

tipath-meter reading also gave lowest distortion and noise and best channel separation, and, unlike the situation with most tuners, none of these normally critical tuning points changed with signal level.

The Sherwood Micro/CPU 100 is one of the most expensive FM tuners you can buy. Sadly, things being what they are in the

broadcast and recording industries, you may not hear much—if any—difference between it and some other fine but far less sophisticated tuners. Given the rapid advances in the state of the audio art—and given the differences in importance that any individual might attach to any particular performance quality—it is risky and perhaps misleading for a reviewer to

refer to any product as "the best." Nevertheless, our reaction to the Sherwood Micro/CPU is that, as of now, it is the best available FM tuner. And it is important to stress that we would have found this tuner just as remarkable even if it lacked its special computer functions.

Circle 105 on reader service card



THE ADS (Analog and Digital Systems) Company describes the sound of its speakers as "invisible," meaning that the goal is to reproduce sound with as little coloration as possible. The ADS approach to design is aptly illustrated by their next-to-the-top model, the 810. This moderate-size system, though plainly intended for floor mounting, is no larger than some speakers that are offered as "bookshelf" models. It is a three-way system whose woofer section consists of two 8-inch drivers in separate, fully sealed, acoustically isolated compartments.

The 810 has a 12-dB-per-octave crossover at 550 Hz to a rather large dome mid-range driver. The 2-inch-diameter dome is described by ADS as being of "soft-tissue" construction and appears to be made of a fine-mesh fabric. It is covered with, and damped by, a sticky material. Since the dome is driven by a voice coil of the same diameter, it can handle considerable power.

The crossover to the tweeter at 4,000 Hz also has a 12-dB-per-octave slope. The tweeter is a 1-inch dome, similar in its construction and damping arrangement to the mid-range driver. The acoustic balance of the ADS 810 is set at the factory, and there are no user adjustments provided.

The ADS 810 system is exceptionally efficient, being rated to deliver a 93-dB sound-pressure level at a 1-meter distance with a 1-watt input. The speaker's nominal power rating is 75 watts, and it can be driven by amplifiers rated at between 20 and 200 watts output. The impedance is rated at 4 ohms minimum and 6 ohms typical.

The ADS 810 is approximately 25½ inches high, 14 inches wide, and 12 inches deep. It weighs 46½ pounds. The cabinet is finished in walnut, and there is a removable grille covered in black cloth. Although it can be placed directly on the floor, better results are often obtained by raising it slightly. An optional black-metal stand for this purpose is available from ADS. The price of the ADS 810 is about \$350. The 800LF base, sold in pairs, is \$64 per pair.

● **Laboratory Measurements.** The ADS 810 was tested on the ADS 800LF base, which raised the cabinet about 12 inches from the floor and tilted it back at a very slight angle. The woofer response, though not extending very low, was exceptionally flat and smooth. It varied only ± 1.5 dB from 50 to 600 Hz and dropped at a 12-dB-per-octave rate below 60 Hz. The mid-range response measured in the

reverberant field of the room was also flat and smooth, averaging about 4 dB below the woofer level from 700 to 5,000 Hz. At higher frequencies, the output rose smoothly, giving the system a very creditable overall frequency response within ± 5 dB from 40 to 15,000 Hz.

The high-frequency dispersion of the 1-inch dome tweeter was truly exceptional. In fact, we could see no significant difference between the frequency-response curves made on axis and about 30 degrees off axis, all the way up to our measurement limit of 15,000 Hz. In this measurement most speakers show at least 5 dB of difference between the two curves at the high end.

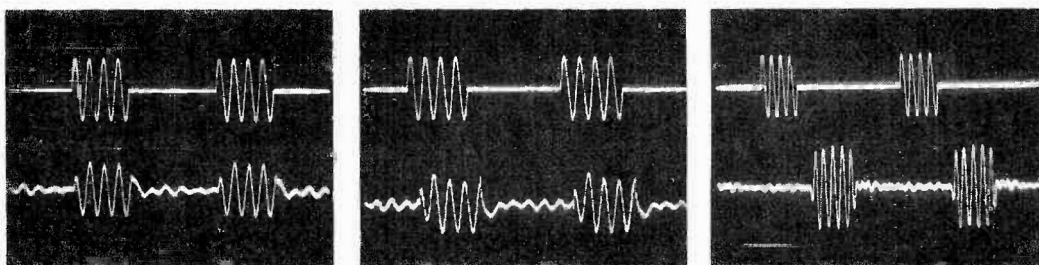
The efficiency was exactly as claimed, so that driving the ADS 810 with an octave of random noise centered at 1,000 Hz produced a 93-dB sound-pressure level at a 1-meter distance. When we measured the bass distortion, the speaker was driven with a 2.8-volt signal (1 watt into a nominal 8-ohm load). However, given the lower-than-8-ohm impedance of the ADS 810, this yielded an effective drive level of about 2 watts. The distortion ranged from 1 to 2.5 per cent at frequencies between 100 and 45 Hz. It rose quite gradually at lower frequencies, reaching 10 per cent at 25 Hz (where the output was some 15 dB below mid-range levels).

The high efficiency of the ADS 810 enables it to generate as much sound with the 2-watt input we used for our basic distortion measurement as most acoustic-suspension speakers can deliver with 10 watts. For a given sound-pressure level, the 810 actually has less distortion than many other speakers we have tested, yet it requires a much lower driving power from the amplifier. The actual minimum impedance of the 810 was 4 ohms, reached between 100 and 150 Hz and at 10,000 Hz. The low-frequency resonance at 50 Hz measured 10 ohms; there was an impedance rise to 20 ohms in the mid-range and a rise to 8 ohms at the second crossover frequency of 4,000 Hz.

The tone-burst response of the 810 was most interesting because of what it did *not* show. With most multi-driver speakers, the tone-burst appearance changes markedly with changes in frequency and microphone position, due to interference effects between the drivers. In the case of the ADS 810, the bursts were uniformly excellent, with no signs of ringing or interference even at the crossover frequencies. Except for the minor and predictable anomalies caused by the crossover networks, and some unavoidable room ringing between bursts, the tone-burst output of the 810 over the full audio range was as nearly

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The excellent tone-burst response of the ADS 810 at frequencies of (left to right) 100, 1,000, and 7,000 Hz. The upper trace is the input signal.



perfect as we can recall seeing (and it was not affected by rather large changes in microphone position).

● **Comment.** As often happens, the sound of the ADS 810 could be predicted quite well from the general shape of its response curve. It has a slightly "distant" character, with strikingly clean, un-boomy bass and a crisp, detailed high end that compares very favorably with the sound of some of the most highly regarded and sophisticated speaker designs. Although there is no particular emphasis on any part of the spectrum, and the speaker's overall balance is outstanding, we felt that the clarity and definition of the high end was its most notable characteristic.

Our simulated "live-vs.-recorded" test

confirmed this impression. These days, many speakers are surprisingly good in their ability to imitate our "live" sound source, but almost all of them seem to have some weak point—such as a heavy mid-bass, or a lack of extreme high-end response, or limited dispersion—that prevents them from simulating the original sound in a completely convincing manner.

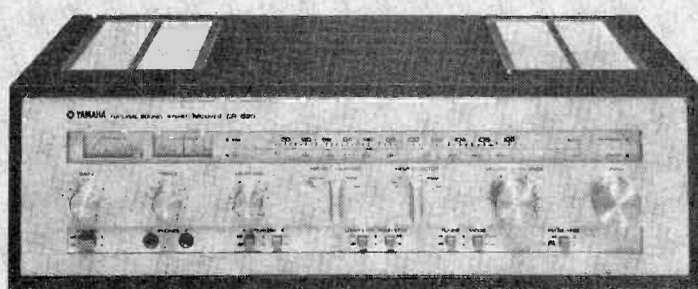
The ADS 810 was one of the very few speakers we have tested in the past ten years or so that was so accurate that we could not distinguish its sound from the original in a side-by-side comparison. As we have pointed out on occasion, a speaker that has this ability will not necessarily suit every listener, since there are also personal taste (many people like coloration in their sound), individual room

acoustics, and speaker performance below 200 Hz to be considered.

The apparent mid-range depression in the measured response of the ADS 810 is not audible as a defect of any sort, but rather as "an absence of presence" compared with the sound of many speakers that emphasize this region. Presence peaks may sell a lot of speakers in the showroom, but they tend to become tiresome in the home.

The bass coverage of the ADS 810 is certainly competent—but it may not satisfy pipe-organ and bass-drum buffs. For us, the smoothness and remarkable polar dispersion of the sound from the ADS 810 make it competitive with just about any other system we have heard, and much better than most.

Circle 106 on reader service card



Yamaha CR-620 AM/FM Stereo Receiver

FROM their first appearance on the American market, Yamaha audio products have conveyed an image of outstanding quality, and for the most part they have been priced somewhat above competitive units. As a result, Yamaha is not a name one associates with a budget-price music system. However, the company has made a policy of maintaining a uniform performance-quality standard at all price levels, which is effectively illustrated by their current line of stereo receivers. For example, from the high-price Model CR-2020 to the lowest-price Model CR-620, they all have

a rated audio distortion of 0.05 per cent from 20 to 20,000 Hz when delivering their rated power to 8-ohm loads.

The CR-620 we tested is rated at 35 watts per channel. It has an almost stark satin-aluminum-finish front panel whose long dial cut-out is unadorned by any bezel or multi-color illumination. Red LED's to the right of the dial scale serve as power and stereo FM indicators, and others to the left show whether the FM or AM tuner function is in use. Two large, legible meters to the left of the dial show FM center-channel tuning and SIGNAL Q

(for "quality"). The Q reading combines relative signal strength and FM multipath distortion. Tuning a signal and orienting the antenna for a maximum meter reading with minimum needle fluctuation results in the best signal quality—hence the meter's name.

Below the meters are the bass and treble tone controls, each having eleven detented positions. Their center settings give a true flat frequency response, eliminating any need for a tone-control bypass switch. To their right is a LOUDNESS control of the same type that has been used with great effectiveness on previous Yamaha models. It, too, has eleven detented positions, with the clockwise limit being a flat position. One first sets the main volume control for the highest listening level one expects to use; thereafter, the desired listening level at any time is selected by turning the LOUDNESS knob counterclockwise from its flat position. As it is turned, the low and high frequencies are automatically cut to a lesser degree than the mid-range. This gives them an effective relative boost as the overall volume is varied through a maximum range of 20 dB. Because Yamaha's loudness compensation is thus linked to the actual listening level, it is far more effective and less obtrusive than the type normally used.

At the right of the row of control knobs are the concentric VOLUME and BALANCE controls (the latter is a center-detented ring) and a tuning knob. In the center of the control panel are two bar-knob switches that give the Yamaha CR-620 a degree of flexibility rarely

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