EDWARD M. LONG

N.E.A.R. 15M SPEAKER

Even in this era of big corporations, small enterprises populate the field of audio—especially the field of loudspeakers. New England Audio Resource (N.E.A.R.) is a good example of a small company driven by one man's desire to produce loudspeakers that are different from and—if possible—better than others in their price range. That man is William Kieltyka (pronounced Kel´-ta-ka), who started N.E.A.R. in 1988 after a six-year apprenticeship at Bozak, a company started by another man with a vision, Rudy Bozak. Once a major force in the loudspeaker business, Bozak made its own cones, including those used in its unique aluminum tweeters. Kieltyka bought Bozak's cone-making equipment and improved and refined this technology to a considerable extent. His desire was to produce high-tech loudspeakers at reasonable prices, and as you will see, I think he has succeeded admirably.

Besides home speakers, N.E.A.R. makes loudspeakers for use outdoors and has supplied systems to many theme parks and other facilities that require a weatherproof design with a low failure rate. Durability and weather resistance are among the advantages claimed for metal cones. A metal-cone driver in N.E.A.R.'s lab has been submerged in water for more than two years and still operates!

The N.E.A.R. 15M is a two-way system, using a 6½-inch woofer with an anodized aluminum-alloy cone and a 1⅛-inch tweeter with a titanium-alloy diaphragm. The enclosure is finished in a black ash laminate; its grille is a half-inch-thick frame covered with black cloth. The cabinet is of ¾-inch medium-density fiberboard except for the front panel, which is 1 inch thick. The interior is divided by a full-sized cross brace, which consists of a ¾-inch-thick panel having four windows that allow air to flow freely within the enclosure. A small amount of Dacron batting within the enclosure helps absorb the sound radiated by the rear of the woofer cone.

Three TeknaSonic TF-10 Anti-Resonance Devices (ARDs) are mounted inside the enclosure, one on the top panel and one on each side panel. The ARDs are tuned to the panels' major resonance modes and absorb and dissipate the energy that the panels would otherwise radiate as delayed acoustical output.

The enclosure is vented through a tuning tube, 2 inches in diameter and 6¼ inches long, set into the rear. The input plate has two five-way binding posts that accept standard double-banana plugs and 16-gauge wire. The 15M's total weight—including the enclosure, the cross brace, the three ARDs, the crossover, and the drivers—is 24 pounds.

The 6½-inch woofer has an aluminum-alloy cone, a cast frame, and a large magnet with a vented back plate; a proprietary formulation of ferrofluid, which N.E.A.R. calls Magnetic Liquid Suspension (MLS), fills the gap around the 1½-inch-diameter voice coil. By using MLS, N.E.A.R. is able to build a woofer without the usual "spider" as a centering device, thereby eliminating a source of nonlinearity. The magnetic fluid not only centers the voice coil in the magnetic gap but helps dissipate heat from it as well; the metal cone and dust cap also help dissipate voice-coil heat. N.E.A.R. builds its own woofers, even spinning the aluminum to form the cone, but it sends the cones out to be anodized with a layer of aluminum oxide that stiffens their surfaces and makes them more rigid. Each woofer (and tweeter) is tested and then matched with an iden-

Rated Frequency Response: 42 Hz to 21 kHz, ±2 dB.
Rated Sensitivity: 88 dB at 1 meter, 2.83 V rms applied.
Rated Impedance: 8 ohms.
Rated Power Handling: 30 to 150 watts.
Dimensions: 15 in. H x 9½ in. W x 11¾ in. D (38.1 cm x 24.1 cm x 29.8 cm).
Weight: 24 lbs. (10.9 kg).
Price: $799 per pair.
Company Address: 12 Foss Rd., Lewiston, Maine 04240; 207/795-0609.
For literature, circle No. 91

Photos: Michael Groen

tical driver, and the 15Ms are built as matched pairs.

Although the 15M's tweeter looks a little like an inverted dome, it isn't: A flat rim (not clearly seen in the detail photo on the next page) surrounds the tweeter's concave center and attaches to a ¼-inch rubber annulus. The 1⅛-inch diaphragm is fabricated from a lightweight titanium alloy, and the voice coil is ¾ inch in diameter.

The crossover is a modified third-order design built from three inductors, three capacitors, and two resistors that all appear to be of very good quality. I measured the acoustical crossover frequency as 2,710 Hz, which is amazingly close to the 2,700 Hz specified by N.E.A.R.

The instruction manual contains information on unpacking the 15Ms, connecting them to your amplifier or receiver, and placing them properly in your room. The manual recommends that you use up to 150 watts per channel to get the best from these speakers. While you might rightly think that too much power could damage the 15Ms, N.E.A.R. cautions that damage can also be inflicted by the distortion that occurs when low-powered amplifiers clip.

THE N.E.A.R. 15M'S FREQUENCY RESPONSE WAS VERY UNIFORM AND VERY SMOOTH AT CROSSOVER.

Measurements

Before I performed my technical measurements, I listened to the N.E.A.R. 15Ms to make sure that there was nothing obviously wrong with them. I was surprised at how good they were, considering that they cost only $799 a pair.

Frequency response, with the microphone 1 meter away from the 15M at a point between its woofer and tweeter, is shown in Fig. 1. The acoustic output is very uniform, within ±3 dB from 60 Hz to 18 kHz and ±1 dB in the important range from 200 Hz to 5 kHz. The drivers' outputs are each 6 dB down at crossover (2,710 Hz) and combine to produce smooth response through the crossover range. (The tweeter's output did not keep rising past the end of the graph but began rolling off at 20 kHz.)

The phase responses (Fig. 2) indicate that the drivers' outputs match within 2.1° at 2,710 Hz. This verifies that they add together, as they should, to produce 6 dB greater level than either driver does separately at that point.

The 15M should be an easy load for any amplifier, as the impedance curve (Fig. 3) indicates. The impedance drops only to about 6 ohms at 40.9 and 160 Hz, which is very reasonable.

For Fig. 4, I measured output and second- and third-harmonic distortion with the microphone and the speaker on the ground; such ground-plane measurements yield a 6-dB higher output than free-field measurements, like those in Fig. 1. They also smooth low-frequency response by eliminating cancellation-producing reflections, which makes it easier to compare the reference output with the distortion curves and represents a speaker's bass response more accurately.

I tested the 15M's output and distortion at sound pressure levels of 90 and 100 dB. I kept the speaker's grille off for all of these tests except for output at 90 dB, which I measured with and without the grille. At 100 dB SPL, the highest second harmonic is 7% (at 100 Hz); the third harmonic reaches a maximum of only 5% (at 40 Hz) and is a minuscule 0.8% at 1.8 kHz. At 90 dB SPL, the second harmonic is at its highest, 4.5%, at 80 Hz and is just 0.6% at 1.8 kHz. I consider these output levels to be more than reasonable for most listening, especially if you want to avoid overloading your ears to the point where the sound distorts or you suffer hearing loss. Because the grille had a very slight effect, I left it on for other measurements and throughout all of the listening evaluations.

Figure 5 shows on- and off-axis responses with the speaker upright and with it horizontal. These curves indicate that it's best to set the 15Ms upright, with the drivers one above the other. If you place the 15Ms on their sides, as you might do to fit them

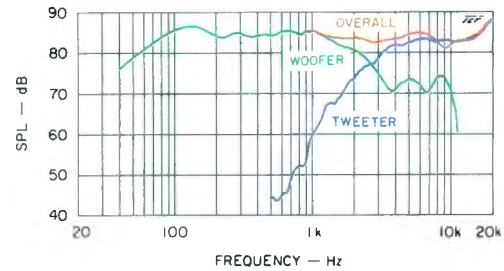

Fig. 1—Frequency response.

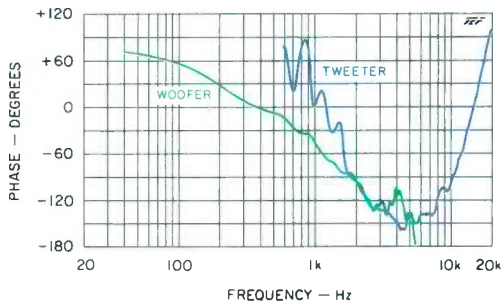

Fig. 2—Phase response.

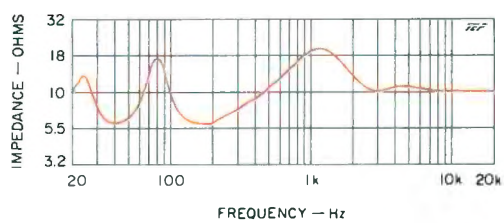

Fig. 3—Impedance magnitude.

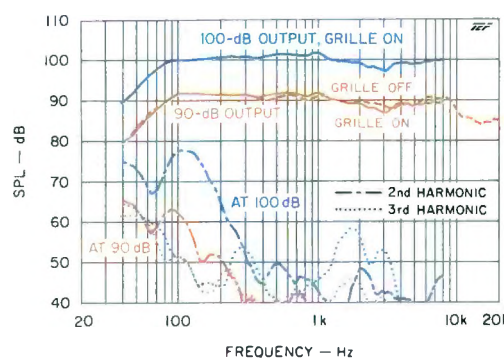

Fig. 4—Ground-plane frequency response, and second and third harmonics, for output levels of 90 and 100 dB.

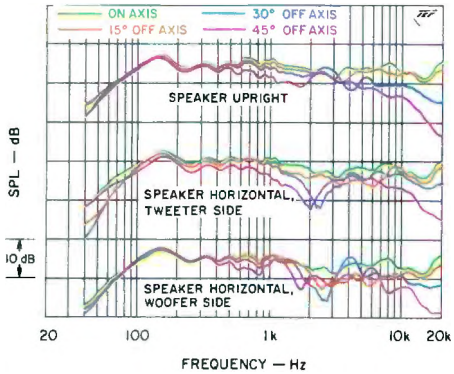

Fig. 5—On- and off-axis responses.

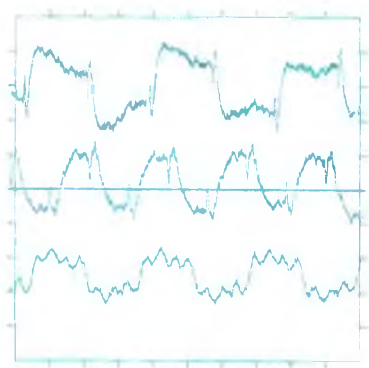

Fig. 6—Square-wave response at 300 Hz (top), 1 kHz (middle), and 3.3 kHz (bottom).

on a bookshelf, you're probably better off listening with the woofers on the inside (bottom set of curves) rather than with the tweeters to the inside (middle curves). However, every listening environment is different, so I suggest you try the 15M each way.

The 15M's square-wave responses at 300 Hz, 1 kHz, and 3.3 kHz (Fig. 6) are typical of its performance across the most important range of frequencies. The fundamental frequency and its harmonics must be in exactly the right amplitude and phase relationship for a speaker to reproduce a square wave perfectly. The 15M comes very close to this ideal with a 300-Hz square wave (top), and I would expect it to have above-average performance in the midrange, especially on voices. The 3.3-kHz square wave (bottom) shows that the tweeter has both the phase integrity and the extended response (also seen in Fig. 1) necessary to reproduce the waveform accurately. At 1 kHz (middle), the relationship of the fundamental and its harmonics is not as good as it might be; considering that these frequencies lie above and below the 2,710-Hz crossover, however, this is still good performance. On square-wave tests, some speakers' outputs shift back and forth between square and triangle waves through the crossover range, but the 15M's square waves remain pretty consistent.

I measured the time offset between the 15M's drivers and found that the tweeter's output, at its higher frequencies, arrived 120 microseconds before the woofer's. This delay can be seen in the energy/time responses (Fig. 7). The woofer's output—which would not normally show up very well in a single, full-range energy/time curve (because the test signal is weighted toward the high frequencies)—has been raised 10 dB for clarity.

The 15M's 20-kHz cosine-pulse output (Fig. 8) is reasonably good but reveals, as does Fig. 2, that the speaker's overall phase response is not linear. You can also see the slight time offset between the woofer and tweeter and that the 15M is very well damped.

I made low-frequency near-field measurements of the woofer's output, the port's output, and both together. The speaker was tuned to 37.8 Hz, and the port's output was spread over a wider frequency range than usual. Together, the woofer and port delivered their maximum output between 80 and 150 Hz.

Accelerometer measurements of the 15M's enclosure in the range from 200 Hz to 1 kHz showed very little vibration and no major peaks. I did see minor peaks at 276 and 450 Hz, but even these were within 5 dB of the overall vibration level.

Use and Listening Tests

To augment my own listening, I use a panel to audition audio equipment that I review. The panel members listen one at a time, but all hear the same musical selections. The speaker used by the panel as a reference comparison is a custom-designed system about 60% larger than the 15M. Its on-axis frequency response is uniform, within ±3 dB, from 32 Hz to 10 kHz; it has a slightly rising top end to 18 kHz, above which its response slopes gently down until its 24-kHz output equals its output at 1 kHz. The time offset between its drivers is within ±25 microseconds from 200 Hz to 12 kHz.

A coating conceals the fact that the woofer, like the tweeter, has a metal diaphragm.

The panel's comments about the 15Ms' sound on Valse, from *The Red Poppy* ballet suite by Reinhold Glière (Delos DE 3178), were: "light and airy," "individual instru-

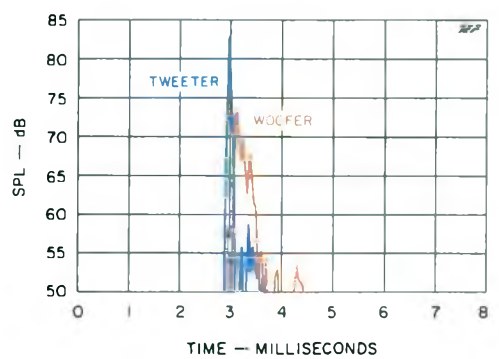

Fig. 7—Energy-time responses. Woofer response has been raised 10 dB for clarity.

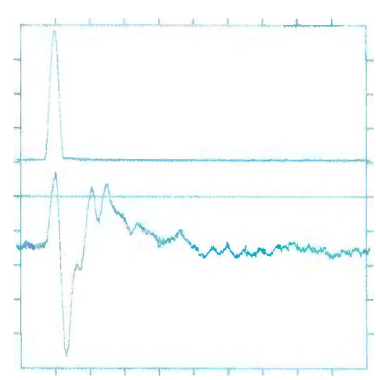

Fig. 8—Response to a 20-kHz cosine pulse; input (top) and output (bottom).

ments clear and distinct," and "good center images." The panelists felt the reference system was "less bright," with "instruments. . . more recessed," but also "more spacious" and with "more expansive sound." When listening through the N.E.A.R. speakers to Aaron Copland's Concerto for Piano and Orchestra (with pianist Earl Wild and the Symphony of the Air, Vanguard Classics SVC 3), the comments were: "piano very clear and sharp," "piano very detailed," "brass and piano slightly brighter," and "a little more hall reverberation." The reference speakers were "very clear and detailed" and "very sonorous."

For "Stormy Weather," sung by Eileen Farrell on the *Test & Burn-In CD* (XLO/Reference Recordings RX1000), the panel's comments on the 15Ms were: "singer more precisely centered," "voice is slightly more veiled," "brushes on drums slightly smeared," and "less deep bass than the reference." On another track of the same disc, " 'Prof.' Johnson Does Something Spatial," Keith Johnson walks around a recording venue while speaking and striking a wood block and then a cymbal. Through the 15Ms, the listening panel felt his voice was "clear, even at a distance," "slightly nasal when in the center," "slightly veiled but distinct," and "more forward, with good articulation." Other comments were: "The wood block has a little more echo" and "cymbal has less body." "Limelight," on Alan Parsons' and Stephen Court's *Sound Check* (Mobile Fidelity Sound Lab SPCD 015), elicited the following comments about the N.E.A.R. speakers: "clear and precise sound," "voice brighter and more forward," "slightly edgier on voice," "percussion has less attack," and "bass good but not as deep." Later, while watching video, some of us noted that actors' voices were clear and articulate, even when picked up at a distance and with lots of room reverberation.

As with any loudspeaker, you should listen to the N.E.A.R. 15M with music that's familiar to you. If you will be using the speaker for home theater as well, I suggest that you listen to it with a spoken voice source, such as the track of the *Test and Burn-In CD* that I used. But for music or video, the 15M is clearly an outstanding speaker, at a price where I don't think it has much competition. A

PROCEED, *continued from page 51*

Regarding more mundane issues, I have little out of the ordinary to report. The player worked silently and exceptionally smoothly. It has a two-speed drawer mechanism that slows down as it closes—very slick—although it takes its time to load and cue a disc (about 7 seconds). The CDP's ultra-elegant disc drawer is also quite sharp-cornered; even though its edges are slightly eased, you can still give yourself a scratch if you accidentally drag the back of your hand across a corner.

The passage of time did not engender any warmer feelings toward the CDP's remote control. Its graphics are somewhat confusing, its lettering doesn't provide enough contrast for good readability, and its placement of the fundamental transport keys, crammed together at the top edge, was unfortunate—to my fingers anyway. Oh, well; this is what programmable master remotes are made for.

The CDP proved very regular and reliable, with only a couple of hiccups over a two-week period. First, when fast-searching through a disc, the player would occasionally jump ahead 10 seconds or so from the expected release point. Second, walking across the carpet, touching the player, and discharging a bolt of static occasionally induced an audible "tick" over the outputs, and once it caused the CDP to go all aphasic and revert to stop mode; re-keying play returned everything to normal.

PROCEED'S CDP YIELDED THE MOST EFFORTLESS BASS THAT I'VE HEARD MY B&Ws DELIVER.

All in all, the Proceed CDP is an exceptionally fine CD player—one of the two or three best-sounding (and handsomest) I've used. Its price is steep, but no more so than that of many another high-end design. And the Proceed has the very unusual added value of digital inputs and preamp utility. Certainly those in search of a top-flight CD player and D/A converter with heirloom-quality materials and construction owe it a serious audition. A