EQUIPMENT **PROFILE**

GENESIS GENRE I LOUDSPEAKER

The Genre I is the top-of-the-line model of three affordable high-end systems produced by Arnie Nudell's new company, Genesis. As you may recall, Nudell co-founded and was the chief designer at Infinity Systems from 1968 to 1989. When he left Infinity, he and Paul McGowan, a co-founder of PS Audio, joined forces at Genesis to produce speakers and amplifiers for the high-end audio market.

Genesis currently produces 12 loudspeaker systems ranging in price from $499 to $6,199, including two subwoofers, and the new $7,000 Stealth B-200 remote-controlled power amplifier. At the recent summer Consumer Electronics Show, they also previewed a very large, very expensive high-end system called the Genesis I. This system superficially looks like the Infinity IRS but is much different in execution, according to Nudell.

SPECS

System Type: Three-way, floor-standing, closed-box system.
Drivers: 8-in. cone woofer, 4½-in. cone midrange, and 1-in. planar-ribbon tweeter.
Frequency Response: 46 Hz to 34 kHz, ±3 dB.
Sensitivity: 88 dB SPL at 1 meter, 2.83 V rms applied.
Crossover Frequencies: 500 Hz and 3.7 kHz.
Impedance: 4 ohms nominal, 2.9 ohms minimum.
Recommended Amplifier Power: 75 to 200 watts per channel.
Dimensions: 10 in. W × 38½ in. H × 14 in. D (25.4 cm × 97.8 cm × 35.6 cm).
Weight: 65 lbs. (29.5 kg) each.
Price: $1,299 per pair; available in black ash or rosewood.
Company Address: 953 South Frontage Rd. West, Vail, Col. 81657.
For literature, circle No. 91

The enclosure of the Genre I is rectangular, with a slanted front panel that houses a vertical array of drivers. The woofer is vertically centered on the front of the enclosure, with the midrange above and the tweeter on top. The slanted front panel, in concert with the drivers and crossover, form a time-synchronized configuration that is said to provide the smoothest transition from driver to driver.

The enclosure is strengthened internally by the addition of half of a heavy cardboard tube (cut lengthwise), joining the top, bottom, and rear of the cabinet. In addition to reducing cabinet wall vibrations, the semicircular strengthener is said to reduce internal standing waves.

The cones of the 8-inch long-throw woofer and 4½-inch midrange are of injection-molded Kevlar and polypropylene.

According to Genesis, these materials and the construction techniques used contribute to clarity and accuracy in the midrange and accurate bass response, due to superior cone damping and rigidity.

All of Genesis' systems, including the Genre I reviewed here, use a 1-inch planar-ribbon tweeter with a very thin circular diaphragm made from a 0.0005-inch membrane of film and foil, and a spiral voice-coil. Genesis claims that the tweeter's diaphragm has less mass than the mass of the air that it moves! They also state that the tweeter operates as a perfect piston to well over 30 kHz and provides a near-perfect point source with virtually nondirectional hemispherical dispersion.

The crossover is designed with the use of proprietary computer software to optimize the efficiency and accuracy of the overall response. The network contains a total of 20 parts including: Seven resistors, five capacitors (not including paralleled units), five inductors, and, for tweeter protection, two zener diodes and a self-resetting circuit breaker. All parts are of high quality. Iron-core inductors are used in the bass and midrange circuits, while all large-value, non-polarized, electrolytic capacitors are bypassed with higher quality polypropylene units. All drivers are connected in positive polarity. Bi-wiring is supported.

THE SEMICIRCULAR BRACE REDUCES INTERNAL STANDING WAVES AS WELL AS REDUCING VIBRATIONS.

The tweeter is driven by an inductor-capacitor, second-order, high-pass filter, with back-to-back zener diodes in parallel for limiting and protection. The midrange is driven by a second-order, high-pass filter in cascade with a second-order, low-pass filter, thus forming a bandpass filter. Interestingly, the woofer is also driven by a similarly configured bandpass filter. Here, in addition to the usual low-pass filter that rolls off the woofer at high frequencies, a low-frequency LC high-pass filter is added.

This added high-pass filter serves two purposes: First, it rapidly rolls off the low-frequency response of the system, thus greatly increasing the system's subsonic power handling. It also allows the response of the system to be extended downwards through resonant amplification at and near the cutoff of the high-pass filter. (Here, the voltage applied to the woofer can actually be higher than the voltage applied to the input of the system.)

In the Genre I, the high-pass frequency is about 45 Hz, which is also approximately equal to the corner frequency of the system's closed-box enclosure. So, the anti-resonance of the added high-pass network is essentially at the same frequency as the system's closed-box resonance. This extension of low-frequency response does not come free, however; it greatly lowers the system's impedance at and near the cutoff frequency of the high-pass filter.

Remember that at low-frequencies the Genre I is a closed-box system that normally rolls off at 12 dB/octave. With the added second-order, high-pass filter, the overall system rolls off at 24 dB/octave, similar to a vented-box (bass-reflex) system. Unlike a vented system, however, the closed-box system with cascaded second-order high-pass filter is quite insensitive to subsonic energy, whereas ordinary vented-box systems are quite susceptible to subsonic material at frequencies below the box tuning.

Genesis does not say much about this added high-pass filter except to state that "The Genre I . . . has unusually deep and non-resonant bass due to a unique anti-resonance circuit that effectively cancels the speaker enclosure resonance normally associated with all sealed and ported designs."

The Genre's grille frame is made from a solid piece of medium-density fiberboard, ¾-inch thick, with beveled circular holes to accommodate the drivers. Without the grille, the drivers protrude from the front panel; but with the grille on, the front of each driver is essentially flush with the front of the grille, leaving minimal edges for reflection and refraction of sound. The Genre I owner's manual specifies that the grille should be on for all listening.

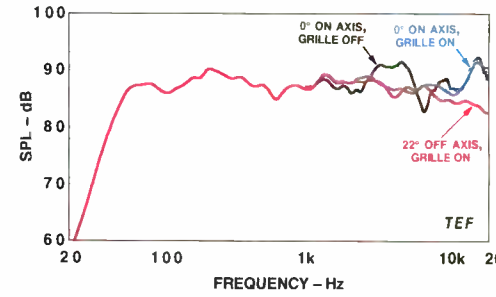

Fig. 1—Anechoic frequency response.

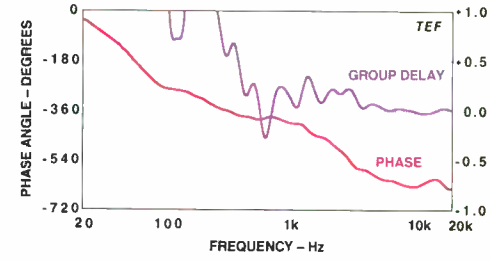

Fig. 2—Phase response and group delay.

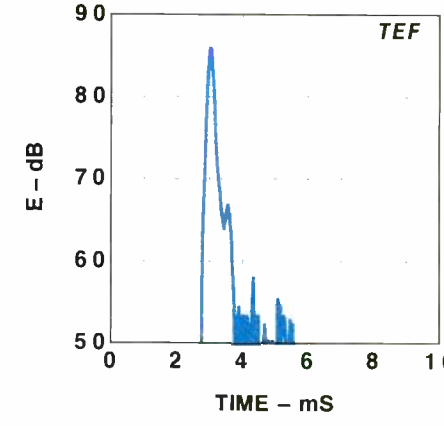

Fig. 3—Energy/time response.

Measurements

When first received, the systems failed my test for rubbing and buzzing on sine-wave signals. With only 1.5 V rms applied

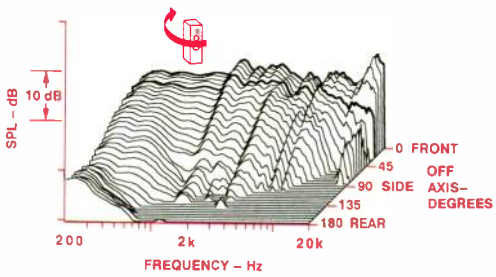

Fig. 4—Horizontal off-axis frequency responses.

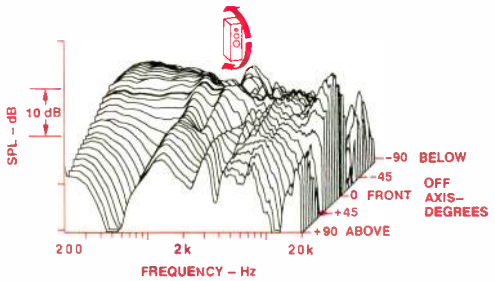

Fig. 5—Vertical off-axis frequency responses.

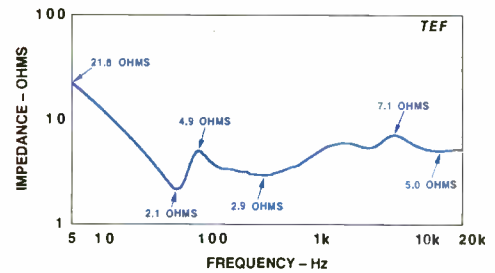

Fig. 6—Impedance.

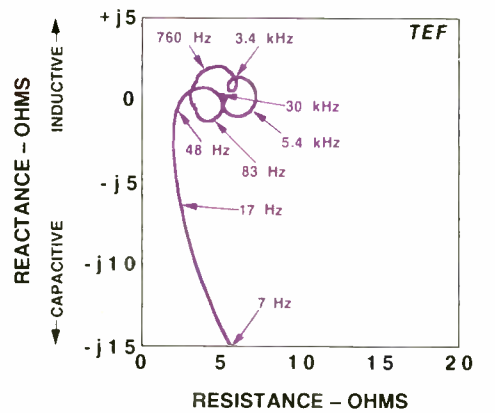

Fig. 7—Complex impedance.

to the system input (0.56 watts into 4 ohms), the tweeter generated extraneous noises above 2.5 kHz. However, as these systems had been shipped at least twice (once to *Audio*'s office in New York for photos and auditioning and then to me), this could be shipping damage. [*Editor's Note:* They didn't buzz here. *E.P.*]

Once I'd installed replacement tweeters, the systems could handle in excess of 4 V rms (4 watts into 4 ohms), without making bad sounds. The Genre's planar tweeters were significantly more prone to buzzing than standard cone or dome tweeter units, which can handle in excess of 10 to 20 V rms without buzzing; but because normal program material does not contain concentrated high levels of high-frequency energy, the 4 V rms limit should be no problem.

Figure 1 displays the smoothed on-axis anechoic frequency response of the Genre I, with the grille on and off. Also shown is a grille-on response taken at 22° off axis horizontally, which corresponds to a central listening position with the system aimed straight ahead (assuming an 8-foot speaker spacing and a 10-foot listening distance), the recommended configuration. Measurements were taken at a distance of 2 meters from the tweeter, on the tweeter's axis, with 2.83 V rms of signal applied, and referenced back to 1 meter by adjusting the scale by 6 dB.

The smoothest curves were measured with the grille on. With the grille off, there are major aberrations in the range from 2 to 10 kHz. On axis, a high-frequency peak is seen at about 17.5 kHz. The smoothest high-frequency responses were exhibited at points between 20° and 25° off the horizontal axis with the grille on. These curves, although quite smooth, exhibit a gradual high-frequency roll-off above 8 kHz.

At 22° off axis, despite a slight roll-off above 10 kHz, the overall curve fits an admirably tight tolerance of about ±2.5 dB from 48 Hz to 10 kHz. Above 20 kHz (curve not shown), the response rapidly died out without exhibiting any out-of-band secondary peaks.

Averaged over the range from 250 Hz to 4 kHz, the sensitivity of the system measured 87.8 dB, essentially equal to Genesis's 88-dB rating. Right-left matching measured a tolerably close +2, –1 dB from 100 Hz to 20 kHz. The maximum deviations were primarily confined to the crossover region, 2 to 6 kHz, where one system was somewhat hotter than the other. Between 9 and 13 kHz, the same system was a bit lower than the other. The match at other frequencies was very good.

IN THIS SYSTEM, THE SMOOTHEST RESPONSES ARE MEASURED WITH THE GRILLE IN PLACE.

The phase and group-delay responses of the Genre I with grille on, referenced to the tweeter's arrival time, are shown in Fig. 2. The phase curve is well behaved but lags a significant 231° between 1 and 20 kHz. This rotation is due to both the crossover design and the offset between the acoustic centers of the midrange and tweeter. The non-flat phase curve indicates that the system is not time-coherent. (The only system I have tested that really was time-coherent was the Thiel CS5 reviewed in the February 1991 *Audio*.) The group-delay curve indicates that the midrange output lags the tweeter by about 0.20 mS between 1 and 3 kHz. Peaks and dips in the group-delay curve correspond to minimum-phase undulations in the phase curve.

The 1-meter, on-axis energy/time response (ETC) is shown in Fig. 3 (input 2.83 V rms, grille on). Test parameters were chosen to accentuate the system's response from 1 to 10 kHz, which includes the upper crossover region. The main arrival, at 3 mS, is quite compact but is followed by a minor peak about 20 dB down from the main peak, delayed about 0.5 mS. All lower-level delayed responses were more than 28 dB down from the main peak.

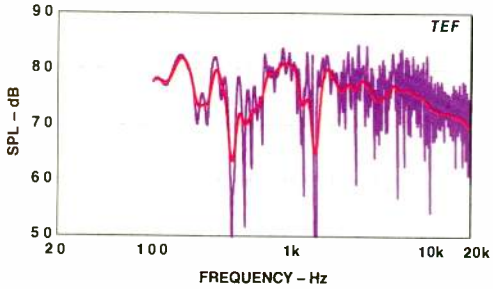

Fig. 8—Three-meter room response.

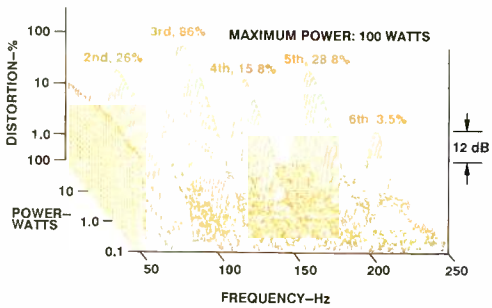

Fig. 9—Harmonic distortion for E_1 (41.2 Hz).

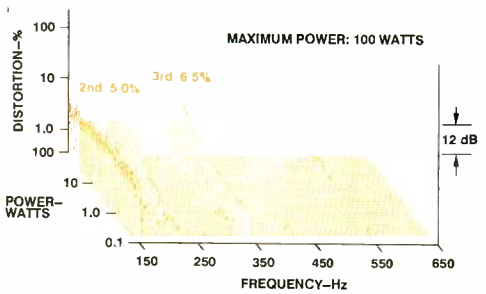

Fig. 10—Harmonic distortion for A_2 (110 Hz).

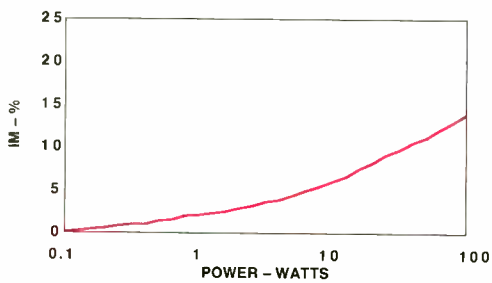

Fig. 11—IM distortion for 440 Hz (A_4) and 41.2 Hz (E_1).

Figure 4 shows the horizontal off-axis responses of the Genre I with grille on. Of the two bold curves, the one at the rear of the graph is the on-axis response, and the one further forward shows response 20° off the axis, corresponding to the position of a centered listener in a standard setup with the system aimed straight ahead. The uniformity of the curves below 14 kHz indicate excellent horizontal off-axis response and coverage.

The vertical off-axis grille-on curves are displayed in Fig. 5. The system was measured at 2 meters away from the tweeter, with the tweeter the center of rotation. The bold curve halfway back is the on-axis response. The curves in the ±15° interval reveal that in the upper crossover region, 3 to 5 kHz, the response is flattest on axis and exhibits dips in the response both above and below the axis. This indicates a minimum amount of lobing error, an ideal situation.

In contrast, at the lower crossover region, 500 Hz, the response for down angles (rear of graph) is much flatter than for up angles (front of graph). Note the sharp 500-Hz dip in the response for extreme upward angles (front of graph). This indicates a maximum amount of lobing error. Fortunately, lobing error is much less significant at lower frequencies because of the fill-in effects provided by room acoustics.

Figure 6 shows the Genre's impedance magnitude versus frequency, plotted over a wider range than usual, from 5 Hz to 20 kHz. Between 20 Hz and 20 kHz, a minimum impedance of 2.1 ohms occurs at 45 Hz, and a maximum of 7.1 ohms occurs at 4.8 kHz. The most significant feature about the curve is the rising impedance below 40 Hz. This is due to the series capacitor of the previously mentioned second-order, high-pass filter that drives the woofer. The anti-resonant tuning point of the woofer high-pass filter occurs at the 45-Hz minimum-impedance frequency. Between 60 Hz and 20 kHz the impedance is relatively constant, only varying between about 3 and 7 ohms.

Between 20 Hz and 20 kHz, the curve has a max/min variation of about 3.4:1 (≈7.1/2.1). This variation, coupled with its low minimum impedance of 2.1 ohms, means that the Genre I will be quite sensitive to cable resistance. Cable series resistance should be limited to a maximum of about 0.035 ohm (35 milliohms) to keep cable-drop effects from causing response peaks and dips greater than 0.1 dB. For a typical run of about 10 feet, 12-gauge or larger wire should be used.

Figure 7 shows the complex impedance of the Genre I, plotted over the range of 7 Hz to 30 kHz. The large increase of negative reactance at low frequencies is caused by the previously mentioned series capacitor. Above 48 Hz, the complex impedance actually stays quite close to the 5-ohm point on the real (resistance) axis.

HORIZONTAL OFF-AXIS RESPONSE AND COVERAGE BELOW 14 kHz ARE EXCELLENT.

The impedance phase (not shown) reached a maximum of +26° (inductive) at 775 Hz and a minimum angle of –72° (capacitive) at the subsonic frequency of 11 Hz. At 50 Hz and above, the phase only varied from –18° to +26°.

Only one significant cabinet resonance was evident when the system was subjected to a high-level, low-frequency sine-wave sweep. This consisted of a front-panel resonance, in the range from 190 to 210 Hz, caused by the woofer frame's buzzing against the front panel. Tightening the woofer screws eliminated this buzzing. The cabinet was otherwise free from vibrations.

When the signal sweeps down in frequency, the woofer's displacement reached a maximum at about 55 Hz, then decreased as frequency was lowered. Distortion did not become subjectively objectionable until levels above about 12 V rms were applied at

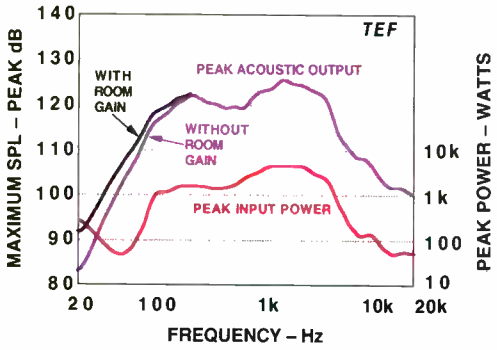

Fig. 12—Maximum peak input power and sound output.

this frequency. The woofer's maximum displacement was about ½ inch peak to peak before distortion became excessive. The woofer did not generate any unpleasant noises when subjected to higher input powers and also did not display any dynamic offset effects.

The power handling of the system at very low frequencies was excellent, better than any system I have tested. On sine waves, the system could handle 30 V rms at 20 Hz, 38 V rms at 16 Hz, 45 V rms at 12.5 Hz, and 60 V rms at 10 Hz! At these levels, the output was quite distorted, but the woofer was not being excessively stressed nor harmed. The built-in high-pass filter pays high dividends here!

The back-to-back zener diodes in parallel with the tweeter clipped the tweeter signal at about ±8 V peak (5.6 V rms). This corresponded to a signal level of about 8 V rms at the input of the system (the high frequencies are attenuated by about 4 dB in the crossover).

The 3-meter room curve of the Genre I, with both raw and sixth-octave smoothed responses, is shown in Fig. 8. The system was in the right-hand stereo position, aimed straight ahead with its axis parallel to the listening room's side wall, and the test microphone was placed at ear height (36 inches), at the listener's position on the sofa. The system was driven with a swept sine-wave signal of 2.83 V rms (corresponding to 2 watts into the rated 4-ohm load). The direct sound plus 13 mS of the room's reverberation are included.

Excluding a room-effect dip at 400 Hz and a higher frequency dip at 1.5 kHz, the averaged curve fits a fairly compact 10-dB window from 100 Hz to 20 kHz. High frequency roll-off is evident above 8 kHz, due to the straight-ahead orientation of the system.

Spectra of single-frequency harmonic distortion versus power for the musical notes of E_1 (41.2 Hz), and A_2 (110 Hz) are shown in Figs. 9 and 10. The power levels were computed using the rated system impedance of 8 ohms. A maximum power of 100 watts (20 V rms) was set as the upper limit.

High distortion levels are reached in the E_1 (41.2-Hz) harmonic test. The predominant distortion products are a high (86%) third harmonic, 26% second, and lower values of fourth and fifth harmonics at full power. As high as these distortion figures are, the resultant acoustic output did not sound all that bad because the sixth and higher harmonics are all low in amplitude. In this test, the actual input power is closer to 175 watts than the 100 watts indicated in the figure, due to the system's very low impedance at 41.2 Hz. The E_1 tone, coincidentally, falls very close to the maximum boost frequency of the system's second-order, high-pass filter, which forces the displacement of the woofer to be higher than it would normally be.

THE PEAK ACOUSTIC OUTPUT REACHES A HEALTHY 120 dB SPL IN THE IMPORTANT REGION FROM 150 Hz TO 2.5 kHz.

Figure 10 shows the A_2 (110-Hz) harmonic data. The only significant distortion at this frequency consists of 5% second and 6.5% third harmonics at full power. Higher harmonics were negligible. The A_4 (440-Hz) distortion data (not shown) rose only to the low values of only 1.8% second and 1.9% third at full power; higher harmonics were also negligible.

The IM created by tones of 440 Hz (A_4) and 41.2 Hz (E_1) of equal power rises to the moderate level of 13.5% at full power (Fig. 11). The 8-inch woofer of the Genre I handles both frequencies of this IM test.

Figure 12 shows the short-term, peak power input and output capabilities of the Genre I as a function of frequency, measured using a 6.5-cycle, third-octave tone burst. The peak input power was calculated by assuming that the measured peak voltage was applied across the rated 4-ohm impedance. The most striking feature of these curves is the fact that the peak input power and peak acoustic output decrease at *both* low and high frequencies, forming a mountain-shaped curve. Most of the systems that I have tested reach their higher power handling and peak output SPL at the highest frequencies and normally use conventional direct-radiator dome tweeters, rather than the membrane-style units used in Genre I.

The zener-based tweeter protection circuitry of the Genre I dramatically reduces the clean high-level output capability of the system above 3 kHz. With the protection circuitry, the system can handle considerably more peak power before being damaged, but the acoustic output becomes very distorted.

Another significant feature of the input power curve is the increase in maximum input below 50 Hz. This is due to the second-order, high-pass filter on the woofer. Below 20 Hz, the peak input power capability of the system continues to increase as frequency is lowered.

The peak input power starts high at very low frequencies, falls to about 50 watts at 50 Hz, then rises rapidly to about 1,500 watts between 100 and 500 Hz, rises even farther to about 4,500 watts at 1.5 kHz, and then falls quickly to only about 50 watts at 20 kHz.

The peak acoustic output of the system reaches a healthy 120 dB SPL between about 150 Hz and 3.5 kHz in the important upper-bass through upper-midrange region. The rapid fall-off of maximum output above 3.5 kHz should not be a problem in most situations, because the spectral content of typical program material also falls at high frequencies. It is only on material such as closely miked drums, solo tambourine, synthesizer, and CD test material, that contain high levels of high-frequency energy content, that the system may get in trouble.

With room gain, the system can generate quite usable outputs of 110 dB SPL above 60 Hz and 120 dB above 130 Hz. With two systems playing bass common to both channels, even higher bass output levels can be reached.

Use and Listening Tests

The Genre I's large-format, 12-page owner's manual gives lots of information on many subjects, including break-in, placement, room treatment, bi-wiring, biamping (essentially like bi-wiring but using two separate amplifiers, and still using the system's internal crossover), amplifier selection, hookup, etc. The manual unfortunately is loose-leaf with a slide-in binder, without page numbers, and appears somewhat disorganized. I initially thought some of the pages were out of order, but found that I was wrong when I examined a second manual that had exactly the same page order.

The systems are supplied with spikes, but interestingly, the manual does not mention them, let alone tell how to install them or the justification for using them. The manual does stress in several places the need to operate the systems with their grilles on and the need to make sure the systems are aimed straight ahead rather than angling them in towards the listener.

My equipment line-up includes the usual Krell amplification, Onkyo and Rotel CD players, B & W 801 Matrix Series III speakers, and Straight Wire Maestro cabling. This setup includes my first CD changer, a new Rotel RCC-940AX. It's nice having several Compact Discs on line at the same time!

My review systems were supplied in rosewood, and they were quite handsome. The cabinetry and build quality are excellent. The systems even look quite good with the grilles removed. (Please remember, though, that you aren't supposed to listen to them this way.)

Listening was done with the systems placed at my usual listening positions but aimed straight ahead rather than canted in. When angled in, they were significantly hotter in the highest octave than my reference B & W systems. With the Genres aimed straight ahead, their high-frequency balance was more like the B & W's, but still slightly warm.

First listening was done using a CD of the Holly Cole Trio playing four tracks from their new album *Don't Smoke in Bed* (Alert Music Inc., Z2/4 81020). The trio consists of Holly singing, accompanied by piano and acoustic bass. I was given this CD at a press party put on by Audio Products International, where I heard the group play live.

The Genres did a particularly impressive job on this disc's acoustic bass and female vocals. Soundstage and realism were impressive, with a crisp, lively, and dynamic sound. Some emphasis of sibilant sounds on the vocal was evident as compared to my reference speakers. The reproduction of bass was very close to that of my references, both in quality and balance. Holly's voice was solidly stationed in the center of the soundstage.

THE GENESIS GENRE I, A RELATIVELY LOW-PRICED, NEAR-HIGH-END SYSTEM, REPRESENTS GOOD VALUE FOR THE MONEY.

On *Jim Morris Brass Plus Montage* (Musical Archives, Musical Archives Foundation, MMF 1005), the systems also did a very credible job. They could be played quite loud and clean on the brass material and exhibited quite convincing impact and dynamics.

Some troublesome high-frequency emphasis was evident when I played other vocal material that originally was not recorded very well or cleanly (peaky microphones, etc.). This was evident on several tracks from a '70s rock compilation, *The Greatest Hits of the '70s* Volumes 1 to 3 (Platinum Disc Corporation S21-57804, S21-57805, S21-57806). Tina Turner's voice on the classic "Proud Mary" (Vol. 1, cut 6), which sounded harsh on the B & Ws, sounded even more harsh (bordering on painful) on the Genre Is. On other tracks of this compilation, the Genres made a good account of themselves, with a clean, balanced sound coupled with sufficient bass to make them worthwhile on rock material.

On the pink-noise, stand-up, sit-down test, the Genres only exhibited some mild upper midrange tonal changes when I stood up. Overall, the Genres' spectral balance on pink noise was similar to that of the B & Ws' but included some high-frequency emphasis and was not as flat on an octave-to-octave basis; some tonality was evident where none should be.

On third-octave, band-limited pink noise, the system's fundamental output at 20 and 25 Hz was not loud enough to be usable. The output was not distorted, however, due to being rolled off by the internal high-pass filter. At 20 Hz, a high level that caused the B & Ws to sound somewhat distressed did not sound distressed on the Genres. The systems' effective output was better at 31.5 Hz and was much better at 40 Hz and above. The maximum clean output at the 40-, 50-, and 63-Hz bands, was somewhat limited, however, due to third-harmonic generation. The output sounded distorted, but not in a way that I found objectionable.

The systems handled the very demanding bass-drum whacks on track 1 (at 1:08, 1:10 etc.) of *Winds of War and Peace* (Wilson Audio WCD-8823) by the National Symphonic Winds quite well but did not produce the incredible body-jarring whomp that the B & W systems can generate. At least, what came out was not distorted, with no sign of the woofer stress that many other systems would show. (I'd be afraid these drum whacks would knock some systems' woofers out onto the floor!)

On more sedate symphonic material, such as Brahms Concerto No. 1 for Piano and Orchestra (Dorian DOR-90172) by Ivan Moravec and the Dallas Symphony Orchestra led by Eduardo Mata, the Genres also did a very credible job with excellent control and good dynamic contrasts on piano, with a wide and accurate symphonic soundstage.

Everything considered, the Genre I represents good value for the money, a relatively inexpensive, near high-end system. I am particularly impressed with its power handling at very low frequencies and its overall performance. Some improvements could be had, however, in reducing bass distortion and correcting a slight tendency towards high-frequency harshness on some program material. *D. B. Keele, Jr.*