.

8.4.33 Reserved for future standardization (BP 1396-2048)

This field shall be set to (00).

8.5 Supplementary Volume Descriptor

The Supplementary Volume Descriptor shall identify the volume, the system specifying the content of the Logical Sectors with Logical Sector Numbers 0 to 15, the size of the Volume Space, the version of the standard which applies to the Volume Descriptor, the version of the specification which applies to the directory records and the Path Table records, certain attributes of the volume and the coded graphic character set used to interpret descriptor fields that contain characters.

BP	Field Name	Content
1	Volume Descriptor Type	numerical value
2-6	Standard Identifier	CD001
7	Volume Descriptor Version	numerical value
8	Volume Flags	8 bits
9-40	System Identifier	a1-characters
41-72	Volume Identifier	d1-characters

73-80	Unused Field	(00) bytes
81-88	Volume Space Size	numerical value
89-120	Escape Sequences	32 bytes
121-124	Volume Set Size	numerical value
125-128	Volume Sequence Number	numerical value
129-132	Logical Block Size	numerical value
133-140	Path Table Size	numerical value
141-144	Location of Occurrence of Type L Path Table	numerical value
(Page 28)		
145-148	Location of Optional Occurrence of Type L Path Table	numerical value
149-152	Location of Occurrence of Type M Path Table	numerical value
153-156	Location of Optional Occurrence of Type M Path Table	numerical value
157-190	Directory Record for Root Directory	34 bytes
191-318	Volume Set Identifier	d1-characters
319-446	Publisher Identifier	a1-characters
447-574	Data Preparer Identifier	a1-characters
575-702	Application Identifier	a1-characters
703-739	Copyright File Identifier	d1-characters,SEPARATOR 1, SEPARATOR 2
740-776	Abstract File Identifier	d1-characters,SEPARATOR 1, SEPARATOR 2
777-813	Bibliographic File Identifier	d1-characters,SEPARATOR 1, SEPARATOR 2
814-830	Volume Creation Date and Time	Digit(s), numerical value
831-847	Volume Modification Date and Time	Digit(s), numerical value
848-864	Volume Expiration Date and Time	Digit(s), numerical value
865-881	Volume Effective Date and Time	Digit(s), numerical value
882	File Structure Version	numerical value
883	(Reserved for future standardization)	(00) bytes

884-1395	Application Use	not specified
1396-2048	(Reserved for future standardization)	(00) bytes

Within a Volume Descriptor Set the contents of the fields of this descriptor shall be identical with the contents of the corresponding fields in a Primary Volume Descriptor except for the following fields.

8.5.1 Volume Descriptor Type (BP 1)

This field shall specify an 8-bit number indicating that the Volume Descriptor is a Supplementary Volume Descriptor.

The number in this field shall be 2.

This field shall be recorded according to 7.1.1.

8.5.2 Volume Descriptor Version (BP 7)

This field shall specify as an 8-bit number an identification of the version of the specification for the Supplementary Volume Descriptor.

1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

8.5.3 Volume Flags (BP 8)

The bits of this field shall be numbered from 0 to 7 starting with the least significant bit.

(Page 29) This field shall specify certain characteristics of the volume as follows.

Bit 0 if set to ZERO, shall mean that the Escape Sequences field specifies only escape sequences registered according to ISO 2375;

if set to ONE, shall mean that the Escape Sequences field specifies at least one escape sequence not registered according to ISO 2375.

Bits 1-7 These bits are reserved for future standardization and shall all be set to ZERO.

8.5.4 System Identifier (BP 9-40)

This field shall specify an identification of a system which can recognize and act upon the content of the Logical Sectors with Logical Sector Numbers 0 to 15 of the volume.

The characters in this field shall be a1-characters.

8.5.5 Volume Identifier (BP 41-72)

This field shall specify an identification of the volume.

The characters in this field shall be d1-characters.

8.5.6 Escape Sequences (BP 89-120)

This field shall specify one more escape sequences according to ECMA-35 that designate the GO graphic character set and, optionally, the G1 graphic character set to be used in an 8-bit environment according to ECMA-35 to interpret descriptor fields related to the Directory Hierarchy identified by this Volume Descriptor (see 7.4.4). If the G1 set is designated, it is implicitly invoked into columns 10 to 15 of the code table.

These escape sequences shall conform to ECMA-35, except that the ESCAPE character shall be omitted from each designating escape sequence when recorded in this field. The first or only escape sequence shall begin at the first byte of the field. Each successive escape sequence shall begin at the byte in the field immediately following the last byte of the preceding escape sequence. Any unused positions following the last sequence shall be set to (00).

If Bit 0 of the Volume Flags field is set to ZERO, it shall mean that this field specifies only escape sequences registered according to ISO 2375.

If all the bytes of this field are set to (00), it shall mean that the set of a1-characters is identical with the set of a-characters and that the set of d1-characters is identical with the set of d-characters. In this case both sets are coded according to ECMA-6.

8.5.7 Path Table Size (BP 133-140)

This field shall specify as a 32-bit number the length in bytes of a recorded occurrence of the Path Table identified by this Volume Descriptor.

This field shall be recorded according to 7.3.3.

8.5.8 Location of Occurrence of Type L Path Table (BP 141-144)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an occurrence of the Path Table. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the least significant byte first.

This field shall be recorded according to 7.3.1.

8.5.9 Location of Optional Occurrence of Type L Path Table (BP 145-148)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an optional occurrence of the Path Table. If the value is 0, it shall

mean that the Extent shall not be expected to have been recorded. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the least significant byte first.

This field shall be recorded according to 7.3.1.

8.5.10 Location of Occurrence of Type M Path Table (BP 149-152)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an occurrence of the Path Table. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the most significant byte first.

This field shall be recorded according to 7.3.2.

8.5.11 Location of Optional Occurrence of Type M Path Table (BP 153-156)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent which contains an occurrence of the Path Table. If the value is 0, it shall mean that the Extent shall not be expected to have been recorded. Multiple-byte numerical values in a record of this occurrence of the Path Table shall be recorded with the most significant byte first.

This field shall be recorded according to 7.3.2.

8.5.12 Directory Record for Root Directory (BP 157-190)

This field shall contain an occurrence of the Directory Record for the Root Directory.

This field shall be recorded according to 9.1.

8.5.13 Volume Set Identifier (BP 191-318)

This field shall specify an identification of the Volume Set of which the volume is a member.

The characters in this field shall be d1-characters.

8.5.14 Publisher Identifier (BP 319-446)

This field shall specify an identification of the user who specified what shall be recorded on the Volume Group of which the volume is a member.

If the first byte is set to (5F), the remaining bytes of this field shall specify an identifier for a file containing the identification of the user. This file shall be described in the Root Directory.

If all bytes of this field are set to (20), it shall mean that no such user is identified.

The characters in this field shall be a1-characters.

8.5.15 Data Preparer Identifier (BP 447-574)

This field shall specify an identification of the person or other entity which controls the preparation of the data to be recorded on the Volume Group of which the volume is a member.

If the first byte is set to (5F), the remaining bytes of this field shall specify an identifier for a file containing the identification of the data preparer. This file shall be described in the Root Directory.

(Page 31) If all bytes of this field are set to (20), it shall mean that no such data preparer is identified.

The characters in this field shall be a1-characters.

8.5.16 Application Identifier (BP 574-702)

This field shall specify an identification of the specification of how the data are recorded on the Volume Group of which the volume is a member.

If the first byte is set to (5F), the remaining bytes of this field shall specify an identifier for a file containing the identification of the application. This file shall be described in the Root Directory.

If all bytes of this field are set to (20), it shall mean that no such application is identified.

The characters in this field shall be a1-characters.

8.5.17 Copyright File Identifier (BP 703-739)

This field shall specify an identification for a file described by the Root Directory and contain a copyright statement for the Volume Set. If all bytes of this field are set to (20), it shall mean that no such file is identified.

The characters in this field shall be d1-characters, SEPARATOR 1 and SEPARATOR 2.

The field shall be recorded as specified in 7.5.

8.5.18 Abstract File Identifier (BP 740-776)

This field shall specify an identification for a file described by the Root Directory and contain an abstract statement for the Volume Set. If all bytes of this field are set to (20), it shall mean that no such file is identified.

The characters in this field shall be d1-characters, SEPARATOR 1 and SEPARATOR 2.

The field shall be recorded as specified in 7.5.

8.5.19 Bibliographic File Identifier (BP 777-813)

This field shall specify an identification for a file described by the Root Directory and contain bibliographic records interpreted according to standards that are the subject of an agreement between the originator and the recipient of the volume. If all bytes of this field are set to (20), it shall mean that no such file is identified.

The characters in this field shall be d1-characters, SEPARATOR 1 and SEPARATOR 2.

The field shall be recorded as specified in 7.5.

8.5.20 Application Use (BP 884-1395)

This field shall be reserved for application use. Its content is not specified by this Standard.

8.6 Volume Partition Descriptor

The Volume Partition Descriptor shall identify a volume partition within the Volume Space, the system specifying the content of fields reserved for system use in the Volume Descriptor, the position and size of the volume partition, and the version of the standard which applies to the Volume Descriptor. The contents of the volume partition are not specified by this Standard.

BP	Field Name	Content
1	Volume Descriptor Type	numerical value
2-6	Standard Identifier	CD001
7	Volume Descriptor Version	numerical value
8	Unused Field	(00) bytes
9-40	System Identifier	a-characters
41-72	Volume Partition Identifier	d-characters
73-80	Volume Partition Location	numerical value
81-88	Volume Partition Size	numerical value
89-2048	System Use	not specified

8.6.1 Volume Descriptor Type (BP 1)

This field shall specify an 8-bit number indicating that the Volume Descriptor is a Volume Partition Descriptor.

The number in this field shall be 3.

This field shall be recorded according to 7.1.1.

8.6.2 Standard Identifier (BP 2-6)

This field shall specify an identification of this Standard.

The characters in this field shall be CD001.

8.6.3 Volume Descriptor Version (BP 7)

This field shall specify as an 8-bit number an identification of the version of the specification for the Volume Partition Descriptor.

1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

8.6.4 Unused Field (BP 8)

This field shall be set to (00).

8.6.5 System Identifier (BP 9-40)

This field shall specify an identification of a system which can recognize and act upon the content of the System Use field in the Volume Descriptor.

The characters in this field shall be a-characters.

8.6.6 Volume Partition Identifier (BP 41-72)

This field shall specify an identification of the Volume Partition.

The characters in this field shall be d-characters.

8.6.7 Volume Partition Location (BP 73-80)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Volume Partition.

This field shall be recorded according to 7.3.3.

8.6.8 Volume Partition Size (BP 81-88)

This field shall specify as a 32-bit number the number of Logical Blocks in which the Volume Partition is recorded.

 This field shall be recorded according to 7.3.3.

8.6.9 System Use (BP 89-2048)

This field shall be reserved for system use. Its content is not specified by this Standard.

FILE AND DIRECTORY DESCRIPTORS

9. FILE AND DIRECTORY DESCRIPTORS

9.1 Format of a Directory Record

BP	Field Name	Content
1	Length of Directory Record (LEN_DR)	numerical value
2	Extended Attribute Record Length	numerical value
3-10	Location of Extent	numerical value
11-18	Data Length	numerical value
19-25	Recording Date and Time	numerical value
26	File Flags	8 bits
27	File Unit Size	numerical value
28	Interleave Gap Size	numerical value
29-32	Volume Sequence Number	numerical value
33	Length of File Identifier (LEN_FI)	numerical value
34-(33+LEN_FI)	File Identifier	d-characters, d1-characters, SEPARATOR 1, SEPARATOR 2, (00), (01)
(34+LEN_FI)	Padding Field	(00) bytes
(LEN_DR-LEN_SU+1)-(LEN_DR)	System Use	LEN_SU bytes

Note 16. LEN_SU denotes the length of the System Use field.

9.1.1 Length of Directory Record (LEN_DR) (BP 1)

This field shall specify as an 8-bit number the length in bytes of the Directory Record.

This field shall be recorded according to 7.1.1.

9.1.2 Extended Attribute Record Length (BP 2)

This field shall contain an 8-bit number. This number shall specify the assigned Extended Attribute Record Length if an Extended Attribute Record is recorded. Otherwise this number shall be zero.

This field shall be recorded according to 7.1.1.

9.1.3 Location of Extent (BP 3-10)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent.

This field shall be recorded according to 7.3.3.

9.1.4 Data Length (BP 11-18)

This field shall specify as a 32-bit number the data length of the File Section.

(Page 34) This field shall be recorded according to 7.3.3.

Note 17. This number does not include the length of any Extended Attribute Record.

9.1.5 Recording Date and Time (BP 19-25)

This field shall indicate the date and the time of the day at which the information in the Extent described by the Directory Record was recorded.

The date and time shall be represented by seven 8-bit numbers each of which shall be recorded according to 7.1.1. as follows.

RBP	Interpretation	Content
1	Number of years since 1900	numerical value
2	Month of the year from 1 to 12	numerical value
3	Day of the month from 1 to 31	numerical value
4	Hour of the day from 0 to 23	numerical value
5	Minute of the hour from 0 to 59	numerical value
6	Second of the minute from 0 to 59	numerical value
7	Offset to Greenwich Mean Time in number of 30 minute intervals from -24 (West) to +24 (East) recorded according to 7.1.2	numerical value

If all seven numbers are zero, it shall mean that the date and time are not specified.

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9.1.6 File Flags (BP 26)

The bits of this field shall be numbered from 0 to 7 starting with the least significant bit.

If this Directory Record identifies a directory then bit positions 2, 3, and 7 shall be set to ZERO.

If no Extended Attribute Record is associated with the File Section identified by this Directory Record then bit positions 3 and 4 shall be set to ZERO.

This field shall specify certain characteristics of the file as follows.

Bit Position	Bit Name	
0	Existence	if set to ZERO, shall mean that the existence of the file shall be made known to the user upon an inquiry by the user; if set to ONE, shall mean that the existence of the file need not be made known to the user.
1	Directory	if set to ZERO, shall mean that the Directory Record does not identify a directory; if set to ONE, shall mean that the Directory Record identifies a directory.
2	Associated File	if set to ZERO, shall mean that the file is not an Associated File; if set to ONE, shall mean that the file is an Associated File.
3	Record	if set to ZERO, shall mean that the structure of the information in the file is not specified by the Record Format field of any associated Extended Attribute Record (see 9.5.8); if set to ONE, shall mean that the structure of the information in the file has a record format specified by a number other than zero in the Record Format Field of the Extended Attribute Record (see 9.5.8).
4	Protection	if set to ZERO, shall mean that: - an Owner Identification and a Group Identification are not specified for the file (see 9.5.1 and 9.5.2),

		- any user may read or execute the file (see 9.5.3). if set to ONE, shall mean that: - an Owner Identification and a Group Identification are specified for the file (see 9.5.1 and 9.5.2), - at least one of the even-numbered bit or bit 0 in the Permissions field of the associated Extended Attribute Record is set to ONE (see 9.5.3).
5-6	Reserved	these bits are reserved for future standardization and shall be set to ZERO.
7	Multi-Extent	if set to ZERO, shall mean that this is the final Directory Record for the file; if set to ONE, shall mean that this is not the final Directory Record for the file.

9.1.7 File Unit Size (BP 27)

This field shall contain an 8-bit number. This number shall specify the File Unit Size for the File Section if the File Section is recorded in interleaved mode. Otherwise this number shall be zero.

This field shall be recorded according to 7.1.1.

9.1.8 Interleave Gap Size (BP 28)

This field shall contain an 8-bit number. This number shall specify the Interleave Gap Size for the File Section if the File Section is recorded in interleaved mode. Otherwise this number shall be zero.

This field shall be recorded according to 7.1.1.

9.1.9 Volume Sequence Number (BP 29-32)

This field shall specify as a 16-bit number the ordinal number of the volume in the Volume Set on which the Extent described by this Directory Record is recorded.

(Page 36) This field shall be recorded according to 7.2.3.

9.1.10 Length of File Identifier (LEN_FI) (BP 33)

This field shall specify as an 8-bit number the length in bytes of the File Identifier field of the Directory Record.

This field shall be recorded according to 7.1.1.

9.1.11 File Identifier (BP 34-(33+LEN_FI))

The interpretation of this field depends as follows on the setting of the Directory bit of the File Flags field.

If set to ZERO, shall mean:	The field shall specify an identification for the file. The characters in this field shall be d-characters or d1-characters, SEPARATOR 1, SEPARATOR 2. The field shall be recorded as specified in 7.5.
If set to ONE, shall mean:	The field shall specify an identification for the directory. The characters in this field shall be d-characters or d1-characters or only a (00) byte, or only a (01) byte. The field shall be recorded as specified in 7.6.

9.1.12 Padding Field (BP (34+LEN_FI))

This field shall be present in the Directory Record only if the number in the Length of the File Identifier field is an even number.

If present, this field shall be set to (00).

9.1.13 System Use (BP (LEN_DR-LEN_SU+1)-LEN_DR)

This field shall be optional. If present, this field shall be reserved for system use. Its content is not specified by this Standard. If necessary to cause the Directory Record to comprise an even number of bytes, a (00) byte shall be added to terminate this field.

9.2 Consistency of File Attributes between Directory Records of a File

The following fields of each Directory Record for the same file shall contain the same values:

- Existence bit of the File Flags field
- Directory bit of the File Flags field
- Associated File bit of the File Flags field
- Record bit of the File Flags field
- Reserved bits of the File Flags field
- Length of File Identifier field
- File Identifier field
- Padding Field

9.3 Order of Directory Records

The records of a Directory shall be ordered by the following criteria

in descending order of significance:

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- in ascending order according to the relative value of File Name, where File Names shall be valued as follows:

  . If two File Names have the same content in all byte positions, then these two File Names are said to be equal in value.

  . If two File Names do not contain the same number of byte positions, the shorter File Name shall be treated as if it were padded on the right with all padding bytes set to (20) and as if both File Names contained the identical number of byte positions.

    After any padding necessary to treat the File Names as if they were of equal length, the characters in the corresponding byte positions, starting with the first position, of the File Names are compared until a byte position is found that does not contain the same character in both File Names. The greater File Name is the one that contains the character with the higher code position value in the coded graphic character set used to interpret the File Name field of the Directory Record.

- in ascending order according to the relative value of File Name Extension, where File Name Extensions shall be valued as follows:

  . If two File Name Extensions have the same content in all byte positions, then these two File Name Extensions are said to be equal in value.

  . If two File Name Extensions do not contain the same number of byte positions, the shorter File Name Extension shall be treated as if it were padded on the right with all padding bytes set to (20) and as if both File Name Extensions contained the identical number of byte positions.

    After any padding necessary to treat the File Name Extensions as if they were of equal length, the characters in the corresponding byte positions, starting with the first position, of the File Name Extensions are compared until a byte position is found that does not contain the same character in both File Name Extensions. The greater File Name Extension is the one that contains the character with the higher code position value in the coded graphic character set used to interpret the File Name Extension field of the Directory Record.

- in descending order according to the relative value of File Version Number, where File Version Numbers shall be valued as follows:

  . If two File Version Numbers have the same content in all byte positions, then these two File Version Numbers are said to be equal in value.

  . If two File Version Numbers do not contain the same number of byte positions, the shorter File Version Number shall be treated as if it were padded on the left with all padding bytes set to (30) and as if both File Version Numbers contained the identical number of byte positions.

After any padding necessary to treat the File Version Numbers as if they were of equal length, the characters in the corresponding byte positions, starting with the first position, of the File Version Numbers are compared until a byte position is found that does not contain the same character in both File Version Numbers. The greater File Version Number is the one that contains the character with the higher code position value in the coded graphic character set used to interpret the File Version Number field of the Directory Record.

- in descending order according to the value of the Associated File bit of the File Flags field.

- The order of the File Sections of the File Space.

9.4 Format of a Path Table Record

BP	Field Name	Content
1	Length of Directory Identifier (LEN_DI)	numerical value
2	Extended Attribute Record Length	numerical value
3-6	Location of Extent	numerical value
7-8	Parent Directory Number	numerical value
9-(8+LEN_DI)	Directory Identifier	d-characters, d1-characters, (00) byte
(9+LEN_DI)	Padding Field	numerical value

9.4.1 Length of Directory Identifier (LEN_DI) (BP 1)

This field shall specify as an 8-bit number the length in bytes of the Directory Identifier field of the Path Table Record.

This field shall be recorded according to 7.1.1.

9.4.2 Extended Attribute Record Length (BP 2)

This field shall contain an 8-bit number. This number shall specify the assigned Extended Attribute Record Length if an Extended Attribute Record is recorded. Otherwise this number shall be zero.

This field shall be recorded according to 7.1.1.

9.4.3 Location of Extent (BP 3-6)

This field shall specify as a 32-bit number the Logical Block Number of the first Logical Block allocated to the Extent in which the directory is recorded.

This field shall be recorded according to 7.3.

9.4.4 Parent Directory Number (BP 7-8)

This field shall specify as a 16-bit number the record number in the Path Table for the parent directory of the directory.

This field shall be recorded according to 7.2.

9.4.5 Directory Identifier (BP 9-(8+LEN_DI))

This field shall specify an identification for a directory.

The characters in this field shall be d-characters or d1-characters or only a (00) byte.

This field shall be recorded as specified in 7.6.

9.4.6 Padding field (BP (9+LEN_DI))

This field shall be present in the Path Table Record only if the number in the Length of Directory Identifier field in an odd number.

If present, this field shall be set to (00).

9.5 Format of an Extended Attribute Record

If present, an Extended Attribute Record shall be recorded over at least one Logical Block. It shall have the following contents.

BP	Field Name	Content
1-4	Owner Identification	numerical value
5-8	Group Identification	numerical value
9-10	Permissions	16 bits
11-27	File Creation Date and Time	Digit(s), numerical value
28-44	File Modification Date and Time	Digit(s), numerical value
45-61	File Expiration Date and Time	Digit(s), numerical value
62-78	File Effective Date and Time	Digit(s), numerical value
79	Record Format	8 bits
80	Record Attributes	8 bits
81-84	Record Length	numerical value

85-116	System Identifier	a-characters, a1-characters
117-180	System Use	not specified
181	Extended Attribute Record Version	numerical value
182	Length of Escape Sequences (LEN_ESC)	numerical value
183-246	(Reserved for future standardization)	(00) bytes
247-250	Length of Application Use (LEN_AU)	numerical value
251-(250+ LEN_AU)	Application Use	LEN_AU bytes
(251+LEN_AU) -(250+ LEN_ESC+ LEN_AU)	Escape Sequences	LEN_ESC bytes

9.5.1 Owner Identification (BP 1-4)

This field shall specify as a 16-bit number an identification of the file owner who is a member of the group identified by the Group Identification field of the Extended Attribute Record.

If the number in this field is 0, this shall indicate that there is no owner identification specified for the file. In this case, the Group Identification field shall contain zero.

This field shall be recorded according to 7.2.3.

9.5.2 Group Identification (BP 5-8)

This field shall specify as a 16-bit number an identification of the group of which the file owner is a member.

The values for this number from 1 to a number subject to agreement between the data preparer and receiving system shall identify the group as belonging to the class of user referred to as System.

(Page 40) If the number in this field is 0, this shall indicate that there is no group identification specified for the file. In this case, the Owner Identification field shall contain zero.

This field shall be recorded according to 7.2.3.

9.5.3 Permissions (BP 9-10)

The bits of this 16-bit field shall be numbered from 0 to 15 starting with the least significant bit of the byte recorded in byte position 10.

Bits 0 to 3 may be ignored in interchange.

If requested by the owner, bits 4 to 7 may be ignored in interchange.

This field shall specify access permissions for certain classes of users as follows.

Bit 0	if set to ZERO, shall mean that an owner who is a member of a group of the System class of user may read the file; if set to ONE, shall mean that an owner who is a member of a group of the System class of user may not read the file.
Bit 1	shall be set to ONE.
Bit 2	if set to ZERO, shall mean that an owner who is a member of a group of the System class of user may execute the file; if set to ONE, shall mean that an owner who is a member of a group of the System class of user may not execute the file.
Bit 3	shall be set to ONE.
Bit 4	if set to ZERO, shall mean that the owner may read the file; if set to ONE, shall mean that the owner may not read the file.
Bit 5	shall be set to ONE.
Bit 6	if set to ZERO, shall mean that the owner may execute the file; if set to ONE, shall mean that the owner may not execute the file.
Bit 7	shall be set to ONE.
Bit 8	if set to ZERO, shall mean that any user who is a member of the group specified by the Group Identification field may read the file; if set to ONE, shall mean that of the users who are members of the group specified by the Group Identification field, only the owner may read the file.
Bit 9	shall be set to ONE.
Bit 10	if set to ZERO shall mean that any user who is a member of the group specified by the Group Identification field may execute the file; if set to ONE, shall mean that of the users who are members

		of the group specified by the Group Identification field, only the owner may execute the file.
Bit 11		shall be set to ONE.
(Page 41) Bit 12		if set to ZERO, shall mean that any user may read the file. if set to ONE, shall mean that a user not a member of the group specified by the Group Identification field may not read the file.
Bit 13		shall be set to ONE.
Bit 14		if set to ZERO, shall mean that any user may execute the file. if set to ONE, shall mean that a user not a member of the group specified by the Group Identification field may not execute the file.
Bit 15		shall be set to ONE.

9.5.4 File Creation Date and Time (BP 11-27)

This field shall specify the date and the time of the day at which the information in the file was created.

This field shall be recorded according to 8.4.26.1.

9.5.5 File Modification Date and Time (BP 28-44)

This field shall specify the date and the time of the day at which the information in the file was last modified.

This field shall be recorded according to 8.4.26.1.

9.5.6 File Expiration Date and Time (BP 45-61)

This field shall specify the date and the time of the day at which the information in the file may be regarded as obsolete. If the date and time are not specified then the information shall not be regarded as obsolete.

This field shall be recorded according to 8.4.26.1.

9.5.7 File Effective Date and Time (BP 62-78)

This field shall specify the date and the time of the day at which the information in the file may be used. If the date and time are not specified then the information may be used at once.

This field shall be recorded according to 8.4.26.1.

9.5.8 Record Format (BP 79)

This field shall contain an 8-bit number specifying the format of the information in the file.

Number 0 shall mean that the structure of the information recorded in the file is not specified by this field.

Number 1 shall mean that the information in the file is a sequence of fixed-length records (see 6.10.3).

Number 2 shall mean that the information in the file is a sequence of variable-length records (see 6.10.4), in which the RCW is recorded according to 7.2.1.

Number 3 shall mean that the information in the file is a sequence of variable-length records (see 6.10.4), in which the RCW is recorded according to 7.2.2.

Numbers 4-127 are reserved for future standardization.

Numbers 128-255 are reserved for system use.

(Page 42) This field shall be recorded according to 7.1.1.

9.5.9 Record Attributes (BP 80)

This field shall contain an 8-bit number specifying certain processing of the records in a file when they are displayed on a character-imaging device.

Number 0 shall mean that each record shall be preceded by a LINE FEED character and followed by a CARRIAGE RETURN character.

Number 1 shall mean that the first byte of a record shall be interpreted as specified in ISO 1539 for vertical spacing.

Number 2 shall mean that the record contains the necessary control information.

Numbers 3-255 are reserved for future standardization.

If the Record Format field contains zero then the Record Attribute field shall be ignored in interchange.

This field shall be recorded according to 7.1.1.

9.5.10 Record Length (BP 81-84)

This field shall specify a 16-bit number as follows.

If the Record Format field contains the number 0, the Record Length field shall contain zero.

If the Record Format field contains the number 1, the Record Length field shall specify the length in bytes of each record in the file.

If the Record Format field contains the number 2 or 3, the Record Length field shall specify the maximum length in bytes of a record in the file.

This field shall be recorded according to 7.2.3.

9.5.11 System Identifier (BP 85-116)

This field shall specify an identification of a system which can recognize and act upon the content of the System Use field in the Extended Attribute Record and associated Directory Record.

The characters in this field shall be a-characters or a1-characters.

9.5.12 System Use (BP 117-180)

This field shall be reserved for system use. Its content is not specified by this Standard.

9.5.13 Extended Attribute Record Version (BP 181)

This field shall specify as an 8-bit number the version of the specification for the Extended Attribute Record.

1 shall indicate the structure of the present Standard.

This field shall be recorded according to 7.1.1.

9.5.14 Length of Escape Sequences (BP 182)

This field shall specify as an 8-bit number the length in bytes of the Escape Sequences field in this Extended Attribute Record.

This field shall be recorded according to 7.1.1.

9.5.15 Reserved for future standardization (BP 183-246)

This field shall be set to (00).

9.5.16 Length of Application Use (BP 247-250)

This field shall specify as a 16-bit number the length in bytes of the Application Use field in the Extended Attribute Record.

This field shall be recorded according to 7.2.3.

9.5.17 Application Use (BP 251-BP (250+LEN_AU))

This field shall be reserved for application use. Its content is not specified by this Standard.

9.5.18 Escape Sequences (BP (251+LEN_AU)-BP(250+LEN_ESC+LEN_AU))

This field shall be optional. If present, it shall contain escape sequences that designate the coded character set to be used to interpret the contents of the file. These escape sequences shall

conform to ECMA-35, except that the ESCAPE character shall be omitted from each escape sequence.

The first or only escape sequence shall begin at the first byte of the field. Each successive escape sequence shall begin at the byte in the field immediately following the last byte of the preceding escape sequence. Any unused positions following the last escape sequence shall be set to (00).

9.6 Consistency of File Attributes between Extended Attribute Records of a File

The following fields of the Extended Attribute Record associated with the File Sections of a file shall contain the same values:

- Record Format field
- Record Attributes field
- Record Length field, if the records are fixed-length records (see 6.10.3).

10. LEVELS OF INTERCHANGE

This Standard specifies three nested levels of interchange.

10.1 Level 1

At Level 1 the following restrictions shall apply:

- each file shall consist of only one File Section;
- a File Name shall not contain more than 8 d-characters or 8 d1-characters;
- a File Name Extension shall not contain more than 3 d-characters or 3 d1-characters;
- A Directory Identifier shall not contain more than 8 d-characters or 8 d1-characters.

10.2 Level 2

At Level 2 the following restriction shall apply:

- each file shall consist of only one File Section.

10.3 Level 3

At Level 3 no restrictions apply.

(Part of **High Sierra**)

11. REQUIREMENT FOR DESCRIPTION OF SYSTEMS

This Standard specifies that certain information shall be communicated between a user and an implementation (see clauses 12 and 13).

An information processing system that conforms to this Standard shall be the subject of a description which identifies the means by which the user may supply such information, or may obtain it when it is made available, as specified in this Standard.

REQUIREMENTS FOR AN ORIGINATING SYSTEM

(Part of **High Sierra**)

12. REQUIREMENTS FOR AN ORIGINATING SYSTEM

12.1 General

The implementation shall be capable of recording a set of files, and all descriptors that are specified in this Standard, on a Volume Set in accordance with one of the interchange levels specified in this Standard.

12.2 Files

The implementation shall obtain from the data preparer the information that constitute the set of files to be recorded.

12.3 Descriptors

12.3.1 The implementation shall allow the data preparer to supply the information that is to be recorded in each of the descriptor fields below, and shall supply the information for a field if the data preparer does not supply it.

For the Primary Volume Descriptor:

- System Identifier
- Volume Identifier
- Logical Block Size
- Location of Occurrence of Type L Path Table
- Location of Optional Occurrence of Type L Path Table
- Location of Occurrence of Type M Path Table
- Location of Optional Occurrence of Type M Path Table
- Volume Set Identifier
- Publisher Identifier
- Data Preparer Identifier
- Application Identifier
- Copyright File Identifier
- Abstract File Identifier
- Bibliographic File Identifier
- Volume Creation Date and Time
- Volume Modification Date and Time
- Volume Expiration Date and Time
- Volume Effective Date and Time
- Application Use

For each Path Table Record:

- Extended Attribute Record Length
- Location of Extent
- Parent Directory Number
- Directory Identifier

For each Directory Record:

- Extended Attribute Record Length
- Location of Extent
- Data Length

- Recording Date and Time
(Page 45) - The Existence bit of the File Flags field
- The Directory bit of the File Flags field
- The Associated File bit of the File Flags field
- The Record bit of the File Flags field
- The Protection bit of the File Flags field
- File Unit Size
- Interleave Gap Size
- Volume Sequence Number
- File Name of a File Identifier
- File Name Extension of a File Identifier
- File Version Number of a File Identifier
- System Use

12.3.2 The implementation shall allow the data preparer to supply the information that is to be recorded in the descriptor fields listed below, and shall not record the Supplementary Volume Descriptor if the data preparer does not supply the information.

For each Supplementary Volume Descriptor:

- System Identifier
- Volume Identifier
- Logical Block Size
- Location of Occurrence of Type L Path Table
- Location of Optional Occurrence of Type L Path Table
- Location of Occurrence of Type M Path Table
- Location of Optional Occurrence of Type M Path Table
- Bit 0 of the Volume Flags field
- Escape Sequences
- Volume Set Identifier
- Publisher Identifier
- Data Preparer Identifier
- Application Identifier
- Copyright File Identifier
- Abstract File Identifier
- Bibliographic File Identifier
- Volume Creation Date and Time
- Volume Modification Date and Time
- Volume Expiration Date and Time
- Volume Effective Date and Time
- Application Use

12.3.3 The implementation shall allow the data preparer to supply the information that is to be recorded in the descriptor fields listed below, and shall not record the Volume Partition Descriptor if the data preparer does not supply the information.

For each Volume Partition Descriptor:

- System Identifier
- Volume Partition Identifier
- Volume Partition Location
- Volume Partition Size
- System Use

12.3.4 The implementation shall allow the data preparer to supply the

information that is to be recorded in the descriptor fields listed below, and shall not record the Boot Record if the data preparer does not supply the information.

(Page 46) For each Boot Record:

- Boot System Identifier
- Boot Identifier
- Boot System Use

12.3.5 The implementation shall allow the data preparer to supply the information that is to be recorded in the descriptor fields listed below, and need not record the Extended Attribute Record if the data preparer does not supply the information for any of the descriptor fields listed below. If the Extended Attribute Record is recorded, the implementation shall supply the information for a field if the data preparer does not supply it.

For each Extended Attribute Record:

- Owner Identification
- Group Identification
- Permissions
- File Creation Date and Time
- File Modification Date and Time
- File Expiration Date and Time
- File Effective Date and Time
- Record Format
- Record Attributes
- Record Length
- System Identifier
- System Use
- Length of Escape Sequences
- Length of Application Use
- Application Use
- Escape Sequences

12.3.6 The implementation shall allow the data preparer to supply the information that is to be recorded on the Logical Sectors with Logical Sector Numbers 0 to 15.

REQUIREMENTS FOR A RECEIVING SYSTEM

(Part of **High Sierra**)

13. REQUIREMENTS FOR A RECEIVING SYSTEM

13.1 General

The implementation shall be capable of reading the files and the recorded descriptors from a Volume Set that has been recorded in accordance with one of the interchange levels specified in this Standard, except Associated Files.

13.2 Files

The implementation shall make available to the user the information that constitutes the recorded files, except any Associated File.

If the implementation allows the user to specify that the information constituting a file is to be interpreted according to 6.10, the implementation shall make available to the user the length of each record in the file.

13.3 Descriptors

13.3.1 The implementation shall allow the user to supply information sufficient to enable the implementation to locate the files required by the user, and to locate the volumes on which these files are recorded.

13.3.2 The implementation shall make available to the user the information that is recorded in each of the descriptor fields listed below.

(Page 47) For the Primary Volume Descriptor:

- Volume Identifier
- Volume Set Identifier
- Copyright File Identifier
- Abstract File Identifier
- Bibliographic File Identifier

For each Supplementary Volume Descriptor:

- Volume Identifier
- Volume Set Identifier
- Copyright File Identifier
- Abstract File Identifier
- Bibliographic File Identifier
- Bit 0 of the Volume Flags field
- Escape Sequences

For each Path Table Record:

- Parent Directory Number
- Directory Identifier

For each Directory Record:

- File Name of a File Identifier

- File Name Extension of a File Identifier
- The Directory bit of the File Flags field

13.4 Restrictions

The implementation may impose a limit on the length of a record to be made available to the user. The implementation is not required to make available to the user any byte beyond the first n bytes of a record, where n is the value of the imposed limit.

13.5 Levels of Implementation

This Standard specifies two nested levels of implementation

13.5.1 Level 1

At Level 1 the implementation need not make available to the user:

- the information that constitutes the files identified in a Directory Hierarchy that is identified in a Supplementary Volume Descriptor,

- the information that is recorded in the fields of a Supplementary Volume Descriptor and of the associate Path Table of associated directory records and Extended Attribute Records identified by the associated directory record.

13.5.2 Level 2

At Level 2 no such restrictions apply.

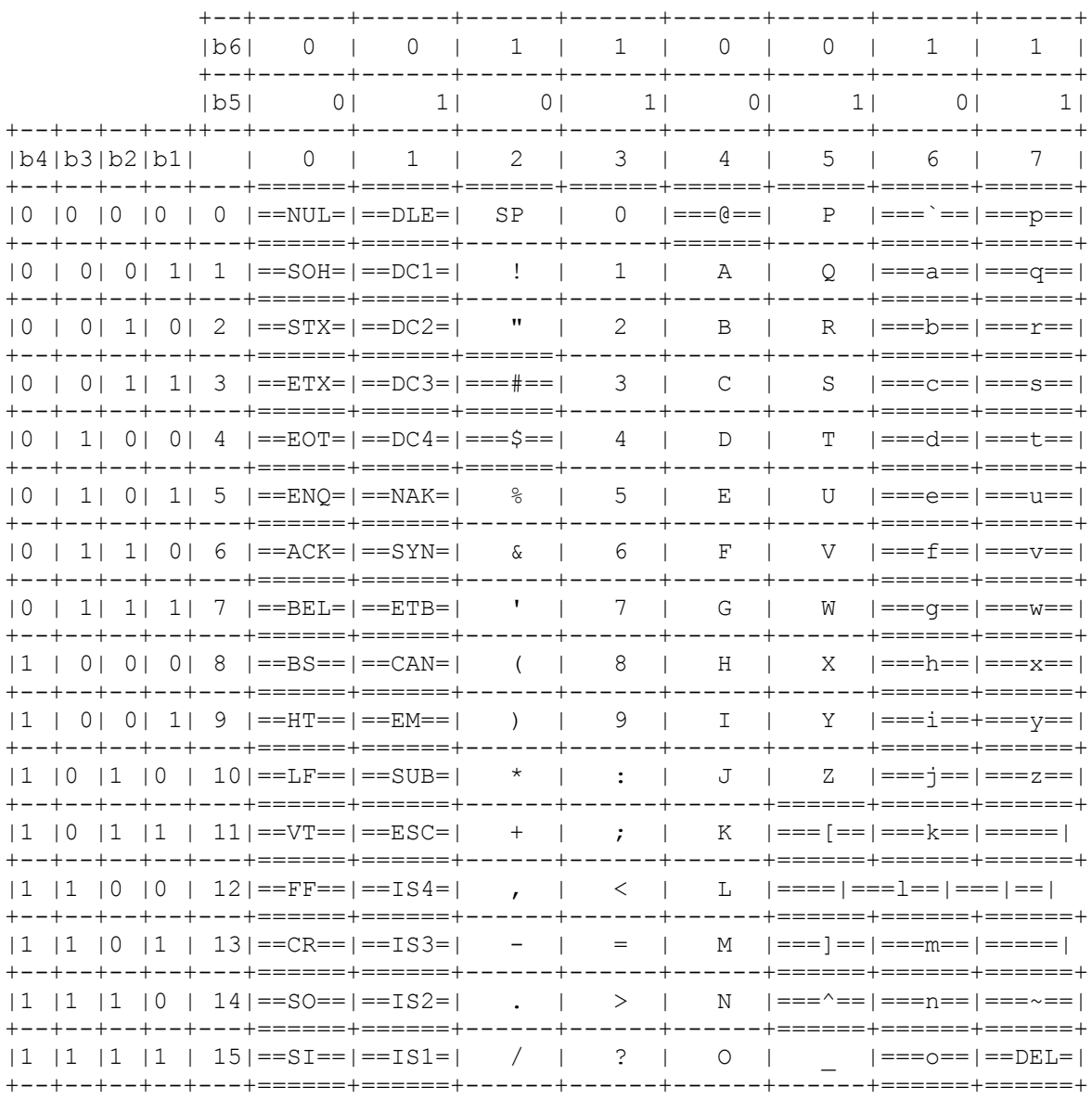
APPENDIX A

STANDARD ECMA-6: INTERNATIONAL REFERENCE VERSION (IRV)

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1								
0 0 0 0	0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	
1 1 0 0	12	FF	IS4	,	<	L		l		
1 1 0 1	13	CR	IS3	-	=	M	]	m	
1 1 1 0	14	SO	IS2	.	>	N	^	n	~
1 1 1 1	15	SI	IS1	/	?	O	_	o	DEL

The d-characters are those which are not shaded in the above table.

b7	0	0	0	0	1	1	1	1



b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1
b4 b3 b2 b1								
0 0 0 0	0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	
1 1 0 0	12	FF	IS4	,	<	L		l		
1 1 0 1	13	CR	IS3	-	=	M	]	m	
1 1 1 0	14	SO	IS2	.	>	N	^	n	~
1 1 1 1	15	SI	IS1	/	?	O	_	o	DEL

The a-characters are those which are not shaded in the above table.

AVIXIVA
Reflective Systems

21Feb93

File: HIHELP.TXT

If you got your Hitachi compatible CD-ROM drive used or passed along from someone else in your company and all the documentation is lost or missing you need this file.

Hi-Help was written to assist Hitachi CD-ROM drives users get the MS-DOS drivers and MS-DOS Extensions up and running so they can perform data access.

CONTENTS OF THIS FILE

Hitachi CD-ROM Drive Model List
Hitachi Bus Interface Card settings
Drive ID settings
CONFIG.SYS Example and Driver parameters
AUTOEXEC.BAT Example and parameters
MSCDEX Version list
Valid Driver version list

(Part of Hitachi help)

HITACHI CD-ROM DRIVE MODELS

Models using HITACHI (CDROM) BUS Interface

```
Model       Type#   Comments
CDR1502S      1     External - C36 type connector
CDR2500       2     Internal Full height - 40 pin card edge connector
CDR2500S            External version of 2500 - Dual DB37 Connectors
                                IDs 0-4
CDR1503S      3     External - Dual DB37, IDs 0-4
CDR3500       4     Internal - 40 pin header, IDs 0-4
CDR3600       5     Internal - 40 pin Header, IDs 0-7, 32K buffer
CDR1600S            External version of 3600, Dual DB37
CDR1700S      6     External, Dual DB37, IDs 0-7. 32K buffer
CDR1700SA     6     (rev 2)
                                128K buffer version of 1700
CDR3700       7     Internal, 40 pin header, IDs 0-7, 64K buffer
special       8     External, Custom I/F with cpu power, 32K buffer

(Drive types 3-8 reported by Identify command of DA3 or DA)

Compatible HITACHI BUS drives

Amdek LD1 - version of 1503S
Amdek LD2 - version of 3500
Todd 6000 - uses 3600 (compatible models use DB37 connectors)
Todd 7000 - uses 3700
Sun Moon Star - versions of CDR3600 and 1600S


Models using SCSI bus Interface

CDR1553S  External SCSI version of CDR1503S Dual C50
CDR3650   Internal SCSI version of CDR3600 with 64K buffer
CDR1650S  External version of CDR3650
CDR1750S  External SCSI version of CDR1700s
CDR3750   Internal SCSI-II MPC Compatible
```

The SCSI bus models work with cards from Future Domain, Adaptec, Trantor on the PC. Drivers from Hitachi are available for FD cards and for the Macintosh.

Interface Cards For Hitachi CD-ROM bus models (in order of intro date)

```
CDIFI2      External - DB37
                   DMA Ch3 transfer, Single drive (NDS-No Drive Select)
                   300H port address only
CDIF25A     Internal/External  40 Pin header/DB37
                   DMA Ch3 transfer, DIP switches for Internal/external
selection
                   Supports IDs 0-3
                   300H port address only
CDIF25-A2   same as CDIF25, Software transfer
```

```
                    300H port address hardwired - Jumper/Trace cut for others

CDIFI3      External - DB37 Single drive card for CDR1502S or NDS mode
                    Software transfer
                    300H port address only
CDIFI4      External - DB37 - Supports IDs 0-3
                    300H port address - Jumper/Trace cut for others
CDIFI4A     same as CDIFI4 with address jumpers & plug
CDIF25-A3   same as CDIF25-A2 with address jumpers & plug
CDIF35A     Internal only version of CDIFI4A - 40 pin header connector
CDIFI5A     Micro Channel version of CDIFI4A - @5EEE.ADF file sets address
CDIFI8A     Internal/External - 40 pin header/DB37 - Supports IDs 0-7
                    8 drive version of CDIFI4A/CDIF35A
CDIFI8S     Same as CDIFI8A except supports I/O bus speeds above 10MHz
```

All of the above interface cards except the CDIFI5A are for the PC bus and can use the same device driver. The CDIFI5A uses another device driver.

With current device drivers DMA Channel 3 is used only if software transfer fails. The Hitachi driver uses Software transfer and may require a card which supports it to work on AT class computers.

The PC bus interface cards are I/O Port mapped, not memory mapped. No hardware IRQ settings are used. The CDIFI8A and 8S have IRQ settings for 3 and 5. Make sure the IRQ jumper is not connected to IRQ3 or 5. It is not supported by the driver.

Interface Card Compatibility

CDIFI4A - 1-4 External drives - Replacement for CDIFI2 CDIFI3 CDIFI4

Supports: CDR1502S (single drive only if used)
CDR1503S CDR2500S CDR1600S CDR1700S (mixed ok)

CDIF35A - Internal drives

Supports: CDR2500 CDR3500 CDR3600 CDR3700 (mixed ok)

CDIFI8S - Direct replacement for: CDIFI2 CDIFI3 CDIFI4 CDIFI4A CDIFI8A
CDIF25A CDIF25A2 CDIF25A3

Supports: CDR1502S (single drive only - no others)
CDR1503S CDR2500S CDR3500 (4 drives max if any one this type)
CDR1600S CDR1700S CDR3600 CDR3700 (8 drives of this type)

NOTE: Internal drives can use external cards if the 40 pin cable to the drive is re-mapped to the DB37 wiring. Connections between pins are different for 40 pin to 37 pin. Cables for 40 pin to 40 pin and for DB37 to DB37 are pin to pin, 1 to 1, 2 to 2, etc. All pins wired. Common grounds wires are connected on the card and in the drives.

Hitachi Cable Model Numbers

CDCBL25B CDCBL25C CDCBL25CS - DB37/DB37 Male - The last model is current.
CDCBL35A CDCBL35AS - 40/40 header for single drive - 3500/3600/3700

External SCSI drives use standard SCSI Slave C50/C50
Internal SCSI drives use 50/50 Header cables - Female cable connectors

Bus Interface

(Part of Hitachi help)

I/O PORT ADDRESS JUMPERS - Hitachi Bus Interface

```
In sequence from Top to bottom
CDIFI4A/CDIFI8A/CDIFI8S
Jumper position - Address (base through base+0FH)
S7 - 360H  (1st alternative preferred)
S6 - 340H
S5 - 320H  (usually XT hard drive)
S4 - 300H  (usual jumper position - often conflicts with Network card)
S3 - 260H
S2 - 240H
S1 - 220H  (usually used by sound card for SB compatibility)
S0 - 200H  (usually not available due to joystick on MIO or sound card)

CDIF35A
S0 - 200H
S1 - 220H
S2 - 240H
S3 - 260H
S4 - 300H
S5 - 320H
S6 - 340H
S7 - 360H
```

The HITACHIA.SYS device driver defaults to 300H if /P:xxx is not used or is invalid on the Driver line in the CONFIG.SYS file.

CDIF25/A2/A3 DIP switch settings
(Switches labeled from top of card as 5 with bus edge connector at 1)
(On is toward left, off toward right)
Drive ID#0 Switch 5 ON-external DB37 connector OFF - Internal H40
ID#1 Switch 4 as above
ID#2 Switch 3 same
ID#3 Switch 2 same
---- Switch 1 Not used - on or off is ok

These switches select either internal or external connection for each drive ID used. The drive ID setting and connection used must match.

SCSI Interface Cards

TMC845 - Standard Future Domain card - Memory mapped - 4 address areas
IRQ 3/5, external connector is DB25 wired FD standard

TMC850MER - Standard Future Domain card - Memory mapped - 6 address areas
external connector is wired same as Macintosh host SCSI

DRIVE ID SETTINGS - INTRO

Hitachi Bus drive ID numbers must start with 0 and increase in sequence, 0, 1, 2, 3, (4, 5, 6, 7) on each interface card. Drives set to NDS mode respond to all ID settings. When more than one HITACHI BUS drive is used on the interface card, the drives must be set to 0, 1, etc.

ID settings 0-3: CDR1503S CDR2500 CDR2500S CDR3500

When these drives are used on the CDIFI8A or CDIFI8S, drive settings above 3 are invalid because the drives respond at 0 & 4, 1 & 5, 2 & 6, 3 & 7. This prevents use of the higher IDs of CDR3600, CDR3700 or CDR1700S drives.

ID settings 0-7: CDR1600S CDR1700S CDR3600 CDR3700

When these drives are used on interface cards which support only ID settings of O-3, drives set to higher ID settings are not seen. This may occur if the interface cable is missing pin 37 or one of the ground pins. 16/17

When a drive is used in single drive housing, the switches on the drive are usually set to ID#0, and the drive select 0 line is remapped to 0, 1, 2, 3 by switches on the case.

DRIVE ID SWITCH SETTINGS

(Part of Hitachi help)

DRIVE ID SWITCH SETTINGS

CDR1503S

Rotory switch set with straight slot screwdriver through hole in rear panel. Fully CCW ID#0 - Fully clockwise NDS
Rotate from CCW at ID 0, 1, 2, 3, NDS.

CDR1700S

1	2	3	4	5	6	Switches 1=On/Up 0=off/down
1	0	0	0	1	0	ID#0
0	1	0	0	1	0	ID#1
0	0	1	0	1	0	ID#2
0	0	0	1	1	0	ID#3
1	0	0	0	0	0	ID#4
0	1	0	0	0	0	ID#5
0	0	1	0	0	0	ID#6
0	0	0	1	0	0	ID#7
-	-	-	-	-	1	DREQ on - (not driver supported)

CDR1750S (SCSI BUS)

1	2	3	4	5	6	Switches 1=On/up 0=off/down
0	0	0	-	-	-	ID#0
0	0	1	-	-	-	ID#1
0	1	0	-	-	-	ID#2
0	1	1	-	-	-	ID#3
1	0	0	-	-	-	ID#4
1	0	1	-	-	-	ID#5
1	1	0	-	-	-	ID#6
1	1	1	-	-	-	ID#7
-	-	-	-	1	-	Termination on (internal power)
-	-	-	-	0	-	Term off
-	-	-	1	-	-	Check parity by drive (always sends parity)
-	-	-	0	-	-	Don't check parity
-	-	-	-	-	0	Normal for firmware revs below 0012
-	-	-	-	-	0	2048 byte default logical blocks (normal)
-	-	-	-	-	1	512 byte default blocks (SPARC bootable)

CDR2500

Dip Switches

1	2	3	4	5	Switches 1=On/Up 0=off/down
x	-	-	-	-	Power save switch On-5 minute sleep Off- no sleep
-	0	0	0	1	ID 0
-	0	0	1	0	ID 1
-	0	1	0	0	ID 2
-	1	0	0	0	ID 3

CDR2500S (External version)

1	2	3	4	5	6	Switches 1=On/Up 0=off/down
x	-	-	-	-		Power save switch On - 5 minute sleep
-	0	0	0	0	1	ID 0
-	0	0	0	1	0	ID 1
-	0	0	1	0	0	ID 2
-	0	1	0	0	0	ID 3
-	1	0	0	0	0	NDS - responds to all ID settings

CDR3500

1	2	3	4	Switches 1=On/Up 0=off/down
1	0	0	0	ID 0
0	1	0	0	ID 1
0	0	1	0	ID 2
0	0	0	1	ID 3

CDR3600 & CDR3700

6	5	4	3	2	1	Switches 1=On/Up 0=off/down
0	1	0	0	0	1	ID#0
0	1	0	0	1	0	ID#1
0	1	0	1	0	0	ID#2
0	1	1	0	0	0	ID#3
0	0	0	0	0	1	ID#4
0	0	0	0	1	0	ID#5
0	0	0	1	0	0	ID#6
0	0	1	0	0	0	ID#7

CDR1553S (SCSI Set to IDs 2-5 External Terminator and Term power required)

1	2	3	4	5	Switches 1=On/up 0=off/down
-	1	1	1	0	ID#0
-	1	1	0	0	ID#1
-	1	0	1	0	ID#2
-	1	0	0	0	ID#3
-	0	1	1	0	ID#4
-	0	1	0	0	ID#5
-	0	0	1	0	ID#6
-	0	0	0	0	ID#7
1	-	-	-	-	Data transfer in 1 blocks after 1st four blocks
0	-	-	-	-	Data transfer in 3 blocks after 1st 4

CDR3650 (SCSI BUS)

6	5	4	3	2	1	Switches 1=On/up 0=off/down
-	-	0	0	0	-	ID#0
-	-	0	0	1	-	ID#1
-	-	0	1	0	-	ID#2
-	-	0	1	1	-	ID#3
-	-	1	0	0	-	ID#4
-	-	1	0	1	-	ID#5
-	-	1	1	0	-	ID#6
-	-	1	1	1	-	ID#7
1	-	-	-	-	-	Termination on
0	-	-	-	-	-	Term off
-	1	-	-	-	-	Check parity by drive (always sends parity)
-	0	-	-	-	-	Don't check parity
-	-	-	-	-	0	Normal setting (1 is Reserved)

CDR3750 (SCSI BUS)

1	2	3	4	5	6	Switches 1=On/up 0=off/down
-	0	0	0	-	-	ID#0
-	1	0	0	-	-	ID#1
-	0	1	0	-	-	ID#2
-	1	1	0	-	-	ID#3
-	0	0	1	-	-	ID#4
-	1	0	1	-	-	ID#5
-	0	1	1	-	-	ID#6

```
-   1   1   1   -  -  ID#7
1   -   -   -   -  -  Termination on (internal power)
0   -   -   -   -  -  Term off
-   -   -   -   1  -  Check parity by drive (always sends parity)
-   -   -   -   0  -  Don't check parity
-   -   -   -   -  0  2048 byte default logical blocks (normal)
-   -   -   -   -  1  512 byte default blocks (SPARC bootable)
```

Note: SCSI bus drives should be set to IDs 2-5. IDs 0 and 1 are often used for booting a hard drive. ID 7 is often the host. ID#6 is used as the host by current Future Domain drivers. ID#6 should be used for SPARC.

Single SCSI drives should be set for term on, and parity checking unless the drive will not operate with parity checking on. SCSI devices at both ends of the chain should be terminated. The last internal drive and the host should be terminated. If external and internal SCSI devices are used, the host termination should be removed, and the last internal and last external device should be terminated. If all devices are external, the host and the last device should be terminated.

Short cables should be used to connect all devices. In theory, the max length can be 19 feet for all cables, but things often get strange at shorter lengths

HITACHI BUS drives do not require termination. Cable lengths to 21 feet are no problem. External cables are double shielded type for both bus types.

config.sys

(Part of Hitachi help)

DEVICE DRIVER PARAMETERS

The device driver must match the drive hardware and interface card used. The HitachiA.Sys and HitachiB.Sys drivers do not work with other drive types or cards although they will install and assign a drive letter even if a card is not present or the drives are power off.

Driver: HITACHIA.SYS

Used with: CDR1502S 1503S 1600S 1700S 3500 3600 3700

Cards: CDIFI2 CDIFI3 CDIFI4 CDIFI4A CDIFI8A CDIFI8S
CDIF25A CDIF25A2 CDIF25A3 CDIF35A

Driver: HITACHIB.SYS

Used with: CDIFI5A Micro Channel interface on PS/2 50-95 with above
listed drives.

The device driver is loaded in the CONFIG.SYS file. It accepts 3 parameters, each separated by at least one space. Example:

DEVICE=HITACHIA.SYS /D:MSCD000 /N:1 /P:300

DEVICE=C:.SYS /D:MSCD000 /N:1 /P:300

If the driver is used with no parameters it defaults to:
/D:12345678 /N:1 /P:300

The /D:xxxxxx is the name it uses when it installs in the device table. This name must be unique and must not be the name of a file or subdirectory or other device, or they cannot be accessed. The /D:xxxxxx used on the driver line must be matched by the /D:xxxxxx on the MSCDEX.EXE line in the AUTOEXEC.BAT file.

The /N:x is the number of CD-ROM drives attached to the interface card. If this is not supplied, 1 is the default. If the interface card supports less than 8 drives, the driver will default to 1 when the setting exceeds 4 drives.

The /P:xxx is the port address the driver should use to talk to the interface card. This must match the address jumper setting. Only valid addresses are accepted. Errors default to 300. See interface card jumper settings.

SCSI Device drivers usually use only /D:xxxxxx on the driver line. They check the number of drives by polling the SCSI bus and checking the device type.

autoexec.bat

(Part of Hitachi help)

MS-DOS Extensions file: MSCDEX.EXE

This is loaded in the **AUTOEXEC.BAT** file after any mouse driver and before any MENU, SHELL, DOSSHELL or WIN line and before any xxx.BAT file is started. If a xxx.BAT file loads a network, the MSCDEX line must be included in the batch file. Otherwise the MSCDEX never gets loaded.

Example:

MSCDEX.EXE /D:MSCD000 /M:8

C:.EXE /D:MSCD000 /M:8

/D:xxxxxx is the device name used by the CD-ROM device driver when it when it installs itself in the device table. This must match the /D:xxxxxx used on the driver line (or the internal default such as /D:1234567)

/M:x is the number of 2K buffers to use for the CDROM drives. Usually 8 for one drive, and 4 more for each added drive. Can be set to 1 or 2 if needed for free space on a 640K machine with current versions of MSCDEX. If set too large, takes up too much free memory and offers little performance gain.

/L:x is the optional drive letter for the CD-ROM drive. If not supplied, the drive will use the first available drive letter, usually drive D. There must be a LASTDRIVE=Z in the CONFIG.SYS file to use letters higher than the first available letter. If the LASTDRIVE=Z is used, network drives may not install after the MSCDEX. It is sometimes necessary to set the LASTDRIVE statement one letter higher than the last drive in the machine, and force the CD-ROM drive letter to the desired setting. CD-ROM applications are usually installed to access a specific letter, so if the letter is changed. applications may need to be re-installed.

/V is the verbose option. Makes MSCDEX show memory useage statistics on screen when booting.

/S is the share option. Used with networks.

/K is the Kanji option. Uses Kanji (Japanese) file types if present.

/E is the Expanded memory option. Must have a expanded memory driver with enough space available to use it.

You can determine what drive letter is used for the CD-ROM drive by viewing the screen at bootup. If it scrolls by too fast, add a pause on the line following the MSCDEX. You can determine if the MSCDEX file is loaded by going into the subdirectory where it is and entering.

MSCDEX

(Part of Hitachi help)

MSCDEX

If loaded, it will indicate, and provide a version number. If it prints a list of parameters, it is not loaded. Either the driver did not load, or the name on the /D:xxxxxx for the driver does not match the name on the MSCDEX line. SCSI drivers will usually not stay loaded if they do not recognize the interface card or they do not find at drive active.

If you get a "Wrong DOS version" message you are running DOS 4 or 5 with a version of MSCDEX which does not support it.

MSCDEX versions by file size:

```
MSCDEX.EXE  1.01  14,913  (No ISO9660 support - High Sierra only)
                   2.00  18,307  (HSG and ISO9660 - Dos 3.1-3.3)
                   2.10  19,943  (DOS 3.1-3.3 and 4.0 - DOS 5 with SETVER)
                   2.20  25,413  (as above + Win 3.x - changes in audio
support)
                   2.21  25,431  (DOS 3.1-5.0 Win 3.1)
```

Add line below to CONFIG.SYS file for version 2.10 or 2.20:

DEVICE=C:.EXE

This does not work for versions 1.01 or 2.00 versions.

SETVER is used to tell programs that they are running under a different version of DOS than DOS 5.0. The 2.10 and 2.20 versions of MSCDEX refuse to work with DOS versions higher than 4.0 unless SETVER is loaded and the internal version table for MSCDEX is 4.00.

In some versions of DOS 5.0 you will need to add an entry to SETVER for MSCDEX. This is often needed for IBM or Compaq DOS 5.0.

Change into the DOS directory and enter:

SETVER MSCDEX.EXE 4.00

This will modify SETVER without changing the size or date. When the update is complete, re-boot to make the new entry active. You can check the table in SETVER by going into the DOS directory and entering SETVER and the list of programs it lies to will be shown. MSCDEX is shown as the 6th item in the list if present. After modification, MSCDEX is the bottom item. If you enter a DOS version before 4.00, the older versions of MSCDEX will appear to load, but will not work. If you enter a version higher than DOS 5.00 with the 2.21 version of MSCDEX in use, you'll get a wrong DOS version message and MSCDEX won't load. If setver is not needed, don't load it and you'll save about 303 bytes.

You can determine if a device driver is loaded by checking the CONFIG.SYS file driver line for /D:xxxxxx. If it is /D:MSCD000, you can check the driver with:

COPY MSCD000 C:tem.xxx

If you get a "file not found", the driver is not installed. Otherwise you should get "Bad command error reading device MSCD000".

TROUBLESHOOTING

CDR101 Message - With HitachiA or B drivers.

1. Check that the drive is set to ID 0.
2. Check that HitachiA is used as the driver unless you have the CDIFI5A interface card. Check that you have the drive type which uses the HitachiA.Sys driver. These drivers do not operate CDR3650/3750/1750S drives or other interface cards.
3. Check that cables are seated fully. Drives will dual DB37 connectors will operate with the cable connected to either connector.
4. The MS-DOS extensions cannot read a directory from a audio CD. CDR101 is normal on a audio disc.
5. Wait for 5-10 seconds after inserting the disc before trying to obtain a directory.
6. Check the address setting of the interface card. Match the driver address setting to the jumper setting.
   Change the Jumper setting to S7 and driver setting to /P:360 and retry.
   Our PCHECK.EXE utility may help isolate conflicts. If needed, work through each jumper setting and /P:xxx setting.
7. Check the I/O bus speed. Set to 10MHz or less if not using CDIFI8S card or CDIFI5A Micro Channel card.
8. Make sure you are using a valid Hitachi device driver.

```
Drivers          Version
   HITACHI.SYS  1.01  12,319 bytes 07-25-87 (parity errors - Model 30)
   HITACHI.SYS  1.02  12,319 bytes 09-18-87 (model 30 fix)
   HITACHI.SYS  1.02M 12,319 bytes 11-11-87 (other fixes - limited dist)
   HIT-AT2B.SYS 1.02B 13,322 bytes 01-02-80 (buffered version - ltd dist)
   HITACHIA.SYS 1.02  12,319 bytes 09-18-87 (HITACHI.SYS renamed)
   HITACHIA.SYS 2.10  13,840 bytes 08-08-89 (busy bit & audio changes)
   HITACHIA.SYS 2.10A 14,017 bytes 12-24-90 (required for CDR1700S Rev 0)

(mfr date before Feb 91)
   HITACHIA.SYS 2.20  14,664 bytes 02-02-91 (Mouse IRQ support Win 3.x)

(Audio/busy bit support changes)
 CDIFI5A (Micro Channel)
   HITACHI.SYS  1.02   12,278 (1st release)
   HITACHIB.SYS 1.02   12,278 (renamed so both drivers on same disk)
                            2.10   13,473
                            2.10A  13,618
                            2.20   14,106
```

CDR103 Message

1. Check that the disc requires the MSDOS Extensions and is not a Photo CD or Apple HFS disc. (Photo CD single session needs a new driver but can work with all Hitachi drives)

No Drive letter or Wrong DOS version message

1. Check that MSCDEX is loaded before a Menu, Shell or Windows.
2. Check the file size of MSCDEX and refer to prior list.

Valid Driver version list

(Part of Hitachi help)

Where to get current device drivers:

Hitachi model CDREXT4D Drivers 2.20 and MSCDEX 2.21 $35.00 list Dual disk package with instructions and 5.25/3.5 disks. Audio play with Extensions.

Hitachi CDR1750/3650/3750 with Future Domain Interface cards.
Hitachi Model CDSCDRVF2

Laser Resources in Carson, CA (AC 310)
Todd (AC 718)
Tech Data (Distributor - dealers only)

HITACHI REFERRAL LINE 800-HITACHI

If you need help with your Hitachi drive, please contact them.

OS/2 drivers for Hitachi SCSI drives are available from IBM with 2.1 beta.

For HITACHI BUS drives, expect a driver by Spring Comdex (93).

Our Hardware Direct programs work on HITACHI BUS drives and include:

DA.EXE	Command line utility and audio play software for start/exit use
DA3.EXE	Audio play program for full time use
PCHECK.EXE	Port address checker for Hitachi PC bus Interface card
ROMLOCK.EXE	Locking software with utility functions and audio play
*.DOC	Doc files for DA, DA3 and ROMLOCK programs

The hardware direct programs free up 61,568 bytes of RAM if the extensions are not loaded, including 16,672 bytes used by the "HITACHI CD" TSR.

These should be available from the same sources as this file.

Our software DA.EXE and DA3.EXE will play audio under OS/2 with non-SCSI and non-Micro Channel interface cards. See Compuserve CDROM section 7.

New Features - DA3.EXE - On-Screen help, Stop, card address seek (Feb 93)
DA.EXE (Maxtrack support for a type 8 drives)
PCHECK.EXE (display of used addresses before reading all)

This help file made available as a public service to the 50+ thousand or so Hitachi drive users and unsupported Amdek drive users.

AVIXIVA
Reflective Systems
a source of audible and visual inovations and solutions

If you have comments for improving this file send E-mail: CIS 71777,2564

We recommend reading this file with the DOS 5.0 Edit utility. Text formatting will vary with other methods. Apparently hidden tabs...

LASER3.TXT: From CompuServe Information Service, CDROM Forum

01/18/92 - Creation
01/23/92 - Revision 1
02/01/92 - Revision 2
03/09/92 - Revision 3
03/14/92 - Revision 3A
03/21/92 - Revision 3B
03/22/92 - Revision 3C
03/24/92 - Revision 3D
04/04/92 - Revision 3E
04/16/92 - Revision 3F
04/18/92 - Revision 3G
05/03/92 - Revision 3H
05/31/92 - Revision 3J
06/21/92 - Revision 3K
10/09/92 - Revision 3L
11/14/92 - Revision 3M
11/26/92 - Revision 3N
12/05/92 - Revision 3P
12/28/93 - Revision 3Q
01/29/93 - Revision 3R
03/07/93 - Revision 3S
04/17/93 - Revision 3T
06/19/93 - Revision 3U
07/04/93 - Revision 3V

I thought some notes from the trenches on optimizing the **Sony Laser Library**(LL), Model #CDU-7205 (its companion, CDU-535, is an internal version of the same basic drive, usually minus the software bundles) -- or even getting it up and running -- on an AT clone might be helpful. I do not hold myself up as an expert; much of what I've picked up was discovered right here in the CDROM Forum thanks to helpful and knowledgeable folks with a willingness to share; this is more a summary of their tips, rumors and suggestions (Thank you, all!). If you learn, share. Much of this information is transportable to other drives and systems if care is exercised. Please let me know if you have something to add or correct, and I'll try to update this file to keep it current.

The LL is a good, popular external drive and was sold with a bundle of 6 CDROM disks. The LL has been superceded by the new Desktop Library bundles, some of which are MPC compatible. The topics I'll cover here are pretty much limited to a 486/33 or 66 AT clone with DOS 5.0 and 8MB of RAM. Most of the discussion will apply to a 386SX processor or higher. Sorry, there's not very much Windows (defenestrate it!), network, or OS/2 (well, a very little) info here, but there is some help for Windows 3.1 installation problems if you can stand a few other condescending comments about it.

For information on multimedia there is a lot of knowledge on the Forum, also on the Multimedia Forum (GO MULTIMEDIA), the Multimedia Vendors Forum (GO MULTIVEN), and elsewhere on CIS; and you might also want to review the 3/31/92 issue of PC Mag that has several articles on the subject.

If you'd like a concise (three pages) and relatively non-technical discussion of CD technology, hardware, software and industry standards, including all those colored "books" you keep seeing mentions about, check "An overview of Optical Technology" by Roger Hutchison; it's an article in the CD ROM, Inc. catalog, available free by calling (800) 821-

5245.

For a more comprehensive review of CDROM technology, definitions and future of the industry, you might find the article "CD-ROM Inside and Out" in the 3/93 issue of BYTE Magazine, page 197, interesting too.

Opinions are usually my own and are highly subjective!

THE BASICS:

To achieve anything with this tome, you *must* know how to edit your CONFIG.SYS and AUTOEXEC.BAT files and have a reasonable understanding of what they do.

For some additional background and discussion you might wish to review PC Magazine's review of CDROM drives in the 10/29/91 issue. It's not one of their better efforts, especially concerning this drive and the software quirks, but it's a start. PC World also did a review of CDROM drives in its 5/92 edition and listed the LL as one of its three "Best Buys", albeit in third position. The two most-favored drives then were NEC's CDR-73M and Toshiba's TXM-3301E, with honorable mention to CD Technology's Porta-Drive T3301 for notebook users and Corel's Blockbuster CDROM Bundle for desktop publishers. Despite the LL's technical non-compliance with MPC specs (not noted in the PC World review), the LL passed their tests on currently- available MPC software (See below for the Media Vision Pro Audio Spectrum Plus with Sony Interface board that will bring the LL into conformance with MPC specs, albeit for lots more $$$). Nor is the LL CD-I compliant to my knowledge. Contrary to my previous report, the LL is XA, eXtended Architecture compliant and may be Photo-CD compliant per the latest list in KODAK.TXT available in Library #7 here. That file lists all Kodak-tested drives, but note that it lists *specific* controller boards, etc. that it tested; mine wasn't listed, so I don't know where I stand. Thank you, Rich Bowers! If you're interested in Photo-CD, Kodak sells the Photo-CD Access software for about $40 with sample photos, and you can reach them at 800- 242-2424. There's also a lot of info at various places on CIS, e.g. here on CDROM, Photofor, Multimedia, DTP, and other Forums, etc. There is unconfirmed information, per Joel White, that the Trantor "fix" for the LL MPC compliance issue is Photo-CD compliant, but Kodak hasn't tested it yet. One other participant here said he had it running and that it was working very well for Photo-CD, single session only; he also mentioned that the Trantor driver significantly improved the LL's speed as a bonus. Trantor confirms that it only works for single session Photo CD's. See below for more info on the Trantor package.

In the 12/92 issue, page 408, of PC Computing there's a good article on fast, higher-end CDROM's that are still moderately priced; the NEC InterSect CDR- 74 got a nomination for their 1992 most valuable product award. Texcel's DM- 5024 was the other drive selected for best multimedia performance.

The 12/22/92 issue of PC Mag (pg. 124) chose the NEC InterSect CDR-74 as its winner for technical excellence (and some big $$$); in the same issue there is an extensive review of CDROM drives (pg. 293) and "27 Good Reasons To Buy a CD-ROM Player" (pg. 345), a review of several software titles and lists of many MPC titles and vendors. Pardon me whilst I drool...

LL's hardware/software installation routines and instructions are generally adequate for plain vanilla systems; but if you have special needs -- a network, other complex drivers or initialization routines, etc. -- they will almost totally desert you. Being confined to only one system with CDROM, I'm light on info for hardware installation and would appreciate a contribution from anyone who's run the gamut. The factory material was adequate for me.

As to installation software, there was a mention from Robert Hunter that you should not try and change Sony's default directory, , as that will create problems.

The PC World review mentioned above that the LL can be mounted on its side. Many other drives cannot be side-mounted, however. Check the PC World chart for information or contact the manufacturer of your drive before taking the plunge.

The LL is reported to be fully-compatible with DR DOS 6, courtesy of Robert Kelsoe.

NOTE: Please see the CAUTION on about page ten of this file if you plan to install LL with Windows 3.1 for the first time.

Stacker users, please also note that installation of Stacker (a brand of software and/or hardware to increase disk capacity) *after* the installation of a CDROM will probably alter your setup in such a way that your CDROM won't work without some tweaking. Stacker creates a second logical drive, usually D: if you have only a C: hard drive, and thus absconds with the D: drive letter that was formerly used by your CDROM. Instructions for changing drive letter assignments are covered below in discussions on MSCDEX (MicroSoft CDrom EXtensions), especially the /L: switch. Depending on your CONFIG, you may also need to adjust your LASTDRIVE statement as well. Thanks, Luc DeBecker! Also, when changing drive assignments with Stacker or an equivalent program -- and I believe the new DOS6 utility, DoubleSpace is of the same ilk -- or when adding another hard disk drive, remember to change the various batch and installation files or menu calls for your CDROM programs to conform to the new drive letter assignment.

Sony is out of sync with the current industry practice in that their interface for this drive is proprietary, not SCSI (Small Computer System Interface). But there seem to be enough tweaks to the supposedly standard SCSI interface in use that that standard has plenty of problems, especially, however, for those who want to daisy-chain dissimilar drives, etc. The Sony adapter will permit multiple LL drives (4) to be daisy-chained from it, but the procedure is not for the non-technical among you. For those of you that are installing a SCSI drive, or trying to troubleshoot one, I highly recommend Winn Rosch's informative article "SCSI Made Simple" in the September 1992 issue of PC/Computing. Almost all SCSI adapter, device numbering, terminating, and other potential minefields are simply and thoroughly explained therein. In addition, there is a brief but informative mention of the three basic SCSI standards on page 384 of the 11/92 issue of PC/Computing that also give you some clues about how to make the different standards cohabitate. There is also an excellent, even newer article on SCSI, including info on SCSI-2, and Fast/Wide/Fast-Wide SCSIs in the 6/29/93 PC Mag.

Kim Bigelow and Kirkland Duckworth mentioned that, if you have SBPro card, you can find a 4' stereo patch cable at Radio Shack with 2 RCA phono plugs on one end (to plug into the rear output jacks of the LL) and a 1/8" mini stereo plug on the other, which can be plugged into the top input jack on the SBPro. Speakers are then plugged into the SBPro output jack above the sound control. Keith Meyers supplemented that with a mention that you'll need to go into the SBP-SET utility and increase the volume settings for the LINE input -- see your SBP manual.

LL is *not* Multimedia PC (MPC) compliant so if you're having difficulty with selected disks only, check that they do not require a complete PC system that meets those specifications. Many people on the Forum have reported that current CDROM titles that require MPC systems run fine on the LL, but there's no guarantee that this will continue. See below for how to make a LL MPC compliant.

Likewise, if you're having problems with a single title on a fast machine, particularly a

486/33 or faster, try slowing it down with the turbo switch, BIOS, or whatever may be appropriate to your system, and try that with a clean boot as below. A lot of software has not been properly tested on a large enough variety of 486's and may not be prepared to receive data back from the hardware as quickly as a 486 can deliver it.

The long-promised MPC upgrade, variously promised by Sony and Media Vision (MV) and which was supposed to be available 3/92 was finally shipped 10/92. The upgrade uses two slots and replaces the original Sony interface card, plus whatever sound board you may have been using. The basis board for this upgrade is the MV Pro Audio Spectrum Plus (PAS+), which is not MV's 16 bit top-of-the-line product, nor does MV have any plans to add the Sony interface to their Pro Audio Spectrum 16 in the future. But the PAS+ is a great improvement over my AdLib board and is both AdLib and Sound Blaster compatible. You can call (800) 356-7886 to order; $239 per kit plus tax and S&H (about $269 total in CA), and they have different models for either an internal or external Sony drive, presumably either the LL or the model 535. They won't charge your credit card until shipment. Sony is referring inquiries to MV.

Many of the earliest versions of the PAS+/Sony upgrade have a bug and will not display video. If you have the following situation, you probably have a defective bracket adapter that needs to be replaced: The unit does not display video (or does so on only a few CDROM's or is very unstable, but all the drivers, MSCDEX.EXE (v2.21 or higher only, please!), MVSOUND.SYS, and SONY_PFM.SYS loaded correctly (look for error messages when loading and check with the MEM command to see that they are loaded); AND the unit plays audio from both CDROM and normal audio CD disks correctly; AND you can copy a data file from a CDROM onto another disk and successfully use DOS's COMP command to compare them. If you bought your PAS+ with Sony Interface card directly from MV, MV will send you a new bracket adapter, available 11/92, without charge along with a CDROM of "Where in the World is Carmen San Diego, Deluxe Edition" for your trouble, a nice touch; and more than most companies would do under similar circumstances. Alternatively, they will also give you a refund if you don't want to wait for the replacement if you call 800-356- 7886. I'm waited; I wanted MPC compliance and better sound. The revised bracket adapter has a "B" suffix on the part number. FWIW, the new bracket adapter alone didn't fix the problem for me after eight weeks of no video from the CDROM. But, EUREKA, the new bracket adapter, followed by removal of the /I:15 switch from the SONY_PFM.SYS command line in CONFIG, did the trick! It's worth the wait!!

The installation process for the PAS+/Sony is NOT for the faint of heart, those who aren't familiar with the guts of a PC, or those who do not know how to manually edit AUTOEXEC and CONFIG and twiddle therewith. The three required drivers use about 33K of UMB on my system, plus oodles of expanded memory (extended memory can't be used), and there are switches galore in the software to set, but the manuals do a pretty decent job of explaining it all so I won't review them here. If you don't have expanded memory for the additional buffers it needs under DOS, don't bother buying the product. Without expanded memory, you aren't likely to have enough conventional memory available to run a program. But, if you don't have expanded memory to stash MSCDEX's normal buffers anyway, you are not going to be happy with almost any drive cuz almost all normal installations require MSCDEX. And if you don't have a 386/486 system with UMB available, that 33K of drivers alone may send you into a RAM-cram mode very quickly anyway; but, then, if you're concerned about MPC specs and performance, you already have such a platform, or you wouldn't be reading this, right? You can install the board to operate under DOS or Windows or both. There are some contradictions in the documentation; watch out for proper orientation of the two cables, both can be reversed very easily.

Media Vision is in Fremont, CA and can be reached at (800) 348-7116. As of April 16th, they expect to have a voicemail system that will explain their PAS-16 upgrade program at (800)

356-7886, not to be confused with the Sony- specific MPC upgrade product. Info on the latter can be obtained from MV Sales at (800) 845-5870.

For a place to start, here are the relevant lines of my CONFIG and AUTOEXEC files for use *only* with the PAS+/Sony board:

CONFIG: Devicehigh=c:.sys d:3 q:5 j:0
Devicehigh=c:_pfm.sys /d:mvcd001 /r /p:3 /s:32 /e

AUTOEXEC: Loadhigh c:.exe /d:mvcd001 /m:10 /v /l:e /e

[FWIW Dept.: Keith Myers had been doing some digging on the MPC compliance issue and said Sony wouldn't commit to any answers on the LL. (This was before MV released its product.) He reported that they've said they're working with MV to develop new boards that meet MPC and won't admit to developing their own standalone until/if it is actually in the distribution channels. One of Sony's people told him that Sony's policy is to keep distributing the non-MPC material until an MPC fix is available. The inference is that they'll deplete existing stock before bringing MPC adapters of their own into play, I guess. Customer-driven, they are.]

* * *

The latest from the trenches on upgrading the LL, from David Louton, 70242,501:

"The real reason for this message is that I also have been impatiently waiting for the upgrade to the LL from Media Vision. When I got the photocopied spec sheet I was less than enthused (and a bit confused...) so I waited until COMDEX to see if there were any other information and/or options. The people at the MV booth had no clue what the LL upgrade was so they gave me the name and number of a person at MV Customer Service to call. On a lark I stopped at the Sony booth to ask about the LL upgrade. They told me about another upgrade from Trantor Systems Ltd. (510) 770-1400 or (800) TRANTOR that consists of a new driver SONY_PF.SYS (9789 bytes, 10/09/92) and a couple of jumpers that will make the drive 'MPC compatible and faster'. [The Trantor driver works by upgrading the drive's buffers by creating a larger buffer in EMS memory.]

"The package costs $39 + T/S/H. One of the jumpers goes from the DRQ3 top pin to an appropriate IRQ pin and the other jumper goes on the DACK2 pair of pins. The driver uses the same options as SONY_CDU.SYS plus options to set the IRQ and the prefetch buffer size. To order the upgrade, make sure you have one of the Sony 24x series controllers [it ONLY supports Sony controllers CDB 242, 243 or 244; it can't be any other, per Trantor on 6/5/93] and that you have a spare IRQ 2, 3, 5 or 7 to get the cache for it. Also works with single session Photo CD's. [Trantor says the driver will give "some additional speed" to the drive but that you shouldn't expect miracles. Arnie Goetchius, who's had a long dialogue with Trantor, wants folks to remember to remove their old Sony driver, usually SONY_CDU.SYS, when installing the new Trantor driver, SONY_PF.SYS. He also said Trantor does not recommend loading the buffers into expanded memory with the /E switch (a real bad piece of news, not to mention the loss of 30-50K of conventional memory!) with the new driver. I assume the /E switch to which he refers is something new in the new driver, which seems kind of unlikely. Maybe the reference is to the /E switch in MSCDEX?]

"I got the upgrade last week and so far it is a bit unreliable. I have been using the new MapExpert CD from DeLorme (maker of Street Atlas) and the Windows 3.1 screen will freeze after anywhere from 2 to 20 minutes into using the program with the CD light flashing on and off. The three finger salute (Ctrl-ALt-Del) gets me a message from Windows stating that

the "System is Busy or Unstable ..."; another three finger salute "cures" the problem. I spent at least 4 hours twiddling with the options, jumpers, AUTOEXEC.BAT, CONFIG.SYS, etc. but the problem continues. I called Trantor today but they said it was probably a MapExpert problem even though it never gave me problems before the upgrade. They suggested that I try other CDs to see if they have problems also. Both of the ones I tried eventually caused the same thing; one was a Kings Quest V (run from DOS) and the other was Microsoft Bookshelf 92 (from Windows). I also noticed that if I ejected the CD after the screen freezes the program would notice and complain; when I put the CD back in I could get it to continue.

"When it is operating correctly the disk light does flicker much less, but I do not notice any big speed increase with MapExpert, although that program is mostly limited by screen redraw, not CD access time."

Then the following arrived:

"Reference: Sony Laser Library Upgrade - Part 2

"This message is a follow on to the SONYLLUP.TXT message that I sent to you on 3 December 1992. After spending about 6 hours trying to get the Trantor Systems Ltd/Sony Laser Library to work with my system I finally just gave up. I tried every conceivable combination of interrupts, ports, driver sequences, etc., and it still had the problem where the system would freeze at random times until the disk was ejected. I talked to two people in technical support, and they were not able to solve the problem. I called Trantor Systems Ltd. customer service, and they gave me an RMA number so that I could return the upgrade for a refund. I think that the problem is some kind of conflict with the Bernoulli adapter in my system even though the two boards were not using the same interrupts, DMA ports or I/O addresses. I don't want to discourage anyone else from trying this upgrade since it is much cheaper than the Media Visions upgrade, but I feel that I cannot afford to spend any more time trying to get it to work. Now I need to decide if it is worth it to me to try the MV upgrade."

* * *

Back to the LL: There seem to be some conflicts between the bundled disks and various common TSR programs such as Sidekick, etc. If you're having difficulty with only a few disks, try stripping down your CONFIG and AUTOEXEC files onto a diskette with only the bare minimum necessary to run and enable the CDROM drive; boot that; and then try the suspect CD. If the problem disappears, normal detective work -- adding back the lines to those two files one at a time until the problem reappears or changing the order of commands in the files -- may lead to a solution. Terminate and stay-resident programs (TSR's) are frequently the culprits.

There is no adequate Sony documentation of the critical software parameters, or any hints and tricks to load files high (under DOS 5.0 with 386 or above platform), for SONY_CDU.SYS and MSCDEX.EXE, the two principal files required to manage the drive.

Sony Tech Support (201) 368-3774 on the east coast -- the old west coast (714) number has been closed and a referral is given to the (201) number -- doesn't know anything about the LL and now refers people to (408) 955-4343 where a recorder answers. That should give you some idea of what you're in for! They may be able to help with some problems, but they will primarily provide support for the hardware and installation-related software. Software support for the application disks supplied in the bundle is via a (900) phone number, (900) 884-1104, at $2 per minute; the documentation supplied with the disks is some of the worst I've seen. Comments here in the Forum have been mixed about the

quality of both, but it leans to the negative kinda strongly. A report from J. Allan Cahill had mentioned being subjected to a five- minute, intrusive questionnaire before just being referred to a Sony dealer for info on the best sound board to use with the LL.

Sony also has a BBS, (408) 955-5107; all Sony drivers, including MSCDEX v2.21 (as of 4/17/93) are posted there. FWIW, if you don't give them your fax number when registering, they'll disconnect you -- so remember to make one up. You get two or three chances.

Sony's Computer Peripheral Products, Optical Products Storage Division's CA office in San Jose, CA, (408) 432-0190, may provide another avenue for help or a place to holler. Also (408) 944-4326 and (408) 944-4225 at various times. I've had good and bad experiences with all those. Greg Hill, is new but knowledgeable and is one of the few people in the tech support group that I've talked to who seems interested and eager. He can be reached at the main (408) 432-0190 number. Literature on the LL and some other Sony products is supposed to be available from (800) 222-0878, but two requests brought nothing to my mailbox. I tried a third time recently, and at least I got part of what I asked for...

Tracking down dealers from any of these sources, or their distributors, had been almost impossible through Sony: Most of the referrals were to dealers for other lines or to dealers that did not stock the product or were at the high end of the product spectrum. Here in Silicon Valley, that's a crime. A recent, 12/93, call to the (800) number above got me a quick referral to a stocking dealer, so maybe that's improving. For info, the LL cannot usually be found anymore but was available at deep discount hereabouts for about $499 when last seen. There are other Sony drives, many of which are MPC compliant; and some of which are bundled with alternative CDROM titles by third parties at considerably reduced prices. The current bundles available from Sony are: The CDU7305, and external kit complete with six CD's, speakers (batteries included, it says here!), 16 bit sound board, etc.; the logically- named CDU31A-LL/L (about $750 on the street), an external version of the first; and the CDU31A-LL/N (about $430 on the street), an internal "starter" kit with three CD's, no sound board or speakers.

A recent addition to the Forum, Rory Sellers (72110,3111), works for Sony and has volunteered to help with some questions and problems, mostly DOS and Windows-related. He disclaims any PS/2 hardware background, I understand.

In desperation, if you have not succeeded in getting anything to work, remove all your add-in boards, especially fax, modem, and others that use IRQ or DMA, that aren't absolutely necessary to get your system running. If that clears up the problem, you have some serious conflict-hunting to do. It sounds more daunting than it is; just use care in labelling your cables and note where the boards came from. Funny thing, you'll have to leave your disk drive controller board, video board, CDROM controller and possibly a memory expansion board; but nuke the rest while troubleshooting if they're not vital.

THE SOFTWARE: (Sony material available from Sony BBS (408) 955-5107)

SONY_CDU.SYS is the device driver necessary to operate the drive. The version distributed with many LL's is 2.20(a), which is dated 6/11/91 and is 9,216 bytes. I've also seen a version on the Sun Moon Star BBS, mentioned below, that's dated 6/19/91 and which is 9,145 bytes, but I haven't tested it; I've also heard of a version (from Rich Bowers, I think) dated 1/10/91, 8,993 bytes but haven't seen a copy. Sony is currently (1/93) distributing the 9,145 byte version on its BBS. A statement must be present in your CONFIG.SYS file enabling this device driver. Other CDROM drive brands will have different file names but will require a similar proprietary driver. Carlyle Maw ran across an older version of SONY_CDU.SYS (8,993 bytes, dated 1/10/91) that ran on his Zenith 386-25, when the newer one wouldn't.

MSCDEX.EXE is the file containing the Microsoft CDROM Extensions, also necessary; this file written by Microsoft is used in virtually every CDROM installation, no matter who made the drive. It assigns the drive a drive number and tell DOS how to access the drive as though it were a conventional disk drive. The version distributed with the LL has been 2.20, dated 6/16/91 and is 25,600 bytes in size. This file and its code do not change from one brand of drive to another, and a statement must be present in your AUTOEXEC.BAT file enabling MSCDEX. There are slipstreamed versions of version 2.20, i.e. revisions have occurred; the file was modified; but the version number was not changed. I've seen three slightly different versions of 2.20. If you're upgrading from version 1.x of MSCDEX, check with the manufacturer of your drive; you probably will need an updated device driver to use MSCDEX version 2.x.

There is a later version of MSCDEX, version 2.21, that I (and Microsoft and most manufacturers of CDROM's) highly recommend. [See below for info on the newest MSCDEX, Ver 2.22, that was released with DOS6.] It does not require the use of DOS's SETVER command in your Config, as the earlier one does (but some of your other programs may need SETVER!). This file is 25,431 bytes and is dated 7/23/91. This newer version seems to load high easier, and I have only heard one complaint here about it, out of hundreds of users. MS says, however, that they know of problems loading any version of MSCDEX high and will not support it in that mode. Their voice support line for CD and Multimedia Support Group is (206) 454-2030. Most manufacturers are now distributing version 2.21. MSCDEX.EXE is available on CompuServe (Go MSL, file CDEXT.EXE, a self-extracting file) and is 25,431 bytes long and dated 2/4/92 OR 7/23/91. There was a defective version of MSCDEX v2.21 being distributed by MS, including here on CIS, that was withdrawn and was indistinguishable from v2.21 that works, so don't nuke your current copy of MSCDEX until you're happy with the way v2.21 works.

A new version, 2.22, of MSCDEX is included with DOS 6. It is also available on CI$ in the Multimedia (GO MULTIMEDIA) Forum, per Jim Divoky, in Library #1 as MSCDEX.EXE. It is 25,377 bytes in size and dated 4/14/93. NB: I've seen two BBS listings that report that use of MSCDEX v2.21 or earlier with DOS6 will throw an "Incorrect DOS version" error message. If you've recently swapped to DOS6 and now find that message, use version 2.22 of MSCDEX, which you should find in your DOS directory. So far, version 2.22 works on my system just fine, and I haven't switched to DOS6 yet. The only discernable difference I've noticed is that it uses 15,856 bytes, a whole 16 bytes more than v2.21, of UMB space when loaded high. Supposedly, this version will load high a little easier. PLEASE NOTE: Almost all CDROM drives use a driver of some kind, for the LL it's SONY_CDU.SYS; some of these drivers may be version-specific for MSCDEX v2.21 or earlier. Save your old version of MSCDEX under a different name or relocate it or whatever so you don't accidently over-write it with the new version and then discover that the new one doesn't work.

The version numbers of MSCDEX and SONY_CDU are reported to your screen when the respective files load, but you may have to read quickly or put a temporary PAUSE statement in your AUTOEXEC immediately after the MSCDEX call to catch it before it flies by.

MS legitimized MSCDEX v2.21 and now strongly suggests its use with Windows 3.1, but Dave Manzari reports that the Windows README.WRI file says you should remove the LANMAN... DEVICE statement, as below.

J. Fortney and J. Chwan noted that MSCDEX 2.21 ships with Windows 3.1 and the setup program will automatically load the driver (beware that you don't lose your copy of a functioning MSCDEX!); it also loaded high with QEMM 6.02. I didn't find it in my upgrade disks; three other denizens of our Forum have not been able to find this v2.21 in their W3.1 material. Paul Hixson found a mention of need for 2.21 in the W3.1 READ.ME file supplied

with his upgrade kit.

And to further confound you Windows fans, Dave Manzari noted that the README.WRI file found in W3.1 strongly suggests the use of MSCDEX.EXE v2.21 and shows a patch to your SYSTEM.INI file that may be required to get it to run.

The latest SONY_CDU, but a 9,145 byte version I haven't tested, plus MSCDEX version 2.21, is available from the Sun-Moon-Star BBS at (408) 452-8281; the filename is SONY.ZIP.

Duncan Kruse found the Sony 2.20(a) driver, plus MSCDEX *v2.20*, on the Phillips BBS (310) 532-6436 in file SONY220A.EXE. Tough to get on that board, he says.

Steve Williams ran into the only problem I've heard reported with old v2.21, an error message, "CDR103: CDROM not High Sierra or ISO-9660 Format". He'd just added a new copy of old v2.21 on a working system and suddenly got the error. When he copied v2.20 back into the directory, the system worked fine again. One out of hundreds isn't bad; but, again, rename your old v2.20 before copying the new one into your directory and overwriting the old version irrevocably. Steve subsequently reported that he was able to load v2.21 successfully by changing the loading order in his AUTOEXEC but then had problems getting Windows to run properly.

Steve Solomon tipped us that v2.21 is available on Creative Lab's BBS at 408- 428-6660 (all speeds) or 408-428-6662 & -64 (9600 bps only); it's got a newer date but compares identically to the 7/23/91 one I have. It's one of the few on-line, gratis sources I know of. Frequently busy on the main number. It's in Library #8; the file name is MSCD221.ZIP. Navigation and slooooooow prompts (I've waited as long as 30 seconds or more for a prompt and thought I'd locked up my system) on this board are a challenge. But worth what you paid for it!

MSCDEX is also available gratis (and with hairy license and indemnity stuff, as is the case here on CIS) directly from Microsoft's BBS at (206) 936-6735. Hey, use it; it may be the only freebie you'll ever get from Bill Gates.

There is a reported hack to v2.20 if you have a disassembler, like Norton's DISKEDIT to get it to run without SETVER, but we've had enough public debate over the Street Atlas hack of late, so I'm not going to post it here.

Matt Seitz said that his firm, Meridian Data, in CA at 800-76SALES (800-767- 2537) or 408-438-3100, sells MSCDEX. Matt also has available, I'm told, thru CD-Net a version of MSCDEX called CDNETEX which is loadable/unloadable (unlike MSCDEX).

Matt also supplied some valuable info on technical MSCDEX material for the seriously code-inclined amongst you: 1) The book MS-DOS EXTENSIONS by Ray Duncan (Microsoft Press, ISBN #1-55615-212-4) contains the MSCDEX functions but not the device driver functions; 2) The book MS-DOS PROGRAMMER'S SOURCEBOOK (ibid) also contains the MSCDEX functions but not the device driver calls; 3) The book DOS INTERRUPTS by Ralf Brown and Jim Kyle (Addison- Wesley, ISBN #0-201-57797-6) contains the same as those above, but it also has MSCDEX 2.1 version of the Get Directory Entry call, which allows you to use the same data structure for both ISO-9660 and High Sierra volume formats; and 4) the MSCDEX Dev. Kit description, a text file in MS Forum on CIS and from Meridian's BBS at (408) 439-9509. This contains the MSCDEX functions and device driver functions. I hope, someday, I'm smart enough to understand what all that means!

Edward Mainzer reports that the NEC BBS, (508) 635-6328, includes a CDROM conference that has MSCDEX, version unknown, and other files, including a demo of a music player

software title, available in a file named CD_T128.EXE.

If you have a penchant for some technical info, you can check file DR0498.ZIP in the MS Software Library (GO MSL), but it's not for the non-technical.

I understand, thanks to some dialogue between Jim Duke and Steve McKnelly, that some applications actually look for the presence of MSCDEX and will not load without it. If you have a system (OS/2, non-DOS or a network?) that can't use MSCDEX, Jim (70414,1653) has developed MDICDEXT -- I think it's a part of SCSI Express for NetWare 386 -- which satisfies the need, without MSCDEX, for most, but not all, such apps.

There had been considerable speculation, for the Windows-reliant among you, that Windows 3.1 does not require MSCDEX. It does. Clarke Ferber, who has a beta release of Windows NT that is scheduled for release early in 1993, reports that NT does not require MSCDEX, but you will need a supported SCSI- 2 CDROM and controller. That's the death knell for those of us with a proprietary Sony bus drive. The CDROM just appears as another drive letter available for use. NT does not, at this time, support non-SCSI CDROM's and it does need SCSI-2 for audio support. Check the WINNT forum, Library #1 for a file similar to 09HW.TXT for a list of supported hardware for NT -- if you live to plan in advance.

CAUTION: On April 12th Craig Frank reported a complete crash of his hard disk that he attributes to the older LL installation software not being Windows 3.1-aware. In the process, LL didn't create the LL Program Group, although it does say that if you have 3.0 installed, it will detect and set up the program appropriately. I guess if it's gonna tank your whole system, it's sorta academic whether it sets up the Program Group... Sorry, Craig!

Several others have reported problems trying to install LL with W3.1, and Sony says there WAS a compatibility problem with the installation routine and that they were working with Microsoft to resolve it. Bill Seymour checked in to tell us that Sony now has a fix available; they will send it to you gratis, apparently on a CD, so call their customer support phone number. Apparently the old install program in LL nukes an icon file, LASERLIB.IL, and the icon isn't available so it can't setup the program group. If you recopy that file from Windows disk #6 to its proper place and know how to manually add a program group and do other installation routines, it will run. For someone who knows his stuff on this problem, you might want to contact Greg Hill, above.

Craig Frank reported -- "after much heartbreak and no help from Sony..." -- that the only way he found to get W3.1 happening was to delete 3.1 from his disk completely. He reloaded 3.0 and installed LL, which successfully installed the program group and icons; and then he reloaded 3.1, which retained the 3.0 program group. A lot of work, but it did the job. I knew I didn't like Windows!

Carl Nelson found what may be a less painful way of doing it. He browsed thru the LLINSTAL.EXE file and found a list of Windows files, which he presumed were being used to validate the presence of Windows (3.0) on his hard disk. He found that one of these files, SYSTEM.EXE, no longer exists in W3.1; it has been replaced by KRNL1286.EXE and KRNL1386.EXE. He created a dummy replacement SYSTEM.EXE file, reran the LLINSTAL program, and everything functioned perfectly. Congrats, Carl!

A quick tutorial on how to create the dummy file in Windows 3.1 that Carl used follows, but DO NOT use this method under W3.0, or you will erase your existing KERNEL.EXE... and feel incredibly stupid and probably never get Windows 3.0 to run again:

> At a DOS prompt, type COPY CON C:.EXE and
> press return. The cursor will advance to the next line with no

other discernable activity. Type any letter you choose on that
line and press return. The cursor will advance to the next line.
Press the F6 key, and a "^Z" will appear; then press return.
You'll see the message "1 file(s) copied", and you're done!

Even tho' I swore I wouldn't turn this tome into a Windows tutorial, I guess I should also mention that MS (GO MSKB, Doc #Q82419, 4/16/92) says that in W3.1 LANMAN10.386 is always installed, even if you're using a version of MSCDEX greater than 2.1. You should remove the DEVICE=LANMAN10.386 from 386Enh section of SYSTEM.INI if you're using MSCDEX 2.2x. One less source of conflict and memory-mushing gone!

Likewise, MS also recommends that MSCDEX should not be loaded from the Windows DOS prompt, unless you're very careful. Apparently, folks are accidently loading multiple copies of MSCDEX on top of each other with less- than-productive results. Install MSCDEX in your AUTOEXEC file, before starting Windows. They still maintain that MSCDEX can't/shouldn't be loaded high, but we know that's usually googrum.

A lot of the messages here have centered around "What are all those switches in SONY_CDU and MSCDEX" and "Why can't I get those @#$%$#! files to load high?" Sony says, officially, that these files cannot be loaded high. Microsoft says MSCDEX *cannot* be loaded high because of some code in it that only acknowledges up to 640K; they're "looking into it" per an 11/91 mention in MSKB on CIS. They told me in early March '92 that they have no current plans to update MSCDEX, but they obviously had something in mind cuz v2.22 is available with DOS6 and from CI$, above. End of discussion from them, 'cept for the mention in the paragraph above. Real world: You can do it. It will either be ridiculously easy, or you will be up half the night cussing. If you have inexplicable problems that are not TSR conflicts, you can always reload it low and see if the problems evaporate, but there have been no reports of such problems here. Several people have reported complete failure in trying to load any version of MSCDEX high, however. Many of the easiest successes have been reported by users of QEMM, a memory manager program in widespread use, in lieu of using DOS' EMM386. FWIW, Qemm was a catastrophe for me; it choked on almost everything and obliterated parts of my AUTOEXEC. But, judging from the many very satisfied customers, I'm a distinct minority in that regard.

Addressing the question of loading high first, both these files can carry some pretty significant RAM overhead if loaded into conventional memory, 15K and up for MSCDEX and 8K for SONY_CDU. If you want your CDROM to play pretty music while you pound on your wordprocessor -- as I do -- making it the world's most expensive CD player, the LLTSR program, which lets you play audio CD's, gobbles another 27K of precious conventional memory. If you can't get some of this overhead into Upper Memory Blocks (UMB), you may find yourself restricted to running programs written in 1983, when 64K of RAM was heavy-duty computing. [If you want to cut down the memory requirements for LLTSR, AND if you're NOT going to use Sony's LLPLAY, download HCDPLAY.ZIP from the Sun Moon Star BBS above. It's a Hitachi CD player that seems to work fine with the LL. There's also a CD player on Hitachi's BBS at (516) 829-0212, but it's not a Hitachi product and didn't work with my Sony. Another source of free-ish CD audio drivers, per Bill Thomas, is right here in Library #7; browse on "Hitachi". Bill says that they support Amdek drives too and can be used with DOS, Windows, and OS/2 without any drivers since they go direct to the hardware.]

Continuing on MSCDEX after that aside, note that many reported problems with getting MSCDEX to load high may be caused by its propensity to want use as much as 65K of upper memory when loading (and oodles more if you've increased the buffers and aren't using the /E switch), which scales way back when it's actually running. One user reported 128K was needed on his system.

John Miriello, a glutton for punishment if ever there was one, has tried loading the drivers high on both 386/25 & 486/33 platforms, using DOS 5.0, 386MAX 6.0, and QEMM 6.0, and thinks 386MAX was the easiest.

OS/2:

Ah, a late-comer to the CDROM wars! Not too much traffic on the Forum yet that I begin to understand, but Frank Zirpolo did check in with the information that there has been debate and support on the IBM OS/2 Forum and that MSCDEX may not work under OS/2 (he says IBM says it won't); he suggests getting OS/2 drivers (if available!?!) for your drive so you won't have to use MSCDEX at all. For those among you with a Sony CDU31A (a non-SCSI, proprietary interface), Les Inanchy of Sony advised 1/93 that there is an OS/2 driver under development that should be ready "within the next few months"; there are no plans for a Sony driver for the CDU531. He also mentioned that Adaptec, Future Domain or other parties may have SCSI drivers in the works.

Bill McHugh responds that OS/2 does not use MSCDEX; it is replaced by an installable file system. His advice that follows is for an NEC drive. Put the following line in your CONFIG for OS/2: IFS=C:.IFS /Q. If there is another IFS= line, do not remove it, just add the above. He also mentioned that the built-in driver only covers IBM and Toshiba drives, so you will need to add that to CONFIG. The built-in device is DEVICE=C:.SYS /I /N:4.

A word of warning to OS/2 and/or NT users was given by John Dvorak in a 6/93 PC Mag column: If you try to use OS/2 in a dual-boot scheme with DOS6 and DoubleSpace, its Stacker-like disk doubler, you will create a compressed partition that OS/2 won't be able to read.

Some 7/93 info: Sony's file SONY31.ZIP, available from their BBS includes an OS/2 driver for their CDU-31A and 7305 drives only, per Chuck Roman. Charles Lomicky reports that there is an OS/2 driver for the CDU-535 (maybe the -531 & -7205 also?) in America Online, under OS/2 Drivers, but notes that it does not support CD Audio yet.

CONFIG.SYS:

A reminder: Please have a bootable DOS diskette handy before you start twiddling with CONFIG.SYS.

DEVICE #1 -- To begin with, there are some basics to getting your 386 or above beast to load these files high. In your CONFIG file the *very* first DEVICE statement should be DEVICE=C:.sys (or use the Drive:appropriate to your system, here and elsewhere below). [N.B.: If you have a proprietary driver of some kind that you must use to enable extended or expanded memory on your system, you should load that as the very first driver.] I've also found that SET, FILES, BUFFERS, BREAK, and a few other commands can precede the HIMEM statement, if necessary. Use the HIMEM.SYS file that came with DOS 5.0 (unless you're using Windows 3.1, then use it's version of HIMEM)! Mine is dated 4/9/91 and is 11,552 bytes. Some previous versions of this file were supplied with applications, including Windows, and might be lurking on your systems; they are probably not compatible with loading files high. DOS 5.0's manual specifically says NOT to use the HIMEM that comes with Windows 3.0. In my file, the only lines that precede the above DEVICE statement are FILES, BUFFERS, STACKS, and BREAK commands. I used a /int15=1088 switch on HIMEM to allocate some extended memory in a strange way, but it's not critical to making the Sony files behave.

DEVICE #2 -- The very next line after the HIMEM line should be the DEVICE statement for

EMM386, DOS's memory manager. My line originally read DEVICE=C:.exe 1024 /I=E000-EFFF ram. This allocates 1,024K to expanded memory (the 1024 parameter), and the /I parameter reenables the E segment of memory and provides about 64K more UMB space (Bless you, PC Computing Magazine, for that one!). That particular /I parameter is *not* appropriate to an IBM PS/2 Microchannel machine or to many Compaq models. You may also be able to add additional /I parameters to that command line; I also have /I=B000-B7FF in mine for another 32K of UMB, but that is something you have to determine on a system-by-system basis. Windows 3.1 will not boot with /I=Bxxx.... Using a good memory manager will help identify areas of unused upper memory; Manifest, which is sometimes available bundled with QEMM but is also a standalone product, and ASQ (available on many BBSs) work well. If you have Windows 3.1, there is a good tool, MSD.EXE, that is undocumented that is located in your Windows directory on your hard disk that will also do the job (it erroneously reported some free RAM in my A & B segments that wasn't there, but it's free and you can always experiment a little). The "ram" parameter must be specified to access UMB *and* expanded memory. If you don't use/want any expanded memory (caution!), substitute "noems" instead, without the quotation marks, and access to the UMB's is still provided. Without one of those last two parameters, not much is heading high. However, please note that MSCDEX, covered in the AUTOEXEC section below, will LOADHIGH easier on most systems if the /E switch is used; expanded memory can also be used by MSCDEX's buffers, so you may want to have some handy, otherwise you will pay a heavy RAM penalty.

You can also twiddle with the FRAME switch on EMM386.EXE to change the location of the EMS page frame to provide more contiguous UMB space for loading larger programs like MSCDEX. Mine now reads DEVICE=C:.exe 1536 FRAME=E000 /I=B000-B7FF ram. Please note that Windows 3.1 will not load with the /I=B000-B7FF switch enabled, so you'll have to forego that additional RAM under Windows. And some systems, especially IBM PS/2s, will not tolerate the use of the E segment for the EMS page frame. Remember to have a bootable DOS diskette handy, just in case.

Bernie Bildman reports that by inserting the statement DEVICE=emm386.exe ram i=e000-efff i=b000-b7ff x=d800-d9ff he was able to load MSCDEX 2.2x high and return over 110K of RAM for use elsewhere. He was, however using an NEC CDR82 drive and the x= portion of the statement he says is relevant to that drive (CPU?) only. The i=B... portion recovered an additional 29.3K+ of UMB for me, at the expense of about 30K of expanded memory. I do understand, though, that if you have a VGA board connected to a color monitor, you should exercise care in allocating away much of the A or B memory segments as above as they are normally used for VGA buffers.

Speaking of which -- nice segue? -- PC Computing published (7/92 issue) a mini-guide on memory tricks to maximize UMB's, among other things. In addition to (I)ncluding the E segment above, except PS/2's & Compaq, they also provided other clues: Diddle with the FRAME=E000 switch to EMM386 to try locating the page frame for expanded memory in the E segment; If you're using an EGA board with a color monitor, you can "I" the B=000-B7FF segment to provide 32K more UMB's; for EGA board with monochrome monitor also add B800-BFFF; and for Hercules, CGA and mono display adapters they had even more segments to include.

If you want an additional resource for scavenging additional memory for UMB via the switches for EMM386.EXE, I enthusiastically recommend the brief, how- to, article on page 445 of the 11/10/92 issue of PC Magazine. Likewise, the 11/92 issue of PC World has a short piece on page 258 that provides a basic introduction to memory management and some simpler explanations of the use of EMM386.EXE. The memory examination features of Manifest (often bundled with QEMM), ASK (Qualitas) or MSD (supplied with Windows 3.1 but undocumented; there's also a newer version bundled with DOS6) will be very helpful to avoid trial and error twiddling with memory, but note that I got slightly different results from

each one.

DOS -- Next, you need the CONFIG statement that loads DOS high and enables the Upper Memory Area: DOS=HIGH,UMB. The order of the three previous lines is important.

LASTDRIVE= -- Sony's installation process has probably put a LASTDRIVE=Z statement in your CONFIG file somewhere. Get rid of it! It may be mislocated, and the statement wastes RAM by allocating RAM for drives all the way to #Z -- about 88 bytes for every drive letter assignment you don't need. Rather than test my system for compatibility with the complete absence of a LASTDRIVE statement, I inserted a LASTDRIVE=F statement immediately after the DOS line above. The actual letter used should be one higher than the letter of your highest drive letter (that should be DOS's default, but belt and suspenders won out at 4am one morning). Don't forget about RAM drives and/or network drives you may have. On my system, I have C: & D: hard disks; the CDROM is E:, hence LASTDRIVE=F. Remember the extra Stacker (or DoubleSpace, etc.) drive as noted at the beginning of this file, if you use that program. If you add an additional hard disk, repartition an existing one and add partitions, or add disk capacity increasing software, such as Stacker, that adds an additional partition, and you'll have to reset LASTDRIVE (and the CD drive assignment!) accordingly. I've also heard that some DAK CDROM's assign themselves as drive S: during installation, so you may need to examine that situation if you have a DAK drive and reset the drive letter if possible as below. I'd recommend that you set your CDROM drive to about letter E: or a little higher in case you ever decide to add a hard drive or to disk-double the one(s) you have; having to tweak the software switch, which you won't remember by then, and reload or tweak all your CDROM menu calls or batch files, etc. will make you nuts someday.

SHELL -- Here, I inserted my SHELL statement, SHELL=C:.com c:/p /e:1024 /f (the /f switch is an undocumented DOS switch to select "Fail" when you access a floppy drive that doesn't have a diskette in it. Thanks, PC Magazine). Yours may vary, of course.

DEVICEHIGH #1 -- Laser Library time, finally. DEVICEHIGH=C:_cdu.sys /D:SONY_001 /B:340 /Q:* /T:* /M:H does it for me. Most comments suggest that these defaults, or the one the install program generates for you, are OK. Explanations of the switches follow, to the extent I've seen discussion of them. Special thanks to Scott Welliver for filling in several blanks:

```
/D:device_name Switch:    The /D: switch provides a name for the drive.  This
                          name *must* be the same as used in MSCDEX's /D:
                          switch, covered below in the AUTOEXEC section,
                          otherwise the two files will not cooperate.  Sony's
                          default was SONY_001 for me.  Someone mentioned
                          that these two /D: switches are case-sensitive;
                          they are not case-sensitive on my PC.

/U:n Switch:    There is a /U:n switch in which the n=number of CDROM drives.
                The default is n=1, so your installation may not provide it
                at all.

/B:nnn Switch:  The /B: Switch is the I/O address or base address of the
                CDROM host adaptor.  Default is nnn=340.

/M:n Switch:    The transfer mode, where n=D for DMA; P for software; H for
                High speed software.  Default is P for PC/XT and H for PC/AT.

/T:n Switch:    The channel number of the CDROM host adapter, which only
                works with /M:D.  The default drq is /T:* in which the "*"
```

```
                indicates not to use DMA requests.

/Q:n Switch:    The IRQ channel number of CDROM host adapter.  The default is
                /Q:* in which the "*" indicates not to use the interrupt.
```

The order of the switches was reported to be important, but Sony's install routine did not follow the above order in my case, so I'm not sure if order is important or if the above-listed order is correct.

Mary Kelbell found that if she did not DEVICEHIGH the driver in her CONFIG file, then MSCDEX, which is substantially larger, LOADHIGH'd easier in her AUTOEXEC.

DEVICEHIGH #2 -- Following the SONY_CDU statement, I inserted DEVICEHIGH's for my video driver, SETVER (Yes, I know I don't need it for MSCDEX v2.21, but I have one other troublemaking program that needs it.), and mouse. (Please see note below on LLTSR.EXE for additional comments on these device drivers.)

DEVICEHIGH #2+ -- If you elected not to use MSCDEX version 2.2x, you will need a DEVICEHIGH=C:.exe statement in CONFIG to permit MSCDEX to load in your AUTOEXEC later. Absence of SETVER will produce the now-famous "Incorrect DOS Version" error message when AUTOEXEC tries to load MSCDEX. Please also remember that use of an MSCDEX driver older than v2.22 with DOS6 may also give you this message. (Please see note below on LLTSR.EXE for additional comments on these device drivers.)

These additional device drivers should usually be loaded in decreasing order of size, per MS's instructions, but you may have difficulty or conflicts. Try adding one at a time where possible, check with MEM/C|MORE often and read MS DOS 5.0 manual carefully, especially the sections on DEVICEHIGH, Customizing your system, Optimizing your system, etc. I know that violates the first rule of computing, "Never read the manual," but... Loading devices and programs high is an art and just changing the order of them makes a big difference!

AUTOEXEC.BAT:

Again, a reminder: Please have a bootable DOS diskette handy before you start twiddling with AUTOEXEC.BAT.

Aside from providing some alterations to my environment with the SET command, I launched right into a PATH statement in my AUTOEXEC. The PATH must include C:. A typical PATH might read as follows: PATH=C:C:;C:

LOADHIGH #1 -- This line is the critical one. Mine is LOADHIGH C:.exe /D:SONY_001 /L:E /M:8 /E /V.

A discussion of the switches for MSCDEX follows:

```
/D: Switch:     This provides the name of the drive as above for SONY_CDU.
                It is imperative that the two /D: switches in MSCDEX and
                SONY_CDU use *exactly* the same name.

                Matt Seitz reports that MSCDEX will recognize multiple device
                drivers.  Just add multiple /D: switches to MSCDEX, e.g.
                MSCDEX /D:device_name1 /D:device_name2 that conform to the
                device drivers /D: switches loaded in your CONFIG.
```

/L: Switch: This is the drive letter assigned to the CDROM drive. If you've setup a RAM disk, remember that its driver will load before MSCDEX and grab your next available drive letter. So if you have a C: hard disk and enable a single RAM drive, the RAM drive will become D:. The CDROM will then have to be E:. The same principle applies if you have network or other device drivers present. The LL seems to be at least a little tolerant of boo-boos with the drive letter variable. As above, under LASTDRIVE, you must reset this switch if you add drives, increase the number of partitions or use a disk-doubling program such as Stacker after installing your CDROM.

/M: Switch: This switch specifies how much memory should be used as buffers for caching CD data. Installation procedure for the LL sets up 8; if the /M: switch is not specified, PC World says the MSCDEX default is 10. You can reserve /M:xx, where xx=number of sectors (1 sector = about 2K, so BEP says, for this). The /E switch below enables expanded memory for these; it's use is recommended since, otherwise, the default of 8 can require a significant amount of conventional or UMB memory (thanks, Jack!), while the driver alone lurks in high memory at about 15K. The total of these may exceed your high memory total, causing MSCDEX not to load high. You should also consider the use of a disk caching program with the use of a reasonable amount of memory for additional buffering capacity, especially one that can utilize extended or expanded memory.

/E Switch: See discussion for /M: Switch. If you have EMS or can provide it, its use is *highly* recommended, especially if you want to load drivers high. Don't forget to enable EMS in EMM386.EXE, covered above.

Lack of the /E switch, and the lack of -- or incorrect configuration of -- expanded memory it presumes you have, are the largest single causes of failure to load MSCDEX high.

/K Switch: Use of the /K Switch enables the use of the Kanji (Japanese) file structure if it is programmed into the CD you have in your drive.

/S Switch: Per BEP, this switch is used to patch DOS on MS-NET based networks to let the CDROM drive be shared by other nodes. Matt also reported, more clearly I hope to those of you that are network aware, that the /S Switch (Server) instructs MSCDEX to make the CDROM appear to networks as a local drive, rather than another network drive; you should then be able to share the CDROM drive using NET SHARE or the net menu. See also the info from Matt Seitz about a network-aware version of MSCDEX.

/V Switch: This switch displays some additional (Verbose) information when the file loads. It may include the total initial loading size of MSCDEX when loading it high. You will probably need to insert a temporary PAUSE in your AUTOEXEC immediately after the MSCDEX call so you can read it. Delete

```
                the PAUSE once the system is humming.
```

The order, above, of the switches may be important, but I have not tested the /K or /S switches.

If you are using a fast (33MHz+) system and are having problems with LOADHIGH for MSCDEX, try the poor-man's fix: Insert a PAUSE in the AUTOEXEC line just before calling MSCDEX. I almost kissed Rick Filisky for that one! When I later rearranged my LOADHIGH's, the need for it went away somehow.

After a successful load of MSCDEX, add additional AUTOEXEC lines as necessary, starting with all other LOADHIGH lines. Per MS, try descending order of size, one at a time, checking with MEM/C|MORE each time. Note that some files, even though there appears to be sufficient UMB available will balk. Sidekick would not load high at all until I put 4 other dinky TSR's in front of it. Work hard on the order and expect some odd surprises, e.g. my ancient Logitech mouse driver not only wouldn't load in UMB, but it wouldn't run at all with any programs in UMB. I ended up further enriching Bill Gates to get a new mouse driver for an old MS mouse I had gathering dust. Then it turned out that two programs wouldn't recognize Bill's latest mouse driver, 8.15, so I had to revert to 7.0. It's tedious, but it works.

Again, if you should encounter an "Incorrect DOS Version" error message when loading MSCDEX v2.20 or earlier in your AUTOEXEC file, be sure you have correctly invoked SETVER in your CONFIG file. If the message persists, change to the directory containing SETVER.EXE (probably where all your DOS 5.0 files are lurking) and enter the command SETVER|MORE at the DOS prompt; there should be a statement that looks like, MSCDEX.EXE 4.00 on the list that displays. If not, type SETVER MSCDEX.EXE 4.00 That will update your SETVER table to report to MSCDEX that it is running under DOS 4.0. Check it again with SETVER|MORE. See above for the MSCDEX/DOS6 problem that can also produce this same error message.

After all the LOADHIGH's, finish up with whatever additional instructions, TSR's, etc. you need or want in conventional memory.

For some additional background on optimizing RAM with CDROM drivers, etc., you might also want to read Harvey Summer's file, CDROM2.SET, in the library here in the CDROM Forum. Look for a newer version, tentatively to be called CDROM3.SET, in which he'll expand and update the material to provide more assistance.

Oh, if you want to play background music with LLTSR.EXE while crunching other data, I finally found the deep, dark secret (Thanks, Teddy!) to loading it high, at least on my system. Normally, when you try to load this high, you'll find that a small piece of it, only 0.1 - 0.5K, will go up; but the rest, about 27K, stays in conventional memory. Sony says LLTSR will not loadhigh, but that's what they said about SONY_CDU and MSCDEX too. Try clearing out CONFIG of all DEVICEHIGH statements, except SONY_CDU. Just reset them to DEVICE statements. I had been running an MS Mouse driver, a proprietary version of ANSI, and SETVER with DEVICEHIGH's and that was what prevented LLTSR from loading high in one configuration, at least. Since LLTSR is a whole lot bigger than the three others combined, it was an easy decision. I worked on that last 10K or so; and, in a later configuration, I was successful getting LLTSR to load high with devices also high; I suspect that LLTSR may require a larger amount of memory when loading that when running. One caveat: LLPLAY will not function on my system with LLTSR loaded high; LLTSR works fine, however. More gremlins to ferret out, time permitting.... Well, I finally got LLTSR to loadhigh with everything else, but I'll be damned if I know what finally did it! Incidently, there is an audio CD player, CDPLAYER appropriately, in the 11/24/92 issue of PC Mag; Richard Mott spotted it, so I don't know if it's Windows only or DOS too. There are also several audio players in the

Forum library here; search under the keyword "audio".

Speaking of LLTSR, Len Bilello observed that it does not work with, uhgg, Windows; but he was able to get it to load high under QEMM. Please also see the note on the Hitachi CD player way above if you need to reduce use of RAM.

For those of true daring, Glen Chapman, 73517,2273, posted a message in late January '92 on the CDROM Forum with an EXPERIMENTAL way to tinker with MSCDEX, if you have EXMOD, a utility distributed with some compilers. It may let you adjust the loading/running size of MSCDEX. His message has scrolled into message never-never land by now, but he might be willing to discuss it with you directly.

Robert Hunter also reported that if MSCDEX is loaded more than once in a session, it increments the drive letter, e.g. if your CDROM was drive G:, it will become H:. On my system it can't be loaded more than once. That might be an idiosyncrasy of the system or the versions of MSCDEX we're using. Beware.

If you find that you have a variety of needs for differing CONFIG and AUTOEXEC statements for various applications, especially memory hogs, you might give serious consideration to MBOOT, a freeware utility graciously provided by PC Magazine and Douglas Boling (available in the library at PC MagNet, GO PCMAG. It takes some $$$ to get at it cuz it's part of Ziffnet now) that lets you boot with any of four different combinations of CONFIG & AUTOEXEC files, including one for OS/2 if you want. The documentation supplied with the utility -- and in a companion file, BOOT.INF -- is a little light, but if you download a copy of the original article from the 2/26/91 issue of PC Mag (GO COMPDB) or Xerox a copy at the library, things will be a *lot* clearer. It's a great tool.

CADDYS:

There've been lots of comments about caddys (caddies? Anyone know the proper version?), where to get them, and how much to pay. I've listed below some names and phone numbers and the prices I've heard here on the Forum, but they are obviously subject to change without notice or may be incomplete. Watch out for the shipping and handling charges! Some vendors charge the equivalent of several dollars per caddy for S&H, especially when their pricing is "each", rather than in lots of, say, ten. Also check MULTIMEDIA and MULTIVEN forums for additional sources and prices.

If you know of more recent or better info, please let me know.

Caddys are available in three styles (Thanks, Gary Nickell): Phillips, NEC CDR-77/80, and "everybody else" -- the most common -- which means Sony, Hitachi, Denon, Toshiba, new NEC, etc. Most of the info herein relates to the latter category. For identification purposes, courtesy of Jack Velte, the Sony-style caddy has a clear top and looks like a 3-1/2" diskette in a 5- 1/4" package. It has a single metal shutter that slides back to expose the CD. The caddy opens by squeezing two tabs at one end; and the lid, hinged at the end closest to the end with the metal shutter, opens. The Phillips- style is clear smokey plastic; it opens by pressing two small tabs, but the CD rests in what looks like a large set of white plastic pinchers.

Bureau of Electronic Publishing, Parsippany, NJ, (800) 828-4766: $12.00 each, 5 for $50.00, plus $1.00/caddy S&H. When I was young and stupid and ordered some, my biggest disappointment was that they didn't come with labels. USA made, at least they were last year.

CD ROM, Inc., Golden, CO, (800) 821-5245 or (303) 526-7600 or Compuserve 72007,544: $6.00 each, no minimum per Phil Lyons. S&H $5.00 for an order of 10. They did well with an order for me. Japanese-made caddys, too -- with labels. See below for raves on their catalog. They also have Philips Caddys for $10, NEC (model 77 & 80) caddys for $19, Pioneer 6-disk Magazine cartridges for $18 and Philips CD-I caddies for $10.

Computerland, no phone number, caddys are part #CDTC-118606. List is $60 for 5 caddys; they sell them, per Dan McDonald, for $44, S&H unknown. Their source is CD Technology in Sunnyvale, CA, (408) 752-8500, but that may be a wholesaler.

DAK Industries, (800) 423-2866: $7.90 each, plus $3.00 _each_ S&H. Catalog #5853.

Educorp, (800) 843-9497: $5.50 each, 10 for $55.00 (ask for ten-pak price), plus about $4.00 S&H. Alternate reports of 10 for $59.00 and $55.00. Recommended by Nelson Ford.

Egghead Software in the Silicon Valley area finally has caddys and titles now -- wouldn't want to be ahead of the wave, right? -- but the caddys I saw were $12.99. Yes, each! Pretty bubble pack, though. Egg-citing... And the CDROM software was kinda steep too.

Fry's Electronics in Sunnyvale, CA carries the Sony branded caddys for those that live nearby in Silicon Valley, but they were $13.95 each... and have a nice day. I recently saw some unbranded ones there at the checkout for $9.95. In March, I saw some at $8.99 at their Fremont store, so maybe they're coming down a little. Likewise, Access Computer Technology in Santa Clara stocked caddys at $16.00 each, but that really runs counter to my Scotch soul -- and is, arguably, the highest price in the country. In May '93 they were advertising them on sale for $6.95, so maybe they've finally awakened. They have reasonable prices on most of the rest of their hardware.

Marshall Industries, $88 for 10 caddies in 1/92, including S&H. Check Yellow Pages or Information; it's supposedly a national firm, per Dave Lindbergh.

MLNC, 800-264-3799, M-F 8-5 Central time. Normally $10 each, but $8 to CIS Forum. Check with Doug Tremere (70714,3234).

NCA Computer Products (formerly NCA Peripherals), for the Silicon Valley set, is now selling caddys at $6.99 each. Lawrence Expwy in Sunnyvale or Blossom Valley Road in San Jose... but you knew that.

REX Computers, (800) 489-9172: $10 each. S&H unknown.

Sony: I'm sure that they sell their caddys; I fear the price would be a catastrophe, like Fry's, above, that sells the Sony caddy, and haven't asked.

Walnut Creek CDROM, (800) 786-9907 or (510) 947-5996, sells caddys for $4.95 in lots of 10 per Jack Velte. S&H are $5 per order. He also accepts orders on CIS at 72147,3425 (please use e-mail, not the forum message area). Several good mentions about their service and prices have passed thru here.

Owen Mitz reported that he buys Sony-type caddys in lots of 10,000 and pays about $3.80 each for them wholesale. He very strongly recommends purchasing only Japanese-made caddys, as opposed to US-made ones, from Opticord, which sell for about $1.50 less (presumably at retail). He found that he had to replace most of the USofA caddys he purchased. He thinks that a $6.00 price is reasonable at retail, quantities of 10.

CABLES:

If you're having difficulty locating oddball cables, especially ones to connect CDROM's to audio boards, etc. George Crandall recommends Cables To Go at (800) 826-7904.

BUNDLED (and other) SOFTWARE THOUGHTS:

Robert also mentioned a "fix" for access time to bundled software, if you don't mind abandoning the LL front-end with its pretty windows, etc. Incorporate direct menu or batch file calls to the CDROM for each application. The LL and its bundled software scatter subdirectories all about your disk, e.g. C:for Mother Goose and C:for the atlas. Please note that you may, unless you write a prompt for CD insertion, face a horrible scrolling error message if you call a non-existent program from the CDROM drive (Ctrl-Break will kill it). Some specifics that he and others kindly supplied, assuming that your is on C:...

ATLAS -- Move to C:and call WA, the Atlas-supplied batch file.

BOOKSHELF -- Call C:. Rick LaBanca noted that there is a known bug with Bookshelf failing to load itself into Windows ("Fatal Error..." when running SETUP from Program Manager) if you're using MS Bookshelf with Windows 3.1; there is an update available free (Bill, are you slipping?) from MS.

COMPTON'S -- Call C:; but note that the CFE.BAT file calls PEDIA.EXE and needs to pass parameters, e.g. CFE [ROMDRIVE] [PEDIADRIVE], so he used CFE G: E:.

KING'S QUEST 5 -- Call C:.BAT. If you have an early edition of this title and are using a Sound Source on a 486, it will not recognize the SS and will not load because of the high speed. There is a patch available from Sierra On-Line. Paul Hixson reported that the DOS version of KQ5 worked well under both Windows and DOS but the Windows version didn't work on his system under Windows 3.1.

MAMMALS -- Change to the CDROM drive (nothing special on your C: for it) by typing G:, or whatever your drive is, and then GO. Paul Zane Pilzer reported that Mammals has a known problem: If your PC is connected to a network, Netware Lite was mentioned, Mammals may not run, even if you're not trying to run the Mammals program itself on the network. There may be a patch for what Paul described as this IBM Linkway bug from Peter Schulz, 70216,174.

LANGUAGES -- Same as Mammals, except the call is LANGS. Remember that Languages of the World is a TSR program -- and a HUGE memory hog -- that, after being loaded, is invoked by pressing ALT-SHIFT. Thanks for that reminder, Bryan at DAK.

MIXED-UP MOTHER GOOSE -- Call C:. Keith Myers left a note that, if you use this method - rather than accessing the disk thru the Laser Library menu system - you can better access all the languages and music thru your Soundblaster Pro. Ray Seely had problems with MG on a 486/33 until he slowed it down to 20MHz. Some Sony users report read-error problems with MUMG; Larry Schneider found out that there is a bug that you can fix with DEBUG. Call Sony at (408) 372-7141 for instructions on correcting the EXE file; they will also send you a corrected disk, I understand from Robin Smith.

PDR -- If you want to load PDR under Windows with the LL, Alan "Bones" says the following batch file must be run, including the strange repetitions:

```
SET SONY_001=MSCD_001
dir d:   (assumes the CD is D:, I think)
```

```
c:
cd
cd pdr
pdr
SET CDXDRIVER=SONY_001
SET SONY_001=MSCD_001
dir d:
c:
cd
cd pdr
pdr
SET CDXDRIVER=SONY_001
```

PUTT-PUTT JOINS THE PARADE -- Nothing sexy to report on getting it working; but if you're looking for a great CDROM for the 3-7+ year-old set with lots of animation, do check this out. Humongous Entertainment, Woodinville, WA, (206) 485-1212

SCIENTIFIC AMERICAN CONSULT: Alan also notes the odd way to get this program to behave. Start it with the following batch file that came from hours with the tech support gurus:

```
dir d:
set cdrom=SONY_001
SAM -CSONY_001
```

If you discover anything easier on the above two, Alan (73107,2440) would LOVE to hear about it.

SHERLOCK HOLMES: John Hays reports that this program requires some heavy resources to run, although he didn't specify what drive/platform he was using. He suggests booting clean, with only CD and mouse drivers and adding additional buffers to MSCDEX, preferably in expanded memory. ICOM support recommends about the same thing, stressing getting rid of TSR's and drivers.

STELLAR7 -- Call C:. This assumes you have followed the INSTALL procedure on the CDROM; unfortunately, that's not in the manual but is hidden inside the label in the jewel box the CD comes in.

MISCELLANEOUS -- Many fast 486 systems overwhelm audio or other drivers supplied with software, especially when initializing, e.g. the initial problems I had getting MSCDEX to loadhigh when just a PAUSE statement in front of the command made it work. I also had problems with one of the early copies of King's Quest V failing to recognize the presence of a Disney Sound Source, just because the CPU wasn't waiting long enough to catch the response from the device that it was prepared to receive output (So said Sierra; they provided a patch very quickly). Check with your software vendors if you experience a problem on just one or two titles and have already tried booting with the minimum possible CONFIG & AUTOEXEC files; they may have already fixed your problem.

If you'd like a good listing/review of CDROM titles, check Nelson Ford's (71355,470) CDROM.EXE, a self-extracting archive file, available for download in Lib #10 on this Forum. Titles therein can be ordered from his company, PsL, at 800-242-4PsL, or you can leave a message for him here. Also check out the CDROM, Inc. catalog (see above, under "Caddys"); it's the longest and best listing of titles I've seen.

Jerry Isdale mentioned that a large, and expensive, listing of CDROM titles, CDROM's In Print,

is available from Meckler at 800-635-5537. About $95 on CDROM and $65 on paper.

For the Silicon Valley crowd, both Fry's in Sunnyvale and CompUSA down the road have begun stocking CDROM titles in quantity (Have we finally mainstreamed?!?), and the prices aren't too bad. Fry's has most of them grouped together right near the front entrance, at the beginning of their IBM software section; their selection is growing. CompUSA has a section for CDROM only and has the capability to demo them, but nobody was around to confirm that. Both stores have most popular titles. Steve Katz mentioned that Walden's and the Electronic Boutique have CDROM titles also.

MPC disks that have been reported to run OK on the LL: Battle Chess, KQ5, Beethoven, Bookshelf, Sherlock Holmes.

MPC disks with compatibility problems reported (some may be speed or TSR conflicts!): Composer Quest

Oh, for those of you with a need for speed -- but not the budget -- you might be interested in Lightning CD, a CD caching program reviewed in the 7/93 issue of PC Magazine. Suggested retail is $99.95 from Lucid Corp., (800) 925-8243, in Richardson, TX.

* * *

CDROM MANUFACTURERS AND MAJOR DEALERS OF SYSTEMS AND ACCESSORIES

This list was created in July, 1993 and will be updated as I notice changes or when changes are suggested to me. I regret that constant verification is beyond the time available to me. If you notice a change or have a suggestion for improvement, PLEASE let me know. And if I omitted your company or favorite major supplier, lemme know. Thanks!

Oh, please accept the usual disclaimer to the effect that I can't guarantee accuracy or the performance (or even the existence) of those listed here, etc.

There is excellent additional information -- esp. for international contacts, CDROM publishing, general reviews of drives, general questions, etc. -- in the file CDROMF.TXT in the Forum Library. There is also sources, info and prices on caddys in a section above.

Note: Several BBS numbers are 9600 bps only!

```
Adaptec, Inc.
 Products/Services:       scsi boards software
 St. Address:             691 S. Milpitas Bl.
 City/State,Prov/ZIP:     Milpitas, CA 95035
 Main Voice #:            (408) 945-8600; (800) 934-2766
 Tech Suppt. Voice #:
 Fax #:                   (408) 262-2533
 Fax-back #:
 BBS #:
 On-line Service/ID:
 Other:
 Last Updated:            7/93

Apple Computers, Inc.
 Products/Services:       drives
 St. Address:
 City/State,Prov/ZIP:     Cupertino, CA
 Main Voice #:            (408) 996-1010
```

Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Bureau of Electronic Publishing
Products/Services: software drives bundles
St. Address: 141 New Road
City/State,Prov/ZIP: Parsippany, NJ 07054
Main Voice #: (201) 808-2700; (800) 828-4766
Tech Suppt. Voice #:
Fax #: (201) 808-2676
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

CD-ROM, Inc.
Products/Services: software drives bundles
St. Address: 1667 Cole Bl. #400
City/State,Prov/ZIP: Golden, CO 80401
Main Voice #: (303) 526-7600; (800) 821-5245
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Chinon
Products/Services: drives
St. Address:
City/State,Prov/ZIP:
Main Voice #: (310) 533-0274
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Corel Corp.
Products/Services: scsi software
St. Address: 1600 Carling Ave.
City/State,Prov/ZIP: Ottawa, Ontario, Canada K1Z8R7
Main Voice #: (613) 728-8200; (800) 836-7274
Tech Suppt. Voice #:
Fax #: (613) 728-9790
Fax-back #:
BBS #:
On-line Service/ID:

Other:
Last Updated: 7/93

Creative Labs
Products/Services: drives bundles sound boards Sound Blaster
St. Address:
City/State,Prov/ZIP:
Main Voice #:
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #: (408) 428-6660
On-line Service/ID:
Other:
Last Updated: 7/93

DAK Industries, Inc.
Products/Services: drives software bundles
St. Address: 8200 Remmet Dr.
City/State,Prov/ZIP: Canoga Park, CA 91304
Main Voice #: (818) 888-8220; Sales (800) 325-0800; Tech info (800) 888-9818
Tech Suppt. Voice #:
Fax #: (818) 888-2837 (orders)
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Denon
Products/Services: drives
St. Address:
City/State,Prov/ZIP:
Main Voice #: (201) 575-7810
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Future Domain Corp.
Products/Services: scsi boards software
St. Address: 2801 McGaw Ave.
City/State,Prov/ZIP: Irvine, CA 92714
Main Voice #: (714) 253-0400; (800) 879-7599
Tech Suppt. Voice #:
Fax #: (714) 253-0913
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Hitachi

Products/Services: drives
St. Address:
City/State,Prov/ZIP:
Main Voice #: (415) 589-8300
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #: (516) 829-0212
On-line Service/ID:
Other:
Last Updated: 7/93

IBM
Products/Services: drives software
St. Address:
City/State,Prov/ZIP:
Main Voice #:
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other: Sorry, no info yet!
Last Updated: 7/93

Kodak
Products/Services: photo-CD
St. Address:
City/State,Prov/ZIP:
Main Voice #: (800) 242-2424
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID: CIS - several forums incl. multimedia, photo
Other: See file Kodak.txt in CDROM Forum Library #7
Last Updated: 7/93

Media Vision
Products/Services: drives bundles sound boards
St. Address: 47221 Fremont Bl.
City/State,Prov/ZIP: Fremont, CA 94538
Main Voice #: (510) 770-8600; (800) 348-7116; (800) 845-5870 sales
Tech Suppt. Voice #: (800) 638-2807
Fax #: (510) 770-8648; (510) 770-9592
Fax-back #:
BBS #: (510) 770-0527
On-line Service/ID: CIS: GO MULTIVEN
Other:
Last Updated: 7/93

Meridian Data
Products/Services: network recording software
St. Address:
City/State,Prov/ZIP:
Main Voice #: (800) 767-2537; (408) 438-3100

Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Microsoft
Products/Services: software mscdex
St. Address:
City/State,Prov/ZIP: Redmond, WA
Main Voice #:
Tech Suppt. Voice #: CD/Multimedia Suppt (206) 454-2030
Fax #:
Fax-back #:
BBS #: MS Download, (206) 936-6735
On-line Service/ID: CIS - GO MSL, GO MSKB, or several others
Other:
Last Updated: 7/93

Mitsumi
Products/Services: drives
St. Address:
City/State,Prov/ZIP:
Main Voice #: (516) 752-7730 (HQ); (214) 550-7300; (408) 970-0700
Tech Suppt. Voice #:
Fax #: (214) 550-7424
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

NEC
Products/Services: drives bundles
St. Address:
City/State,Prov/ZIP:
Main Voice #: (508) 264-8000
Tech Suppt. Voice #:
Fax #:
Fax-back #: (800) 366-0476
BBS #: (508) 635-4706; (508) 635-6328; Users' Group ((603) 878-2567
On-line Service/ID:
Other:
Last Updated: 7/93

Panasonic Communications and Systems
Products/Services: drives
St. Address: Two Panasonic Way
City/State,Prov/ZIP: Secaucus, NJ 07094
Main Voice #: (201) 348-7000; (800) 742-8086
Tech Suppt. Voice #:
Fax #:
Fax-back #:

BBS #: (201) 863-7845
On-line Service/ID:
Other:
Last Updated: 7/93

Phillips
Products/Services: drives
St. Address:
City/State,Prov/ZIP:
Main Voice #: (615) 521-4499
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Pioneer
Products/Services: drives jukebox
St. Address:
City/State,Prov/ZIP:
Main Voice #: (408) 988-1702
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

PsL (Public software Library)
Products/Services: software drives bundles
St. Address: P.O. Box 35707; 5925 Kirby Dr. #209
City/State,Prov/ZIP: Houston, TX 77235-5705
Main Voice #: (713) 524-6394; (800) 242-4775 (orders)
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Sanyo
Products/Services: drives
St. Address:
City/State,Prov/ZIP:
Main Voice #: (801) 225-6888
Tech Suppt. Voice #:
Fax #:
Fax-back #:
BBS #:
On-line Service/ID:
Other:
Last Updated: 7/93

Sony Computer Peripheral Products, Optical Products Storage Division
 Products/Services: drives bundles
 St. Address:
 City/State,Prov/ZIP: San Jose, CA
 Main Voice #: (408) 434-6644; -432-0190, -944-4326?, -944-4225?
 Tech Suppt. Voice #: (408) 955-4343
 Fax #:
 Fax-back #:
 BBS #: (408) 955-5107
 On-line Service/ID:
 Other:
 Last Updated: 7/93

Sun Moon Star
 Products/Services: drives Hitachi Sony
 St. Address:
 City/State,Prov/ZIP: San Jose, CA
 Main Voice #:
 Tech Suppt. Voice #:
 Fax #:
 Fax-back #:
 BBS #: (408) 452-8281
 On-line Service/ID:
 Other:
 Last Updated: 7/93

Talon
 Products/Services: drives
 St. Address:
 City/State,Prov/ZIP:
 Main Voice #:
 Tech Suppt. Voice #:
 Fax #:
 Fax-back #:
 BBS #:
 On-line Service/ID:
 Other:
 Last Updated: 7/93

Tandy
 Products/Services:
 St. Address:
 City/State,Prov/ZIP:
 Main Voice #: (817) 390-3700
 Tech Suppt. Voice #:
 Fax #:
 Fax-back #:
 BBS #:
 On-line Service/ID:
 Other:
 Last Updated: 7/93

Texel
 Products/Services:
 St. Address:
 City/State,Prov/ZIP:
 Main Voice #: (800) 886-3935

```
 Tech Suppt. Voice #:
 Fax #:
 Fax-back #:
 BBS #:
 On-line Service/ID:
 Other:
 Last Updated:            7/93

Toshiba America Information Systems, Inc., Disk Products Division
 Products/Services:       drives
 St. Address:             9740 Irvine Bl.
 City/State,Prov/ZIP:     Irvine, CA 92718
 Main Voice #:            (714) 583-3111; (714) 455-0407
 Tech Suppt. Voice #:
 Fax #:                   (714) 583-3133
 Fax-back #:
 BBS #:
 On-line Service/ID:
 Other:
 Last Updated:            7/93

Trantor Systems Ltd. (wholly owned subsidiary of Adaptec, Inc.)
 Products/Services:       drives scsi software boards
 St. Address:
 City/State,Prov/ZIP:
 Main Voice #:            (415) 770-1400
 Tech Suppt. Voice #:
 Fax #:
 Fax-back #:
 BBS #:
 On-line Service/ID:      CIS: GO CDVEN
 Other:
 Last Updated:            7/93
```

Please contribute if you have info to share!

Enjoy! Kevin Kelly -- 76650,351

Article 7772 in alt.cd-rom:
From: wlsmith@valve.heart.rri.uwo.ca (Wayne Smith)
Subject: **Mitsumi CD-ROM drives**: ->FAQ<-
Organization: (this space for rent)
Date: Sun, 7 Feb 1993 19:54:38 GMT
Message-ID: <1993Feb7.195438.27607@julian.uwo.ca>
Sender: news@julian.uwo.ca (USENET News System)
Nntp-Posting-Host: valve.heart.rri.uwo.ca
Lines: 482

Over the last few months, I've asked some questions about CD-ROM drives in general, and the Mitsumi drive in particular. Here's what I've collected...

From: forb0004@student.tc.umn.edu (Eric Forbis)
Subject: Re: New Mitsumi drive

>I am thinking about buying a (cheap) CD-ROM drive for my PC.
>ComputAbility's ad has a new Mitsumi drive for 187$. Has anyone

I bought one for $199 at Software ETC, and brought it home expecting conflicts with other boards. To my surprise, the physical installation was a breeze and their factory settings worked fine. I rebooted with the new cd drivers provided, saw a new drive listed on dosshell, plugged in one of my meager collection of CD's, and was immediately working. Very pleasent surprise. I haven't tested the access speed yet, but since responses are relatively quick, it must be operating at close to the 380ms.

Very good deal, IMHO.

From gpaille@cln.etc.bc.ca Sat Feb 6 17:04:33 1993
From: gpaille@cln.etc.bc.ca
Subject: Re: Photo CD

>Can you tell me if any Mitsumi drives are mentioned in that list, and
>if so will they read mulitsession (Photo CD) cd's?

The document I was referring to indicates that the Mitsumi CRMC-LU005s internal drive will read multisession using the controller card and device driver software that comes with the drive. (for IBM and compatible computers)

From smlg1015@uxa.cso.uiuc.edu Mon Jan 4 16:22:35 1993
From: Stuart M Lichtenthal <smlg1015@uxa.cso.uiuc.edu>
Subject: Re: Mitsumi CD-ROM drive: $169 -> Good, bad or ugly?

I bought that drive for $199 4 months ago. All CD-Rom drives are slow compared to hard disks. I don't use it for Multimedia since I don't have any MM CD's. It is the bare minimum for getting data off CD's and the seek time will annoy you from the start. However, people say that all CD-Rom's have this problem.

Believe it or not, I don't have any music CD's and haven't tried playing any on the Mitsumi. The drivers I'm using came from cica. I couldn't believe the ones in the box wouldn't work with Windows 3.1. Nevertheless, getting the one off cica fixed the problem. If you are running os/2, be prepared to do battle. You need to set up a specific dos session in order to

use the mitsumi or most any of the non SCSI CD drives. Mitsumi has been "working on the drivers" for quite some time. What this means is that under os/2, you can't just access the drive, but have to leave os/2 for dos, and not just os/2 dos, but real dos before you can get to the drive.

There seems to be a wealth of CD-ROM stuff around. I only have two disks, one from Microsoft and one from IBM with alot of programming information on them. This is also the way that Windows NT is being distributed.

From FFAAB02@BLEKUL11.bitnet Tue Jan 5 09:18:11 1993
From: Ivo Jossart <ffaab02%blekul11.bitnet@utcs.utoronto.ca>
Subject: Re: Mitsumi CD-ROM drive: $169 -> Good, bad or ugly?

I have such a drive, and it works fine. It has a special IDE interface and it uses IRQ 2,3,4,5 (one of these). If you have lots of i-o boards like scanners, sound cards ... you may get into trouble with irq conflicts. If you can afford a scsi-cdrom and controller you can attach up to 7 cdroms mod's hard disks ... on one single controller. (and you can have more than 1 controller in a machine ...)

It all depends on how much you can afford, and if you want to get some high tech specs. (like photo cd requires a multi-session cd-player, or heavy multimedia stuff...)

From ee_d316@ceres.kingston.ac.uk Thu Jan 14 10:05:46 1993
From: Stevey Weavey <ee_d316@ceres.kingston.ac.uk>
Subject: Re: New Mitsumi CD-ROM Drive
From: dh@fncrd6.fnal.gov (don husby)
Subject: Mitsumi drives

The fast version is specified to have an average seek time of 350ms, a sustained transfer rate of 175K bytes/sec. It claims to be MPC compatible and meets or exceeds High Sierra and ISO 9660 specifications. It is not a SCSI drive, but it does have a 16 bit controller. It is advertised (by Insight) as having a 32K buffer, but the user manual says nothing about buffer size, and there are no RAM chips on the controller board. I suspect that it does have a large buffer inside the drive.

The slow version has an 800ms seek time, 2K buffer, and a 150KB/S transfer rate and an 8 bit controller interface.

The fast one is significantly faster than the slow one when running the Toolworks encyclopedia (My only benchmark). Both worked with the Soundblaster Pro (Though I did NOT try them with the soundblaster's CD rom controller.) using default interrupts, DMA channels, etc. The music samples from the toolworks encyclopedia were a little distorted when they were played through the soundblaster.

From: rjk@iastate.edu (Jeff Kraemer)
Subject: Re: DR-DOS 6.0 and Mitsumi MTMCDE.SYS

>There are problems using the emm386.sys and the interrupt and DMA-transfer
>driver mtmcde.sys together. If I try to load mtmcde.sys with emm386.sys
>installed, the system hangs.

> This should probably go onto the FAQ file. It's about the fourth time a
>question of this type has been asked in the past few weeks. There seems to
>be a bug/feature in Mitsumi's MTMCDE.SYS that prevents it from working
>properly with memory managers. It will NOT load high.

Huh? Well, I bought the cheapie mitsumi drive last week (the 150msec one) and I admit, it caused me quite a bit of grief to get enough free memory to run _anything_ off of it. However, after way too much fun with my manuels (sp?) for 8 hours, I managed to push it up into high. It ate allmost all that was available in high *grr* but up it went. With no tsrs running, I got it to 627k free. I reloaded a disk caching program, and now I have 599 free. The trick lies in the order that you put the items in autoexec.bat and config.sys.

I still havent figured out the dippy windows cut and paste yet, but if there is interest, I will dig back out the windows book and figure it out, and post my autoexec and config files. I should note: I'm using DRDOS, which I strongly recommend, and the tricks I used wont work with DOS.

PS I am using emm386 at the same time.
Email me, and if I get too many I'll post it.

From: harrison@lclark.edu (Mark Harrison)
Subject: Re: New Mitsumi -- Driver loaded high w/QEMM?

>Has anyone managed to load the device driver for the NEW Mitsumi drive,
>the LU-005S, high using QEMM?

>I've got 6.02 of QEMM, but everytime the driver tries to come up when asked
>to load high, it just freezes, and doesn't load. The system isn't ENTIRELY
>locked up, as the numlock light still toggles and I can reset with a C-A-D,
>but the driver never loads high.

>Anyone having loaded it high with QEMM who would like to pass the info on to
>me would be much appreciated.

I've read about this problem several times now. I just picked one up last night and had no problem load everything high with QEMM 6.02. Perhaps I got newer drivers? My only problem is that I can't use the DMA option of MTMCDE.SYS with Sherlock Holmes or Carmen Sandiego. It could have something to do with my soundboard. Simtel works great with DMA option.

I'll bring in my disk tomorrow and see if we have different versions. If so, I'll mail mine out to anyone who needs newer ones. I'll also try to bring in my config.sys and autoexec.bat if our drivers are the same.

From: pjs@ariel.ucs.unimelb.EDU.AU (Peter John Swiatkowski)
Subject: Re: What is the access time on the cheap Mitsumi?

>From my reading of the BBS CD-ROM conference: Mitsumi have released a new
>model drive (500 in the model number I think) which still uses their
>proprietary interface but has 350ms seek times and is fully multi-session
>XA and photo CD compliant. The selling price is generally a bit higher by I
>have seen vendors offering it for less than US$200.
>Do you happen to know what size buffer it has?

32K I believe. Not a lot but more than many of its competitors.

From: splee@pd.org (Seng-Poh Lee, Speedy)
Subject: Re: **DAK BSR CD-ROM drive**
> I purchased a $200 BSR drive from DAK (which comes with a proprietary non-

> SCSI host interface. The drive works fine, but the host adaptor interferes
> with the floppy drives.

How so? I have no problems whatsoever. My card is set for 310 and IRQ 2

> Since I have been unsuccesful at getting through DAKs' customer support
> phone line for more then 3 weeks now, and sinc e DAK does not respond to
> customer support FAX requests,

I faxed a query in and they DID call me back. Three weeks later, but they DID call back.

> Can anyone recommend another source for the drive that DAK sells, or a
> different drive ? Something in the $200 range is preferrable. It must be
> external as I have no open bays left in the machine. Is the Mitsumi drive
> any good ?

The **DAK BSR drive** IS a Mitsumi.

From: pat@aurora.cis.upenn.edu (Pat Barron)
Subject: Re: Tech info on Mitsumi CD-ROM or drivers

>From: dittman@skitzo.dseg.ti.com (Eric Dittman)
>Subject: Re: Tech info on Mitsumi CD-ROM or drivers
>Mitsumi's phone number is 408-970-0700.
>It was real nice of them to leave out their address and phone number from
>their manuals. Fortunately, a call to 408-555-1212 tracked them down.

Good luck getting any info out of these folks. I've dealt with them, over the same issue that Terry has (except I was trying to write an OS/2 driver for the low-end drive, and trying to write a better DOS driver to replace the one I got with the drive, which is much too slow for my tastes [and Mitsumi confirmed for me that their driver doesn't have much in the way of optimizations).

Apparently, they left their address and phone number off of the documentation because they simply do not want to talk to end users. After badgering their customer support manager for weeks, I finally got them to send me the engineering spec for the drive (under non-disclosure, so I can't share it - sorry!). I found some bugs in the spec, and single-stepping through their DOS driver revealed that the driver was using commands that were not documented in the spec. Trying to ask them about it resulted in about two months of unreturned phone calls and FAXes. When I finally managed to catch the customer support manager at his desk, he effectively told me they couldn't support end users, they wouldn't answer my questions, and there was nothing else they could do for me. Apparently it would have gone differently if I were an "established company" and wanted to contract to write a driver for them. During my first conversation with him, he offered to send me the source code for the DOS driver, which he later changed his mind about. When I asked what I could do about this drive that's useless in my OS/2 machine, he said "Please understand that OS/2 *is* important to us", but there was no schedule for doing an OS/2 driver for the low-end drive, since they're busy working on getting their newer products out the door.

Disclaimer: as you can probably tell, I'm still pretty steamed about all of this, and I'm sure it shows in what I wrote. Take it for what it's worth.....

P.S. If you want to reply to this, ignore the headers and send replies
to me at "Pat_Barron@transarc.com".

From dce@krusty.smsc.Sony.COM Tue Jan 12 17:25:05 1993
From: dce@krusty.smsc.Sony.COM
Subject: Re: CD-ROM: SCSI vs "other",fast vs slow,Mitsumi,MPC,formats ->?

> 1) Given the relatively low data transfer rate of these CD-rom drives,
> is there any advantage in getting a SCSI cd-rom (and paying $150 to
> $200 for a SCSI controller) or would a proprietary controller card
> be perfectly adequate?

Well, you can upgrade to a better SCSI card (maybe one with caching or some other features), but you're stuck with a proprietary CD-ROM controller. Otherwise, I'd say it's a crap-shoot right now.

> 2) Is this multi-media thing just a list of required hardware?
> (ie are cd-rom drives sold 3 or 4 years ago just as MPC compatible
> as currently available ones?) Is it possible to buy a cd-rom drive
> today and find that it is in some way (major or minor) not MPC
> compatible?

Some drives are really slow, and are thus not compliant. MPC is used by CD-ROM disc creators to have some kind of minimum measure of speed.

There are two parts to the speed issue: access time and data transfer rate.

Older drives may not be able to decode fast enough to run at 150k/sec, and that can be a problem, but the access time can be an even bigger deal when the software expects to be able to get around the disc. For example, if you have an interactive adventure game where going through a door requires moving halfway across the disc, and you have an average access time of 1 second (1000ms), the game is going to feel slow.

> 2a) I have read that the old (and still prevelant) transfer rate of
> 150 k/sec is at best borderline as far as animation goes.
> Will I really really be sorry that I didn't get a 300k/sec drive?

Interestingly enough, you probably won't, at least not in this regard.

Currently, Video for Windows won't run very well on a 150kb/sec CD-ROM drive (even on an Adaptec 1740 EISA SCSI adapter and a 350ms ast drive). Originally, QuickTime wouldn't handle that very well, either, but improvements are being made. In other words, by the time it really matters, most software will be able to handle the slower data rates.

On the other hand, you won't regret buying a 300k/sec drive. I have two (an NEC CDR-74 and a Sony CDU-561), and I wouldn't want to use anything slower.

From: wade@nb.rockwell.com (Wade Guthrie)
Subject: Re: CD-ROM: SCSI vs "other",fast vs slow,Mitsumi,MPC,formats ->?

> 1) Given the relatively low data transfer rate of these CD-rom drives,
> is there any advantage in getting a SCSI cd-rom (and paying $150 to
> $200 for a SCSI controller) or would a proprietary controller card
> be perfectly adequate?

Well, you have to ask yourself: do you want to stay with DOS for the rest of your life? If the answer is no (I am planning on getting Linux, for example) then I think SCSI will be more compatible with other OS options.

As far as throughput, heck, I don't know. The reason I originally went SCSI was card slots. I can have up to seven devices (I currently have 2 hard disks and a CD) plus a floppy controller and only suck-up one slot.

> (I've read about tons of problems with SCSI drivers. Are drivers for
> proprietary controllers more or less trouble-free?)

I had to do one driver swap (to get sound -- the first driver did data okay, but no sound). This was no hastle (and DC Drives should have known better, anyway). From what I've heard, the Correl SCSI drivers are pretty good as well. The proprietary drivers will be matched to the CD-ROM, so they should be pretty okay too.

> 2) Is this multi-media thing just a list of required hardware?
> (ie are cd-rom drives sold 3 or 4 years ago just as MPC compatible
> as currently available ones?)

They may not be fast enough. I don't remember the speed requirements, but I think it is in the neighborhood of 350ms access on the CD-ROM. The cheapest drives (as well as most of the 3 or 4 year-old ones) are gonna be in the area of 600ms.

> Is it possible to buy a cd-rom drive today and find that it is in some
> way (major or minor) not MPC compatible?

Yeah, speed.

> 3b) I haven't asked HI-TECH if they sell a starter-pak of CD software, but
> is it cheaper in the long run to buy a drive and start-set of cd's in
> a combined deal (what, $280, $325?) or just buy the drive of my choice
> and buy the software of choice separately?

Well, it depends on what you want. I never would buy a description of mammals (a common CD in the CD-bundles sold with the drive) on my own. Yeah, I could get one cheaper if I got it with the drive; but, I got away cheaper still -- I didn't get it at all. When I looked what came with the bundles and asked myself: would you buy any (or even 3 out of 5) of those on your own? If the answer is 'yes', then you should probably go with the bundle.

> 4) Is there a top-10 list of "must-have" cd's. or a list of stuff not to
> get? Does anyone have any preferences either way?

I decided that one big reason to get a CD-ROM was to get a tap into all the shareware (it is a lot easier than down-loading, for me). I think that the SIMTEL disc ($24.95, as I remember from Walnut Creek) is really cool. In addition, there's the CICA windows disk. I'd give the GNU disc a miss, cause the stuff's not set-up for PCs (find a disc with the GNUISH stuff on it -- SIMTEL has some, but not a lot). Finally, if you get a CD-ROM drive that takes caddies, you can't beat Walnut Creek ($4.95); their number is 1-800-786-9907.

From: mbeyer@zamboni.NSP-SERVER1 (Mark D Beyer)
Subject: Re: CD-ROM: SCSI vs "other",fast vs slow,Mitsum

> is there any advantage in getting a SCSI cd-rom (and paying $150 to
> $200 for a SCSI controller) or would a proprietary controller card
> be perfectly adequate?

If you have lots of peripherals and not a lot of open slots, SCSI is good because you can

daisy chain 6 or 7 peripheral devices to just one adapter.

> (I've read about tons of problems with SCSI drivers. Are drivers for
> proprietary controllers more or less trouble-free?)

The SCSI spec is not the cause of buggy drivers. I've not had problems with Adaptec drivers.

From: adrie@ica.philips.nl (Adrie Koolen)
Subject: Re: CD-ROM: SCSI vs "other",fast vs slow,Mitsumi,MPC,formats ->?

>1) Given the relatively low data transfer rate of these CD-rom drives, is
> there any advantage in getting a SCSI cd-rom (and paying $150 to $200 for
> a SCSI controller) or would a proprietary controller be perfectly adequate?

When you compare a CDROM with a hard disk, there's a big difference in one respect. With a hard disk, you normally only want to read files and do nothing with the blocks as you read them. Not so with CDROM drives. As you play an animation (real time file), you want to do something with the blocks as you read them, e.g. send them to audio play hardware or the VGA. In the meantime you need processor cycles to process the data.

To do all this with the limited resources of the PC, you want the CDROM hardware to be as fast as possible, i.e. a low AT-bus load and a fast and efficient MS-DOS driver. When reading ordinary files, you will probably not notice whether the load of the CDROM drive(r) is 90% or 10%, but when playing animations, you'll see and hear the difference. Note that Microsoft specifies a maximum of 40% for MPC compatibility.

Most SCSI adapters are very efficient in their way of transfering data over the AT-bus. Especially bus mastering controllers like Adaptec's AHA 1542b. DMA, when not implemented cleverly, can be real bad in bus load.

Subject: CD-ROM: SCSI vs "other",fast vs slow,Mitsumi,MPC,formats ->?
From: terry.goodman@pcb.batpad.lgb.ca.us (Terry Goodman)

> (I've read about tons of problems with SCSI drivers. Are drivers for
> proprietary controllers more or less trouble-free?)

Under DOS, yes. But a proprietary controller is less likely to be supported by your next operating system than a popular SCSI adapter from a major manufacturer.

>2) Is this multi-media thing just a list of required hardware? (ie are cd-rom
> drives sold 3 or 4 years ago just as MPC compatible as currently available
> ones?) Is it possible to buy a cd-rom drive today and find that it is in
> some way (major or minor) not MPC compatible?

The original MPC specifications as to system RAM and reader speed were unrealistic. Moreover, you might be wise to hold out for a reader that is Kodak Photo-CD compatible.

>2a) I have read that the old (and still prevelant) transfer rate of 150 k/sec
> is at best borderline as far as animation goes. Will I really really be
> sorry that I didn't get a 300k/sec drive?

If animation is your interest, yes. If your CDROMs are shareware file collections or even just text databases, slow access will be less disturbing.

> Are there any advantages in getting the external vs the internal drive?

The extra expense of an external unit (with its cabinet and power supply) may be worth it if you have multiple PC's and may want to share or occasionally move the drive to another system, or if you have other plans for the drive bay space in your system unit.

>4) Is there a top-10 list of "must-have" cd's. or a list of stuff not to get?
> Does anyone have any preferences either way?

Microsoft Bookshelf, an encyclopedia, and one of the mammoth collections of Great Books. The Atlas products are pretty and interesting, but very sparse on data and instantly out of date, in our changing world.

DAK has a Computer Select Limited Edition CDROM available that may well be worth more to you than the price of a drive from them, if you do any PC consulting.

From peter.gottlieb@channel1.com Mon Jan 18 01:46:18 1993
From: peter.gottlieb@channel1.com (Peter Gottlieb)
Subject: cd-rom: scsi vs "other",f

>1) Given the relatively low data transfer rate of these CD-rom drives, is
> there any advantage in getting a SCSI cd-rom (and paying $150 to $200 for
> a SCSI controller) or would a proprietary controller card be perfectly
> adequate?

If you don't need the SCSI card for other things or for future expansion, you can stay with a proprietary solution. You are correct about the speed.

> (I've read about tons of problems with SCSI drivers. Are drivers for
> proprietary controllers more or less trouble-free?)

I had no problems with adding a Toshiba XM3401B to my Adaptec 1542b. The only thing missing being able to play audio disks, but that is due to the lack of driver and can be solved at any time by buying the CorelSCSI driver package. I don't really care about playing audio disks, though.

>2) Is this multi-media thing just a list of required hardware? (ie are cd-rom
> drives sold 3 or 4 years ago just as MPC compatible as currently available
> ones?) Is it possible to buy a cd-rom drive today and find that it is in
> some way not MPC compatible?

The MPC standards are not too tough as far as CD-ROM specs go. But there are reported problems with drives that claim to be MPC compatible. Most drives today that claim MPC work fine.

>2a) I have read that the old (and still prevelant) transfer rate of 150 k/sec
> is at best borderline as far as animation goes. Will I really really be
> sorry that I didn't get a 300k/sec drive?

It is a cost vs. utility issue. Yes, 150K is borderline, but if you wait for the faster drives to become cheaper, you will not have the use of the drive until then (which could be a couple of years). I decided to bite the bullet and get a 330 KB/sec, multisession drive. This set me back $500, but at least I won't have to mess with my system for a while.

> I know that there is a fast and slow Mitsumi drive, and I have also read

> about the "order one kind of drive, but get another (slower) drive
> instead" phenomena.

Become knowledgeable about what you are buying. A quick scan here shows two Mitsumi models: CRMC, 600msec; and CRMC005, 347msec.

> Are there any advantages in getting the external vs the internal drive?
> Is this drive (or CD-rom drives in general) affected by 5.25" floppy
> drives mounted directly above or below it?

I have heard the powerful motor (and its magnets) can affect floppy or hard drives close by, but nothing is mentioned in my Toshiba CD-ROM install guide about this, and I have had no problems. Perhaps certain drives emit more of a field than others.

From: poffen@sj.ate.slb.com (Russ Poffenberger)
Subject: Re: CD-ROM: SCSI vs "other",fast vs slow,Mitsum

> is there any advantage in getting a SCSI cd-rom (and paying $150 to
> $200 for a SCSI controller) or would a proprietary controller card
> be perfectly adequate?

Also, support for CDROM's on SCSI is much more extensive. For now, NT only supports CDROM's on SCSI. OS/2 I think is also that way (driver may now be coming available, not sure.)

For now, THE END...

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Announcing: The **Ultimate MOD Collection CD-ROM**

MOD format files have been enormously popular on the Amiga ever since they were first introduced. So popular in fact, that they quickly spread to the Atari ST and the IBM PC (and compatibles) platforms. Today, there are now MOD players for nearly every popular PC and workstation format.

This CD-ROM provides MOD enthusiasts everywhere with the ultimate collection of MODs, players, editors, tools, and instruments on one convenient CD-ROM! With this CD-ROM you can now stop wasting time, money, and disk space collecting these modules!

The UMC CD-ROM features:

- Dozens of PD/Shareware MOD players for every popular computer format (Amiga, PC & compatibles, Atari ST, Mac, Apple IIgs, NeXT, Sun)

- Dozens of PD/Shareware MOD editors & tools for Amiga, ST, PC

- Over 1,700+ modules, ready to play direct from disc

- Over 1,500+ instrument files for you to compose your own mods with or to experiment on existing mods

- Source code for various players as well as detailed information on the MOD file format provided for interested programmers

- MOD files, players, editors, tools and instruments are also provided in compressed (.LZH) format for the benefit of BBS operators

- Standard ISO-9660 format, can be read on nearly any system

- A sampling of other Amiga music module formats provided on disc as a bonus (e.g. Future Composer 1.3 & 1.4, MED/OctaMED, SoundFX, Face the Music, Oktalyzer, and others) Currently, these formats can only be played on the Amiga; however, information on the file formats of some of the above module formats is provided if you wish to construct a player for other systems

Whether you're a programmer, composer, bbs sysop, or someone who just enjoys listening to MOD files, this CD-ROM provides a convenient archive of thousands of MOD files, instruments, and related utilities.

IMPORTANT INFORMATION FOLLOWS:

Amiga users with only 512K chip ram may encounter problems playing large MOD files, especially while running other chip-ram intensive programs. One meg or more of chip ram is highly recommended.

NOTE: The following limitations apply to PC & Mac computers attempting to play MOD files:

PC (and compatibles): MINIMUM equip: 12mhz 286 w/standard PC speaker
(a sound card and at least a 386SX is highly recommended)

Mac: MINIMUM equip: Any Mac with at least a 68020 processor and running System 6.0.8+ or 7.0+
(a Mac with STEREO output, and 68030+ processor is recommended)

Also note: This CD-ROM has been set-up primarily for the Amiga, PC, and Atari ST systems.

The Mac, IIgs and Unix (NeXT & Sun) MOD players have not been tested and are provided on the disc for the sake of completeness. The players for these computers are provided in compressed archives.

Ordering information:

Name _____

Address _____

City _____ State _____ ZIP _____

Country (if outside US) _____

Phone (optional) _____ Circle one: Home / Work

Questionnaire (optional):

Computer system you intend to use this CD-ROM on:

Manufacturer _____ Model _____

How much memory does your system have? _____

What video card? (PC & compats only) _____

What sound card? (PC & compats only) _____

Which brand of CD-ROM drive are you using?

Manufacturer _____ Model _____

How many CD-ROMS have you purchased in the last year? _____

Product	No. copies	Price	Total
The Ultimate MOD Collection CD-ROM	_____	x $34.95	_____
Add Shipping & handling ($4 for US/Canada/Mexico, $9 foreign overseas)			_____

Amount enclosed: _____

Acceptable forms of payment: Check or money order
(made out to "Sunset Productions")

Foreign orders: Checks and/or money orders MUST be made in U.S. funds
and drawn from a U.S. bank

(sorry, we can not accept credit card orders at this time)

Mail to: Sunset Productions
P.O. Box 8180
Austin, TX 78713-8180

For further information call
Phone: (512) 320-0356

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LITTLE EDITORIAL ON RECENT NEWS

Paul Nicholls

The Multimedia PC Marketing Council made a series of announcements in late May that will have a profound, and very positive, impact on the broad market acceptance of multimedia. The Multimedia PC Marketing Council is a trade association formed in 1991 to support and promote the Multimedia PC platform. The Board of Directors of the Council consists of representatives from fourteen leading computer industry organizations, including Compton's New Media, CompuAdd, Creative Labs, Fujitsu, Headland Technology/Video Seven, Olivetti, Media Vision, Microsoft, NCR, NEC, Philips, Software Publishers Association, Tandy and Zenith. In 1991, the MPC Marketing Council introduced a standard platform for multimedia consisting of an IBM/compatible 386, sound board, VGA video and a CD-ROM drive. This standard platform, identified by the MPC logo on both systems and CD-ROM titles, went some way to clear up the confusion about multimedia on the part of both developers and consumers. The whole enterprise, while pioneering, useful, and making a certain impact, did not quite "take off" due to a few problems. The three recent announcements address these problems and clear the way for a genuine standard platform for multimedia with an extensive installed base.

First, a Level 2 Specification for "enhanced" multimedia has been established and will be identified by its own derivative logo. The basic components of the Level 2 system are:

IBM/compatible 486/25MHz
binary compatibility with Windows 3.1
4Mb RAM (8Mb recommended)
160Mb hard disk
400ms CD-ROM drive (double-spin, XA-ready, multisession)
16 bit sound card
640 x 480 display resolution with 65,536 colors

The Council consulted more than 50 industry companies in devising the Level 2 Spec, which reflects a broad industry consensus regarding appropriate functionality for enhanced multimedia. Note that Windows 3.1 is not the "official" operating system, although compatibility is required. The door stands open for Windows NT, OS/2 and UNIX. And pay no attention to that "enhanced" malarky. The Level 1 spec is gutless and inadequate (even for simply running Windows) and the Level 2 spec should be regarded as the basic platform for anyone who expects to use multimedia or be happy with their new system for more than a year into the future. For those who wish to remain underpowered, Marc Miller, Chairman of the Council, notes that "The new specification is backwardly compatible with the original MPC Specification, which remains in full effect and will continue to serve the needs of the market segment that does not require advanced multimedia capabilities."

Second, the original MPC logo was a trademark, not a certification. The presence of the logo suggested compatibility between systems and CD-ROM titles, but did not guarantee it. This not only undermined consumer confidence somewhat, but encouraged many hardware and software companies to avoid paying a fee for using the MPC logo and simply advertised themselves as "MPC compatible" -- further undermining consumer confidence in the cases where this promise did not jive with reality. But now the MPC Council is devleoping a suite of test programs which will be released this summer, and products will have to pass the test before they get the logo, which is now a certifaction mark rather than a mere trademark. In addition, the Council will verify the compatibility test results. This development will certainly lead to more reliable performance in multimedia systems and should provide even more of a "warm and fuzzy" feeling in consumers than the previous trademark did.

Finally, IBM has now come on board. Previously, IBM preferred (some would say out of pure bloody-mindedness) to push their own similar but not quite compatible multimedia platform, Ultimedia. Ultimedia is effective, but expensive and lacking an extensive selection of titles produced for the platform. The titles that exist are excellent, but there are not enough of them to drive broad sales. In contrast, there are now 190 licensed MPC titles. IBM will continue to push Ultimedia, which may retain a niche market in schools and perhaps corporations. But (and it makes perfect sense because the MPC spec is based on the present enormous installed base of IBM/compatible microcomputers) IBM has now decided to become an MPC licensee, along with the other 118 software and hardware vendors. Steven Solazzo, Director of Multimedia at IBM, while sitting on both sides of the fence to some extent, stated that "We believe the robust nature of the Level 2 Specification sets a benchmark that will enable compelling multimedia applications. It will encourage developers and buyers alike to invest in exciting multimedia hardware and software, stimulating the entire PC marketplace. We are pleased to complement our support of the new MPC Level 2 Specification with today's [May 24] announcements of the newest members of the Ultimedia family of products, the Multimedia for PS/Valuepoint Series."

These three developments excise the few warts that marred an otherwise workable program for getting multimedia hardware and software into a large segment of the present large IBM/compatible installed base. The Level 2 Specification is powerful enough to meet multimedia requirements, and will neither disappoint consumers with lackluster performance, nor hobble developers by forcing them to author for an inadequate and incapable platform. The presence of IBM removes the confusion and insecurity introduced by their previous insistence on an alternate platform, and, with IBM and Microsoft both backing it, how can MPC now fail? Multimedia is still in its youth, but these recent announcements are the best news we have heard in some time. Multimedia is still young --there are many headaches still ahead during the first half of the decade at least -- but it would appear that we now finally know what a "multimedia PC" is, and so do the developers. And we may now expect this multimedia platform to begin flourishing and evolving further.

For more information on the Multimedia PC marketing Council announcements, contact Glenn Ochsenreiter at the MPC Marking Council, 1730 M Street NW, Suite 707, Washington DC 20036, 202/331- 0494; fax 202/785-3197.

INTRODUCTION TO MULTI MEDIA DESIGN

Seminar Chairman: Jay Silber - opening comments.

Thank you. I welcome this opportunity to discuss multimedia design with so many people from so many different organizations and backgrounds.

Coming together here at CD ROM EXPO from many different places and many different directions is not unlike the evolution of video technologies and computer technologies which have now converged to create the multi media environments in which all of us up here are actively working.

Before we begin our discussion I'd like to introduce you to our speakers and kind of plan out the hour and 15 minutes ahead of us.

I'll start with myself, because I'm not at all modest. I arrived here on a path that began with television production at CBS over 20 years ago. In the mid -70's I was producing training films and corporate image films, and by the mid - 80's I was producing interactive video disc training programs controlled by computers. By the end of the last decade I heard of a new medium that combined the visual power and random access capabilities of video disc with the speed and flexibility of computers - and this new medium is called DVI - Digital Video Interactive technology from Intel. Today, I am a producer and program designer for DVI applications primarily in the training field. DVI, in my opinion, is the best exrpression - today - of the multimedia promise - but we'll get into that in a few minutes.

To my right is Tom Vreeland, President of Network Technology of Springfield, Va. Tom, like everyone else up here, is a visionary, and he believes that access to multimedia technology is dramatically broadened by the use of authoring tools - one of which he produces for the DVI medium. Tom will discuss the role of authoring tools in multimedia design.

Next to Tom is my friend Stephen Buerkele of Applied Optical Media Corporation. Applied Optical Media is a leader in multimedia development on several platforms including Intel's DVI and IBM's AVC, and it was at Applied Optical Media where I produced the first DVI based industrial training program - the DuPont Truck Driver Safety trainer. Steve will describe the process and pitfalls associated with designing a multimedia project.

And finally, we'll hear from one of the most important thinkers in the multimedia world today - Paul Evans, Manager of Knowledge Systems Development at IBM. Paul's vision of a world of digitally stored information with a vast network of links in all possible forms and directions, reachable through the desktop PC is one that inspires all of us who have struggled on what we knowingly call - the 'bleeding edge' of technology.

Well, if you're here, it's because you are intrigued by the term multimedia, or perhaps confused by it. Is there anyone here who still thinks multimedia means more than one slide projector with an audio cassette player?

To understand multimedia you must begin to think of information as more than just text with an occassional illustration. Tom Vreeland over here coined a very useful phrase for those of us who use his MediaScript authoring language - the term is 'information asset'. A picture may be an information asset. A quantity of audio may be such an asset. A segment of motion video, an animated graphic, and of course text may all be information assets. Because today we have the ability to store each of these assets as digital information in a computer file, and because we have developed the means to access these assets

instantaneously, and manipulate them in ways which allow us to have one kind of information asset augment another and another, we now have multimedia in the digital sense of that word.

In the training field, the term instructional designer took on new importance when random access tools such as video discs became programmable in the early 1980's.

Unfortunately, instructional designers coming out of educational institutions were always one or two steps behind developments in instructional technology. Computer controlled video technologies and computer graphics technologies, the use of digitized audio, all grew faster than the technical process of instructional design and the result for the last seven or eight years has been that instructional designs, produced by individuals who didn't have a complete command of current technologies, slowed down the pace of implementing multimedia programs in industry and education.

Traditionally, in the design process, one examines the jobs which require training, the tasks which those jobs involve, and then one determines the best medium for delivering the training. Industrial designers are taught to resist the temptation to design for a specific medium such as video tape, or slides, or textbooks, but rather to complete the task analysis and determine the medium which fits the tasks.

With a fully functional multimedia technology such as DVI, I am prepared today to challenge that rule. I am prepared to say to you, that with a medium which combines all the potentials for which we used to design, we may start with the multimedia platform at the beginning of the design process.

And now that I have totally alienated all of the professors of Instructional Design in the audience, I would like to show you an example of DVI technology functioning in the training application where it serves both as an instructional tool and as a simulator.

(The material demonstrated was Jay Silber Productions's FlightSafety International, DASH 8 Aircraft training program, currently in prodcution.)

Jay Silber - 76656,2057

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Listing of NASA Data Available on CD-ROM
from the National Space Science Data Center (NSSDC):
****
*

Unless otherwise specified, federally-funded and university researchers may contact NSSDC for data listed in this section:

NSSDC/Goddard Space Flight Center
Code 933.4
Greenbelt, MD 20771
(301) 286-6695, Fax 286-4952
REQUEST@NSSDCA.GSFC.NASA.GOV

1. Astronomical Catalog Library for stellar and nonstellar sources from the Astronomical Data Center (ADC). One test disc available in Flexible Image Transport System (FITS) and ASCII format. New version in 2-disc set to be available in Fall 1991.
   Contact: NSSDC Coordinated Request and User Support Office
   Originator: Mr. Lee Brotzman
   NASA/Goddard Space Flight Center
   Code 930.3
   Greenbelt, MD 20771
   (301) 286-6953

2a. Comet Giacobini-Zinner data from the International Halley Watch. One test disc available in compressed Flexible Image Transport System (FITS) and Planetary Data System (PDS) format along with ASCII text.

One archival disc to be available no earlier than December 1991.

2b. Comet Halley data from the International Halley Watch. Twenty-three discs in compressed Flexible Image Transport System (FITS) and Planetary Data System (PDS) format along with ASCII text, to be available no earlier than December 1991.

Contact: NSSDC Coordinated Request and User Support Office
Originator: Dr. Edwin Grayzeck
University of Maryland
College Park, MD
(301) 405-1539

3. First ISLSCP Field Experiment (FIFE) data from the Pilot Land Data System (PLDS). One prototype disc available with a subset of satellite, aircraft and ground based measurements from the Konza Prairie in 1987. Most data written in ASCII, some image data in compressed form, decompression software provided with the disc. Image display software and browse software for point data sets are provided on disc or associated IBM-PC compatible diskette. Complete data set to be available on a series of CD-ROMs over the next 18 months.

Data are free to the NASA affiliated research community.

Contact: PLDS User Support Office at GSFC
(301) 286-9761

Originators:	Dr. Blanche Meeson	Dr. Don Strebel
	NASA/GSFC	Versar, Inc.
	Pilot Land Data System	FIFE Information System
	Code 934	Code 923
	Greenbelt, MD 20771	Greenbelt, MD 20771
	(301)286-9282	(301)286-2111

4. Geologic Remote Sensing Field Experiment (GRSFE). Nine discs available with various aircraft and field measurements of selected sites in California and Nevada. Data are useful for studies of the geology and meteorology of the various sites and for investigations of scattering and emission from surfaces. Full documentation of the data is provided on the discs themselves, as described in a cover letter.

Contact: NSSDC Coordinated Request and User Support Office
Originator: Ms. Mary A. Dale-Bannister
Washington University
Campus Box 1169
One Brookings Drive
St. Louis, MO 63130-4899
(314) 935-6652
(314) 935-5679 (alternate)

5a. Magellan mission to Venus data from the Magellan Project and the Planetary Data System (PDS). Radar mosaic image discs available in VICAR2 and PDS format. Additional discs containing images, altimetry and radiometry composite data, and global maps to be

available at a later date.

5b. Pre-Magellan data from the Magellan Project and the Planetary Data System (PDS). One disc available with radar data for Venus, Mercury, Mars, Earth and the Moon, together with gravity data obtained through the Pioneer-Venus Orbiter and the Viking Orbiters.

Contact: NSSDC Coordinated Request and User Support Office
Originator: Dr. Raymond Arvidson
Washington University
Department of Earth & Planetary Sciences
Campus Box 1169
One Brookings Drive
Saint Louis, MO 63130-4899
(314) 935-5609

6. Nimbus-7 Total Ozone Mapping Spectrometer (TOMS) ozone data from the Upper Atmospheric Research Program (UARP). One disc available with Version 6 data in ASCII format. Second disc containing image data to be available in Fall 1991.

Contact: NSSDC Coordinated Request and User Support Office
Originator: Dr. Richard D. McPeters
NASA/Goddard Space Flight Center
Code 916
Greenbelt, MD 20771
(301) 286-3832

7a. Viking Orbiter Images of Mars from the Planetary Data System (PDS). Two image discs available with compressed and browse images, more to be available at a later date.

7b. *Viking Orbiter Infrared Thermal Mapper (IRTM) data from the Planetary Data System. One disc (non-imaging) available in VAX/VMS and Planetary Data System (PDS) format.

Contact: NSSDC Coordinated Request and User Support Office
Originator: Planetary Data System
NASA/Jet Propulsion Laboratory
Mail Stop 525-3610
4800 Oak Grove Drive
Pasadena, CA 91109
(818) 306-6130

*Due to manufacturer's problem, NSSDC is not sure if, or when, more copies will become available. Check back in six months.

8. Voyager Spacecraft to the Outer Planets from the Planetary Data System (PDS). Compressed and browse images accessed through the IMage DISplay (IMDISP) retrieval program.

Uranus (Vols. 1 - 3) -- 6538 images
Saturn (Vols. 4 - 5) -- 4000 images
Jupiter (Vols. 6 - 8) -- 6000 images
Neptune (Vols. 9 -12) -- 10,000 images

Contact: NSSDC Coordinated Request and User Support Office
Originator: Planetary Data System

NASA/Jet Propulsion Laboratory
Mail Stop 525-3610
4800 Oak Grove Drive
Pasadena, CA 91109
(818) 306-6130

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Listing of Data Available on CD-ROM from other
NASA Centers or Affiliated Institutions:

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1. Antarctic Airborne Ozone Expedition (AAOE) data and other stratospheric data from the Upper Atmospheric Research Program (UARP). Four discs available: AAOE, the Arctic Airborne Ozone Expedition (AASE), the Stratospheric Tropospheric Exchange Project (STEP), and the Appendix A to AASE containing meteorological and position data taken in ER2 flights. All data are in ASCII, with documentation on each disc.
   Contact: Mr. R. Steve Hipskind
   NASA Ames Research Center
   Mail Stop 245-5
   Moffett Field, CA 94035-1000
   (415) 604-5076

2. Joint Education Initiative (JEDI) Earth Science Education discs from the U.S. Geological Survey. Three discs available with on-line tutorials. NASA data included are: International Halley Watch (IHW) data, Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) sea ice data, Total Ozone Mapping Spectrometer (TOMS) data, and Voyager images from the outer planets. Also included is the NASA Master Directory (MD).
   Contact: Dr. Robert Ridky
   Geology Department
   University of Maryland
   College Park, MD 20742
   (301) 405-4090

3. Nimbus-7 Coastal Zone Color Scanner Grids, West Coast Time Series (WCTS)
   and the Tropical Ocean Global Atmosphere (TOGA) discs from the NASA Ocean Data System (NODS). One WCTS disc (Volume 1, Version 2 for 1979 - 1981) available with compressed and browse images of phytoplankton pigment concentration accessed through the IMage DISPlay (IMDISP) retrieval program.

   Reprocessed and additional data to be available in 1992. One TOGA disc available with in-situ ocean data in ASCII and GRIB. Six additional discs in planning for 1985-1990 data.
   Contact: Ms. Elizabeth Smith
   NASA/Jet Propulsion Laboratory
   Mail Stop 300-323

4800 Oak Grove Drive
Pasadena, CA 91109
(818) 354-6980

4. Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) Irradiance and Sea Ice parameters in the Special Sensor Microwave/Imager Grid. One disc containing data for October 29, 1978 through January 31, 1980.
Sensor and grid documentation are contained on the disc, and display software is provided on a floppy diskette.
Contact: Ms. Claire Hanson
National Snow and Ice Data Center
CIRES, Campus Box 449
University of Colorado at Boulder
Boulder, CO 80309
(303) 492-1834 or 5171

5. Solar Variability Affecting Earth from the National Geophysical Data Center (NGDC). One disc containing solar flare reports, sunspot numbers and region histories, total solar irradiance, and solar bursts.
Also included are all geomagnetic and related indices, cosmic ray observations, and NASA's "OMNI" solar wind and interplanetary magnetic field values along with model programs. IBM PC-compatible software accompanies disc to access, decompress, and display data.
Contact: National Geophysical Data Center
NOAA E/GC
325 Broadway
Boulder, CO 80303-3328
(303) 497-6346

6. Space Science Sampler, Volumes 1 and 2 from the Planetary Data System (PDS). Two discs containing 800 images of Uranus, its rings and satellites, and 400 files of other space and Earth science data.
Contact: Mr. Randal Davis
LASP, Campus Box 392
University of Colorado
Boulder, CO 80309
(303) 492-6867, Fax 492-5105

CD-ROM Order Form

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Please return the following form when ordering:

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National Space Science Data Center Charge and Service Policy

********** The purpose of the National Space Science Data Center (NSSDC) is to provide data and information from space and Earth science flight experiments for studies beyond those performed by the principal investigators. These services are available to foreign requesters through the World Data Center-A for Rockets and Satellites (WDC-A-R&S). Normally, a charge is made to cover the cost of reproducing and processing the requested data. However, as resources permit, the NSSDC director may waive the charge for modest amounts of data when they are to be used for scientific studies or specific college-level educational purposes, and when they are requested by an individual affiliated with:

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2- Other U.S. Government agencies, their contractors, or their grantees.
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NOTE:

You can send mail from CompuServe to the Internet addresses above by preceeding the address with >INTERNET:

For instance, to send CompuServe Mail to the Internet address of "request@nssdc.gsfc.nasa.gov", go to CompuServe Mail and compose a message in the regular manner. Then send it to the address of:

>INTERNET: request@nssdc.gsfc.nasa.gov

Nimbus Information Systems
"The Full Service Solution to CD-ROM"

PRE-PRODUCTION SERVICES

PROJECT PLANNING
Nimbus Information Systems will consult with you from the very first steps of planning the delivery of your data to your end users on CD-ROM.

DATA EVALUATION The second step in the production of your CD-ROM is to have a sample of your data analyzed for projected conversion time and costs. We can help you choose your retrieval software or give you the option of using our CD-ROM software which is called ROMWARE.

SOFTWARE EVALUATION
Nimbus can simulate the performance of your database on CD-ROM using your software or ROMWARE.

PROTOTYPING
For proof of concept, we can prototype a sample of your data in ROMWARE and make a Write-Once CD disc for beta test purposes.

PRODUCTION SERVICES

Nimbus can perform the following services for your CD-ROM production:

Data Conversion
Nimbus can write filters to convert machine readable files into files that are ASCII loadable into ROMWARE.

Nimbus can arrange for text or graphics conversion from paper to machine loadable files.

Nimbus can perform the building of your database using ROMWARE, or train you to do this in-house.

Nimbus can perform the indexing and testing of your database using ROMWARE, or train you to take this step in-house.

Nimbus can perform the logical formatting or premastering of your database in the international standard ISO-9660, or you can supply us with formatted tapes from your premastering hardware.

MANUFACTURING SERVICES

Nimbus offers the next generation of equipment and processes. On-site at our Virginia facility is the finest and most technologically advanced compact disc manufacturing plant in the world using the latest equipment available. We strive to stay beyond the competition and it shows in our product and people and their willingness to experiment with new technics. Only Nimbus has the proprietary Nimbus-Halliday Laser Beam Recorder. This laser cutting system is the backbone of our manufacturing process and guarantees 100%

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Any or all of the above services are at your disposal!

A Site Visit to Nimbus Information Systems

Nimbus offers a site visit to potential CD-ROM publishers. This invitation is for you and as many associates as you wish to include for a one day private seminar on "CD-ROM Production for Information Providers." The agenda of this visit could be as follows:

1. Demonstrations of the mass storage and distribution of your type of data on CD-ROM

2. Discussions of regular updates to CD-ROM volumes and how these would be handled

3. A hands-on demonstration of the advantages of using off-the-shelf software with a custom application program running over it to give your finished product corporate identity

4. A demonstration of data conversion to a form easily indexed by retrieval software

5. A hands-on demonstration of the ROMWARE retrieval software and how it would fit your application

6. An examination of a sample of the data you would be publishing and estimating time and effort necessary to filter and load it into ROMWARE

7. Demonstrations of how the database would be built and indexed and where this should be done (With an eye toward taking it in-house)

8. A demonstration of the hardware used to transmit data from the publisher to Nimbus. Suggestions on hardware will be included in the demonstration

9. A tour of our data bureau and manufacturing facilities showing:

a. Logical formatting of data into an ISO 9660 Image;
b. Premastering of a CD-ROM image;
c. Origination of a family of metalwork;
d. Injection molding of a 720 Megabyte ROM every six seconds;
e. In-line metalization of the reflective coating of a CD;
f. Lacquering, label inking and electronic production testing;
g. Bit-for-Bit comparison of a test pressing;
h. Block Error Checking (BLER).

10. A demonstration of creating label art, packaging and shipping

11. Hand out material will be provided.

What we offer is a day at our facilities in central Virginia on 270 scenic acres at the foot of

the Blue Ridge Mountains. Nimbus is a scant 90 minutes south west of Washington, D.C. and Dulles Airport (or 5 minutes from the Charlottesville Airport). You will experience firsthand the complete CD-ROM production solutions that Nimbus offers.

We've even been known to provide lunch for groups of 8 or more!!