

Pink Floyd were among the earliest innovators to use four channel sound, and more recently Dark Side of the Moon has won many awards, including several for engineering. The author, who engineered these and many other sessions for the band, discusses the quadrasonic record production, and contrasts it with the presentation of multichannel sound on stage.

Four sides of the moon

ALAN PARSONS

MANY YEARS AGO, in the earlier part of their career, Pink Floyd had been experimenting with a device inscrutably known as the Azimuth Co-ordinator. It was not a magic box for aligning type machine heads as the name might suggest but a very glorified term for what we now know as a quad pan pot. Its use at live concerts at that time very likely inspired considerable audience interest in multi-channel sound systems and in a mild way may have contributed towards the now booming industry of quadrasonic. Many groups have recently adopted quadrasonic pa systems for live shows, the size and power of which seem to be increasing. Quadrasonic record sales are also on the increase, despite the indecision both on the part of the public and record companies about which of the various systems provide the best results and compatibility.

Practically all non-classical recordings are made using close mic techniques in relatively dead studio acoustics and later remixed to a stereo master tape. Exactly the same recording procedures can apply for a quadrasonic record except that, because the master reduction is made to four channels rather than two, the multitrack layout must allow an effective distribution of sounds for adapting to quad. There are obviously more possible positions in a four channel remix, and conflict may arise with track groupings organised with stereo in mind. Although *Dark Side of the Moon* was monitored in studios equipped for stereo reproduction, many sections were recorded with regard to the eventual quadrasonic reduction, even though this took more track space than would have been necessary for stereo. For example, the clock sounds for *Time* were built in an imaginary quad picture on to four tracks of the 16 track master. The sounds heard on the introduction to *Money* were also distributed across four tracks to enable the spatial shifts of the quad reduction. This involved transfer from an edited tape loop on a four track machine to the 16 track for subse-

quent overdubs so that each sound issued from a different speaker.

Merely redistributing the sound for the quad mix, however, is not the end of the story. The various quad systems for which the album is intended have to be borne in mind. EMI have adopted the SQ system for disc issues. As with all matrix systems it has specific limitations. For example, if signals are positioned anywhere in the area between centre-of-the-room and centre back they are likely to be out of phase to some degree when encoded and cut in two disc channels. This results in a considerable drop in level, due to the difference channel limitations or even a total disappearance of the signal in mono, so this has to be avoided wherever possible, although a pan through this centre area might pass unnoticed since level variations would be less objectionable in a moving picture.

When approaching the quad mix of the album it had to be emphasised that the contents should be unchanged musically, but be a 'showcase' for the quad medium and avoid the more obvious gimmicks of panning etc. The requirements were a discrete master for tape systems, and an encoded SQ master for disc transfer. It was thought that two separate remixes would be the ideal situation, for in that case each system could be used to its fullest capabilities without compromise on account of the other. However, there might have been such huge differences in quad effect between the two that they might have been incompatible with each other musically; for example, in the effect of following disc and tape cartridge.

Another considered alternative was to remix to discrete and SQ simultaneously. This would have presented a considerable demand on machinery, especially as many other tape machines would be in use for quad echo delay, adt and so on. Every edit would then have to be duplicated on both systems; crossfades would be a nightmare, needing three four track machines and three stereo machines quite apart from the extra time involved and the multipli-

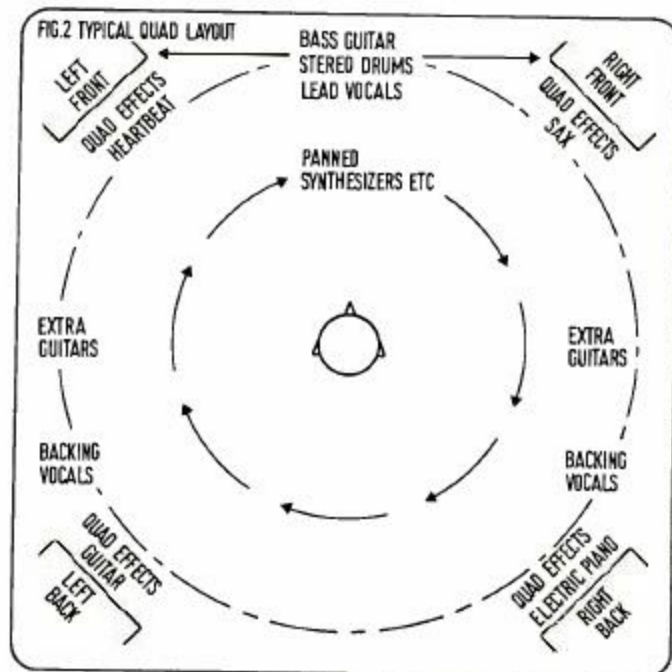
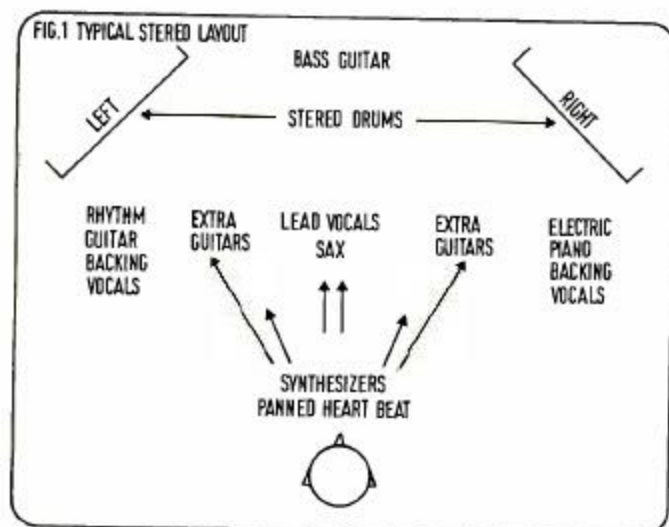
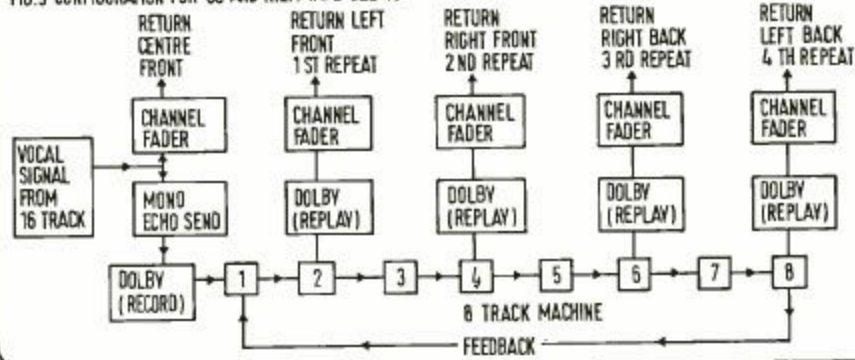


FIG.3 CONFIGURATION FOR 'US AND THEM' TAPE DELAYS



cation of lineup procedures. It was eventually decided to work with one discrete four track tape and monitor it in such a way that assured a reasonable result for both systems, in other words bearing in mind the compromises in the subsequent two-channel processing. The quad remix room at EMI's Abbey Road Studios has the convenient facility to monitor a discrete tape passed through a back-to-back SQ encode/decode arrangement, and also the stereo result direct from the two matrix channels without decoding. Thus, we can monitor discrete, SQ and stereo from just one four track tape. An SQ master was to be prepared simply by making a copy of the final edited and crossfaded four track tape through the SQ encoder. This extra generation could be saved if it was felt necessary by direct transfer from an advance head four track machine to disc via an encoder, although normal practice is to prepare an intermediate two channel tape: azimuth and generation difficulties can be overcome by careful engineering. Having determined the manner in which the various systems could be handled for the reduction, the problem of quad positioning arose.

On the stereo version the basic instrument positions were arranged as in fig. 1. Additional sounds such as synthesizers, extra guitars and backing vocals were spread across the picture in various combinations for maximum filling out of the music stage. The stereo remix was by no means a simple one, many tracks having to be 'potted' for just a bar or two. The 16 track master itself was derived from an earlier 16 (down to nine or ten tracks on the second in some cases) in order to make spare tracks available for further overdubs. This did not make the quad picture 'design' any easier. For instance, the drums had been mixed to stereo on the second generation 16 track which, owing to SQ limitations, had to be spread from left to front right, leaving bass drum and snare centre front and tom toms spread in stereo across the front of the room. The bass guitar also had to remain centre front for the sake of the SQ, but this was no great problem as bass frequencies have little directional characteristics and the harmonics and attack of the instrument are not particularly strong here. Guitar was placed rear left and the electric piano rear right.

The reverberation system used throughout the quad reduction was two EMT reverb plates: one was spread across the front channels and one across the rear—both fed from the

same source. This gave a very full 'inside the chamber effect' and helped to minimise the 'hole in middle of the room' caused by the absence of direct sounds there.

The piano on *The Great Gig in the Sky* is a natural quad recording made in Abbey Road Studio One (while bass and drums were playing simultaneously in Two) using two distant mics for back channel reverberation. The four tracks were simply combined for the stereo version.

In *Time* the roto-toms (tom-toms tuned by rotating drums on a pivot to stretch the head) were spread across the back channels while most of the remaining instruments were distributed across the front. The recording technique and studio layout for the basic backing tracks were nothing especially unusual except that maximum possible separation was attempted. Poor separation for a quad remix of this type could prove very disturbing. This was no problem in most cases, as many instruments were overdubbed rather than laid down on the basic track. The Kepex system was used as a noise gate on all the 16 tracks for the reduction, and also in the earlier stages to improve separation between individual drums on the basic recording. Further use of Kepex enabled decay times of various tracks to be altered; the heartbeat on the introduction to the album was, in fact, a Kepexed bass drum.

The positioning for quad remix was effected by means of an external insertion unit containing sixteen dual-concentric pan pots (front to back and right to left). These were then fed into channel faders on the mixing console in the normal way. Any movement or panning was arranged by patching in external joystick panpots to the appropriate tracks and then again returned to channel faders.

Us and Them is probably the most involved piece of quad technique on the album. On the stereo version a vocal line is repeated by means of a very long tape echo which moves from the left towards the right on each successive repeat. In order to achieve an interesting effect in quad, each repeat was returned to a different channel which entailed using a different tape system for each repeat rather than recycling one signal back through the same system, as one would for a normal tape echo or digital loop. In order to do this a hook-up had to be arranged, with an eight track machine as in fig. 3.

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SIDES OF THE MOON

It will be noticed that each repeat involves two record-replay stages. This was necessary to attain the length of delay needed for the piece and in fact to increase the delay still further the tape speed of the machine was lowered. By the time the fourth repeat had arrived about four seconds after the original signal it had passed through eight stages of t. x, so machine and Dolby line up were extremely critical. This caused troubles: originally, the record/replay eq was accurately set, as usual, but the relatively slight speed deviation meant that, at the changed speed, slight top lift occurred. After eight repetitions this became rather unusable. It will also be noticed that the repeat from track eight is fed back into the record stage of track one so that a further cycle takes place. Thus: fifth repeat returns left front, sixth right front and so on. The result is a round-and-round-the-room effect. The system is operated below unity gain however, and the sixth and seventh repeats are barely audible.

A similar type of delay is used in *Any colour you like* on synthesizers. Richard Wright, when overdubbing on to the section, heard the tape repeat in earphones, and played in such a way that the result was canonic.

Owing to the sheer complexity of some of the procedures involved in the recording of *Dark Side*, many of the sounds would be impossible to reproduce live, even with the most involved equipment. It is for this reason that Pink Floyd use a number of pre-recorded tapes, reproduced in quad on a Teac four track machine, for their concert programmes. The tape is operated at the mixing desk which is situated within the hall in the audience area. One unusual point about the quadrasonic layout for Floyd concerts can be seen in fig. 4. Rather than use a conventional double stereo set up, ie left front, right front, left back and right back, the whole system is rotated 45°. This has many advantages over a normal system.

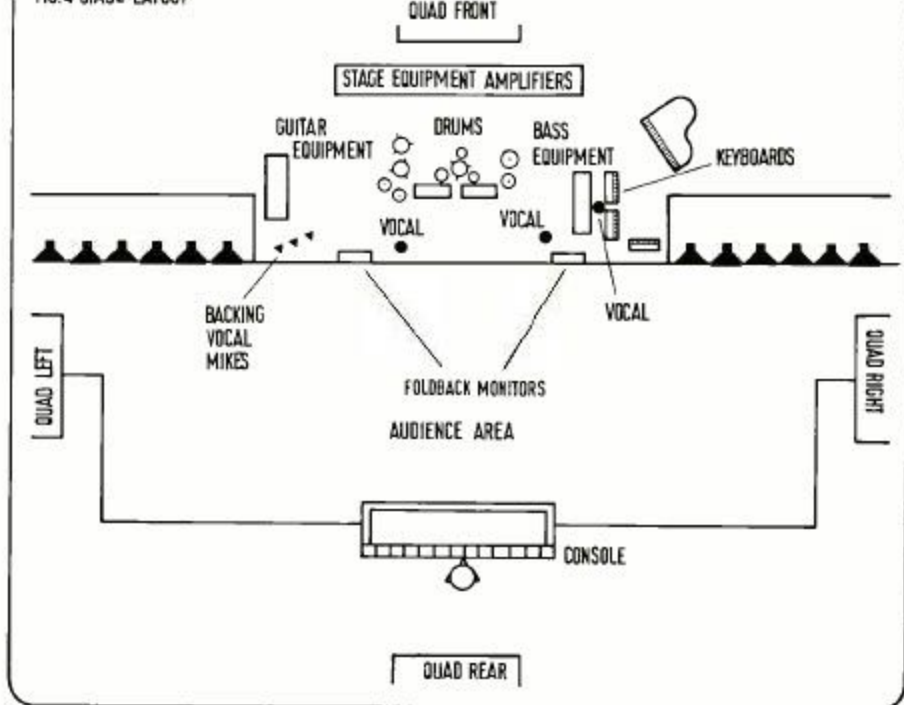
The main stereo pa is extremely large and powerful (approx 8 kW). To set up an equally powerful system at the rear corners of a concert hall would be a mammoth task, and very impractical. Even with the layout shown, road crews have a hard time humping huge cabinets to the sides and back of the hall, especially when the auditorium is on several levels. This involves speaker stacks on every level together with their associated cables, which have to be kept out of the way of the audience.

It has been found very effective to have the quad output stacks on a level somewhat above that of the stage, especially since the system is used frequently to simulate movement.

This applies more especially to the stack behind the stage, of course, which in most cases would be drowned by the more powerful independent stereo stage pa. The stage quad stack also serves as an aural cue to the band, who might otherwise find it difficult to hear the other quad channels, which could literally be hundreds of feet away from the stage.

Any attempt to duplicate the quad picture from the recorded version would be disastrous. The delay from front to back in a large hall could be as much as half a second, and in tight rhythmic sections this would be very unpleasant to listen to, quite apart from the

FIG. 4 STAGE LAYOUT



band finding time-keeping very difficult with their own sound coming back at them from all directions with various erratic degrees of delay.

Thus, the quad system for a live hall has to be used in a rather subtle manner, the aim being in this case to add impact at relevant points in the piece being performed. In the long introduction to *Dark Side*, the heart beat fades on slowly as the house lights dim and synthesizers and voices swirl round the hall. In one of the Floyd's old favourites the effect is slightly less subtle: in *Careful with that axe Eugene* the quad carries no sound at all until the famous horrific scream at which every amplifier and speaker is driven to its absolute maximum, accompanied by an explosion of flash powder behind the stage.

Any individual instrument carrying a microphone to the mixing console can be individually switched into the quad system. This is used to the most advantage on quiet passages where the main stereo pa can be virtually shut down and the maximum use made of quad pan pots for movement.

With domestic quadrasonic systems, seating position is very important. In a concert hall, however, this is not as critical owing to the greater distances involved between channels. It is an unfortunate fact, however, that some unlucky concert goers have to sit directly underneath a quad stack and get themselves deafened—which is as good a reason as any for not using the quad too much throughout the concert. In the film *Earthquake* the noise issues from huge cabinets at both ends of the theatre, and the author was unlucky enough to find himself sitting near one of the rear stacks at a showing in the West End.

Pink Floyd have recently used back projected film behind the stage with a 35 mm four channel

sound track. This has proved very successful but problems do arise with run-up-times of up to ten seconds when attempting to bring in a sound on a musical cue. Film and multichannel sound are now commonplace of course, as in the new Ken Russell picture of 'Tommy' and its use of a 'quintophonic' system—doubtless an indication of things to come.

AGONY COLUMN

■ The big name group was appearing at a certain big London gig, as was the small, enthusiastic band that was supporting them. The big time producer was around at the rehearsal which went very well for the superstars but even better for the support, who were sensational. 'You really mustn't do as well as that on the right, must you?' said the producer, 'otherwise we might get upset'. Or words to that effect. Support bands tend to be a bit green so they didn't really sort out all the possibilities. On the night, the superstars were pretty good, as befits a good, professional outfit; the support was even better... for the first few numbers. Then the vocalist found that he couldn't hear himself through the monitors, and the bass player's sound seemed to go wrong. The balance seemed to be a bit out. As a result, the set fell apart around them, and they finished in a shambles. Afterwards, they discovered that the pa balancer had been paid to ruin the sound. Oh well, so that's the way it goes. But the rub was when the band discovered that the price was £10; that hurt.

