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OF THE WORLD

VOLUME II:
PERFORMANCE AND PRODUCTION

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production stage of a recording as an integral part of the songwriting process.

Once the music has been recorded, the engineer and producer begin the lengthy task of processing the recorded tracks and preparing them for the final mixdown to stereo. Basic balances between the various tracks are established; further equalization might be required in order to balance the overall frequency spectrum of the recording or to help individual tracks stand out within the musical texture. Additional compression might be applied to even out the dynamic contour of a vocal performance or to add extra 'punch' to drums and bass, and special effects such as chorus, delay or reverb may be added. The spatial location of individual sounds in the stereo field is determined. Decisions to edit, eliminate or add new tracks may also be made at this stage of production.

Once the editing and processing stage has been accomplished, the mixdown takes place. The mixdown is essentially a real-time process in which the engineer 'performs' the prerecorded music at the console, balancing, processing and creating the overall dynamic shape of the music as it is played back from the multitrack recorder and mixed to the stereo master tape. Increasing specialization during the 1980s led to the common practise of employing separate recording and mixdown engineers on many music recording projects. Although most engineers prefer to mix in real time, the process has become so complex that many mixing consoles (and most multitrack software programs) are now equipped with computerized controls allowing for various degrees of automation to be introduced into the mixdown process.

Having a distinct 'sound' is both a musical and an aesthetic goal for many musicians, and a commercial imperative within the record industry. The production stage of the recording process is significant because it is through the various technical and musical practices associated with multitrack recording, signal processing and mixing that the basic 'sound' of a recording is defined and shaped.

Bibliography

Quantizing
Quantizing, or quantization, is a process in which a continuous input is transformed into discrete steps.

(a) In the case of digital audio, quantizing is part of the analog-to-digital conversion process in which the continuous electrical amplitude of an audio signal is converted into digital form – for example, into 16-bit digital numbers.

(b) In drum machines and sequencers, quantizing is used to bring notes played at irregular intervals into line with the basic beat or precise subdivisions of the beat. Sometimes referred to as 'auto-correct,' the rhythmic effect of excessive quantization gives a kind of rigid, mechanical feel, valued by many electro-pop musicians but also deplored by critics of electronically generated music.

**Recording**

Methods of sound recording production vary greatly depending on the recording medium. The phonograph, analog tape recorder and digital media require different recording methods based on their technical and aural qualities. As editing, multitrack recording and other technological developments came about, the relations of production changed along with individual roles and the functions of performers, engineers and producers. As the technology of sound recording grew more complex, the roles played by the producer and engineer in popular music creation became even more important. However, as music technology became more affordable, many amateur and professional musicians were able to acquire recording equipment and learn more about the recording process.

The process of recording essentially relies on the performance of music before technological equipment that 'fixes' sound onto a recording medium. In the late 1800s and early 1900s, recording was, simply, the mechanical opposite of reproduction. A performer would play or sing into the phonograph's horn, and the sound would be etched onto the disc or cylinder. An article in a 1900 issue of *Scientific American* provides a description of the Edison Phonograph Works and the typical recording method of the time:

One of the upper floors of a large building in the record department is divided into a number of rooms, in which the specialists who are employed by the Edison Phonograph Works are kept steadily at work speaking, playing or singing into the recording machines ... the violinist stands with his instrument immediately and closely in front of three converging horns, each of which connects with a recording phonograph ... One of the first things that strikes a visitor to the record room is the rapidity with which the artists sing, the speed being much greater than that to which one is accustomed in a music hall or opera house. Moreover, the songs are sung with the
full power which would be used before a public audience.

Among the most popular records are those of band music, and for making these the company maintains a full instrumental band... the musicians are so grouped around the phonographs that the volume of sound from each instrument strikes full upon the horns, the front row of the performers being seated on ordinary chairs and those behind on raised seats. On the occasion of our visit there were no less than sixteen phonographs on the racks in front of the band, each with its horn pointing toward the musicians. In this case, as in the case of solos, the music is performed at full power. (390)

Recording sound has, from its earliest days, been an unnatural method of trying to create natural-sounding performances. Opera singer Maria Jeritza, in an interview in The Literary Digest (1924), described her first recording experience in North America and noted the difficulties that have accompanied studio recording ever since recording sessions began at the Edison Phonograph Works:

I already knew one thing... that I must try to sing just as naturally as I would on the stage. But when I arrived, I knew that the only way I could do so would be to forget my surroundings completely, for my setting was anything but a stage-setting.

First of all, the records were made in a small room, a room so small that the members of the little orchestra of ten or fourteen men which accompanied me had to sit close together, knee to knee. Then came the actual singing itself. With the orchestra so close to the singer the sound of the instruments is so overpowering that it drowns the voice, and I could not hear myself sing... but I found myself able to overcome this difficulty by holding my hands over my ears...

Then there is the matter of adjusting your position, as you stand and sing, so that you are at exactly the right distance from the receiver. For deep register tones one comes closer, for high register tones one moves farther away.

The first record made is always an experimental one. It enables the singer to hear herself as she should not be... [and then come] as many more recordings as may be necessary to secure perfect results. (28)

The unique recording capabilities of the phonograph, together with the consequent sound manipulations that were to alter forever the relationship between studio performance and public live performance, were discovered early on. Speeding up or slowing down the phonograph during recording, cutting two cylinders in half and editing them together, overlaying the sound of a previous recording with a new performance onto a new cylinder, and other techniques presaged modern multitrack recording methods. It became apparent very early in the phonograph’s existence that the recording studio was a place where sound did not have to be recorded and reproduced exactly as it was during a live performance.

Manipulation of sound for phonograph recording became commonplace once electrical recording was invented. The microphone and the amplifier permitted precise control of loudness and tone, and brought a significant change in studio performance and recording, a change that resulted in a transformation in recorded music by allowing the capture of softer and ambient sounds, and quieter music.

Electrical recording also affected popular music style in performance as well as in recording. Bing Crosby’s style of crooning, for example, would have been impossible without the microphone.

Overdubbing (the layering of sound upon sound), a key element of modern popular music recording, was, at best, a difficult matter with phonograph recording. Two or more phonographs were played and their sound combined onto another phonograph. That was also the process by which a long-playing record (LP) was made: multiple performances on several separate discs were combined onto one longer one by playing back each one onto the new one. Problems with timing, speed and so on were numerous. The widespread use of tape recorders coincided with the advent of the LP, and tape also allowed easier overdubbing and editing.

Tape recording proved very useful and economical in the studio, and by the early 1950s tape recordings could be made in stereo. Phonograph recording continued into the 1950s, although tape recording edged it out of most commercial and consumer applications. In the late 1970s, phonograph recording was reintroduced under the name ‘direct-to-disc,’ and was marketed for audiophiles. Referred to by some as ‘superdisc,’ the process was essentially the same as electrical phonograph recording in the 1950s and earlier. It was often cited as a return to a more natural, musical form of recording, one that eliminated tape from the recording process and recorded sound directly onto a disc that would be used for pressing records.

Tape recording brought about many changes in sound recording, but most were concentrated in the control room and not the studio. Splicing, editing and tape manipulation have almost always been accomplished by the engineer or producer in the control room. The parameters of musical performance changed little, however, and much of the recording process remained essentially the same as it was for phonograph recording until the mid-1960s. There was typically no overdubbing, and the musicians performed together in the same room.
During the initial period of the use of tape recording, the most noticeable changes in popular music recording were those brought about by the editing capabilities of tape and by the increased recording time easy editing allowed. For the musician, editing meant that a piece did not necessarily have to be performed all the way through. Instead, parts of it could be performed and then spliced together later. Moreover, editing ability meant that the 'perfect' take could be assembled from several imperfect ones. The best parts of each take would be chosen and carefully joined into one seamless piece. The Beatles' 'Strawberry Fields Forever,' for example, joined two separate takes, one sped up and one slowed down until they were in the same key.

In the mid-1960s, multitrack tape recording brought about the most significant change of all. Not only did multitrack recording incorporate previously used tape techniques; it added several more that were crucial to the development of popular music recordings. First, it allowed overdubbing, a technique whose use is first ascribed to guitarist Les Paul. On one of the tape's tracks a piano could be recorded, then later a guitar could be recorded synchronously with the piano but on another track, and so on.

The process had several immediate consequences. First, an artist could now play all instruments without the help of a group. Second, band members did not have to perform their parts at the same time in the same place. The drummer and bass guitarist could record their parts one night in one studio; then the next day, the tape could be taken elsewhere, where the keyboard player and lead guitarist could go to record their parts the next night.

Third, multitrack recording allowed for easy 'punch-ins.' It was no longer difficult to fix short segments of a performance within a piece of recorded music. Since each instrument was on a separate, isolated track, it became possible to return to it at any given time and replace it. Should it be deemed necessary, it was possible to erase and re-record only a small section of it. Fourth, multitrack recording enabled composers to create music by layering sounds, track by track.

Fifth, and most germane to any discussion of recording, multitrack recording technology put the producer and sound engineer firmly in charge of studio recording. Since sounds could be recorded on discrete tracks, they could easily be manipulated after recording. This manipulation and balancing of sound became known as mixing, and it is the foundation of contemporary popular music. After multitrack recording's introduction, songs were recorded until the performance was satisfactory. The balance and tone of sounds, room acoustics, even song arrangements, were adjusted during mixing sessions.

The development of sound processing equipment, or 'effects,' also established the control room as the center of production. 'Effects' can be divided into roughly three categories: reverberation-related effects, equalizers and compressors/limiters. Reverberation-related effects include those that can add echo or time delay, or simulate room acoustics. They are usually used to add ambiance to a sound. Since it is quite easy to add ambiance after a recording has been made, acoustic isolation is even more important in the studio room, and performers often play in isolation booths, or alone, to avoid 'leakage' of other sounds into their own track. The goal is to have as primed a sound as possible, so that it can be developed later, in the control room, under the supervision of the producer and engineer.

Equalizers vary the amount of a specific frequency band and are used to alter the tone of a sound. Essentially precise tone controls, they are used to change the color of the sound. A mixing board usually has some form of equalization for each channel.

Compressors and limiters restrict the level of a sound. Although engineers strive for a very wide dynamic range, some instruments can exceed a recording device's range. A limiter ensures that a signal does not exceed a certain level, while a compressor narrows the dynamic range. Noise gates are usually separate from a compressor or limiter, and essentially shut off sound from a channel unless it reaches a certain threshold. They are most often used to make certain that low-level, stray, unwanted sounds (such as tape hiss or shuffling feet) do not make their way into a recording. They are also used to make rock recordings sound as loud as possible without exceeding broadcasting limits.

During the late 1960s, innovation in professional audio recording centered on the addition of more tracks to multitrack recorders, and by the early 1970s 24-track recorders were the industry standard. The 1980s saw development of techniques with which it was possible to slave together two 24-track decks for a total of 48 tracks, and 32- and 48-track recorders were developed as well.

Another great leap in recording technology came at the Audio Engineering Society's 1977 convention in New York, when digital recording was introduced as a viable studio technology. Although digital recorders had been developed several years earlier, the 32-track digital tape recorder introduced by 3M in 1977 was the first to be purchased by recording studios. In most ways, the 3M deck introduced at the convention physically resembled analog tape machines. It used 1" (2.5
cm) tape moving at a slightly faster speed than on an analog tape deck.

Concomitant with the introduction of 3M’s digital recorder was the introduction of the digital compact disc (CD), and it is no coincidence that its introduction corresponded to 3M’s release of their deck. Without suitable home playback equipment, digital recording would have had little opportunity to find a market.

Recording studios did not quickly acquire digital recorders, not simply because their price was high but because of already heavy investments in analog tape equipment. At 1990 and 1991 audio industry trade conventions, smaller versions of professional digital recorders were exhibited by Alesis (the ‘ADAT’), Tascam and Akai. These units allowed for eight-track recording, and could be chained together for up to 24-track (or more) recording. These digital recorders quickly made their way into personal, home studios, as well as into larger, commercial facilities. And soon after, advances in computer technology (particularly the decrease in the cost of hard disc storage and the increase in microprocessor speed and capability) meant that digital recording direct to a hard disc became competitive with tape-based forms of digital recording.

As with the introduction of tape recording, the recording process itself initially changed little as studios acquired digital tape and hard disc recorders. However, just as tape’s editing capabilities revolutionized recording, the first prominent change brought about by digital recording also involved editing. Digital recording did away with razor blade splicing. Instead, electronic editing is performed with the aid of a microprocessor. The degree of precision that electronic editing offers is far beyond that of analog recording. With a digital recording, splicing by hand is impossible. Instead, one observes the sound waveforms of a specific track on a computer monitor and locates points at which the waveforms match. The points are stored in a microprocessor’s memory and, when they come up during playback, the microprocessor switches from one point to the next imperceptibly. Each track can be previewed in that fashion so that edit points do not have to be the same throughout the recording. The best edit points for each track can be selected. Edit points within 10 microseconds of absolute accuracy can be attained. Moreover, digital editing, unlike tape editing, is non-destructive, since one can recall from the tape or hard disc the ‘original’ track.

If there has been any single bias in the development of recording techniques and technology, it is toward editing. As it has evolved, recording equipment has allowed more precise editing of music. The traditional roles of producers and recording engineers, though remaining intact in large, professional studios, have fallen away in other spheres of music production. Preproduction can now be accomplished at home or elsewhere, using digital tape recorders or computer-based hard disc recorders. With much preproduction occurring largely outside the studio and, if desired, under the control of the musician, once in the studio the producer is faced with music that is almost completely realized. However, owing to the malleable nature of digital recording, radical alteration of song structure and arrangements becomes possible even in the late stages of production. The producer and musician are thus faced with more decision-making throughout the recording process, thereby lengthening the time it takes to make a recording.

Modern digital recording offers much that was unavailable, even unthought of, in any previous recording medium. But when faced with a stunning array of possibilities, it becomes difficult to determine exactly what decision to make, what choice is the right one. Recording was once fettered by the medium – phonograph recording allowed for short recordings of a certain volume, for example, and performances had to be live, in the studio. Sound, performance and music can now be entirely flexible, and creativity unbound by the physical restrictions of a recording medium.

Bibliography

Discographical Reference

Reverb
‘Reverb’ (a colloquial abbreviation for ‘reverberation’) is a term used in popular music to designate either an