

**Digital Music**  
**FHF Computer Club – 4/28/08**

If the goal is to record your own selections of music, lectures, bird calls, or other audio onto a compact disc (CD) so you can play it back on your own or other people's audio equipment, there are definite steps you must follow. While recognizing the many types of audio files to transfer, I will refer to them as songs for ease of reference and reading. I will be focusing on three types of songs to transfer to CD: vinyl albums or singles; audio tape (cassettes, etc.); and prerecorded CDs. Some of you may have experience with downloading songs from the Internet; if so, please share with the rest of us so we can learn about that aspect of audio transfer, too. This is not an area with which I am familiar but would be glad to discuss and learn.

**Transferring songs from CDs to your own mixture of songs**

Let's look first at the simplest task – transferring songs from a CD or many CDs to a CD comprised of songs you select. This is simplest because you likely already have the software to do this transfer and because the songs probably do not need improvement before recording them to your own compilation.

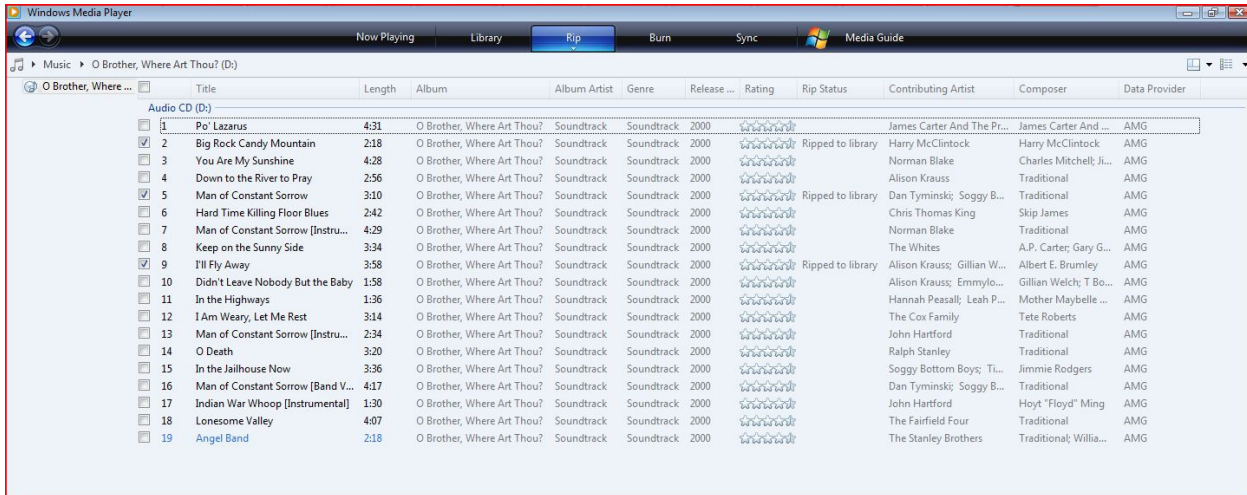
In order to put your own compilation of songs onto a CD, it is easiest to first have all of the various songs from different CDs on your computer's hard disk drive. Some software will allow you to transfer songs directly from various CDs to your finished compilation. However, having tried this method, I find that changing all of the discs throughout the process to be tedious as well as providing more wear and tear on your computer's disc drive. (You actually load and remove the original CDs twice: once for the software to determine how many songs can be placed on the CD and a second time to actually record the new CD.) Also, if you decide to replace a song on the new compilation, you may need to load and remove the original CDs yet another time so the software can accurately compute the new total running time of the songs.

Therefore, you should look over your pre-recorded CDs and note the songs you would like to transfer for your new compilation, and then keep them at your computer as you begin work. You can then use a program like Windows Media Player to copy the songs onto your hard disk drive. This copying is called "ripping" the songs from the original CD.

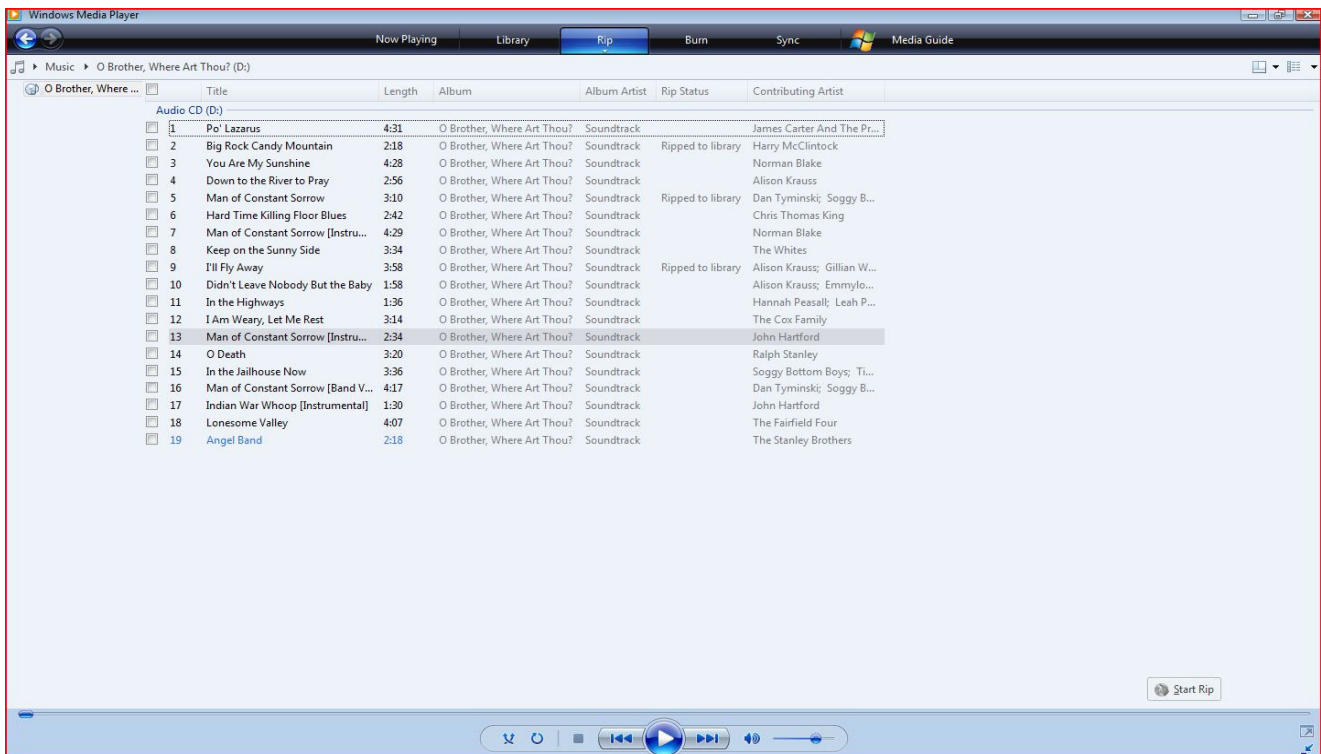
**Ripping the songs**

Following are some screen shots of what Windows Media Player 11 (WMP) looks like. The first two shots are of the ripping window. You will note that there are many default columns in this window. You can change what you see in this window to include only those columns you prefer. If you right click on one of the headings of the light blue column heading line, a short drop down menu will appear with the option "Choose columns ..." Selecting (left clicking) this option will allow you to uncheck the columns you do not want to see and check others that you may want. The second shot shows the same ripping window with only the columns I wanted to see as I worked with the CD to copy tracks to my hard disk drive.

## WMP Rip screen showing the default columns



## WMP Rip screen showing my choice of columns

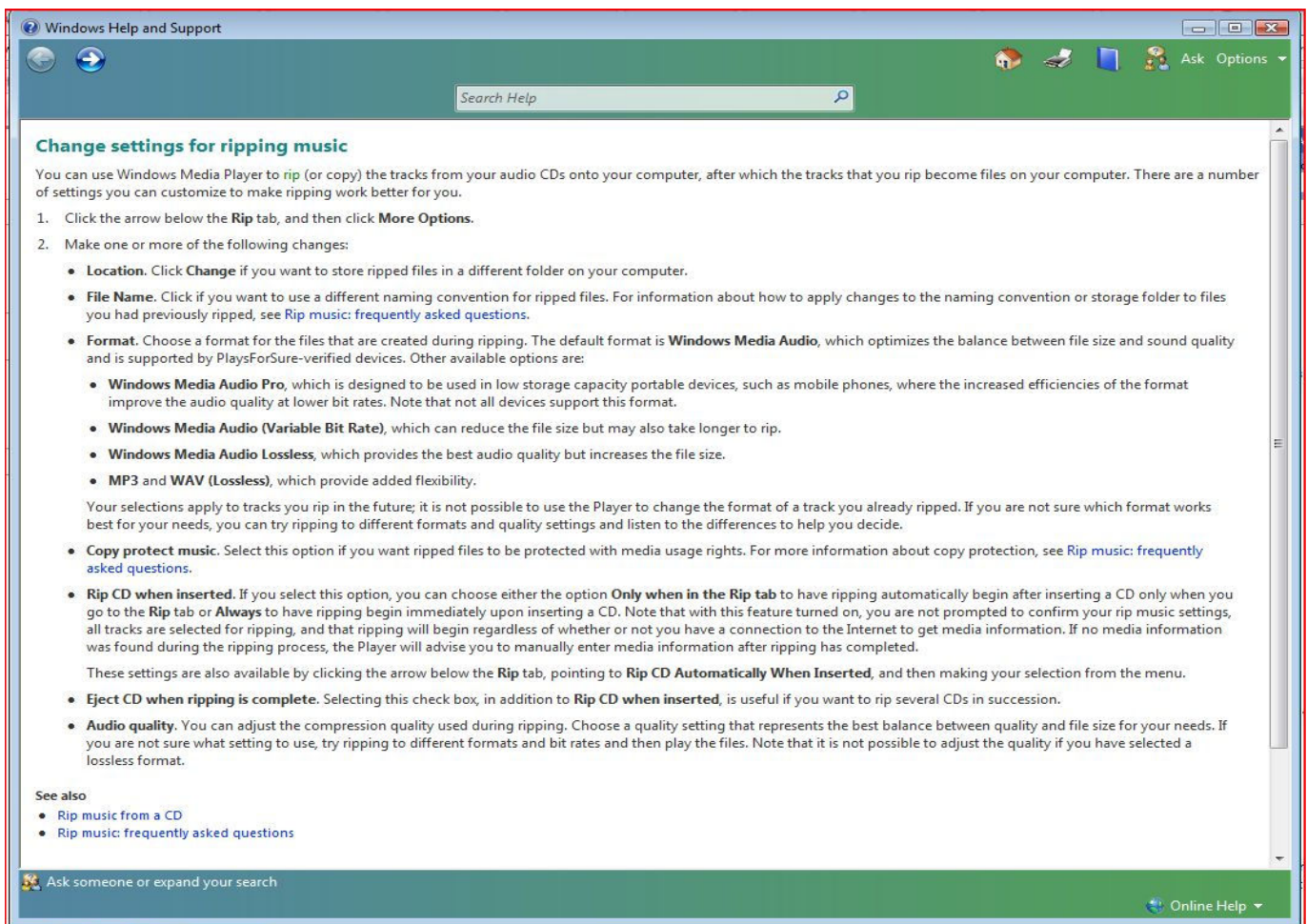
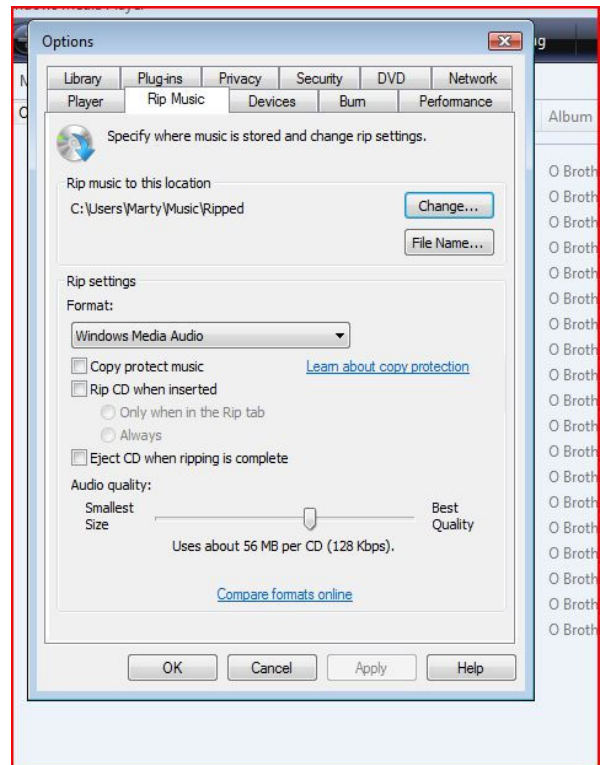


As you prepare to rip the songs, either a few or all from the CD onto the hard disk drive, you will need to set up some options in WMP. These options are accessed by left clicking on the “Rip” heading of WMP and selecting “More options ...” When the Options window opens, left click the “Rip Music” tab for the controllable options. (See graphic below)

An important option to consider is the “Format” button. Although I could not capture it when the drop down menu was extended, there are six format options (see the panel below for more information on these options). It is generally recommended that you initially rip or copy the songs from the original CD

in a “Lossless” format. As you can see, that limits you to either a Windows Media Audio Lossless or WAV (Lossless) format. Since most but not all other devices play the Windows Media Audio formats, I choose to rip songs in the WAV file format. Unfortunately, that also results in the largest files. For example, the Dinah Washington song, “I’ll Close My Eyes,” from the album Bridges of Madison County is 2.5 MB in MP3 format, 14.1 MB in WMA Lossless format, and 28.6 MB in WAV format. Thus, you could fit ten times as much music in the MP3 format as you can in the WAV. Whether the difference in audio quality is noticeable is up to you.

One option you may want to change is to uncheck the box labeled “Rip CD when inserted.” If you leave this checked, it will start to copy every song on each audio CD you insert into your computer’s CD drive. Usually I only want to copy the songs I really want to re-record in my private compilations. Therefore, if you uncheck this box, WMP will wait for you to initiate ripping the songs that you have indicated you want to copy.

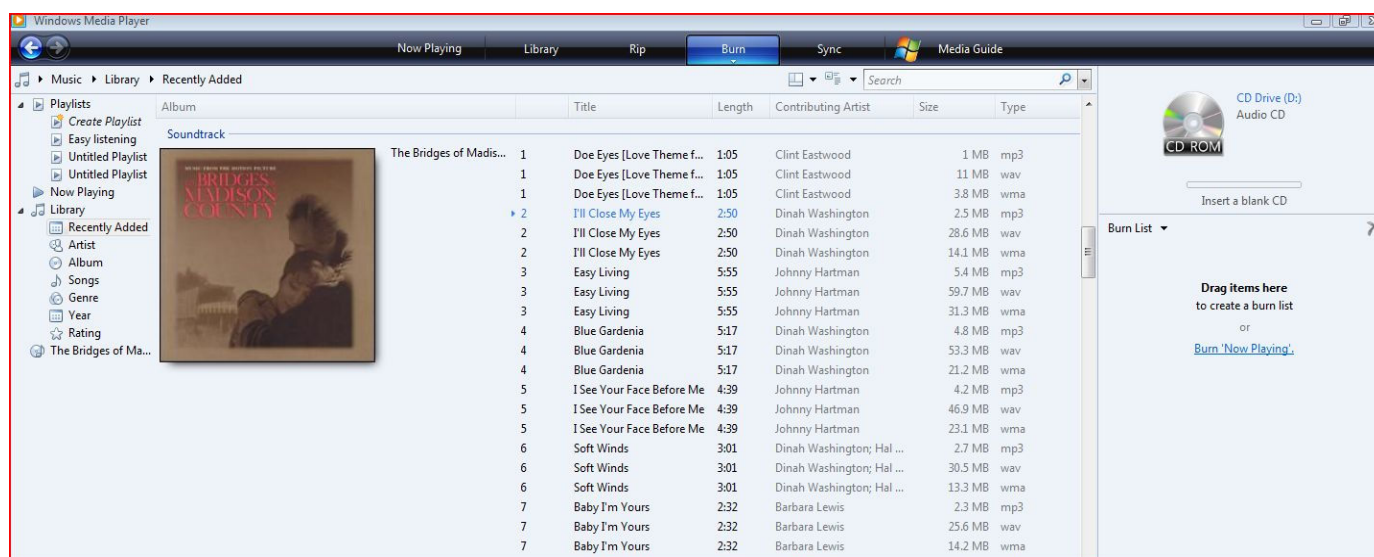


After you have selected the format in which to rip the songs (and audio quality if not ripping in either WMA Lossless or WAV formats), you select the song, songs, or entire album that you want to rip. If your computer is connected to the Internet when you insert the original CD, WMP will look for the album information and display it – unless you have some obscure CD (I have a few). If you look back at the screen shots of the Rip window on page 2, you will see that you can select the boxes to the left of the songs or the box at the top next to the name of the album. The box at the top selects all of the boxes for the songs on the album and copies the entire album onto your hard disk drive

Once you have selected the songs to copy or rip, you would left click on the “Start Rip” button located in the bottom right of the Rip window. You will then see the progress for each selected song as it is copied from the CD onto the hard disk drive. You should proceed in this manner for all of the songs from all of the CDs you want to have available to construct your personal music compilation CD

### Burning the new CD

Now that you have your songs ripped to the hard disk drive, it’s time to get the songs in place to create your own compilation of music. Back in Windows Media Player (WMP), you should left click on the word “Burn” which should open the WMP Burn screen. Please note that in the upper right corner of the Burn screen is an icon/picture of a CD with the letters CD ROM which stand for Compact Disc Read Only Memory. Next to the icon may be the letter designation for your CD recorder either in or attached to your computer – if you have only one such drive. It will also list the kind of disc that is to be recorded – in this instance it is Audio CD. If it shows “Data Disc”, you must change it to Audio CD. This is done by left clicking on the “Burn” tab again, and selecting with a left click the option listed as “Audio CD.” Underneath the icon is a blank rectangle with the words “Insert a blank CD” below the rectangle.



You should have a blank, recordable CD available. You should then open the CD drawer of the CD recorder that you plan to use to create your CD, insert the blank, recordable CD, and close the CD drawer. If you have more than one CD recorder drive in or attached to your computer, and the other drives do not have any recordable CDs in them, this will signal WMP which drive will be used to burn your CD. It will also let WMP know what the capacity of your recordable CD is and whether the CD is

the type that can only be recorded once or the kind that can be re-recorded or rewritten more than once. This information will be shown on or below the CD icon, including how many minutes of music are remaining to place onto the recordable CD in the CD recorder's drawer.

The next step is to actually select the songs for the CD. In this screen shot below, there are a few differences. The title "Burn List" was changed to "20080428 CD" by right clicking on Burn List and selecting "Rename Playlist" then typing in the name. You can also see that songs have been moved into list for recording. You can choose what the WMP Burn screen will display using the folder list on the left of the Burn screen. If you have just ripped the songs to your hard disk drive, you will want to left click on the "Recently Added" folder in order to be able to select from any of those songs to place on your new compilation. To move the songs from Recently Added, use the drag and drop method of positioning your cursor over the name of the song you want to put in your compilation, left click and hold the left button of the mouse while you move the mouse into the area under the words "Burn List" in the right hand column under the CD icon. Each time you move a song into that list, you will see more of the blank rectangle under the CD icon filled with color, and the time remaining on the CD will be reduced by the length of the song you just dropped on the list. In this screen shot, there are seven songs from two different albums listed in the Burn List, and it shows 54:26 minutes available for more songs to be place on the CD.

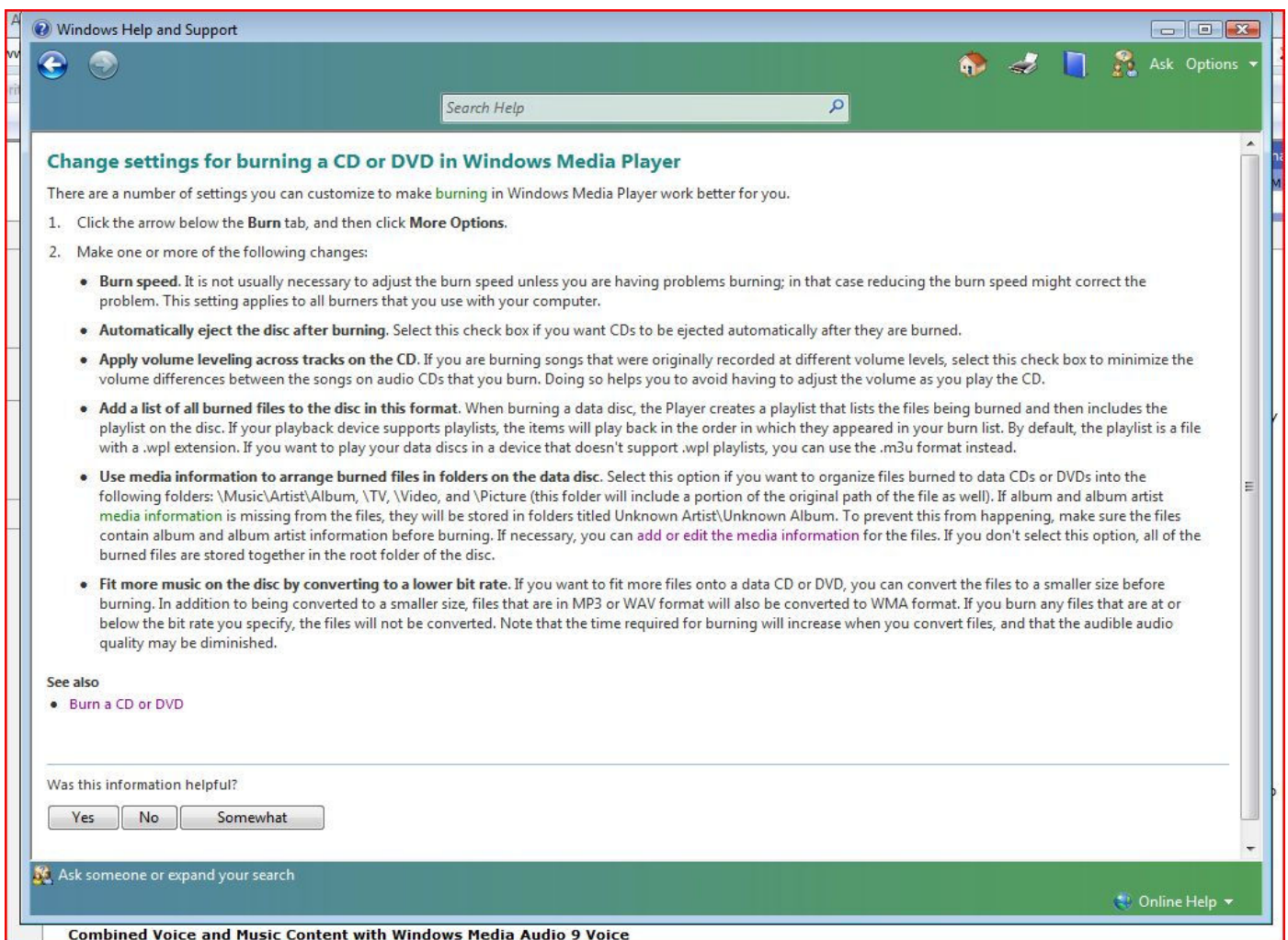
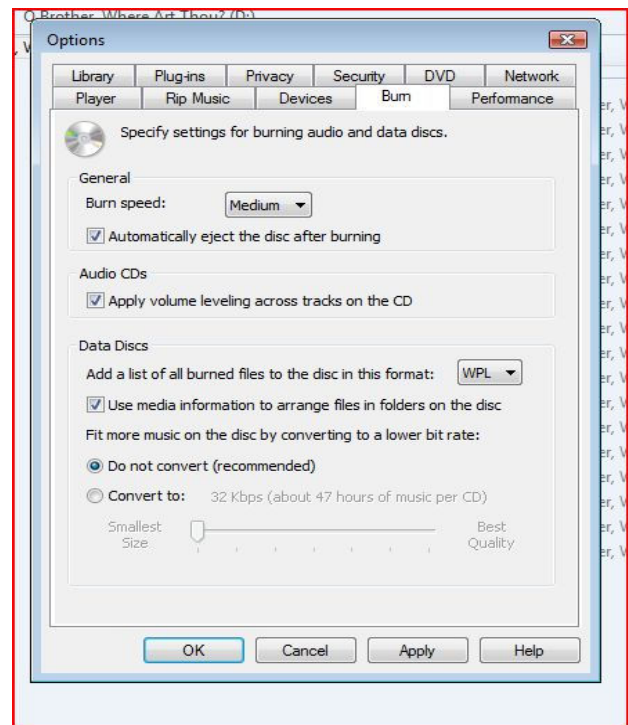


If you decide you want to change the order of the songs you have moved onto the Burn List, simply drag and drop them into order you prefer. You can also move a song up or down the list by right clicking on the song and choosing which way to move it from the drop down menu. Similarly, if you decide you don't want a song or songs on the Burn List that you have dragged there, you can right click the song you want to remove from the Burn List and select "Remove from List". If you forget what the song sounds like, either before you move it to the Burn List or after you have done so, you can right click the song and select the "Play" option from the drop down menu to hear the song.

There are some other options in setting up the Burn process that you will want to set. These are accessed as mentioned above by left clicking on the "Burn" tab again, and selecting with a left click the option listed as "More Options ..." When the Options window opens, left click to open the "Burn" tab on this window. The option for "Burn speed:" on this tab allows speeds of Fastest, Fast, Medium, and Slow. As you can see on the following screen print about these settings, you may need to reduce the

Burn speed if you have any problems with the CDs you make. I have had such problems when I try to burn audio CDs at very high speeds. I don't choose the slowest speed which would take as long to record as the minutes of music you have (example – 65 minutes to record 65 minutes of music). Instead I usually choose the Medium speed or its equivalent on other software. This often takes half as long or a quarter as long as the number of minutes of music you have.

The other option you may want to use is the box under the Audio CDs heading labeled “Apply volume leveling across tracks on the CD.” Again the settings guidance screen print below notes that using this option will minimize the need to adjust the volume on the device you use to play your finished CD.



When you finally have the songs in the order you prefer and the options set, you are ready to burn the compilation onto your CD. At this point, you should left click on the “Start Burn” button in the lower right corner of the WMP Burn screen. The burning process will begin. If you have selected the option “Eject disc after burning” from the main Burn screen “Burn” tab, the CD you will know when burning has ended as your CD recorder drawer will open. At this point, if you want to create another copy of this compilation, you should insert another blank disc and click on “Start Burn” again. Be sure to label the completed discs so you don’t inadvertently try to record over the completed disc.

When you are finished burning the CD or multiple copies of the CD and are ready to store them, you may use hard “jewel boxes,” a soft CD pocket, a binder designed to hold a large volume of CDs, or some other storage idea. You will probably want to know what songs are on the CD when you intend to play it in the future. Therefore, you will want to create some sort of list of what you just recorded. If you are keeping them in a binder, you may want to create a list referenced to the label you placed on the completed disc. You can use any word processing program for this kind of list. You can also use a spreadsheet program to create such a list. It’s up to you if you want to save the files with the song list in case you lose the initial list in the future.

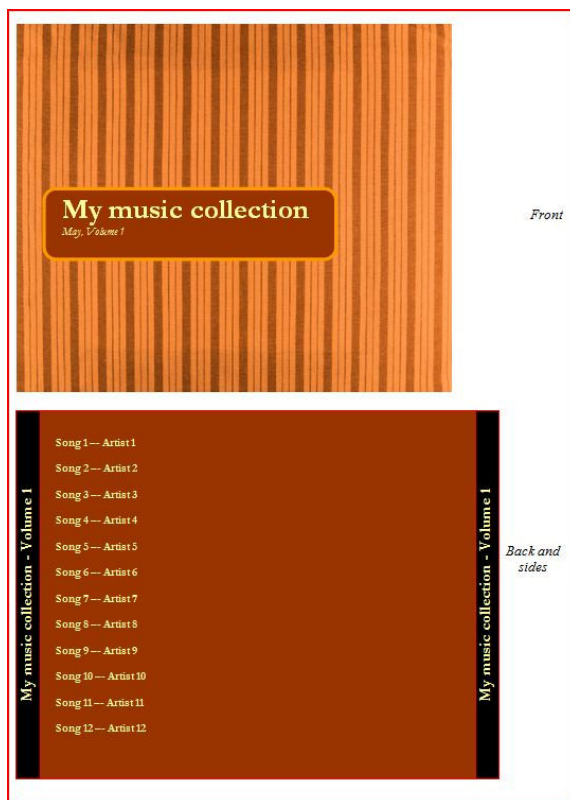
If you plan to keep your completed CD in a jewel box, it would be helpful to have a template on which you can put a title for the CD as well as information about the songs on it. I found a Microsoft Word template at the Microsoft website which can be used as a starting point. Each of the text areas (text boxes or text fields), can be individually clicked on to select it. Then you can alter the wording in the text box to create a title (on the front or sides) or a list of songs and related information (on the back). This template is available at

<http://office.microsoft.com/en-us/templates/TC060872981033.aspx?CategoryID=CT101467661033>

### **Converting vinyl records and audio tape to CDs**

The original CDs used in the previous section were already in a digital format even though the CDs may have been recorded initially in an analog format – the way records and tapes were recorded before digital recordings. The difference in converting vinyl records and audio tapes, rather than original CDs, to your own compilations is the need to convert them to a digital format so it can be stored on the hard disk drive. After the songs are on your hard disk, the process of burning and labeling the CDs is the same.

In order to move the songs to your hard disk, you will probably need to buy some new equipment. That equipment may or may not come with software to use it. In addition you may need to use some software to improve the quality of the audio you have on your old vinyl records and audio tapes. First we’ll look



at some of the equipment you may need, depending on what you now have, and a free software possibility, and then we'll talk about the process of digitizing the songs onto our hard disk.

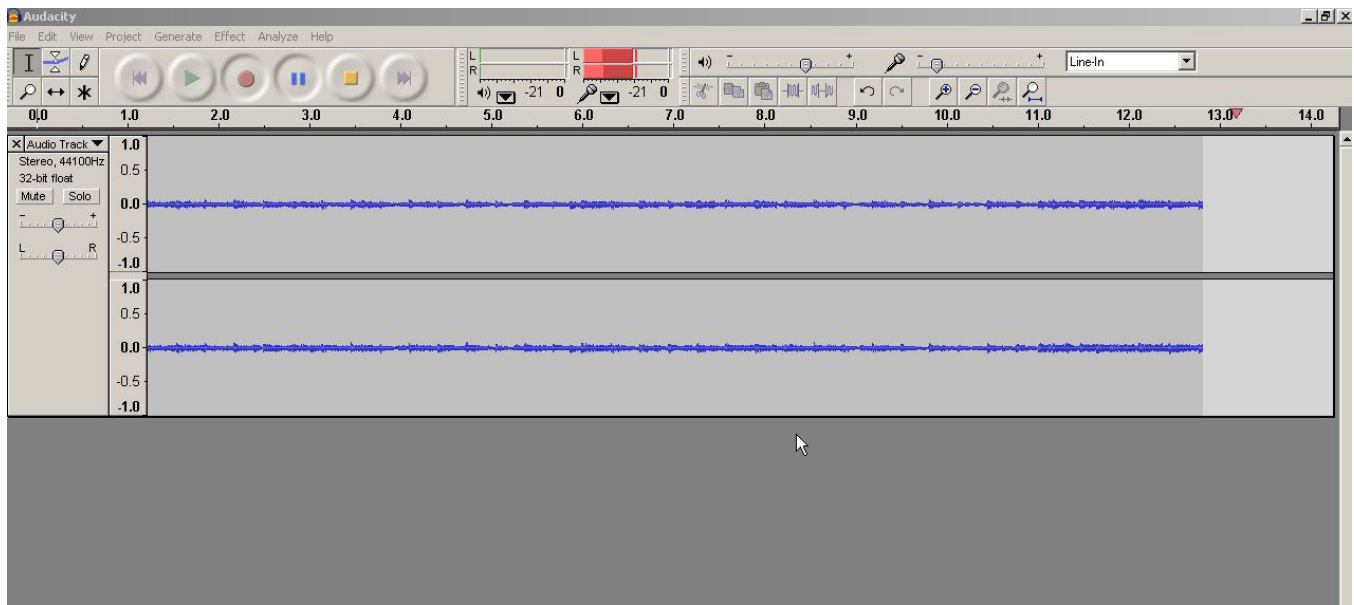
Here are some **hardware/equipment solutions** to converting your record and tape collection to digital:

1. A **sound card** with a "Line In" jack in your desktop computer. This is usually a built in card or one that you may add if you have an open expansion slot in your computer. This allows you to connect a patch cord from the right and left channels of your audio system's record player/turntable, tape deck, or the receiver through which signals from both of these audio devices are processed before being sent to the speakers. Then the other end of the cable which is a miniature stereo plug can be connected into the sound card in your desktop computer. This may cost as little as \$20-\$30 plus the cable. This method works for records or tapes.
2. A specially designed input device that converts analog signal to digital input (from right and left channel of stereo to USB port) – essentially replacing the sound card. I found an ad for such a device, **Xitel INPORT Deluxe for PC**, at Radio Shack. It comes with the cable to connect the device to the output of your receiver/stereo system as well as the cable to connect to the USB port on your computer (desktop or laptop). This lists for \$80 including the cables and software. This method also works for records or tapes.
3. Specially made turntables (play vinyl only) that play 33 1/3 RPM and 45 RPM records, outputting the signal to a USB port. **ionAudio** (\$150) at Brookstone, **Audio-Technica** (\$230), and **Sony** (\$130) at Best Buy website. The online information about the latter two turntables indicates that they convert records into MP3 files only. Since these are all turntables and don't play tapes, this cannot be used for audio tape conversion to digital files.
4. Specially made turntable (play vinyl only) that plays 33 1/3 RPM and 45 RPM records, outputting the signal as an MP3 file to an SD/MMC memory card or flash drive. This **iConvert USB Turntable** (\$130) is sold through Brookstone. It has built in speakers for stand-alone listening as well as a line out connection for playing through a home stereo system. It does not convert audio tapes.
5. Specially made turntable (play vinyl only) that plays 33 1/3 RPM, 45 RPM, and 78RPM records, outputting the signal as an MP3 file to a USB port. The **Crosley Keepsake USB LP-Ripping Turntable** (\$150) from Brookstone is actually a self-contained, "suitcase style," record player with a vinyl-covered wood case, built-in speakers on the sides, and a carrying handle and metal snap closure to keep the lid closed as it is carried. It does not convert audio tapes.
6. A specially made tape deck has a USB output cable to your PC. The **Ion Dual Ripping Cassette Deck with USB Output** (\$150) from Brookstone can transfer music from your audio cassettes (not reel-to-reel or 8 track tapes) at either normal or high speed directly to our computer via USB port as MP3 files. The information about this deck does not indicate if it can be connected to a home stereo system, and the photo does not show any headphone jack, so this seems to be limited only to converting tapes to MP3 files.
7. There are a couple of all-in-one, stand-alone conversion machines. One is the **Crosley Songwriter Recordable Turntable** (\$400) from Brookstone, and the other is the **Salzburg Music Center** (\$300) from Improvements. These are 33 1/3 RPM, 45 RPM, and 78 RPM record

players, cassette tape players, CD players, with speakers, that can transfer music from the records or tapes played on the machine directly to the CD recorder built into it. The more expensive Crosley machine also has an AM/FM radio built in. If you chose this solution to transferring music, you could bypass the computer. However, you may have to transfer entire records or tapes since the brief descriptions portray one-touch or simple recording once you have put the record or tape and a blank recordable CD in the machine.

When researching the ionAudio turntable, I found information about the **free software, Audacity**, which is packaged with those turntables. I have downloaded and used this software to convert analog music to CD and will briefly discuss it here. There are other software packages available for purchase, and there may be other shareware or freeware, too.

Once you have installed an equipment solution to digitizing your records/tapes, and have installed the needed software, you should open the software. I'll refer to this software as Audacity and show graphics from this program, starting with the input screen shot below.



You must select the audio input source for Line In (from an audio receiver/system Line Out jacks as opposed to from a microphone or music CDs). This is set by left clicking the button to the right of the microphone volume icon and selecting the correct type of input from the resulting drop down menu. You should also be sure that Audacity is set for either stereo (two channels of music) or monaural (one channel of music). This is set by left clicking on “Edit” to open the drop down Edit menu, then left clicking on “Preferences.” After then left clicking the “Audio I/O” tab, you select the correct option after “Channels:” for either “Stereo” or “Mono.”

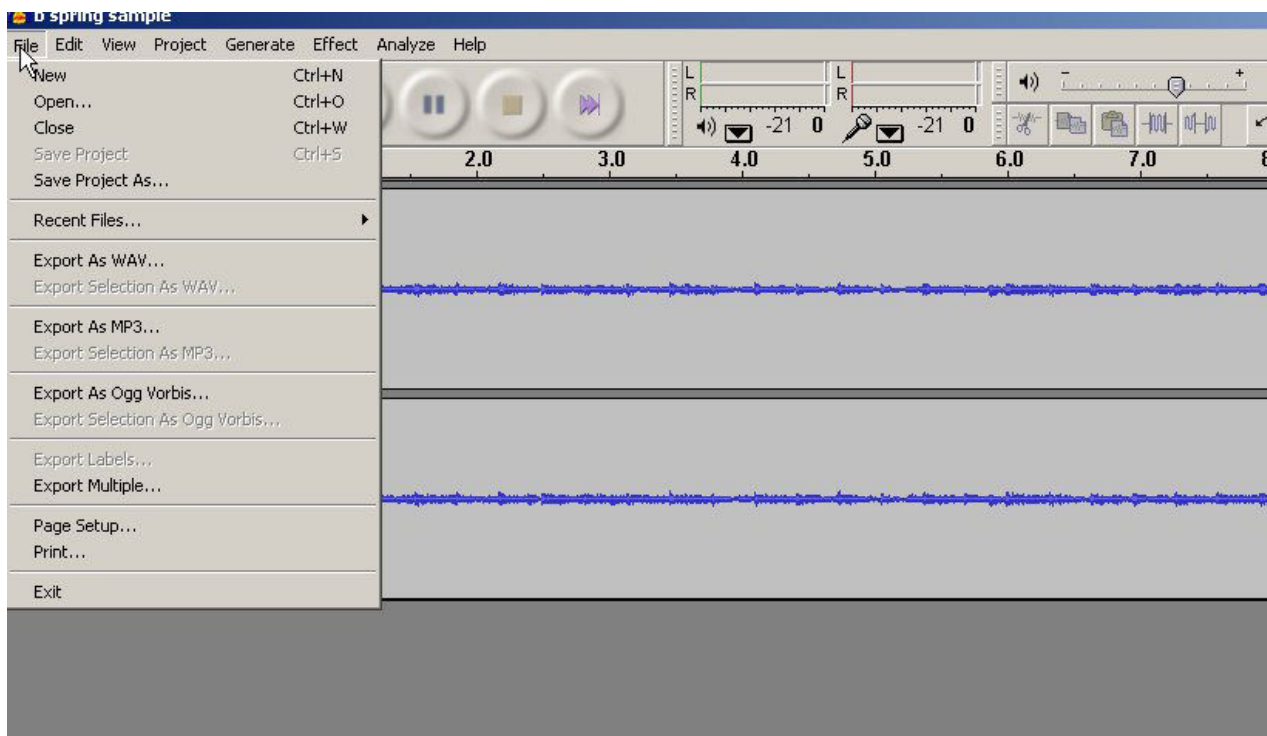
After you have started your input machine (turntable, tape deck, etc.), you can then set the input volume level while viewing the meter located above the speaker icon. The input meter is the meter with the red bars moving to the tempo of the input music. You need to be sure that when the loudest parts of the music are playing, the meter does not hit the right hand end of the meter scale or the resulting music will be distorted. Ideally, the highest readings will be around two-thirds to three quarters of the entire meter scale. If you need to adjust the input level so it is loud enough but not distorted, you will use the portion of the screen on the left side under the heading “Audio Track.” Directly under the buttons labeled

“Mute” and “Solo” are two slider controls. The top slider is for volume and is changed by left clicking on the slider icon and dragging it toward “+” for more volume or toward “-“ less volume.

When the recording volume level is set, you actually record the song. Normally, the best sequence to use is to turn on the Audacity recorder (clicking on the red record button) then starting the song on the record player or tape deck. I usually suggest monitoring each song, recording each song to a separate file as you go. If you are doing this, you will need to monitor the music to click on the yellow stop button when the song is done. While it is possible to record an entire side of an album or tape, you would then need to carefully separate the songs without adversely affecting the file with the entire side of music on it – just in case you needed to redo the song separations.

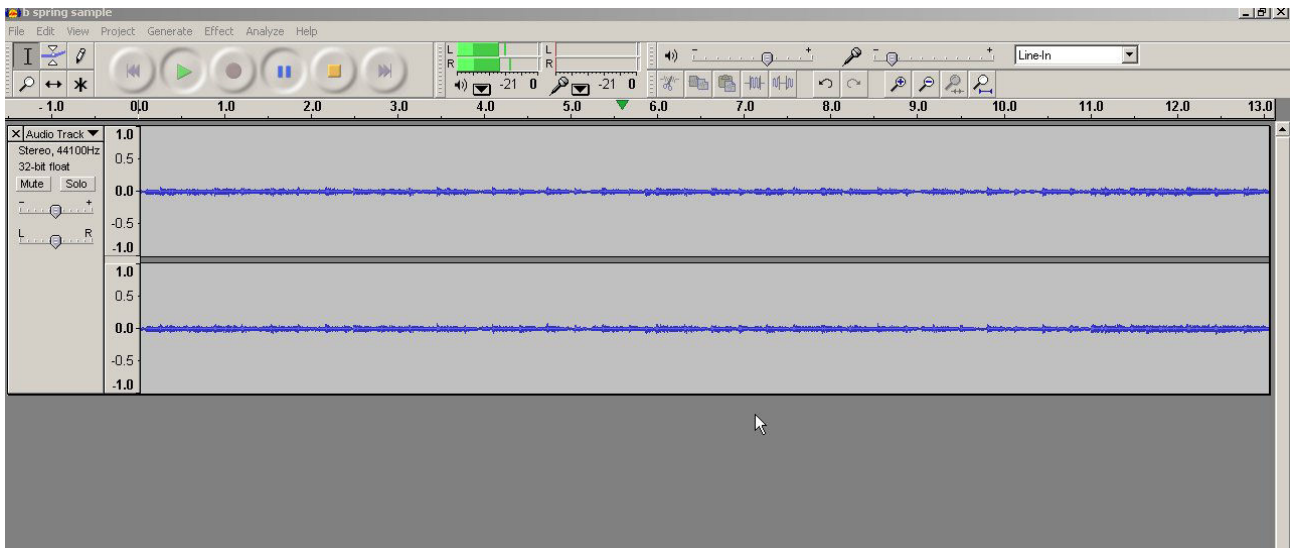
As you record each song, you should stop and save/name each file. This is done by left clicking on the “File” button and left clicking/selecting “Save Project” and naming the song. You can then either close the recorded track by left clicking the “x” (close) button on the left end of the recorded tracks or by selecting “New” from the drop down “File” menu. If you chose the second option, you will actually be opening another window of Audacity in which you can record the next song.

You should note that Audacity saves each project in a proprietary format where the Project file (\*.aup) joins the sound segments recorded (\*.au). If you want to save the files as \*.WAV files you must use the “Export As WAV...” option from the drop down “File” menu. Although there is an option on this drop down menu to “Export as MP3,” you will be directed to download another associated program which will allow you to save songs in the MP3 format.



Audacity will also allow you to edit the songs you have recorded. You can open the songs you saved and play them using the different colored but standard shaped buttons in the upper left of the Audacity screen. Just as you could adjust the volume of the red record meter channels when you were recording

songs, you can adjust the volume of the green play meter channels. You use the same slider icon on the same “+” to “-“ file on the left side of the stereo tracks.



There are many options you can use in editing the songs (see next page) although I don't use most of them. Besides separating the songs, you can remove many of the clicks and pops sometimes heard on vinyl records, reduce the hiss you sometimes hear on tapes, as well as some really unusual effects. I suggest that you save the changed song under a slightly different name so your original song will remain available if you need to start over again. Also recall that you will need to Export As WAV or Export as MP3 if you want to play the edited song on some other machine using some program other than Audacity.

Once you have edited and saved your songs in a WAV or MP3 format, you can use them just like they had been ripped from a CD. That is, you can put them together in any compilation you choose and create CDs for special occasions – both for yourself and for others.

Some of the commercial programs can handle a lot of the functions described in this lesson – ripping audio from CDs, records, tapes; editing the audio files; saving the files in various formats readable by other programs and equipment; creating a list of songs to burn and burning the compilation; and, creating CD jewel case inserts which incorporate your own graphics/photos and don't require you to type in the names, artists, and length of each song. Most of these cost less than \$100 and may well be worth the investment if you plan to transfer a lot of albums or create special CDs from your current CD collection. Shop around for sales, read the comments by users online (both at retail sites and on user comment pages), and be creative!

