

**Sun City Summerlin Computer Club
Seminar**

**Basics of Burning CD-ROMs
and
Digital Music**

**Tom Burt
June 26, 2003**

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1

Agenda – CD ROM Burning

- **CD Drive Technology**
- **Types of Compact Disk Media**
- **CD Formats and Standards**
- **CD Burning Programs**
- **Brief Demonstration of Easy CD Creator**
- **Good Web Links to Learn / Get More**

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2

Agenda – Digital Music

- Sound card basics
- Audio Formats and Standards
- **Bio-Break (10 min)**
- CD “Ripping” and Jukebox Programs
- Other sources of digital music
- Demonstration of Music Match Jukebox
- Burning CDs using Music Match Jukebox
- Questions and Answers

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3

CD Drive Technology

- CD Drive uses a laser to “read” information
 - Bounces light off the shiny surface of the disk to a photo-sensor that converts to electronic signals.
 - 1 and 0 represented as different levels of reflectivity.
- CD R or RW Drive uses laser to “write” data
 - Uses high intensity light to “darken” spots.
 - CD RW, uses med intensity light to “erase” spots.
- Most newer drives support “Burn Proof” buffer
- <http://www.howstuffworks.com/cd.htm>

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CD-RW Drive Specs

- **Write Speed / Rewrite Speed / Read Speed**
 - **Example: Buslink 32x 12x 40x**
Writes at [up to] 32x, Rewrites at 12x, Reads at 40x
- **40x what? – The audio CD read rate**
 - **Audio CD reads at 150,000 bits/sec (150 Kbps)**
 - **So 40x is $40 \times 150 = 6,000$ Kilobits per second**
- **Drive RPM speed varies depending on which part of disk is being read / written.**

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5

Some CD-RW Drive Vendors

- **Hewlett Packard**
- **Sony**
- **Teac**
- **Mitsubishi**
- **lomega**
- **Philips**
- **Plextor (more expensive)**
- **Acer**
- **Lite-on**
- **Memorex**
- **Sanyo**

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Types of CD Media (1)

- **CD – Read-Only Memory (CD-ROM)**
 - Stamped, mass produced, shiny silver surface.
 - Not recordable.
- **CD – Recordable (CD-R)**
 - Suitable for recording ONCE.
 - Relatively permanent (~100+ years).
 - Good for archival storage.
 - Very inexpensive.

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Types of CD Media (2)

- **CD – Re-writeable (CD-RW)**
 - Recording layer supports “erasing”, re-recording.
 - Generally only readable on another CD-RW drive.
 - Erasing slows recording (compared to CD-R).
 - Can be “formatted” before using.
- **CD – Audio (CD-A)**
 - For digital music.
 - Stamped, mass produced.
 - Different data format than CD-R.
- **Kodak Photo CD**
- **Games (Sony PS2, XBox,,,) Many formats**

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Types of DVD Media

- **Recordable Digital Versatile Disks**
- **All 4.7 Gigabytes capacity**
- **Two Write Once standards DVD –R**
 - **DVD +R, DVD -R**
- **Three Read / Write standards**
 - **DVD –RW, DVD +RW, DVD RAM**
- **Sony makes a combo drive that can support DVD –R, DVD –RW, DVD +R, VD +RW**

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Data CD Formats - ISO

- **ISO 9660 1 or 2 (High Sierra)**
 - **~650 MB capacity**
 - **8.3 file names (1), 31 char file names (2)**
 - **Older format – compatible with many OS platforms**
- **Joliet**
 - **Overlays ISO 9660**
 - **~700 MB capacity**
 - **255 character path/file names**
 - **Most compatible with Windows**
- **Both formats supported in Win 9x, NT, 2K, XP**

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Data CD Formats - UDF

- **Universal Data Format (packet) Data Format**
 - Used with CD RW Media
 - Format the CD RW disk before using
 - ~550 MB formatted capacity
 - 255 character path\file names
- **Allows CD RW disk to be mounted / dismounted**
 - Act just like a large “floppy disk”
 - Can manage data using Windows Explorer
 - Can use normal Windows / DOS file commands
- **Requires Roxio Direct CD or Nero InCD**

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Data CD Structure

- **A data CD contains one or more Sessions**
 - Each Session contains one or more tracks
 - Can leave a Session open so more tracks can be added, or, can Close it (recommended and typical).
- **After closing a Session:**
 - Can leave the Compact Disk open, so more sessions can be added later ...
 - Or, can close the CD, so CD is then “locked”, can no longer be extended.
- **Easiest case is Burn 1 Session, then Close**

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CD Burning Programs

- **Roxio (Adaptec) - Easy CD Creator Platinum or 6.**
 - Good, easy to use, handles all media types.
- **Ahead Software – Nero.**
 - Good, easy to use , handles all media types..
- **Built-in in Windows XP (Roxio light).**
 - Good basic functionality for copying data to CD.
- **Many others (shareware from web).**

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CD Burning Tips

- **Use good quality media.**
- **Use media rated to desired speed (e.g. 24X).**
- **CD Burners should have full access to the CPU and HD.**
- **Enable “Burn Proof” buffer mode if available.**
- **Shut down background programs, especially those that access the Internet. For example:**
 - MS Internet Explorer, MS Personal Web Server.
 - E-mail client (Outlook, Outlook Express or AOL).
 - Stock tickers, indexers, power managers.
 - Screen savers.

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14

Data CD Burning Demo

- **Explicit CD-R Burn (Roxio Easy CD Creator 6).**
 - Explorer like interface.
 - Drag and Drop files to be copied to the CD-R disk.
 - High degree of control.
 - Also supports burning audio CDs.
- **Implicit CD-RW burn (Roxio Direct CD)**
 - CD-R/W appears as a logical drive.
 - Just use Windows Explorer to drag and drop files.
 - Acts like a very large floppy disk.
 - Good vehicle for recurring backup of files.

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15

Useful Web Links

- <http://www.howstuffworks.com/cd.htm>
- <http://www.smartcomputing.com> (subscribers)
- <http://www.zdnet.com>
- <http://www.cdfreaks.com>
- <http://www.roxio.com>
- <http://www.nero.com/en/index2.htm>

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16

CD Burning Basics

Questions and Answers

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17

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18

Sound Card Basics

- Able to synthesize analogue stereo sound from a digital output stream (D to A).
- Able to convert analogue stereo in to a digital sound input stream (A to D).
- Also contains a programmable sound synthesizer.
 - Number and richness of voices varies by brand, cost.
 - Used for MIDI music output.
- Connects to CD drive so PC can “play” music CDs.
- Card has line in, line - speaker out, and microphone in jacks.
- <http://www.howstuffworks.com/sound-card.htm>

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19

Bio-Break

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20

Audio File Formats

- **Microsoft WAVE (.WAV)**
 - 44.1 KHz / sec, stereo, 16-bit samples each channel.
 - Uncompressed, consumes about 10.6 MB / minute of sound.
 - CD Quality (same specs).
- **Motion Picture Experts Group Level 3 (.MP3)**
 - Compressed, size varies based on sample rate.
 - 128 Kbps (CD quality), 64 Kbps (“near CD” quality).
 - At 128Kbps, uses about 1 MB / minute of sound.
 - Little point in going higher than 160Kbps for MP3.

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21

Audio File Formats (2)

- **MP3Pro (.MP3) – New Standard**
 - Double compressed, size varies based on sample rate.
 - 64 Kbps (CD quality), 48 Kbps (“near CD” quality).
 - At 64Kbps, uses about .5 MB / minute of sound.
- **Microsoft Windows Media Audio (.WMA)**
 - Compressed, size varies based on sample rate.
 - Supports Digital Rights Management standards.
 - MS claims files about half the size of .MP3 files.
- **More Information**
 - <http://ekei.com/audio>

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CD Rippers

- **Ripping (Definition)**
 - Copying contents of an Audio CD to your hard disk.
 - Digital audio data is converted to: .WAV, .WMA or .MP3.
 - Often audio album and track information looked up in online CD Database (CDDB).
 - Legal, fair *personal* use of copyrighted material you own.
- **Many rippers available (shareware, freeware).**
 - <http://www.mgshareware.com/frmmain.html>

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Jukebox programs

- Support ripping from Audio CDs.
- Support stereo recording off the sound card “line” input.
- Can play the ripped files back through your sound card.
- Can usually convert between some file formats.
- Usually support a Music Library to organize your music.
- Can often burn new music CDs with your favorite tracks.

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24

Popular Juke Box Programs

- **Music Match Jukebox (V 7.5 or 8)**
 - <http://www.musicmatch.com>
 - Free version available – nice, but nags you to upgrade.
 - Plus version costs ~\$20, lifetime subscription for ~\$60.
 - Excellent organizer for your music library.
 - Plus version has many nice features – including CD Burning.
- **Microsoft Windows Media Player 9.x**
 - <http://www.microsoft.com/downloads/search.aspx?displaylang=en>
 - Free version – full featured.
 - Only supports ripping to WMA-8 format (no MP3s w/o plug-in).

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25

Other Jukebox Programs

- **Real One Jukebox**
 - <http://www.real.com/jukebox/index.html>
 - Free version available – nice.
 - Deluxe version costs ~\$15.
 - More obtrusive with promos for other products.
- **WinAmp 3**
 - <http://www.winamp.com>
 - Nice feature set
 - Free download

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26

Other Web Music Sources

- <http://www.mp3.com/>
- <http://www.emusic.com/>
- <http://www.midikaraoke.com/>
- <http://www.half.com/products/music/index.cfm>
- <http://www.jumpmusic.com/>

- <http://www.winmx.com/> (very good!)
- <http://www.musiccity.com/> (Morpheus)
- <http://www.limewire.com/> (good)
- <http://www.gnutella.wego.com/> (Gnutella)
- <http://www.bearshare.com/>
- <http://www.kazaa.com> (popular, but installs spyware)

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27

Demo - MusicMatch Juke Box

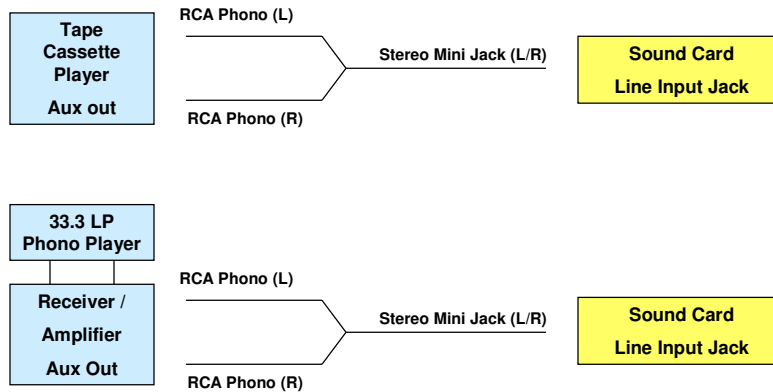
- **Playing Music CDs**
- **Playing Music Files (.MP3, .WAV, .WMA)**
- **“Ripping” a Music CD to your Music Folder**
- **Organizing and Managing Your Music Library**
 - **Albums, Artists, Titles**
 - **Editing Track Information Tags**
- **Creating and Saving Playlists of MP3 Files**
- **Selecting and Playing Playlists**
- **Recording off the sound card “line” input**
 - **LP records, tapes, FM music**
 - **“Y” cable (2 RCA stereo to stereo mini-jack)**

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28

Ripping Tapes and LPs



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29

Demo - Burning Music CDs

- Can use MusicMatch, Easy CD Creator or Nero
- Burning From a MusicMatch Playlist (Easiest)
- Drag and Drop of files (Explorer style)
 - MMJB Plus version
 - Roxio Easy CD Creator or Ahead Nero
- Most faithful “lossless” burns from .WAV files
 - No compression = No loss of fidelity
- 128 / 160 Kb/sec .MP3 files also near-perfect dups
- 64 Kb/sec .MP3 files Fine for Diskman or Car CD

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30

Digital Music Questions and Answers

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31