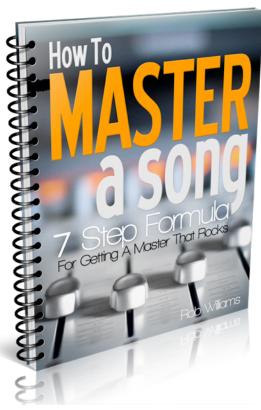


ProSoundFormula.com



How To Master A Song

7 Step Formula For Getting A Master That Rocks

By Rob Williams

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Introduction

Mastering has been made out to be some form of 'black-voodoo' that can only be practiced by an ancient master of the craft who's been at it for the past 43 years.

While that may help, I think it's been blown somewhat out of proportion.

I'm here to tell you that you can learn the art of mastering yourself and while it may take many years to become a genuine 'master', the 80/20 rule says that you can get 80% of the way there in 20% of the time.

The other 20% takes 80% of the time.

Fortunately, the 80/20 rule would also mean that 80% of the people (fans) probably won't be able to tell the difference anyway!

What's my point?

Don't let anyone tell you what you can or can't do. You can learn anything you like, and get good at it with a bit of effort and commitment.

Not only that, but music has gotten to a point where the playing field has really been leveled in that you no longer need a big record company to sign you in order to make it big.

I want your music, or the music you're working on, to have the best shot of standing up to the 'commercial' stuff out there.

What I like about mastering is the LEVERAGE that it gives us, we can take a track that sounds otherwise rather average and just take it to a new level.

And while you may not be able to do miracles, you can certainly make people's ears think that you do.

I wrote this book as an introduction to mastering, something to get you started. Or, if you've already got some experience mastering then perhaps this will just help you structure your system or simply get some new ideas.

The great thing is we never stop learning and there's always another level to go to.

But you have to PRACTICE what you learn.

The best definition for learning I've heard is 'Learning is behavior change'.

Learning is NOT the accumulation of knowledge.

So I encourage you to try these ideas and principals out, put them into practice and see what works for you.

And if it doesn't work the first time don't give up and say 'that doesn't work' –keep going until you really HEAR the results.

As you do this you will grow and improve and your masters WILL be taken to a new level.

And do me a favor, Email me your ideas, comments and complaints. I want to know what you think.

You can mail me at:

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Alright, lets get started!

Rob Williams

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Part 1: What is Mastering?

A wise man once said,

"You can't win a game that you don't understand"

Imagine trying to play a sport that you don't know the rules to?

A little difficult!

Understanding is the first step, it doesn't matter how much skill a person may have, if they don't know the rules they can't win the game.

So I want to give you an overview of what mastering is and what exactly we're trying to achieve here.

Don't worry, I'm not going to get all technical on you and use a bunch of jargon to try and make me sound clever, there's enough thick reference books like that out there if you want to dig deeper (and die of boredom).

The Definition Of Mastering

After scouring the net for a good definition of what mastering actually is, I was very surprised that there really wasn't a good one, at least not one that really defined it in full and in a modern sense.

So I gave it a lot of thought and this is what I came up with,

"Mastering is the process of finalizing a track or album by both enhancing it and preparing it for final release"

The way music is made and released is changing all the time. Mastering was once the process of transferring the audio recording onto a wax master (to be honest, it was a little before my time).

Now it can be as simple as a couple of plugins on your mix bus.

The important part to remember is that it's the final link in the chain. Its the last set of processes before a track is released to the world and that's why it's so important.

It's not going to change the song, how well / badly it was recorded and played, or whether the lead singer could sing or not, but it will make the most of it.

Simply put, a great master won't make a poor track great, but a poor master can somewhat ruin an otherwise great track.

Let me get a little more specific, I've broken down the purpose of mastering into 5 key areas...

The 5 Purposes Of Mastering

1. The Final Check

Mastering is the final chance we have to make sure the track or album is just as we want it, -or just as the client / artist wants it.

If you're doing your own mastering, it's a good idea to get some objective ears in there, someone who hasn't heard the track a million times. It's amazing how we lose perspective after listening to something over and over again, often it's something really obvious.

So find someone with a bit of a musical background to come listen in and give you their first impressions.

A little word of advice, just something I've noticed when it comes to this;

Don't ask someone 'What do you think is wrong with this?'

It sets you up for failure because they will LOOK for something wrong, and often come up with the most random things that are completely irrelevant –Because they don't want to seem stupid and miss something.

So instead, rather just tell them 'this is the track, take a listen and let me know what you think'.

Also, always keep in mind that NO ONE is truly objective, so just take all comments with a pinch of salt.

2. Consistency

Consistency is very important because there is such a wide variety of systems the track could be played on that we have to make sure that it's going to sound as consistent to the artist's vision as possible.

Say for example the bass line in a song is really important, now if someone plays the track back on their laptop are they going to be able to hear that bass line?

Probably not.

This is what we need to take into consideration.

Now of course there's only so much we can do and it's much better if this has been thought of in the recording and mix phase, but ultimately it all comes down to the mastering to do whatever it takes to make the track as good as possible.

Consistency could also apply to level consistency –is it really soft in some places and then really loud in others so people would have to keep changing the volume?

It also needs to be consistent in terms of the frequency spectrum so that it doesn't blow the doors off of someone's car. Rather than go into a complex explanation of this, just compare you track to other commercial tracks, you'll notice that they all have a SIMILAR frequency range.

You can also look at this visually on a spectrum analyzer, however, master with your ears not your eyes.

3. Enhancement

This applies to anything that can be done to the track to make it sound better than it already does and really bring out the most in it.

This could be anything from using a stereo widener to make the track sound bigger, it could be driving the track through an analog desk to get some of those qualities, or it could be compressing it to make it sound more even overall.

Most artists / record companies want their record to be as loud as possible because they think that this will give the track an edge.

If you think louder is better, then it's better.

There really are no rules, it all comes down to what you or the artist wants.. but keep in mind that it's the FANS who are going to BUY the record so they are really the ultimate 'customer'.

4. Album Flow

It's very important that songs work in the context of an album, you want the album to flow and sound like a performance.

Think about when you go to a live concert, the basic format is a couple of loud songs up front, some ballads in the middle and end off with some big numbers, if there's an encore it's generally a mellow song to round off the set.

While there really are no rules, you could think of the flow of an album in the same kind of way.

The spaces between songs are also determined at this stage. You may notice that on some albums the tracks flow seamlessly from one to the next –especially live albums.

Where's most albums generally have a two second gap in between songs.

However, it's not just a matter of deciding you want a gap or not, the spaces between songs are also dependent on how much space there is at the END of the previous song.

This all comes down to personal preference and you need to listen to the tracks in CONTEXT to hear what works.

It's strange, if you listen to the gaps by themselves they'l often sound way too long, but when you listen to them in the context of the album they often sound too short, so it's just something to be aware of.

5. Final Formatting

Final formatting pertains to everything from naming the tracks, putting fade-ins and fade-outs, and saving to the desired format.

You want to make sure that each track starts and finishes seamlessly.

By putting a very short fade-in at the start and fading out the end it will make it sound a lot smoother.

You don't want HEAR the fade, you're basically just fading in the track hiss –when listen at a high volume you'll notice that there's some natural noise just before the track starts and right at the end when the music fades out, that's what I'm talking about.

A little tip to keep in mind, most CD players tend to cut off the first few milliseconds of a track. So you want to account for that by putting in a little bit of space right at the beginning.

I generally put between 100ms - 500ms, and if you import some commercial tracks into your software you should notice the same.

The final format is generally a CD which is 44.1kHz 16bit.

However, with more and more digital copies being sold these days, the mastering engineer may very well make an MP3 master as well.

This is also the stage where things like track titles, ISRC codes (used to pull track information off the net) and tags, if going to MP3 will be done.

Some tips to keep in mind:

"Mastering Without Professional Reference Monitors Is Like Trying To Paint In The Dark"

What does this mean?

Well, unless you're one incredible artist with a lot of experience, you're unlikely to get the Mona-Lisa from painting in the dark.

Likewise, all the professionals rely on reference monitors to allow them to hear what's really going on.

You don't need the best monitors in the world, but you do need something that's going to allow you to hear the full range of frequencies and make good decisions –otherwise you're literally just guessing.

If You Own A Set Of Speakers, DON'T Use Headphones As Your Primary Reference!

If you really don't have any reference monitors, find some speakers! Headphones make it incredibly difficult to judge the sound.

In fact, years ago when I studied audio engineering, on the first little project we received we were told to use headphones only.

When the our lecturer asked us what we learnt with a smile on his face, someone shouted out 'You can't mix with headphones!'

'That's your first lesson' he replied.

Almost any speakers will be better than headphones. Headphones can be a great reference, but just not as your primary source of reference, so just keep that in mind.

Listen At Different Volumes And From Different Listening Positions

Our ears hear frequencies differently at different levels (if you want to research this more, Google 'Fletcher Munson Equal Loudness Contours') so it's important for us to reference at different levels.

It's best that most of the time, and especially when you're making adjustments, to listen at a low volume because we get ear fatigue which distorts and changes the way we hear things.

Make sure that you also listen from many different positions when you're referencing back.

A good little trick is to walk out the room and listen from the room next door, it's amazing how obvious some things will be all of a sudden.

Part 2:

The 7 Step Formula

Whether they recognize it or not, all the professionals have a set way of doing something, a 'success formula' if you will.

It's this system that they use which gets them consistent results over and over again.

Now of course, every track is different and they have many DIFFERENT 'formulas' and methods that they use.

In the same way, this isn't meant to be a 'one-size-fits-all' solution, just a proven method and a great starting point for getting a solid master with almost any style of music.

Once again, try it out and see what works for YOU, and then decide for yourself what you want to stick with and what you want to throw out (don't worry, we can still be friends).

Step 1: 'Prepare It'

The first thing you need to do is the prep work, just like a chef must prepare all the ingredients, so we must prepare for the (hopefully delicious) meal we're about to make.

Bounce Down Your Multi-Track Session To A Stereo File

Although mastering is done in many different ways these days, to keep it simple it's best to export / bounce your multi-track down to a stereo uncompressed format such as '.wav' or '.aiff'.

You want to make sure that it's kept in the highest resolution possible, I like to master at 96kHz 24bit as it seems to 'hold up' better to the processing.

You see, every time you use a plugin the computer has to recalculate that waveform again and the inaccuracies in those constant calculations are what lead to things like noise, distortion and other unwanted artifacts.

When you use a higher resolution, there is more information contained in the file and so when it's processed the computer can be more accurate.

The important part to remember is just to use the highest resolution you can.

Now the biggest limitation is your computer's processing power, when you work at 96kHz it's having to do DOUBLE the work than at 48kHz, so especially with big sessions it's often not practical to record or mix at such a high resolution.

However, you can still convert your mix to 96kHz 24bit for the mastering, it won't be as obvious but it does help.

Of course if you can't or don't want to do this, there's nothing wrong with 44.1kHz or 48kHz.

Try and stick with 24 bit though, you only want to save to 16 bit when you make your FINAL master.

Bring In 2 - 3 Reference Tracks

Modeling the masters is one of the most effective ways in getting from where you are to where you want to go.

Find two or three tracks that are similar both in composition (the instrumentation and way it's played) and in intensity (how mellow or aggressive the track is)

You want to bring these into your actual session so that you can compare to them directly and reference to them throughout the process.

The reason for this is that our ears can easily deceive us because they get use to hearing something in a certain way and ADAPT to it.

You may have had the experience where you'd spend ages working on something and get to a point where you think that it sounds great –and then you compare it to one of your favorite songs and it's just horribly embarrassing.

This has certainly happened to me more than once.

Step 2: 'Fix It'

Confucius says:

"You can't polish a turd"

...Ok so maybe it wasn't Confucius, but it was a wise man indeed.

If you're not familiar with this saying, all it means is that;

'No matter how much you try to fix and 'polish' a bad sounding mix / recording / song etc, -It's STILL BAD!'

It's still a turd.

Although.. I suppose shiny turds do look better than dull ones.

The point is, there's only so much you can do with a sub-par quality track,

'Garbage In, Garbage Out'

However, you've got to work with what you've got and make the most of it.

Ideally, if at all possible you want to try and go back to the mix phase to fix problems as you'll have far more control and be able to tweak individual instruments.

If this isn't possible, then lets see what we should look out for and what we can do...

Some common culprits you want to look out for are;

- Excess noise, especially at the top and tail and in quiet gaps.
- Distortion or digital clipping

- Low end rumble
- Harsh esses or cymbals
- Mixture of dull and bright elements –IOW, the vocals may be really bright sounding and the backing track dull sounding, so you can't make the track brighter for the backing as it will make the vocals way too bright.
- Over compressed –You can't undo compression, so it's best to leave that final compression to the mastering phase.

It's beyond the scope of this book to go through all the 'cures' for these problems, -mainly because it's far easier to HEAR and show it to you than it is to talk about it.

But just be aware of these things so that you can spot them should they come up, and if possible go back to the mix and fix them.

Step 3: 'Enhance It'

Enhancement is really ANYTHING that makes the overall track sound better.

Because this is so subjective and dependent on the style of music there's no way to say:

'THESE are the things you MUST do every time!'

So I'm just going to give you some common examples of processes that are used and then you can go and try them for yourself and see if they work for you.

Some plugins you can try are;

- EQ Often a slight top end shelf boost can sound good.
- Valve emulator Adds a bit of thickness in the low end.
- Tape emulator -adds subtle saturation and distortion which sounds more 'analog'.
- Compressor Can 'glue' the track together and make it sound more consistent.
- Bass Enhancer Good for making the bass more prominent on a variety of systems, especially on smaller speakers.
- Stereo widener If the track sounds too mono or you want to make it sound a little larger than life.
- Exciter Makes your track sound brighter by adding harmonics.

Now a little word of advice,

LESS IS MORE!

When you're processing the entire track you don't want to go too crazy with any one thing.

There really is no silver bullet, there's no one plugin that's going to transform your track from the proverbial frog into a prince.

It's all the SMALL improvements that add up in the end to make a BIG impact and difference.

So focus on just making little improvements.

If you're making big adjustments it's probably a sign that you're 'polishing a turd' and it's best to go back to the mix or even recording to fix that.

One other thing, you don't HAVE to use EVERY single plugin you own.. I know it's very tempting..

Seriously, just because you're adding something doesn't mean it's getting better.

Ask yourself;

'What is this track lacking?'

Maybe it sounds a little thin –so you try some valve emulation or a bass enhancer.

Or perhaps it sounds a bit dull –try an exciter or a high end shelf EQ.

And keep comparing to your references, these will tell you whether you're in the ball park or way off.

Step 4: 'Compress It'

Compressing a track allows us to make the overall track sound louder.

The fact is, we're actually not making the track any louder, we're just making the PEAKS (those sticking out parts you see on the waveform in your sound editor) softer.

When we stop the peaks from 'jumping out' so much, we can now bring up the OVERALL level of the track without it clipping.

So we've essentially made the AVERAGE level louder which sounds louder to our ears.

There are many different kinds of compressors which all have their advantages and disadvantages, but I'm just going to go over the two main kinds you'll come across, your standard compressor and a multiband compressor.

A regular compressor processes the entire track as one entity.

So lets say you have a kick drum peaking in your track, if you set up your compressor to compress those peaks, each time the kick drum will cause the compressor to bring down the ENTIRE level of the track at that point.

Now this has it's pros and cons.

On the one hand it can sound good, because it's processing the entire track it sounds like everything is working together.

On the other hand, if the compression is too obvious you can get this 'pumping and breathing' sound from the entire track being brought down each time there's a strong sound like a kick drum.

However, in some styles, like trance music, this is often done on purpose to make the track 'pump' to the rhythm of the song.

It's all very subjective, but just use your ears and if it sounds right, it is right!

The other kind of compressor is a multiband compressor, what this allows us to do is compress different frequency bands separately so that we have more control.

So with the example I just used, you may want to compress your low end quite aggressively so that it sounds fat, tight and consistent, but compress your midrange, where the vocals are, much less so that the track doesn't sound obviously compressed.

As a rule of thumb, compression is most obvious in the midrange (because that's where our ears are most sensitive, and the vocals are there which most people are focussing on), so don't over do it there.

So the question is; 'Should I use a multiband compressor?'

I say give it a try.

I always try a multiband compressor and usually end up using it because I find that it makes the track sound clearer and more consistent overall.

Remember, there's no harm in TRYING something, this is how you learn what works and what doesn't work. So put it on and ask yourself the question, 'Does this sound BETTER or not?'

To see how I set up my multiband compressor, watch the video on 'How to Master a Song' if you haven't done so already.

Step 5: 'Clip It'

If you've ever compared your tracks to some insanely loud record and just shook your head and wondered;

'How the hell do they do that?!'

Well, clipping is one of the 'secrets' the pros use to get some of the loudest tracks.

If you like it LOUD, clipping is your friend –more accurately, 'soft clipping'. (Hang in there, I'll explain that soon)

Now clipping is generally associated with being negative, we're always trying to AVOID clipping.

Well there's a difference, you get GOOD sounding clipping and BAD sounding clipping.

Bad sounding clipping has a harsh clicking sound. Digital is far less forgiving than analog because every sound you hear is just a series of '0' and '1' which may look something like this:

0011101010011011010101101101

What does digital clipping look like?

In other words, it doesn't have a value for it, once the signal goes above 0 you're in no man's land, it doesn't know what to call that and so it's just a string of numbers that doesn't sound very good.

This is generally known as 'hard' clipping or 'digital clipping'.

So just to make this clear, the rule of thumb is:

Hard clipping should be AVOIDED at ALL phases of the recording, mixing and mastering process.

OK, so then where does clipping come into mastering and what is GOOD clipping??

Glad you asked!

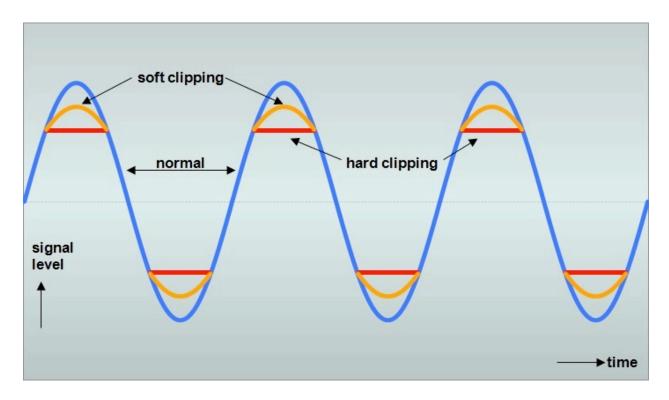
Firstly let me just put a small disclaimer here.

'ALL sound is SUBJECTIVE and I'm not say that clipping is good or bad. As a general rule, soft clipping works on more aggressive styles of music such as rock or metal, I can't imagine ever wanting to clip a mellow acoustic track or classical number'

With that said, the pros tend to use VERY expensive converters to soft clip tracks which mask a lot of the side affects.

Did I mention that these converters are VERY expensive?

Instead of me trying to explain this in a thousand words, let me just give you this picture..



http://www.gmarts.org

BTW, convertors are what convert a signal from analog to digital (AD) and vice versa (DA). A lot of the big mastering houses use analog outboard gear and so they use very high end AD and DA convertors to insure the signal is kept at the highest quality when going between the computer and outboard gear.

So these expensive convertors often have settings that allow them to account for and disguise clipping and they do it in such a way that it's often not very noticeable.

So by now I would imagine you're thinking:

'That's great Rob, you've just spent two pages telling me about something that I can't afford anyway!'

Hang on a second.

Now that we know WHAT they're doing, we can try to mimic that using some kind of plugin.

I've used the T-Racks clipper quite successfully many times, and while it may never live up to something that costs a hundred times more, it certainly does the job and will fool 95% of people (i.e. 'The fans')

Step 6: 'Limit it'

Limiting is the final phase and should always be the LAST process applied.

A limiter compresses the sound without allowing it to go past a certain level, I set mine at `-0.1' (just below zero).

Even if you do NOTHING else, use a limiter to get your track up to a good level without it clipping.

A limited IS a compressor with an infinite ratio.

So with a compressor you may set it at a 4:1 ratio for example. What it's doing is for every 4 parts of sound that go past a certain level (the threshold) it only allows 1 part to come out.

With a 'brick wall' limiter, no matter how much you push the level, it will not let it pass the threshold you set.

All this means is that we can use a limiter to get the most level out of our track without it digitally clipping.

Now of course, like everything, there is a limit (no pun intended) to which we can push it before it starts sounding obviously compressed.

I generally aim for 2 dB's gain reduction if I've used a clipper, if I haven't used a clipper then between 2dB's and 4 dB's.

The limiters I use at the moment are either the Waves L2 or L3. I really like them because they're quite transparent and don't make the track sound obviously compressed as long as you don't push it more than about 4 - 6 dB's of GR (Gain Reduction).

There are many good limiters though so you have to experiment with the ones that you have to see what sounds best.

Step 7: 'Reference It'

One advantage of the pro mastering houses is they often have entire ROOMS filled with a variety of different speakers, sound systems and reference monitors so they can instantly listen back and compare the sound on many different sources.

Although not as convenient, we can do the same by simply burning our tracks to CD or putting them on an MP3 player and playing it back on everything from small portable stereos, the car, a laptop, headphones, a PA, HiFi with a subwoofer, PC speakers, iPod etc.

Compare it to the two or three reference tracks you used for comparison in your mastering session.

Look out for consistent differences – For example, just because you can't hear the bass on your laptop speakers doesn't mean you should turn the bass up, compare to your references and listen to whether the bass comes through on those tracks. If you notice it's more prominent on all your reference tracks then you may want to look at that.

Keep in mind that you can only do so much in the mastering phase and that if the bass wan't mixed loud enough, or at the right frequencies, you're not going to be able to do that much.

Remember, mastering is the art of COMPROMISE, it's about the OVERALL track and making it the best it can be, not about making each instrument the best it can be –that's really the mixing phase.

The 7 Step Formula Overview

1. Prepare It

- √ Bounce down to a stereo file
- √ Bring in 2 3 reference tracks

2. Fix It

- √ Check for problems
- ✓ Go back and fix it in the mix if possible, otherwise fix what you can.

3. Enhance It

- ✓ What will make the track sound better?
- ✓ Could it use some thickening up?
- ✓ Would it sound better with a stereo widener?
- √ How about a little bit of EQ on the top end?

4. Compress It

- ✓ Does it need compressing?
- ✓ Multiband compressors allow you to compress the different frequency ranges separately and thus give you more control.

5. Clip It

- ✓ If you're going for loud, soft clipping is your friend
- ✓ Generally this is for more aggressive tracks, if it's a mellow song or something more natural, stay away!
- ✓ If you're not Donald Trump's son, consider trying a plugin such as the T-Racks soft clipper to get a similar effect to what the pro's use.

6. Limit It

- ✓ If you do NOTHING else, a limiter is great to get your track up to a good level without digital clipping.
- ✓ A limiter is ALWAYS the LAST step in the chain, don't put anything after the limiter.
- ✓ Limit to -0.1 (Some people say -0.3 is better, personally I don't think it makes any difference but that's up to you to decide)

7. Reference It

- ✓ Listen on as many different systems as possible
- ✓ Compare to your reference tracks and look out for consistent differences
- ✓ Make adjustments and repeat the process as many times as necessary

Some Final Tips...

Loudness Isn't Everything

The 'loudness war' going on at the moment is rather interesting because there really is nowhere to go from here.. except worse.

There's always a compromise to making a track louder that doesn't always benefit the music.

Sure, some kinds of music like grunge rock sound cool all loud, dirty and distorted, but others not so much.

It is a fact that our ears perceive the louder of two tracks to sound comparatively better. And because MP3 singles and mixed playlists seem to be taking over, it's becoming more important that your track stands up to the one next door.

In the case of an album, this is negligible as people just turn up the overall volume and so it makes no difference.

Ironically, it's actually been shown that louder isn't necessarily better when it comes to things like TV and radio, because the broadcasters all use compressors to even out the channel level, this FURTHER compresses the music and so in essence, music that isn't mastered as loud isn't affected as much and can often sound better.

Record companies even go as far as sending different masters to radio stations for this very reason.

At the end of the day, you need to be the judge and see what works for you.

But as a overall guideline, I would go for QUALITY first.

First get it sounding great and then worry about getting it that little bit louder if you really want to.

If Your Track is Sounding Louder Than A Hot Commercial Record...

BEWARE!

Especially when starting out I'd have times when my master was sounding LOUDER than a commercial record.

Did I think there was something wrong perhaps?

Of course not! (We human's tend to do that a lot)

I thought..

'I am a genius, I've created a master that is superior to all others! [evil laughter]'

Yeah right.

Learn from my foolish ways and keep this in mind...

The louder you go the more difficult it is to retain quality, so if your master is sounding louder than the latest Greenday record, you're probably missing something!

Because low frequencies take up most of the bandwidth, it probably means you're cutting too much low end and / or your master is too harsh (The 1kHz - 8 kHz range).

Your Ears Get 'Tired' So Make Sure You Take Regular Breaks

-No, coffee doesn't fix this.

It's very tempting to keep going until we hear the results we want, but after about an hour or two this just becomes a downward spiral into frustration.

A little tip: Take REGULAR breaks, rest BEFORE you get tired.

Something I do is set an alarm for an hour, and then just take a few minutes break. It may seem silly but it will transform the way you work and get you results MUCH quicker.

It's amazing how much clearer you hear something when you come back to it, suddenly it all seems to make sense.

Closing Thoughts

I'm going to assume that you have a passion for music, I don't think most people get into sound because they have a passion for turning knobs and looking at shiny VU meters.

So that's what I always try to keep in mind, it's ALL about the MUSIC.

It's easy to be distracted by all the complicated technical stuff but ultimately people just want to hear a cool song.

I think the great thing about learning this stuff is that you get to make every song the BEST it can be.

So keep working at it and you WILL take the songs you work on to a new level.

I hope I've managed to help you in some small way to take your tracks to the next level.

I wish you all the best and I'll talk to you soon!

-Rob Williams