selektor

Four-ear quad

Reproduction of sound with directional information can be done with two-channel systems. Of these, there are two basic types: conventional stereophony and the binaural system. By far the best-known is conventional stereo; basically, this can be described as the reproduction of two mono signals through two loudspeakers, whereby amplitude differences between the two channels determine the position of the 'phantom' image in the total stereo picture. In recent years, an alternative system has been discussed extensively: the binaural system, or dummy-head stereo as it is popularly referred to. As the name implies, dummy-head recordings are made with an artificial head that has microphones inside its ears.
Both systems have their disadvantages. Localisation in conventional stereo is not particularly good: the amplitude differences between two channels are not sufficient for precise and accurate image localisation. Dummy-head recordings, on the other hand, suffer from the drawback that conventional mixing and panpotting in the recording studio cannot be used; furthermore, the system is only suitable for reproduction through headphones — loudspeaker reproduction is distinctly inferior even to conventional stereo. The reason for this is that 'acoustic crosstalk' occurs, with sounds from the right-hand loudspeaker reaching the left ear and vice versa. It is probably no coincidence that the most fervent proponents of dummy-head stereo happen to be manufacturers of headphones!
Most of the problems associated with dummy-head recordings have been solved in the so-called Bi-phonic system proposed by JVC. A special processor in the recording studio offers multi-mike and panpotting facilities, and produces two output signals that will tolerate a normal amount of acoustic crosstalk.
JVC have now announced a further extension of this principle. The Q-Biphonic system is intended for reproduction using four loudspeakers instead of two. In this way, a major improvement in sound localisation is obtained, particularly for side and rear images.
Q-Biphonic recordings can be made using two dummy-heads instead of one, where the signals from the front head feed the front loudspeaker pair and the signals from the rear head feed the rear pair. In other words, the recording is made using four ears (the obvious solution to the two-ear-four-loudspeaker paradox?!).
A Q-Biphonic processor has also been developed, offering multi-mike and pan-potting facilities.
It is perhaps interesting to note that JVC are also the originators of the CD-4 quadrophonic system. Since the Q-Biphonic system offers distinctly better image localisation than conventional Pair-Wise Mix, and since the Q-Biphonic system requires four transmission channels which can be acommodated on a CD-4 disc, it seems reasonable to assume that JVC have exactly that in mind!

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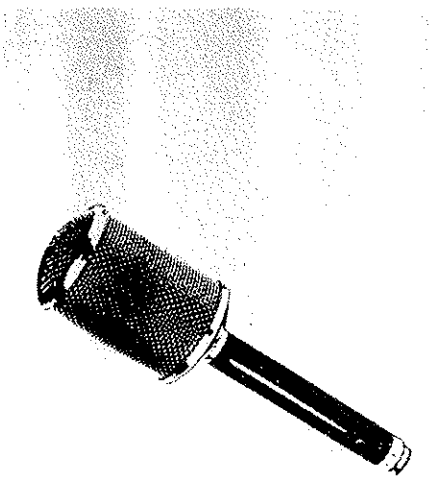
Soundfield microphone: a new way to record

The Calrec Sound Field Microphone Type CM4050 caused quite a stir among professional recording engineers when it was presented at the recent AES Convention in Hamburg. Developed primarily for the Ambisonics Surround Sound System, it gives unprecedented operational flexibility in 'conventional' stereo recording as well.
The microphone is used in conjunction with a special equalisation unit, and provides four output signals: the soundfield pressure (equivalent to the output of an omnidirectional mono microphone) and three 'velocity' outputs. The latter outputs correspond to the three components of the pressure gradient in the sound field: left minus right, front minus back and up minus down. Together, these four signals correspond to the Ambisonics B-Format signals. Also, together they completely define the sound field present at the microphone — and this is where things begin to get interesting!



In order to visualise the exceptional capabilities inherent in this system, it may be helpful to imagine the following experiment. It has been stated that the B-Format signals completely define the sound field present at the microphone. If these B-Format signals are recorded and then played back at a later date through the same microphone (assuming that were possible!) the result would be to exactly recreate the original sound field at that point in space. Any conventional microphone could now be placed in this field, pointing in any desired direction, and its output would be exactly the same as if it were placed in the same position during the original recording!
In practice, of course, there is no need to first reproduce the sound field and then re-record it. The same result can be obtained by electronically blending the four B-Format signals. This is achieved with the aid of a 'soundfield signal control unit'. This unit contains controls with which any first-order microphone characteristic can be synthesised: that is the complete range from omni-directional, through cardioid and hypercardioid to figure-of-eight. In theory, any number of such microphones can be synthesised simultaneously, but the Calrec unit provides a mono output, a stereo pair, conventional 'quadrophonic' outputs and Ambisonic B-Format periphonic or horizontal outputs.
Controls are provided which allow the synthesised microphones to be rotated and/or tilted, and the directivity may be varied from cardioid to hyper-cardioid. Furthermore, in stereo the angle between the two microphones of the synthesised pair may be varied at will.
All these facilities are available both during the live recording session and in post-session processing of the B-Format tape. This means that after having made the recording it is still possible to 'aim' the microphone at a soloist, and even 'zoom in' by selecting the extreme hyper-cardioid characteristic!
All in all, the soundfield microphone should prove to be a welcome and powerful tool for those who are interested in high-quality sound recording.

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