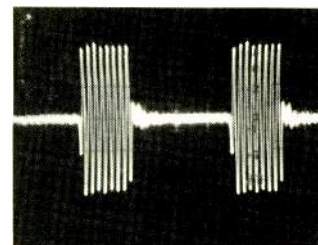
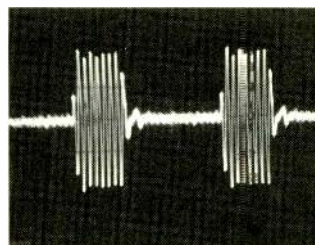
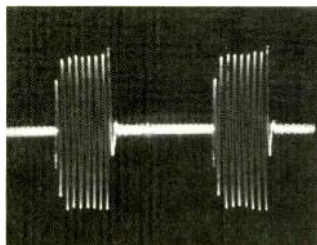


These oscilloscope photos taken at (left to right) 50, 1,500, and 5,000 Hz illustrate the general excellence of the D-12's tone-burst response.



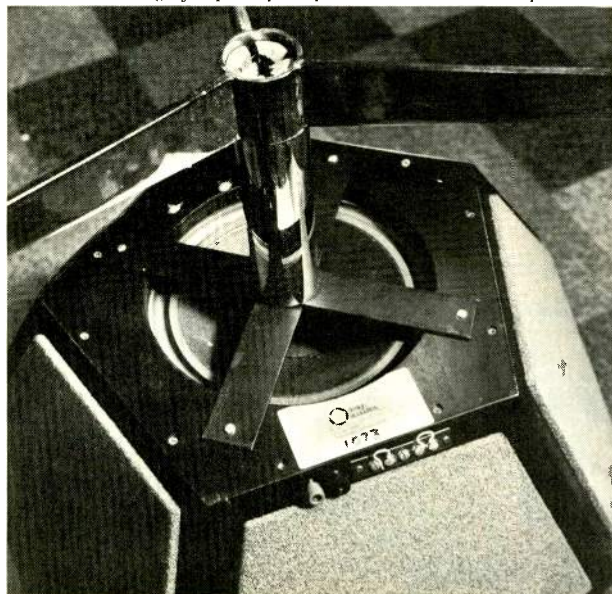
speaker input connectors. On the other hand, if the D-12 is placed near or in a corner, the low-bass response may be undesirably accentuated, and another jumper-wire change can reduce the low- and middle-frequency output as required.

The Design Acoustics D-12 is approximately 22 inches in diameter and 30 inches tall on its pedestal; it weighs about 40 pounds. In our test samples, the exposed wood trim was walnut, and each of the twelve sides was covered with a pentagonal black grille panel. Grille panels are available in a variety of other colors with black wood trim. The standard pedestal is a solid walnut post on a black steel base, but a fully chromed metal pedestal is available. The system can also be suspended from the ceiling by a suitable chain. Price of the standard D-12 is \$349.

● **Laboratory Measurements.** The only meaningful way to measure the output of a true omnidirectional speaker such as the D-12 is in a reverberant room which integrates its output in all directions. We believe that this is one of the best ways to measure *any* type of speaker (our test set-up is designed roughly to approximate reverberant room conditions), but with a speaker such as this one it is a necessity. As a check on the validity of our procedures, we had the D-12 calibrated in a true laboratory reverberant chamber (effective in the frequency range from 500 to 15,000 Hz) and verified that our techniques produced essentially similar results. For measurements at low frequencies, we placed our microphone close to the woofer opening with the speaker in its normal upright position. This eliminated the influence of room resonances, so that "splicing" the high- and low-frequency curves produced a reasonably valid plot of the total energy output of the system.

Our test results completely confirmed the manufactur-

*A view of the D-12's underside, showing the 10-inch woofer, the input binding posts, strapping terminals for adjusting the speaker's low- and high-frequency outputs, and the chromed pedestal.*



er's claim of uniform energy output, with a total measured variation of  $\pm 2$  dB from 70 to 15,000 Hz. This ranks among the "flattest" responses we have measured for a speaker system. Since the speaker was tested in the center of a 15 x 20 foot room, it was in the worst possible location for propagating low frequencies, and, as a result, the measured output dropped off rather rapidly below about 50 Hz. In addition, our measurement could not take into account the radiation from the port, which becomes effective below 50 Hz and is dominant below about 35 Hz. Our ears attest to the fact that the D-12 maintained a healthy output down to 30 Hz or below.

Our response curve had a broad, shallow dip (about 3 dB deep at its maximum) between 1,000 and 3,000 Hz which did not show up on the reverberant-chamber curve. A possible explanation would be the predominance of the upward-facing mid-range speaker in this range. With our microphone set 90 degrees off the axis of the mid-range speaker, we were highly dependent on ceiling reflection for our measured output, and the acoustictile ceiling may have had appreciable absorption. At a 1-watt drive level, low-frequency harmonic distortion was very low (under 2 per cent at 50 Hz and above, rising to 5 per cent at 40 Hz and 14 per cent at 30 Hz). Distortion at a 10-watt drive level increased only slightly, and, for a 90-dB sound-pressure level, distortion was 6 per cent at 50 Hz and 14 per cent at 40 Hz. The D-12 is somewhat more efficient than typical acoustic-suspension speakers, and 1 watt of drive was sufficient to produce a 90-dB sound-pressure level at mid frequencies as measured about 3 feet from the speaker. The high-frequency level (above 2,000 Hz) was reduced about 3 dB when the jumper connection was removed. When the low/middle range was attenuated, the slope began at 2,000 Hz and was down about 4 dB at frequencies below 500 Hz.

The D-12 is nominally an 8-ohm system. Its measured impedance was about 6 ohms above 100 Hz, with a rise to 30 ohms at the bass resonance of 50 Hz. With the jumper set for reduced lows, the maximum impedance was 8 ohms at 50 Hz, dropping off gradually from 6 ohms at 100 Hz to between 3 and 4 ohms at frequencies above 2,000 Hz. Given this impedance, D-12's should not be used in parallel with another pair of speakers when driven by a transistor amplifier.

Tone-burst response was generally excellent, although we found a small amount of ringing at 7,000 Hz. The effect was insignificant in itself, and was noted only because the tone-burst output was near-perfect at all other frequencies.

● **Comment.** The D-12, even in its muted walnut and black grille configuration, is visually prominent, and we suspect that most people will have a strong reaction, *pro* or *con*, to its appearance. Technically speaking, the D-12 is the first true "omni" speaker (as distinguished from those systems designed for controlled proportions of direct and reflected radiation) that we have had the opportunity to evaluate and live with for some time. Having observed for years that the speakers with the widest dispersion (all else being equal) usually sounded the best, we were not too surprised to find that the D-12 was a remarkably fine-sounding system. (Continued on page 32)