

The Unofficial

EXTREME

BETA

SUPER

SUPER AUDIO CD

Authoring Guide

PREVIEW

Version: 0.0

VERSION

SUPERAUDIO.LABS

EXTREME

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EARLY

PREVIEW

VERSION

DSD

Direct Stream Digital

For absolutely no real reason, I have decided to write a step-by-step guide...showing you every step...in authoring an SACD image that can be played in Foobar or a specially modified SACD player. Though Redacted does not have any DSD content, it's possible this may change in the future. I also feel that Redacted may not be the only tool on your ship; and you may have DSD content from elsewhere. This information may be handy in the future, or just to a small specific set of people.

Why you should do this:

- *You have a specially modified SACD player that can accept burned SACDs; and a bunch of individual DSF/DFF files.*
- *You have a specially modified SACD player and would like to make compilation SACDs. (You can fit several hours on a disc with DST compression).*

Why you shouldn't do this:

- *Literally any other reason.*

A Brief History Of Why:

When Sony came out with SACD back in 1999 it was the thing of controversy....even today people are very for or against the idea of a delta-sigma modulated format. I'll give them the benefit of the doubt and say the 90's were an interesting time in the DAC world and it made some sense; it's just by the time it came to market it's necessity was less.

But one thing Sony did push was the amount of DRM the format had. Encryption of the data was backed up with watermarking; and that was further backed up using "pit-modulation" of the key, something you can't reproduce with a DVD-R drive. It's also not as easy as it was with the Playstation where the modulation contained a static code.

But none of this mattered until they exploited the PS3 and started being able to extract DSD data from SACDs. In fact the first rips done by a PS3 were of individual tracks. But then the player exploits happened and word spread quickly...surprisingly through the SACD mastering world. There was absolutely no way of seeing if your authored disc worked without sending it off; now they could just burn the cutting master, pop it in an exploited player, and see if it works.

Eventually the PS3 ripper started outputting ISOs directly (as it should) and there was little to no use to author a disc. I mean...I had some reasons; I had 192khz content with no 192khz capable DAC, and converting to DSD to play in my player was better than downsampling. It is possible to buy DSD tracks from a few stores; and there are people ripping reel-to-reel and vinyl to DSD now. I've also done this to combine two-disc releases on to a single disc just so my lazy butt didn't have to swap discs; or because I wanted 5 albums on a single disc.

Software You'll Need:

This guide is written for Windows. I don't know if this stuff will run under WINE.

Philips SuperAuthor
dsdmerge

Philips DST Encoder (Optional)

Foobar2000 with SACD, DSD Processor & DSD Converter components

TEAC Hi-Res Editor

I will not provide links at this time. You can find them with some searching.

What Each Program Does:

Philips SuperAuthor: Creates the SACD image.

dsdmerge: merges DFF files in to a single DSD stream

Philips DST Encoder: Provides DST compression for DSD content.

Foobar2k Package: DSD Transcoding between resolutions (proper) track extraction from SACD images

TEAC Hi-Res Editor: Used to make the FB2K produced files work, trim DSD files losslessly, or figuring out gap lengths.

sacd_extract: (improper) track extraction from SACD ISOs (won't work with your self-made images and I won't tell you how)

The Basic Basic Process:

You need to merge all of your DSD64 (2.8mhz) content in to one single DFF file. Yes, DFF. This is supposed to be a "Master Edit" file, which is the functional equivalent of an embedded CUE. Even when I've made Master Edit DFF files, SuperAuthor does little to nothing with this information.

There are probably several things to do if you have a lot of content. One, you have your DFF files merged into one file using dsdmerge. You have to create a new disc in SuperAuthor, add an album to the disc, add tracks (I don't know how to do this) to the disc, tell it how many tracks there are, then punch in all track information by hand. This includes the length of each track as well as its title information.

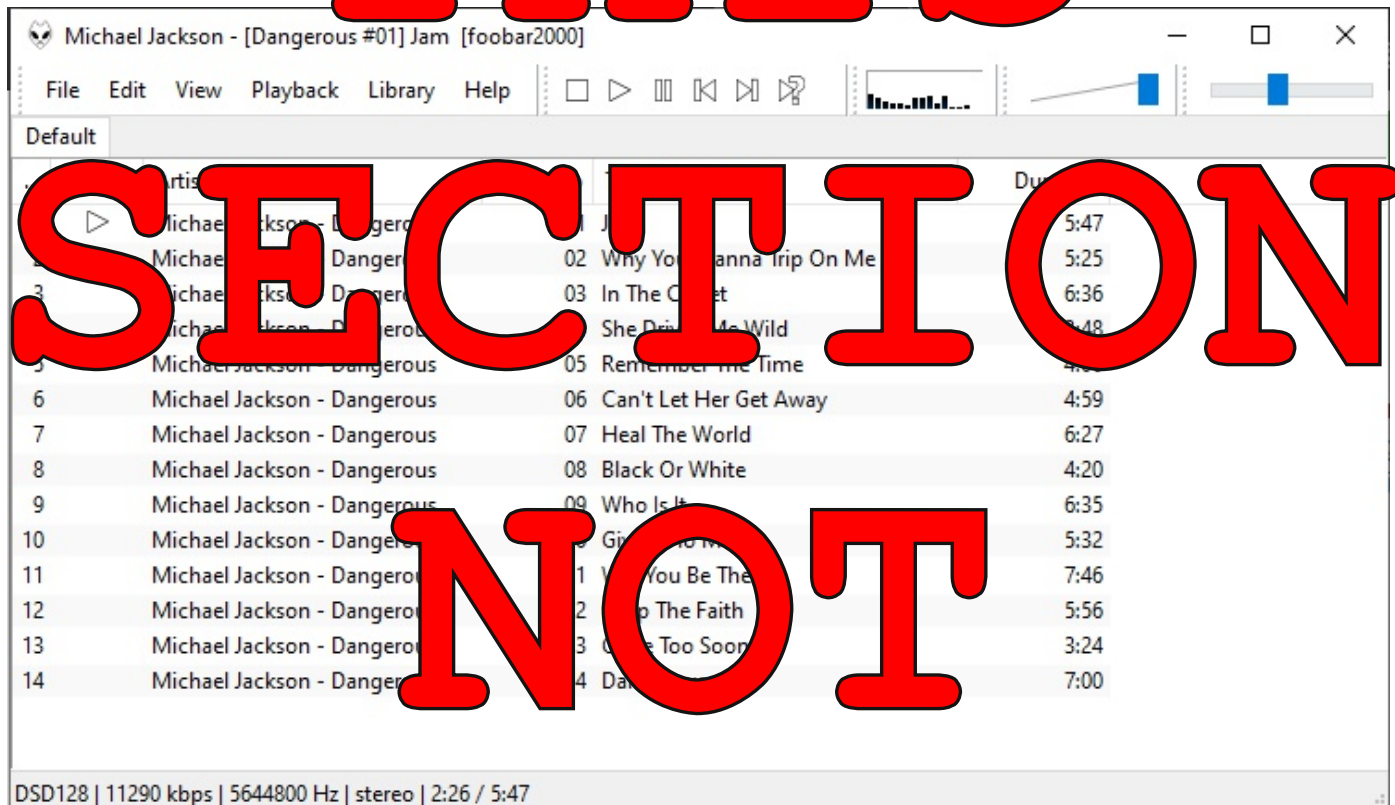
The CUE file you might get from dsdmerge or sacd_extract won't help you much either....SuperAuthor wants you to define the length (not the start position). It also supports a type of "pregap" length, specifying the amount of audio to skip during playback if it isn't there. This was used on discs where the flat master might have longer than expected gaps between tracks.

But first we need to prepare our content to be able to import it in to SuperAuthor.

Higher Rate DSD Rip To SACD Format

For this one we're going to be going from a DSD128 LP rip. In order to make this SACD compatible, we need to convert it to 64k samples per second. The TASCAM method is "easier" and takes about as much time as the foobar method. I'll do both (because I can).

Let's load the album up in Foobar:



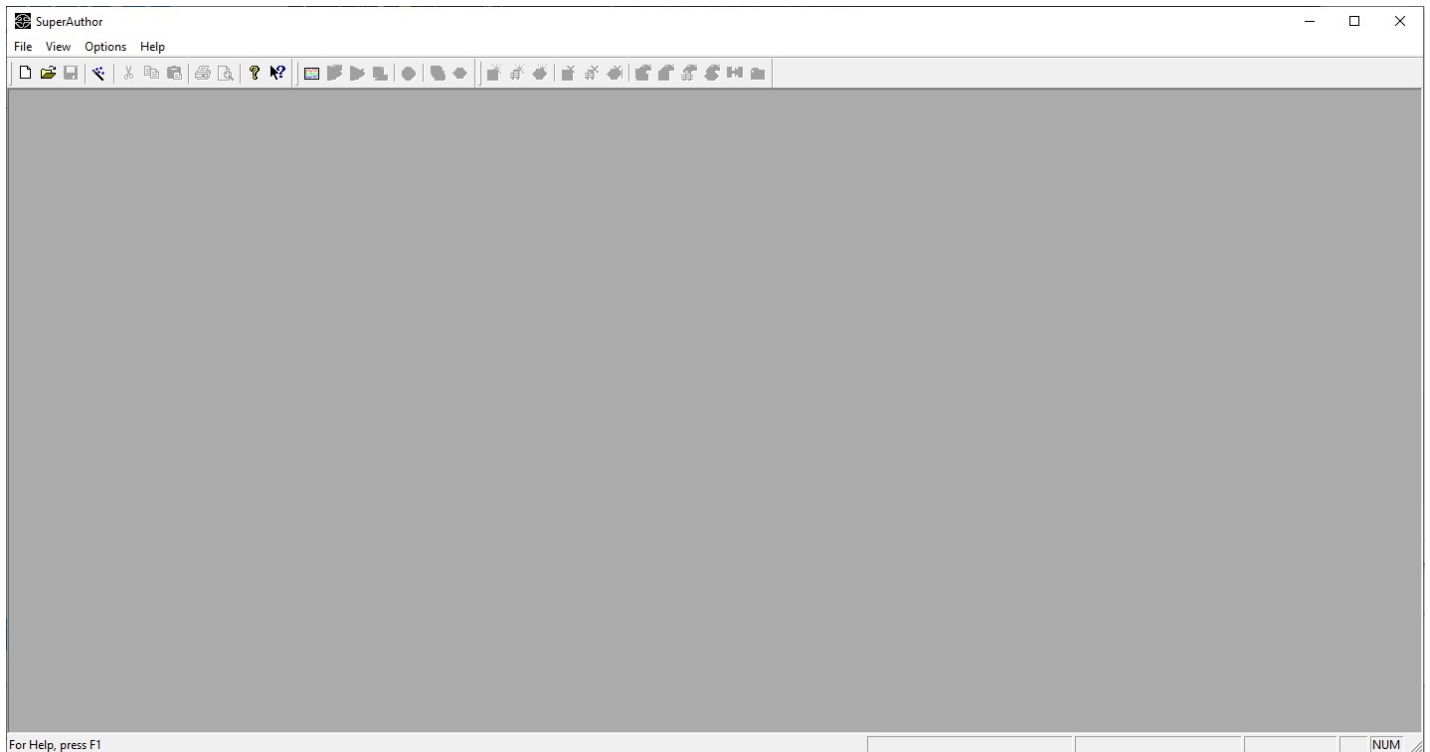
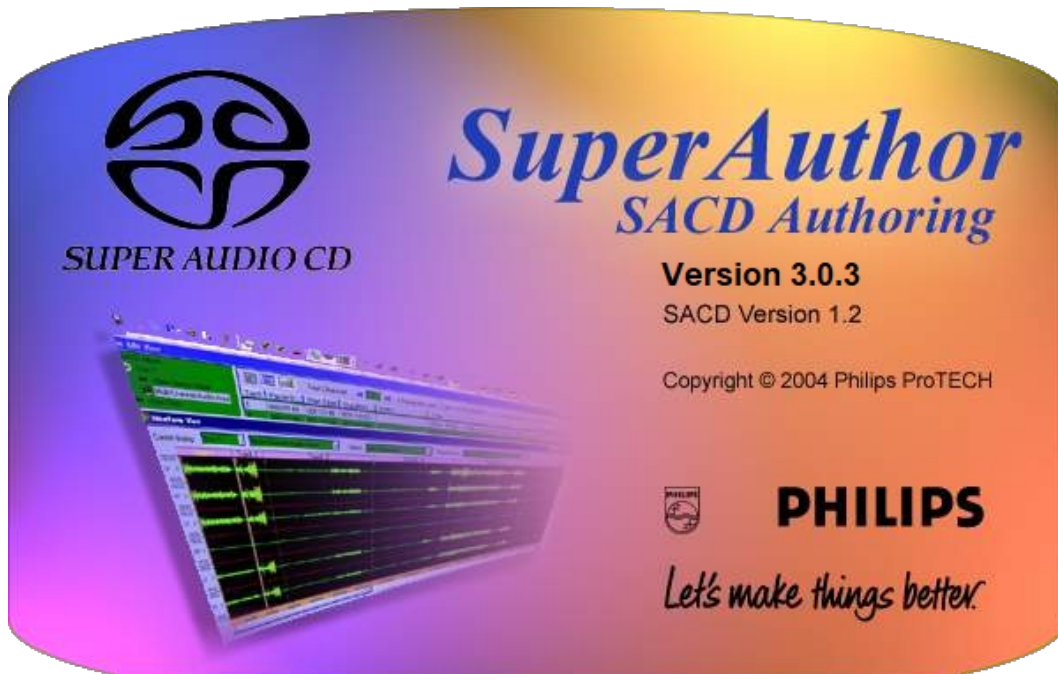
Now click on File | Preferences and click on "SACD" under Tools. You want to change DSD Processor from None to DSD Processor.

DONE

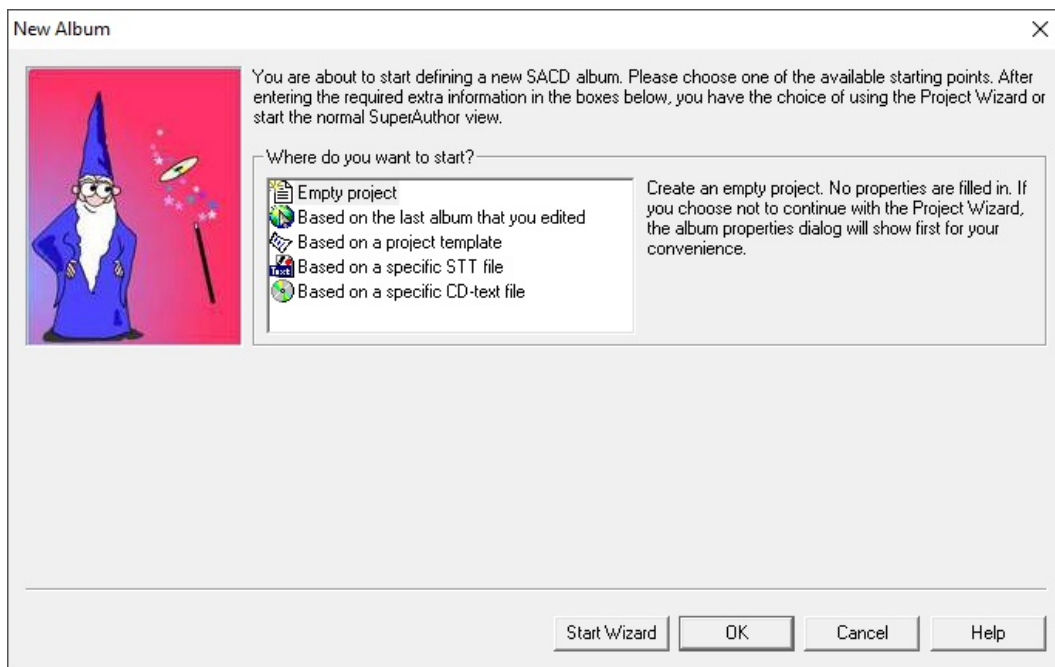
YET

Authoring in SuperAuthor

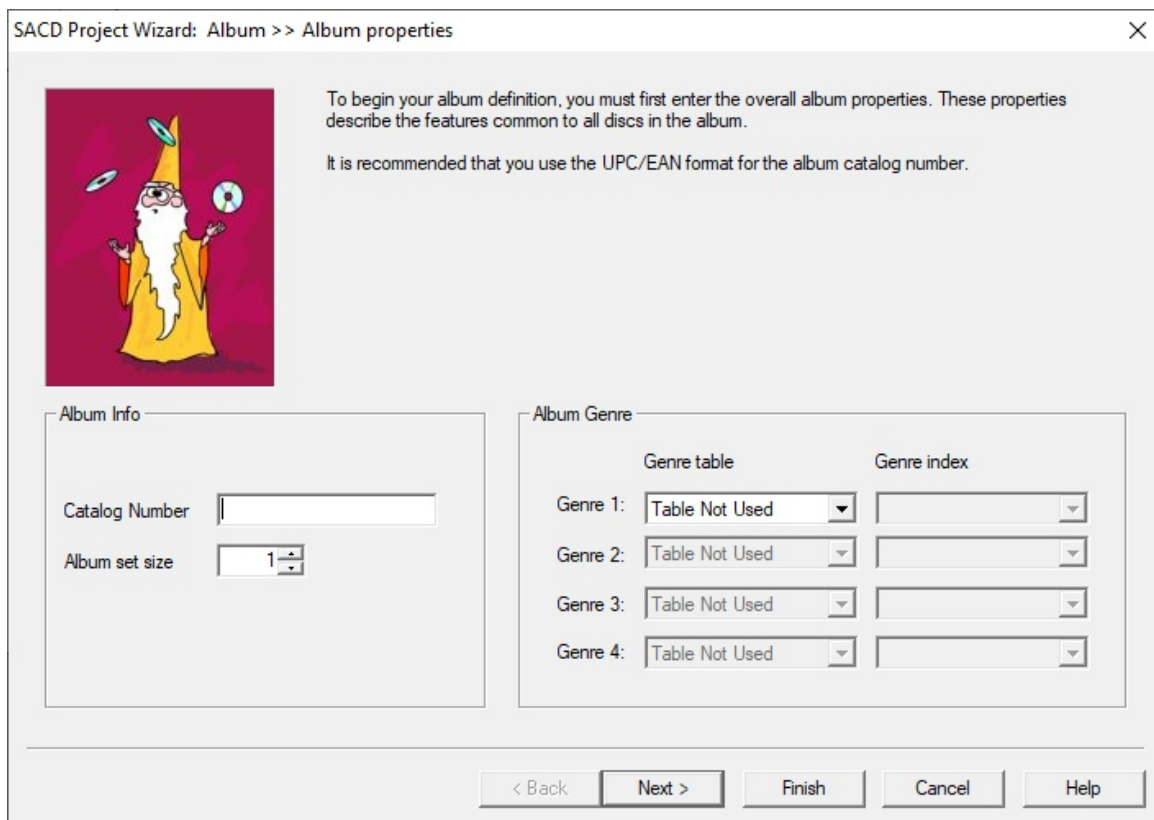
This section covers how to author your SACD image using SuperAuthor. It assumes you have already prepared your DSD data as outlined in one of the first two sections. This process is the same regardless of the presence of DST compression.



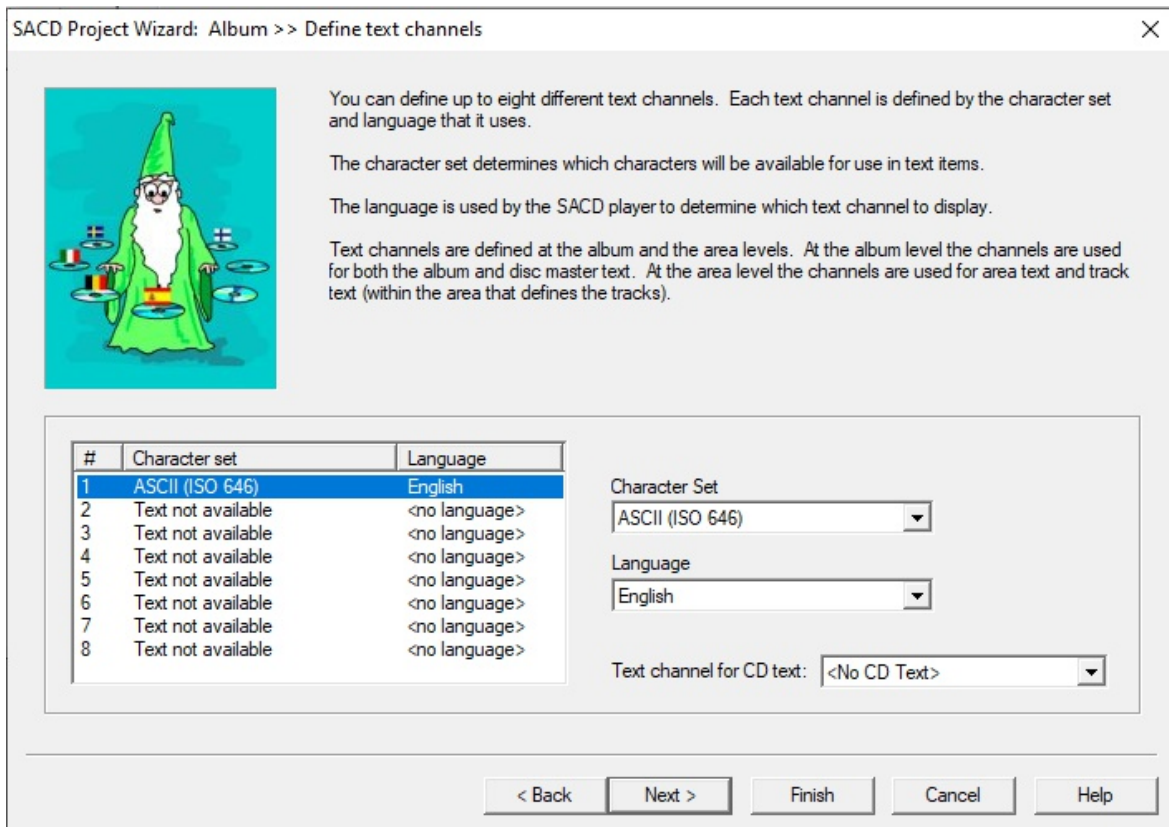
Welcome to SuperAuthor. Yes, it boots up like this. Welcome to the jungle. Go ahead and click the "New" icon at the right of the toolbar.



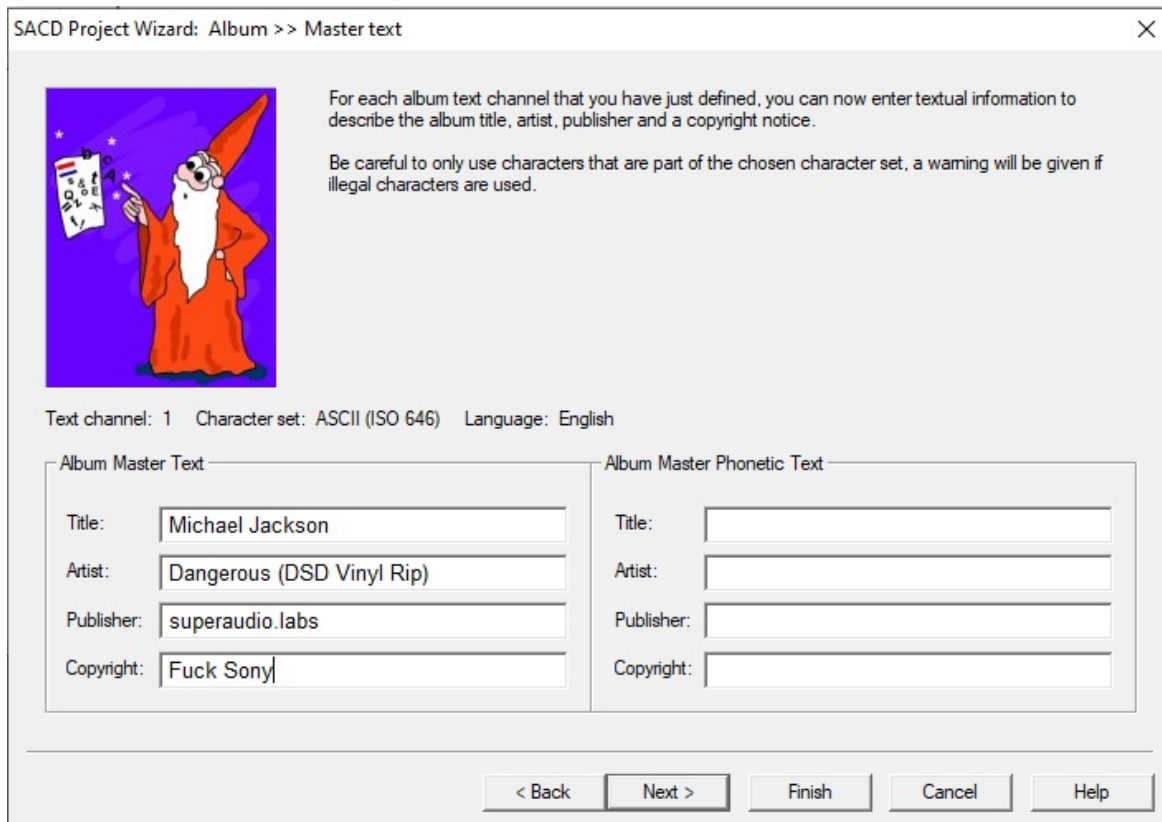
Now go ahead and click "Start Wizard". This will make things less of a pain; but only slightly.



First we'll define some basic album properties. Catalog number can be whatever you want. You will want to pick one (or multiple) genres from either the general table or japanese table. You can intermix tables if you want to get detailed. Next.




Now we define the text channels used on the disc. I typically pick ASCII; you can choose another if you're sure it's what you want to use. Now pick a language, ou can add additional text channels by selecting it in the left box and setting it's options. Next.



These next fields should be explanatory. You can literally enter whatever you want for them...but it might be a good idea they be relevent to your album. I ignore phonetic text entries. Next.

SACD Project Wizard: Disc 1 >> Disc properties



The disc properties are additional to the album properties defined previously and are specific to the disc currently being defined. You must define each disc in order, starting with disc number 1. For all subsequent discs you may choose to use the properties already entered from the previous disc.

You must decide at this point whether this disc will contain a stereo audio area, a multi-channel audio area or both. Specify this by checking the boxes at the bottom.

Disc Info

Catalog Number: SAL-LP-002

Disc Date: 2021-2-15 yyyy-mm-dd

Disc Type: Single Layer

Stereo Area Multi-Channel Area

Disc Genre


Copy from album Copy from previous disc

Genre table	Genre index
Genre 1: Japanese Genre	Pop music
Genre 2: Japanese Genre	Rock/Disco
Genre 3: General Genre	Pop Music
Genre 4: General Genre	Rhythm & Blues

< Back Next > Finish Cancel Help

Some more disc properties. Catalog and disc date can be whatever you want. For Disc Type you'll pick single-layer or dual-layer depending on if you're intending to make a single or dual layer disc. Pick the "areas" you want (stereo, multi-channel). Click "Copy from album" under Disc Genre; that imports some information you entered earlier. Next.

SACD Project Wizard: Disc 1 >> Master text



Disc Master Text contains the same properties as master text at the album level. All discs use the same text channel definitions (character set and language) as defined for the album.

There is an additional option for Disc Master Text that allows you to copy all the text for the current channel from the album.

Be careful to only use characters that are part of the chosen character set, a warning will be given if illegal characters are used.

Text channel: 1 Character set: ASCII (ISO 646) Language: English Copy disc text from album text

Disc Master Text

Title: Michael Jackson

Artist: Dangerous (DSD Vinyl Rip)

Publisher: superaudio.labs

Copyright: Fuck Sony

Disc Master Phonetic Text

Title:

Artist:

Publisher:

Copyright:

< Back Next > Finish Cancel Help

More text entries? Didn't we enter this earlier? We did. Just check "Copy disc text from album text". This is why we're using the wizard...otherwise we'd have to manually enter some of this crap twice.



Stereo Area

Here you can specify properties specific to the stereo area of your disc.

If your disc is to contain extra data then select this option under Area Type. By selecting this, each sector on the disc will contain less audio data in order to leave space for extra data. This option therefore reduces the total playing time available due to the space available on the disc.

The track offset should be set to the sum of all the tracks from previous discs in the album. This can be calculated automatically by selecting the check box. This option is not available for the first disc, which must have a track offset of 0.

Area Properties	Advanced Area Properties
Area Type: <input type="text" value="Stereo"/>	Area Copy Management: <input type="text" value="Comply with Copy Management List"/>
Track offset: <input type="text" value="0"/> <input type="checkbox"/> Automatically calculate	Audio Ch 4 use: <input type="text"/>

You don't really change anything here...at least I don't. I have no clue what "Stereo Area +extra data" does....and I don't care. Just click Next.



You can define up to eight different text channels. Each text channel is defined by the character set and language that it uses.

The character set determines which characters will be available for use in text items.

The language is used by the SACD player to determine which text channel to display.

Text channels are defined at the album and the area levels. At the album level the channels are used for both the album and disc master text. At the area level the channels are used for area text and track text (within the area that defines the tracks).

#	Character set	Language
1	ASCII (ISO 646)	English
2	Text not available	<no language>
3	Text not available	<no language>
4	Text not available	<no language>
5	Text not available	<no language>
6	Text not available	<no language>
7	Text not available	<no language>
8	Text not available	<no language>

Copy definitions from album


Character Set:

Language:

Text channel for CD text:

Are we having fun yet? Yes, it wants this again. Just click "Copy definitions from album", and click Next.

SACD Project Wizard: Disc 1, Stereo Area >> Area text



You can specify here an area name and an additional copyright notice specific to this area.
Be careful to only use characters that are part of the chosen character set, a warning will be given if illegal characters are used.

Stereo Area

Text channel: 1 Character set: ASCII (ISO 646) Language: English

Area Text		Area Phonetic	
Name:	<input type="text" value="Stereo LP Rip"/>	Name:	<input type="text"/>
Copyright:	<input type="text" value="Fuck Sony."/>	Copyright:	<input type="text"/>

< Back Next > Finish Cancel Help

You can give your area a name. Really. Stereo area not enough? You can call it "STUPIDLY HIGH DEFINITION AUDIO". Or you can enter nothing. This isn't 100% critical. Next.

SACD Project Wizard: Disc 1, Stereo Area >> Create Tracks



You can create all the tracks for your area in one simple step using the Project Wizard. At the same time, the Wizard can fill in the genre and audio channel usage for all new tracks.


Create tracks in this area

Default genre for all new tracks	Default audio channel use for new tracks
Genre Table : <input type="text" value="General Genre"/>	<input checked="" type="checkbox"/> LF + RF <input type="checkbox"/> Center <input type="checkbox"/> LFE <input type="checkbox"/> LS + RS
Genre Index : <input type="text" value="Pop Music"/>	

< Back Next > Finish Cancel Help

Okay, we're getting closer. Now you specify a default genre for your tracks and how many tracks you want to create. Then click next.

SACD Project Wizard: Disc 1, Stereo Area >> Track Text



Here you can enter any text items that will be common to all tracks in the area. These items will typically be the Performer or Songwriter name, Copyright Notice, etc.

The text on this page is for one text channel only, as displayed on the left of this window.

Text channel: 1
Character set: ASCII (ISO 646)
Language: English


Text items used: 0
Total text items available: 10

Text Type	Text
Title	
Performer Name	Michael Jackson
Songwriter Name	
Composer Name	
Arranger Name	
Content Provider Message	
Extra Message	
Title (Phonetic)	
Performer Name (Phonetic)	
Songwriter Name (Phonetic)	
Composer Name (Phonetic)	
Arranger Name (Phonetic)	
Content Provider Message (...)	
Extra Message (Phonetic)	

< Back Next > Finish Cancel Help


Now you can enter any information that might be common among every track. Next.


SACD Project Wizard: Disc 1 >> File Parameters - Input




If you already have the data files needed to build your disc, you can enter their locations here. Alternatively you may skip this step and fill in the values in the File Parameters window at a later stage.

Input Files

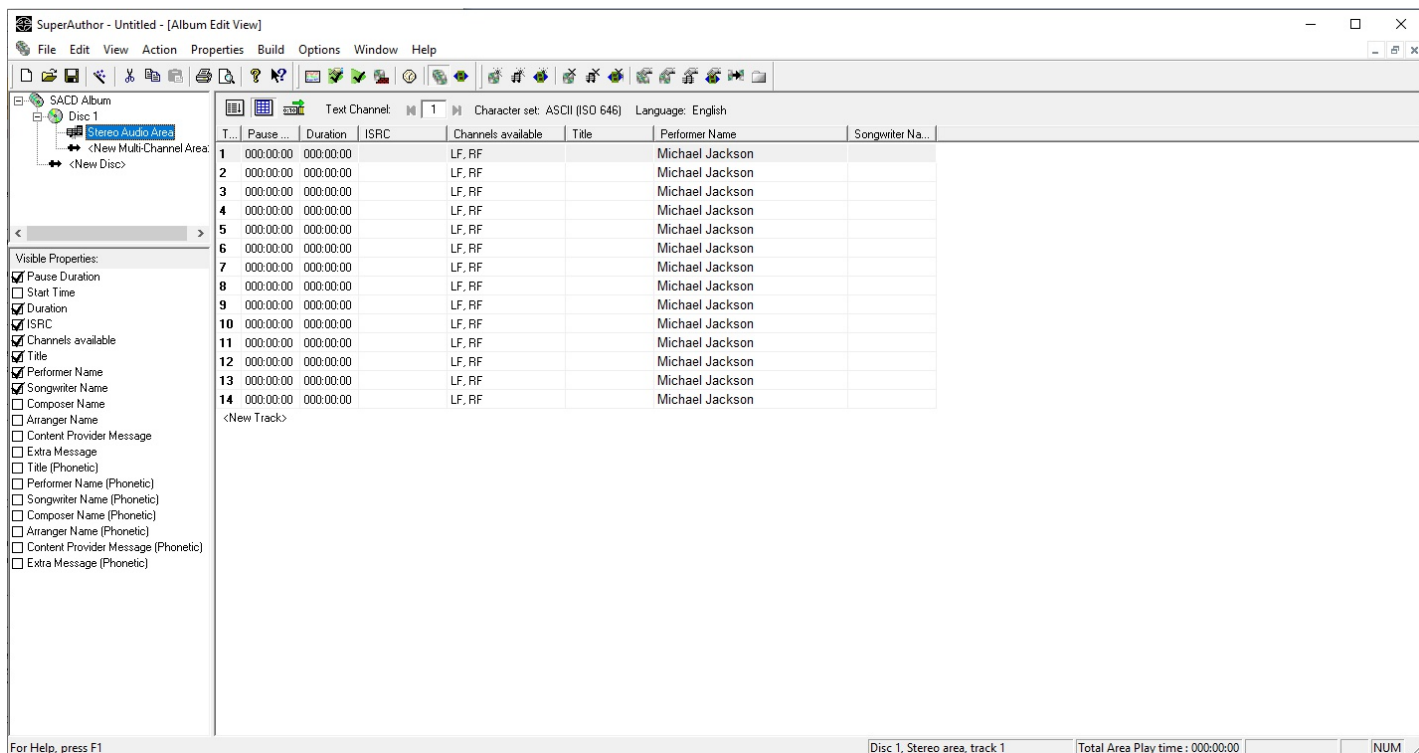
Stereo audio data file : 

Multi channel audio data file : 

Watermark bitmap : 

< Back Next > Finish Cancel Help

Pick the location of your audio files; the merged DSD data you made earlier. I guess you could pick a watermark bitmap but I have no clue what they technically are. This isn't going to play outside of modified players anyway. Click next and the next window just lets you choose where to save things. If you accept the defaults; it will save them in the same directory your source DFF is. Click Next. Click Finish on the next window. You're not even close to done.



So look at this bad-boy. It's mostly blank and we need to fill in the rest of the information. I'll give you a quick idea of what each column is we're worrying with.

- *Pause* - pre-gap, specifies length between tracks to "ignore"
- *Duration* - Length of the track in MMM:SS:FF
- *Title* - Track Title

Since we pre-edited these tracks, we aren't worrying about pause entries. What we need to do is enter the length of each one. This probably sounds more tedious than it can be.

75fps

Custom Foobar2000 75fps Column

5:38:60

If you skipped ahead and don't know about the custom UI column for Foobar, you need it now; so here it is again. This column will display the 75fps timecode so you don't have to figure out how to calculate it by hand.

5:24:55

6:33:24

3:41:59

The code for the column is as follows:

4:00:13

```
$left(%length_ex%, $sub($len(%length_ex%), 4)) : $num($div($sub(%length_samples%, $mul(%length_seconds_fp%, %samplerate%)), $div(%samplerate%, 75)), 2)
```

4:59:35

6:26:55

4:15:28

Now you can put Foobar2000 and SuperAuthor on the same screen and have an easy-to-see list of all your track lengths in the format you need. You'll need this column if you follow the other tutorial for dealing with extracted SACD data. You can see an example to the left. In our case, we used the CUE sheet generated by dsdmerge.exe; this is because we pre-trimmed gaps off our DSD files before merge.

6:35:13

5:31:00

7:39:62

5:56:30

3:23:45

If you're doing this from an SACD source, you'll likely need to load a different file. The specific tutorial section will specify which to use.

7:00:07

T...	Pause ...	Duration	ISRC	Channels available	Title	Performer Name	Songwriter Na...
1	000:00:00	005:38:60		LF, RF		Michael Jac...	
2	000:00:00	052:40:55		LF, RF		Michael Jac...	
3	000:00:00	006:33:24		LF, RF		Michael Jac...	
4	000:00:00	003:41:59		LF, RF		Michael Jac...	
5	000:00:00	004:00:13		LF, RF		Michael Jac...	
6	000:00:00	004:59:35		LF, RF		Michael Jac...	
7	000:00:00	006:26:55		LF, RF		Michael Jac...	
8	000:00:00	004:15:28		LF, RF		Michael Jac...	
9	000:00:00	006:35:13		LF, RF		Michael Jac...	
10	000:00:00	005:31:00		LF, RF		Michael Jac...	
11	000:00:00	007:39:62		LF, RF		Michael Jac...	
12	000:00:00	005:56:30		LF, RF		Michael Jac...	
13	000:00:00	003:23:45		LF, RF		Michael Jac...	
14	000:00:00	007:00:07		LF, RF		Michael Jac...	
<New Track>							

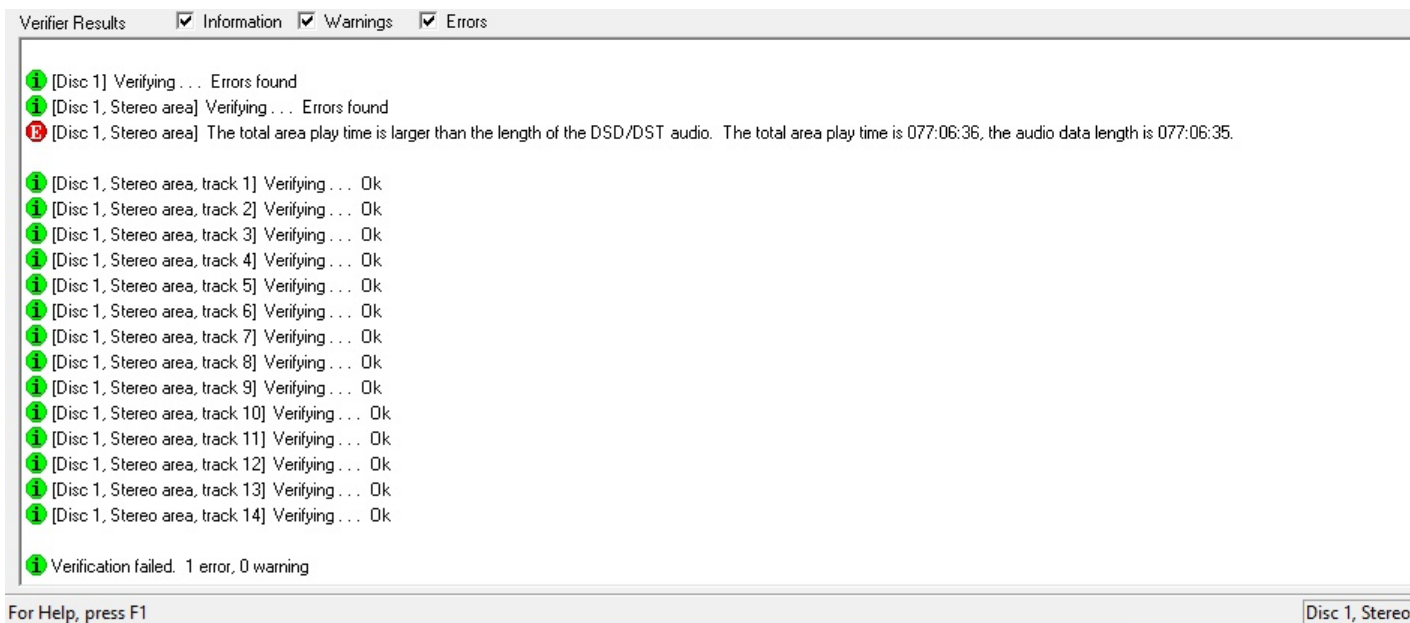
So here's the quickest way I've found to do this. Click the duration field of the first track, enter the time from the Foobar 75fps column, but add two 0s to the minutes. It will automatically populate each field as long as you add those first two 0's (unless you have a track over 9 minutes). If you press Enter, it will automatically jump to the next track's duration for entry; enter that time padding out the minutes. Hit enter. Repeat for track 3. Keystrokes would look like this:

0053869(Enter)0052455(Enter)0063324(Enter)0034159....

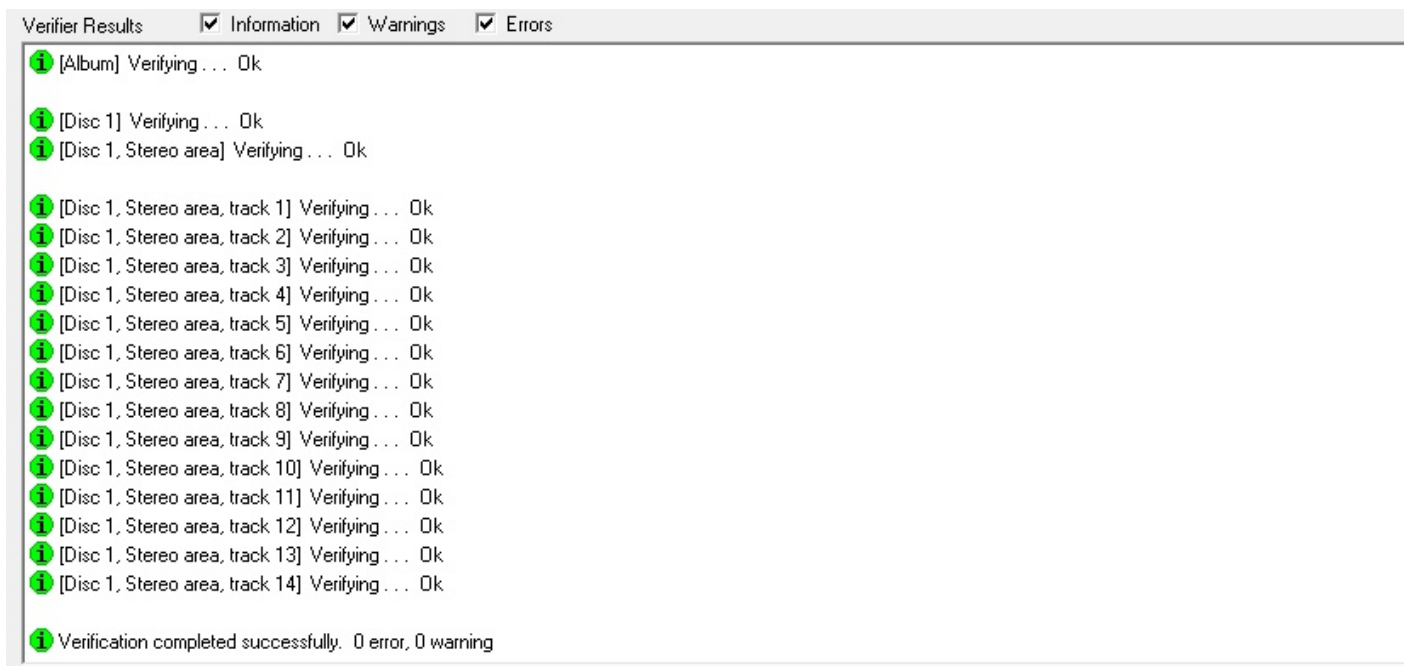
That little trick makes it easier, but it's still a bit of a pain. But...we have all our lengths entered; now we just need to add track titles. They work the same way; click the first one, type it in, hit enter, type the second track title, hit enter, rinse, lather, repeat.

T...	Pause ...	Duration	ISRC	Channels available	Title	Performer Name	Songwriter
1	000:00:00	005:38:60		LF, RF	Jam	Michael Jac...	
2	000:00:00	005:24:55		LF, RF	Why You Wanna Trip On Me	Michael Jac...	
3	000:00:00	006:33:24		LF, RF	In The Closet	Michael Jac...	
4	000:00:00	003:41:59		LF, RF	She Drives Me Wild	Michael Jac...	
5	000:00:00	004:00:13		LF, RF	Remember The Time	Michael Jac...	
6	000:00:00	004:59:35		LF, RF	Can't Let Her Get Away	Michael Jac...	
7	000:00:00	006:26:55		LF, RF	Heal The World	Michael Jac...	
8	000:00:00	004:15:28		LF, RF	Black or White	Michael Jac...	
9	000:00:00	006:35:13		LF, RF	Who Is It	Michael Jac...	
10	000:00:00	005:31:00		LF, RF	Give In To Me	Michael Jac...	
11	000:00:00	007:39:62		LF, RF	Will You Be There	Michael Jac...	
12	000:00:00	005:56:30		LF, RF	Keep The Faith	Michael Jac...	
13	000:00:00	003:23:45		LF, RF	Gone Too Soon	Michael Jac...	
14	000:00:00	007:00:07		LF, RF	Dangerous	Michael Jac...	
<New Track>							

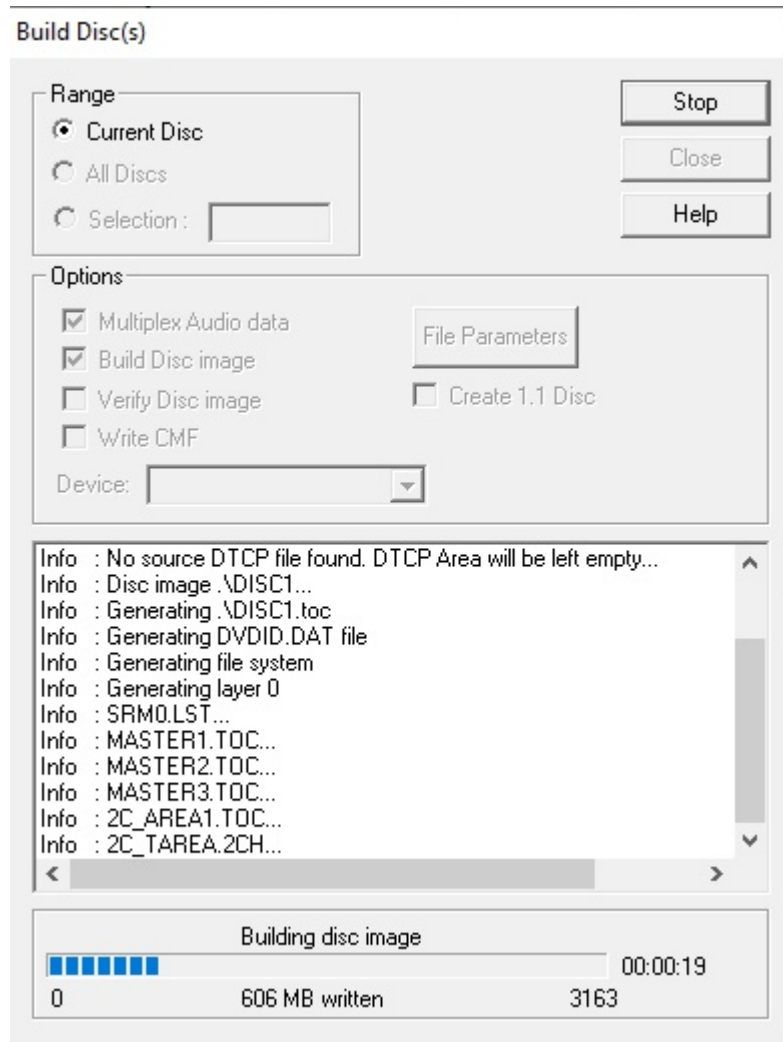
Ok...with all the basic metadata entered; we're ready to start the build process. Go to the top, select build, and select Verify. The results will be printed in the status window.



In our case, we have an error; the amount of data specified in the disc is longer than the DSD data in the file. I expected this as my Foobar script isn't perfect. Does it matter where we got one frame off? No. It literally will not matter, it's 1/75th of a second. I will just shorten the length of the last track by one frame and reverify.



Ok, we passed. Errors usually prevent you from building; but a warning usually won't. Ideally you shouldn't have any. But now we can go back up to Build and get to building.



The defaults are fine, all you have to do is click build and wait for it to finish. There's no flashy sounds or anything; it just stops when it's done. Click Close to close the build window.

You have successfully built a SACD image. Now let's verify it works. Browse to the folder where SuperAuthor output stuff and open the DISC1 folder. Inside you will see a DVDIMAGE.DAT file; this is your image.

Success! We've created an "SACD Image".