

CD RIPPING GUIDE

for an average user

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INTRODUCTION

The time has come for me to rip my CD collection and put it on my home server.

Actually, I tried to do it an year ago and was hit by the complexity of the subject and postponed it for some later time. I simply wasn't ready to dig deeply enough to master offsets, cue sheets, gaps and other issues. I thought it's just a matter of putting CD in the drive, choose file format and click button, and being overwhelmed with technical issues/choices I just gave up, being scared that if I make a wrong choice I'll have to re-rip all my collection later again.

I don't consider myself an audiophile. My CD collection is about 150-200 CDs and I don't spend too much time listening music from CDs. My hi-fi (home theater) equipment is decent, but doesn't cost a fortune and has a dedicated room. However, it's good enough to make it easily noticeable when CD has errors, or music is ripped at low bitrate. Therefore, I prefer that equipment is limiting factor when enjoying music, rather than the music source quality.

My main reason for moving music from CDs to files might sound strange. I had DVD jukebox (Sony, 200 places) which I was filling with CDs and only a few DVDs and really enjoyed not having to deal with CDs and cases all over the place. They were protected from kids and I had photo album with sleeves where I was storing CD covers, so it was easy to find disc number in jukebox. But now I run out of the space in jukebox and I couldn't find another one to buy in shops anymore.

On the other hand disk space became cheap, so I calculated if I rip my whole collection uncompressed in wav format, it would still fit on $200 \times 600 \text{MB} = 120 \text{GB}$ hard disk. Even an year ago it wasn't terribly expensive.

What I realized over the past year is that choosing the right strategy (hardware, software, file formats, folder structure...) is probably as equally important as understanding technical background of CD ripping (gaps, cue sheets, offsets...). My main goal is still, that once ripped and stored away, I don't want to use original CDs and pass them through my CD drive at any point in the future. So, my strategy must be as future proof as possible. If I preserve CD information correctly, there will always be some software way to transform files from one format to another, or re-organize files. But there will never be possible to automate taking CDs from the shelf and putting them in and out of CD-R drive.

I've spent past months reading countless posts, manuals, discussions, and I believe I understood technical side of ripping disks and I can do it any way I want it. I am ready to go.

The problem now is to decide how I want it done.

After careful consideration (and changing my mind several times), this is what I've decided and why.

FILE FORMAT

An year ago, when initially I wanted to start this adventure, I thought I will use .wav. Yes, it's bulky, but my collection is not huge and will still fit onto hard drive. And I will preserve the full audio quality of the original.

After a while, I realized that it won't work. It's difficult to find media streamers that support .wav and certainly portable devices are mostly oriented to lossy formats due to limited storage space.

Therefore, it became obvious that I will need two formats: lossless and lossy

[Lossless formats](#), as their name says, don't lose any information when encoding wav files. They all have similar performances and compression ratios of about 0.5-0.6.

Lossy formats, on the other hand, have much better compression ratios, about 0.10. But the drawback is that they lose some information/quality, so you cannot re-create original file. All of them have various settings for fine tuning (better quality/less compression etc.) and use the fact that human hearing is not perfect so it will not hear certain combination of tones, frequency, loudness. Then they strip out such information. But then, not all of us are the same and someone will hear such intervention, and someone will not notice the

difference. There is no mathematical way to measure quality of lossy encoding. Instead, people use blind tests and try to judge lossy encoders/decoders/file formats.

Lossless format therefore I'll need for preserving the quality of the original, which I will hopefully be able to use in the future, when it becomes widely supported by the hardware. But also I could use it as a source for re-encoding in some other lossless format if that format becomes market winner. In the meantime, I can use it as a source for encoding into lossy format as well. It's always easier to use these files as a source, then to search for a CD for ripping again.

For this format I chose FLAC. Although, there are no huge differences between FLAC and the others (Monkey Audio, Wavpack...), FLAC seems to have less demand on hardware for decoding, probably the reason why it's more widely supported by hardware, then the others. It's free, so no legal issues in the future, and has wide range of software tools already available. Therefore, I placed my bets on FLAC. I'll use it with maximum compression -8 to preserve disk space at this time.

Lossy format I'll use for portable devices and currently I'm using it with my media streamers (Kiss DP-558 and Pinnacle Showcenter 200) until firmware upgrade enables them to use FLAC, eventually (or I buy other device). For those reasons, I chose MP3 because it's compatible with almost anything. Encoder I will use will be LAME, because there seems to be a consensus that it's the best.

For encoding quality I will use "-V 0 --vbr-new", which is equivalent of "--alt preset fast extreme" That's almost the best setting, and I didn't go for the best "-b 320" because the files are bigger and I have feeling that not all the hardware devices will be able to support it. I might be wrong here.

Detailed explanation of encoding quality settings can be found [here](#).

RIPPING SOFTWARE

Again there seems to be consensus that [EAC](#) is the best free ripper, actually, the only one that provides secure mode and can guarantee that no errors will pass unnoticed. The commercial alternative, which is equally secure (if not better) is [dbPowerAmp Music Converter](#), but it has some limitations in the latest version (R12), when it comes to other functionality, which will be explained later.

So, the choice was simple. (An year ago, I started using CDEx, but only on a few CDs, which I'll re-rip now when I know that they might contain errors)

Still, there are a number of options to set up in EAC and make decisions.

OFFSETS

In order to make a perfect rip, CD-R drive offset has to be set up correctly in EAC. The way it was designed to calibrate it, didn't work for me. I bought my CDs mostly in UK, and found about 10 titles from the EAC CD reference list, but none of them matched CD code on the inner ring. As EAC's author is from Germany, I think, probably they were pressed in a different factory, so they are not exactly the same.

Fortunately, the new plug-in [AccurateRip](#) solved the problem

GAPS AND CUE SHEETS

One decision to make is how do we want to create CD Archive in lossless format (FLAC).

There are two options: to rip the whole CD as a single image file, or to rip it into separate tracks.

By the standards, each CD consists of tracks and 2 second gaps (not always exactly 2 seconds) between them. Each gap belongs to the track after it (e.g. gap 3 comes before track 3).

As you know CDs can be mostly split into 2 categories. The ones recorded on live events (concerts) and studio recorded. The ones recorded at events usually have gaps filled with applause, talk etc.

Studio recorded CDs have more clean cut, but still their gaps contain some information, usually fading in or fading out adjacent songs.

Therefore, if we want to be able to recreate audio CD later, from our archive, we'll have to preserve both tracks and gaps.

Cue sheet is a text file(with extension .cue), which contains information about tracks and gaps. Regardless we rip CD as a single file (image file) or as individual tracks, we will need cue sheet in order to be able to re-create audio CD.

This is how part of cue sheet looks like:

```
REM GENRE Rock
REM DATE 1995
REM DISCID 9B095E0D
REM COMMENT "ExactAudioCopy v0.95b4"
PERFORMER "Chris Isaak"
TITLE "Forever Blue"
FILE "Baby Did A Bad Bad Thing - Chris Isaak.flac" WAVE
  TRACK 01 AUDIO
    TITLE "Baby Did A Bad Bad Thing"
    PERFORMER "Chris Isaak"
    INDEX 01 00:00:00
  TRACK 02 AUDIO
    TITLE "Somebody's Crying"
    PERFORMER "Chris Isaak"
    INDEX 00 02:53:72
FILE "Somebody's Crying - Chris Isaak.flac" WAVE
  INDEX 01 00:00:00
  TRACK 03 AUDIO
    TITLE "Graduation Day"
    PERFORMER "Chris Isaak"
    INDEX 00 02:46:35
FILE "Graduation Day - Chris Isaak.flac" WAVE
  INDEX 01 00:00:00
  TRACK 04 AUDIO
    TITLE "Go Walking Down There"
    PERFORMER "Chris Isaak"
    INDEX 00 03:10:40
```

etc.

If we rip CD in a single file, some software players can use cue sheets in order to jump to a particular song within that file, as opposed to having to play the whole file (CD).

One strong argument against ripping CDs as a single file is that most of hi-fi equipment/streamers, don't support cue sheets, so you cannot play individual songs from such image files.

Therefore I decided to rip tracks as individual files, so I can easily play them with e.g. WinAmp, and at some later point in the future I hope that I'll manage to get rid of MP3s (e.g. my current streamers can be firmware updated to support FLAC) and use FLAC files only. In that case, no re-ripping will be needed, because everything will be ready.

One other thing I noticed, in favor of burning individual files, is that it seems that the whole music industry will move towards selling individual songs, instead of the albums. And also, logically, I don't want always to buy CD, just because of only 2 good songs. I would rather buy just the songs I like. Therefore, having songs

organized in albums, might be obsolete in 10-15 years time, so taking care that all the gaps are exactly ripped and preserved might be pointless in a few years time, unless they are live event recordings.

Now, we need to decide how we want gaps associated with the tracks. By the standards, each gap belongs to the track coming after it. But, if we rip tracks in a such way, we'll have 2 sec silence at the beginning of each track, and when we play such song, we'll see that counter goes from -2 sec., before song starts.

Most people, including me, find that annoying.

Audio CD players, always skip that gap if you chose to play individual track, but software players don't. The alternative I opted for, is to append gap after the track. E.g. file with track 3, when ripped, will consist of track 3 and gap 4. Now the gaps will be appended to the end of a file.

The drawback of this method is that we'll lose first gap (pre-gap) of 2 sec, because first track file will start with track 1, not gap 1 (called pre-gap). But that gap, most often, contains silence anyway.

And also, those 2 seconds are never played by audio CD players either, they are there, just because of standard, so no information is lost really.

The excellent explanation of this topic can be found [here](#).

I will use [Burrn](#) for restoring original CDs from individual FLAC files and cue sheet.

Some people prefer to re-create audio CDs immediately and keep CD backups in such form, instead on hard drive, but some topics I read, e.g. [here](#) suggest that it's very unreliable to keep copies on CD-R media because their shelf life is very short.

TAGS

Tags are small pieces of information that are embedded in a music file (like track name, artist etc.). There are different formats in which tags can be written and embedded into files.

For FLAC I will use Vorbis Comments as tag format because it's the only tagging system [required and guaranteed to be supported](#) by FLAC implementations.

For mp3 files I will include tags in both ID3v1 and ID3v2 version supported by Lame.

I would like to have both ID3v1 and ID3v2 tags, just in case that some older mp3 player cannot recognize ID3v2 tags. ID3v1 tags are old format and they take 128 bytes only, so it's better to include them then later having to do some re-tagging.

There is no rule here. I found that some people don't want to have tags at all, because they put all the information they want in a file name and want to keep file size to the minimum.

It's worth mentioning, once you have info in either format, it's possible to use tools to copy info from one format to another. ID3v1 format tags are at the end of the file (so it arrives last when streaming) and ID3v2 ones are at the beginning.

Explanation of ID3 tags can be found on [wiki](#).

I'll also use APEv2 format for storing Replay Gain related tags, because that's the only format mp3gain software supports.

COVER ART

Although cover art can also be stored in tags, I'll not store it, mostly because of it's size. The size depends on image size/resolution, but I also don't like the idea keeping 10-15 duplicates of the same image. Cover art is more album related info, not track, so I'll try to store it in album folder. Anyway, I found that cover arts are sometimes difficult to find and they are used mostly on software players. On the other hand, such players like WinAmp can search internet during playing and show cower art, regardless of having it prepared and saved in a folder. Hence, for me, it's not worth the effort and space. I might search for Cover Art only for albums which player cannot find automatically.

REPLAY GAIN

Different CDs are recorded with different levels of loudness. You probably didn't notice, because you rarely leave several CDs to play in a row (you need jukebox for that), or change audio CDs every few songs. That means that if you rip and mix tracks from different CDs and then play them, it's very likely that you'll have to adjust sound level between tracks. Therefore, people decided that it would be nice to have "average loudness" calculated and stored in a track tag, so players which know how to read that tag can adjust volume automatically, so all the songs have similar level of loudness.

That "average loudness" parameter is named Replay Gain and can be calculated per track and per album and they are called trackgain and albumgain respectively.

It's calculated using complex algorithms, taking into account human hearing imperfections.

Albumgain is important because there might be a song that is intentionally recorded with lower volume and shouldn't be adjusted. More info on Replay Gain can be found on <http://www.replaygain.org/>.

REPLAY GAIN WITH FLAC

I have decided to calculate and write Replay Gain values in tags in flac files during ripping and encoding process. If players support Replay Gain, as many newer ones do, it will make listening more pleasant. If they don't, there will be no effect and no harm. The only drawback of including them, I can think of, is that they will increase file size for a few more Bytes and make ripping process slightly longer.

REPLAY GAIN WITH MP3

For adjusting volumes of mp3 files, I will use slightly different approach. I will use program mp3gain, which uses Replay Gain algorithm to calculate loudness of the track. But, instead of leaving the file as is (like for flac files explained above), and just writing calculated albumgain and trackgain in tags, I will directly adjust mp3 files for the albumgain value. It's important to know that such adjustment is made losslessly.

The only danger is possibility for tracks to go into clipping.

The clipping happens when music peaks, after decoded to 16bit, 44.1kHz (Audio CD quality), get level higher than 32767, because such volumes cannot be reproduced when played. Therefore, decoder will cut them at 32767, and distinguishable noise will be heard.

Mp3 format specification allows such values to be stored in a file, so file itself will not be damaged, only the decoded wave would be.

To help you understand, once you have all the necessary software installed, you could do this simple test: Take a proper mp3 with max gain peak value below 32767.

Then increase the volume (losslessly) by mp3gain to values far above from 32767, to 50000 for example.

If you play such mp3, you will clearly hear clipping.

Then take this mp3 with values above 50000 and decrease the volume so they fall below 32767.

It will sound well again!

And if you lower it to the starting value, the resulting file will be exactly the same as at the beginning.

This approach takes an advantage of mp3 file possibilities and is better then method with only storing Replay Gain values in tags, because it works with any player, even non Replay Gain aware ones..

But we still need to decide what we should do with such files that would, after being adjusted for Replay Gain, produce clipping output after decoding.

There are two options.

One is, for such tracks, to reduce Replay Gain to the value that's just below the one that would produce clipping. The drawback is that such track will sound a bit quieter then the rest because calculated Replay Gain hasn't been applied in full.

The second option is to use limiters (software) that will compress peaks so they don't go into clipping. The advantage of this option is that track will sound approximately the same as the rest, but the drawback is that such track will differ much more from the original. I chose carefully lossy format and encoder in order to have music sounding as similar as original, so this option would make it pointless.

Therefore I chose the first option.

The good news about clipping is that if we use 89dB as default gain value (which is de-facto standard), most of the albums will require album gain to be scaled down, not up, so the problems with clipping won't exist. Only some classical music albums with huge dynamic range might have problem.

Although such adjusted files can be played on non-Replay Gain aware players, it's still recommended to use Replay Gain aware player. One reason is that with mp3gain we can apply either albumgain or trackgain, which will have effect on non-Replay Gain aware players, while with Replay Gain aware players, we can chose which gain we want applied during playback (both are stored in separate tags) regardless which gain was applied by mp3gain.

The other reason is that mp3gain can adjust Replay Gain in increments of 1.5dB only, although it can calculate it and store in tags in 0.01dB precision. Replay Gain aware players will read tags and adjust playback level more precisely, although most of the people can hardly notice 1.5dB difference in gain. Mp3gain writes Replay Gain tags in APEv2 format (not ID3v2).

FILE STRUCTURE

I had to decide how and where I will store the files. I've changed my mind several times already, and I hope that I've decided finally.

I will have two folders: FLAC and MP3.

FLAC will have folder structure Genre\Artist\Album\

Files will have names as TrackName-Artist. That's because, I think some MP3 players display filenames instead of Tags, and if they have a limited number of characters on a display it's better if they start with song name, rather than all start with e.g. Joe Cocker.

I don't see why I would need track number in a file name.

MP3 will have similar folder structure, but not having Album folder.

All the songs from the same Artist will be stored in a single folder.

FLAC ones are grouped by Album only because it's simpler if I want to re-create audio CDs.

I will never re-create audio CDs from MP3s.

RIPPING PROCEDURE

As I need to rip and encode tracks in two different formats, I plan to do it in a single go, so I don't rip CDs twice. For that purpose, I plan to use [Flacattack](#)

For protection from disk failure, I have my hard disks mirrored, which are now 2x250GB, so enough room for expansion and some other stuff as well.

I know that for most of the decisions I made there are no right or wrong answers, they are individual preferences.

SOFTWARE MUSIC PLAYERS

Although, I plan to play my music files mostly on hardware devices, from time to time, I'll need some software player to play them on a PC. There are a number of music players available, most of them for free. The first that springs to mind is Windows Media Player, because it comes preinstalled with Windows, but it is tricky to enable it to support flac files. The other two most popular contenders are WinAmp and Foobar2000. I chose WinAmp because it's free, it's been around for a long time, so it's supported well, and

has a number of plug-ins to extend it's basic functionality. It supports playing back flac and mp3 files out of the box, but even that can be improved with using additional mp3 decoders in the form of plugins, like [in_mad MP3 input plugin](#).

It also supports ReplayGain.

Foobar 2000 has similar features, but I have feeling that WinAmp is easier to learn, and because it has commercial version, probably more developers are working on it.

STEP BY STEP INSTRUCTIONS

1. DOWNLOAD AND INSTALL EAC

1.1. Download the latest version of EAC (v.0.95 beta 4) from it's web site <http://www.exactaudiocopy.de/>. Click on Download in the menu. I chose British flag and then I chose version with CDRDAO burning, Windows installer. I'm not sure what CDRDAO burning is, it seems that it's some kind of burning module, but I reckon that it's better having it, then missing it later. Maybe some expert can give us some explanation.

1.2. Install EAC with default values.

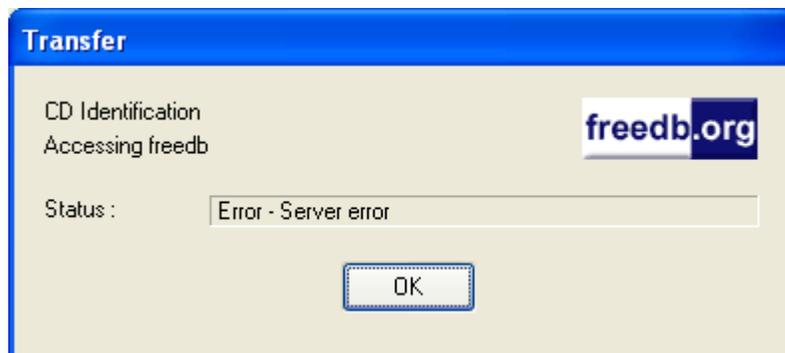
1.3. Check for ASPI problems (see <http://users.pandora.be/satcp/eac-qs-en.htm#aspi>)
I have WinXP and had no problems reading CDs

2. DOWNLOAD AND INSTALL ACCURATERIP PLUGIN

2.1. Download AccurateRip plugin from AccurateRip web site: www accuraterip.com/software.htm
It's called "AccurateRip Function" on the page. It's an .exe file.
There's no need to download "Offline AccurateRip database".

2.2. Install AccurateRip plugin by starting just downloaded "dMC-AccurateRip.exe" file.
I suggest installing it in "C:\Program Files\AccurateRip" instead of default offered.
When installation complete, help page is displayed. Please read it for more info and copy accuraterip.dll file from "C:\Program Files\AccurateRip", or wherever you installed it, into "C:\Program Files\Exact Audio Copy" folder, as suggested.

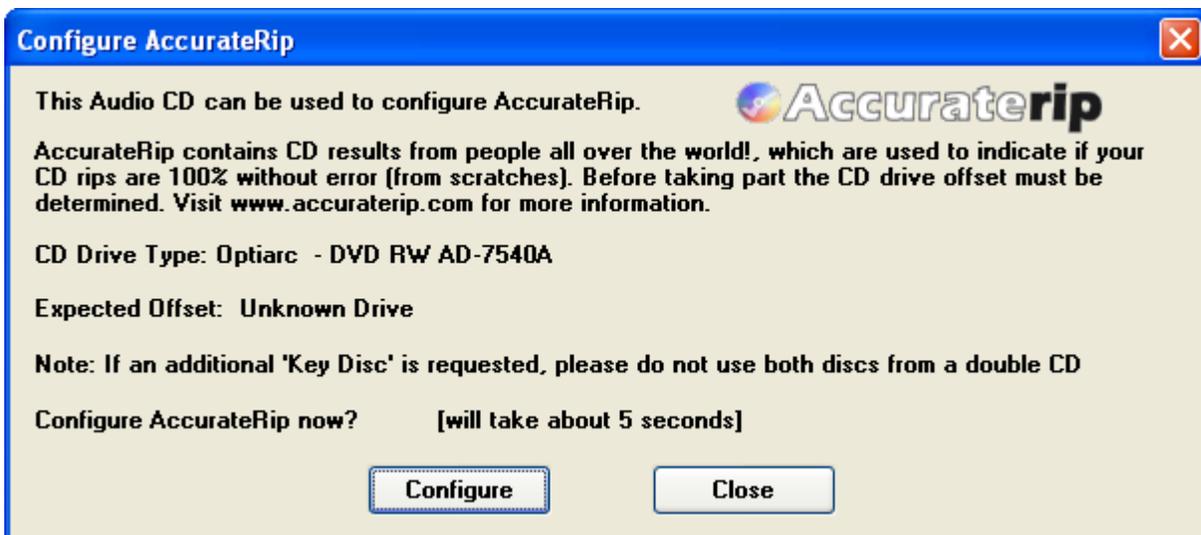
2.3. Configure EAC drive offset with AccurateRip.
In order for AccurateRip to work it must be able to access freeDB, so you need to configure options for accessing it. See here: <http://users.pandora.be/satcp/eac04.htm#->
Basically, you should start EAC and insert one of the key discs in CD/DVD drive.
AccurateRip logo should automatically pop up (thus you know that it's working) and it will try to connect to the database of CD Drives and key discs. If it finds your CD drive model it will suggest offset from it's drive database and you don't have to bother with discs. For most of the desktop drives (if they are not the latest model) it will work like that. However, my laptop drive wasn't in their drives database and I had to insert key discs.
If you try some obscure Croatian CD, like I did, it's most likely not even in freeDB. In that case, you'll get an error something like this:



If you try some more popular CD, it's probably in freeDB, and you might get CD data (tracks, artist...), but it might not be key disc in AccurateRip database. So, it still cannot be used for drive offset calibration. In that case, you'll get message like this one:



Then, keep on trying, inserting different discs, until you find key disc. You'll get message like this:

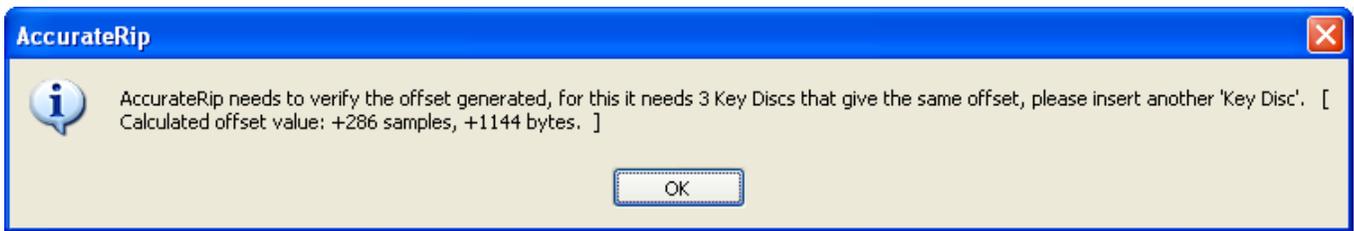


Click on "Configure" and it will calculate offset of your drive by comparing key disc you inserted with the reference one in it's database. It will show you result:



But, sometimes you have same CD being produced in several factories. In order for AccurateRip to be sure that the one that you just scanned has come from the same factory as the reference one it has in it's database it requires that you scan more discs, and that at least 3 of them produce the same offset.

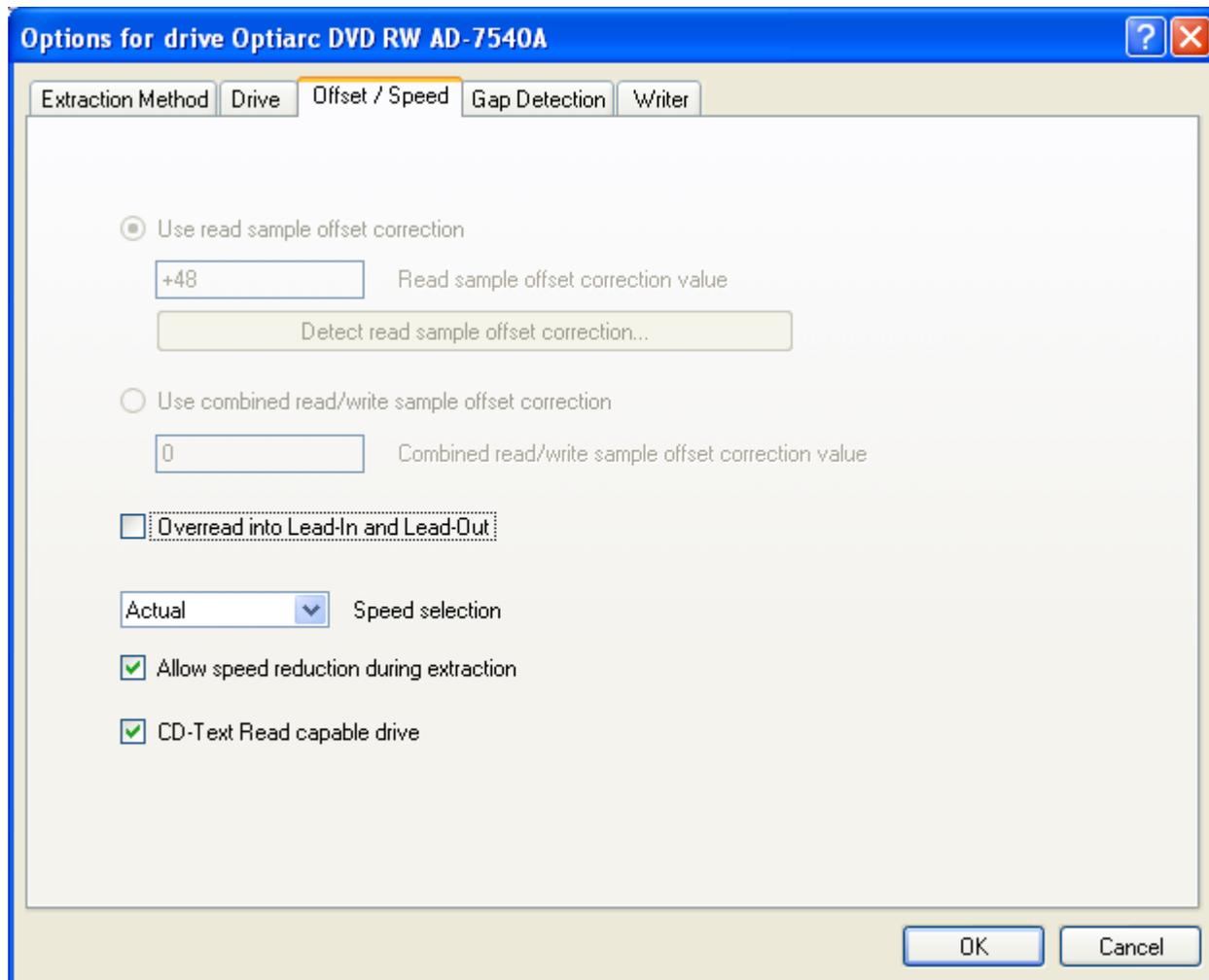
E.g. if you continue feeding the drive, you might get similar message, but this time the different offset value is calculated:



Keep on feeding drive with different discs. AccurateRip stores results somewhere in the background and when the third time you get the same result, you get message:



If you check, you'll see that Offset/Speed options are now locked (grayed out) and cannot be changed anymore.



Congratulations! You have configured your CD drive offset.

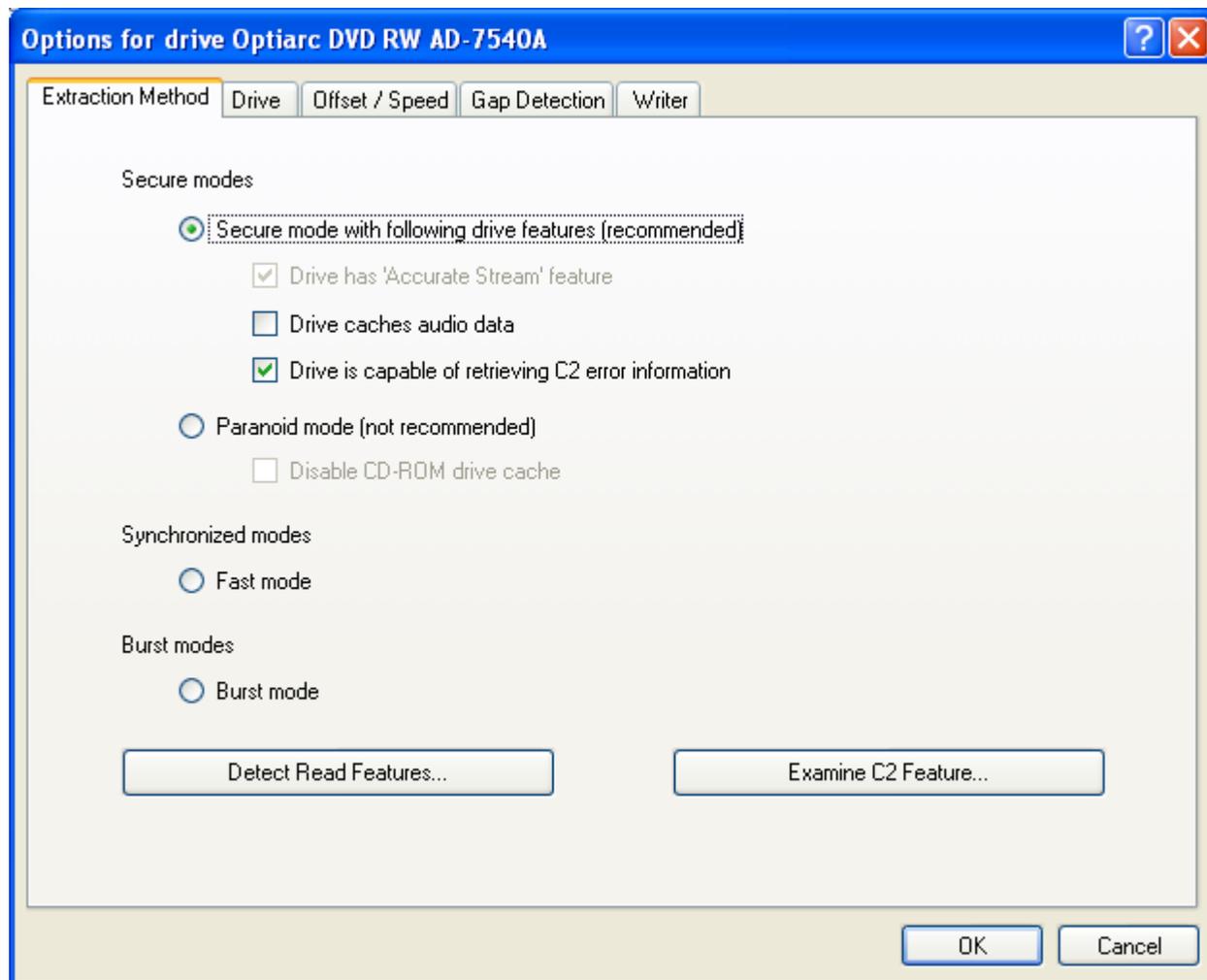
3. CONFIGURE EAC DRIVE OPTIONS

I used [Satcp's manual](#) as a guide and mostly followed recommended settings.

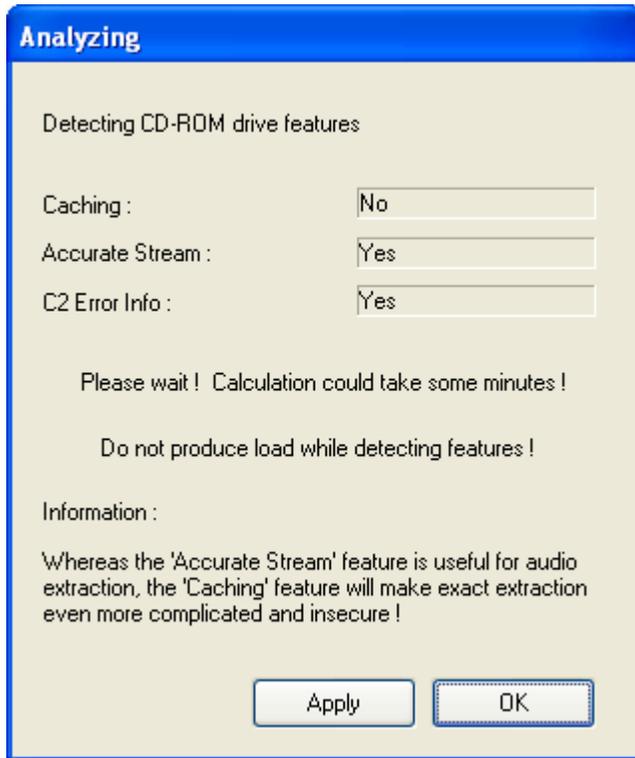
The manual and screenshots are from older version of EAC, so there are some differences which I'll try to explain if they are not obvious.

Also, I looked at [Liekloo's manual](#) for some further explanations

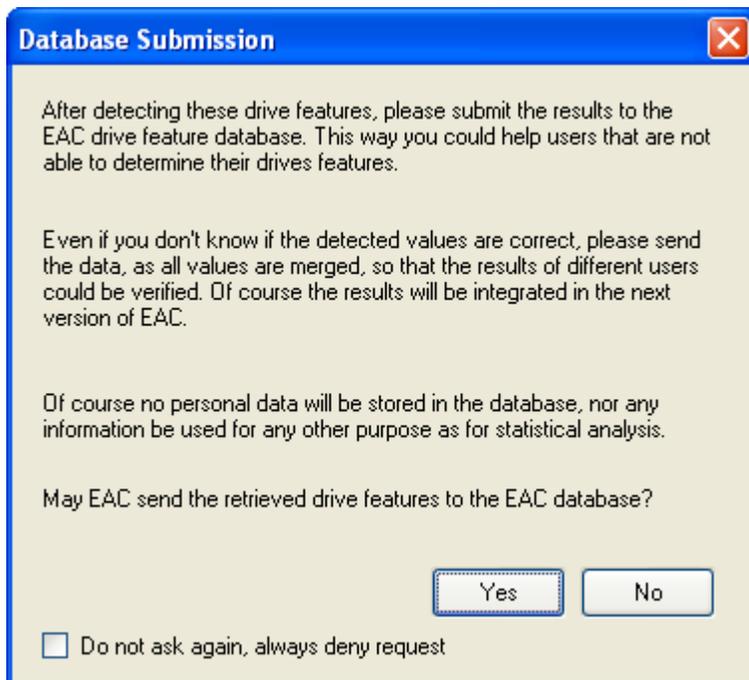
Here are my screenshots:



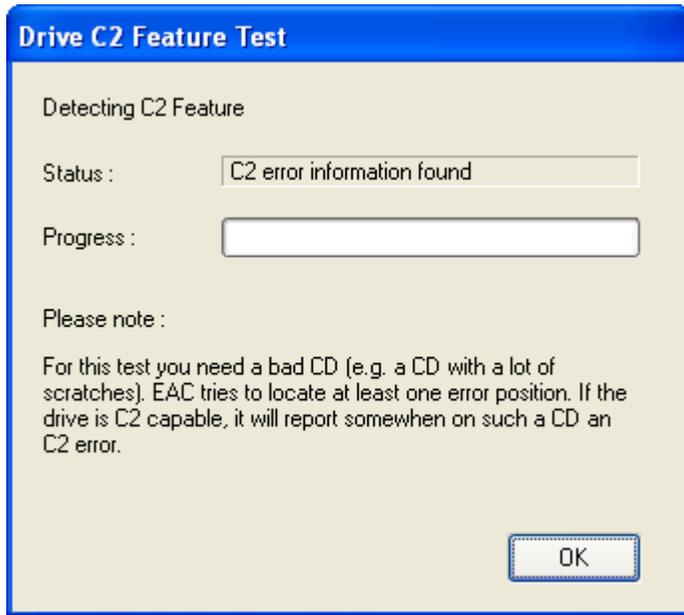
I have clicked on "Detect Read Features" (with CD inserted) and after examining drive for a while, I've got this:



I've clicked on apply to apply detected settings and then submitted results to EAC drives database for future versions.

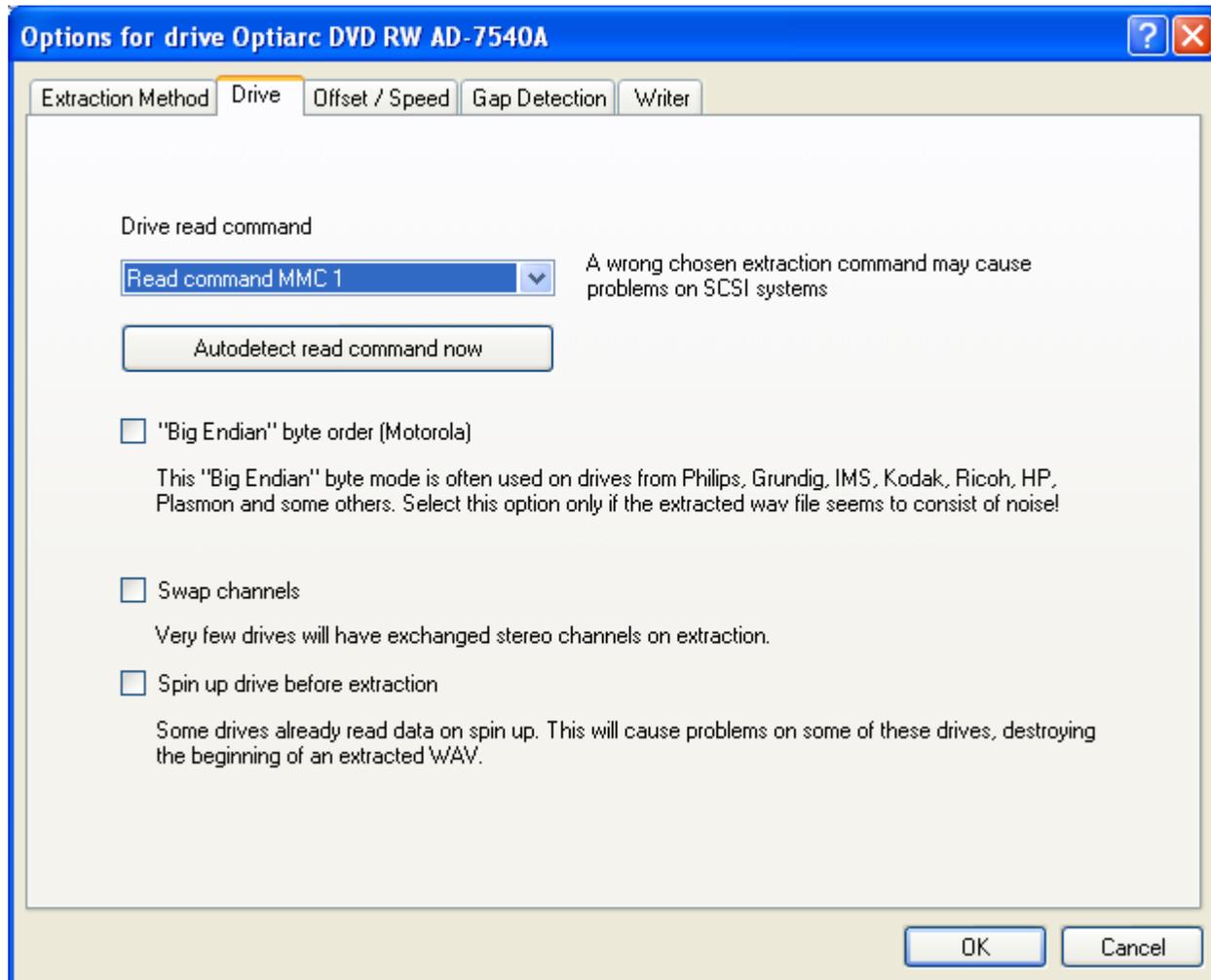


Then, as suggested, I inserted scratched CD, to verify that drive really supports C2 error detection. I clicked on "Examine C2 Feature" and it really detected errors.



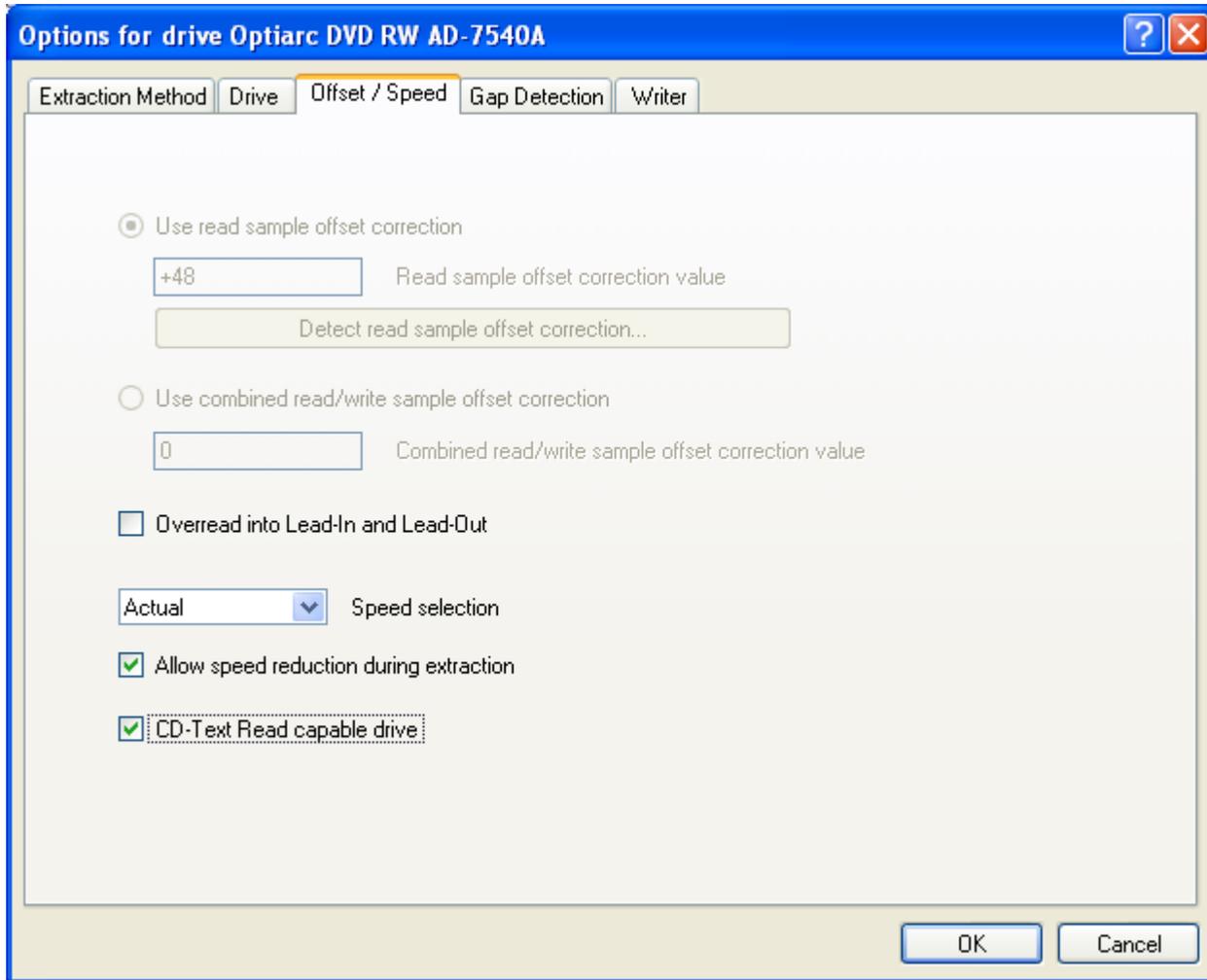
So, this tab is finished.

On the Drive tab, I auto detected read command. The result is here:



Offset / Speed tab:

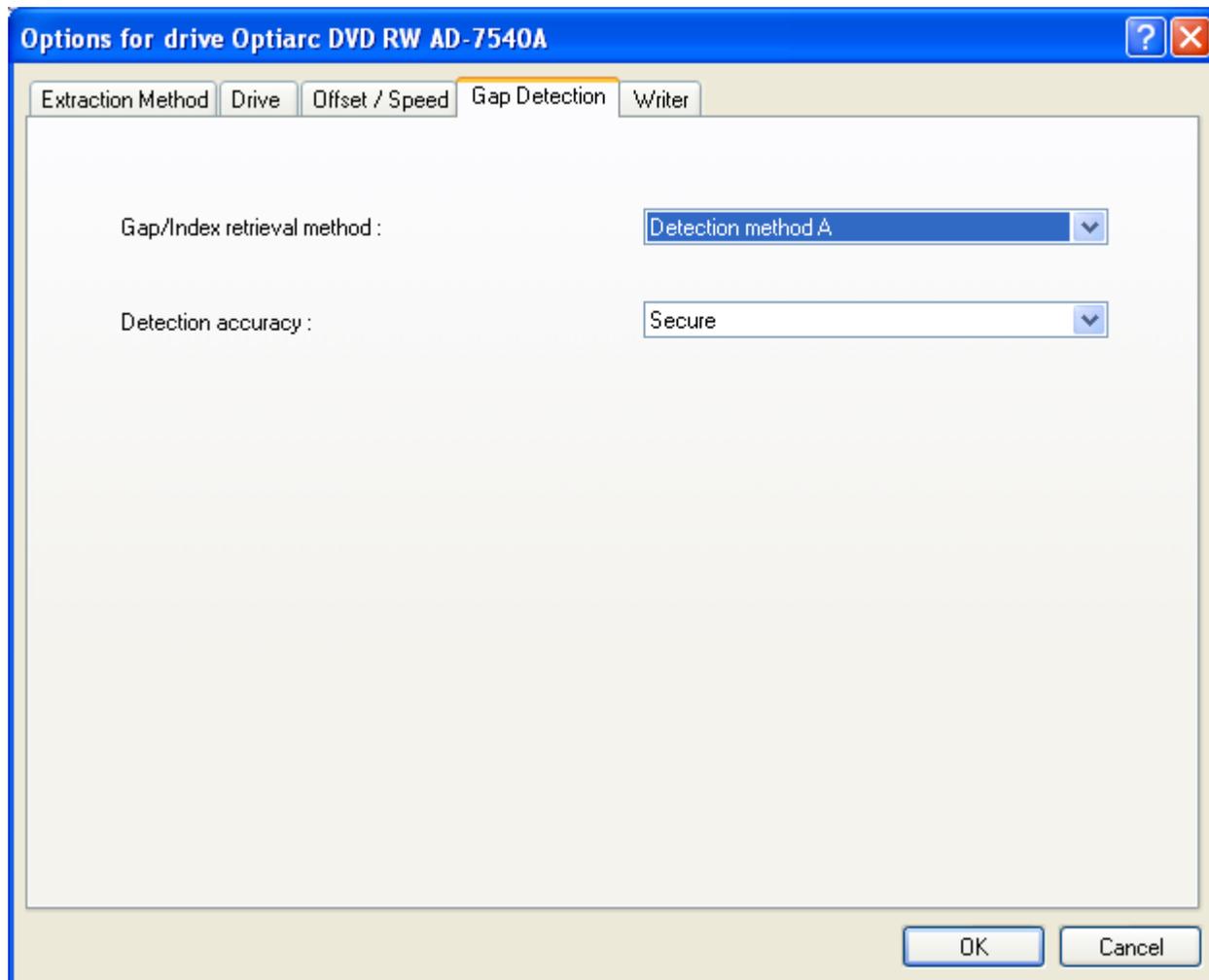
Manual of my drive says that it supports CD-Text feature, but it doesn't say if it supports read or write. I assume if it's not specified, that it must be read, at least.



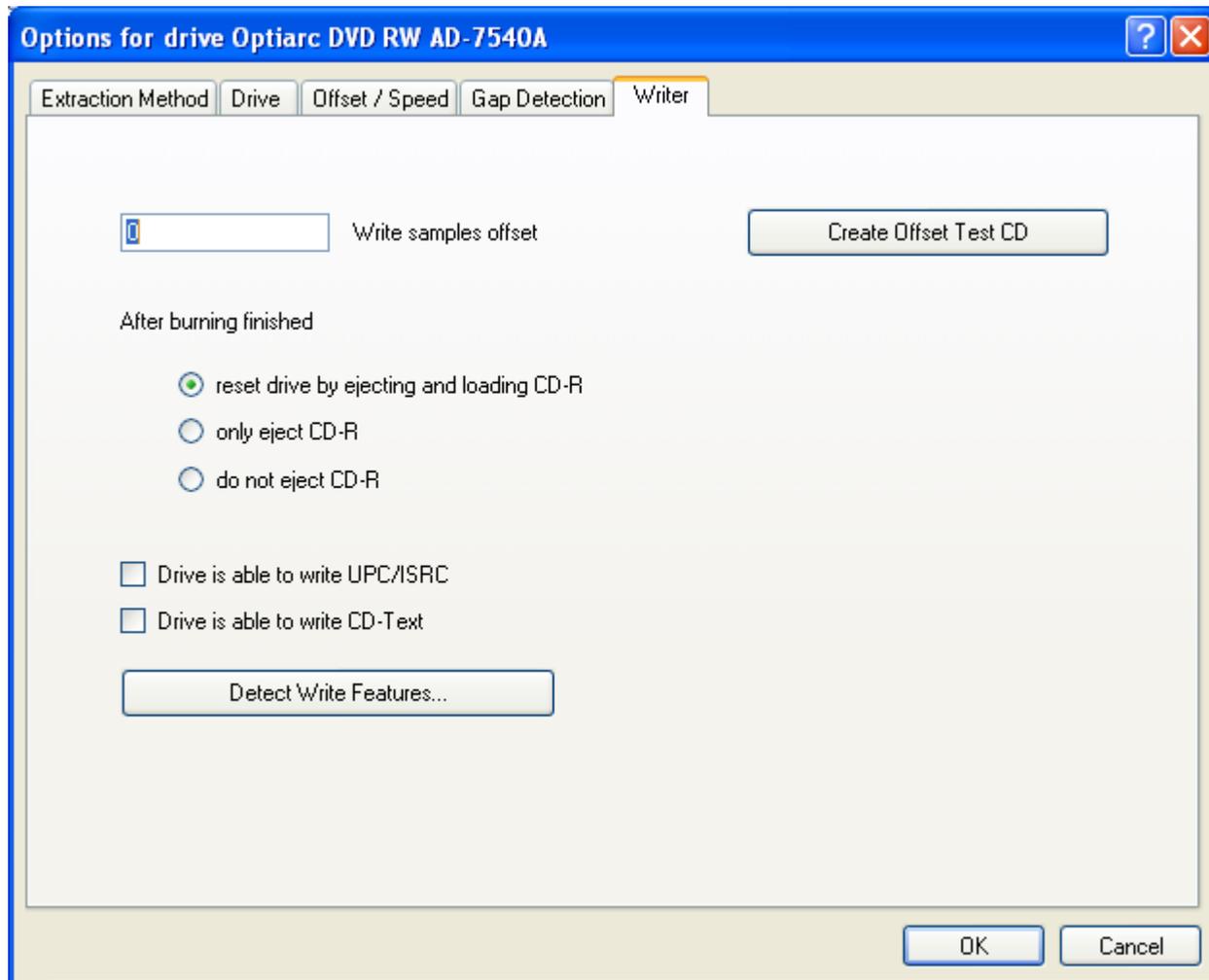
For the Gap Detection tab, after I did suggested test from [this manual](#), the result is here:
All in secure mode

- Detection method A – 19 sec
- Detection method B – 23 sec
- Detection method C – 101 sec

The resulting screenshot is therefore:

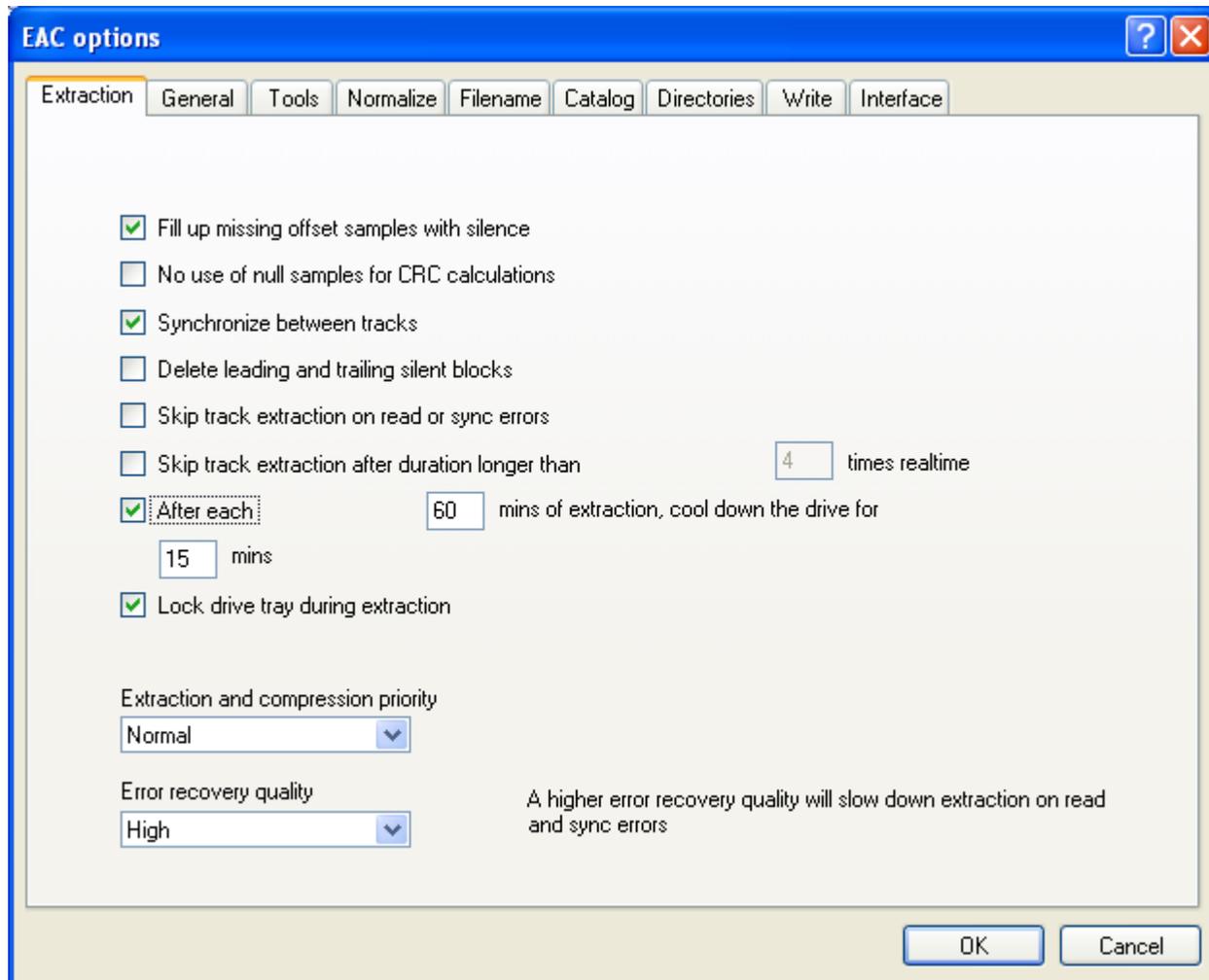


As I plan to rip music to hard drive and encode it into FLAC and MP3, writing features of my drive are not important, so I left default settings



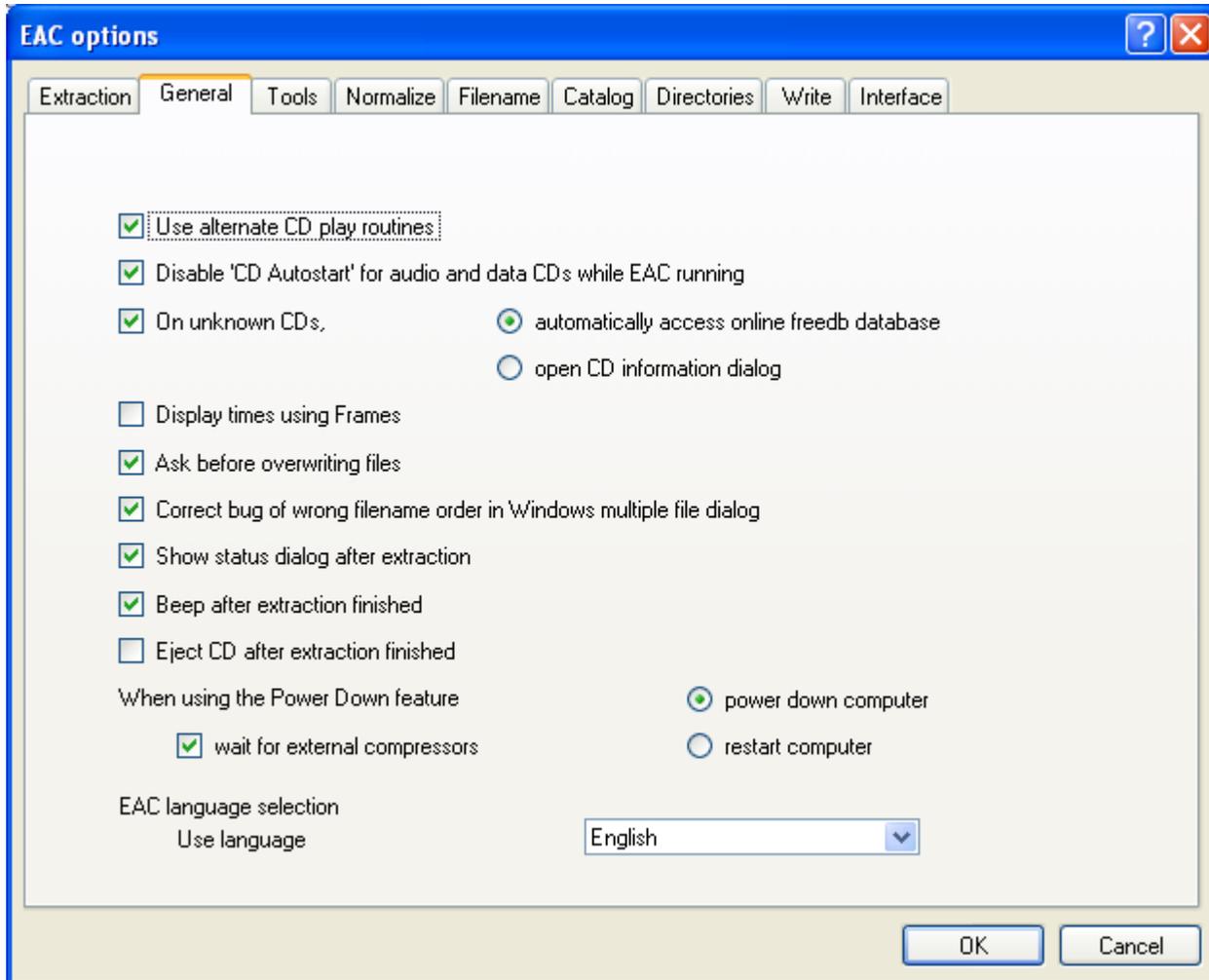
4. CONFIGURE EAC OPTIONS

Here are my screenshots:



I enabled *Use alternate CD play routines* because, when disabled, there was no sound when CD tracks were played in EAC. Windows Media Player played them without problems. It's probably because this is laptop and this CD/DVD drive doesn't have analogue connection between CD/DVD drive and sound card.

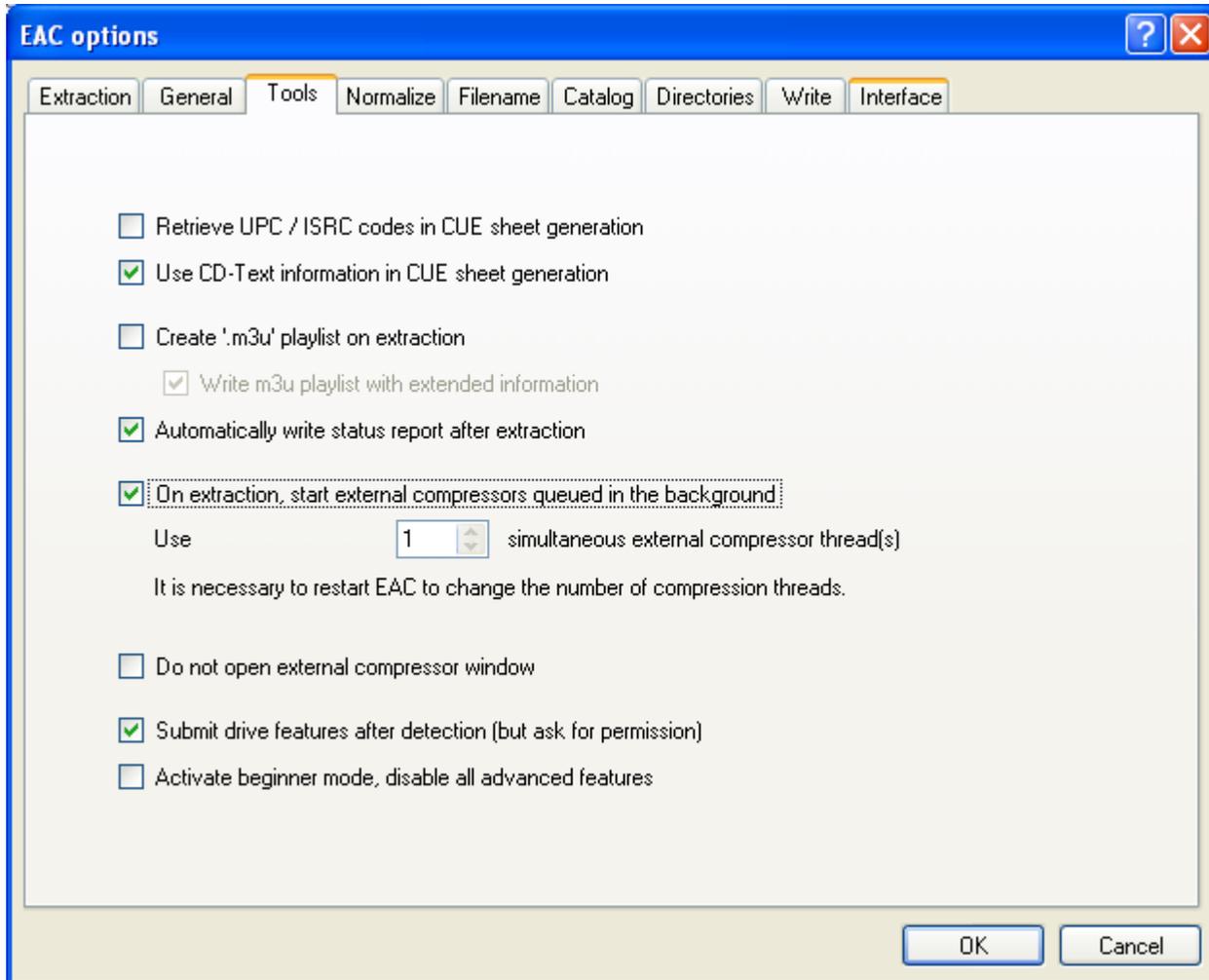
Show status dialog after extraction – shows both EAC's status report and AccurateRip's. If it's disabled, AccurateRip's report will not be displayed, and as it's not possible to have it written in file, we will not know AccurateRip's results at all, making it pointless having it installed. Hence, this feature must be enabled.



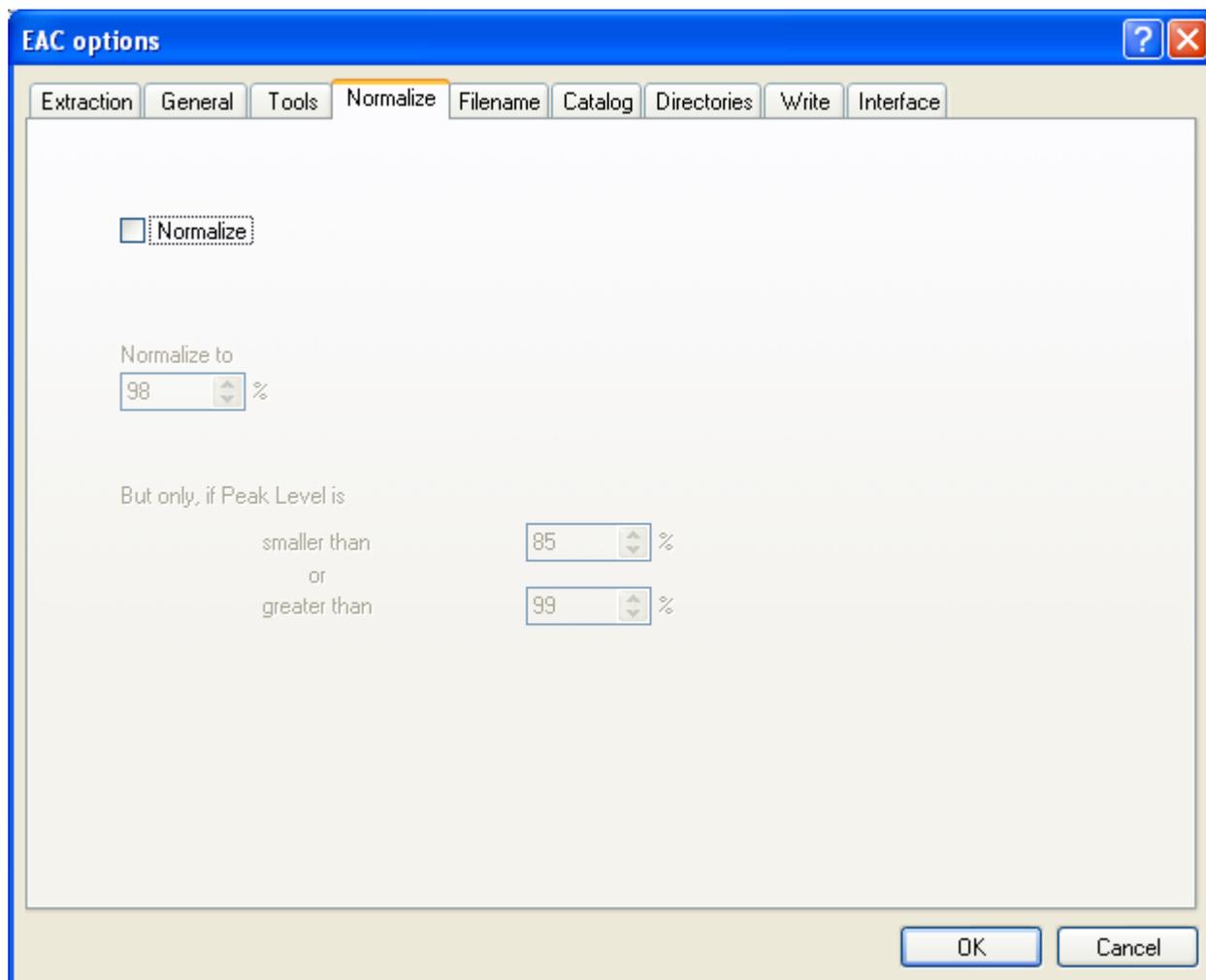
I enabled *Use CD-Text in CUE sheet*. I tested it with Burrn and it works, so it's better to have information if it's not doing any harm.

Also I enabled *Automatically write status report after extraction*. Again, it can be used later, and it doesn't make any harm. Also, it's needed for Flacattack later, and it can be configured in Flacattack how to handle them. They can always be easily deleted in a bulk from the folder structure using Windows Explorer (Search *.log)

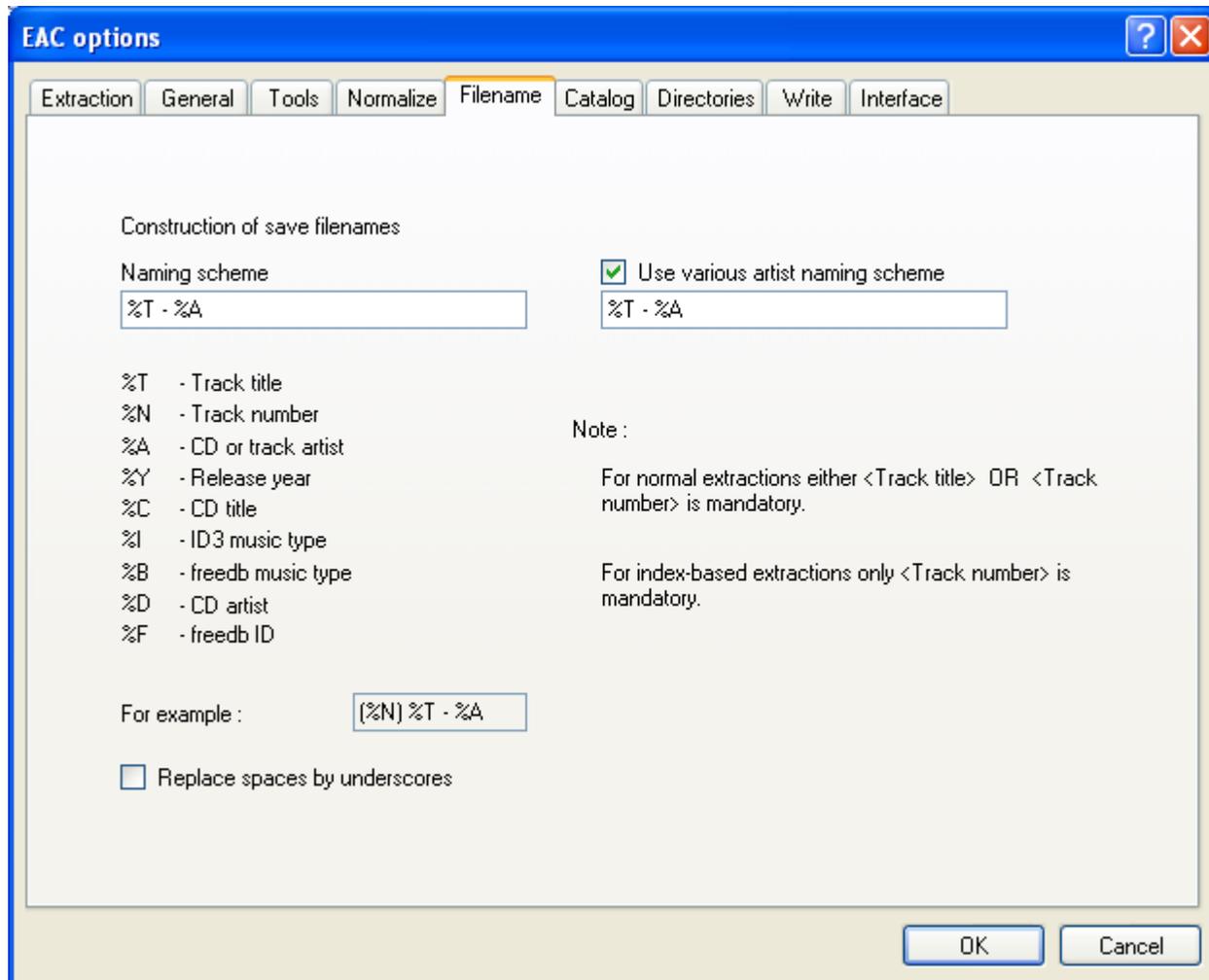
On extraction, start external compressors queued in the background is also selected because Flacattack will need it.



Manually suggest not to normalize (use ReplayGain instead), so I left it disabled.



Here we specify how we want filenames for tracks to be created, both for wav and flac and mp3 files. We can also specify subfolders here, so EAC can create directory structure for us. Directories will be created relative to the directory specified under Directories tab. However, if we use Flacattack, it will take control of naming files, and it will not like any subdirectories specified here, so we'll leave just filenames here. It doesn't matter how we configure it here really, because in our scenario, this configures how wav files will be named and we'll use wav files as an interim format only, before files are further converted into flac and mp3. After conversion is finished, wav files will be deleted.



EAC options



- Extraction
- General
- Tools
- Normalize
- Filename
- Catalog
- Directories
- Write
- Interface

Catalog file length (in seconds)

Catalog start position in a track (in seconds)

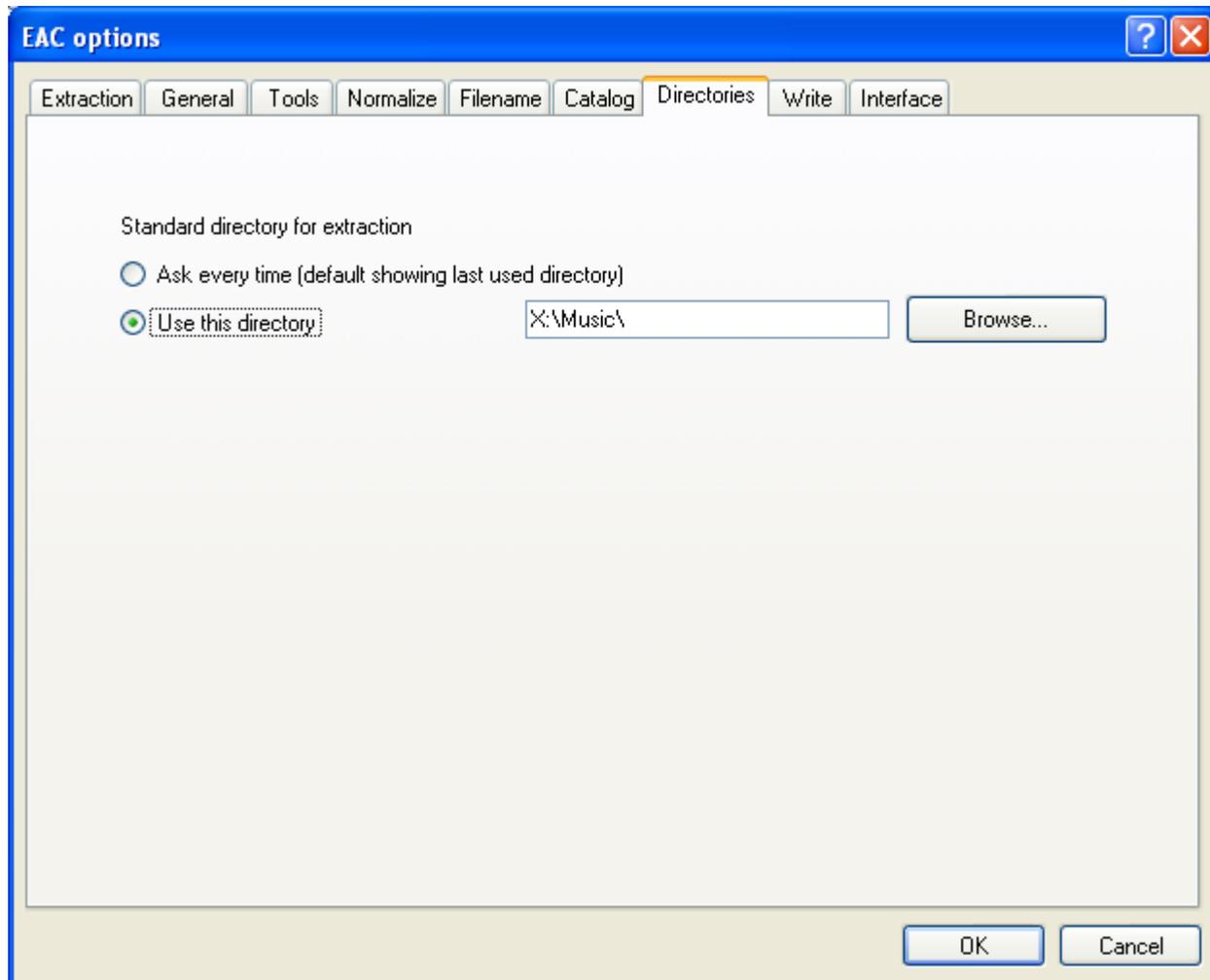
Fade in length (in seconds)

Fade out length (in seconds)

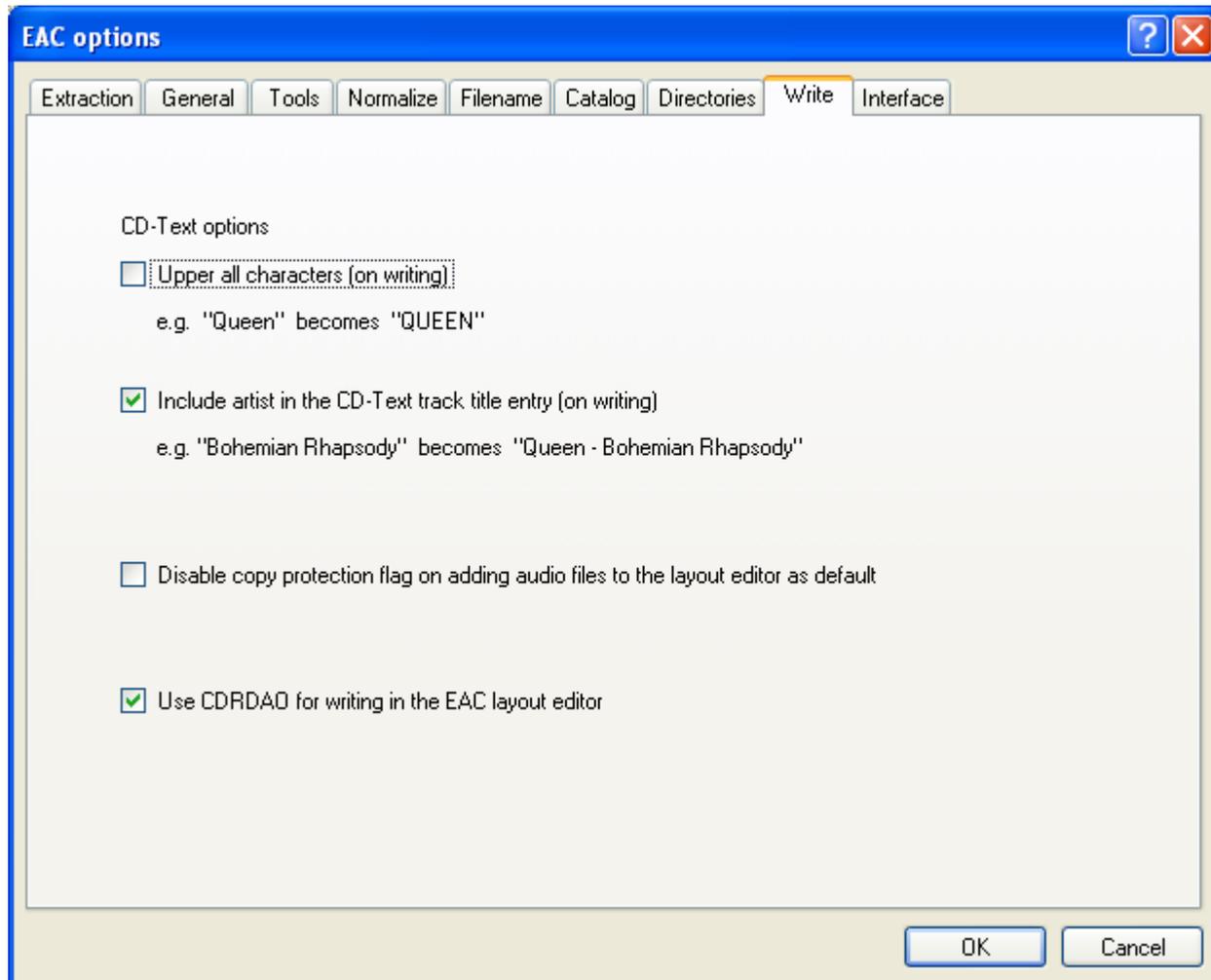
OK

Cancel

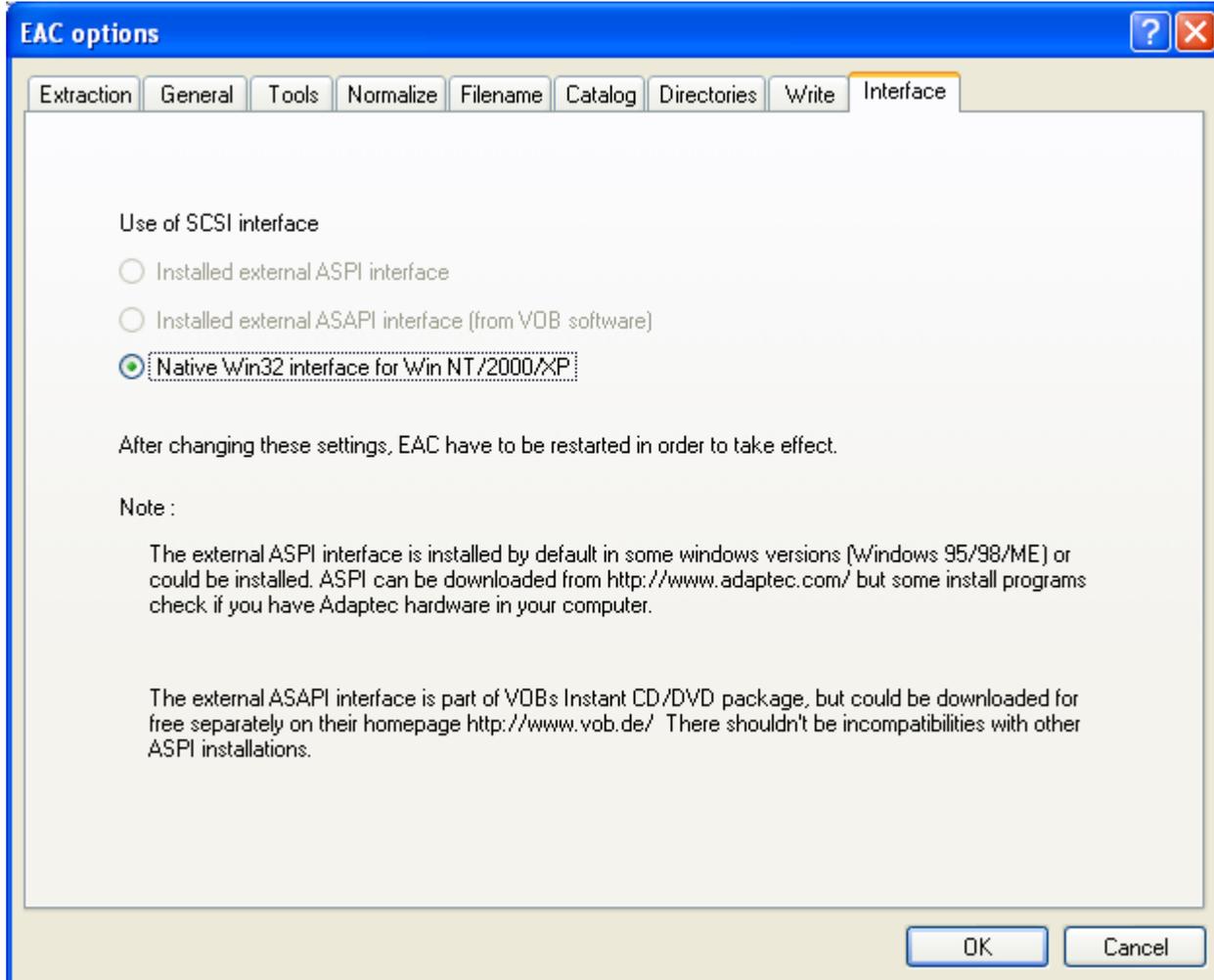
This is music root directory. All the music directory structure is created under this folder. Cue sheets and log files will be created here, but when we use Flacattack, it will copy them further into specified location.



As I don't plan to Write CDs through EAC, I think these settings don't matter

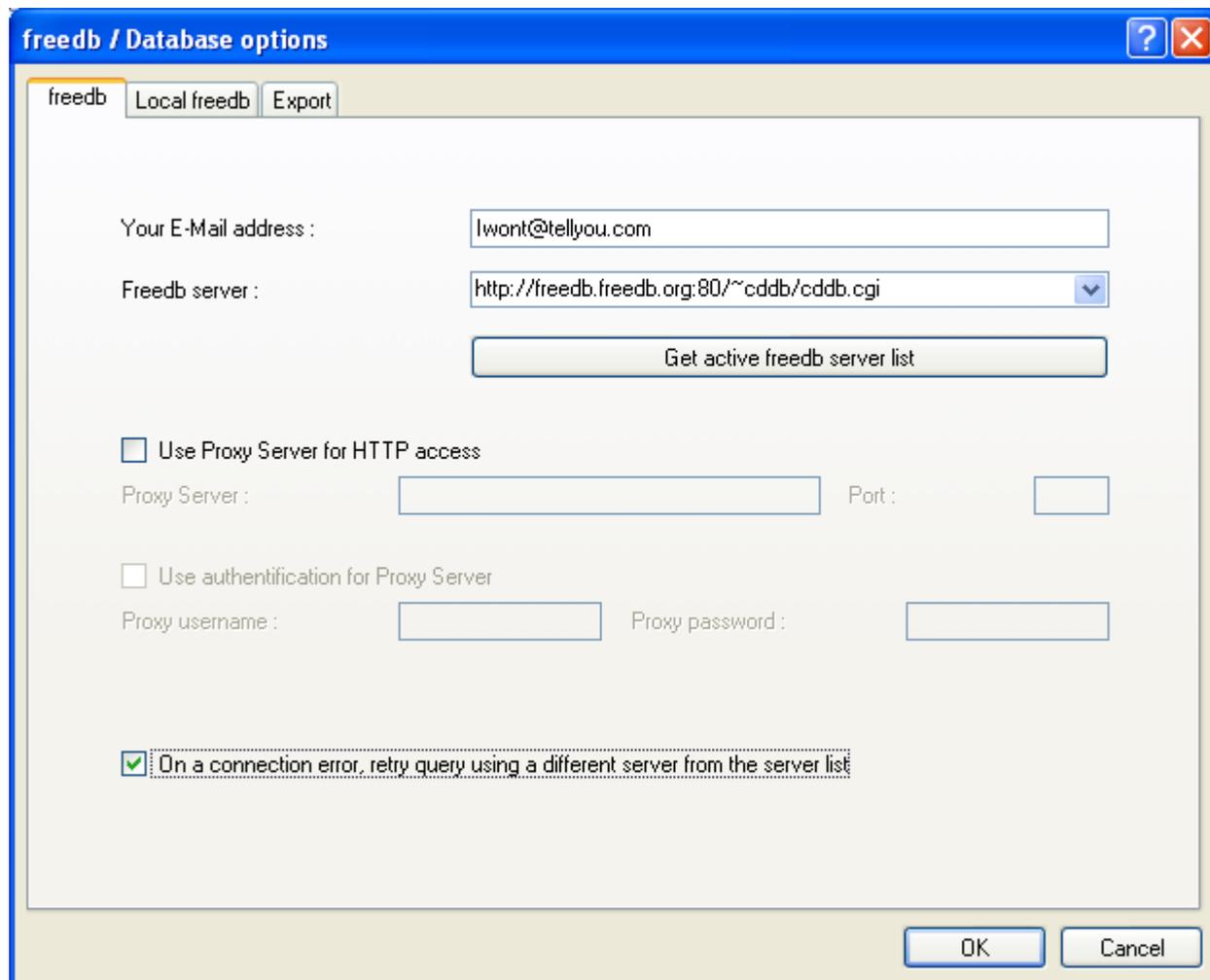


I have Windows XP Home and had no problems, so I haven't installed external ASPI interface.



5. CONFIGURE FREEDB OPTIONS

Here are the screenshots:



The screenshot shows a dialog box titled "freedb / Database options" with a blue title bar and standard window controls (help, close). The dialog has three tabs: "freedb", "Local freedb", and "Export". The "freedb" tab is selected. The form contains the following fields and options:

- "Your E-Mail address :" with a text box containing "lwont@tellyou.com".
- "Freedb server :" with a dropdown menu showing "http://freedb.freedb.org:80/~cddb/cddb.cgi".
- A button labeled "Get active freedb server list".
- An unchecked checkbox labeled "Use Proxy Server for HTTP access".
- "Proxy Server :" and "Port :" text boxes.
- An unchecked checkbox labeled "Use authentication for Proxy Server".
- "Proxy username :" and "Proxy password :" text boxes.
- A checked checkbox labeled "On a connection error, retry query using a different server from the server list".

At the bottom right, there are "OK" and "Cancel" buttons.

freedb / Database options



freedb

Local freedb

Export

Use local freedb database

Local freedb path :

X:\Music\CDDb\

Browse...

Windows freedb file format

Unix freedb file format

The windows freedb file format will be better for FAT16 and other older filesystems, the unix file format will create a file for each freedb entry.

OK

Cancel

freedb / Database options



freedb

Local freedb

Export

Construction of database export lines

`%A;%N;%T;%L`

- %T - Track title
- %N - Track number
- %L - Track length
- %A - CD or track artist
- %Y - Release year
- %C - CD title
- %I - ID3 music type
- %B - freedb music type
- %D - CD artist
- %F - freedb ID
- %Z - Tabulator character

OK

Cancel

6. LEAVE WAV EDITOR OPTIONS AS THEY ARE

I don't plan to edit wavs or repair files, so I'll leave this untouched.

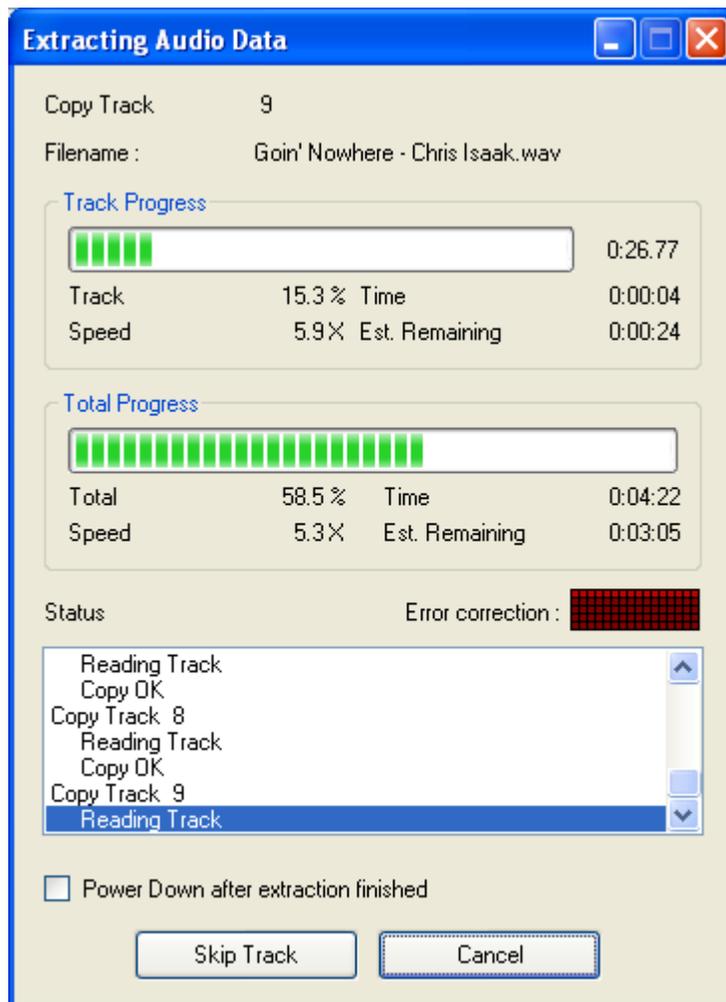
7. LEAVE COMPRESSION OPTIONS AS THEY ARE

Ripping process always works in a way that music tracks are ripped into wav files, and then, in a next step, those wav files are compressed and encoded into some other desirable format. In my case they are FLAC and mp3.

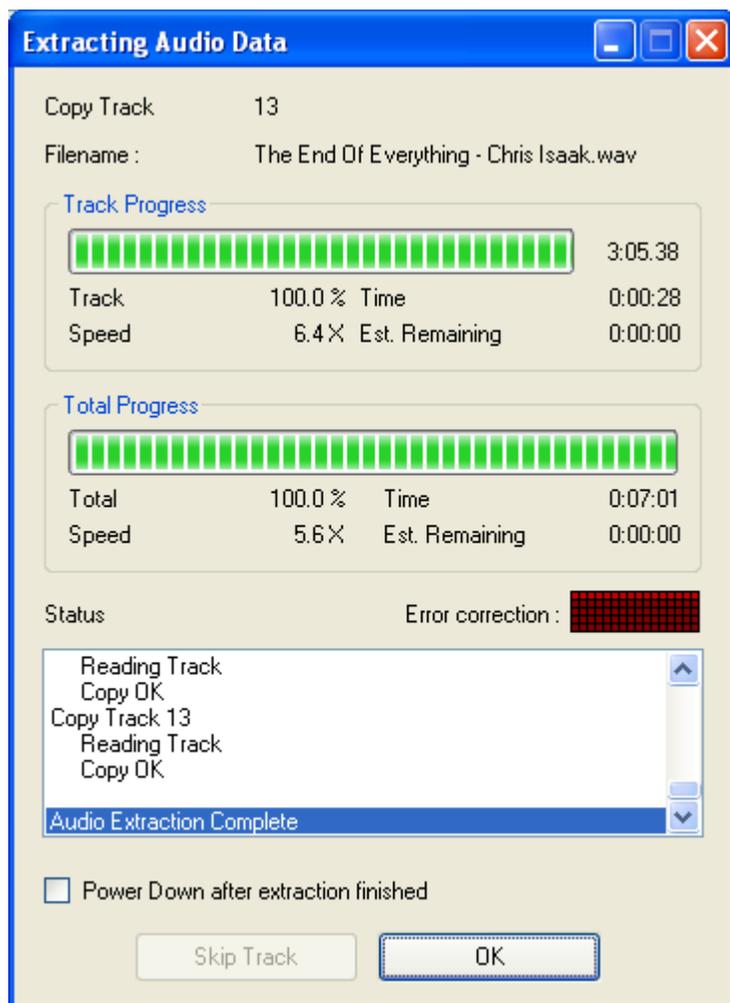
At this point we want to test that we can rip files into wav format first, so we'll leave compression option untouched and configure them later

8. RIP FIRST CD

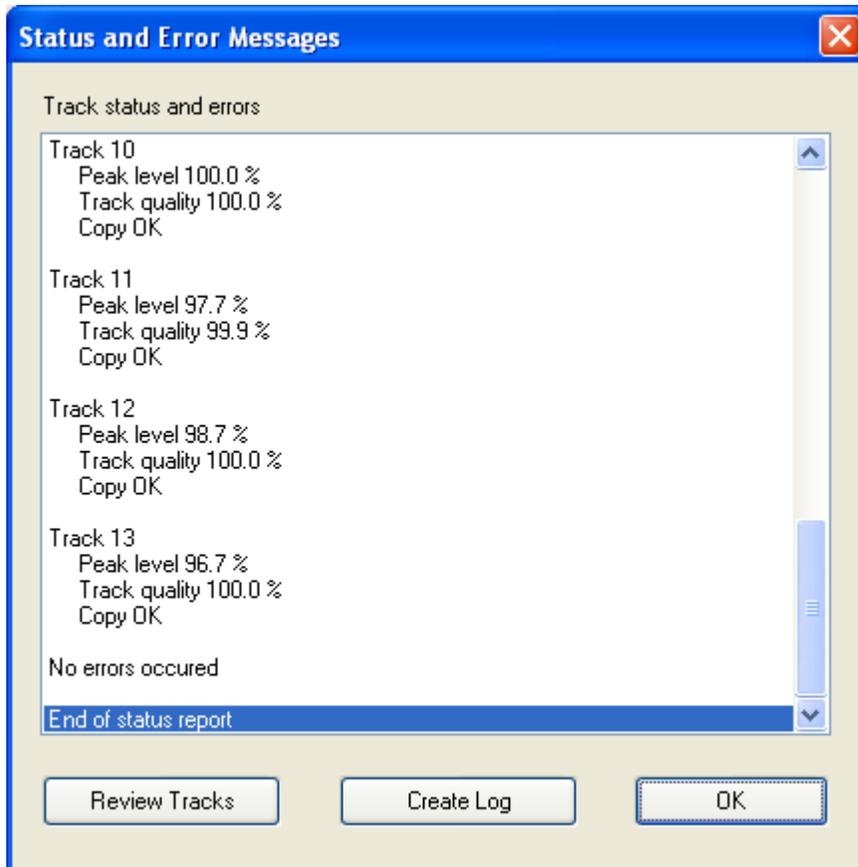
Click on WAV icon on the left edge of the screen in EAC. Ripping process will start.



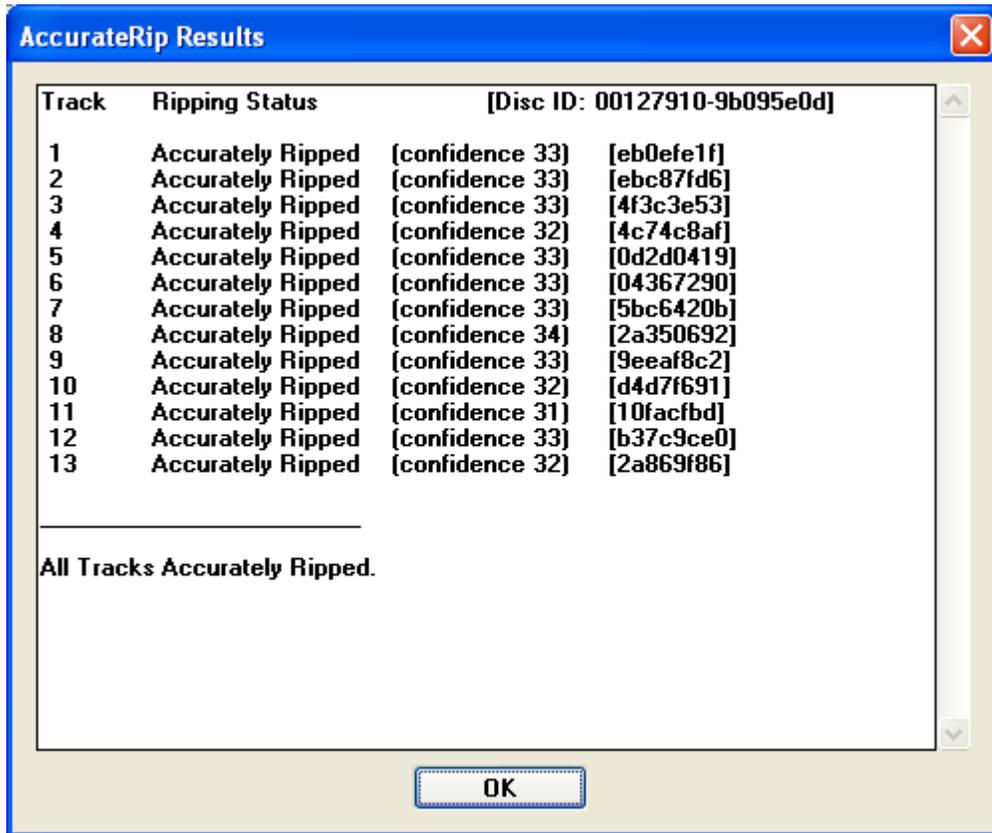
It beeps when it's finished and then you have to click on OK.



Now report is shown. You can view it to check that there were no errors (Copy OK). Doesn't matter if track quality is not 100% as long as it's "Copy OK". That means only that some errors were detected and corrected (some sectors re-read several times). If you want to save this report as a log file, click on "Create Log", choose log filename and location.



Now you click on OK and AccurateRip connects to its database over internet. If it finds those tracks it compares them and then shows you this report.

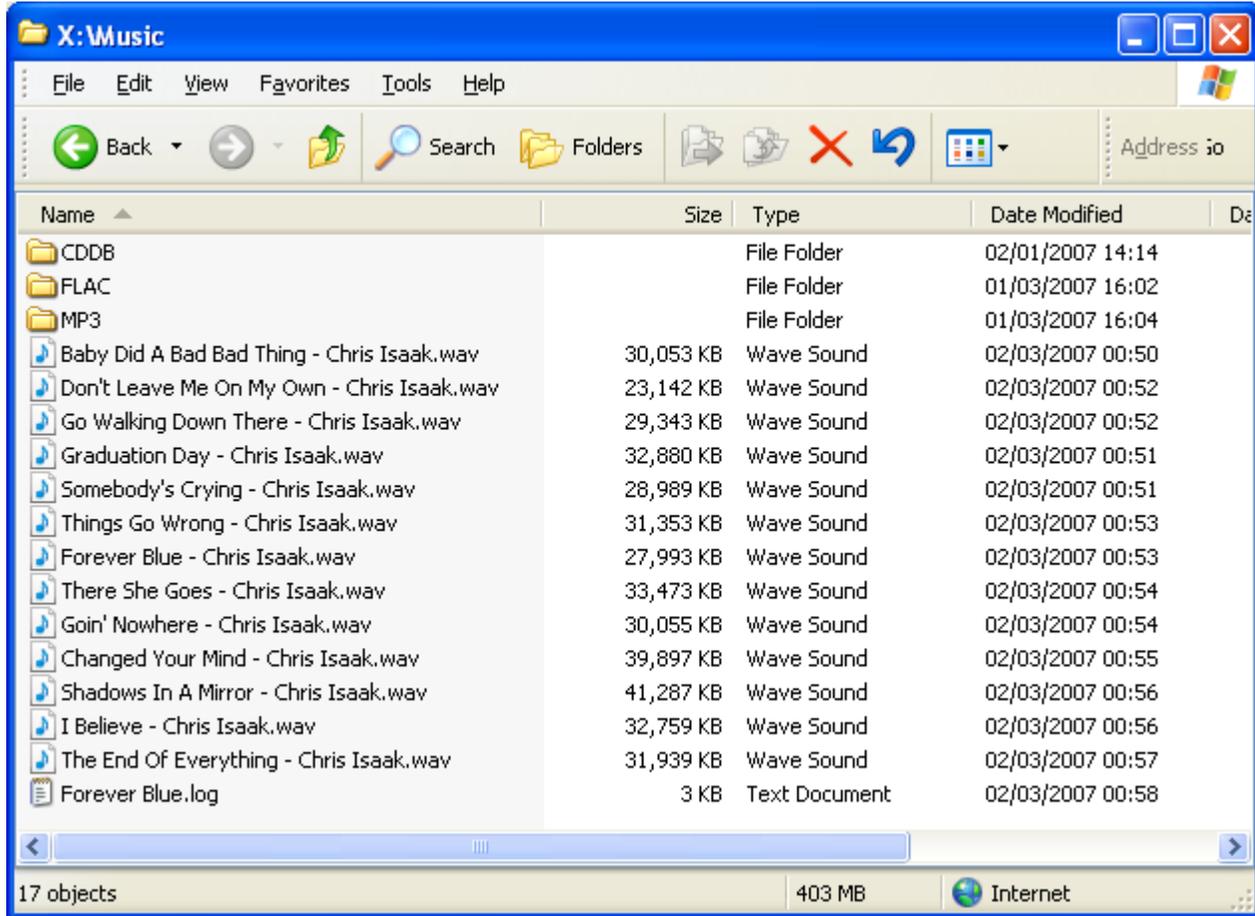


Confidence 33 means that 33 more people ripped the same track with the same results.

With confidence 3 or more you can consider that you've got an exact copy.

Some sources say that even with confidence 1 the chance of error is extremely tiny (unless you are the one who submitted that track to AccurateRip database in the past).

If you take a look in x:\music folder, you should see wav files there, as well as log file:



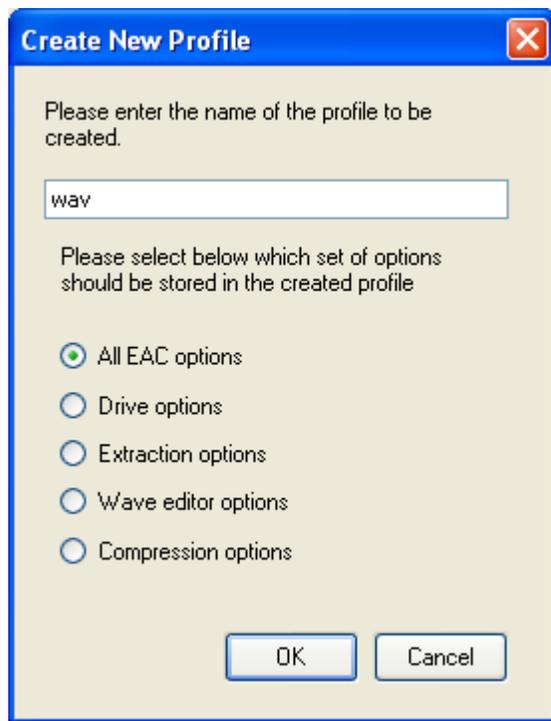
That means that we accurately ripped music from audio CD into wav files.

Now we can manually convert these files into flac or mp3 files using various tools, but we want it to be done automatically in the same process.

Therefore, you can delete these files, because we proved the process so far.

You should save all these settings now.

In EAC status bar, at the bottom of the window, click on button *New*. Dialogue box will pop up. Write the name of the profile e.g. “wav” and save all options.



Now we can continue with configuring the rest of the process.

9. DOWNLOAD AND INSTALL FLAC

9.1. Go to <http://flac.sourceforge.net/download.html> and download “FLAC for Windows with Installer”
The latest version is 1.13b (although version 1.14b is available without installer).

9.2. Run downloaded exe file.

9.3. Tick all options offered

9.4. Do not download and install WinAmp as offered at this point.
FLAC and tools are now installed in the Program Files directory.

10. DOWNLOAD AND INSTALL LAME MP3 ENCODER

10.1. Go to <http://www.mp3dev.org> and download the latest final version of Lame encoder (currently 3.97).

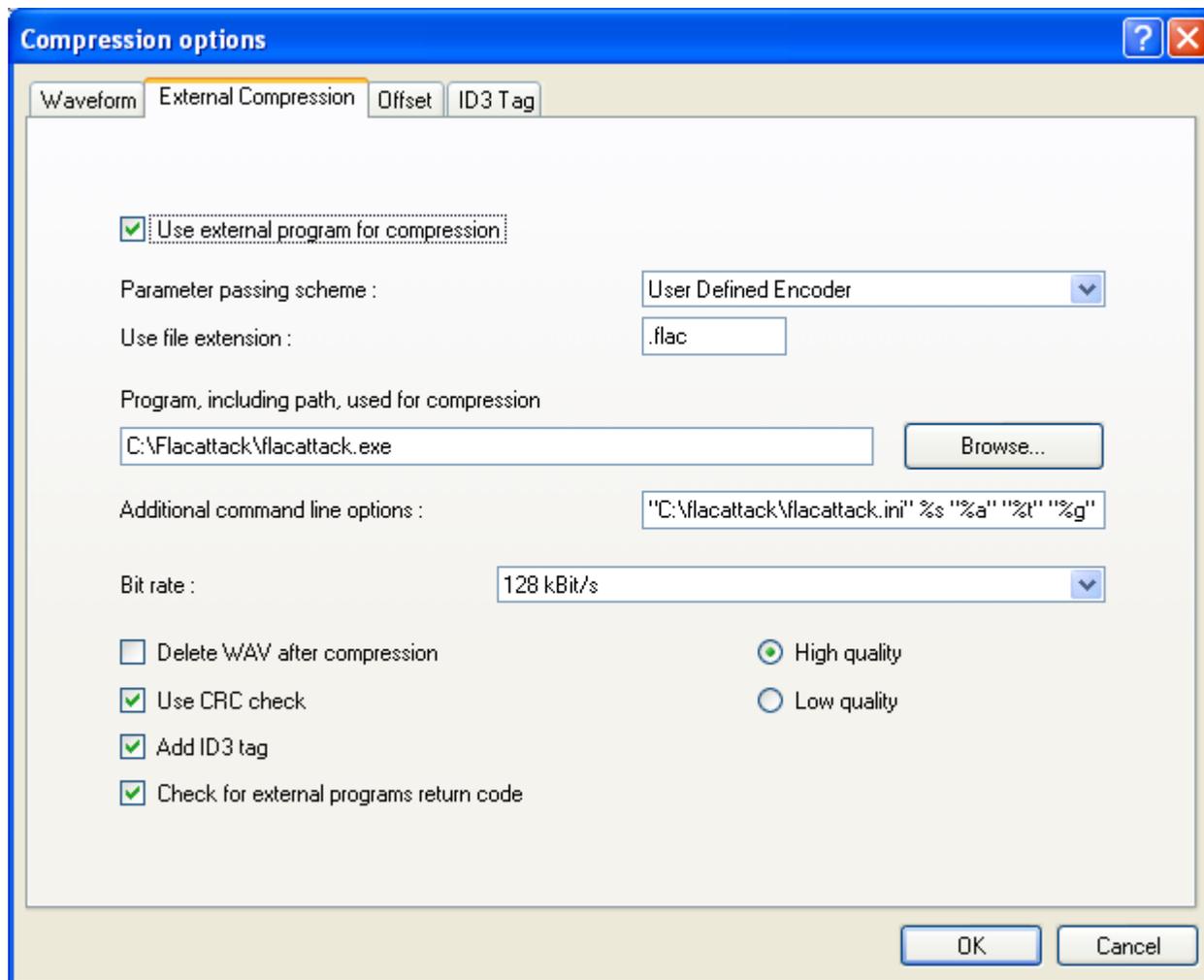
10.2. Unzip downloaded file into e.g. c:\Lame folder

11. DOWNLOAD AND INSTALL MP3GAIN

11.1 Go to [here](#) and download and install the latest stable, full version of MP3gain. Currently it's 1.2.5

12. CONFIGURE EAC TO WORK WITH FLACATTACK

12.1. Configure External Compression tab



Additional command line options are not fully displayed on the screenshot.

They are: "C:\flacattack\flacattack.ini" %s "%a" "%t" "%g" "%y" "%n" "%m" %o

Through these command line options parameters are passed from EAC to Flacattack.

The full list of [EAC parameters](#) that can be passed to external application/compressor and used as command line options are:

%s	Source filename
%d	Destination filename
%h...%h	Text "... " only when "High quality" selected
%l...%l	Text "... " only when "Low quality" selected
%c...%c	Text "... " only when "CRC checksum" selected
%r	Bitrate ("32".."320")
%a	CD artist

%g	CD title
%t	Track title
%y	Year
%n	Track number
%m	MP3 music genre
%o	Original filename (without temporary renaming)
%e	Comment (as selected in EAC)
%b	CRC of extracted track
%f	freedb ID
%x	Number of tracks on album

Unfortunately, Flacattack cannot receive all of them. On the Flacattack side their positions and meanings are hardcoded, so it's not possible to use the full list, but only the ones listed below:

```
"C:\flacattack\flacattack.ini" %s "%a" "%t" "%g" "%y" "%n" "%m" %o
```

Obviously, the first parameter is the name and location of ini file that Flacattack should use.

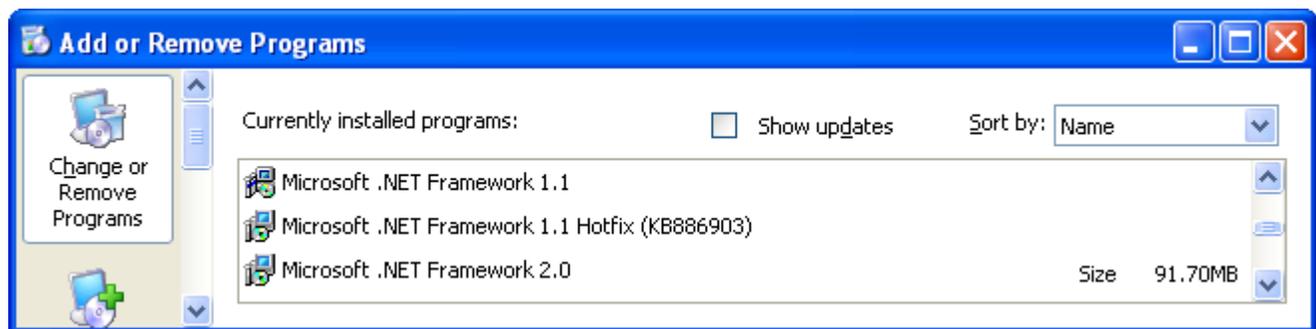
12.2. Ignore other tabs as those settings are either not relevant, or are controlled by Flacattack.

12.3. Save all these EAC settings (using buttons on the status bar) as e.g. "Flacattack"

13. DOWNLOAD AND INSTALL FLACATTACK

13.1. Go to <http://flacattack.sourceforge.net> and download Flacattack (fa103.zip).
The latest version is 1.03. Unzip file in any folder, e.g. c:\flacattack

13.2. You need to install .NET framework if it's not already installed in order to use flacattack.
Check in Add or Remove programs:

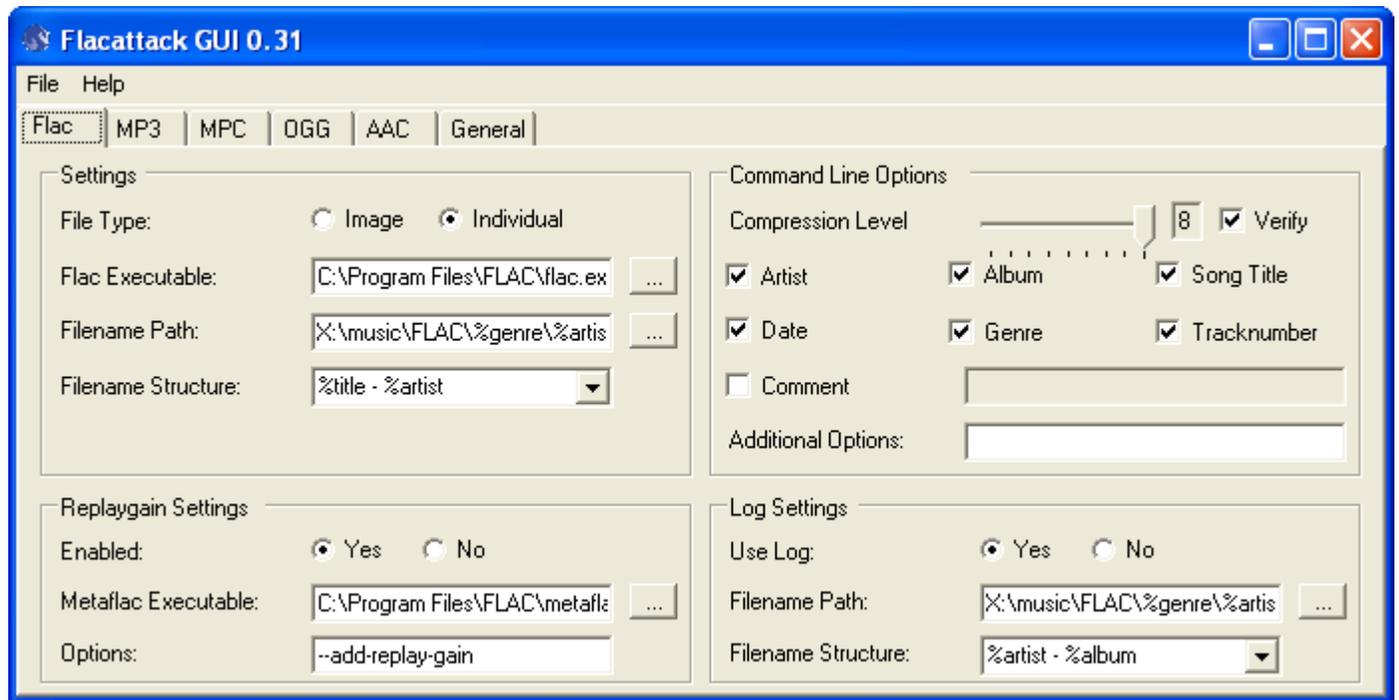


If not there, you can download it from [Microsoft pages](#) or through automatic updates.

13.3. Configure flacattack.ini using the GUI (fagui.exe) in c:\flackattack
The detailed instructions can be found [here](#).

My screenshots are here:

For setting flac encoding



Settings Filename Path: X:\music\FLAC\%genre%\%artist%\album

Log Settings Filename Path: X:\music\FLAC\%genre%\%artist%\album

Variables you can use for defining path and filenames here and elsewhere in Flacattack are:

%artist = Album Artist

%album = Album Title

%title = Track Title

%tracknumber = Track Number

%genre = Genre

%date = Year of Album Release

%letter = First Letter of Track Artist

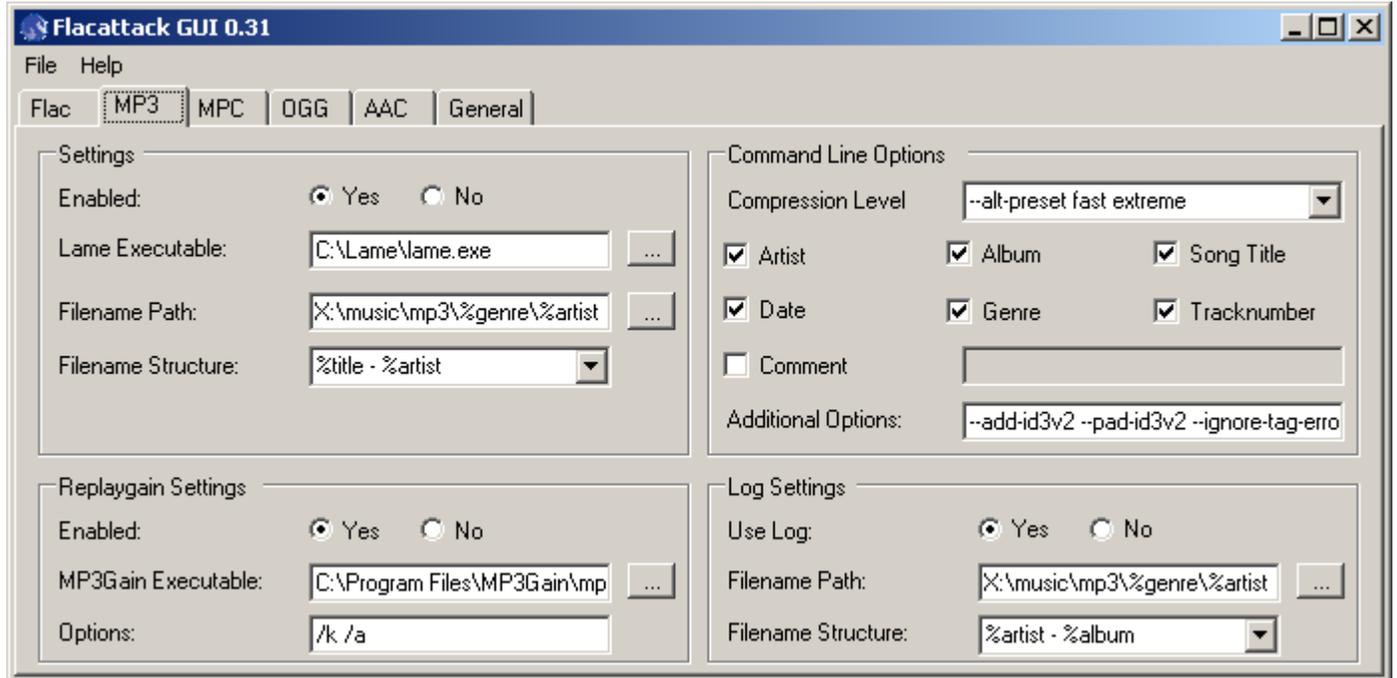
Command Line Options define which tags will be embedded in flac file. The value of each tag is passed from EAC. You can put additional comment here, that will be included in each file (e.g. "Ripped by me")

With Replaygain Settings, you define if you want replaygain to be calculated and embedded.

With Log Settings you define if you want EAC log to be created and where you want it moved and renamed.

Inside flacattack.ini there are comments with some further explanations.

For MP3 encoding:



Under Settings you define how you want path and filenames created.

Under Command Line Options, you define which tags you want created and the remaining command line options.

Hydrogenaudio community produced a [list of several recommended LAME settings](#) for EAC one of which is:

```
-V 0 --vbr-new --id3v2-only --pad-id3v2 --ta "%a" --tt "%t" --tl "%g" --ty "%y" --tn "%n" %s %d
```

which I will use just slightly modified.

--al-preset fast extreme is the encoding quality I chose. Reasons explained in Introduction chapter.

--add-id3v2 instructs Lame to write in both id3v1 and id3v2 tags. Reasons explained in Introduction chapter.

--pad-id3v2 switch is recommended because it avoids the whole file needing to be re-written during tag-updates later on (unless the update adds more than 128 bytes to the ID3v2 tag). The lame.exe tagging switches are recommended instead of EAC's own tagging implementation because some people have reported problems with EAC's tagging implementation.

--ta, *--tt*, *--tl*, *--ty*, *--tn* are Lame's command line switches that instruct Lame to fill tags for Artist, Track title, CD title, Year and Track number respectively. Their values are passed from EAC parameters *%a*, *%t*, *%g*, *%y*, *%n*, whose meanings were listed in the table before.

The lame.exe "*--tg*" switch isn't recommended because if the genre isn't one of 148 genres that lame.exe supports, then those files won't be encoded to MP3 and lame.exe shows an error message.

However, I would really like to use the "*--tg*" switch, so I get genre written in tags. Therefore, I will have to additionally use "*--ignore-tag-errors*" switch, which will make lame.exe still encode files with un-supported genres and just set the genre tag to "Other"

It already happened to me that MP3s were simply not created without any error message, as Flacattack hid it.

Here's the list of [Lame supported genres](#):

- | | | | |
|-------------------|------------------------|-----------------------|------------------------------|
| 00 - Blues | 40 - Alternative Rock | 80 - Folk | 120 - Duet |
| 01 - Classic Rock | 41 - Bass | 81 - Folk-Rock | 121 - Punk Rock |
| 02 - Country | 42 - Soul | 82 - National Folk | 122 - Drum Solo |
| 03 - Dance | 43 - Punk | 83 - Swing | 123 - Acappella |
| 04 - Disco | 44 - Space | 84 - Fast Fusion | 124 - Euro-House |
| 05 - Funk | 45 - Meditative | 85 - Bebob | 125 - Dance Hall |
| 06 - Grunge | 46 - Instrumental Pop | 86 - Latin | 126 - Goa |
| 07 - Hip-Hop | 47 - Instrumental Rock | 87 - Revival | 127 - Drum & Bass |
| 08 - Jazz | 48 - Ethnic | 88 - Celtic | 128 - Club-House |
| 09 - Metal | 49 - Gothic | 89 - Bluegrass | 129 - Hardcore |
| 10 - New Age | 50 - Darkwave | 90 - Avantgarde | 130 - Terror |
| 11 - Oldies | 51 - Techno-Industrial | 91 - Gothic Rock | 131 - Indie |
| 12 - Other | 52 - Electronic | 92 - Progressive Rock | 132 - BritPop |
| 13 - Pop | 53 - Pop-Folk | 93 - Psychedelic Rock | 133 - Negerpunk |
| 14 - R&B | 54 - Eurodance | 94 - Symphonic Rock | 134 - Polsk Punk |
| 15 - Rap | 55 - Dream | 95 - Slow Rock | 135 - Beat |
| 16 - Reggae | 56 - Southern Rock | 96 - Big Band | 136 - Christian Gangsta |
| 17 - Rock | 57 - Comedy | 97 - Chorus | 137 - Heavy Metal |
| 18 - Techno | 58 - Cult | 98 - Easy Listening | 138 - Black Metal |
| 19 - Industrial | 59 - Gangsta | 99 - Acoustic | 139 - Crossover |
| 20 - Alternative | 60 - Top 40 | 100 - Humour | 140 - Contemporary Christian |
| 21 - Ska | 61 - Christian Rap | 101 - Speech | 141 - Christian Rock |
| 22 - Death Metal | 62 - Pop/Funk | 102 - Chanson | 142 - Merengue |
| 23 - Pranks | 63 - Jungle | 103 - Opera | 143 - Salsa |
| 24 - Soundtrack | 64 - Native US | 104 - Chamber Music | 144 - Thrash Metal |
| 25 - Euro-Techno | 65 - Cabaret | 105 - Sonata | 145 - Anime |
| 26 - Ambient | 66 - New Wave | 106 - Symphony | 146 - JPop |
| 27 - Trip-Hop | 67 - Psychedelic | 107 - Booty Bass | 147 - SynthPop |
| 28 - Vocal | 68 - Rave | 108 - Primus | |
| 29 - Jazz+Funk | 69 - Showtunes | 109 - Porn Groove | |
| 30 - Fusion | 70 - Trailer | 110 - Satire | |
| 31 - Trance | 71 - Lo-Fi | 111 - Slow Jam | |
| 32 - Classical | 72 - Tribal | 112 - Club | |
| 33 - Instrumental | 73 - Acid Punk | 113 - Tango | |
| 34 - Acid | 74 - Acid Jazz | 114 - Samba | |
| 35 - House | 75 - Polka | 115 - Folklore | |
| 36 - Game | 76 - Retro | 116 - Ballad | |
| 37 - Sound Clip | 77 - Musical | 117 - Power Ballad | |
| 38 - Gospel | 78 - Rock & Roll | 118 - Rhythmic Soul | |
| 39 - Noise | 79 - Hard Rock | 119 - Freestyle | |

Descriptions of all possible Lame command line parameters can be found [here](#).

Therefore, my resulting External compressor command line option in EAC would look like:

```
--alt-preset fast extreme --id3v2-only --pad-id3v2 --ta "%a" --tt "%t" --tl "%g" --ty "%y" --tn "%n" --tg "%m" %s %d
```

Those settings are achieved by ticking respective tickboxes and specifying Additional Options "--id3v2-only --pad-id3v2 --ignore-tag-errors", like on the screenshot above.

For Replay Gain setting options, it should be */a /k*.

/a means to apply Album gain to mp3 files

When Flacattack (using Lame) finishes encoding all the files from CD in mp3 format and storing them to defined folder, Mp3gain analyzes all the files in that folder, considers them as a single album and calculates Album Replay Gain. Then it stores such Album Replay Gain into each track's tags.

(files are all from the same album: a single gain change is applied to all files, so their loudness relative to each other remains unchanged, but the average album loudness is normalized).

/k means to analyze if applying Replay Gain will cause clipping, and if it will, to reduce it before applying it, to the level just below the one that would cause clipping.

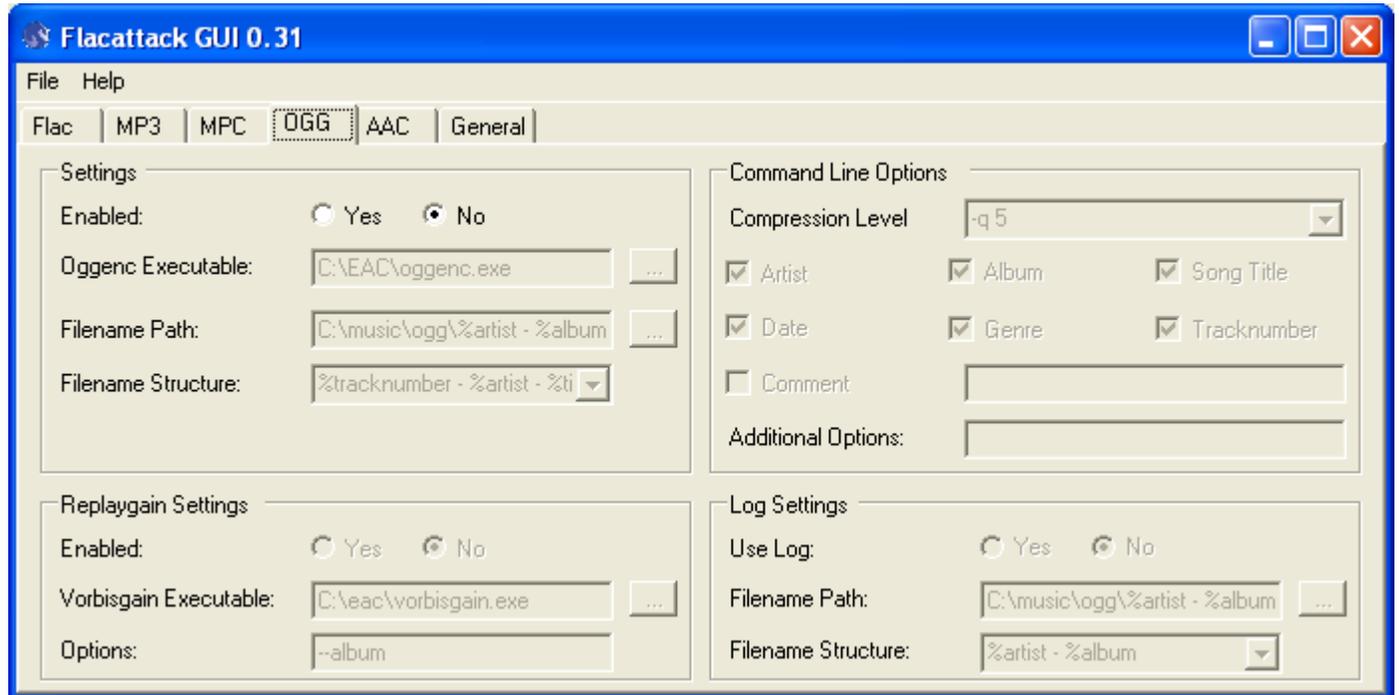
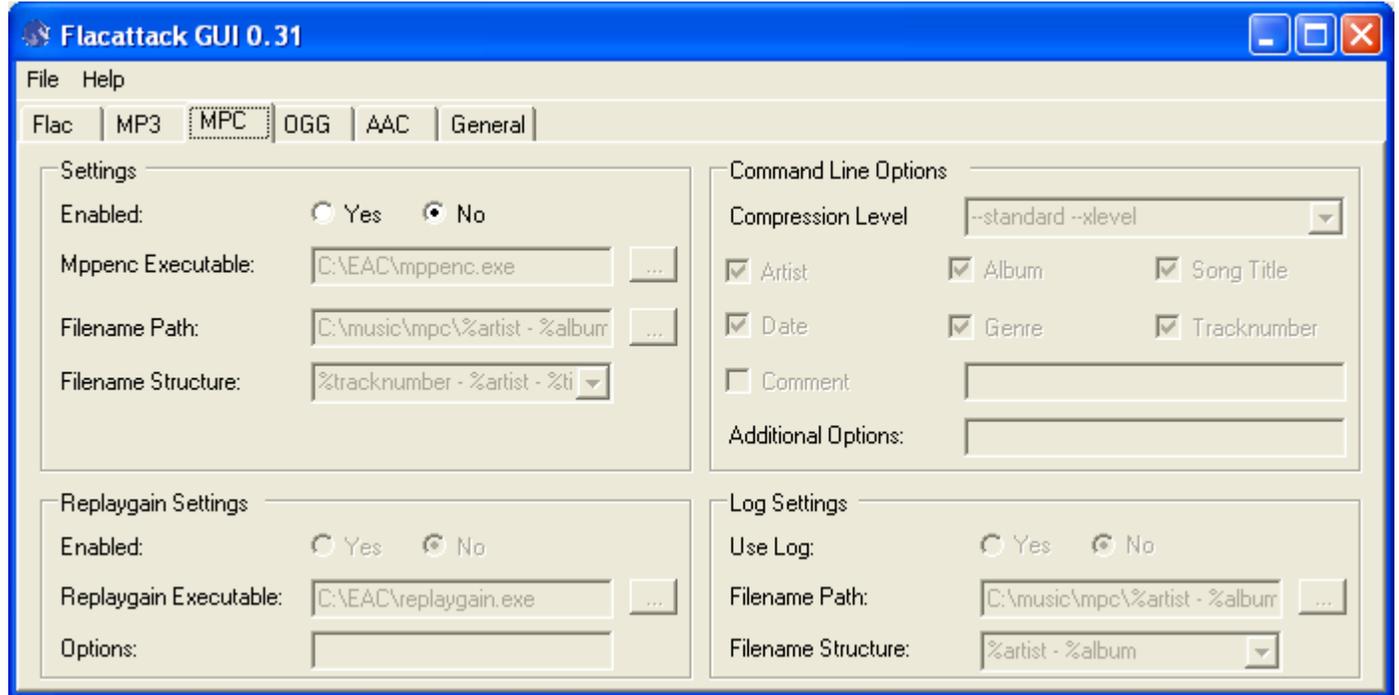
The de-facto RG tag fields are :

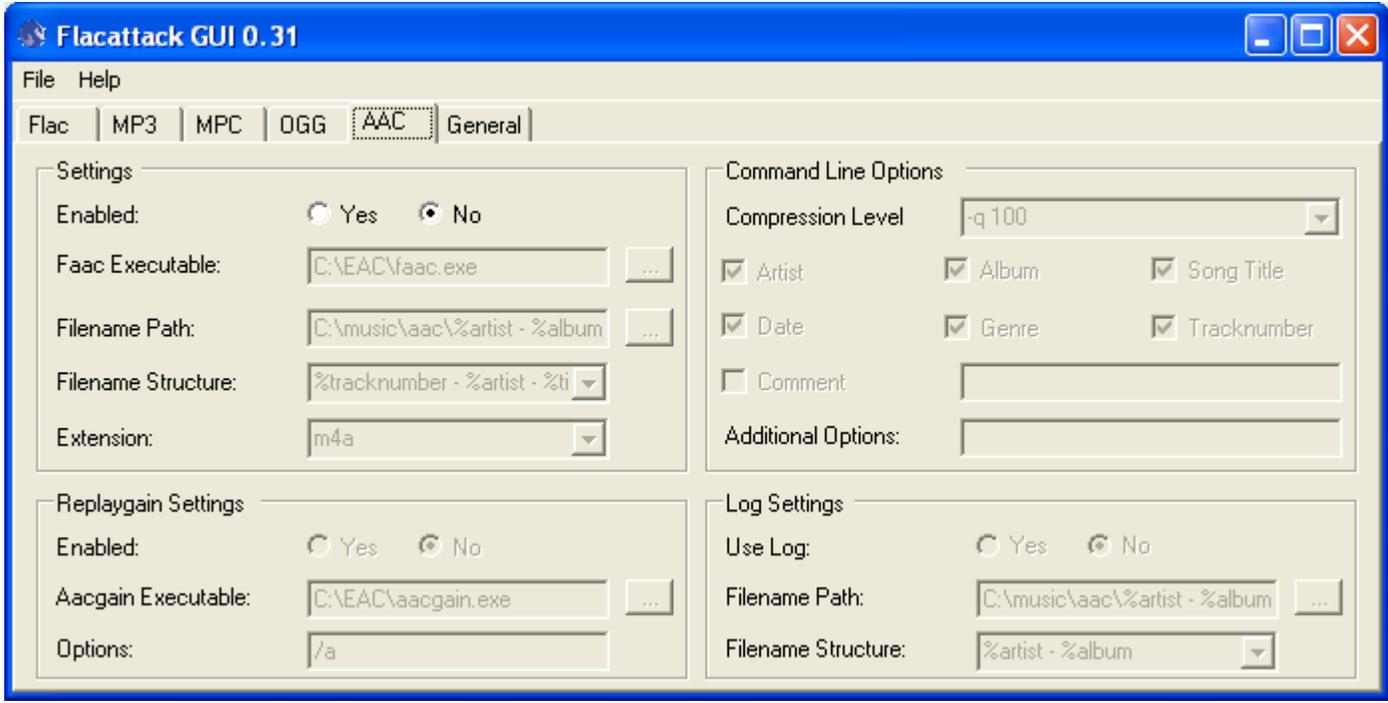
```
replaygain_track_gain  
replaygain_track_peak  
replaygain_album_gain  
replaygain_album_peak
```

They were originally proposed by Garf for making an RG standard for Vorbis and were then implemented in VorbisGain and since then everyone has followed.

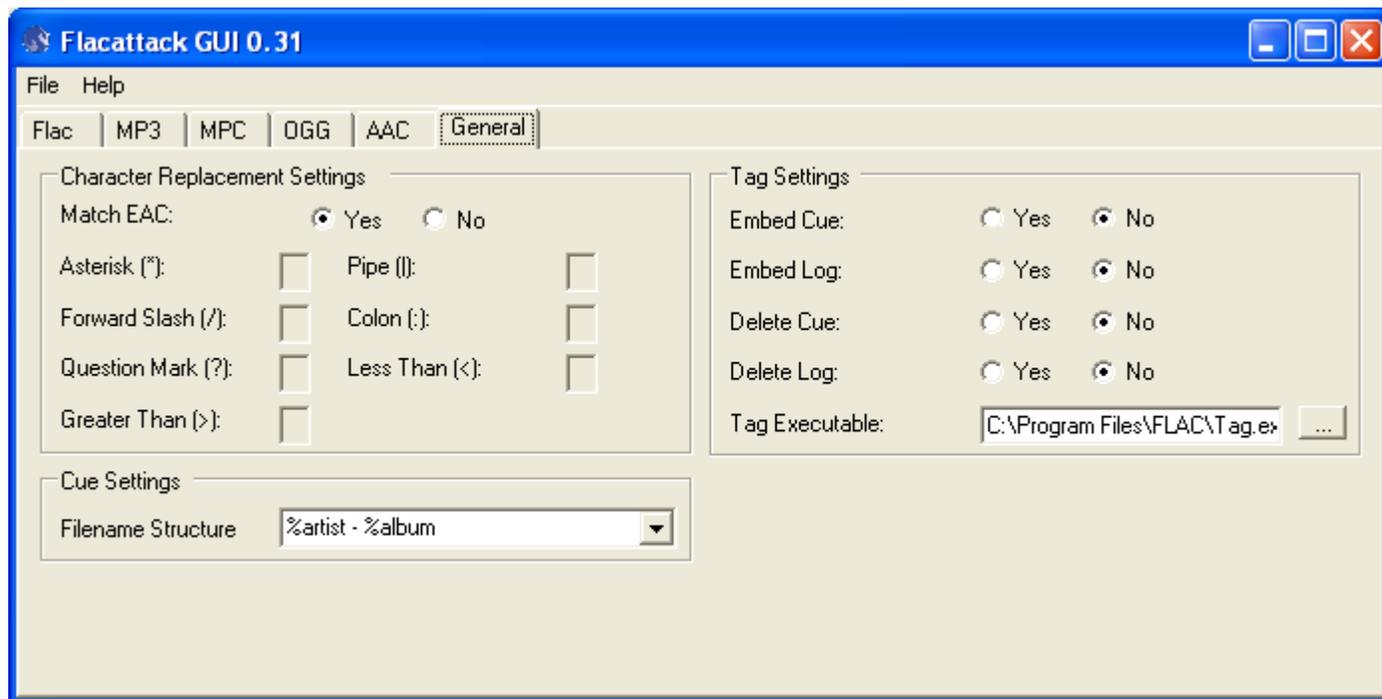
For MP3, then mp3gain.exe sets the four above tags + between 1 and 3 others depending on the situation as APEv2 tags, but as APEv2 tags on MP3's never really has caught up, then fb2k and Winamp sets the four above tags as ID3v2 TXXX frames and in which I believe will sooner or later become the de-facto standard for MP3 RG tags(if it isn't already).

The other formats encodings are disabled:





General tab defines some other parameters



If you enter (in EAC) invalid characters in artist, album, title, and genre strings, before inserting them into tags or creating filenames, EAC will convert them with the following character replacement scheme (as explained in flacattack.ini file):

(asterisk)	* = x	
(pipe)	= !	
(slash)	/ = ,	
(backslash)	\ = cuts off everything after	
(colon)	: = -	
(question mark)	? = " "	(space)
(less then)	< = [
(greater then)	> =]	
(double quotes)	" = ' "	(single quotes)

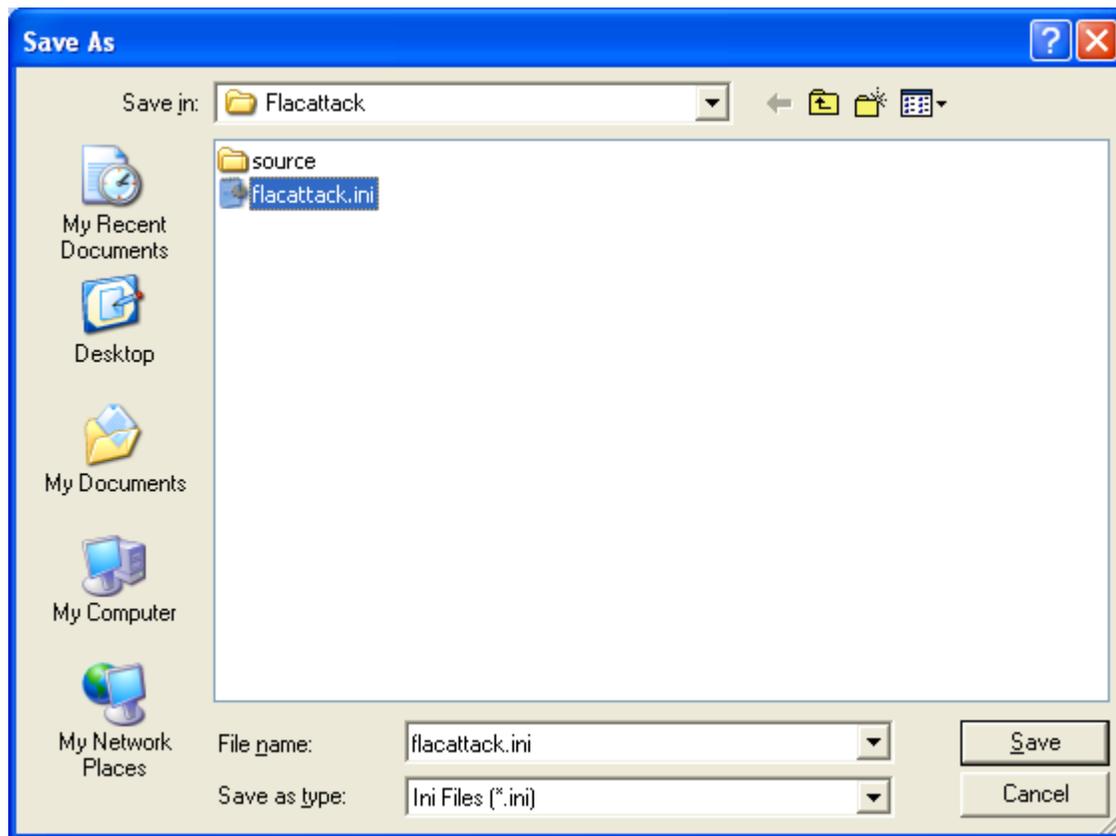
But, if we use Flacattack, those strings will be forwarded unconverted to Flacattack and Flacattack has to do the conversion, because filenames cannot be created with those characters.

In Character Replacement Settings above, you can define your character replacement scheme, or if you want to use the scheme EAC uses, which is listed above.

Tag Settings define if you want cue sheets and log files to be embedded into flac files as tags, and do you want to delete the external files afterwards.

Cue Settings define how you want cue sheet file names created.

13.4. Save all these settings into ini file:



Be careful to save them into flackattack.ini file, not some other one as it happened to me and I couldn't figure why Flacattack cannot remember settings.

14. DOWNLOAD AND INSTALL BURRRN

We need Burrn to be able to re-create CD from flac files and cue sheet.

14.1. Go to http://www.burrn.net/?page_id=4 to take a look into Burrn and download the latest version from [here](#). Currently it's 1.14 beta 2.

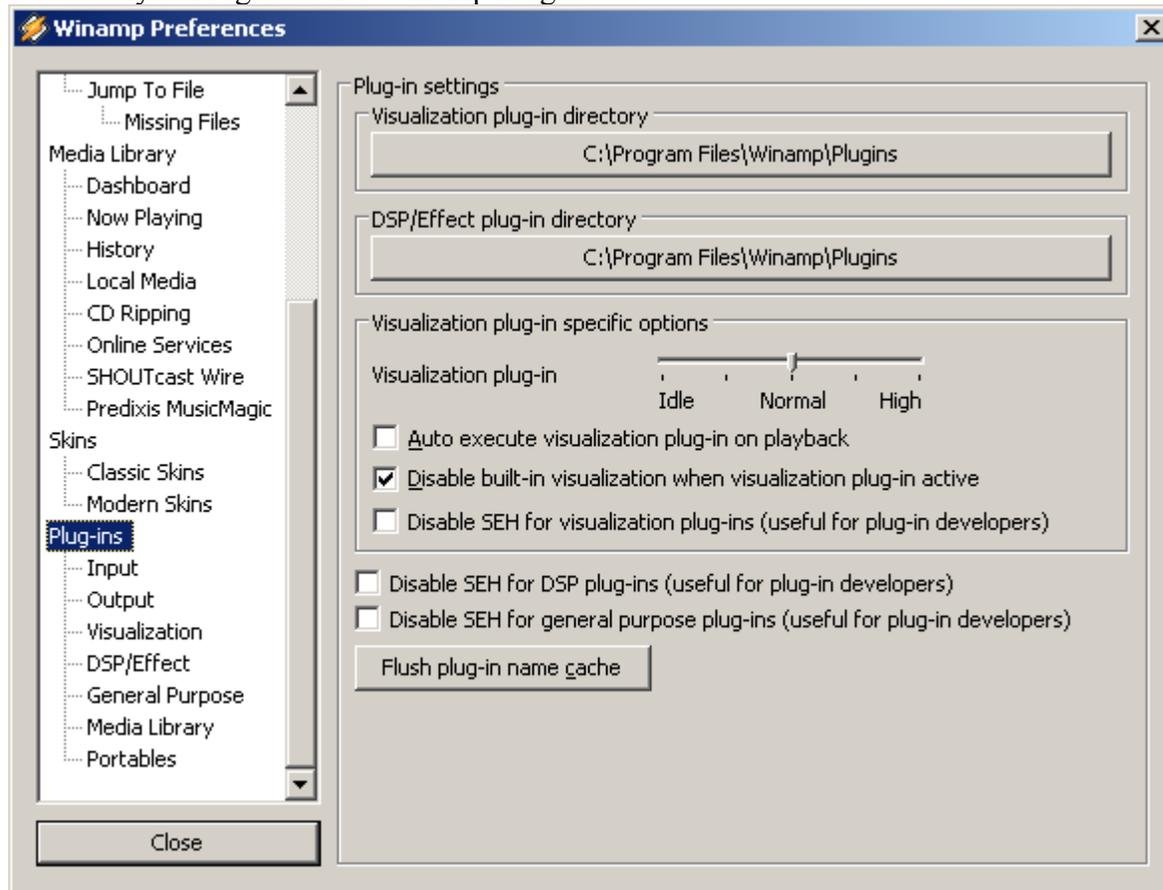
14.2. Run downloaded burrn_package.exe file and it will install Burrn on your PC.

15. DOWNLOAD AND INSTALL WINAMP PLAYER

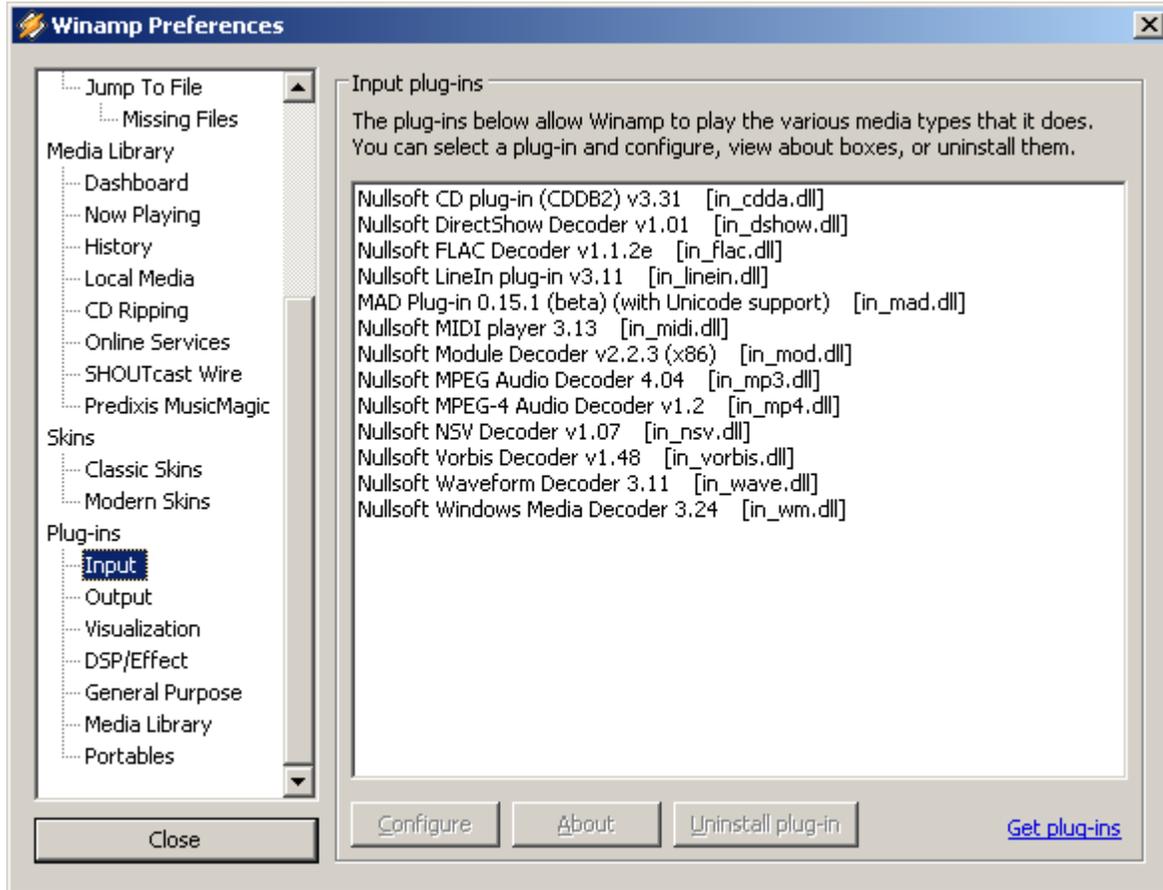
15.1 Go to www.winamp.com and install the latest free Basic player (currently ver. 5.33)

15.2 Go to [here](#) and install the latest in_MAD mp3 input plugin for WinAmp (currently 0.14.1b). The latest version is always in the first post. When you download and unzip zip file, you will need only in_mad.dll file. The rest are source files. Copy in_mad.dll file into your WinAmp plugin folder.

It's usually c:\Program Files\Winamp\Plugins:



And when you restart WinAmp, you should be able to verify that it's been installed:



16. RIP CD AND ENCODE TRACKS IN A SINGLE GO

Well, not quite.

We still need to do it in 2 steps.

The first step is to detect gaps and create cue sheet.

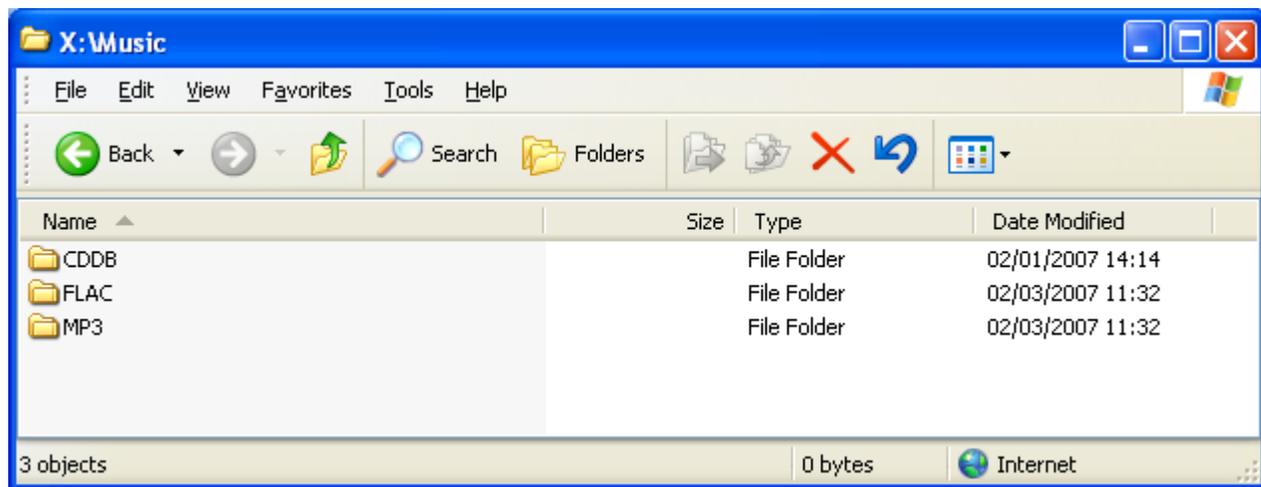
The second step is to rip CD and create flac and wav files.

Let's see how it works.

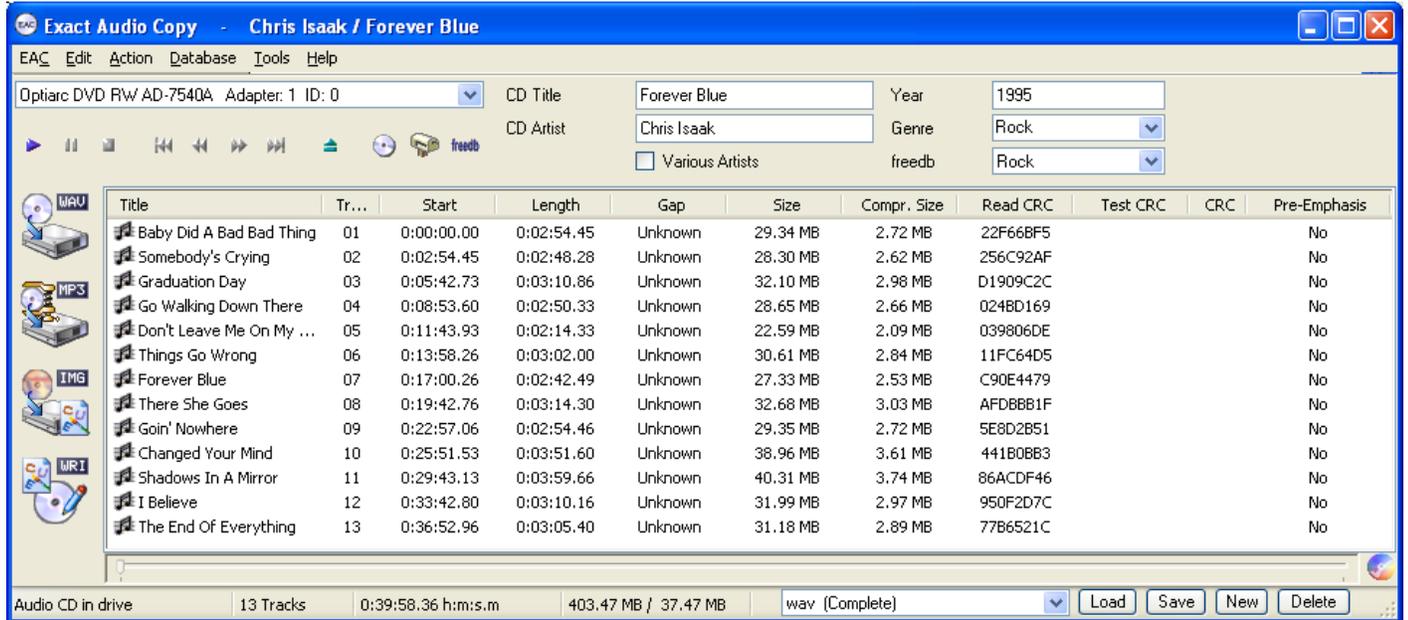
Our music root folder (x:\music) has only 3 subfolders:

- CDDB – freeDB CD info stored locally
- FLAC – flac files stored in directory structure
- MP3 – mp3 files stored in directory structure

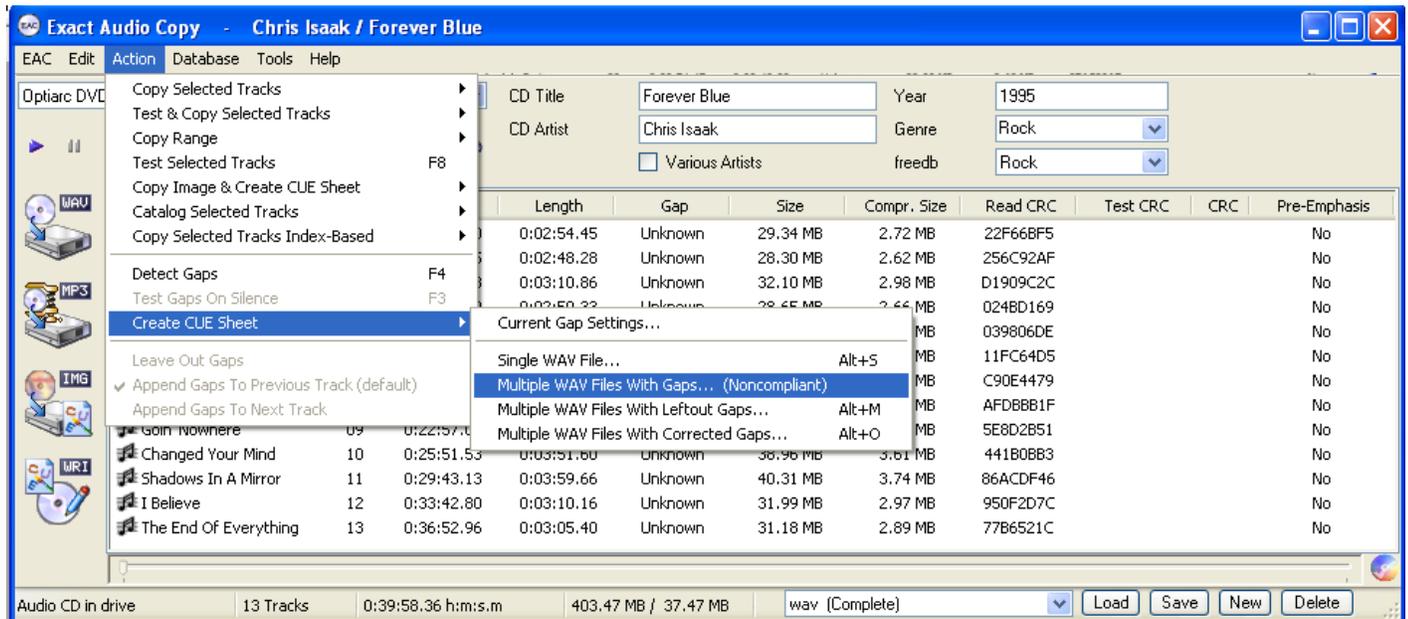
FLAC and MP3 folders are currently empty as we haven't started ripping our CD collection yet.



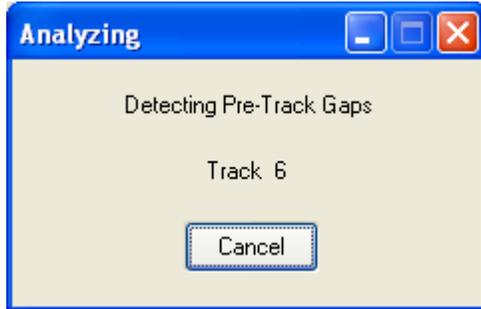
16.1 Now, we can insert CD into drive and start EAC.



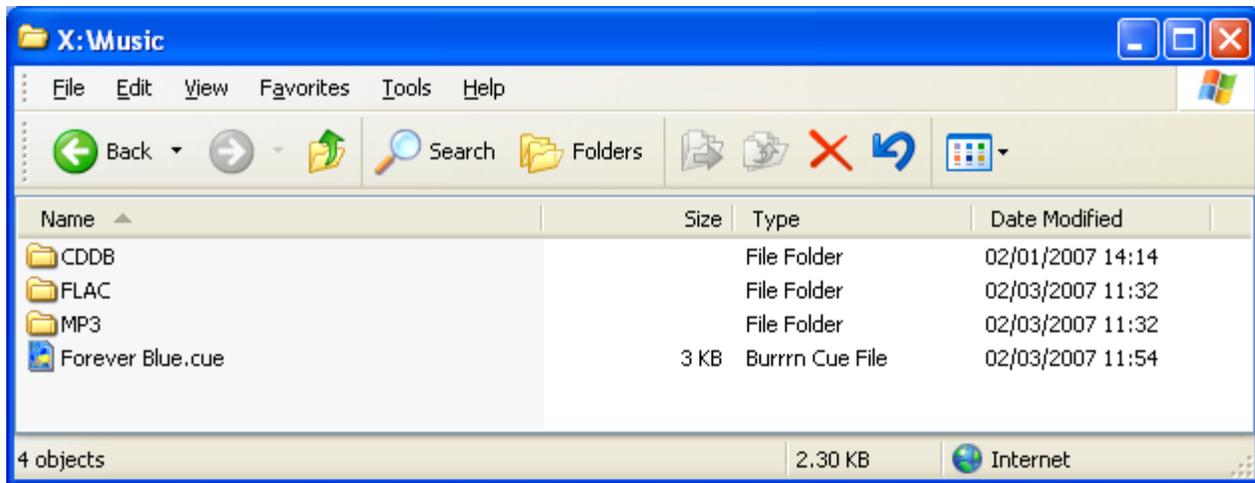
16.2. Choose Action, Create Cue Sheet, Multiple Wav Files with Gaps (noncompliant).



EAC will start analyzing tracks and gaps:

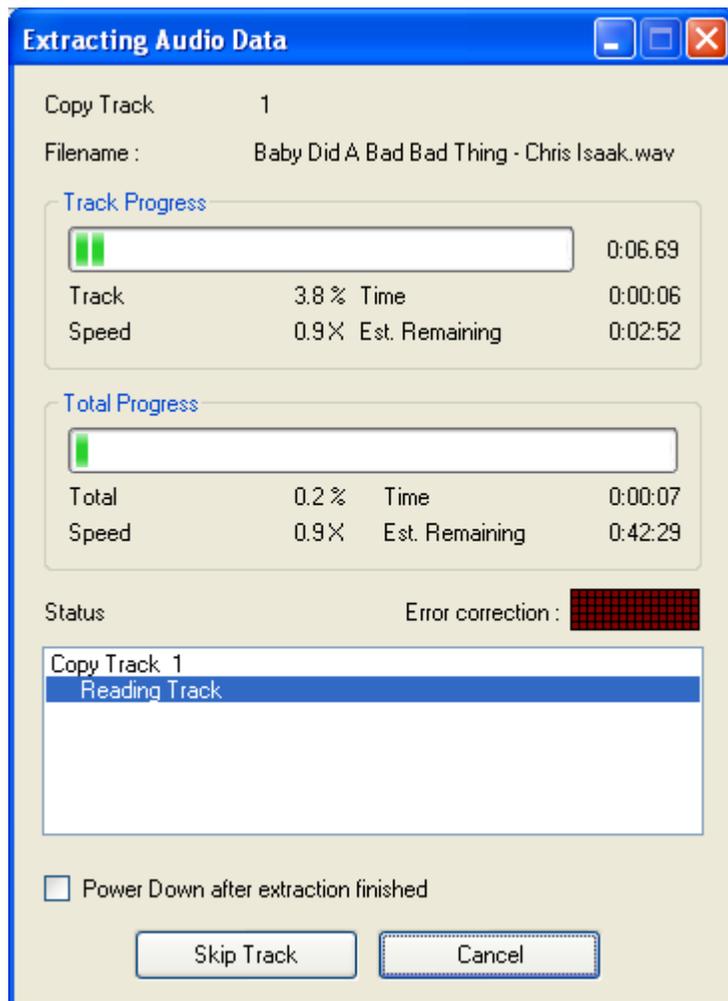


and will create cue sheet.



Don't worry. Cue sheet is just temporarily here, in the music root folder. It will later be modified and moved by Flacattack into proper location.

16.3. Now click on MP3 icon in EAC. The ripping process will start:



Actually, two processes started now running almost simultaneously:

EAC is ripping tracks into wav files in music root folder and is passing control to Flacattack.

As soon as each track is ripped, flacattack converts/encodes track into flac and mp3 format and saves them into subfolder structure which is created on-the-fly (if it doesn't already exist). Then Flacattack deletes wav files. Cue sheet is also modified and moved into folder with flac files.

You will notice that command window with Flacattack has started and that Flacattack is creating some temporary files and encoding in flac:

```

C:\Flacattack\flacattack.exe
Flacattack 1.03, Copyright (C) 2004-2005 Jeremy Hicks
February 25, 2005

Individual file compression

flac 1.1.3, Copyright (C) 2000,2001,2002,2003,2004,2005,2006 Josh Coalson
flac comes with ABSOLUTELY NO WARRANTY. This is free software, and you are
welcome to redistribute it under certain conditions. Type 'flac' for details.

Gtmp!>!3!.wav: 83% complete, ratio=0.708

```

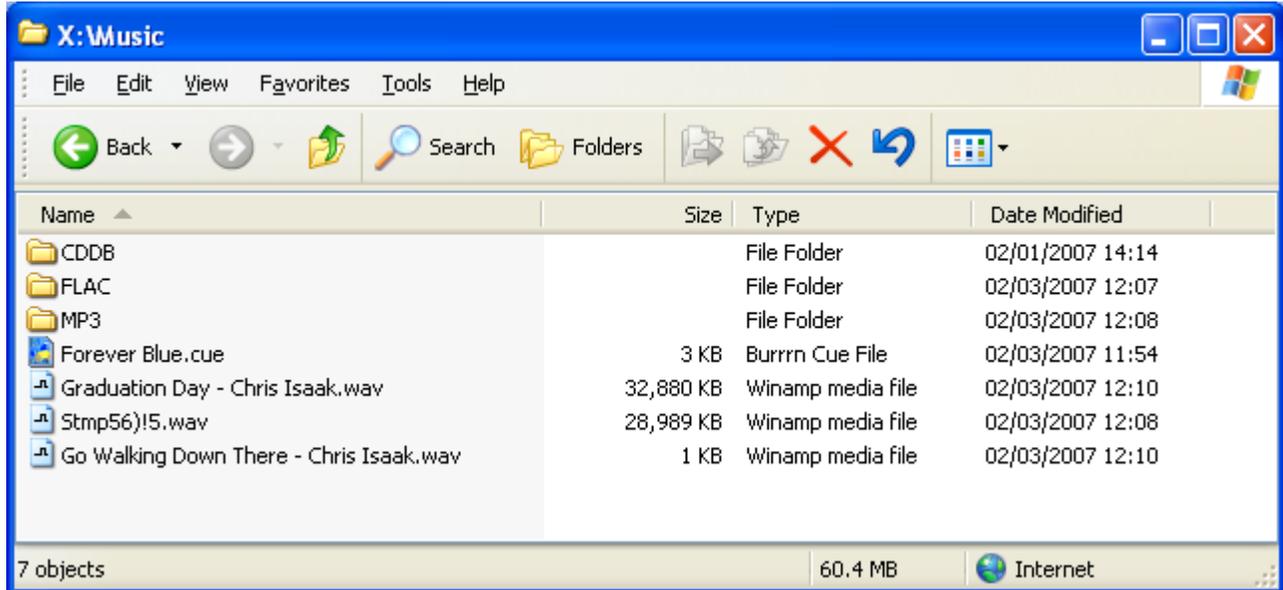
...and MP3 with Lame:

```

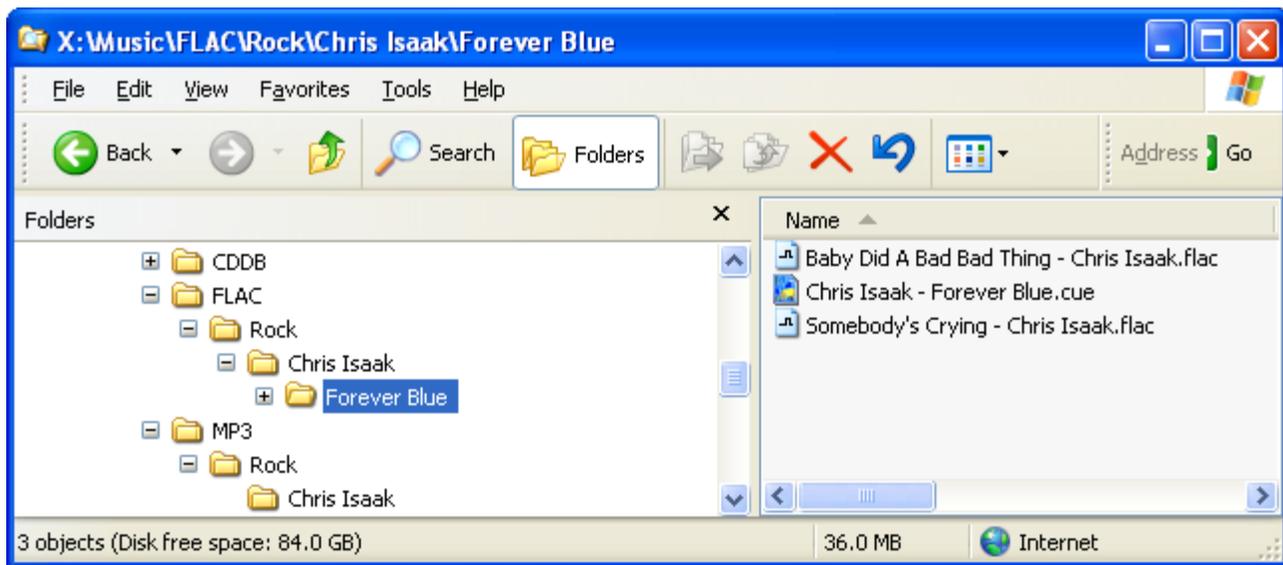
C:\Flacattack\flacattack.exe
LAME 3.97 32bits (http://www.mp3dev.org/)
CPU features: MMX (ASM used), SSE (ASM used), SSE2
Using polyphase lowpass filter, transition band: 19383 Hz - 19916 Hz
Encoding X:\Music\Gtmp8>58-.wav
to X:\music\mp3\Rock\Chris Isaak\Graduation Day - Chris Isaak.mp3
Encoding as 44.1 kHz UBR(q=0) j-stereo MPEG-1 Layer III (ca. 5.7x) qual=3
  Frame      | CPU time/estim | REAL time/estim | play/CPU | ETA
4250/7308   (58%) | 0:26/ 0:45 | 0:26/ 0:45 | 4.1506x | 0:19
32 [ 14] *
40 [ 0]
48 [ 0]
56 [ 0]
64 [ 0]
80 [ 0]
96 [ 0]
112 [ 0]
128 [ 3] %
160 [ 258] %*****
192 [1337] //////////////////////////////////////////////////*****
224 [1529] //////////////////////////////////////////////////*****
256 [ 675] //////////////////////////////////////////////////*****
320 [ 434] //////////////////////////////////////////////////***
-----01:19-----
kbps      LR      MS      %      long switch short %
224.2     46.8   53.2   %      93.0   4.0   3.0

```

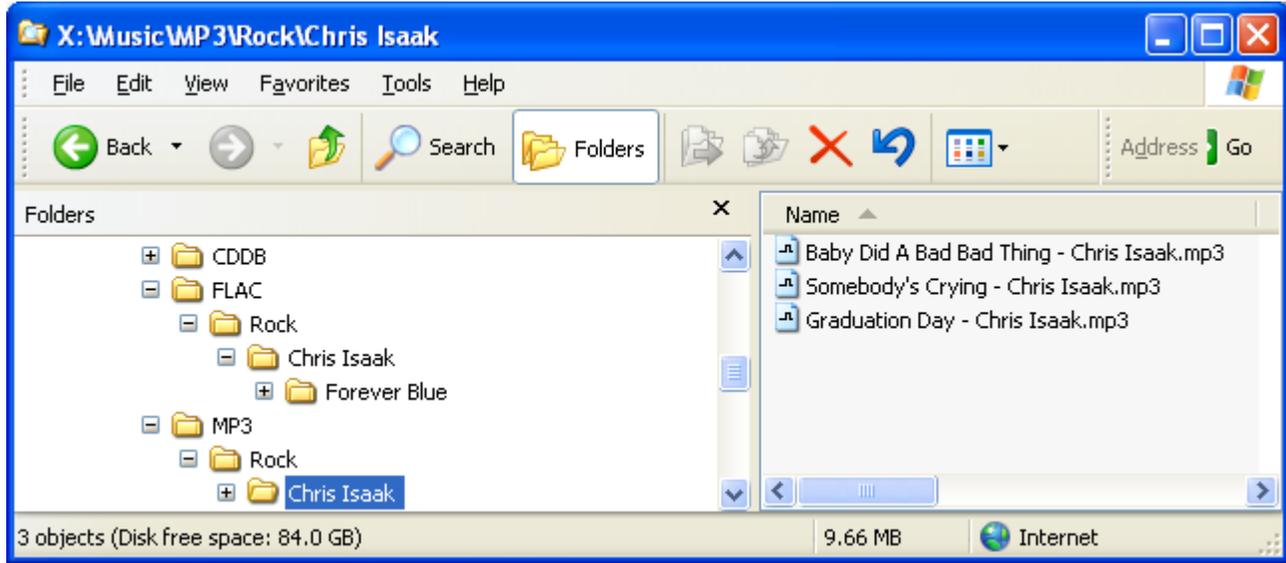
Temporary files in music root folder:



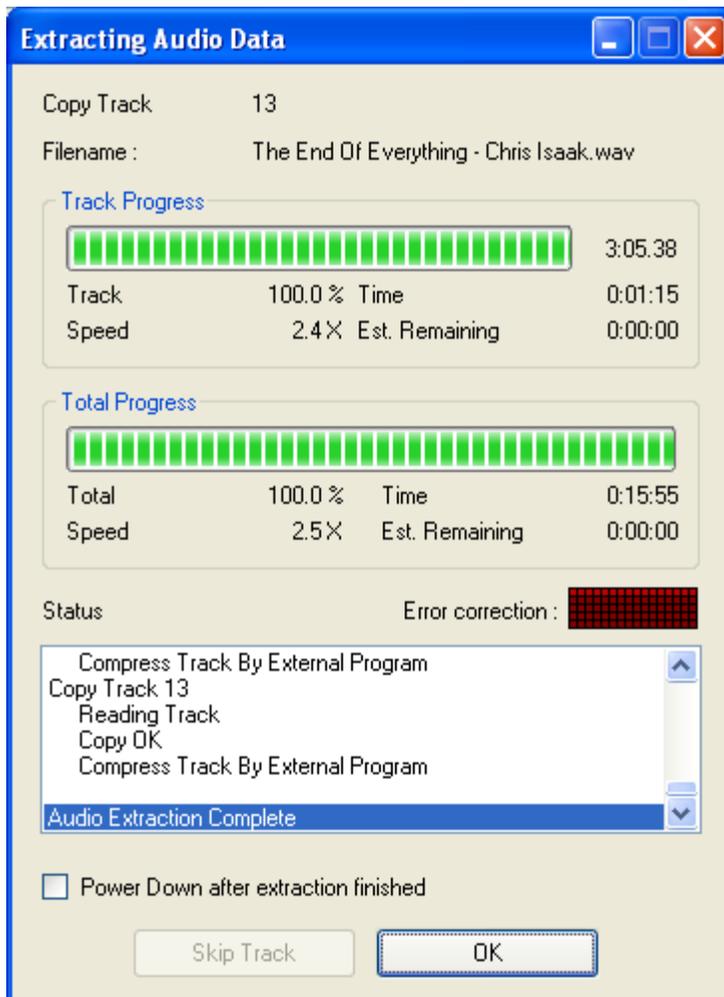
Flac files and cue sheet created in flac subdirectory structure:



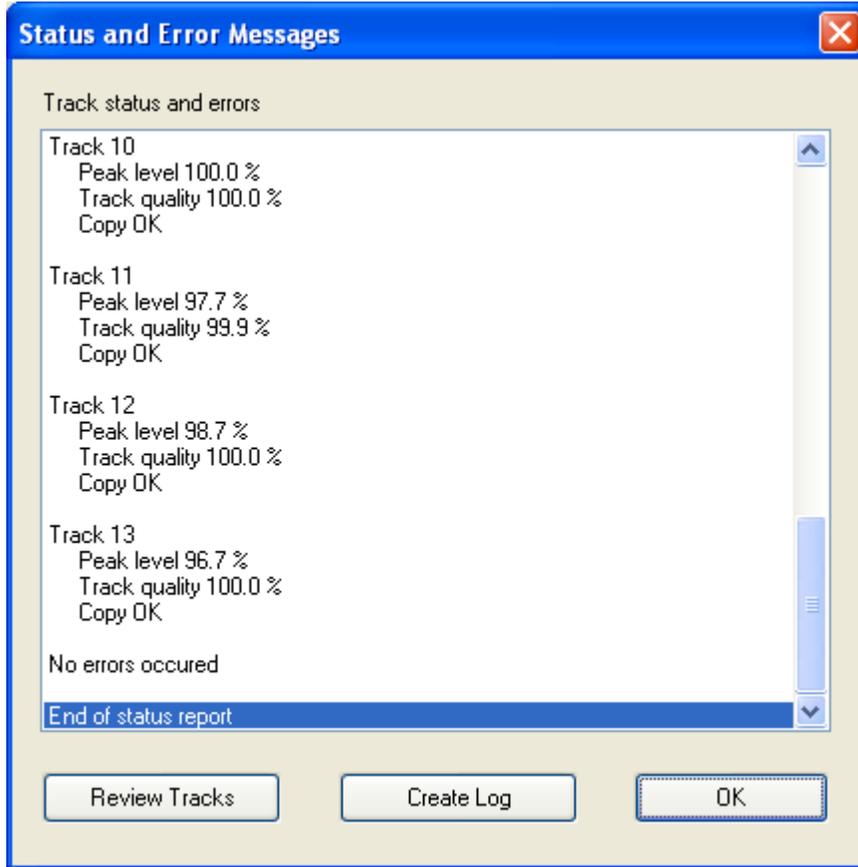
Mp3 files created in mp3 subdirectory structure:



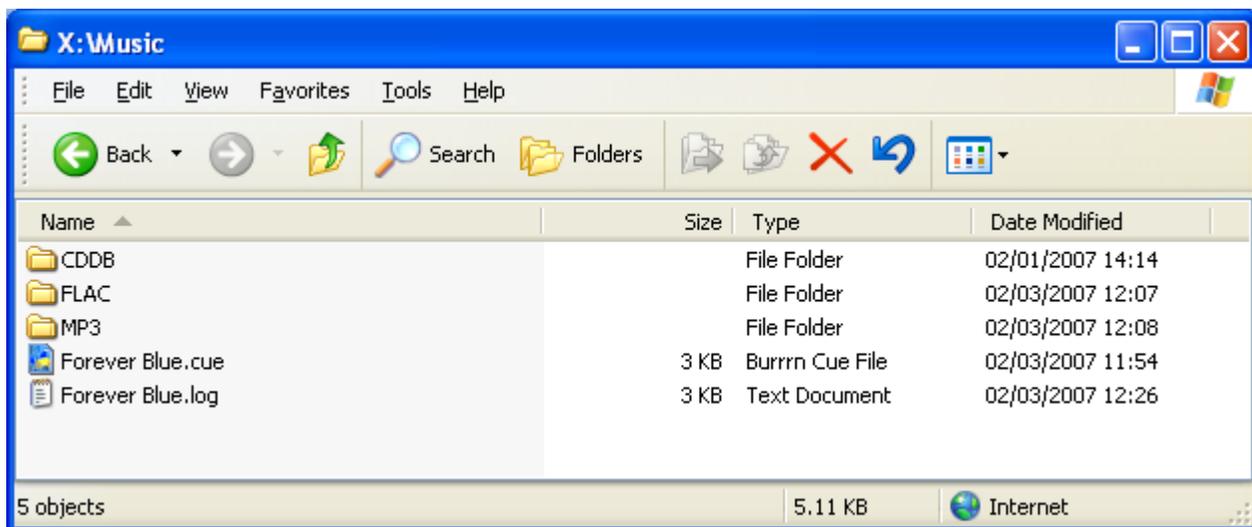
EAC will beep when it finishes ripping tracks from CD.



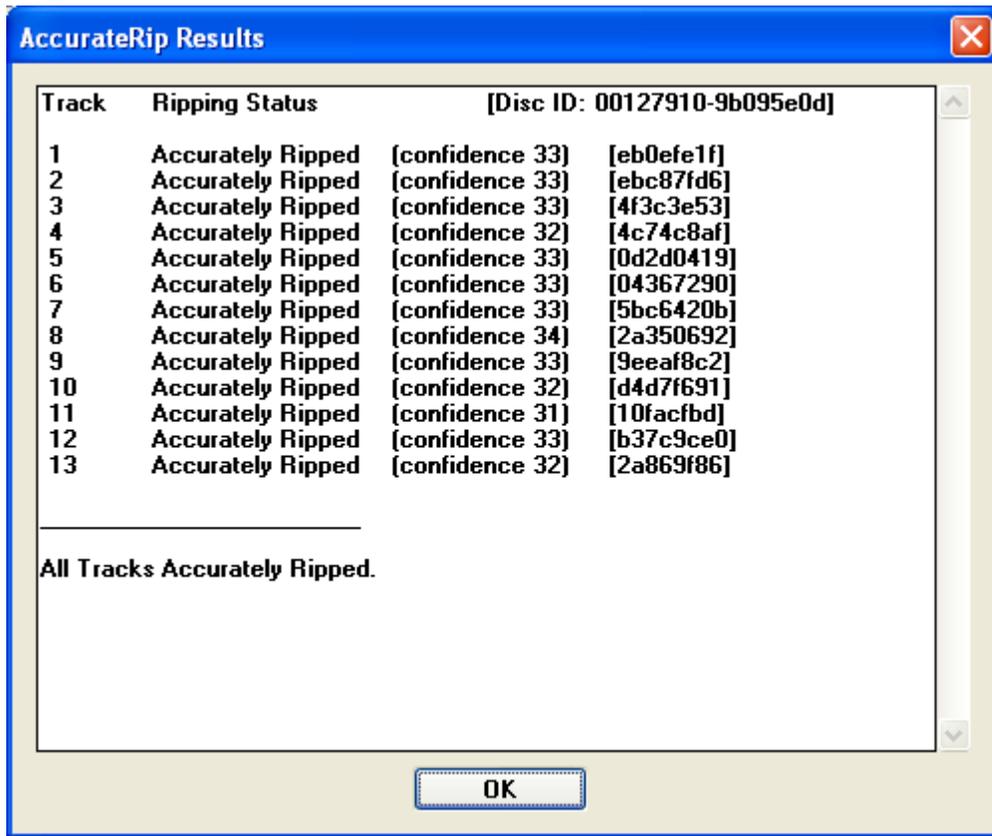
You can click on O.K. and report log will be displayed, which you can examine:



You'll see that log file is already created in the root music folder, so there is no need to click on "Create Log" button:

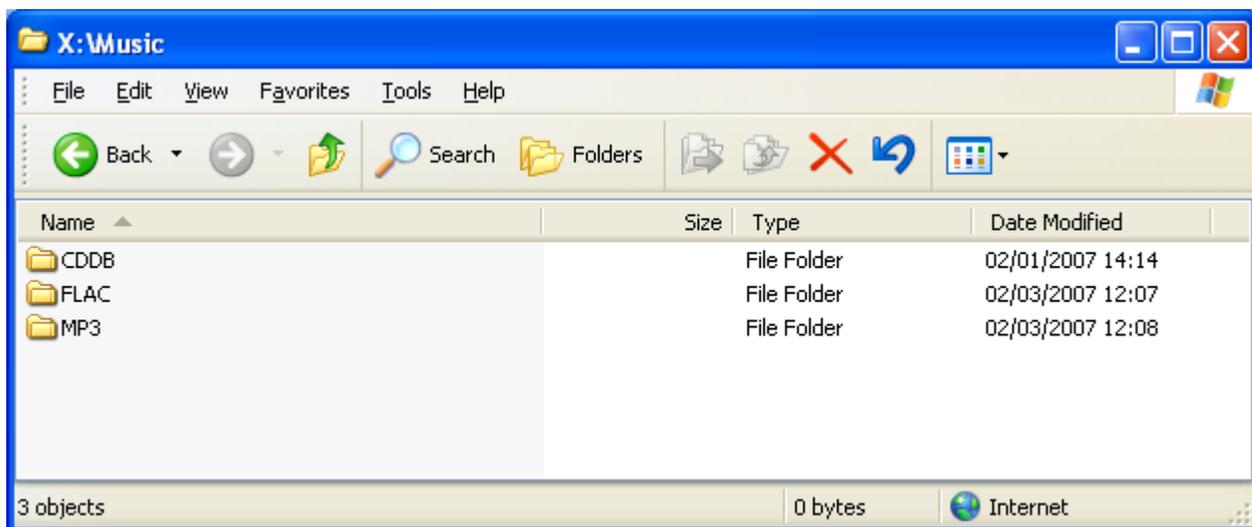


Now, when you click on O.K. AccurateRip will display it's results, which we explained before:

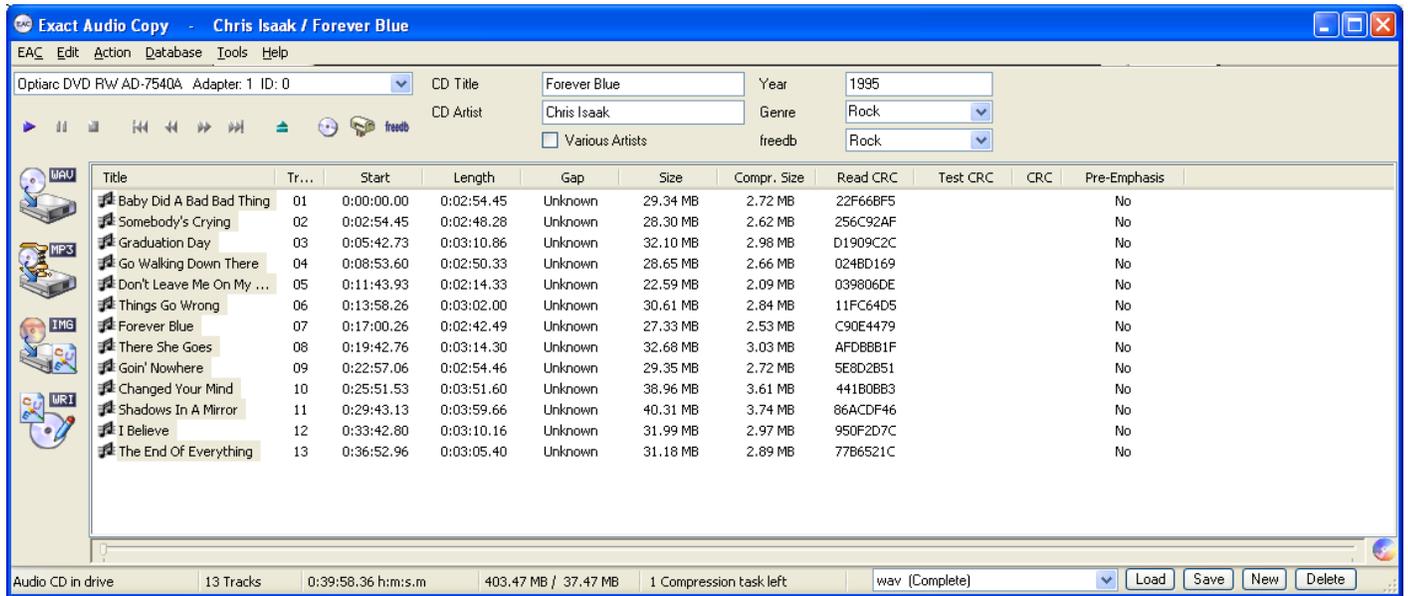


Unfortunately, it's not possible to automatically store these results using EAC. You'll have to manually Copy-Paste them, or use commercial program [dbPowerAmp](#), for which AccurateRip was written in the first place. DbPowerAmp's CD ripper would both add AccurateRip results to the tags of the ripped songs (as well as AccurateRip Disc ID) and write the results to the log file.

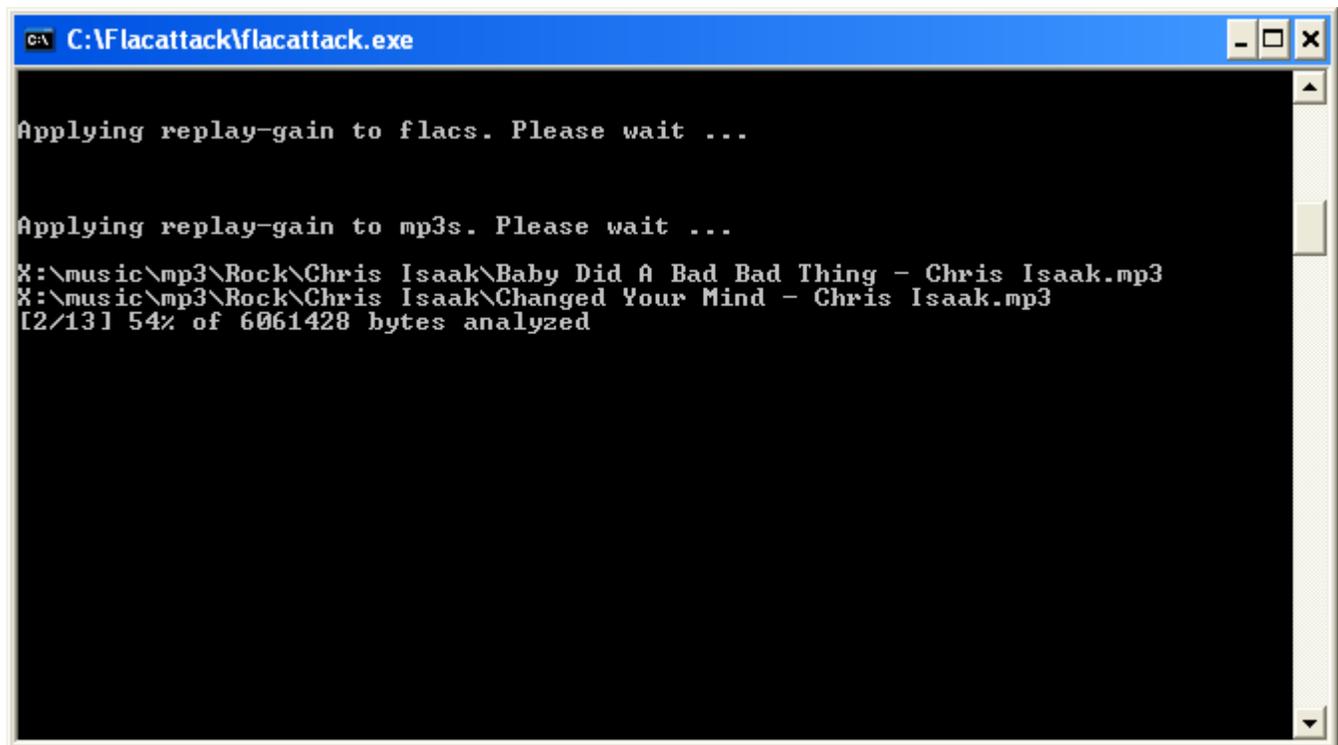
When we click on O.K. again, we'll see that cue sheet and log files have been moved from music root folder:



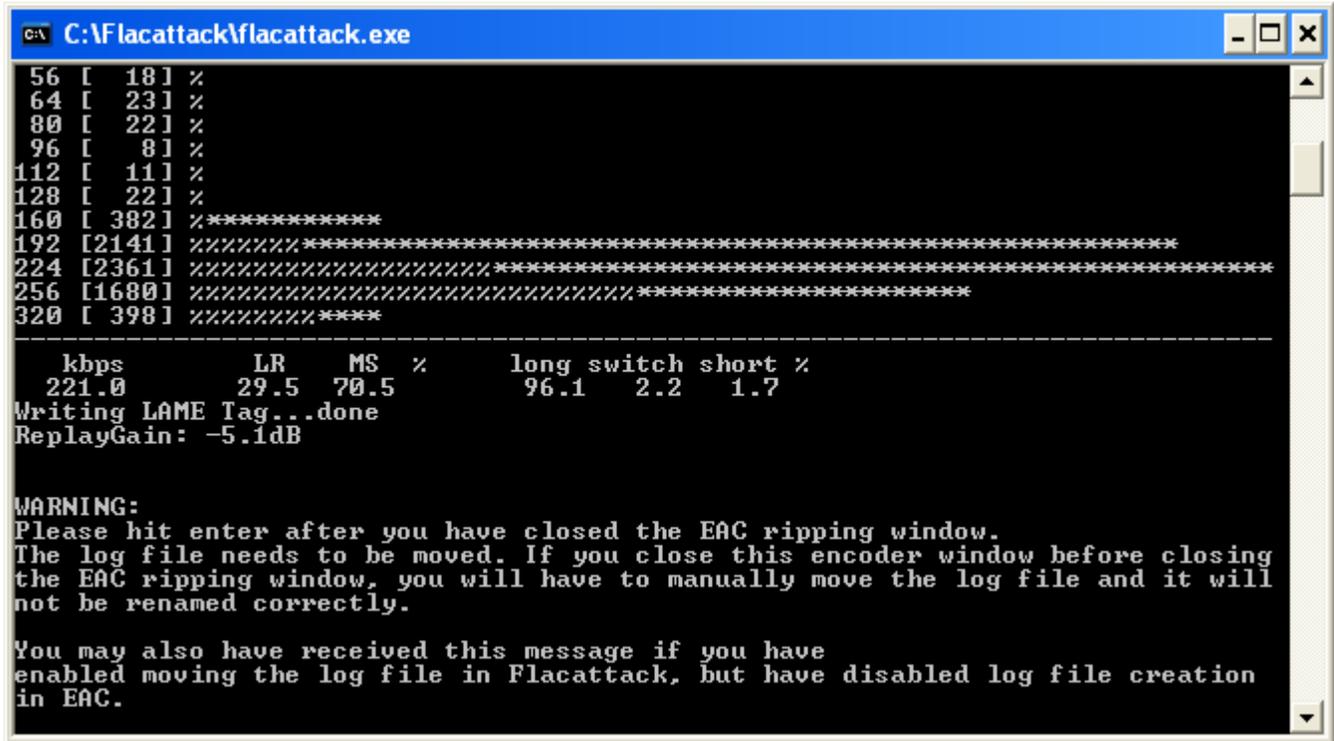
However, you'll notice that the process is not finished yet, as Flacattack is still converting wav files into flac and mp3. It's indicated in the status bar with the message "1 Compression task left"



If you close AccurateRip Results window before Flacattack finishes converting to flac and mp3 files, it will automatically continue applying ReplayGain settings to flac and mp3 files:



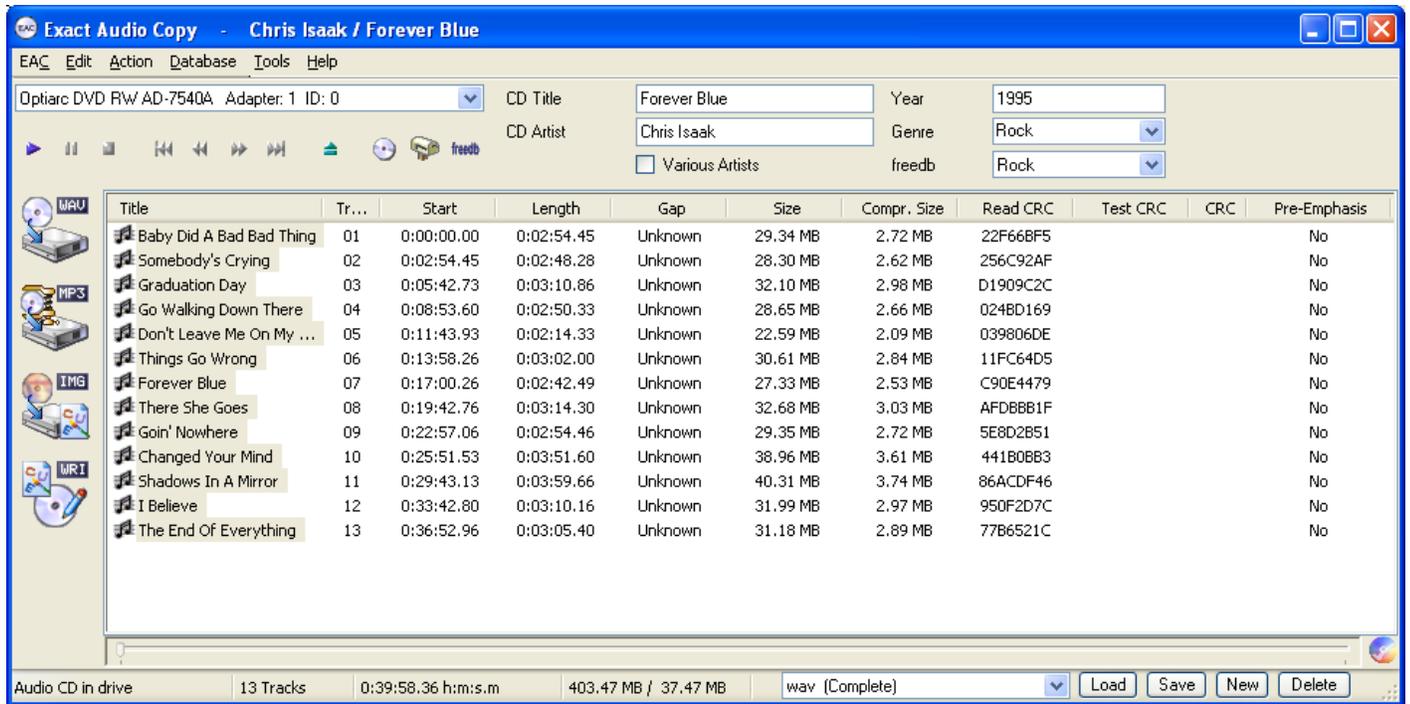
However, if you leave it on, you will get following message in Flacattack and you have to hit Enter.



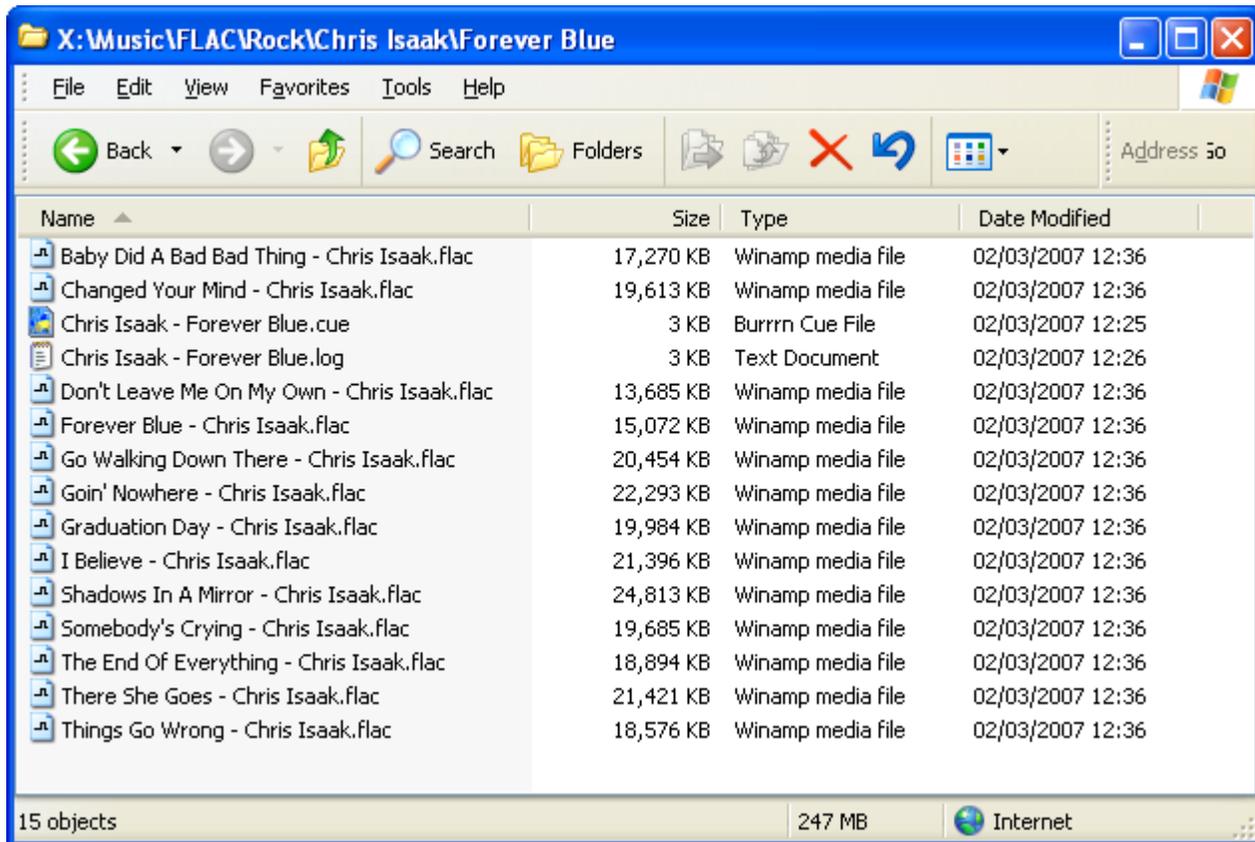
```
C:\Flacattack\flacattack.exe
Applying replay-gain to flacs. Please wait ...

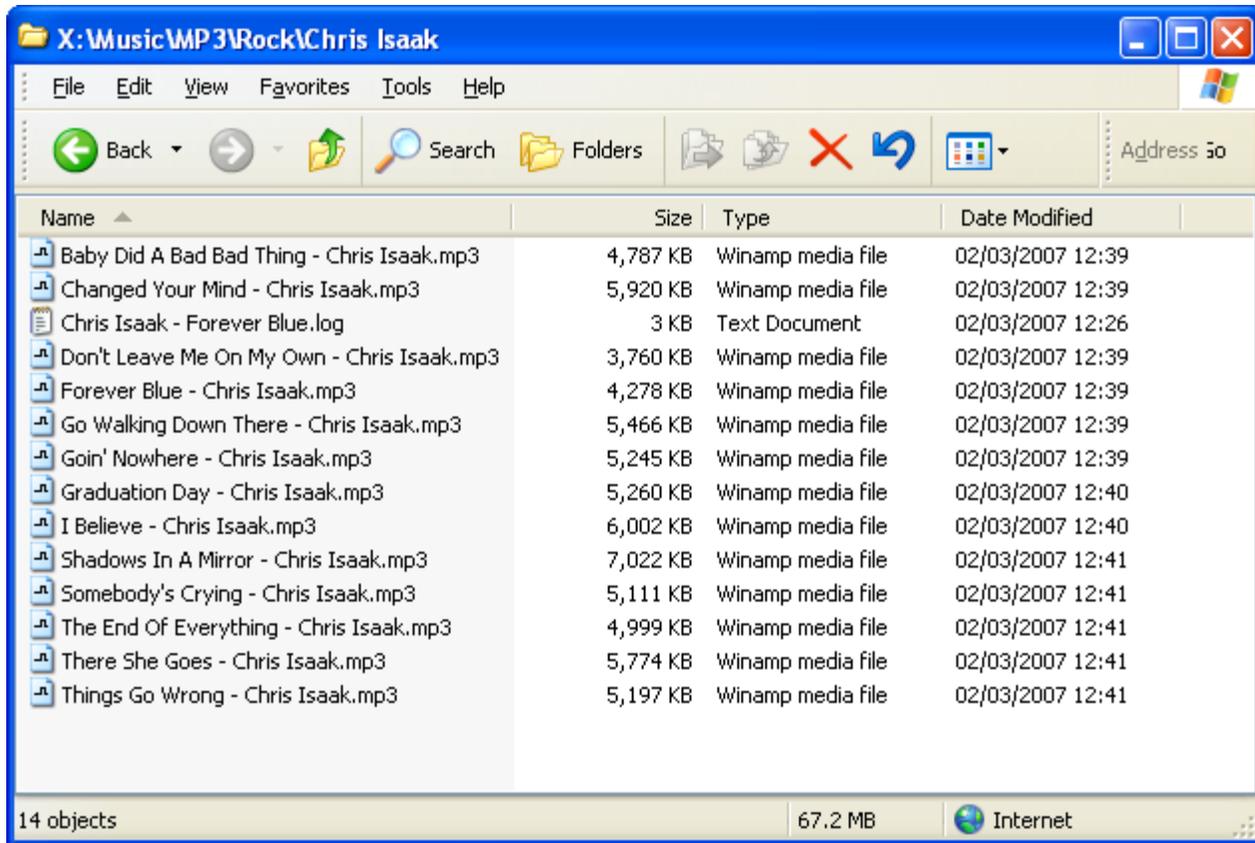
Applying replay-gain to mp3s. Please wait ...
X:\music\mp3\Rock\Chris Isaak\Baby Did A Bad Bad Thing - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Changed Your Mind - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Don't Leave Me On My Own - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Forever Blue - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Go Walking Down There - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Goin' Nowhere - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Graduation Day - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\I Believe - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Shadows In A Mirror - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Somebody's Crying - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\The End Of Everything - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\There She Goes - Chris Isaak.mp3
X:\music\mp3\Rock\Chris Isaak\Things Go Wrong - Chris Isaak.mp3
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Baby Did A Bad B
ad Thing - Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Changed Your Min
d - Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Don't Leave Me O
n My Own - Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Forever Blue - C
hris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Go Walking Down
There - Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Goin' Nowhere -
Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Graduation Day -
Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\I Believe - Chri
s Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Shadows In A Mir
ror - Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\Somebody's Cryin
g - Chris Isaak.mp3...
Applying mp3 gain change of -5 to X:\music\mp3\Rock\Chris Isaak\The End Of Every
thing - Chris Isaak.mp3...
```

When Flacattack finishes, EAC will beep again, and you'll notice that message "1 Compression task left" from the status bar has disappeared.



We can go now into flac and mp3 folders to check that all the files are there:





We can check tags in flac file, by using metaflac.exe. It's installed in Flac folder together with flac.exe (c:\Program Files\Flac).

The syntax is: metaflac.exe filename --list

In our case it looks like:

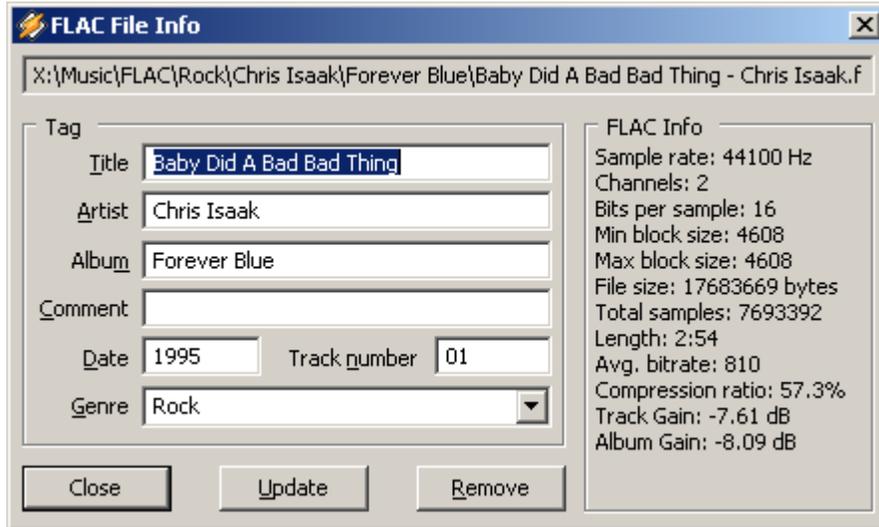
The screenshot shows a Windows command prompt window titled "C:\WINDOWS\system32\cmd.exe". The output of the metaflac.exe command is displayed as follows:

```

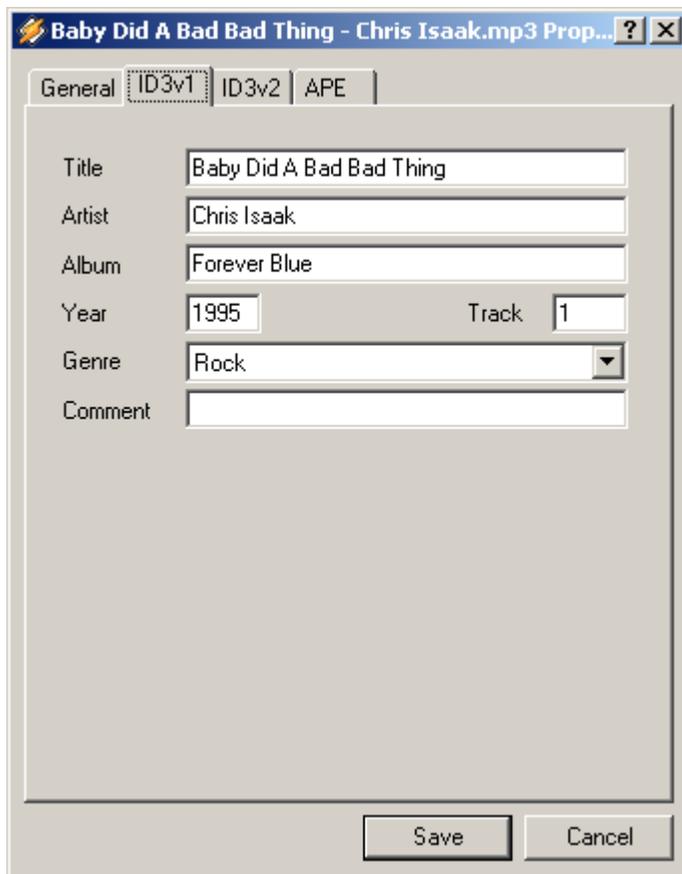
METADATA block #2
  type: 4 (UORBIS_COMMENT)
  is last: false
  length: 344
  vendor string: reference libFLAC 1.1.3 20061120
  comments: 11
    comment[0]: artist=Chris Isaak
    comment[1]: album=Forever Blue
    comment[2]: title=Baby Did A Bad Bad Thing
    comment[3]: date=1995
    comment[4]: tracknumber=01
    comment[5]: genre=Rock
    comment[6]: REPLAYGAIN_REFERENCE_LOUDNESS=89.0 dB
    comment[7]: REPLAYGAIN_TRACK_GAIN=-7.61 dB
    comment[8]: REPLAYGAIN_TRACK_PEAK=1.00000000
    comment[9]: REPLAYGAIN_ALBUM_GAIN=-8.09 dB
    comment[10]: REPLAYGAIN_ALBUM_PEAK=1.00000000
METADATA block #3
  type: 1 (PADDING)
  is last: true
  length: 8011
P:\>

```

Or by using e.g. WinAmp in File, View File Info... menu.



We can do the same for mp3 file and verify tags:



Baby Did A Bad Bad Thing - Chris Isaak.mp3 Prop... ? x

General ID3v1 ID3v2 APE

Title

Artist

Album

Year Track

Genre

Comment

Composer

Orig. Artist

Copyright

URL

Encoder

Baby Did A Bad Bad Thing - Chris Isaak.mp3 Prop... ? X

General ID3v1 ID3v2 APE

Title

Artist

Album

Year Track

Genre

Comment

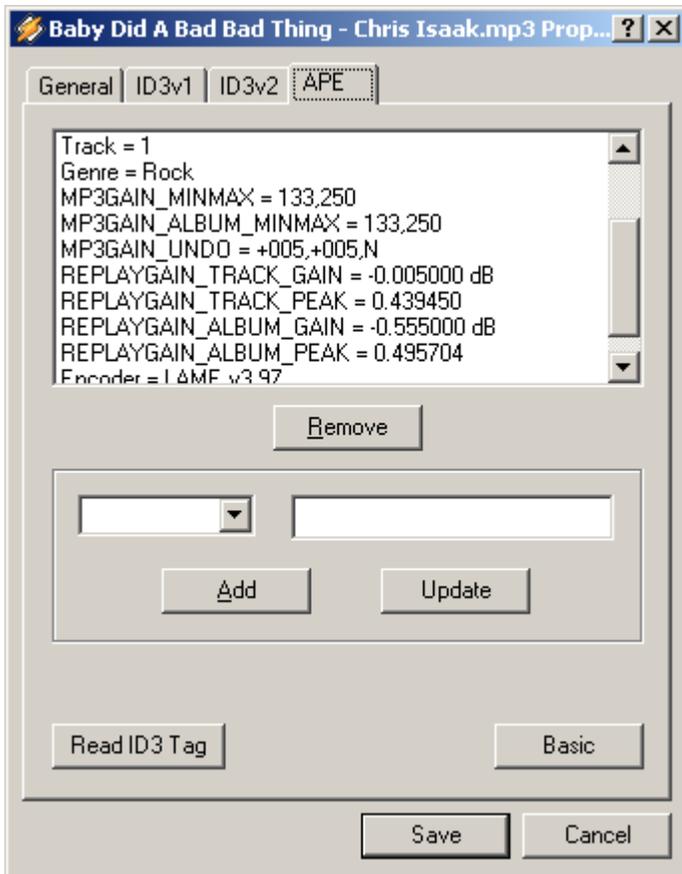
Composer

Orig. Artist

Copyright

URL

Encoder



Mp3gain adjusted gain on this track

MP3GAIN_UNDO tag shows the value (in increments of 1.5dB), for each channel. Letter N indicates that no wrapping was applied.

Wrapping is a feature of mp3gain.exe which will make global gain field changes that go over 255 and under 0 to be "wrapped" around, so that e.g. a -2 change to a global gain field of 0 becomes 254, and then if undoing that gain change, then that global gain field would again be 0. Without wrapping enabled, then a -2 change to a global gain field of 0, would just be 0. Wrapping is disabled by default.

In this case, gain was lowered by $-5 \times 1.5\text{dB} = -7.5\text{dB}$, hence to reverse the operation, we'll have to increase it 7.5 dB..

Mp3gain calculated albumgain as -8.055dB , but as it already adjusted track by -7.5dB , only the difference is written in tag REPLAYGAIN_ALBUM_GAIN = -0.555000 dB .

Trackgain value is also calculated as -7.505 dB and adjusted by -7.5 dB , so only the difference is written in REPLAYGAIN_TRACK_GAIN tag, which equals -0.005 dB .

If non-Replay Gain aware player plays this track, it will be played with -7.5dB gain compared to original.

If Replay Gain aware player, configured to apply albumgain, plays this track, it will be able to read REPLAYGAIN_ALBUM_GAIN tag and will apply further -0.555000 dB adjustment.

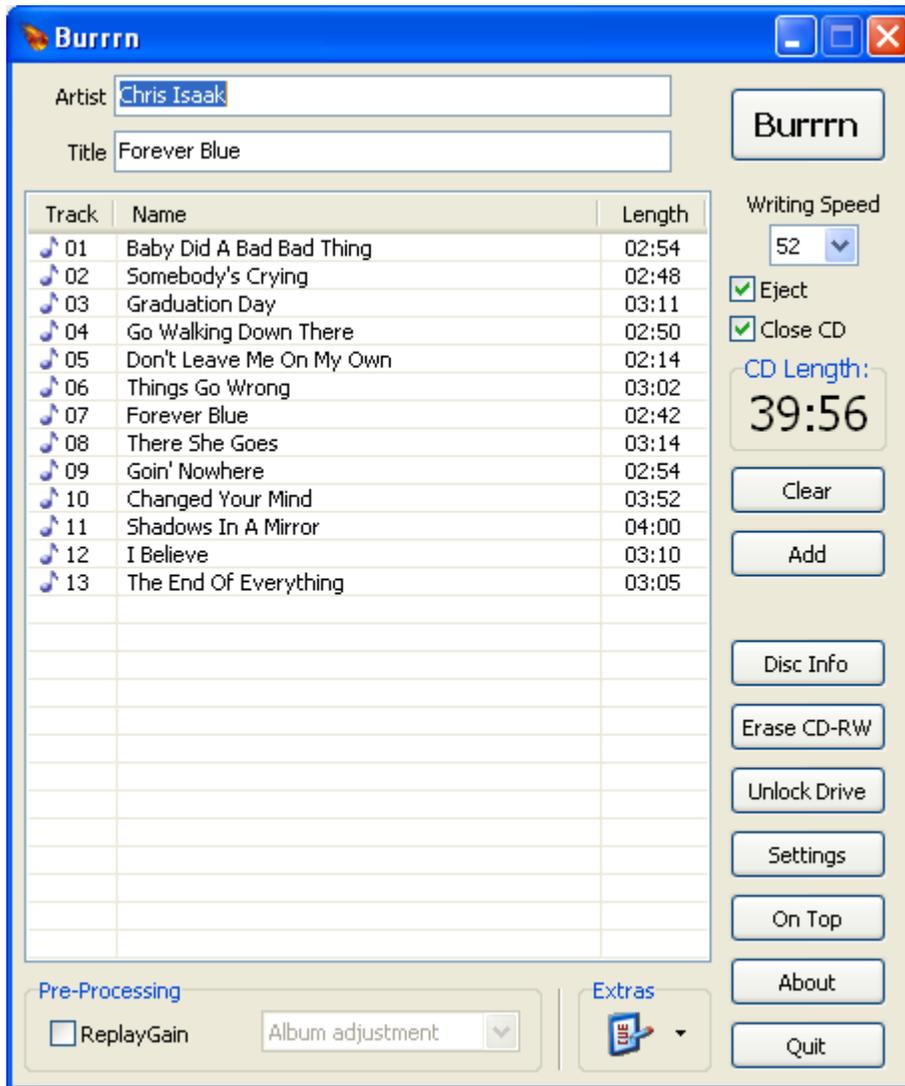
So, in that case it will be played with -8.055dB adjustment, which is more precise.

REPLAYGAIN_TRACK_PEAK and REPLAYGAIN_ALBUM_PEAK stores the highest peak value for the track and the album respectively, so that peak-based clipping prevention can be used and mp3gain.exe can warn if we are trying to apply a gain change to a track/album which will make it clip. Peak is the maximum

sample value of the file before any gain has been applied, where 1.0 means "full sample value" (32,767 when decoding to signed 16 bit samples).

MP3GAIN_MINMAX and MP3GAIN_ALBUM_MINMAX is the minimum and maximum value of the global gain fields in the track and album respectively. In this case the values are 133,250 for both.

As a final check, you can double click on cue sheet in folder with flac files and Burrn program should start:



And if you insert blank CD into drive and click on "Burrn" button, you should get written the copy of the original CD.

Now you can store your original CD in a safe place.

17. VARIATIONS

17.1. ACCURATE RIP

Every time someone rips tracks and submits data to AccurateRip it stores results (including CD Id) into rawdata database.

When two or more results for individual track match, the data is moved into "confirmed" database (I don't know what should be name for it). Rawdata database is considered to contain mostly incorrect rip results i.e. rubbish.

When you get in a report:

Accurately Ripped (confidence 33)

That means that 33 other users ripped the same track from the same CD with the same result. Confidence of 3 or more is enough to consider having accurate rip.

Now, if there are 2 pressings of a same CD (same CD Id) and we call them CD A and CD B, although they both have the same CD title and Disc ID, e.g. Forever Blue by Chris Isaac Disc ID: 00127910-9b095e0d, they might have different CRCs stored as results. Records in AccurateRip database are stored for each track individually. If we have 5 users ripping e.g. track 3 on CD A (and getting the same CRC A) and another 7 ripping track 3 on CD B (getting the same CRC B), there will be 1 record in "confirmed" database for track 3 with CRC A and another record in the same database with CRC B.

Now if new user rips correctly the track from CD A, he will get result Accurately Ripped (confidence 5)

If new user rips correctly the track from CD B, he will get result Accurately Ripped (confidence 7)

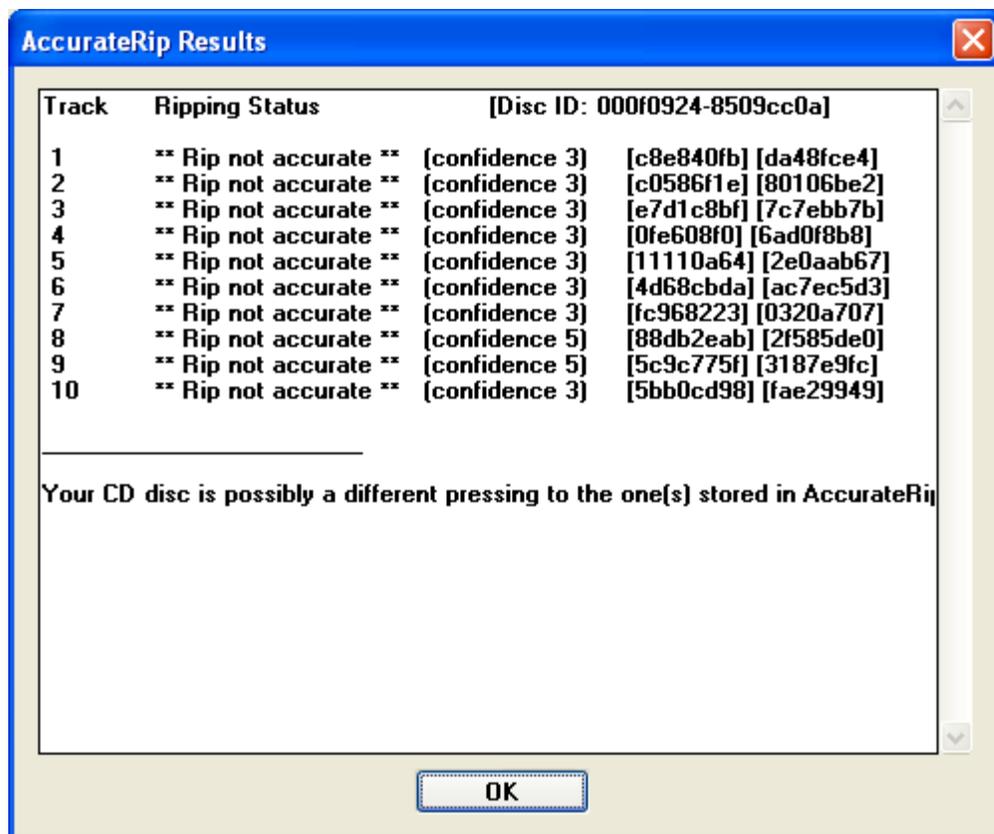
If new user rips from another pressing (e.g. CD C), he'll get

****Rip not accurate**** (confidence 7) or ****Rip not accurate**** (confidence 5).

Because there are more than one confirmed result (CRC) in the database for that particular track, AccurateRip cannot display all of them in a report, so it will choose one randomly, just to indicate that results don't match with any.

If new user rips and has an error in process, he'll get the same result ****Rip not accurate**** (confidence 7).

Below is the resulting report for Janis Joplin's "Greatest Hits"



The first column with CRC checksum is from AccurateRip's database, and the second one is calculated from just ripped track.

It's very unlikely, after I ripped several CDs without errors that on this CD I've got an error on every single track. It's more likely that the whole CD is of a different pressing, that nobody submitted to the database so far. However, because this CD exists, but pressing doesn't in AccurateRip database, they cannot be confirmed to be ripped accurately. As EAC hasn't reported any errors, one would assume that we can be pretty sure that they are ripped correctly. However, I had an experience when I took the same CD in other machine and EAC hasn't reported any errors, but AccurateRip gave different CRC results on some tracks and in subsequent rips on other tracks.

Hence, to be sure, it might be worth for such discs to rip them on different machine with different CD drive and compare CRC results.

Even that will not be 100% accurate, because if CD is damaged and has incorrect data, both drives and processes will produce same, inaccurate results.

With such discs, it's recommended to use Action/Test&Copy Selected Tracks/Compressed... (Shift+F6), instead of just clicking on mp3 icon on the left.

Maybe it would be the best to store AccurateRip results for such CDs and come back at some later date, when other users submit more results for the same CD, and verify results. But you cannot automatically store AccurateRip report using EAC, you can just manually copy/paste them. DBPowerAmp can do that.

Not all the users rip the whole CD, nor all of them rip all the songs error free. Hence it's possible that there is a different confidence number for different tracks on the same CD.

Disc ID is AccurateRip's ID, not CD manufacturer's ID. Different pressings of the same disk have different manufacturer's IDs (written on the inner track of the CD), but same AccurateRip Disc ID (because it's actually the same CD, with only offset different).

17.2. VARIOUS ARTISTS

When it comes to CDs with various artists, then each track name should contain both artist name and title. People who submit such entries into freedb, should write them in the form: artistname / title, in order for software to recognize and separate artist name and title and write them into tags.

However, many users don't know that and write entries using different formats and separators.

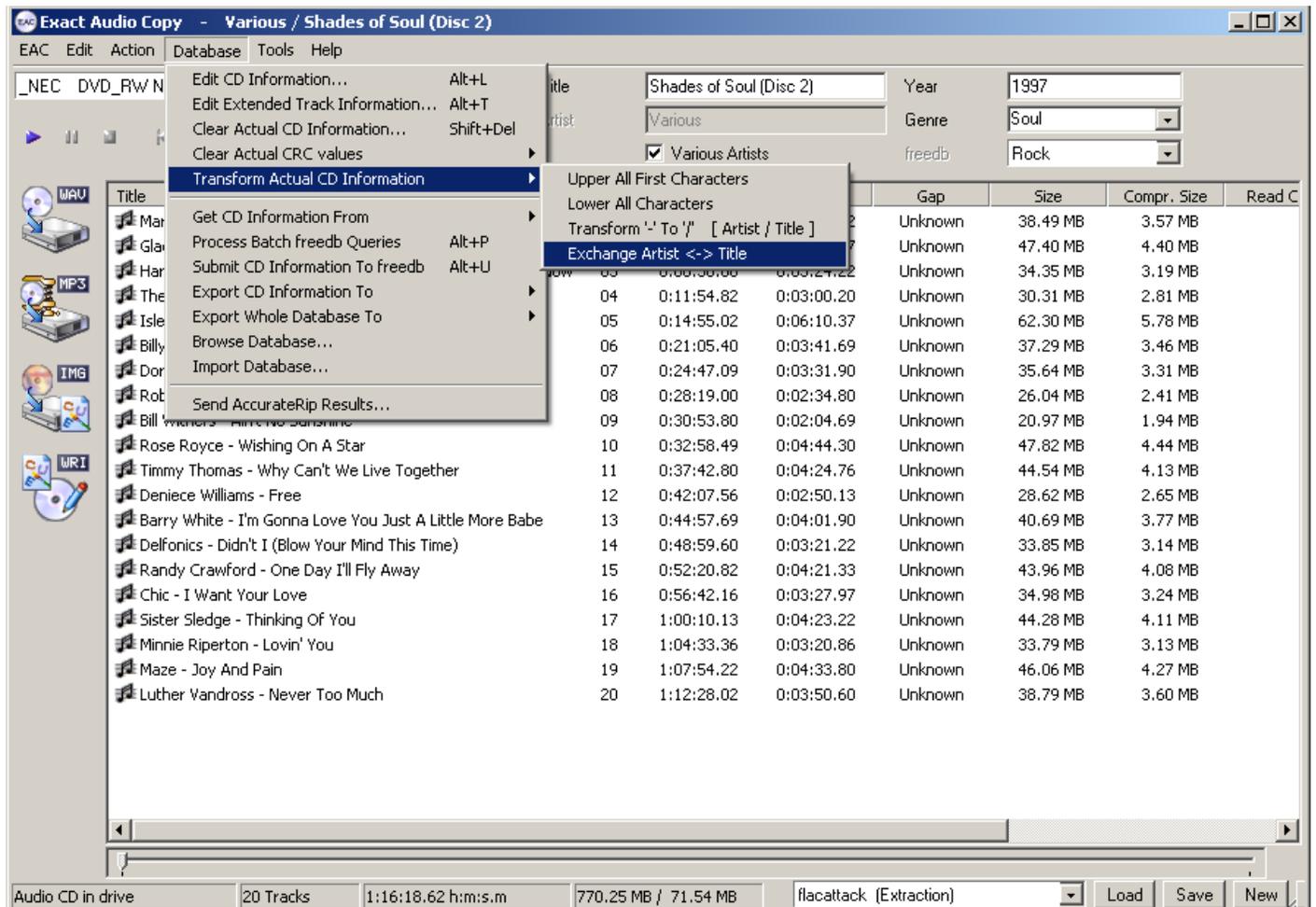
The most common error is when users use hyphen "-", instead of slash "/" as a separator, like below:

The screenshot shows the Exact Audio Copy (EAC) interface for a CD titled "Shades of Soul (Disc 2)" by "Various" artists, released in 1997. The CD is in drive _NEC DVD_RW ND-3520AW. The interface displays a list of 20 tracks with their titles, track numbers, start and end times, lengths, gaps, sizes, and compressed sizes. The tracks are listed as follows:

Title	Track	Start	Length	Gap	Size	Compr. Size	Read C
Marvin Gaye - What's Going On	01	0:00:00.00	0:03:48.82	Unknown	38.49 MB	3.57 MB	
Gladys Night & the Pips - Midnight Train To Georgia	02	0:03:48.82	0:04:41.77	Unknown	47.40 MB	4.40 MB	
Harold Melvin & the Bluenotes - If You Don't Know Me By Now	03	0:08:30.60	0:03:24.22	Unknown	34.35 MB	3.19 MB	
The O'jays - Love Train	04	0:11:54.82	0:03:00.20	Unknown	30.31 MB	2.81 MB	
Isley Brothers - Summer Breeze	05	0:14:55.02	0:06:10.37	Unknown	62.30 MB	5.78 MB	
Billy Paul - Me & Mrs Jones	06	0:21:05.40	0:03:41.69	Unknown	37.29 MB	3.46 MB	
Dorothy Moore - Misty Blue	07	0:24:47.09	0:03:31.90	Unknown	35.64 MB	3.31 MB	
Robert Parker - Barefootin'	08	0:28:19.00	0:02:34.80	Unknown	26.04 MB	2.41 MB	
Bill Withers - Ain't No Sunshine	09	0:30:53.80	0:02:04.69	Unknown	20.97 MB	1.94 MB	
Rose Royce - Wishing On A Star	10	0:32:58.49	0:04:44.30	Unknown	47.82 MB	4.44 MB	
Timmy Thomas - Why Can't We Live Together	11	0:37:42.80	0:04:24.76	Unknown	44.54 MB	4.13 MB	
Deniece Williams - Free	12	0:42:07.56	0:02:50.13	Unknown	28.62 MB	2.65 MB	
Barry White - I'm Gonna Love You Just A Little More Babe	13	0:44:57.69	0:04:01.90	Unknown	40.69 MB	3.77 MB	
Delfonics - Didn't I (Blow Your Mind This Time)	14	0:48:59.60	0:03:21.22	Unknown	33.85 MB	3.14 MB	
Randy Crawford - One Day I'll Fly Away	15	0:52:20.82	0:04:21.33	Unknown	43.96 MB	4.08 MB	
Chic - I Want Your Love	16	0:56:42.16	0:03:27.97	Unknown	34.98 MB	3.24 MB	
Sister Sledge - Thinking Of You	17	1:00:10.13	0:04:23.22	Unknown	44.28 MB	4.11 MB	
Minnie Riperton - Lovin' You	18	1:04:33.36	0:03:20.86	Unknown	33.79 MB	3.13 MB	
Maze - Joy And Pain	19	1:07:54.22	0:04:33.80	Unknown	46.06 MB	4.27 MB	
Luther Vandross - Never Too Much	20	1:12:28.02	0:03:50.60	Unknown	38.79 MB	3.60 MB	

The status bar at the bottom indicates "Audio CD in drive", "20 Tracks", "1:16:18.62 h:m:s.m", "770.25 MB / 71.54 MB", and "flacattack (Extraction)".

Fortunately, EAC has tools to correct some of the simplest errors, like this one, or switching position of artist and title:



After changing separator, we get proper result:

The screenshot shows the Exact Audio Copy (EAC) software interface. The window title is "Exact Audio Copy - Various / Shades of Soul (Disc 2)". The interface includes a menu bar (EAC, Edit, Action, Database, Tools, Help), a device selection dropdown (currently showing "_NEC DVD_RW ND-3520AW Adapter: 1 ID: 0"), and fields for CD Title ("Shades of Soul (Disc 2)"), Year ("1997"), CD Artist ("Various"), Genre ("Soul"), and a "freedb" dropdown set to "Rock". A "Various Artists" checkbox is checked. Below these fields is a playback control bar with buttons for play, stop, previous, next, and a volume icon, along with a "freedb" icon.

The main area contains a table of tracks with the following columns: Title, Track, Start, Length, Gap, Size, Compr. Size, and Read C. The tracks listed are:

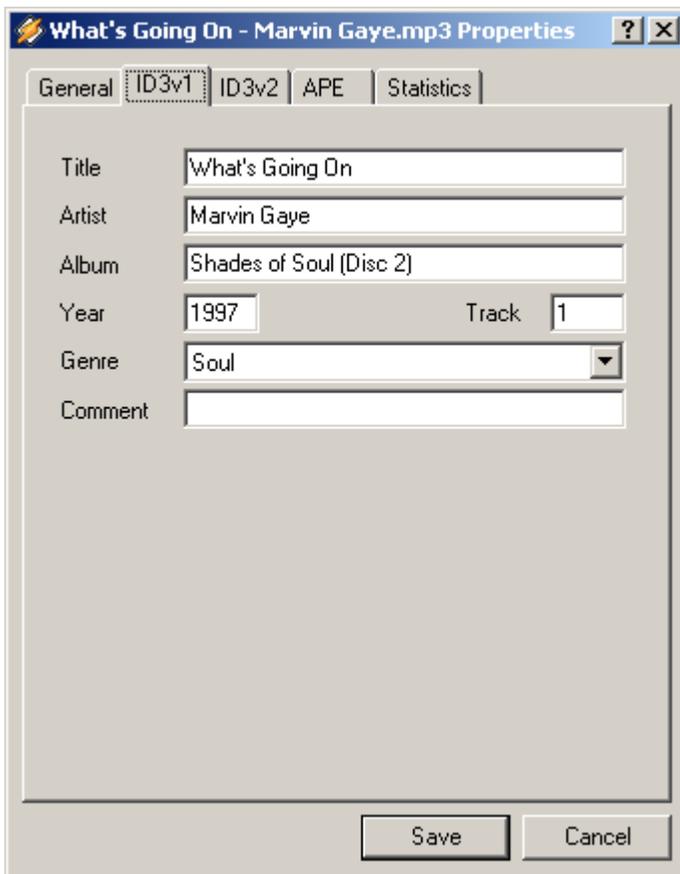
Title	Track	Start	Length	Gap	Size	Compr. Size	Read C
Marvin Gaye / What's Going On	01	0:00:00.00	0:03:48.82	Unknown	38.49 MB	3.57 MB	
Gladys Night & the Pips / Midnight Train To Georgia	02	0:03:48.82	0:04:41.77	Unknown	47.40 MB	4.40 MB	
Harold Melvin & the Bluenotes / If You Don't Know Me By Now	03	0:08:30.60	0:03:24.22	Unknown	34.35 MB	3.19 MB	
The O'jays / Love Train	04	0:11:54.82	0:03:00.20	Unknown	30.31 MB	2.81 MB	
Isley Brothers / Summer Breeze	05	0:14:55.02	0:06:10.37	Unknown	62.30 MB	5.78 MB	
Billy Paul / Me & Mrs Jones	06	0:21:05.40	0:03:41.69	Unknown	37.29 MB	3.46 MB	
Dorothy Moore / Misty Blue	07	0:24:47.09	0:03:31.90	Unknown	35.64 MB	3.31 MB	
Robert Parker / Barefootin'	08	0:28:19.00	0:02:34.80	Unknown	26.04 MB	2.41 MB	
Bill Withers / Ain't No Sunshine	09	0:30:53.80	0:02:04.69	Unknown	20.97 MB	1.94 MB	
Rose Royce / Wishing On A Star	10	0:32:58.49	0:04:44.30	Unknown	47.82 MB	4.44 MB	
Timmy Thomas / Why Can't We Live Together	11	0:37:42.80	0:04:24.76	Unknown	44.54 MB	4.13 MB	
Deniece Williams / Free	12	0:42:07.56	0:02:50.13	Unknown	28.62 MB	2.65 MB	
Barry White / I'm Gonna Love You Just A Little More Babe	13	0:44:57.69	0:04:01.90	Unknown	40.69 MB	3.77 MB	
Delfonics / Didn't I (Blow Your Mind This Time)	14	0:48:59.60	0:03:21.22	Unknown	33.85 MB	3.14 MB	
Randy Crawford / One Day I'll Fly Away	15	0:52:20.82	0:04:21.33	Unknown	43.96 MB	4.08 MB	
Chic / I Want Your Love	16	0:56:42.16	0:03:27.97	Unknown	34.98 MB	3.24 MB	
Sister Sledge / Thinking Of You	17	1:00:10.13	0:04:23.22	Unknown	44.28 MB	4.11 MB	
Minnie Riperton / Lovin' You	18	1:04:33.36	0:03:20.86	Unknown	33.79 MB	3.13 MB	
Maze / Joy And Pain	19	1:07:54.22	0:04:33.80	Unknown	46.06 MB	4.27 MB	
Luther Vandross / Never Too Much	20	1:12:28.02	0:03:50.60	Unknown	38.79 MB	3.60 MB	

At the bottom of the window, there is a status bar showing "Audio CD in drive", "20 Tracks", "1:16:18.62 h:m:s.m", "770.25 MB / 71.54 MB", a dropdown menu set to "flacattack (Extraction)", and buttons for "Load", "Save", and "New".

Here you can see that filename was created correctly, according to our naming scheme and also tags of a flac file:



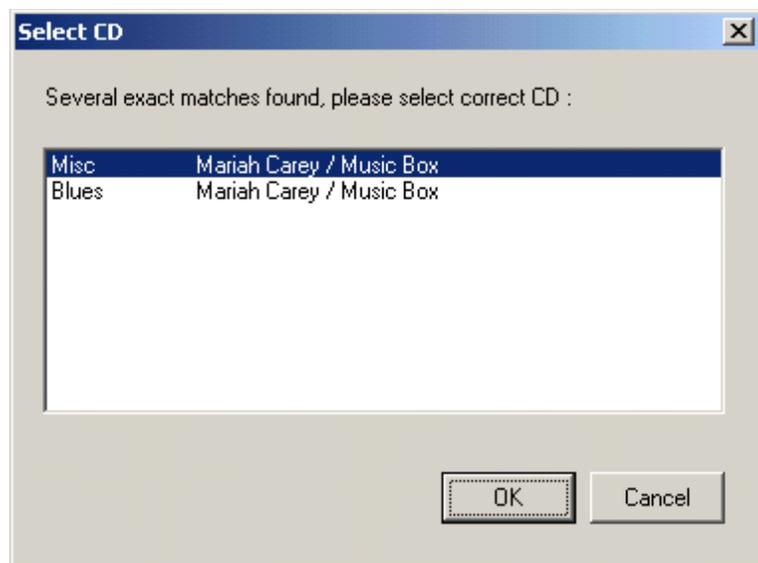
It's the same with mp3 file as well:



If track names are not entered correctly in EAC, then info will not be written correctly in tags. E.g. tag Artist will contain title of the track and tag Title will contain artist name.

17.3. FREEDB

Sometimes, there will be two entries for the same CD, written in freedb. In that case, you'll get screen like this and you'll have to pick one:



SUMMARY

If you would like to store AccurateRip's results in tags and have them automatically saved in a log file, you should consider using [dbPowerAmp](#)'s ripper. They promise to do it in next version (R13), so not working yet. You cannot do it with EAC.

However dbPowerAmp's Music Converter doesn't support cue sheets, so it cannot be used for CD archiving/backup in separate flac files. That's also promised in next release (R13).

If you would like to use custom genres, e.g. to separate German music from English one, you cannot do it with this configuration, as Lame encoder is used for storing tags and it doesn't support custom genres.

It can be achieved using REACT, instead of Flacattack, and still using Lame as an encoder.

THANK YOU

Thanks to all the authors of the great free software I mentioned and used here, as well to the Satcp and Liekloo, whose manuals were a great starting point for a novice like me to dig into this subject.

Also, many thanks to a Spoon and a number of people in [Hydrogenaudio community](#), whose advices saved me many times when I got stuck.