RECORDING IN THE 1970S – ACHIEVING THE 1970S SOUND

[BACKGROUND INFORMATION TO THE WORKSHOP AT RS2017 ON 2017/11/23. COPIES OF THE POWERPOINT PRESENTATION CAN BE DOWNLOADED VIA THE RS2017 WEBSITE.]

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1 INTRODUCTION

In the early 1970s, the recording equipment which is now so revered by many younger musicians and producers was often more of a limiting factor than an asset. Today's equipment is often far superior, and could have led to far better results had it been available to the recording industry of 40 or 50 years ago. However, in those days, the whole recording environment was different. Since then, using modern equipment has led not only to a change in practices, but also to a change in the thinking. The change in mentality has led us to a situation whereby, even using the genuine old equipment in modern ways, it will be unlikely lead to the 1970s sounds that are often now sought. On the other hand, using modern equipment with the old techniques can actually do so.

2 THE RECORDING SYSTEMS AND THEIR USAGE

Recording equipment in the late 1960s and early 1970s was fairly primitive by 21st century standards. Concepts such as changing the frequency without changing the speed, and vice versa, were subjects only for science fiction because electro-magnetic or electro-mechanical recording systems were based on wavelengths at stable speeds (either linear or rotational). The recording media had physical properties which limited the dynamic ranges of signals that could be usefully recorded on them. Each specific brand and type of each medium was designed with a careful balance of characteristics, which governed things such as background noise (at the lower recorded levels) and distortion at the higher levels. Physical wear on the transducer heads was another aspect which had to be considered. When all of these things had been taken into account, and even at the highest professional level, the available dynamic range was not even close to that of a symphony orchestra, so truly high-fidelity recordings were only a goal to be approached; but never reached.

Until the 1950s, band or orchestras performed in studios as they would at a concert, and the recording engineers would mix the sound directly to either a single-track (mono) or a two-track (stereo) tape recorder. By the late 1950s, three, four and eventually eight-track tape recorders had appeared, which allowed the luxury of recording some instruments separately, for post-processing, and the then new possibility of overdubbing without generation loss. Nevertheless, even by 1970, the great majority of multi-track tape recorders had, at most, eight tracks. Sixteen-track machines were still quite rare, and it was uncertain whether the physical properties of the tape and the basic characteristics of the electronics would permit any more at that time.

If a recording was made on eight tracks, later be mixed to a stereo master, the noise built up by around 3 dB every time the number of tracks was doubled. Consequently, the noise build-up on eight tracks could be about 6 dB greater than two tracks recorded at similar levels. Then, the noise could increase another 3 dB or so when the mix of the eight tracks was recorded to a stereo master tape. Fortunately, the Dolby A noise-reduction systems had been introduced in the mid 1960s, which could improve the noise performance of a track by 10 dB or more. Using this system, an

eight-track recording mixed to stereo could therefore be no noisier than a 'straight to stereo' mix if noise-reduction was applied to all channels of both machines.

The Dolby A system was not totally transparent, audibly, but this was often considered to be a price worth paying for the reduction in tape noise. Nevertheless, on the subject of price, a full set of 'Dolbys' for an eight-track and a two-track recorder cost about the same as a decent house, with garden, in the suburbs of London. In fact, to buy the eight-track tape recorder would require the cost of another, similar house, which in those days would be around £5,000, at a time when a recording engineer may earn about £20 per week.

Multi-track recording made it possible to spend more of the time during a recording session on getting the performances right. Minor problems with the sounds could be 'fixed' during the subsequent mix, and, what is more, the recording engineers did not need to spend valuable time balancing a mix to the degree that it was ready for release. This extra freedom allowed more music to be recorded during a given time, which was important because the session could be costing a fortune if 30 or 40 session musicians were all being paid by the hour. The subsequent time spent mixing could then be carried out with just the producer and the recording team, at a later date, significantly reducing the overall costs.

In those days, session musician earned around £15 for a three-hour session, so 40 of them could cost £600 in a single morning. Therefore, if twice as much recording could be done in a session by means of using multi-track tape recorders, the investment could become very viable. However, in order for this extra productivity not to risk the jobs of the session musicians, the Musicians Union put a strict 20-minute limit on the amount of music that could be recorded in one three-hour session, and any musician overdubbing a second part on the same piece of music would have to be paid double. Therefore, if a part needed three violins, it was not possible to ask one violin player to overdub the three parts during one session, to save money. One violin recorded three times, or three separate violins, would cost the same to the record company – *three sessions!*

Nevertheless, these strict rules did not apply to named groups of musicians, such as a rock group, unless they were employing additional session musicians, and to many of these groups, the multi-track facilities soon became a new creative tool. Whereas with larger groups of session musicians the eight tracks would usually be used for different sections, such as all the brass, all the strings, all the percussion, the choirs of backing singers, etc, the rock groups could use single tracks for single instruments, permitting subsequent experimentation with individual equalisation, compression, echo, or even replacing an instrument completely. This facility could be invaluable in the context of the live recording of somewhat unpredictable rock concerts.

With the tapes of the early 1970s there was perhaps only a 60 dB usable range between the noise floor and the onset of unacceptable distortion. Different tapes from different manufacturers, and even different tape recorders, could be very different in the way that they handled peaks, but in general, the 1% distortion level was considered to be the maximum that should be used. Consequently, if the average level was to be kept well above the noise floor, compression and limiting were often applied to the signals before they went to tape. Also, some equalisation may have needed to be applied because some tapes overloaded at lower levels at lower frequencies. It was all something of a balancing act, and the recording engineers needed to know the tape limitations well. What is more, if two instruments needed to be recorded on the same track, a careful balance of levels, equalisation and compression would be needed because it could not be re-done later.

In a live recording of a four-piece rock group, a typical track list could have been as follows:

1 Drums and Bass guitar
2 Lead guitar
3 Lead vocal and harmonica
4 Backing vocal 1
5 Backing vocal 2

6 Backing vocal 3
7 Audience left
8 Audience right

As there would not be much point in recording a live album without recording the audience, the two tracks for the audience would be more or less obligatory, as mono audience would be most unsatisfactory for a stereo album. The lead guitar and the lead vocal would be at the forefront of any future mix, so the recording of each on a separate track would be a priority. If all the group sang, the individual backing vocals would tend to be very unstable as the musicians moved towards the microphones during harmonies or choruses, so, again, they may need separate tracks – but that may only leave one for the bass and drums. Fortunately, the bass and drums often tend to be the most stable instruments, so with careful limiting and mixing, putting these two instruments together was often a viable option.

Had the same group been recording in a studio, the audience tracks could perhaps have been used for bass guitar and bass drum, for example, or the drum kit could have been recorded in stereo if the backing harmonies were to be overdubbed afterwards. The track layout could then have the looked like this:

1 Drums left
2 Drums right
3 Bass drum
4 Bass guitar
5 Lead guitar
6 Lead vocal and harmonica
7 Backing vocals left
8 Backing vocals right

The stereo drum tracks could just have been a left-right pair of overhead microphones; perhaps with a separate snare microphone mixed in. On the other hand, it could also include a microphone (or two) on the tom-toms, which would then require that the recording to tape would have to be well-judged and well-balanced, with equalisation and compression where necessary. No individual component of the mix to the two drum-tracks would be able to be adjusted afterwards without affecting everything on those tracks. The stereo vocal tracks would similarly need a relatively final balance, ready for inclusion into the overall stereo mix.

Consequently, with all the sounds heading for the multi-track tape in a relatively polished form, the foldback mix, which would probably be derived from the output feeds, would be sent to the headphones of the musicians in a mix that was quite representative of the final sound. Hearing such a complete mix can be quite inspiring for the musicians, and can substantially contribute to a performance, as the group would then tend to play as a group: feeding of each other's playing and building up the sound still further.

The balance for the headphone mix would be made in the control room, often with the engineer and producer having an identical set of headphones to those of the musicians, all fed from the same amplifier, and perhaps even in stereo! Using this technique, the producer would have control of the mix, and would be very aware of what the musicians were hearing. In this way, he (usually) was somewhat like the conductor of an orchestra, who could dictate the beat by the manipulation of the balance of instruments in the foldback. Nonetheless, in some studios where the foldback was monitored only on the studio loudspeakers, the perceived mix in the headphones could be awful, and especially if a mix of different types of headphones was used. No group can play well to a poor headphone mix.

3 MIXING AND DISC-MASTERING

Once a recording had been completed, the mixing began. In many cases, the levels had to be controlled carefully because of the interaction between the instruments. On a multi-track recording, a bass guitar suffering some tape compression may sound fine, but if the same occurred in a stereo mix, it could 'pump' the other instruments. Even using Dolby A noise-reduction, the dynamic range between noise and distortion was only around 75 dB, so the noise could become intrusive if the mix was recorded too low, but it could become 'muddy' if the peaks were not clean. Again, this required the careful use of compression and limiting if the music was to optimally fit in the available range. Also, at the time of mixing, the 'balance' engineers were very aware of the fact that the mix would have to be subsequently transcribed to disc.

In the vinyl-disc production process there were several further limiting-factors to be considered. The first was what could be *cut* on to the disc; the second was what could economically be reproduced *from* the disc; and the third was the physical properties of the vinyl. In the disc *cutting* process, a sapphire or ruby stylus was mounted in a cutter head, electrically driven by an amplifier of up to 300 watts peak, per channel, fed via a control console with the signal from the master tape. An aluminium disc, coated with a cellulose nitrate lacquer (or, in the long-distant past, cellulose *acetate*) would be placed on a very stable turntable rotating at a constant speed. The stylus would then be lowered on to the disc to cut at a predetermined depth (with no input signal). A rotating screw-thread gradually moved the cutter-head inwards, towards the centre of the disc, by an amount that prevented the modulations of the groove from touching on adjacent turns.

In-phase signals, such as a centrally-panned bass guitar, cause a lateral movement of the stylus, whilst and out of phase signal, such as widely-panned, overhead drum microphones, tend to produce vertical movement. Hence, in-phase signals eat up 'land', and out-of-phase signals require depth. High levels of central, low-frequency signals gave rise to lots of lateral movement, so adjacent turns of the disc would need to be spaced well apart if the cut was not to encroach upon the previous turn. By contrast, high levels of relatively out-of-phase signals would drive the cutting stylus vertically. If the cut went too deep, the stylus could reach the aluminium base (substrate) of the disc and be destroyed, but if it went too high, it would leave the surface of the lacquer and no groove would be cut. What is more, too much level of high frequencies could require so much power from the amplifiers to drive the stylus so far and so fast that it could burn the head. The disc-cutting engineer had to ensure that none of these events took place, especially as a ruined cutter head could cost about three-months wages to replace.

As a result of these limitations, a musical mix with too much low frequency and out-of-phase high-frequencies may need to be cut a such a low level that, once the disc was pressed, the surface noise from the imperfections in the vinyl would be unacceptable. If the level *had* to be high, the result would be more widely-spaced groove-turns and a shorter playing time. What is more, even if an 'excessive' musical signal could be cut at a high enough level, the playback styli in the 'record players' were not under the same electro-mechanical control as the cutting stylus. The styli have momentum, which in the lateral direction was restrained by the groove walls, but if 'launched' vertically by the groove, they could lose contact with the disc and 'jump' to another turn. Record which 'jumped' would often be returned to the shops as being 'faulty', and so could become costly for the record company.

Consequently, all of these things had to be taken into account during the mixing process because, if it was all left to be dealt with by the cutting engineer, the disc arriving in the shops may sound very different to the mix which had left the studio. If the stereo was narrowed, the bass was rolled off, the high frequencies were rolled off and more overall compression had been applied, they could all combine to spoil the artistic intentions of the musicians and producer. The only way to avoid this situation was for the balance (mixing) engineers to know the limitations of discs in advance, and work with the producer to find an artistically-acceptable mix which would transfer well with only minimal changes. This often required a careful compromise between art and technology.

4 MORE TRACKS

In the late 1960s, 16-track tape-recorders began to appear, using 2-inch tape, and with the same head-widths as ¼-inch two-track recorders. The noise build-up was significant, but the use of Dolby As could still keep it under control. Having 16 tracks allowed much more flexibility during the mixing process, and when 24-track recording arrived (in functional reality, in 1973) the general concept of recording one-mic-to-one-tracks was born – even for drum kits.

The maximum ability to post-process each track could depend on the separation between the microphones, as leakage from one microphone to another could lead to unwanted effects affecting unintended instruments (especially if the primary track of the affected instrument had later been removed from the mix). The requirement for separation led variously to the development of studios with lower reverberation time, multiple isolation-rooms, and musician playing sequentially – rather than simultaneously, as a band. It was a time of much experimentation.

Although 16-track recorders had heads of the same track-width as two-track recorders, the 24-track recorders used the same 2-inch tape as the 16-track recorders, so the width of each track had to be correspondingly narrower. With less magnetic-material to record on, the noise build-up from a 24-track machine was not only greater because of the extra number of tracks, but also because the background noise from each track was greater. Therefore, concurrently with the increase in the number of tracks, the tape-manufacturers began to develop tapes which could take more level whilst maintaining the low background noise levels of their predecessors. To some degree, the different formulations of the different manufacturers led to tapes with distinctly different overload characteristics, so tapes were sometimes selected for their particular sound, as well as for their low noise. Some combinations of recorder and tape were preferred for their combined sound, but the mechanical properties of some tapes also better suited the transports of certain machines. No two combinations really sounded the same on all types of music, so the tape-recording process could not really be said to be sonically transparent (unlike most of the *professional* digital-recording systems of today), although most of the recording engineers of the time probably wished that it had been.

The availability of many more than eight tracks also led to the possibility of overdubbing many more instruments, without the quality-loss and noise build-up that inevitably accompanied the 'track-bouncing' that would have previously been needed if free tracks were not available. This, in turn, led to much more complicated arrangements being made, and recordings where one musician could record a whole, multi-instrumental album. Furthermore, 16 and 24 tracks were a godsend to live recordings, where the possibility of using one microphone to one track greatly reduced the need to be over-cautious with the levels when microphones were mixed to one track, and where an overload of one mic would ruin the mix. Although some big changes in the recording techniques were taking place, tape was still tape, and the mixes still had to be made for transfer to disc.

5 EFFECT ON MUSICIANS

Different mixing consoles, also, tended to sound different, although no decent mixing console would be the controlling factor in the sound of a recording because the dynamic ranges of the electronics of mixing consoles were vastly wider than those of the tape recorders, and the inherent distortion was much lower. This fact was later exploited when the change to digital recording occurred, so no mass scrapping of mixing consoles took place. However, later mixing consoles did tend to offer a greater range of control of effects processors, and more possibilities for additional, separate headphone mixes. This latter point, together with a growing tendency for more musician to record separately, did lead to fewer musician playing in the studio as a band whilst all listening to the same headphone mix.

At the dawn of the 1970s, one foldback mix usually served for all the musicians, occasionally with an extra one for a drummer who may need to hear less drums and more bass. The overall balance would usually be set by producer, albeit in conjunction with the musicians, but the producer would

retain control because the foldback balance could change 'feel' of the performance. By contrast, once the mixing consoles had sufficient outputs such that each musician could request his or her preferred balance, there was the risk that they would not all be playing to the same beat, as they may all have had in their own heads their own ideas of how an arrangement should be. At times, this can be rather akin to an orchestra playing from the same music, but with reference only to a metronome, with no conductor.

Of course, the tendency for the musicians to record separately (at separate times) removed all possibility of developing any mutual 'chemistry' between them during the recording of the basic tracks, and this could also significantly change the 'feel' of a song. This aspect of the new techniques did get recognised, quite early on, as sometimes being a problem. By the later 1970s, some of the isolation rooms had been relegated to the storage of equipment and cases, because many musicians, noticing the 'coldness' of separate recording, elected to put the unity of the band before the cleanliness of the recording. The concept of a 'groove' is almost impossible to achieve unless all the musicians are playing together. In many ways, however, it was the availability and temptations of the technology which originally led many musicians to playing in isolation: it was not driven by any musical need.

6 THE DISC STILL RULED

Even until 1982, despite all the advances in the flexibility of the new technologies, the vast majority of recordings still had to be made to analogue tape, and the final mixes still had to be suitable for release on vinyl discs. So, despite the changes in the recording techniques which had evolved with the availability of extra tracks, all stages of the process still needed to keep the vinyl disc in mind.
Looking back, although digital recording freed the process from the limitations of the electro-magnetic and electro-mechanical storage media, it appears that may of the restrictions imposed by tape and disc were actually beneficial for many forms of music, and especially electrified music. The limitations also ensured that the dynamic range was kept within the reasonable limits for playback in the vast majority of circumstances, and ensured that the process was technically monitored throughout the journey from the musicians to the homes of the record-buying public.

7 THE IMPLICATIONS OF THE COMPROMISES

The limitations of the recording technology in the 1970, particularly when no more than eight tracks were available, almost demanded that the groups would have to play together. This meant that the performances would need to be well rehearsed before going to the studios, because the high cost of the equipment meant that studio time would be very expensive. Few record companies were prepared to hire recording studios for a band to spend many hours rehearsing in it. A consequence of this was that the very first takes of a recording session were often far better arranged than those of a song which was more or less written in the studio, and where the early takes, due to time pressures, could be accepted as the basis for the future overdubs. This meant that there was a certain amount of guess-work involved in deciding whether a certain, partial backing track could be 'the' take for further overdubbing.

Conversely, if the sounds were already developed by the musicians and confirmed at the recording stage as they were being committed to tape, it was usually very obvious if any given take was 'the one'. That is to say, right there and then, in the studios, the whole recording team would have a good idea of where the final result was heading. It is often beneficial if the 'core' of a song is clear to all the band at the outset because it gives a greater sense of meaning to the performance.

Likewise, when a single foldback mix is heard by the whole band, the musicians will all playing to, *and playing off*, the same sound. There is a risk that when each musician is setting his or her foldback balance, they are each creating it in the light of their individual perceptions of how the song

should be, rather than all being guided by the same producer. Also, too much individuality can consume a lot of studio time, and the cost of recording did put some emphasis on getting quick results. In fact, a primary function of a producer was to keep the recording within budget, which usually meant completing it within the scheduled time. There is no doubt that quick recordings of well-rehearsed music can help to keep the 'life' in the performances. By contrast, too much repetition, even if it results in a *technically* more precise recording, can lead to jaded performances which even the subsequent overdubbing may not be able to rescue. A 'special' feel in a recording must usually be captured during the recording of the primary instruments.

Also, recording limited by tape characteristics necessitated taking control of the sounds from the outset. It tended to be obvious from an early stage if they were going to fit together or not, and *if* not, something would need to be done about it. Once again, sorting this out at the recording stage was usually beneficial to the whole performance, and a better recording resulted. The monitor mix, itself, would be a good indication that a satisfactory *final* mix would be possible.

Once a final mix was being made, it was understood by all concerned that the mixes would have to be compatible with cutting them on to disc, and that the resulting vinyl discs would have to be suitable for playback in the homes of their purchasers. Taken together, all of these limitations have, in many cases, been *musically* beneficial. Removing all of these restrictions, as digital recording has now allowed, can lead to a lack of concentration on the end result at the time of the recordings, and the recording of sounds of such wide individual frequency ranges and dynamic ranges that their impact may be totally lost when either mixed together, or to a level that would be reproducible in anything but top-studio conditions.

Another 'down' side of having so much 'leeway' has been the ability for lesser-skilled musicians to use technology to compensate for some of their failings. Granted, in some cases, this has led to new styles of music from people whose good ideas have not been matched by their musical proficiency. However, it also means that many people who are trying to get a 1970s sound will not necessarily be able to do so if they cannot perform in a way that could overcome the technical limitations that prevailed in the 1970s.

On the other hand, recording in the same manner as was necessary in the 1970s, even with the latest, all-digital recording equipment, can lead to results which are far more '1970s-sounding' than recording in a modern manner using 1970s equipment. Remember; in general, only talented musicians could record in the conditions of the 1970s, largely because:

As tracks were limited, instruments had to be combined during the recordings.

Instruments combined with other could not be 'repaired' afterwards.

Musicians needed to be able to deliver performances on the spot.

Only good musicians playing together could find 'grooves'.

The sum could be greater than individual parts.

In addition, the recording staff, usually consisting of a recording engineer, an assistant engineer and a producer, needed to have the required level of skills to be able to work quickly and precisely. In most cases, some compression and equalisation would need to be applied to the recordings, and done in a way that neither took too much time or was done to an extent that could not be undone, if needed, during the mix. 'Wasting' time was economically unjustifiable when an hour in the studios cost as much as a skilled engineer's weekly wage. Furthermore, if too much time was spent on technical adjustments, it could be very frustrating for the musicians, who could often 'go off the boil' and lose the excitement of the performance.

8 FURTHER ANALYSIS

It would seem that a relatively large number of young recording engineers and producers are frequently buying old, 'vintage' recording equipment in order to help them achieve a "1970's" sound on their recordings and mixes. In many cases, however, the main aspects of the sounds that they desire to emulate were largely a result of the recording techniques which had had to be adopted to avoid the problems arising from the limitations which using the then-current equipment encountered.

Yes; it is true to say that the different mixing consoles had subtle differences in their sounds, but it was not usual for recording engineers to either specifically choose, or refuse to use, a studio simply because of the sound of its mixing console: at least as long as it was of reputable manufacture. Whether a studio had a mixing console by Neve, or Cadac, or Helios, or API, or MCI, or Harrison, etc, was not usually an issue based on sound alone. Indeed, in the late 1970s, when the first SSL consoles came onto the market, the primary drive behind their rapid acceptance was the advanced nature of the automation and the well-thought-out layout of the controls. It was actually quite a long time before SSL designed a console which was widely-considered to be in the very top league in terms of sound, alone.

Likewise, much of the 'out-board' equipment from that era that is now so revered was designed primarily for functionality, and was found to 'sound good' after it had already become accepted for doing its job well. In so many cases, the equipment was chosen for its functionality, and not for adding its own special sound. It must also be understood that much equipment which really is 60 years old, will not be sounding as it did when it was new, so comparing a modern replica to the original version is not necessarily a true representation of the degree of 'authenticity' of the sound of the new one. The sound of a piece of equipment can change over time, and not usually for the best. Do we really know how any piece of equipment from the 1960s sounded in isolation when it was brand new? (And though the loudspeakers of the day?)

During a short period of time in 1970 and '71, Pye Recording Studios, in London, 'got rid of' all their Neumann U67 microphones, replacing them with the transistorised U77s and the FET U87s. The old U67s now sometimes sell for £10,000, or even more, yet none of the experienced engineers at Pye resisted the change. The U87s sounded slightly 'cleaner', and were *much* more reliable. By comparison, the U67s were noisy and unreliable, and the change to U87s did nothing to lessen the chances of getting a great sound. Fewer problems also led to more time being available to concentrate on the recordings, and fewer delays for the musicians. It was all generally seen as progress.

Right up to the 1980s, recording usually equipment was replaced to obtain better functionality, because the concentration was on recording the musicians as efficiently as possible. If musicians were happy to wait whilst experiments were made, then fine, but *they* usually wanted to concentrate on their playing, so the efficiency of the process was a prime concern. Of course, with the limitations that the 1970s equipment posed in terms of post-manipulation, there was a great emphasis on getting things right at the recording stage because there was no possibility of post-tuning a specific instrument (or voice), or correcting timing errors on one track on a multi-track recording.

Another aspect of the inability to correct meant that musicians who could not play in tune or in time would not be allocated studio time by the record companies, at least not until the 'Punk' era, although in this case it was semi-deliberate. (This certainly did lead to a characteristic sound of that era.) In general, however, the trend of the 1970s sound was that of accomplished musicians playing together, under the guidance of an experience producer in a studio staffed with an adequate team of recording personnel.

9 THE RECORDING TEAM

The whole recording team in most studios would usually include a recording engineer, an assistant engineer, a maintenance engineer and a studio receptionist, all working on behalf of the producer. Yes, it cost a fortune, but not necessarily in comparison with the cost of the recording equipment and studio infrastructure. This typical recording team was based on a 'one person – one job' concept. The recording engineer concentrated of recording the sounds and keeping the levels within the optimum ranges of the equipment. The assistant engineer would set up the studio microphones and headphones, check them from the studio floor, and operate the tape recorders, hence allowed the recording engineer to concentrate on getting the recording 'right'. As the complex equipment of an entire studio was also quite unreliable (especially as much was still made from valves and custom built), having a maintenance engineer waiting in another room was almost standard practice, which meant that the other members of the team would not need to get side-tracked in the case of any equipment failure. In the studio, the producer would be the overall decision-maker, and the final arbiter in the case of any conflicts of opinions between musicians.

Although all likely to be working in the same room, the jobs of the above four people are all very different, and require a very different type of concentration. These people would be employing their brains very differently, and not necessarily in ways which it is easy to switch between at short notice, because it is not always possible to concentrate on details whilst maintaining a broad over-view. Although technology subsequently developed to a point whereby, at least physically, one-person operation was feasible, nothing could be done about the fact that few people can have their brains in the producer, engineer and assistant modes at the same time. What is more, even if it were possible, it is very taxing and tiring to do so, but the development of the technology and the drastic reduction in the real costs of equipping a recording studio changed the whole scene.

Along with the drastic reduction in recording costs which resulted from lower-priced equipment and single-person operation, it also became possible to spend much more time in a studio for the same amount of money. In turn, this led to the development of recording in a way in which one person could record a whole band, but it often also led to techniques which broke up the performance into stages which one engineer could deal with without being overloaded. However, this slower process completely changed the dynamics of the process, and led to a situation where the musicians were being forced into recording in a way that the studio could deal with, as opposed to the traditional (expensive) way of making and staffing a studio in such a way that it could capture the musicians playing as they preferred to.

10 CONCLUSIONS

There is no doubt that the recording equipment which was used in the 1970s had a great bearing on the sound of the recordings of that era, but often in ways far beyond the sound of the equipment itself. The technical limitations of the equipment imposed restraints on the recording engineers which required them to record and mix in certain ways, not only from the view of recording to tape, but also to permit the subsequent transfer to disc. The physical size of the equipment and its temperamentality also required a larger team of recording personnel to operate it, although this allowed more brains to be simultaneously be applied to the task, with often-beneficial effect. The cost of this team was proportionally not exorbitant considering the cost of the equipment itself, (and the air-conditioning needed to cool it), so the concept was viable as long as the average quantity of record sales was sufficiently high.

At the same time that these circumstances prevailed, the technology had not been developed which would later allow individual tracks to be corrected for tuning or timing, so the musician in the studios had to be capable of all playing in tune and in time together. This tended to put a certain lower limit of their proficiency in playing or singing, and musicians of that calibre were also usually capable of finding musical grooves which could allow artistically-important tempo variations to be taken in their stride. This is something which is lost when a song is built up from a drummer playing alone to an electronically-generated 'click', for all the other instruments to follow later. The speed of the

recording process, albeit driven mainly by costs but made possible by the large recording team, tended to keep the musicians 'on the boil', and reduced the risk of them losing their concentration. This also contributed to the overall sound.

In fact, included in the list of the recording team, mentioned at the beginning of the previous section, was the studio receptionist. Yes; a pretty receptionist was often an artistic inspiration, of that there is no doubt, but, in the days before mobile phones, an efficient receptionist taking messages for the musicians, and knowing when and when not to disturb them, was a fundamental part of keeping the band fully concentrating on the music whilst still being confident that they were not missing anything serious. [Mobile phones in a studio can be a total disaster.] The receptionist could politely tell any callers that the musicians were not available. This relative isolation from the outside world could help to set the scene for a *performance*, and it was the job of the studio to capture performances. The studio was all about providing a creative environment and making the musicians feel like they wanted to play, without the world touching them. There was psychological 'chemistry' and physical adrenaline, so it could be an exciting environment to be in. This is another factor which, almost certainly, fed into the sound.

11 GETTING THE SOUND

So much of the character of 1970's recordings was a result of the actual performances in the studios. These, in turn, were a result of the general environment of musicians playing together, directed by producers, with recording engineers carefully squeezing the sounds to fit within the relatively narrow limits of the equipment and always thinking about how they would transfer to disc. To some degree, we should also consider the acoustics of the recording studios, but, as often as not, the rooms were divided by screens or curtains, so the basic acoustics were often tamed to facilitate the multi-track recording process. In most circumstances, a group of musicians would have either been well-rehearsed, or playing to a previously polished musical arrangement.

Much of the sounds of the recordings of the 1970s were more a result of the conditions and the techniques which applied at that time, and were not specifically down to the particular sounds deriving from using particular models or brands of equipment. So, if people want recordings to sound like they were 'authentically 1970s', there is little reason that the results cannot be achieved by using modern equipment in modern studios if the recording *conditions* of the 1970s are recreated. The crucial condition is that the musicians should perform in the manner that would be necessary if the limitations of the old equipment still prevailed. That is to say, by imagining that the recordings had to be made to analogue tape, and by thinking that the final mix would need to be released on vinyl disc, there would be an almost automatic tendency for the recordings to sound like they were made in that era.