#### **DIGITAL MUSIC**

#### CALLERLAB CONVENTION - APRIL 18, 2011

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## 1. What is Digital Music?

- a. Digital Music is music that has been recorded and digitized into electronic files.
- b. What was once recorded onto a vinyl record is now stored in a single file that may be played by various different music players.
- c. Music that has been recorded digitally may be edited and spliced together to create different versions and longer running versions of the same tune.
- d. Using Computer Software (and some music players) you can change the pitch/tempo and set loops to allow the music to fit your voice and calling style.
- e. Digital Music can be purchased legally as downloadable files which can be stored on your computer.
- f. Digital Music can be created from existing vinyl records by playing the record and directing the output into the computer for capture into a file.
- g. Various music file types with different levels of compression are available. Generally, .MP3 is suitable and most common file type in use for working with music.

# 2. Do You Want to Go Digital? - Pros & Cons - PROS

#### a. Greater music selection

- -- While most music released through Palomino is in all three (vinyl/CD/MP3) formats, some producers are going totally digital and selling their music online independently.
- -- Out-of-print records are being re-released as MP3s.
- -- Non-traditional square dance music: music that can be used for square dancing, but is not released by square dance record producers.
- b. **Convenience**: More music, less space.
- c. **Longevity**: Digital music doesn't wear out and get scratchy.
- d. **Music control** (with some equipment): independent pitch and tempo control
- e. **Speed**: You can get (almost) instant gratification with MP3 files--order your music and get it the same day.
- **f.** Can be distributed easily around the world A few "on-line" clicks and you can have the music in your computer.
- **g. More square dance music is available digitally -** On the April Hanhurst release, no releases were only available in vinyl. Most were in all three formats (vinyl/CD/MP3), giving callers a greater choice. A few were digital only; and vinyl was not available for some re-releases.

- h. Digitizing vinyl is more mainstream A little web research will find tons of information about recording old LPs to CDs. USB turntables make connecting a turntable to your computer easier. Sound editing and noise removal software continues to improve.
- i. Computers/Music Devices are getting smaller and cheaper and more powerful-Laptops, IPad, netbooks, smart phones and many other players are available to play music. The iPhone/iPod Touch just got some software that will adjust tempo and pitch on the fly. With new systems like Android and the iPhone, perhaps someone will write some calling software.
- j. **Custom music possibilities** With digital music production techniques, it's possible to get custom music made for a reasonable cost.

#### - CONS

- a. **Expense**: you'll need some additional equipment and additional software.
- b. **Time**: If you choose to go completely digital, it takes time to digitize your vinyl recordings.
- c. **Complexity**: You'll need to learn about new equipment and new techniques.
- **d. Reliability**: Vinyl always works (unless the turntable breaks). Electronic equipment is more fragile.
- **e. Music piracy remains a problem --** We're going to lose new music for square dancing if callers share their music. It is easy and tempting to share it BUT DON'T. If you're going to use the music, buy it! It is illegal to give copies of your music files to other callers while retaining your own copy for use.

#### 3. Purchasing Music

a. Now that most square dance music is being released in multiple formats (vinyl/CD/MP3, vinyl/CD, or CD/MP3), which should you buy? The price for all three formats is the same. With CD and MP3, you will often get three versions in different keys. Sometimes, you'll get one track with vocal backing and one without. Some labels will give you both a short and long patter track. Buying the CD gives you "hard copy" for backup and it is easy to get the uncompressed sound onto a computer or play it with a CD Player. You can avoid delivery costs and delays by buying MP3s, which are delivered digitally from many sources. They are immediately ready to use but are already compressed so can affect your editing.

b. There are several square dance specific sites set up by record producers to legally purchase music files. All allow you to pay for the music using credit card or PayPal and then give you a way to download the song after you have purchased it.

#### 4. Alternative Music

- a. If you buy music from an online music service (iTunes Store, for example), it may be in a format that your digital music management program doesn't play. For example, music purchased from iTunes is in the AAC format, which Winamp can't play. If the digital rights management in the format allows it, you can make a CD, and then convert the CD to MP3s. (Note: this is a decompression/lossy recompression technique.)
- b. Amazon.com, WalMart.com, iTunes and numerous other websites legally sell music of all kinds that you can buy usually for a dollar or less. The possibilities are endless for the type of music you can find.

## 5. Conversion of Digital Data Formats

- a. **Vinyl to Anything -** Best technique: Record to computer, use software to remove scratches and clean up sound, back up .wav files to CD, transfer to desired format. There are several USB turntables available that make connecting and recording to a computer easier—just plug the turntable to your computer's USB port If you decide to record to CDs, record at a fairly slow rate; the CDs will be more likely to play in a wide variety of CD players.
- b. **Mini-Disc to MP3** Best technique: re-record your original vinyl to computer. See above. Record to computer. There's currently no way to avoid the step of reconverting the ATRAC format MD files to .wav files and then converting to MP3. With old equipment, there's also no way to avoid real-time recording. The best you can do is look for convenience: if your MD player has an optical out, and your sound card has an optical in, you may be able to avoid a digital to analog to digital conversion. Backup .wav files to CD (to avoid future lossy conversions) and then convert to MP3s.
- c. **CD to MP3** Use computer software to "rip" the CD files. Most software can create MP3 files directly. You don't need to back up, since you have the original CDs as your backup. However, re-ripping the CDs is time-consuming, so you probably should back up your MP3 files to CDs, DVDs, or another hard disk.
- **d. MP3 to Anything -** Try to avoid doing this. MP3 is a lossy compression format. You should use your original .wav files or CDs to convert to other formats. If it's unavoidable (i.e., you bought MP3 files), use software to convert the MP3 to a .wav

file. Back up the .wav file, so you won't have to do this again. Convert the .wav file to the desired format.

### 6. Recording and Editing Sound Files

## a. Equipment needed:

- A turntable. Don't use your Hilton turntable if you can avoid it. You'll get better sound from a "hi-fi" turntable. If you're going to buy a new turntable for this purpose, consider one with USB output.
  - An amplified signal from the turntable that has been RIAA equalized. Some modern turntables provide amplified and equalized output. Some provide equalized output, but still need pre-amplification. Some computer programs can take normal phono output and do the RIAA equalization in software.
  - Software that can record audio to the computer's hard drive.
  - Software to process and clean up the audio. (May be the same as the software used to record the audio.)
  - Software to convert the uncompressed audio files to MP3s.

#### b. Process

- Clean the record (garbage in, garbage out). Check out Gruv-Glide; it may make your record sound better. If your record is badly worn, consider buying a new copy.
- Check the recording levels; maximize signal without clipping.
- Record in stereo. Don't worry about trying to record just the music; you want some of the "noise" without music.
- Remove the background noise if necessary. Most sound editing software includes the ability to sample the noise and then remove that noise from the music. Results vary widely; you should listen and make sure the music is still acceptable after processing.
- Trim the non-music from the start and end of the recording. Some callers like to add a couple of seconds of silence to the start and end.
- De-pop and de-click the music. Some sound editing software includes click-removal processing, but you may prefer to do this manually.
- Equalize if needed.
- Normalize or amplify the music if needed.
- Change the tempo, if needed. (I tend to change the tempo as needed at the dance. If

I'm adapting some non-traditional music for square dancing, and it's very slow or fast, I'll use sound editing software to change the tempo to a normal square dance tempo.) If you're using a playback device without tempo control, you may want to create different versions at different tempos.

- Change the pitch, if needed. If you're using a laptop, you can do real-time pitch-shifting at the dance. I prefer to figure out what I want and do it using sound editing software.
- Convert the file to MP3.

## c. Files to keep

- The original, unprocessed recording. Sound processing software might improve in the future and you might be able to get better results.
- The cleaned-up recording.
- The tempo- and pitch-shifted recording.
- The MP3.

## d. Music Quality

#### Terms:

- Bit.
  - "b" a "1" or "0", "data letter" Referred to in data transfers
- Byte
  - "B" 8 bits, "data word" Referred to in data storage
- Kilo
  - "k" 1000 thousand
- Mega
  - "M" 1000000 million
- Hertz
  - "Hz" cycles per second
- Sample Rate
  - How often we measure the sound signal
- Bit Depth
  - Amount of data we read per sample
- Channels
  - Audio dispersions in stereo, mono, surround sound, etc
- Bit Rate (bits per second, bps)
  - Samples X Bit Depth X Channels = Bit Rate
  - CD Bit Rate
    - 1411 kbps
      - 44100 Hz x 16 bit x 2 channels = 1,411,200 bps

#### MP3 Bit Rate

Is variable from 16 kbps to 320 kbps

Higher bit rates provide better quality sound but require more storage space on the player device. It is important to find the point of diminished returns. This is the point where bit rate increases no longer produce increased audio quality over your sound system.

Where do you hear the point of diminished return?

16kbps 32kbps 64kbps 128kbps 160kbps 320kbps

Stereo versus Mono:

On typical amplifiers stereo inputs are "down mixed" to mono. It would be a space savings on your player to record/convert audio files to mono.

## 7. Organizing Files on Your Computer

- a. Music files tend to multiply like rabbits you need a good organizational method to keep track of the files you have to created. There is one file for each song/record that you have.
- b. Computers allow you to have long file Names Make use of it.
- c. Files may be stalled in a series of FOLDERS on your computer which are just like file cabinet folders. Develop a system to store your files in a folder structure that will help you locate the music quickly. For example, I keep my patter files in a folder named C:\Music\SDPatter. I keep my singers in C:\Music\SDSinger and my cue sheets in C:\Music\CueSheets. Pick some structure that you can remember and stick with it.
- d. The file name is important if you use computer software for callers. The programs work best if your names match the format they are looking for and it can be different for different programs. Some wish to see the name in the format: <Name> <Rec label> <Rec No> (e.g. Angel Dance Desert 9009.mp3). Others would like to see that as Desert9009 Angel Dance. Pick a naming format and be consistent with every file you put on your computer. It may mean that you have to rename one you have purchased on-line.
- e. Install a system of REGULAR backups for your computer, copying to an external hard drive or an on-line backup service. You can never take too many backups.
- f. Have an alternate music player to play in an emergency, such as smart phone, CD player or other device that can play music. Keep some music that you can play if your computer gives out!

## 8. Working with Music at a Dance

#### a. Laptop Computer

#### Pros

- A laptop allows you to change pitch and tempo on the fly. You can have easy access

to thousands of songs. You can set up playlists, do looping, display information on the screen. You can quickly filter and find music based on keywords, lyrics, etc.

- Can **eliminate paper**: display all information on screen
- Can easily keep a full library of songs and retrieve quickly. Special software has been created specifically for caller use (see details below).

#### Cons

- **Expense**: Laptops are the most expensive playback technique.
- **Reliability**: Laptops are fragile. Hard disks can crash. Software can crash. You must carry some kind of back up music.
- Complexity: Along with the power comes a steep learning curve.

### b. Tablet Computers, IPad, IPod, ITouch

- Tablet computers from several companies have provided the same processing power as their larger laptop cousins. They can be used to organize and play music in a smaller package with a modern interface of "finger" touch to manipulate the data. Several run the Windows Operating System so caller music software can be used just as in the laptop.
- The IPad, IPod, ITouch and several competing products all provide convenient and excellent ways to store, manipulate music. Many have an entirely different way of organizing the files and, of course, several ways to access and play the files as needed. They are easy to carry around and may be a viable option worth considering.

## c. CD Players/MP3 players/Smart Phones.

- Hard disk MP3 players and smart phones can hold most of the music you will ever use however, they have capacity limitations you might run into. Looping is possible, especially if you plan ahead and divide your patter music into separate tracks on your computer. Tempo control may be possible, but check the interface and the granularity. Most tempo control features are designed for speeding up audiobooks, and aren't suitable for minor tempo adjustments. Check the interface; when you have thousands of songs on the device, you need a way to find and organize them to make it easy to play them at dances.
  - **CDs**. DJ CD players provide tempo control and looping (which may involve setting loop points every time you play the track). If you use MP3 CDs, you can pack a lot of music on a single disk.

#### d. Ways to handle looping

- All players have a single-track repeat mode. Be sure to check the interface. This works if you don't mind starting the track from the beginning when you reset, or if you divide the song into separate tracks on your computer.

- Alternative: Create longer tracks on the computer, using your sound editing software's capability to copy and paste sections of the music. This is more work up front, but easier at the dance.

### e. Ways to handle tempo control:

- Note which records are slower and faster, and use records with the appropriate tempo.
- Alternative: Use your computer's sound editing software to create different versions of the track at different tempos.

#### e. Ways to handle track organization and cue sheets:

- CDs can hold multiple songs, so you'll need a way to keep track of which song is on which disk. Also, you'll need a way to quickly find cue sheets, since each tune doesn't have its own cover any more. If you keep a database of your songs, you can print various lists and keep them in a notebook: by disk, by title, by record label—any way that would help you find what you're looking for. You could keep the record jackets, or you could copy them onto notebook size paper to keep with your lists of records.

# 9. Specialized Computer Software for Callers

Software has been developed to run on Windows computers that is set up to play your music, display your cue and lyrics sheets for each song, let you change the pitch, tempo, set loops and adjust what is played in many different, convenient ways. It will also help you with choreography. There are for major programs for Windows (unfortunately, there is nothing that I am aware of that is written specifically for the Mac): See the appendix for screen prints of each program. Demo versions are available that you can try on your own computer.

- Ceder Square Dance System Vic Ceder \$200 USD http://www.ceder.net/csds.php4
- Digital Music Magician Palomino Supreme Audio \$149 USD http://www.dosado.com/cgi-bin/lib/shop-wrapper.pl?page=dmm&shop=dosado
- Sqmp3Gold Dave Wilson -- \$150 USD http://www.sqmp3.com/
- Sqview Thomas Bernhed -- Free <a href="http://www.sqview.se/">http://www.sqview.se/</a>

## 10. Factors to Consider Choosing a System for Playing Music

- a. How **easy** is it to use at a dance? You don't want the hardware to interfere with your calling and your relationship with the dancers. MD, CD, and MP3 players may have tiny buttons and a confusing interface. Some functions may only be available on the remote control. A computer requires working with the software you choose to play your music.
- b. Do you need **tempo control**? At the dance? The slider on a turntable is easy.
- c. Do you need to **loop** your patter music? The reset button on a turntable is easy.
- d. How will you handle **singing call lyrics**? The record jacket is convenient.
- e. How will you keep your music **organized**? It's easy to keep records in a case with dividers, and you can find one by flipping through them. It's harder with CDs and MDs with multiple tracks.
- f. Do you work with **other callers**? It's easier to flip through someone's records than it is to examine their laptop.
- g. How much **money** are you willing to spend?
- h. How comfortable are you with **modern technology**?
- i. How easy is it to **convert your vinyl to a digital format**? Recording to MiniDisc is fairly easy (but time consuming). Recording to a computer requires more knowledge, but gives you more power to improve your recordings and more flexibility in the future.
- j. What kind of **image** do you want to project? Most people under thirty have never used vinyl or even seen records.

# 11. Recommended Hook-Up for Playback

Hilton Model	Input	Booster	Location of Signal In Jack
Micro-75 <sup>2</sup>	RCA	No	Rear RCA Jack "Music"
Micro-75A*,B*,C2	RCA	Note 1	Rear RCA Jack "Music"
Micro-100	1/8"	No	Front 1/8" Jack "Music In"

AC-201 <sup>2</sup>	RCA	No	Front RCA Jack "Music In"
AC-205	1/8"	No	Front 1/8" Jack "Music In"
AC-200	1/4"	Yes	Top Deck 1/4" Jack "Tape Playback"
AC-300 <sup>2</sup> , A*, B*,	1/4"	Note 1	Top Deck 1/4" Jack "Tape Playback"
AC-500 (SN 1- 252) <sup>2</sup>	RCA	No	Left Front RCA Jacks "Input A" or "B"
AC-500 (SN > 252)	1/8"	No	Front 1/8" Jack "Music In"
MA-150, MA-500	1/8"	No	Front 1/8" Jack "Music In"

## Chart adapted from a Hilton webpage

Note 1 – Models with an asterisk will require an inline booster unless the unit has been upgraded with the "C" type tone arm. Models ending with "C" do not require a booster.

Use shielded cables for all amplifier inputs. Hilton units with "2" need a special cable to isolate the stereo channels of the player from each other and downmix stereo to mono. Hilton units with 1/8" inputs have an internal circuit to isolate the stereo channels of the player and downmix stereo to mono using an ordinary stereo cable.

## In-Line Signal Boosters

Low output signals from CD Players, MiniDisc Players, Laptop Computers, and other sources can be boosted to better match your older Hilton sound system. These small in-line boosters require no power and will increase the signal strength up to 3 to 4 times. Specify the type of output jacks on your player, when ordering the booster.

#### **USB Sound Cards**

There are a wide variety of USB Sound Cards on the market. These devices can help you with a couple of things, first, it will not have the heavy "Bass-Boost" of a "Headphone Out" jack, and it can also function as an electronic protection device for your player.

# Music Playback Tips

#### Terms:

- Shielded/Non-Shielded
  - Shielded cables provide noise reduction on amp inputs, while non-shielded cables are suitable for speaker outputs only.

- Bass-Boot
  - Headphone out circuitry has extra bass applied to help ear bud phones to sound better.
- Overdriven/Hot
  - The signal from the chain (music file/software/player) is set too high for the input of your amp.
- Thin/Weak
  - The signal from the chain is set too low for the input of your amp or it requires a booster.
- Anomalies/Artifacts
  - If multiple effects are processing on the fly it can cause skips or other abnormal sounds.
- Looping Issues
  - "Auto-loop" is very useful but can create a loss of energy when jumping to a loop spot or cause a loss of beat/rhythm.
  - Create a timer of some sort to avoid calling too long.

# Pre-Event Set-up:

- 1. Normalize audio files to avoid varied volumes during playback.
- 2. Edit songs that require more than one on the fly adjustment.
- 3. Adjust the loops on patter music to make smoother transitions.
- 4. Create a playlist of songs for the event to avoid lost dance time.

# Initial Set-up:

- 1. Select an appropriate shielded cable and booster (if required) from the chart.
- 2. Turn off all bass-boost settings or use a USB Sound Card.
- 3. Adjust the volume levels of the chain; this can be done in any order. (booster, player device, software application)
  - a. With the volume of the amplifier turned all the way down you should not be able to hear any sound. Set the entire chain to maximum level then adjust one item in the chain down until sound is not heard. Once this level is obtained the only adjustment needed will be the main amplifier volume.

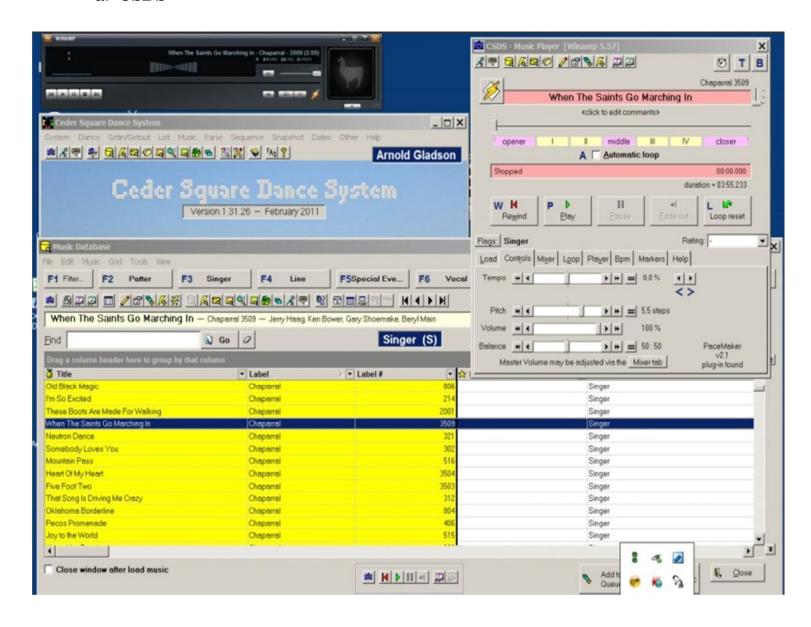
#### 12. References

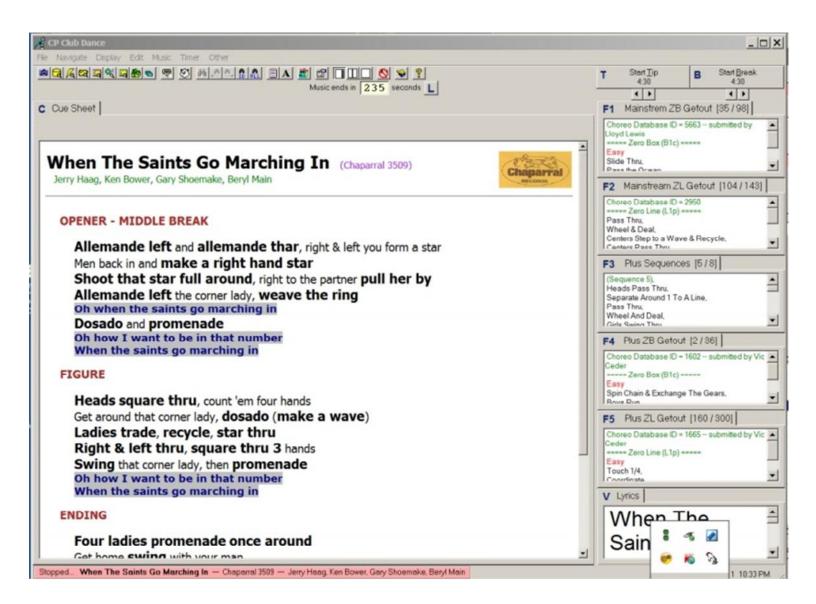
- a. Links to several papers on digital music can be found at: http://www.squarez.com/digitalmusic2009/
- b. Vic Ceder's Digital Music Info: <a href="http://www.ceder.net/digital\_music/">http://www.ceder.net/digital\_music/</a>
  This site has pointers to other good sources for digital music.
- c. Dick Henschel's (Hilton Audio) has good information on using Music with Laptops: <a href="http://www.hiltonaudio.com/laptop.htm">http://www.hiltonaudio.com/laptop.htm</a>
- d. Good source for cleaning up vinyl: <a href="http://www.delback.co.uk/lp-cdr.htm">http://www.delback.co.uk/lp-cdr.htm</a>
  Detailed description of all the steps in recording vinyl to a computer
- e. Digital Music PowerPoint Presentation Scott Bennett http://www.scottbennettcaller.com/training/digital.aspx

# **Appendix**

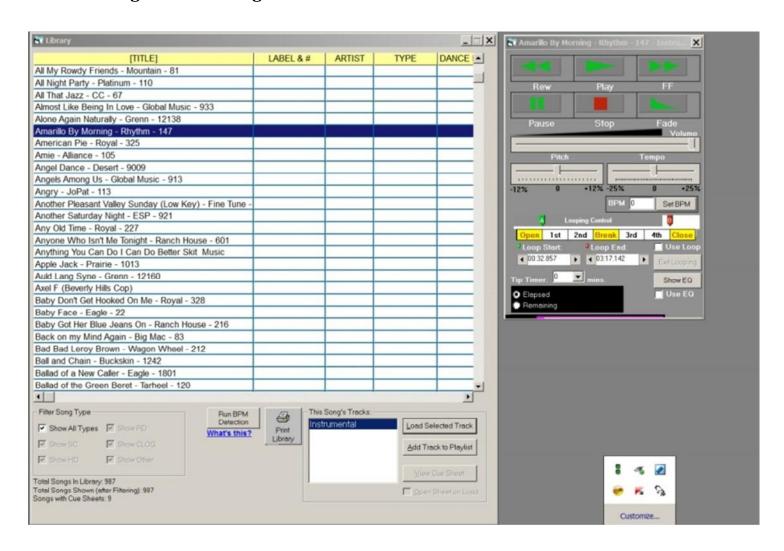
# 1. Square Dance Calling Software Screens

#### a. CSDS

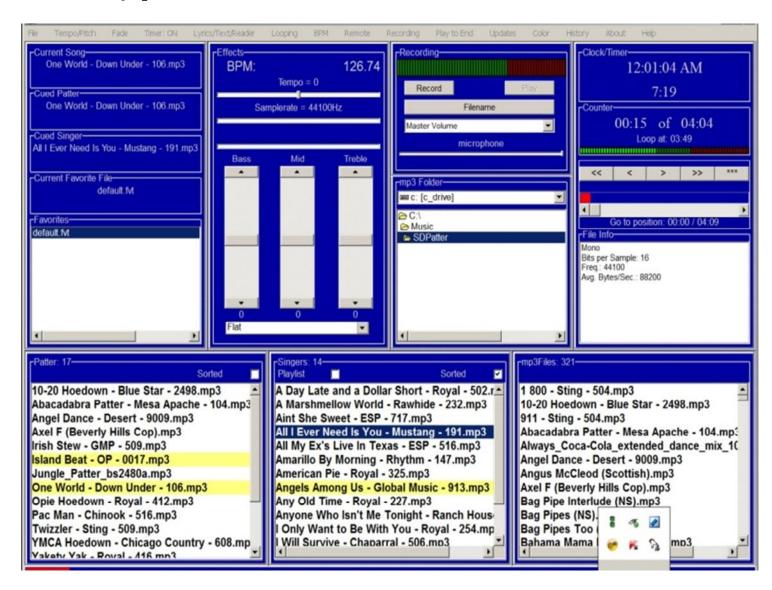




# b. Digital Music Magician



## c. SQMp3 Gold



## d. SQView

