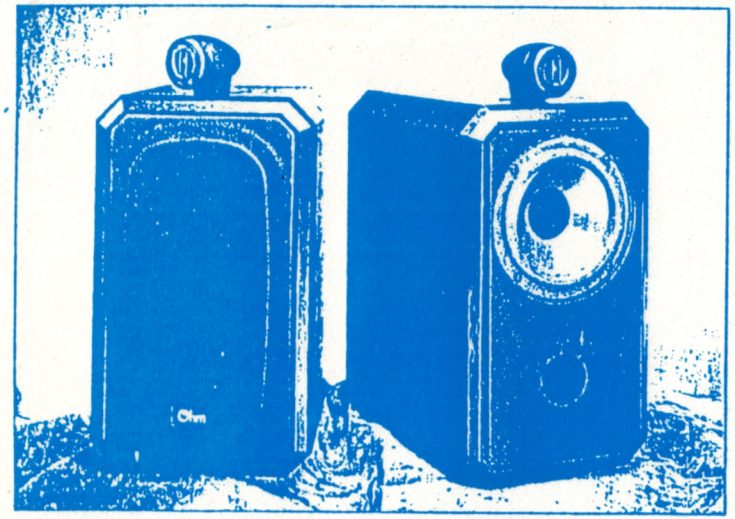

JOHN LEVINE

OHM CAM 16 SPEAKER

Julian Hirsch, Hirsch-Houck Laboratories

THE Coherent Audio Monitor (CAM) speaker systems from Ohm Acoustics were designed to provide optimum sound and stereo imaging under a variety of difficult installation conditions that may make these qualities unattainable with conventional speakers. All three CAM speakers—we tested the smallest model, the CAM 16—are two-way systems that enclose the woofer (plus a passive radiator in the two larger models) in a rigid, vented cabinet with a frameless, acoustically transparent, removable plastic grille. The tweeter is housed in a separate enclosure that plugs into the top of the main cabinet and can be rotated freely through 360 degrees in the horizontal plane. By aiming the tweeters correctly, it is possible to create a stereo image (sound stage) that remains fixed as the listener moves about the room, even outside the area bounded by the speakers themselves.

An additional degree of placement flexibility is provided by the tweeter's rotating capability. The speakers need not be along the same wall but can be on adjacent walls or even opposite walls. Even if it is not possible to achieve an optimum stereo effect, aiming the tweeters properly will enable maximum stereo performance to be obtained from any speaker locations. Ohm also suggests that a modification of the high-frequency balance of the system is possible by turning one or both tweeters away from the listening position.

The tweeter's position relative to the woofer was selected to provide correct time and phase alignment between the high and low frequencies for good stereo imaging. The egg-shaped tweeter housing minimizes diffraction around its front, and the beveled edges of the woofer cabinet perform a similar function for the middle and low frequencies. The cabinet is internally braced, and the inside of the woofer frame is lined with sound-absorbent material to damp surface reflections. The tweeter has a ¾-inch polycarbonate dome, with ferrofluid cooling, and a large (2-inch) magnet.

A Thermo Guard protective device minimizes the possibility of damaging the drivers by prolonged high-level listening. It is a bistable resistor whose value increases suddenly when the temperature rises to a critical value, greatly reducing the speaker's output. After the excessive drive is removed or reduced, the resistor returns to normal temperature (and a negligible resistance) in about 2 minutes, and normal operation is restored automatically.

The CAM 16 has a 6½-inch woofer, with a polypropylene cone, in a 16-liter enclosure (the model number corresponds to the cabinet volume). The cabinet, finished in black, is 17¼ inches high, 9 inches wide, and 11 inches deep. Each speaker weighs 19 pounds. The manufacturer's specifications include a sensitivity of 89 dB sound-pressure level (SPL) and a frequency response of 46 to 20,000 Hz ±4 dB. Price: $300 a pair. Ohm Acoustics, Dept. SR, 241 Taaffe Place, Brooklyn, NY 11205.

Lab Tests

The room-response curve was very smooth and free of the large variations that are often found in live-room measurements. The only significant irregularity was a 7-dB hole at 400 Hz, caused by the reflected signal from the floor (the speakers were on 26-inch stands). The close-miked bass response, combining separate measurements made at the cone and the port, was flat within about ±1 dB from 30 to 250 Hz and decreased smoothly by another 5 dB at 2,000 Hz. Although Ohm does not specify the crossover frequency of the system, our measurements suggested that it was about 2,000 Hz.

The composite frequency response was flat within ±4 dB from 20 to 20,000 Hz. It could be viewed as consisting of two relatively flat sections about 5 dB apart in level, extending respectively from 25 to 1,000 Hz and from 1,000 to 20,000 Hz—except for a narrow tweeter resonance of about 5 dB amplitude at 14,000 Hz. Along with a smaller peak at 16,000 Hz, the 14,000-Hz one was also present in all our FFT response measurements, appearing as a ringing of about 2 milliseconds duration in the time/frequency/amplitude plots created by the IQS FFT analysis system. Up to 10,000 Hz, there was a slight frequency-independent directivity, with about 3 dB level difference between the response curves on-axis and 45 degrees off-axis. Above 10,000 Hz, the normal tweeter directivity was apparent.

The minimum impedance of the CAM 16 was about 5 ohms, at 200 and 7,000 Hz, and the maximum value of 20 ohms occurred at 82 Hz. The system's sensitivity was 90 dB SPL at 1 meter with a 2.83-volt drive signal (corresponding to 1 watt). With the same input signal, the bass distortion rose smoothly from under 1.5 percent at 100 Hz to 4.5 percent at 50 Hz and 14 percent at 25 Hz. In pulse testing, the woofer cone bottomed audibly at a 100-Hz input of 175 watts, but at 1,000 and 10,000 Hz the amplifier clipped, at 720 and 1,400 watts, before the speaker overloaded.

Comments

Ohm states that the optimum spacing between the CAM 16 speakers is about 5 feet. Not only is a full stereo effect obtainable with this spacing, but the mutual coupling between the woofers provides some enhancement of output at low-bass frequencies. For our listening tests we installed the speakers on stands 5 feet apart and about 2 feet in front of a wall.

When we aimed the tweeters inward at about 30 or 40 degrees, the sound stage developed between the speakers (and extending somewhat beyond them to the sides) remained essentially fixed as we walked across the room from side to side. It was effectively anchored midway between the speakers, and we heard the left, right, and center portions of the sound with little change as we moved about the room.

Controlling the position of the sound stage by shaping a speaker system's directivity is neither new nor exclusive to Ohm. The company's CAM speakers are unusual, however, in having rotatable tweeters, which provide greater flexibility in one's choice of speaker and listener locations than do speakers whose directive characteristics are fixed in their design. The system works, and works well. It was interesting to hear what a broad stereo sound stage could be developed by a pair of small speakers only 5 feet apart without resorting to electronic or other spatial-enhancement techniques.

In addition to its spatial qualities, the CAM 16 was a very comfortable, smooth-sounding speaker. Of course, a small bass driver cannot generate room-shaking levels at low bass frequencies, and the bass distortion was somewhat greater than we would prefer (though not unreasonable for the speaker's price class). Nevertheless, the CAM 16 managed to sound larger (and considerably higher-priced) than it is. We suspect that few, if any, speakers of comparable size and price can match it, let alone outperform it.

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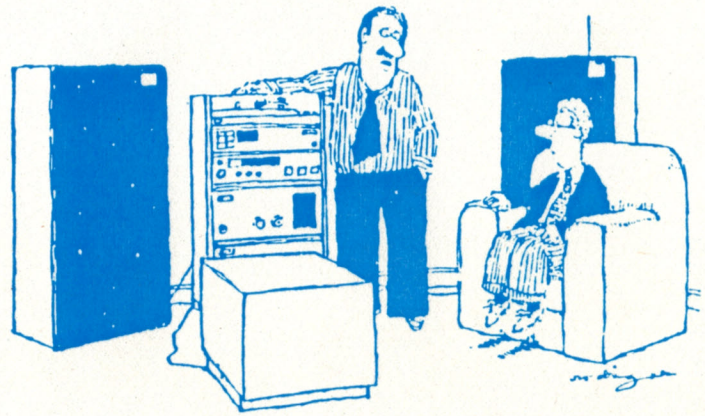

"Oliver, would you like me to get some books to put under your feet so you can experience the full effect of the subwoofer?"