

I'm Doug Fearn and this is My Take On Music Recording

### Tracking, Mixing, and Mastering

In the old days, these were not three separate processes. In most cases, the three jobs were done by one engineer.

In the days before tape, there was no other option. You set up a mic or two, recorded to a lacquer disc, and that became the master for the record pressing.

With tape, you had more options. Instead of throwing away countless lacquer discs ruined by a performance or technical imperfection, you could back up the tape and record a new take. Or, if you had a large budget, keep every take and decide later which one to use.

You could splice together a polished version from multiple takes if you wanted to. Tape editing became a skill in itself, and was almost always done by the engineer who made the recording.

The master tape, which was a first-generation original recording in almost all cases, could be transferred to the master lacquer. The engineer who cut the track might do that, but often it was done by another engineer who specialized in cutting masters.

The entire process of recording and cutting the disc master was usually done in the same studio facility, sometimes literally in the same room. But many studios put the disc lathe and its peripheral gear in another room. Disc lathes are big and they are noisy, so this made sense.

Somewhere along the line, perhaps around 1960, specialized studios that did only disc mastering opened up. Sometimes they shared space in the building with a recording studio, but others were stand-alone facilities.

Many of the people who cut discs all day, every day, got to be very good at it and record labels and studios sought them out. Mastering back then meant trying to translate the original recording to shellac or vinyl with as little damage to the sound as possible. This is tricky because of the rising frequency response characteristic of the disc cutting system which makes the highest frequencies about 20dB higher in level than mid-range frequencies. This is necessary to reduce surface noise on the disc. The playback system "undid" the frequency boost, restoring the playback to near flat response, and reducing the high frequency noise.

This created problems with recorded material that had a lot of high-frequency content, like a piano. A good disc mastering engineer used frequency selective limiters and other tricks to make a piano recording translate to vinyl.

Eventually, the disc mastering process became the last step where some corrective changes in the sound of the recording could be made. When requested to do so, a good mastering engineer could bring out the vocal, tone down the cymbals, or make the bass cut through better.

As these skills became more valued, or maybe more necessary to correct for a lousy recording, the final artistic decisions were often left to the mastering engineer and his judgement. What you got back on the vinyl pressing might be quite different from what you heard in the control room, and even different from the vision of the song, as conceived by the artist or producer. That could be good or bad.

Engineers, producers, and record labels often sent work to a mastering engineer who had recent success with a hit record. To some extent this made sense, but trying to make a hit record from a non-hit song rarely works.

When CDs started to replace vinyl records in the early 1980s, many engineers, myself included, thought this would be a good thing, since a mastering engineer was no longer needed. Your vision for the song, crafted in the studio with all involved in agreement, could simply be transferred to a CD master disc, and the consumer would get exactly what you heard in the control room. That was the idealized goal, but it soon became apparent that the CD did not sound as good as the vinyl version.

Some of this was because of the early CD A-to-D and D-to-A converters, which truly sounded awful.

Another problem was that engineers made many recording decisions based on the limitations of the vinyl medium. Recordings from back then were often eq'd much brighter than necessary, to make up for the loss of highs in the disc mastering.

Even panning the tracks had to take into account the limitations of vinyl, since excessive bass off to one side would create tracking problems for the listener's turntable. And any out-of-phase content could throw the playback stylus right out of the groove.

The CD had none of those limitations, so recordings created and mixed for vinyl sounded harsh when played from a CD.

It took a while until engineers learned that they had to leave behind their vinyl compensations when recording for a CD.

Many of us thought that the job of mastering engineer would go the way elevator operator. (For those of you too young to know this, until around the 1960s, all elevators required an operator. You couldn't just get on and push the button for the floor you wanted.)

I felt bad for my friends who I had used for years to master the recordings I made. I was sure they would have to find a new line of work. I hoped they all used their talents and stayed in the music recording business.

But many of the mastering engineers re-invented their job and stayed in business mastering CD albums.

But what did they do? Well, they did some of the same corrective things they had done with vinyl. They remained the last opportunity to correct a problem in the recording.

And some used their vinyl mastering skills to enhance the recording.

The old guys continue to do this, and they bring a lot of experience and skill. They can help salvage an otherwise poor recording and often make it sound acceptably good.

But what if the recording is exactly what you want? It fulfills the vision of all involved. Is mastering still necessary? Or does it impose another set of tastes upon your music? Is this good or bad?

My answer is, it depends. Sometimes a skillful mastering engineer, with fresh ears on a project, can hear opportunities to enhance something, or they might detect a problem that went unheard by those working on it who heard it over and over, perhaps for months.

On the other hand, mastering might change the music for the worse. Or just make it sound different, neither better nor worse.

If the mastering engineer uncovers a problem, maybe it is best to go back to the original recording and fix it there.

Ever since the first limiter was invented in the 1930s, there has been an unending quest to make recordings sound louder. This was important back in the days when the recording medium had noise that was only 30dB or so below the peak level, but today noise is a non-issue in digital recording and distribution.

But still, the goal of most people is to make their recording as loud as possible. This is a topic for another episode which I'll do in the future, but in the context of today's discussion, mastering is where most of the loudness processing is applied. No one wants their record to sound 10dB quieter than everyone else, so the loudness war is never-ending.

As the industry moves towards loudness standards, this might cease to become an issue and we might experience a reasonable dynamic range in our music. Time will tell.

In the meantime, mastering usually increases apparent loudness, and that is one of the goals of the client in sending their recording for mastering. Mastering engineers accommodate the demands of their customers.

But back to the studio of the 1960s when multitrack tape machines became available. Now engineers could put individual instruments, or sections, on separate tracks. They could overdub new parts. Taken to an extreme, one person could record all the instruments and vocals, all by themselves.

That opened the door to many possibilities, and made the innovative music of the 1960s and beyond possible. Virtually all engineers embraced the new technology, some sooner than others. To stay in business, a studio had to have the latest multitrack capability. It started with 2, 3, or 4 tracks but quickly jumped to 8 then 16 and 24 tracks. When even 24 tracks were not enough, clever people invented the technology to synchronize two 24-track tape machines, which gave you 46 tracks to work with. (One track on each machine carried the synchronization time code.) That was enough for just about any production and made it possible to put every mic on its own track.

In the earliest days of multitrack recording, there were not enough tracks to do much except have a track for the instruments and a track or two for overdubbing. The vast majority of records up until the 1960s were in mono.

Just like in the days prior, the engineer had to envision the final product and essentially create the final mix during the session, leaving room for any overdubbed elements to fit in.

As more tracks became available, more of the mixing decisions could be left for later. This allowed a lot more experimentation, since the engineer did not have to be as conservative with the mix during recording. It could all be changed later.

This also led to the concept of “outboard” gear. Sure, equalizers and compressors were in use from the dawn of the electrical recording age. But now those decisions could often be postponed to the mixing stage. The only limitation was the number of outboard devices you had available. If you only had one compressor, you would probably use it when cutting the rhythm track, assigned to the bass or another instrument you knew would need it. Then you had your compressor free to use on a different track during the mix.

Of course, as the track count went up and the music became more complex, studios had to have multiple compressors and equalizers. That meant that on many songs, you could use your compressors on every track, if that ever was a good idea.

When recording to a format with limited tracks, such as 8-track, it was often necessary to utilize blank spaces on a track to add another part. For example, if there was a guitar solo, it might end up going on the vocal track. That complicated the mixing, but it was often the only alternative.

You could combine multiple tracks into one, and many producers relied on this process, called bouncing, to increase the number of overdubs. Bouncing had serious limitations, however, since, for technical reasons, you could not bounce to an adjacent track. And to keep the tracks synchronized, you had to use the record head for playback when bouncing, which affected the quality. And worst of all, bouncing a track means the final track is second-generation. The audio quality with tape degrades depressingly with each generation.

With 16 or 24 track recordings, the mixing process now became its own thing. Before the days of fader automation, the mix was a performance in itself, done in real time. Often it would require multiple people, each assigned a batch of faders. No two passes were the same, since people moving the faders rarely exactly duplicated their moves each time.

I really had a problem with this approach to mixing, since I was accustomed to doing my mixing on the fly, as we were recording. My goal was to have all the tracks essentially “pre-mixed,” so the final mixdown process was simply a matter of setting the faders and letting it run with minimal intervention.

But, as usual, the mix became another opportunity to fix things that should have been done right in the first place, either performance-wise or technically. In this scenario, the mix was no longer a creative process but a corrective one. It is always better to have the tracks right to begin with. I still put time into making sure I have captured the best performance.

Somewhere along the line in the 1970s, people started to specialize in mixing. Usually they were not involved in recording the music, but only came in afterwards to mix. I had a lot of really bad experiences with this approach. Someone who had never heard the track before and usually didn’t understand it at all would impose their artistic taste, or lack thereof, on the music. And I worked with some of the most successful mixers back in those days and not once did I think the final product made any sense.

But in recent years, the independent mixer became a thing, and now there are thousands of them. Some are really amazing people who know how to make a bunch of tracks into hit records. I have learned a lot from them, and I think they bring something to the project that I can't do.

But this only works if they are expert in the music you give them. You have to choose your mixer carefully or your folk record could end up sounding like a hip hop hit. I exaggerate, but you get the point.

I find it fascinating when I talk with successful tracking engineers, mixers, and mastering engineers that they are drawn to their specialty and feel they are not qualified for another role in the recording process. Some mastering engineers tell me that they could never do a mix as good as the ones they get in. Mixing engineers tell me that they have no interest in tracking.

Tracking engineers may have no interest in mixing.

But some of the specialists would like to be good at another aspect, but don't think they have the talent. Or they are too busy to venture into another specialty.

I understand and respect their position. They have chosen to be best at what they feel they are drawn to. And certainly, many of them are very successful.

I love all three aspects. Although mixing or mastering of other people's work is not a major part of my recording life, I do enjoy doing it. But often I feel like I am lacking context. I didn't live with the music and the people making it, and that process always provides me with an ever-increasing understanding of the music and the artist's goal. So, I guess I fall into a different class of specialization, one where I want to do all three processes.

This brings me back the fundamental point about whether you need a mix engineer and/or a mastering engineer for your project.

That is a decision you have to make for yourself. For me, the answer is almost always no. I have a vision of the recording from the start, which may change slightly during the process, but generally not much. I hear the final product in my head and work towards that goal at every stage. Sure, there is input from the others involved in the project, but for the most part, the people I work with trust me to do what is best for their song and it is rare that we disagree. But I always listen to them. Sometimes, they hear something that I do not and their perspective is helpful to me.

I mix the project myself. I wouldn't hesitate to send it to a mixing expert if I thought there would be an improvement in the finished product. But I rarely feel that way. This may be a reflection on the music I work with, which is often non-mainstream. And I have the luxury of working only on projects that interest me.

One thing I do think helps my mixes is to not listen to the music for a week or more before mixing it, if time allows. By then, I can forget many of the details that drew my attention during recording, for one reason or another.

And I do the mastering as part of the mix, adding the processing I think is necessary to achieve a cohesive sound and the proper loudness. By the way, I mix for an integrated loudness of -16db loudness units full scale for music. For the podcast, or other spoken word, -18 sounds best to me.

Your standards will be different and your workflow is unlikely to duplicate what I do. And that's great, since if we all did everything the same way, all our recordings would sound the same. And that would be a very dull musical world.

This is My Take On Music Recording. I'm Doug Fearn. See you next time.