CD Recording Overview

Types of files that can be recorded to CD

Any type of data file that can be viewed in File Manager or Explorer can be recorded to CD, as well as audio. Some data files are more difficult to record, such as large cad, compressed, and Power Point files, though this is rare.

Amount of information a CD can hold

Due to the audio origin of CDs, disc capacity is measured in minutes:seconds:sectors. Each second contains 75 sectors, each of which can hold 2048 bytes (2 kilobytes) of user data.

Currently, three CD sizes are supported:
>74 minutes
>63 minutes
>21 minutes

Single Session Data

When recording data, there are two factors that you must subtract when calculating the total amount of data that you can fit on a CD:

Session Lead-In: This is recorded at the beginning of the session and contains the Table of Contents which lists the files recorded. This is not accessible and uses about 9 megabytes of space in addition to amount of space used by the actual data.

Session Lead-Out: This is recorded at the end of a session and tells the player that the end of the data has been reached. The Lead-Out uses about 13 megabytes of space in addition to amount of space used by the actual data and the Lead-In.

The amount of total space needed for the Lead-In and Lead-Out is about 22 megabytes in addition to space needed for the actual data.

>74 minutes = 650 megabytes of recordable space = 628 megabytes of usable space
>63 minutes = 553 megabytes of recordable space = 531 megabytes of usable space
>21 minutes = 184 megabytes of recordable space = 162 megabytes of usable space

Multi Session Data

The first session recorded uses the same amount for the Session Lead-In and Lead-Out as a single session CD. When adding another session to a CD, another Lead-In and Lead-Out is written for each session. These additional Lead-Ins and Lead-Outs will each use a total of about 13 megabytes of space in addition to the space used by the actual data.

Example:
>Two sessions written to a 74 minutes CD will use 35 megabytes of space in addition to the space used by the actual data. 9mb for the first Lead-In, 13mb for the first Lead-out, 9mb for the second Lead-In, and 4mb for the second Lead-Out.

Audio

Audio CD's do not use a Lead-In and Lead-Out. This means that audio uses the full capacity of a CD.

Each track does record a two second gap of silence along with the actual song. This plays as a pause between songs. When calculating the length of an audio CD to be recorded, two seconds should be added to the time of each song to allow for the pause between tracks.

Example: A song length of 2:34 should be calculated as 2:36 to allow for the gap.

Each audio track will take up about 10mb / minute of audio on a hard drive when extracted as a wave file. A two minute song will use about 20 Mb of hard drive space. The wave files must be 44.1kHz, 16bit stereo.

Audio must be recorded in a single session.

> 74 minutes = 74 minutes of audio = 747 megabytes of converted wave files
> 63 minutes = 63 minutes of audio = 637 megabytes of converted wave files
> 21 minutes = 21 minutes of audio = 217 megabytes of converted wave files

Source Devices

Data can be recorded from the following devices as long as they are capable of sustaining the required transfer speed for the speed of recording.

> 1x recording - 150kb/sec
> 2x recording - 300kb/sec
> 4x recording - 600kb/sec

Hard drives - any type, SCSI or IDE
CD-ROM drives - SCSI or SCSI 2
Removable Media other then CD - Not recommended, although some SCSI ZIP drives can be used

The speed at which the data is written does not affect the speed at which it is read. If you record at 4x speed, the resulting CD can be read on any CD-ROM drive capable of recognizing a recordable CD, whether it is a 1x drive or a 10x drive.

CD Formats, Also Known as Books

CD-DA RED BOOK

This is the format for recording audio CD's.

The CD can contain up to 99 tracks. They are recorded at 44.1kHz, 16 bit stereo

CD-ROM YELLOW BOOK

This is the format for recording data (non-audio) to CD.

This can be done in two Modes:
Mode 1 and Mode 2. Mode 1 uses more space per sector for error checking, leaving 2048 bytes of recordable space. Mode 2 does not do as much error checking, which allows 2336 bytes of recordable space.

ORANGE BOOK

This is the format for recordable CD's (gold CD's)

BLUE BOOK (CD-PLUS or CD-EXTRA)

This is a type of multi-session CD.

A number of audio tracks are recorded in the first session, followed by a data track in the second session.

CD-I GREEN BOOK (Interactive)

This is an interactive multimedia CD.

They can be played on a TV screen using either a small computer or a disc player designed specifically for these CD's.

WHITE BOOK (CD-I Bridge)

This is used to record Video CD's and Photo CD's.

Video CD's are recorded with a data track first which contains information about the CD and the video application. The following tracks are all video and sound compressed together using the MPEG 1 standard.

Photo CD's are recorded using CD-ROM XA to store photos on a CD. They require a special application for viewing and the player must be Photo CD compatible.

MIXED MODE

This is used for multi-media CD's such as games.

This is a single session CD containing data on the first track and audio on all following tracks. It is written using the Yellow and Red Book standards.