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Notes From The Mastering Department:

Preparing Audio Masters for Replication or Duplication

Thank you for considering WMG, Inc. to manufacture your Audio CD and/or cassette project. Here are some guidelines and information that will be helpful as you prepare your master tape for duplication.

Masters for Cassette

Our goal at WMG is to make your duplicated cassettes sound as close as possible to your source master within the limitations inherent to cassette tape. Due to limited track width and playback speed, cassette tape has a lower dynamic range, and higher noise floor than a typical digital source master. In order to help us produce the best possible duplicated tape, we have the following recommendations:

- ✓ No matter what format you supply, always keep a safety copy. Never send your only copy of your material.
- ✓ Provide accurate documentation: list all song titles, clearly denote side breaks, list side lengths, and start and end times or track numbers for each side.
- ✓ When preparing masters for cassettes, always make sure there is a gap (silence) at the side break. A long gap (a minute or more) is preferable. If original program is continuous at the side break, and cannot be pre-mastered, please give explicit instructions as to the fade out of side A and the fade in of side B.
- ✓ Your source master must be prepared with the material in the correct order, and correct timing between songs. Do not include any material on the master that is not wanted on the duplicated cassette. Masters which must be re-sequenced or edited will have to be pre-mastered before production mastering.
- ✓ Please record a 1kHz reference tone, but only if it relates to the average level of the program as read on a VU meter (not peak). Tones recorded above $-12dB_{fs}$ are generally useless.

DAT

DAT, or Digital Audio Tape has been the predominant format in the audio industry for many years. While it is an inexpensive and convenient medium, it is also a fragile one. Here are some guidelines for avoiding problems with DAT:

- ✓ Always record at least one minute (preferably two) before the beginning of the program. If a DAT Tape is going to stretch or break, it will usually be at the beginning of the tape
- ✓ Always use A-Time. A-Time, or Absolute-Time, is an accurate time code that is recorded onto DAT tape by all currently made DAT recorders. It must be recorded from the beginning of the tape without fast-forwarding over any unrecorded sections of tape.
- ✓ Use quality tape. Many of the inexpensive brands of tape are also the tapes we discover the most problems with in the mastering room.
- ✓ Use new tapes. Used tapes are more prone to digital errors
- ✓ Clean your DAT recorder regularly. Use cleaning tapes frequently, and have a professional service tech. clean your DAT recorder approximately once a year, depending on use.
- ✓ Remember that "0" on your DAT recorder's meters is the absolute maximum level recordable. Average levels should be approximately –12 to $-18dB_{fs}$ (decibels below full-scale)
- ✓ Please indicate the make and model of the DAT recorder on which the tape was recorded. There are slight alignment differences between various DAT decks, and this will allow us to replay it on the same brand deck it was recorded on.
- ✓ Please record indexes at the beginning of each cut, or at least the first cut of each side. Whenever possible, include the cue sheet from the digital edit session with the DAT master. When assembling directly to DAT, be careful not to clip off the beginning of the songs when the machine is put into record. Note that if assembling directly to DAT, some machines may cause digital errors at the pause points, and may require additional mastering before production mastering.

CD-Rs

CD's are increasingly being used as masters for Cassettes. The price of both recorders and media has dropped dramatically in recent years. However, the reliability of the medium has dropped with the proliferation of consumer-oriented product.

- ✓ Always use the best possible media. It does not pay to save a few cents per disc if it costs you time, and you must use more discs. As of this writing, we see the fewest problems on discs from Mitsui and Taiyo Yuden. We see the most problems with blue dye. However different media may work best in different burners.
- ✓ Use the best drives. Go with name brands. There is a wide difference in capabilities and error rates between the best and worst drives.
- ✓ Use the proper software. Consumer-oriented software, such as may come bundled with the purchase of a drive, may allow you to burn audio discs, but often limit the users control over things such as levels and track spacing. Also, some of these programs may introduce pops or clicks at the starts and/or ends of songs. It is best to us a program oriented specifically toward professional digital audio.
- ✓ "Don't try this at home." If you are attempting to create a CD on your home computer, there are many pitfalls. The quality of converters in consumer-grade sound cards is poor compared to professional equipment. Your hard-drive or data bus may not be able to handle continuous transfer of audio without interruption. Unless you have designed your system around digital audio, and spent the time, effort, and money required to be sure it is working properly, it is better to take it to a professional studio.
- ✓ Check your discs. Listen to your disc 100% to make sure that there are no errors.

CASSETTE

Cassette tapes will be accepted as masters, although they are not recommended. Cassettes have a limited dynamic range, more distortion, and more variation between recorders and players when compared to digital audio or professional analog formats. A pre-mastering charge may be charged in order to generate a clean digital copy. Please note whether Dolby (B, C or S) noise reduction was used in the final mixdown.

OTHER FORMATS

Most professional formats are accepted as Cassette masters, although with some formats, a transfer charge may be required. Please consult your Customer Service Representative about other formats. All analog sources should have test tones at 0VU for level, and tones at various frequencies for EQ calibration. There should also be an indication of whether and what type of Noise Reduction has been used.

NOTES

Please specify if you desire Dolby B to be encoded onto your finished cassettes. Professionally, we recommend the use of Dolby B to reduce cassette background noise, but some clients have justifiable reasons not to use it (e.g., educational, spoken word, motivational, etc.). **If you use Dolby B, we recommend indicating that you are using Dolby B on your cassette imprint or other graphics.**

All pre-recorded cassettes, ferric or chrome, are recorded to playback with a "normal" playback EQ curve (120µs EQ). If you have an older cassette deck with a playback EQ switch, leave it in the "normal" position. Whether listening to a chrome or a ferric test cassette from WMG leave this switch in the "normal" position. Most current decks do not have this switch, and will automatically play the cassette correctly (i.e. with normal EQ)

Masters for Audio CDs

At World Media Group, Inc., quality and accuracy are paramount. We will always strive to make your CD bit-for-bit accurate to your digital source.

Terminology:

Note that there are two parts of the process that are both called mastering. **Glass mastering** is the process of using a laser and photochemical processes to physically etch glass from which ultimately a stamper is make, which sits in a mold to physically press a CD. [Note that this is an entirely different process from CD-Rs, which use changes in colors of light sensitive inks to record the CD-R.] **Pre-mastering** is the process of formatting the audio properly, and adding "P/Q codes" to indicate the starts and stops of tracks, which is then recorded to a CD-R, Exabyte/DDP, or 1630 tape to go to glass mastering.

CD-Rs

CD-Rs received as masters will be assumed to be formatted in the exact final format the customer wants the pressed discs, unless the customer requests pre-mastering. What you give us is what you get – bit for bit. CD-Rs are tested for error rates and conformity to CD "Red-book" standards. If there are problems, we will always consult the customer before doing anything to fix the disc, which would cause even subtle changes, or result in a master that is not "bit-accurate" with the original.

Here are a few suggestions for the best possible results when using CD-R's as masters:

- ✓ Always use the best possible media. It does not pay to save a few cents per disc if it costs you time, and you must use more discs. As of this writing, we see the fewest problems on discs from Mitsui and Taiyo Yuden. We see the most problems with discs using blue dye. However different media may work best in different burners.
- ✓ Use the best drives. Go with name brands. There is a wide difference in capabilities and error rates between the best and worst drives.
- ✓ Use the proper software. Consumer-oriented software, such as may come bundled with the purchase of a drive, may allow you to burn audio discs, but often limit the users control over things such as levels and track spacing. Also, some of these programs may introduce pops or clicks at the starts and/or ends of songs. It is best to us a program oriented specifically toward professional digital audio.
- ✓ "Don't try this at home." If you are attempting to create a CD on your home computer, there are many pitfalls. The quality of converters in consumer-grade sound cards is poor compared to professional equipment. Your hard-drive or data bus may not be able to handle continuous transfer of audio without interruption. Unless you have designed your system around digital audio, and spent the time, effort, and money required to be sure it is working properly, it is better to take it to a professional studio.
- ✓ Always burn your disc "Disc-at-Once", never "Track at Once". Track-At-Once discs are unusable for glass mastering, and will have to be pre-mastered to create an acceptable master.
- ✓ Never use stand-alone CD-Recorders. Consumer units use special discs, which cannot be used for glass mastering. Professional units cannot write their Table Of Contents at the beginning of the disc until it has recorded the entirety of the audio, causing them to be not truly "Disc-At-Once." In addition, the method of detection of track starts may cause track IDs to be written after the start of audio.
- ✓ Check your discs. Listen to your disc 100% to make sure that there are no errors.

Mastering with Bundled Software

The software that came bundled with your CD-Recorder for your computer (such as *Easy CD Creator* for the PC or *Toast* for the Mac) can create proper masters for replication, but have several inherent limitations. If you use such programs, you should pay attention to several things.

- ✓ Make sure you are creating an audio CD. Most of these programs allow you to create an audio CD by dragging your audio files into the program, but will also allow you to create a data CD containing the raw audio files by a very similar method. Make sure you are in audio mode before you start.
- ✓ Burn Disc-At-Once! Burning Disc-At-Once is like writing a novel in cursive without ever picking up your pen. The disc is burned from the beginning of the Table of Contents to the and of the Lead-Out without ever turning off the laser. Track-At-Once burns the disc in sections, with link blocks between the sections. Such discs cannot be glass mastered for replication, and must be remastered before replication. You must set your program to burn in Disc-At-Once mode. Note that versions of Toast before 4.0 cannot burn Disc-At-Once.
- ✓ Prep your audio files. Always add a short fade in and fade out to each track when creating your audio files. This will avoid pops caused by any DC Offset in your audio.
- ✓ These programs will add a fixed length break between tracks. This is usually 2 seconds. Some programs will allow you to vary this. You can create longer silence between tracks by adding silence to the end of the track before the break.
- ✓ Continuous programs, such as live performances, with no breaks between tracks may have problems. Some of these programs, even if they allow a "zero length" break between tracks, will actually add a short break of a few milliseconds, which may be audible. Double check any such track transitions.

EXABYTE / DDP

DDP, or "Exabyte" masters are a professional format of master for CD, which is generally available only from high-end professional audio mastering studios. It is considered safer, and has lower error rates than CD-R. We gladly accept Exabyte masters for CD-Replication.

1630

1630 is the original format for CD audio. It encodes the CD-Audio along with subcodes on U-Matic videotape. It has been largely replaced by CD-R and Exabyte. We gladly accept 1630 masters, however, we note that as most of the 1630 masters we receive are older masters, we see a high level of errors in masters of this format.

DAT

We gladly accept DATs (Digital Audio Tape) for CDs. However, note that we must pre-master CDs to encode track IDs onto the disc. Proper documentation of your DAT is absolutely necessary in order that we can properly place Track Start IDs. Here are some guidelines for avoiding problems with DAT:

- ✓ Always record at least one minute (preferably two) before the beginning of the program. If a DAT Tape is going to stretch or break, it will usually be at the beginning of the tape.
- ✓ Always use A-Time. A-Time, or Absolute-Time, is an accurate time code that is recorded onto DAT tape by all currently made DAT recorders. It must be recorded from the beginning of the tape without fast-forwarding over any unrecorded sections of tape.
- ✓ Use quality tape. Many of the inexpensive brands of tape are also the tapes we discover the most problems with in the mastering room.
- ✓ Use new tapes. Used tapes are more prone to digital errors
- ✓ Clean your DAT recorder regularly. Use cleaning tapes frequently, and have a professional service tech. clean your DAT recorder approximately once a year, depending on use.
- ✓ Remember that "0" on your DAT recorder's meters is the absolute maximum level recordable. Average levels should be approximately –12 to -18dB$_{fs}$ (decibels below full-scale)
- ✓ Please indicate the make and model of the DAT recorder on which the tape was recorded. There are slight alignment differences between various DAT decks, and this will allow us to replay it on the same brand deck it was recorded on.
- ✓ Please record indexes at the beginning of each cut. Also include a log of start times, or the cue sheet from the digital editing session with the DAT master. Note that due to variations between DAT decks, start ID's are not a frame-accurate means of communicating start times, and the exact position will be at the discretion of the mastering engineer. When assembling directly to DAT, be careful not to clip off the beginning of the songs when the machine is put into record. Note that if assembling directly to DAT, some machines may cause digital errors at the pause points, and may require additional mastering before glass mastering.

Other Formats

World Media Group, Inc. accepts most professional formats as masters. However many formats may require pre-mastering or transfer before production. Please consult your Customer Service Representative about other formats. All analog sources should have test tones at 0VU for level, and tones at various frequencies for EQ calibration. There should also be an indication of whether and what type of Noise Reduction has been used.

Additional Notes *(CD and Cassette):*

Masters that are unsequenced or need to be assembled from multiple sources, either analog or digital, can be edited entirely in the digital domain. An edited DAT is generated at 44.1K which is then used as the cassette master. That same DAT can also be used to make the 1630 for CD manufacturing. Studio time for digital editing is $110/hr plus materials.

All masters are transferred "As Is". The mastering engineer will contact the client if there are any obvious discrepancies. Otherwise, a master tape is considered ready for production.

Any tape that is not "ready to master" and requires editing, resequencing, tightening of space between songs, assembly from different masters, or any processing will be mastered at an hourly rate of $110.00/hr. plus materials. A master tape that requires no extra treatment is considered "ready to master" and will only be billed the standard mastering charges. Re-mastering to correct or to make additional changes in level, EQ, etc. will be billed as an additional mastering charge.

Any master tape that is being prepared for mastering should have a **safety copy** made that is stored at your facility. This guards against loss in transit or damage to the master sent in for production. WMG will exercise every bit of care in the handling and storage of your master, but **we are not responsible for any loss, theft, or damage of a client's master**. Master tapes should always be sent overnight express to our facility, never mailed. A DAT safety copy can be made at WMG. (See rate card)

If you have any questions or need further assistance in preparing your master tapes, feel free to call us here at WMG, our production staff will be glad to help.