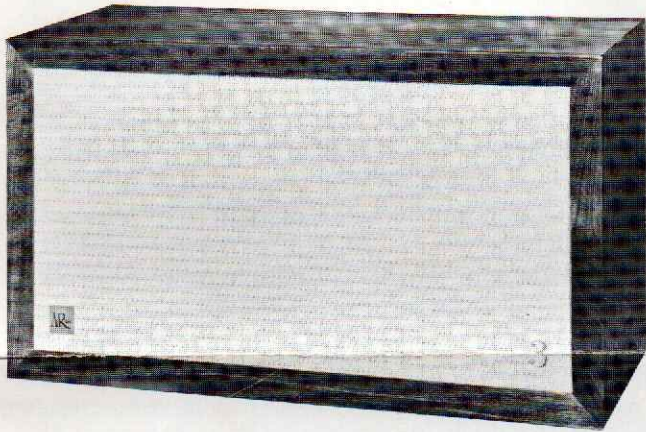


HOW TO GET THE MOST FROM YOUR LOUDSPEAKERS

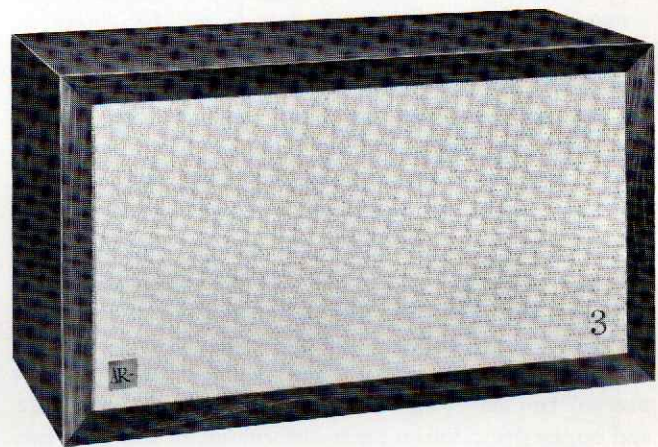


THE LOUDSPEAKER is potentially the most important element in a high-fidelity reproducing system because it is the one likely to provide the least fidelity. If you were to look through several panes of glass held against each other and all but one of them were clear, the one that was unclear would limit the clarity of your vision. So the loudspeaker, the least advanced among audio components, can limit the fidelity of reproduction. All loudspeakers are not necessarily less "transparent" to the original sound than are all pickups, tone arms, and amplifiers, but in the typical high-fidelity system it is the loudspeaker that is most often the weakest link.

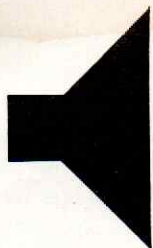
When a salesman in an audio salon switches from one amplifier to another there are subtle differences in sound, and the higher the quality of the amplifiers being compared the less these differences are. One turntable may show a little less rumble than another during quiet passages, a little less wow on sustained piano tones. Pickups, like speakers, are electromechanical devices, and here the differences become more obvious. But let the salesman begin switching various loudspeakers in and out and we are dealing with new orders of difference.

When we leave speaker A for speaker B we are in a different world; it is as though someone has put on another record. Instruments may emerge or they may disappear. The very pitch of an organ pedal tone may seem to shift an octave. Violins sound like clarinets, or vice versa, and a flute may sound edgy or muffled—or, sometimes, fortunately, flutelike.

Loudspeaker designers cannot evade their responsibility by speaking of subjective response and taste. When we compare a Stradivari violin to a Guarneri we are making a subjective appraisal, but when we compare the reproduction of



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TIPS ON CHOOSING AND USING LOUDSPEAKERS

the sound of these musical instruments through different audio devices there is only one standard, that of accuracy. Of all the radically different tone colors we hear through different speakers, each purporting to represent the same musical sound, there cannot be two dissimilar ones that are both right. Taste does come into question when we must choose among imperfections—the tendency to boominess of one speaker, the distorted bass of another, or the exaggerated midrange of a third. The choice between an accurate and an inaccurate copy, however, is a matter of judgment rather than of taste.

The ear is the most valuable single tool among audio-measuring instruments. In order to use it for evaluating the effectiveness of a speaker installation we must have a standard for comparison, and this standard is live sound. The first step, therefore, in setting up a new loudspeaker system, or in turning a critical ear to an old one, should be one additional purchase: a ticket to a concert. When you experiment with different speaker-mounting positions let the echo of live music ring in your ears, not the echo of someone's hi-fi system.

The business of audio equipment is to reproduce with exactness sounds that have existed, not to create new, exciting, dramatic sounds. And so the second rule to follow in setting up a speaker installation is to find records that represent as many different kinds of musical sound—massed strings, brass, organ, voice, guitar—as you are familiar with.

At this stage of the game avoid gimmick records like the plague. You have never heard a harmonica, tambourine, and bongo drum blown up to the volume of a seventy-five-piece symphony orchestra because such a thing does not exist in nature, and you therefore have nothing to which you can compare the recorded sound. Also avoid records of electronic instruments and of crooners; their sound has no existence except through loudspeakers, and again there is no live standard of comparison.

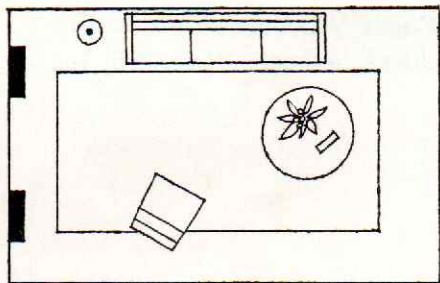
Armed now with a fresh memory of live music and a selection of human-type records, you are ready to install loudspeakers, or to check your present installation. The final judge will always be your ear—or rather, your auditory memory—but there are some principles and a trick or two that will help.

To begin with, your speakers should be served by amplifiers of adequate power. These days a speaker manufacturer generally gives information on recommended minimum power, where a few years ago he would have given only the maximum power his speaker could handle. An overloading amplifier can imitate speaker rattle to perfection.

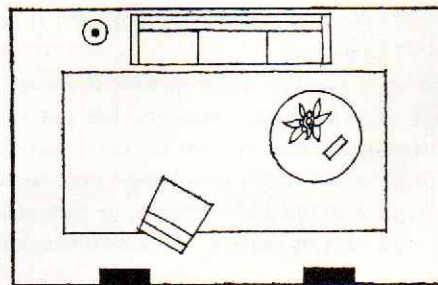
Next, the speakers should be matched to the proper impedance taps of the amplifier. A four-ohm speaker must be connected to terminals "Common" and "4," an eight-ohm speaker to "Common" and "8," and so forth.

IN STEREO, the speakers must be in phase; that is, both cones must move forward and backward simultaneously rather than alternately. One good way to check phase is to place the two speakers facing each other, an inch or so apart, and, with the amplifier set in the mono position, play an organ record with deep bass. An out-of-phase speaker connection will cancel bass and weaken it markedly. The same test can be performed with the speakers in stereo playing position, but the difference may not be as apparent. Reverse the leads to one speaker only. Then indicate the proper connections by tying a knot in one side of the wires that go to each of the speakers.

A second method for testing phase is to play a monaural record and to listen from a position in front of and exactly midway between the two speakers. By moving your head slightly you should be able to locate the sound as coming from a definite point between the speakers, if they are in phase. If they are out of phase, the sound will seem to be disjointed and to surround the listener. This test may



Placing the loudspeakers against one of the shorter walls of a room produces maximum bass, but it engages room resonances.



The long-wall placement of the loudspeakers stimulates the room resonances to a lesser degree, but it also decreases bass.

work better with some records than with others, and in some rooms better than in others.

Speakers in a stereo installation must also be balanced so that each speaker contributes its proper ratio of sound. To check this, it is possible to use the phase test just described, adjusting the amplifier's balance control until the apparent sound source is neither to the left nor to the right of center. Another, and probably easier, method is to disconnect each speaker in turn, and to balance for equal volume from each speaker. Again a monaural record should be used.

After the speakers have been balanced, the tweeter level controls, present on most speaker systems, should be adjusted. Turn the tweeter-control (and super-tweeter control, if it is a three-way system) all the way down, and then turn it up slowly until the sound seems right and natural. This is a very important step. Final adjustment must be made with the speaker in its playing position, and the setting should be checked with many different kinds of records, especially strings, brass, and voice.

If there is a super-tweeter control, it should then be brought up until, on well-recorded program material that contains a great deal of high-frequency energy, such as recordings of cymbals, harpsichord, or violin, the effect of the super-tweeter becomes just noticeable.

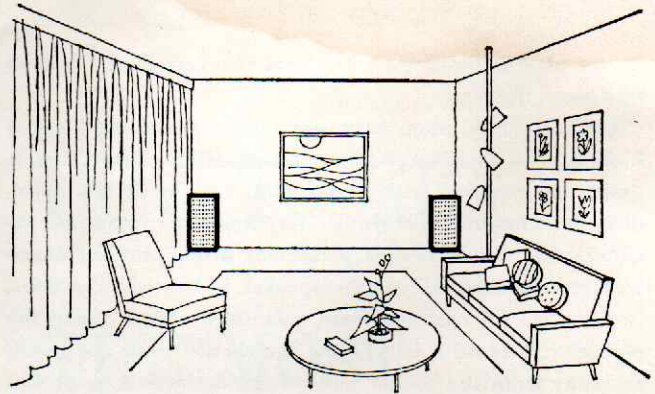
After these controls are set, they should be touched up from time to time as you hear different kinds of records and the newness of the sound wears off.

THE MOST important consideration in the proper use of loudspeakers, and often the most important consideration in the installation of a high-fidelity system, is the placement of the speakers in the room where they are to be heard.

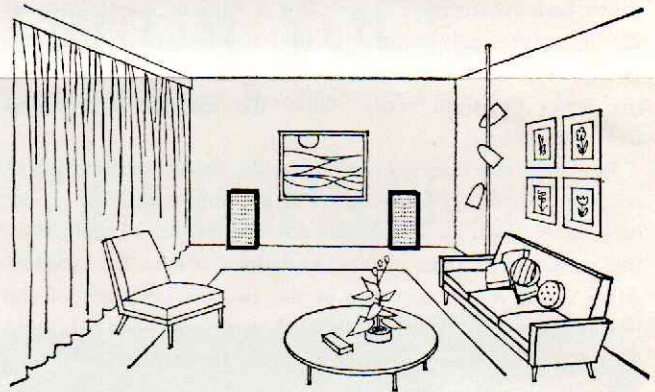
General principles can be stated, but there is one overriding principle: the best position is the position that provides the most natural sound, frees you to the greatest extent from the acoustical environment of your listening room, and brings the sense of openness and space of the concert hall. There are so many variables involved in placing speakers in a room that prediction of performance on a scientific basis is extremely difficult. One quantitative approach is to take the square root of the area of the triangle formed by two stereo speakers and the midpoint of the listening area, note it carefully, and then have your wife tell you where the speakers sound best.

Stereo speakers are generally placed six to ten feet apart, larger rooms calling for the greater spacing. You can place your speakers symmetrically (woofers on the inside, tweeters on the outside, or vice versa) or asymmetrically; one setup is as good as the other. The speakers are usually mounted facing the same way, but in some rooms they work well if they are turned outward, at right angles to each other.

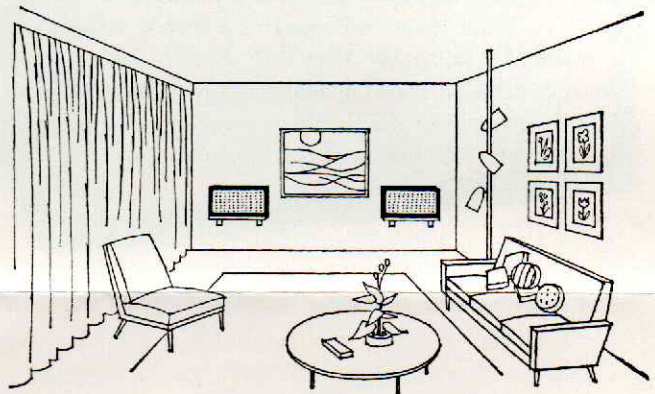
If a loudspeaker system were suspended by a rope in the center of the universe it would be said to be radiating into a solid angle of 360 degrees. If the speaker were then placed against a wall that divided the universe in half, the angle of radiation would be reduced to 180 degrees.



For maximum bass response, each of the two stereo speakers should be placed in a corner of the room.



If corner placement results in too much bass, the loudspeakers should be moved away from the corners.



To cut down on bass still further, the loudspeakers should be mounted toward the center of the wall.

The higher frequencies are restricted in their dispersion by the nature of the speaker itself, and so reducing the angle that the speaker "sees" has little effect on the treble. But bass frequencies are pumped out in all directions, and restricting the solid angle of radiation concentrates the bass energy into a smaller space. More concentrated bass with the same treble means, of course, a heavier relative bass. Thus, speakers placed in a corner provide the most bass. The same speakers mounted at the junction of a floor and wall or a wall and ceiling provide less bass, speakers at the

center of a flat wall even less, and speakers in the middle of a room the least.

Unfortunately, when enthusiasts lose sight of the ideal of high fidelity as natural sound reproduction, more bass is sometimes equated with better bass, and so corner placement is sometimes erroneously recommended under all circumstances. While corner placement often provides excellent results, especially if the speaker is kept off the floor, in some cases it creates boomy, unnatural sound. When the reproduced sound is bass-heavy, you should move the speakers away from the corner and off the floor by four or five feet. If the sound is bass-light, move at least one speaker into or closer to a corner; this is usually a better solution than picking up the solid angle between floor and wall, because floor mounting carries with it the risk of boominess. If the speaker is mounted so that woofer and tweeter are not at the same height, the woofer should normally take the lower position, except when the speaker is mounted near the ceiling.

Bass reproduction is only one of the things to consider in speaker mounting, although it is an important one. Some mounting positions emphasize the resonances of the listening room more than others, and these are to be avoided. After all, it is the acoustics of the concert hall, not of the living room, that we want; and when we can hear the room in the color of the reproduced music, we should look for a different mounting position. Always bear in mind that the objective is not to bring musical instruments into the room, but rather to transport the listener to the concert hall.

Mounting the speakers at the end of a long, narrow room tends to stimulate room resonances more than if the speakers are mounted against the long wall. On the other hand, mounting them on the long wall tends to lighten the bass, and the listener must decide which position gives the more natural effect. As indicated earlier, the most effective

evaluative tools available to the high-fidelity listener are a discriminating ear and a fresh memory of the sound of live music in the concert hall. This must serve as his standard of reference.

Speaker designers have not agreed on the best way to accomplish given results. There are speakers, designed for the same function, that do not even resemble each other physically and, in fact, would hardly be recognizable on the surface as belonging to the same class of device. The listener must judge each speaker solely on the basis of its performance, not on any preconceived notions about the superiority of one or another design approach.

It is not difficult to be influenced by such preconceptions. For example, if you stare at a pair of small speaker systems, having been told that such systems have a restrictive effect on the aural feeling of space, your eyes, which tell you that the sound is coming from two small areas, can play tricks on your ears. Actually the feeling of space conveyed by a speaker is dependent on the excellence of its high-frequency dispersion, and the smaller the radiating diaphragm of the tweeter the better the dispersion. (This is why even the largest speaker systems use small-size tweeters.)

There is also no scientific basis for relating the metaphorical "bigness" of deep bass sound to the bigness of the speaker enclosure. Every type of speaker system must be measured by the same criterion: its ability to reproduce music naturally. Sometimes it is a good idea to turn your back on speakers being auditioned so that sight cannot mislead hearing.

As for maintenance, speakers are hardy brutes. They should be kept out of the rain, and screw drivers should not be poked into them, but there are no regular preventive maintenance procedures to follow. The best compliment one can pay a speaker is to forget about it and concentrate on the music.

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