MULTICHANNEL MICROPHONE SUPPORT SYSTEM

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Using the process of Multichannel Microphone Array Design (MMAD), an almost infinite number of microphone configurations can be chosen to suit the needs of a particular sound recording situation. Careful adjustment of microphone position is needed to achieve each desired configuration, both with respect to each microphone position coordinate and also the individual microphone orientation. The "wingspan" must be capable of adjustment from a minimum of about 30 cms to a maximum of a few metres. Independent adjustment must also be possible for the front triplet group of microphones and the back pair. A new approach to this problem will be presented, together with a practical demonstration of a prototype suspension system, with particular emphasis on the specific needs of MMAD.

INTRODUCTION

Many different microphone array systems are being tried out for both experimental evaluation and in some cases already in multichannel production. Although most of the scientific publications on the subject focus on the physical and psycho-acoustical analysis, the sound engineer is also faced with a much more practical problem - that of finding a sufficiently flexible microphone support system.

It has been shown in previous AES Convention papers (1)(2)(3) that a great number of different Multichannel Microphone Arrays can be designed to suit different sound recording situations. However the "wingspan" of these arrays can vary from around 50 cm up to 2 or 3 meters, and a distance between the front and back microphones approaching anything up to a metre. Careful adjustment of microphone position is always needed to achieve each desired configuration, both with respect to each microphone position coordinate and also the individual microphone orientation.

The few microphone support systems that do exist already, tend to use the "Lorraine Cross" approach as shown in Figure 1, where a central rigid beam supports the front facing microphone and two cross bars are used, one for the left and right microphones of the Front Triplet and another for the Back Pair. Although this approach is perfectly satisfactory for the smaller wingspan arrays, it becomes very cumbersome and difficult to manipulate when the arrays take on a much wider "wingspan". Some single transverse bar systems also exist, but unfortunately restricting us to the use of only a few microphone array designs.

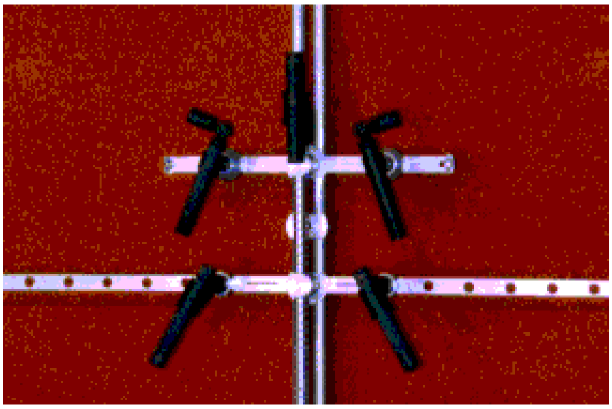

Figure 1 - The "Lorraine Cross" microphone support system - a central beam plus two cross bars.

As usual "time is money" and little time is unfortunately allowed for the complex process of installation and experimentation of different microphones systems. To fully exploit the Multichannel Microphone Array Design process, the author of this presentation has found it necessary to develop a new microphone support system that allows much greater freedom in the use of any microphone array system described in the Multichannel Quick Reference Guide (3), whilst still retaining a reasonably compact size (comparable to a camera tripod), for transport of the system once folded. This microphone support system also allows any specific multichannel microphone array to be put in place within about 10 minutes.

Figure 2 - Multichannel Sound Recording course at the Institut National de l'Audiovisuel near Paris « Quintet de Musique Baroque Celtique sous la direction de Michel Reuter ».

The support system has been designed to facilitate adjustment of all the main parameters described in the Multichannel Microphone Array Design process such as the spacing and orientation of the Front Triplet and the Back Pair (Figures 3 & 4), and independent adjustment of the distance between the Front Triplet and the Back Pair in order to obtain the optimum Coverage of the Lateral Segments.

Figure 3 - Easy adjustment of microphone array parameters such as microphone orientation and spacing.

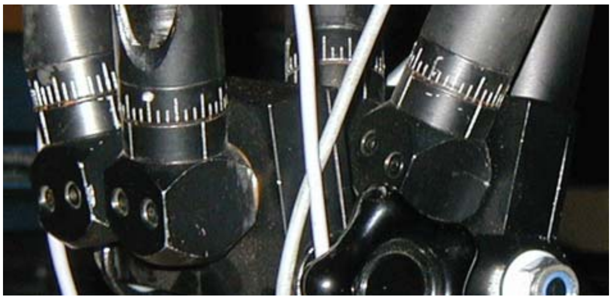

Figure 4 - Adjustment of microphone orientation at the base of each arm.

CONSTRUCTION

Each of the five microphones is mounted on an individual arm which is extendable to about 1m50 and also free to rotate about its axis. The arms are fixed to a single central support which can be mounted on a standard microphone stand or suspended from a transversal aerial cord. The symmetry of adjustment of the left and right microphones of each part of the system (left and right microphones of the front triplet, and left and right microphones of the back pair), is automatically maintained by gear coupling of the movement of respective left and right arms.

The front triplet of microphones is also mounted in such a way as to be movable as a single group with respect to the back pair thereby facilitating the adjustment of the Lateral Segment Coverage coordinates. Precisely calibrated friction adjustments allow the microphone arms to be moved easily to the desired position and then blocked in position if necessary. Orientation of each individual microphone is graduated, and under calibrated friction control, and does not need any blocking during operation.

It is also possible to mount a central vertical arm to support a stereo microphone pair, when combined multichannel and stereo recordings are required. This central arm can also be used to support an omnidirectional microphone often used for very low bass response pick-up.

The complete support system, when folded for transport, is no larger than the size of a standard camera tripod and considerably lighter, as shown in Figure 5.

Figure 5 - Microphone Support System folded for transport.

VERTICAL ORIENTATION OF THE MICROPHONES

With this type of central fixing of the support arms, the rotation of these arms, to produce spacing between the microphones, will obviously introduce a degree of vertical orientation of each microphone with reference to the horizontal reference plane (see Figure 6). However this can be minimized by using the arms at full extension, or compensated for, using a graph giving the relationship between the real angle between the microphones and the arm rotation angle calibrations, for different arm positions.

Figure 6 - Downward looking microphones.

However in a paper present to the 112th AES Convention (4), the author showed how this parameter may be used to one's advantage creating a somewhat downward looking Coverage Angle, which is often useful when the microphone array is positioned for instance above the orchestra. The full analysis of this facet of the proposed microphone array support system are described in this AES paper (4).

If required this downward looking orientation can be adjusted by realignment of the microphone clip so that the microphone is repositioned in the horizontal plane (as in Figure 7), obviously introducing some error into the calibrated value of angular rotation for each arm.

Figure 7 - Microphones adjusted so as to be aligned with the horizontal reference plane

REFERENCES

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