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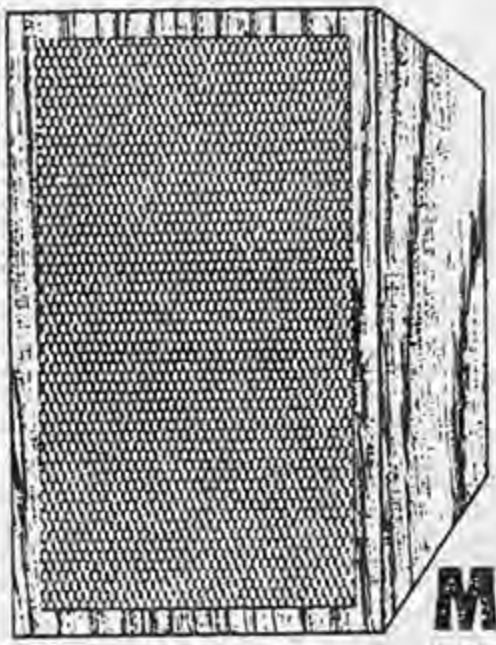
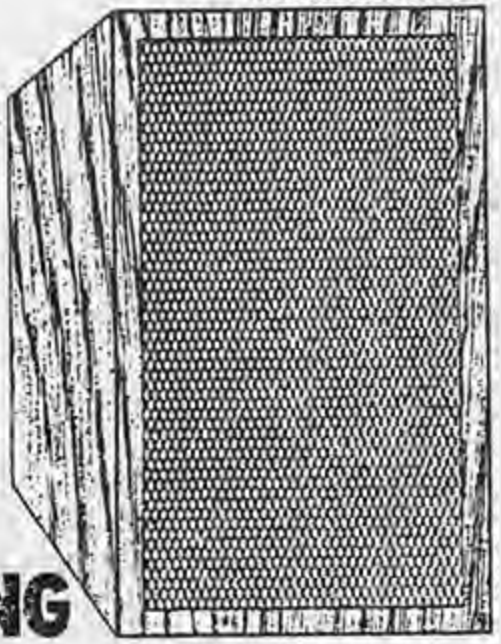


NEAR FIELD MONITORING



by Ed Long

Edward M. Long is the owner of E.M. Long Associates of Oakland, California, an acoustics consulting firm which specializes in the design of loudspeaker drivers and loudspeaker systems and quality control systems for loudspeaker manufacturers. The UREI Model 813 Time-Align™ Monitor was designed as a joint effort of UREI and E.M. Long Associates. The Time-Align™ Technique has been applied to other commercial loudspeakers and is licensed by various manufacturers. The Pressure Recording Process™ or PRP™ was also developed as a joint effort of E.M. Long Associates and R.I. Wickersham Associates and has been licensed to recording companies. Mr. Long claims that his interest in Near Field Monitoring™ contributed directly to the development of both the Time-Align™ Technique and the Pressure Recording Process™.

Probably in no other industry is there any greater desire to blend art and science than in the recording industry. The ultimate aim of the whole audio business is to evoke a pleasant subject response in its customers, the listeners who buy audio equipment and recordings. The use of technical equipment to interface between the performance and listeners implies "science", or "an ordering of knowledge".

The equipment itself, as good as it may be, cannot insure that the desired end-results will be achieved. Knowledge about the proper use of technical equipment can help to increase the chance of success. This is true about all of the equipment used in producing modern, high technology recordings, and anyone who is seriously interested in recording ones to learn all he can about his equipment and the best ways to use it.

One of the areas which lacks a completely rational approach is the acoustical monitoring of recordings. There are a number of reasons for

this. One of the reasons is that an indepth understanding of what "stereo" is and how a good "stereo" recording is produced seems to be lacking. Another reason is the confusion between the goal of true monitoring and a desire to enhance monitoring in superficial ways. The goal of true monitoring should be to hear exactly what is happening in the recording. This seems, on the surface, to be an obvious objective. It seems natural and desirable that the goal of true monitoring would include being able to hear extraneous noises, dropouts, excessive limiting and compression effects, the degree of vocal articulation, amplitude balances between instruments, spectral balances of various instruments, etc. You may have noticed that I have left out of the list the degree of true stereo effect and the sense of depth. I will get back to this. But before I do I will try to describe one part of the monitoring problem which should be discussed, as it applies to the items already listed. It applies no matter how many channels are used to present the final product.

The enhancement of the acoustical output of the monitor loudspeakers has been a problem for years. The attempts, which are sometimes very successful, to enhance the sound of the monitors by the clever use of early reflections, is exactly opposite to the stated goal: to monitor only what is on the recording itself. It can be compared to "looking at the world through rose colored glasses". It is fairly common knowledge that early reflections can be used to enhance the "body" and "warmth" of musical sources. The shells used by symphonic orchestras are a good example of this. Even when they play concerts out-of-doors they are usually ensconced in a shell of some kind. The use of early reflections to enhance the sound of monitor loudspeakers should be avoided. Only the direct sound from the monitors should be heard if the desire is to be able to hear only what is in the recording. This is not an argument against the enhancement of the sound from the loudspeakers, by early reflections, for all listening situations. It is an argument specifically applied to monitoring situations. The fact that a person uses a microscope to see tiny details doesn't mean he must always look at the whole world through one.

This argument implies that I endorse the idea embodied in the "Live End, Dead End" (LEDE) concept which has been actively promoted by Don Davis. As far as the "Dead End" part, it is true. The enhancement afforded by the "Live End" part of the concept is only acceptable when the delayed reflections do not fool the persons involved in the recording into thinking that the recording itself contains "body" and "warmth" which is actually lacks.

The persons involved in the recording must be able to extrapolate how the recording will sound when played back in different environments. One of the main attributes of the really successful people in the business is their ability to do this. A comment I often hear is, "I work around the monitors". Apart from being a somewhat

disparaging remark, what they really mean is that they are able to produce successful recordings by being able to extrapolate how the recording will sound in other environments and when using a variety of loudspeakers.

One of the ways of overcoming the problems and confusing effects caused by early reflection enhancement is to use the technique of Near Field Monitoring™. The monitors are placed approximately 3 feet from the listener and about 3 feet apart. This usually means right in back of a mixing desk or up over the meters. In some cases, the monitors may be suspended over part of the console desk, if it is a large one. The concept is not new but the problem has been a lack of a suitable monitor.

Most wide-range multi-driver loudspeakers are not designed with close-in listening in mind. The lack of coherence between the output of the various drivers, when listened to at close range, causes them to be unsatisfactory for Near Field Monitoring™. Small cube speakers, such as the Auratone and Alembic are suitable because they use a single driver, but they lack the wide frequency range necessary to satisfy all the aspects which are desireable in a Near Field Monitor™.

The MDM-4 Mix-Down-Monitor designed by E.M. Long Associates and produced by Calibration Standard Instruments, was developed specifically for Near Field Monitoring™. It is, in a sense, a product of necessity. Since I design loudspeaker systems for clients it was my desire to have a monitor which could be used to separate what was on the recordings from the effect upon the sound produced by various loudspeaker system designs and their interaction with different room acoustics. Satisfactory, wide range, Near Field Monitoring™ is possible with the MDM-4. Very favorable comments are constantly coming in from persons who are using the MDM-4 in the Near Field Monitoring™ mode.

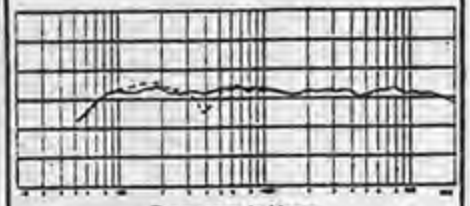


FIGURE 1: The effect of the delayed reflection from the mixing desk, upon the MDM-4 Mix-Down-Monitor when operated at 3 feet from the listener and 1.5 feet above the mixing desk in the Near Field Monitoring™ mode. Moving back and forth between the monitors, allows the effect of this reflection to be accounted for by the listener, and separated from the direct sound from the monitors, since the position of the notch (shown at 450 Hertz) will move up and down in frequency with listener movement (solid curve). The MDM-4 operated in 4 steradians, free field conditions, for reference (dashed curve).

Elimination of the early reflections are only one aspect of monitoring which is solved by Near Field Monitoring™. The effect upon the lower register of sound by the mode of loudspeaker operation is another serious problem. A loudspeaker will be affected in at least two ways by the nearby boundaries. The bass will increase when placed near a wall or a wall/ceiling boundary. A series of peaks and nulls will occur due to delayed reflections from the nearby boundaries. To know only the spectral balance of the monitor and the first order reflection from the mixing desk will affect what you hear.

Each MDM-4 comes with a B&K run graph of the amplitude vs frequency response of that particular serial numbered unit. The curve is run under 4 TT steradians, free field conditions with a ½" B&K microphone at ½ meter on axis. Since this mode of operation is even closer in than the end use condition, which will usually be with the MDM-4 at about 3 ft. from the listener, and up and away from nearby objects, (except the mixing desk), only the effect of the reflection from the mixing desk is a variable factor. I have made measurements which show that this effect is present, (see Fig. 1), but I have found that moving my position while monitoring, allows me to separate this early reflection effect from the actual spectral balance of the recording.

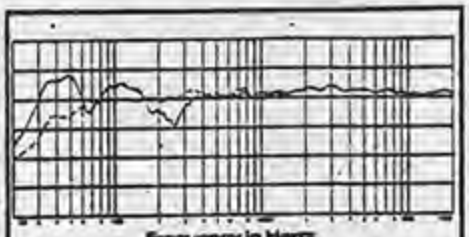


FIGURE 2: The effect upon the response of an excellent monitor loudspeaker, by the effects of the delayed reflections from the walls, floor and ceiling and the room eigen modes, when operated at about 12 feet from the listener (solid curve). The same monitor in 4 steradians, free field conditions, for reference (dashed curve).

The effects upon the spectral balance of a far field monitor (8 to 15 feet away), due to the early reflections from the walls, floor, and ceiling (see fig. 2), are much harder to handle even with good amplitude vs frequency domain room equalization. These spectral anomalies are due to time differentials as well as amplitude differentials between the direct sound and early reflections, so amplitude vs frequency equalization adjustments can be, at best, only partly successful in correcting the problem. In case the foregoing sounds as if I am against using equalization as a method of correcting the aforementioned problem, I am not. I use and recommend room equalization to correct problems below 500 or 600 Hertz, while realizing its limitations.

Near Field Monitoring™ has for me, its chief advantage in allowing me to be able to determine differences in the degree and precision of recordings labeled "stereo". Stereo is from the Greek and means "solid". A truly successful stereo recording should present a solid sound image which remains relatively stable when you move across the sound field between the monitors. It should mean that, as you move, there should be little or no "combing" or "phasing" effects. A recording which satisfies these two criteria, when auditioned in the Near Field Monitoring™ Mode and while moving back and forth between the two monitors, will be a true stereo recording. Such a recording requires no special stereo seat for a listener to hear a "solid" sound field between the speakers. This sense of solidity to a projective sound field and what is necessary to produce it could be dealt with in another article. But for now at least, we have a means to determine if we have achieved it: Near Field Monitoring™.

*Near-Field-Monitor and Near-Field-Monitoring are trademarks of E.M. Long Associates