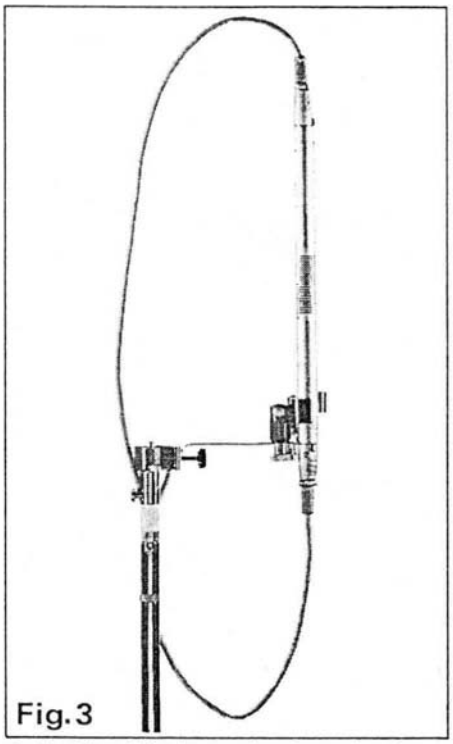

Fig. 3

the head' and 'in the speakers' sound, when other than figure-of-eight mikes are used, with an uncomfortable lower mid-frequency and bass 'fog' around the centre of the stereo image.

Furthermore, when the listener is seated significantly away from the ideal listening position directly between the loudspeakers, pure coincident recordings rarely seem to give successful sensation of stereo and ambience.

I spend a great deal of what spare time I have in going to concerts to 'keep my feet on the ground' and to listen to some live music; inevitably while I am there my ears are not only feeding me with musical stimulation but also technical aspects of the quality of the live sound which I endeavour to reproduce in my professional work. There are certain particular features of what my ears are presenting to my brain, and some of these are not satisfied for me by conventional coincident microphone systems.

Research last year brought me finally to a novel approach as shown in fig. 1b. In my alternative technique two microphones are employed as a phased array (fig. 4), reminiscent in some ways of the techniques employed in high resolution radio antennae for satellites and radar. Two capsules are mounted (best results being with figure-of-eights in my experience) side by side, with their principal axes of maximum sensitivity aligned parallel to one another.

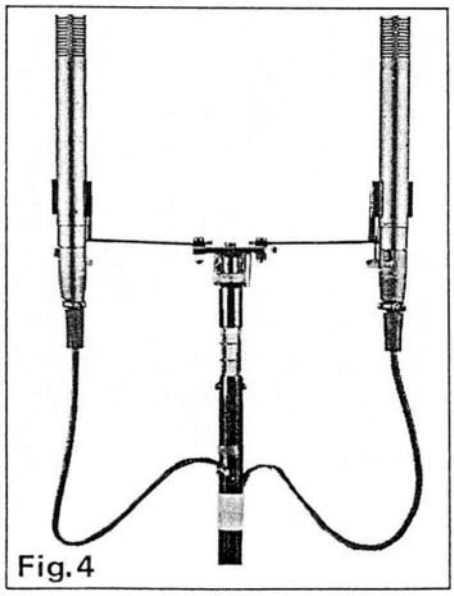

Fig. 4

In this way, one is using the microphones as a phase-detector as well as a differential amplitude detector, and by making their spacing of the same order of magnitude as the inter-ear spacing, one is sampling the phase information which would be available to a listener standing in the same position which would be otherwise filtered out by coincident techniques. When sitting in a concert audience more than a few rows back from the performers, it is an interesting experience to shut one's eyes and analyse what stereo effects there are. I can obviously only speak for myself, but I am especially aware of two features. Firstly, my brain is processing phase information to the almost total exclusion of amplitude information once I am more than a few yards from the sound sources within the orchestra; and secondly, my ear-lobes (pinnae) are having a significant effect upon my hearing in making the ear's polar-diagram go 'high order' with increasing frequency at the centre of the stereo image. Another interesting experiment is to sit oneself 15 feet or so away from a ticking clock: as one twists one's head slowly one discovers that there is a solid angle of around 60° where the high frequencies appear enhanced and clearer. This is because not only are one's ears working as a phased-array but also as a 'forward preference' array through the pinnae's action – such phenomena are conveniently put to one side when discussing existing coincident-type microphone systems.

Traditionally, the academics have scorned all 'non-coincident' microphone techniques for many good reasons, but it should not be forgotten that the natural human hearing process itself is non-coincident in their terms and still appears to function with some success. The principal theoretical objection is usually the off-axis path difference between transducers, but with my system such adverse side-effects are minimised through the use of pressure gradient (velocity) figure-of-eights where the plane of maximum path difference coincides with the null in the directional polar diagram of the microphones. Furthermore, through the use of a tight polar diagram, a great deal of troublesome unrequired ambience pick-up is eliminated when working in over-reverberant surroundings. It is thus possible to place microphones a good deal further back than usual (to considerable musical and sonic advantage), so that the path difference again becomes less significant. The stereo width available when using a parallel pair of figure-of-eights at 200 mm or so spacing is most surprising when one sits back and thinks about it, and I find it a useful facility always to incorporate a 'centre blend' in my mixer (fig. 5), whereby I can re-introduce into centre-front a mono mix of the stereo pair. Fading this mono centre blend in and out of the balance has a curious 'zooming in' effect on performers at the centre of the image (not just the narrowing effect one might anticipate) and is very useful in focusing soloists.

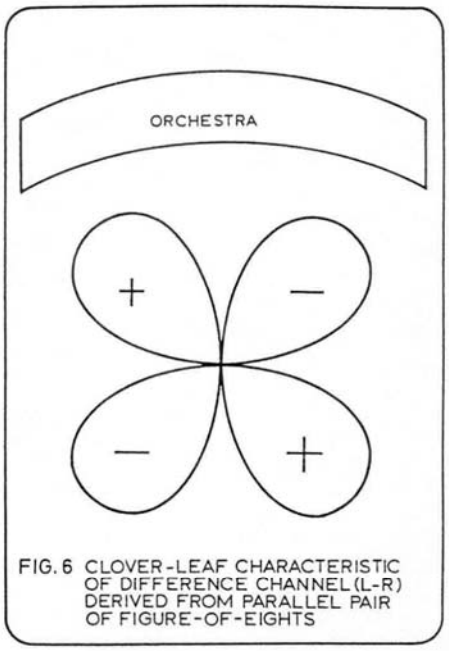

FIG. 6 CLOVER-LEAF CHARACTERISTIC OF DIFFERENCE CHANNEL (L-R) DERIVED FROM PARALLEL PAIR OF FIGURE-OF-EIGHTS

Scrutinising more closely the human hearing process, there is only one respect in which the ears can be regarded as coincident, and that is in temporal terms, not positional, *ie,* sound other than from near field arrives at both ears at very nearly if not precisely the same time. My microphone technique replicates this aspect in a fashion not inferior to a crossed-pair, so maybe one should find a new term for crossed-pair recording to en-

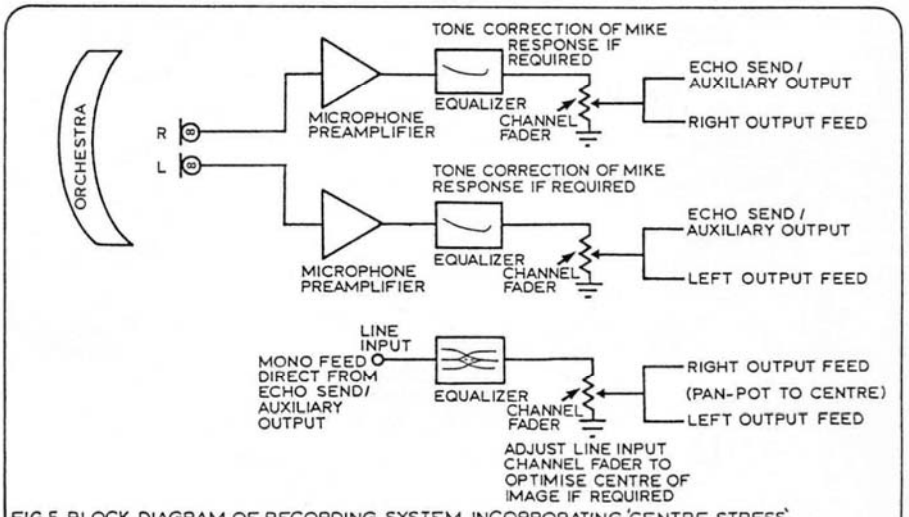

FIG. 5 BLOCK DIAGRAM OF RECORDING SYSTEM INCORPORATING 'CENTRE STRESS' FOR PROFESSIONAL USE.