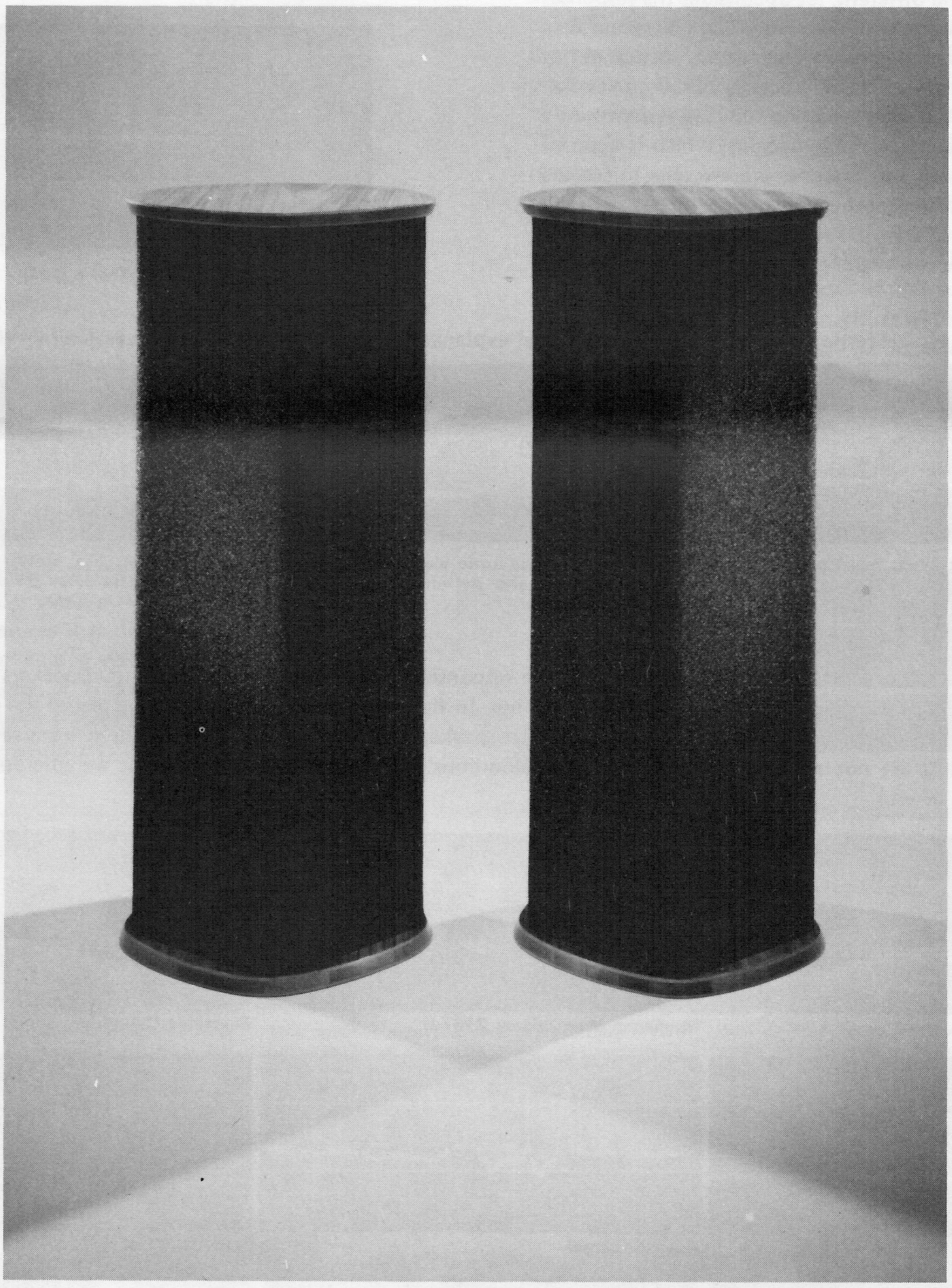
For the Audiophile
Who would rather listen to Music
Than to equipment . . .

The DCM Time Window:™
Listen through it
Not to it.



Until now, the only choice available to the Audiophile was a grim one: either choose a loudspeaker whose colorations could be lived with, or go without. The trouble with loudspeakers is that they sound like loudspeakers. And the more you listen to them, the more you come to dread the familiar wall between you and the music: your loudspeakers.

For the Audiophile, who has had his fill of loudspeaker sound, we offer the DCM Time Window.

Though clouded in controversy, the importance of the Time element in sound replication is readily understood when the nature of sound and hearing is considered. Simply stated, real sounds travel through the air at the same speed regardless of frequency. Therefore, the attacks and decays of all frequencies in a sound from one source reach the listener in precisely the same order in time as they were emitted by the source. We identify sounds of real things not only by recognizing their various harmonic structures, but also, in the case of transient or non-periodic sounds, by the relative times-of-arrival of the various components of the sound.

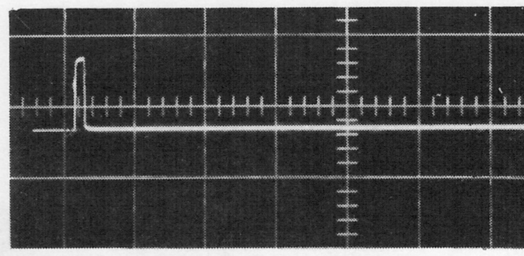
Just as the ear receives all of the waves in a sound in the correct order, the recording microphone relays all of the components of a sound, transformed into electronic impulses, to the recording machine in Real Time. Through the entire reproductive process little of the signal's Time Integrity is lost — until it tries to pass through a loudspeaker into the air.

There are hundreds of reasonably good loudspeakers on the market; a few of them are outstanding. Whether their differences are blatant or subtle is not the issue; they remain, despairingly, audible. Until now, the Audiophile has lacked the means to objectively quantify these differences which are subjectively so apparent.

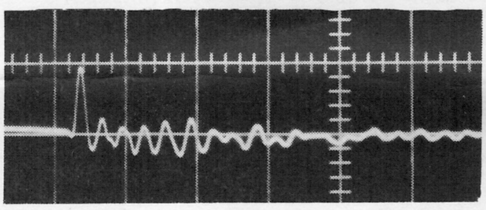
To provide a basis for understanding why different loudspeakers sound different, let us consider the responses of some different loudspeakers to a simple stimulus, a one-tenth millisecond pulse. This pulse, being of no particular frequency, effectively acts as a brief burst of all frequencies at once. By "listening" to the response of a speaker with a laboratory microphone, which is coupled to a triggered-sweep oscilloscope, we are able to see the sonic waveform produced by the speaker just as it would reach the listener's ear. Any difference between the speaker's response and the original signal represents distortion of the sound by the loudspeaker. This same distortion will also happen to any musical transients played by the loudspeaker.

If a loudspeaker is not precisely designed to respond to all frequencies evenly with respect to Time, its ability to reproduce accurately even the simplest waveform is impaired. Given the enormous complexity of musical waveforms, the reader may now judge the relative abilities of the loudspeakers shown below to provide the minute detail and clarity of definition so vital for the reproduction of music.

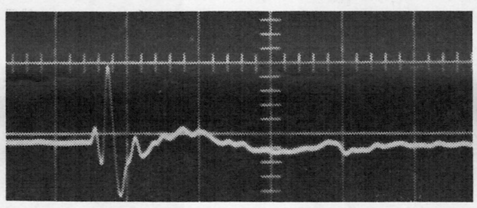
Here is a photograph of the one-tenth millisecond pulse, generated directly into the oscilloscope. Each square in the graph represents one millisecond in time.



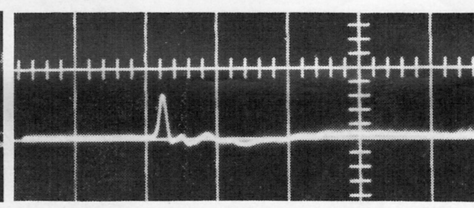
Here are three typical responses of loudspeakers, and brief explanations of various inaccuracies revealed by this procedure.



This speaker rings. It keeps making sound after the impulse is over, causing a metallic coloration of some sounds.



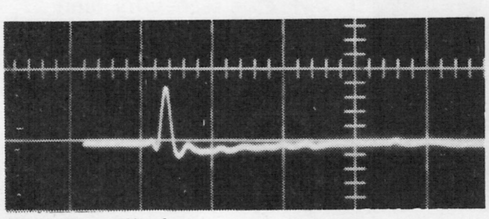
This speaker sounds quite clean, but lacks the phase coherence and definition of the best loudspeakers.



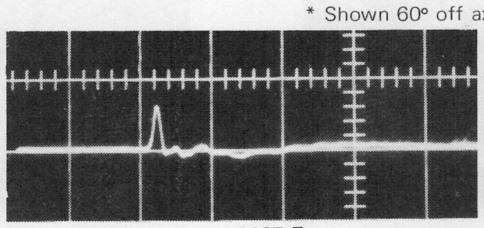
This speaker has state-of-the-art definition, with very little delay distortion. The sound is not smeared in time; it has what some call "focus".

Below are some rather startling photographs showing the responses of a variety of well-known loudspeakers to this simple pulse. (NOTE: These photographs represent on-axis response. In the interests of fairness, we have placed the microphone to record the best possible response of each loudspeaker. The speakers tested were selected at random from retail stock. The results of this test are not affected by listening room colorations; the reflected waves arrived at the microphone after the photograph was taken.)

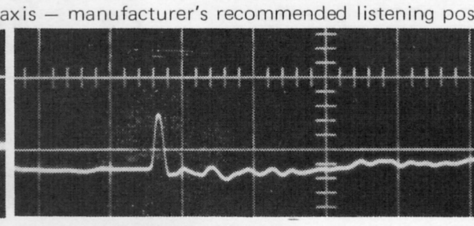
* Shown 60° off axis — manufacturer's recommended listening position



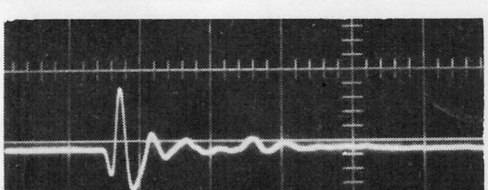
DCM Time Window



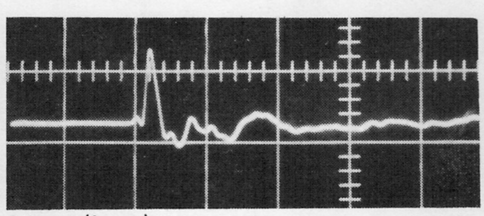
Magnepan Magneplanar 2167-F



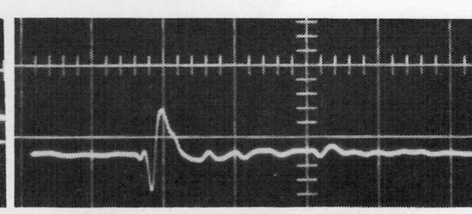
Beveridge Cylindrical Sound*



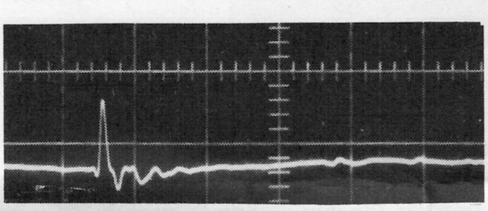
Crown ES-14



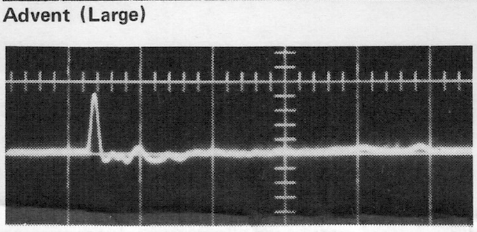
Advent (Large)



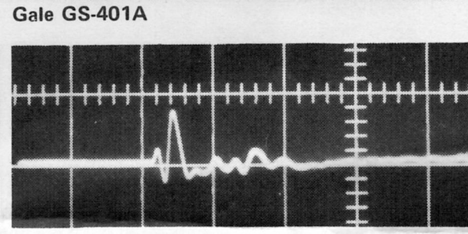
Gale GS-401A



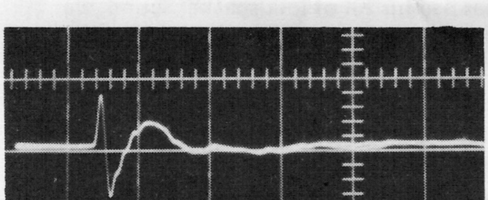
DCM QED



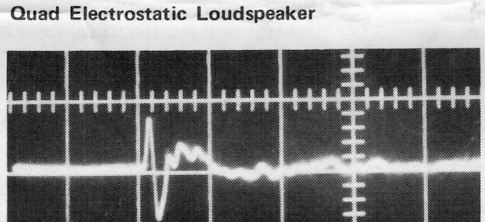
Quad Electrostatic Loudspeaker



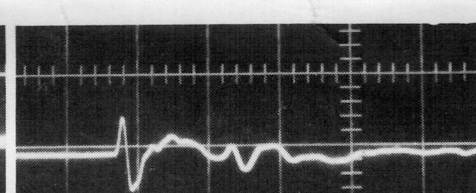
ElectroVoice Interface A



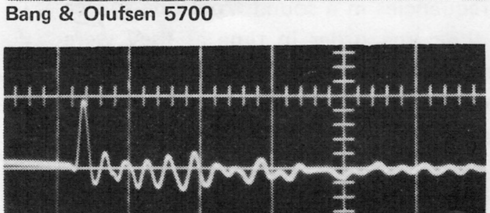
Bang & Olufsen 5700



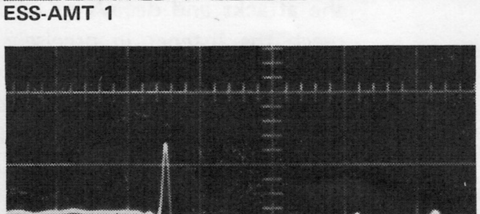
ESS-AMT 1



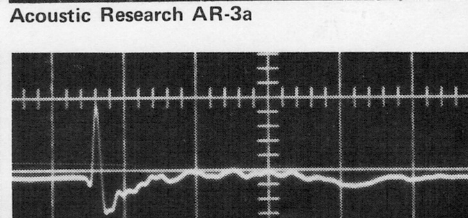
Acoustic Research AR-3a



Ohm F



Dayton-Wright XG-8 mk3 series 2000



Dahlquist DQ-10

The DCM Time Window evolved through exhaustive research and collation of data necessary to comprehend the delicate interplay of the phenomena governing what we hear from a loudspeaker. To describe the sound of the Time Window is to describe another moment, another place. It is the music you hear, not a loudspeaker.

The term *Transient Response* describes a system's ability to transcend its physical nature (stiffness and inertia) and respond to subtle details in sounds. Popular demonstrations of transient response display series of tone bursts that particular loudspeakers can produce at particular frequencies. This test, while important, does not tell all. For example, do two signals, of different frequencies, fed into the loudspeaker at precisely the same time, reach the ear at precisely the same time?

Far more revealing are the impulse tests shown here. Because the pulse acts as a burst of all frequencies simultaneously, phase shifts and time delay distortion have nowhere to hide. By employing Real Time waveform analysis throughout the entire development of the Time Window, DCM's Audiophile engineers have reduced these causes of coloration by a factor of one hundred compared to competitive products.

We don't want to bore you with discussions of our phase-matching crossover which also corrects time delay. Everyone says that's impossible anyway. It must be the magic word spoken into each cabinet as it is sealed.

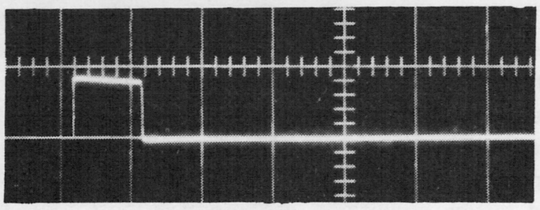
Even more than the actual transducer elements mounted in it, the enclosure affects the sound of a loudspeaker. The most popular enclosures are boxes, whose parallel surfaces spawn standing waves, and whose sharp, straight edges create diffractions. These factors color the sound. Further, mounting transducers in the front of a box assures that dispersion will be uneven and limited, thus contributing even more to the boxy, boomy, or confined sound of a box loudspeaker — beaming particularly at higher frequencies — rather than the openness and freedom of live sound.

To circumvent the problem of limited dispersion, several enterprising designers have offered omnidirectional loudspeakers. The thinking Audiophile, however, will recognize that time delay distortion — or smear of the image — is inherent here because the waves reflected from the wall behind the speaker reach the ear later than the direct sound. After all, the ambience of, say, a concert hall is *already recorded* in Real Time with respect to the direct sound of the instruments. Omnidirectionality in a loudspeaker is sometimes exciting, but remains nevertheless a synthetic approach, invalid for Real Time replication of sound.

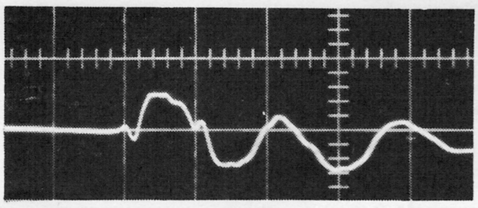
The DCM Time Window has the openness of omnidirectional loudspeakers without the severe problem of interference from rear-wall reflections. Four transducers, exactly placed on precisely angled surfaces, provide 180 degrees of even dispersion *at all frequencies* necessary for precise sound imagery. A Time Window enclosure does not support standing waves and introduces no coloration. The hybrid transmission line produces clean, tight bass response.

To illustrate the effect that limited dispersion has on the aural image, we present, below, comparisons of waveforms of various loudspeakers recorded on axis with waveforms measured off axis. If the loudspeaker produces a different waveform off axis (even at only 45 degrees) than it does on axis, we must doubt its ability to co-operate with the other loudspeaker(s) in the system to create depth and focus in the aural image.

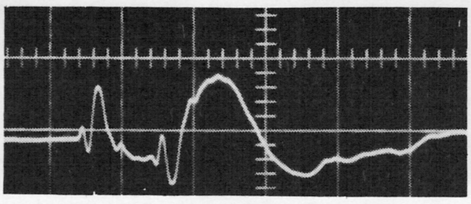
In this test, we introduce into each loudspeaker a pulse of one millisecond's duration, like this one, generated directly into the oscilloscope. Each square on the graph represents one millisecond in time.



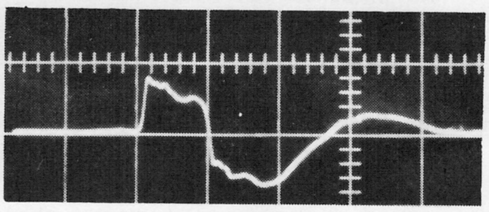
Here are three typical examples of loudspeaker responses, with brief explanations of the implications.



This speaker has unacceptable midrange ringing, as well as serious attenuation of the upper midrange.

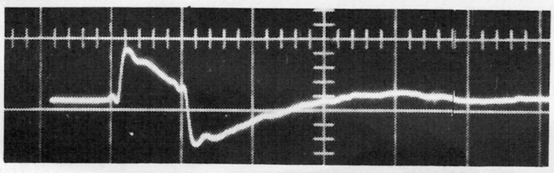


This speaker shows a decent amplitude match between lows and highs, but the tweeter is ahead of the woofer in time. Some post-pulse muddiness is present.

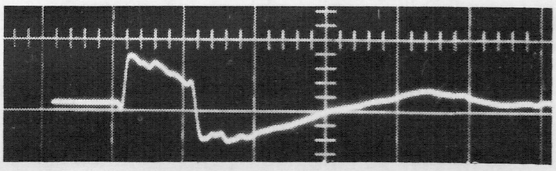


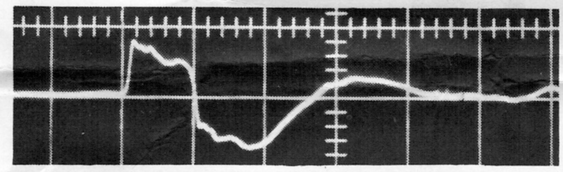
Well defined edges on the pulse indicate quite clean reproduction, although the post-pulse trace does not immediately tilt back toward the center line. This could be audible as a slight hollowness in the midrange.

Remember, a loudspeaker's ability to fill a room evenly with sound (the same sound wherever you sit) depends upon its ability to produce the same waveform off axis that it does on axis.

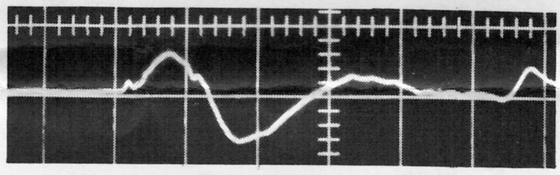


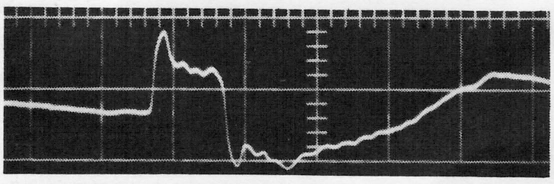
DCM Time Window
(left) on axis
(right) 60° off axis



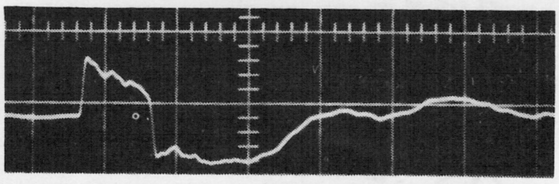


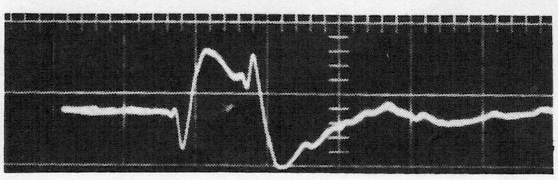
Magnepan
Magneplanar 2167-F
(left) on axis
(right) 45° off axis



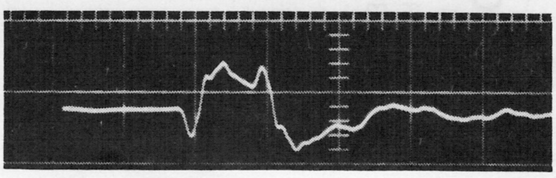


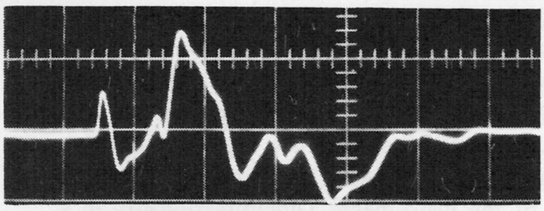
Beveridge
Cylindrical Sound
(left) on axis
(right) 60° off axis



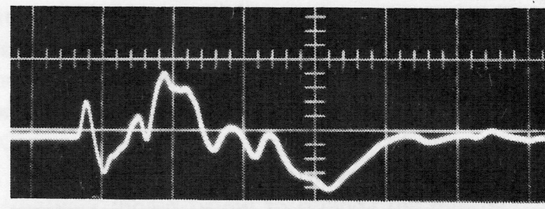


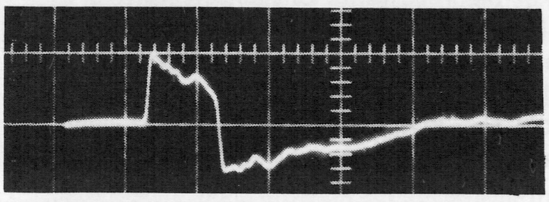
Gale GS-401A
(left) on axis
(right) 45° off axis



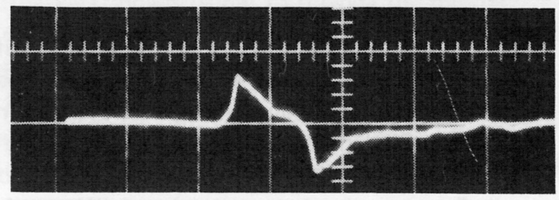


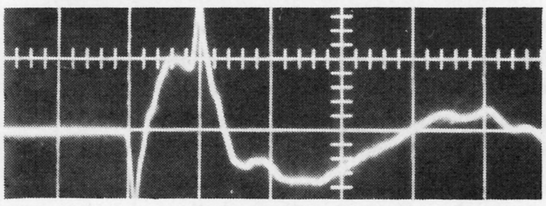
Acoustic Research
AR-3a
(left) on axis
(right) 45° off axis



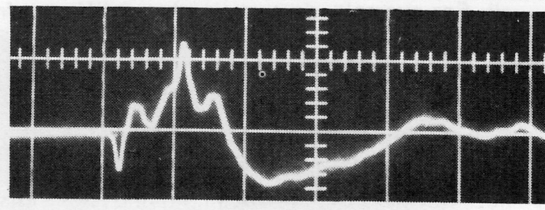


Quad
Electrostatic Loudspeaker
(left) on axis
(right) 30° off axis





Dahlquist DQ — 10
(left) on axis
(right) 45° off axis



Finally, we must make mention of Frequency Response. Of all the myths and superstitutions confounding devotees of high fidelity today, the notion of Flat Frequency Response in a loudspeaker receives the most misdirected homage. This is not to say that Flat Frequency Response is not important; it is only so rarely understood. In comparing frequency response graphs of various loudspeakers, the Audiophile is confronted with the results of nearly as many testing procedures as there are loudspeakers, each obviously performed under the conditions most favorable to optimum performance.

The results of DCM's impulse testing procedures shown here are not affected by the testing environment; the photos show direct sound arriving at the microphone before the sound has reached any objects or boundaries in the room. However, it must be remembered that no loudspeaker, whatever its frequency response in controlled testing conditions, can produce those same flat characteristics in a listening room, whose capricious and final influences subvert even the best intentions of loudspeaker designers.

The room affects frequency response most from the bass up through the midrange, while high frequencies, with their much shorter wavelengths, are less susceptible to room colorations. Amplitude peaks in the high frequencies cause their own colorations by emphasizing certain components of the random noise in the background of all recordings. Special attention has been paid to eliminating peaks at high frequencies in the Time Window, so even noisy source material is less annoying; the incredibly smooth response of the Time Window results in a lack of listener fatigue.

At midrange frequencies and below, the most severe peaks and dips in frequency response are caused by reflections between the parallel surfaces of, and objects within, the listening room. The Time Window is designed to reduce the problems of low frequency standing waves in listening rooms. To fully appreciate the lack of colorations in the Time Window, it is necessary to understand the listening room's acoustics because even the most subtle room colorations can now be heard. The Time Window Owner's Instructions discuss the effects at various room placements, enabling the owner to place the Time Window for optimum performance in any room.

We must add that nearly any loudspeaker, with the proper electronic equalization, can provide flat frequency response to at least one listening position. The DCM Time Window, besides it unsurpassed imaging capability, projects virtually uniform frequency response to all corners of a listening room. No manufacturer of box loudspeakers can make this claim.

The development of the Time Window has been a labor of love, a quest for performance beyond the capabilities of loudspeakers. As Audiophiles, we feel that our efforts have been rewarded. For those who can appreciate it, the Time Window is available through a small group of professional Audiophiles at an astonishingly modest price. This product is not intended for the mass hi-fi market, and is not mass-produced. We have, therefore, been spared the outrageous expenses of mass-marketing. And you, the thinking Audiophile, have been spared the indignity of supporting Madison Avenue at the expense of your ecstasy.

Please do not ask your dealer to reduce the price of the Time Window — he cannot afford to. Take comfort in the knowledge that, if he offers you the Time Window, he isn't just working for money.

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