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VECTOR RESEARCH VRX-5200R RECEIVER

Manufacturer's Specifications

FM Tuner Section

Usable Sensitivity: Mono, 11.2 dBf.
50-dB Quieting Sensitivity: Mono, 15.6 dBf; stereo, 37.6 dBf.
S/N: Mono, 74 dB; stereo, 70 dB.
THD at 65 dBf, 1 kHz: Mono, 0.17%; stereo, 0.35%.
Frequency Response: 50 Hz to 15 kHz, ±1.5 dB.
Capture Ratio: 1.3 dB.
Alternate-Channel Selectivity: 60 dB.
Image Rejection: 52 dB.
I.f. Rejection: 80 dB.
AM Suppression: 56 dB.
Spurious-Response Rejection: 65 dB.
Separation: 42 dB at 1 kHz.

Amplifier Section

Power Output: 50 watts per channel into 8 ohms, 60 watts per channel into 4 ohms.
Power Bandwidth: 20 Hz to 20 kHz (see text).
THD: 0.07%.
IM Distortion: 0.07%.
Dynamic Headroom Power: 80 watts (see text).
Frequency Response: High level, 10 Hz to 50 kHz, ±1 dB.
Damping Factor: 50.
Input Sensitivity: MM phono, 2.5 mV; high level, 150 mV.
S/N: Phono, 80 dB; high level, 95 dB.

General Specifications

Power Requirements: 120 V a.c., 60 Hz.
Dimensions: 17 in. W × 4½ in H × 12 in. D (43.2 cm × 11.4 cm × 30.5 cm).
Weight: 18½ lbs. (8.4 kg).
Price: $369.95.
Company Address: 1230 Calle Suerte, Camarillo, Cal. 93010.
For literature, circle No. 93

Despite some published specifications that are less than spectacular (not to mention some mildly "creative" nonstandard specifications I will discuss later), the Vector Research VRX-5200R receiver has much to commend it. The unit's quartz frequency-synthesized AM/FM tuner section features 20 presets. There's an audio/video signal-processing loop in addition to two tape-monitor loops. One feature I particularly like is having separate FM muting and mono/stereo controls. Most receivers link these two functions to a single control, making it impossible to receive weak signals in stereo—even if the user is willing to tolerate somewhat higher noise levels. With this receiver, you can choose whether to switch to mono under such conditions and, separately, whether to apply muting to eliminate those weak signals altogether. Unlike some other units which are called, as this one is, audio/video receivers, the VRX-5200R actually lets you route video signals through it and connect a TV monitor to it as well. In other words, within limits, this receiver can serve as your total audio/video control center. Vector Research has brought back some of the nice features I used to find on receivers years ago, such as separate preamp-out/amp-in jacks and separate 75-ohm coaxial and 300-ohm screw-terminal FM antenna inputs.

In many other ways, though, this receiver is as modern and up-to-date as the competition. It has AM and FM autoscan tuning and a dedicated remote control that handles preset station selection, volume adjustment (including mute), function selection, and power on/off. There is provision for connecting two pairs of speakers in parallel. If four speakers are used in the same room, a matrix circuit can be switched in to provide a simulated surround effect. The addition of a midrange tone control adds to the flexibility of audio spectral balance that can be achieved with this receiver. To make the unit more flexible when used as an A/V control center, there's even a video signal-processing loop (video in/out) which is normally interconnected by a removable jumper. With the jumper out, such devices as video noise-reduction units or video enhancers can be interposed in the video signal path.

Vector Research's brochure and owner's manual provide little detail concerning actual circuit approaches used in the VRX-5200R, other than pointing out that the output stages utilize discrete transistors. They have come up with a name for this: DOS, which computer aficionados will immediately surmise stands for Disk Operating System, but which, in fact, is Vector Research's acronym for Discrete Output Stage.

Control Layout

At the extreme left of the front panel is the on/off switch and, below it, a stereo 'phone jack. A frequency display is further to the right. To its right are banks of LEDs, two of which serve as approximate power output meters. The third bank, consisting of three LEDs, serves as a signal-strength meter. The display area flashes the word "Memory" when the "Memory" button is pressed to store station frequencies. A stereo indicator light is also found in the display.

The lower left portion of the panel contains a pair of speaker on/off switches; the "Matrix Surround" button; rotary tone controls for bass, midrange, and treble; a rotary balance control, plus pushbuttons for loudness compensation and audio muting. Buttons for 10 numbered presets, up/down tuning, and "Memory" are at the upper right portion of the panel. Below these are seven program source selectors, three of which are associated with tuner operation. After pressing the "Tuner" button, you must then select either AM or FM by pressing an additional button nearby. I wonder why Vector Research couldn't have simply included one button for AM and one for FM, without the additional "Tuner" button. Perhaps they did it for visual symmetry, since the preset/memory bank of buttons just above also has a button count of seven. At the extreme right of the panel are the aforementioned "Mute," "Mono," and "Auto Scan" buttons, with a good-sized rotary volume control above. This control is motorized, so it rotates when the remote control is used to adjust volume.

The rear panel is equipped with 300-ohm FM antenna screw terminals, a 75-ohm coaxial FM antenna terminal, and AM antenna screw terminals. A separate AM loop antenna, supplied with the receiver, can be snapped into a clamp and then rotated for best reception, or an external AM antenna can be connected. The usual array of input jacks for "Phono," "CD," "AV/Tape 1," and "AV/Tape 2" are augmented by sets of "Video" input and output jacks, a video "Monitor" output jack, the previously mentioned "Processor" in/out jacks, and the two preamp-out/amp-in jacks. A separate ground terminal is provided for turntable grounding. Spring-loaded speaker terminals accommodate two pairs of speakers. One switched and one unswitched receptacle complete the back panel's layout.

Tuner Measurements

Figure 1 shows the frequency response of the FM tuner section of the VRX-5200R. The dashed curve, measured for the right channel, has been deliberately displaced for clarity. Notice that the actual response meets Vector Research's claims, since response at 50 Hz was off by less than −1.0 dB, and left-channel output exhibited a slight rise of about +1.0 dB at 15 kHz.

This receiver's versatile controls include such niceties as a motorized volume pot that can be operated remotely.

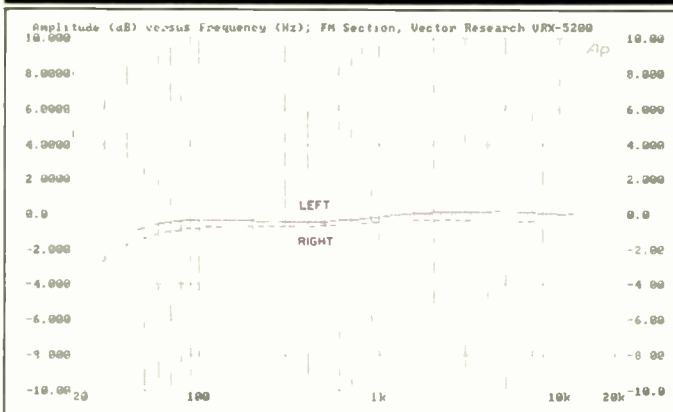


Fig. 1—Frequency response, FM tuner section. Right-channel curve has been displaced for clarity.

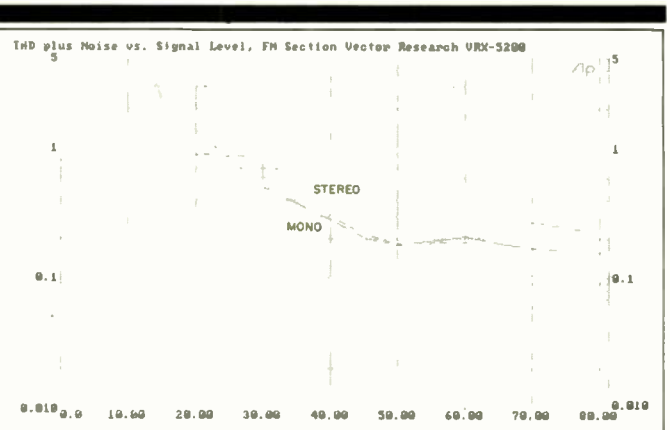


Fig. 3—THD + N vs. signal strength at 1 kHz.

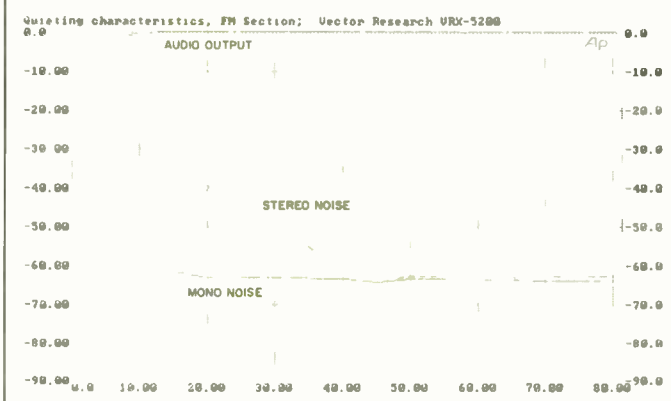


Fig. 2—Mono and stereo quieting characteristics.

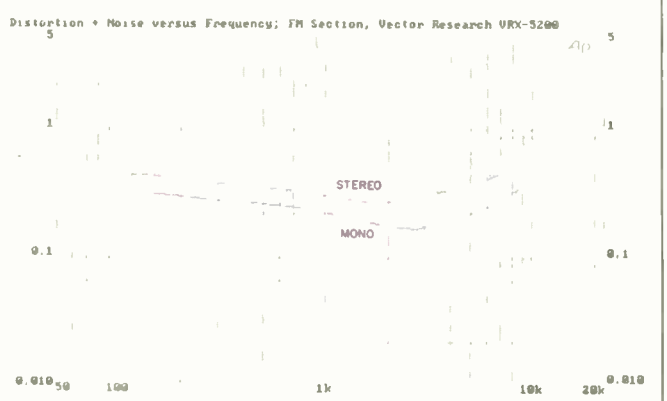


Fig. 4—THD + N vs. modulating frequency for 65-dBf signal.

My usual plot of S/N versus signal input level for the FM tuner section is shown in Fig. 2. Maximum S/N fell short of Vector Research's claims; my results were 65 dB for mono and 63.5 dB for stereo at 65 dBf and above. Notice that the stereo switching threshold occurred at about 15 dBf. Sensitivity for 50-dB quieting was very good, whether in mono or stereo. To be specific, the results I obtained were 12 dBf for mono and 30 dBf for stereo.

Plots of THD + N versus input signal level are shown in Fig. 3. At 65 dBf, THD + N for 1-kHz signals was only 0.18% in mono and 0.25% in stereo. The usable sensitivity measurement, derived from this test, was 13.5 dBf in mono. It may seem odd that this is not as good as the 50-dB quieting sensitivity measurement, but this is not unique. Usable sensitivity measurements take distortion and noise into account, while 50-dB sensitivity is based on noise alone. When the noise slopes off more rapidly with signal strength than the THD does, this apparent discrepancy can occur.

Figure 4 shows how THD + N varied with frequency for a constant 65-dBf input signal. The 1-kHz figures correlate fairly well with those in Fig. 3. At 100 Hz, THD + N measured 0.27% in mono and 0.36% in stereo. At 6 kHz, the other standard frequency for this test, THD + N was 0.24% in mono and just under 0.4% in stereo.

FM separation is plotted in Fig. 5. Separation reached 40 dB at mid-frequencies, decreasing to 33.5 dB at 100 Hz and 26.5 dB at 10 kHz. A spectrum analysis of a 5-kHz, 100% modulated, left-only signal (Fig. 6) revealed that actual separation was somewhat better than the results in Fig. 5. In Fig. 5, crosstalk products other than the fundamental frequency are included, such as subcarrier output and harmonic components of the modulating signal. In Fig. 6, these additional components are isolated from the actual 5 kHz present in the unmodulated channel's output. Accordingly, you can see that the amount of 5-kHz crosstalk present in the unmodulated channel's output is some 48 dB lower than

The surround-sound matrix worked quite well, using a simple design dating from the "prehistoric" days of quadraphonic sound.

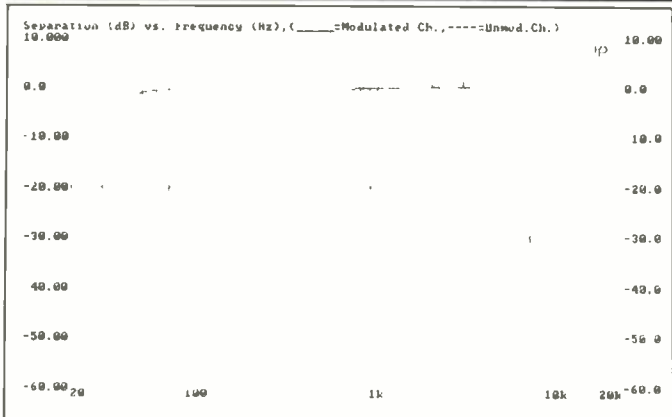


Fig. 5—FM frequency response (top) and separation vs. frequency.

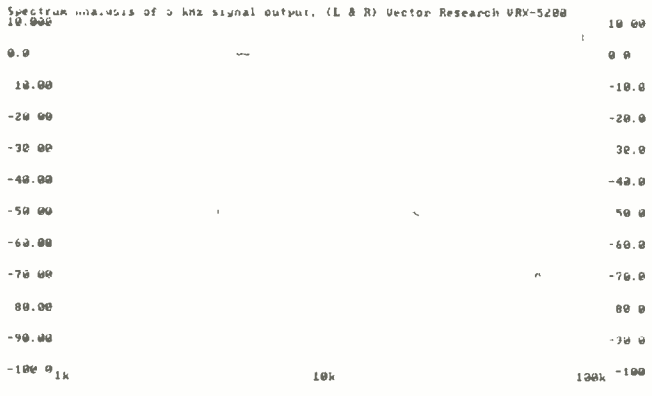


Fig. 6—Spectrum analysis of 5-kHz modulating signal (top) and crosstalk, including subcarrier and other components (bottom); see text.

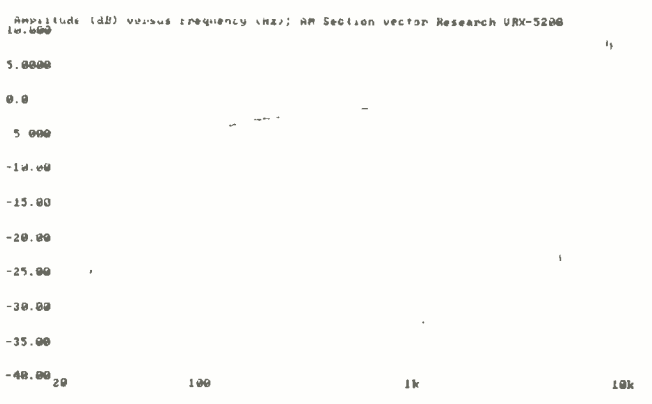


Fig. 7—AM frequency response with 75-μS pre-emphasis.

in the modulated channel's output, while components at 10, 15, 19, 38, and 57 kHz are also clearly visible. The 38-kHz component at the modulated channel's output was attenuated by about 53 dB.

Secondary FM tuner specifications turned out to be pretty much as claimed—in most cases a bit better. I measured a capture ratio of 1.5 dB, i.f. rejection of 83 dB, AM suppression of exactly the rated 56 dB, image rejection of 55 dB, alternate-channel selectivity of 62 dB, and spurious-response rejection of 70 dB.

Vector Research doesn't quote any performance specifications for the AM tuner section of this receiver. However, my listening tests revealed that this unit's AM section was not all that bad—certainly no worse than most such sections supplied with otherwise "high-fidelity" tuners and receivers. I measured the AM tuner's frequency response, and results are shown in Fig. 7. Using the −6 dB convention for quoting AM response, this tuner can be said to have a frequency response from 80 Hz to 2.7 kHz.

Amplifier Measurements

The amplifier section easily met its power output specification for 8-ohm loads. As shown in Fig. 8A, THD + N, at an output of 50 watts per channel, was 0.009% at 1 kHz, 0.006% at 20 Hz, and 0.048% at 20 kHz. The same measurements were repeated using 4-ohm loads (Fig. 8B). Again, the output claimed by Vector Research—60 watts per channel, in this case—was easily attained at levels of THD + N well below the 0.07% rated value. At an output of 60 watts per channel, the results for THD + N using 4-ohm loads were 0.013% at 1 kHz, 0.018% at 20 Hz, and 0.049% at 20 kHz.

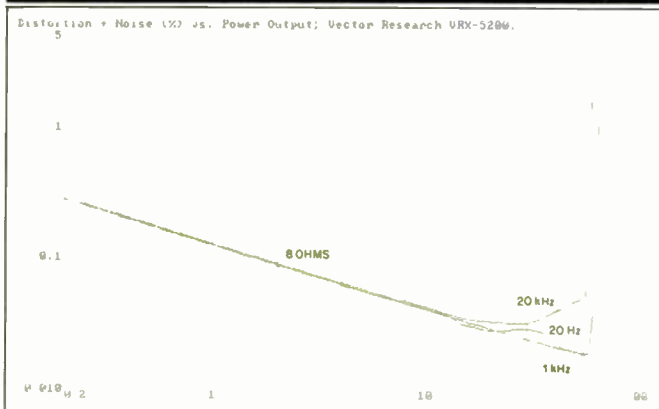
Almost perfect correlation with these figures was obtained when I set up my Audio Precision test equipment so that a constant 50 watts per channel was delivered into 8-ohm loads, and test frequencies were swept from 20 Hz to 20 kHz. Results of this distortion test are shown in Fig. 9A, while results for 4-ohm loads, with the system regulated for an output of 60 watts per channel, are shown in Fig. 9B.

I plotted SMPTE-IM distortion only for 8-ohm loads (Fig. 10), since results were almost identical when the load was changed to 4 ohms. At an output of 50 watts per channel, SMPTE-IM distortion was 0.055%, well within the 0.07% limit set by Vector Research. Damping factor, referred to 8-ohm loads and using a 50-Hz test signal, measured 52.

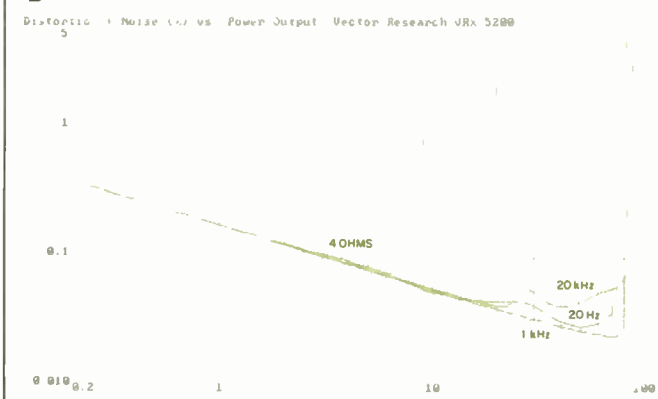
Next I turned my attention to the preamplifier and control section of the receiver. Figure 11 shows the characteristics of the loudness compensation circuitry. The degree of bass and treble boost increased gradually as volume levels were decreased from maximum to −40 dB. I would have preferred to see less, or no, treble boost. Many manufacturers, however, insist on including both bass and treble boost, as Vector Research does in this loudness circuit.

Figure 12 shows the maximum boost-and-cut range of the bass, midrange, and treble tone controls. In my opinion, given the relatively limited dynamic headroom of this receiver (less than 1 dB), entirely too much boost has been provided by the bass control. While a maximum boost of 10 dB is available at 100 Hz, the output continues to rise below this frequency, so that at 20 Hz, it reaches an extreme boost

With efficient speakers, sound levels were more than adequate, distortion was imperceptible, and transients were clean.

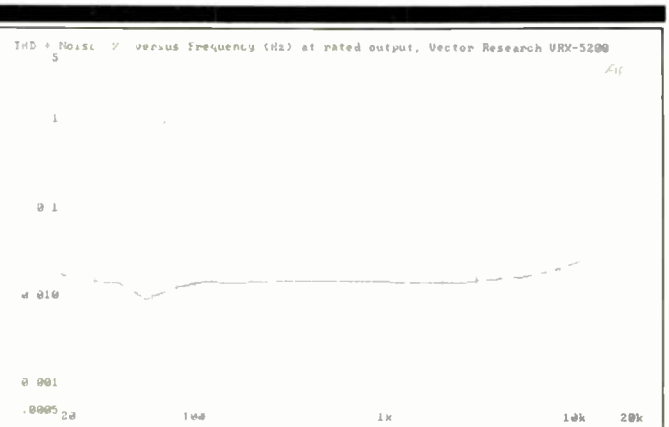


A



B

Fig. 8—THD + N vs. power output per channel into 8 ohms (A) and 4 ohms (B).



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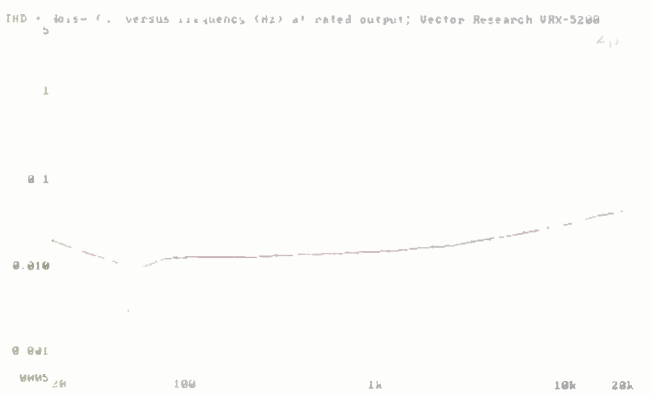

B

Fig. 9—THD + N vs. frequency at rated output of 50 watts per channel into 8 ohms (A) and 60 watts per channel into 4 ohms (B). The two curves are virtually identical from 40 Hz to 1 kHz.

of nearly 15 dB. Anyone setting the bass control to maximum while listening to, say, organ records is likely to notice an increase in turntable rumble; in extreme cases, acoustic feedback and howling may actually occur.

I also measured dynamic headroom. Vector Research quotes this in actual power, rather than in dB, as called for in the EIA/IEEE measurement standard. This duplicate power rating causes confusion. Coupled with their failure to quote power ratings properly (the frequency range over which rated power can be delivered must be quoted in the same sentence as the power level itself), it could potentially trigger some action by the Federal Trade Commission, whose "Power Rule" they are violating. This would be a pity, since the amplifier did, in fact, meet all its power ratings very adequately over the entire range from 20 Hz to 20 kHz.

Getting back to my bench tests, sensitivity for the high-level inputs measured 22 mV for 1 watt output. Like so many other manufacturers, Vector Research doesn't quote input sensitivity—or, for that matter, amplifier S/N ratios—in accordance with EIA/IEEE measurement standards. This accounts for the discrepancy between my high-level input sensitivity figure of 22 mV and their quoted figure of 150 mV, which is referred to rated output. Signal-to-noise ratio for the high-level inputs was an adequate 77 dB, referred to 500 mV of signal input and with the volume control adjusted for 1 watt output.

Input sensitivity for the MM phono inputs measured 0.35 mV for 1 watt output. Signal-to-noise ratio for the phono inputs, referred to 5 mV input and with the volume control again adjusted to produce 1 watt output per channel, was 76.4 dB. There is no exact way of correlating these S/N readings with those quoted by Vector Research, since their figures are referred to rated output, with the volume control set at maximum.

Figure 13 shows the deviation from exact RIAA playback equalization over the frequency range from 20 Hz to 20 kHz. At 30 Hz, overall equalization and response from phono inputs to speaker outputs was off by −1.8 dB. Maximum error in treble equalization was +0.9 dB at around 5 kHz, decreasing to +0.4 dB at 20 kHz.

For a mid-powered receiver that sells for a moderate price, the VRX-5200R has many features of costly, higher powered models.

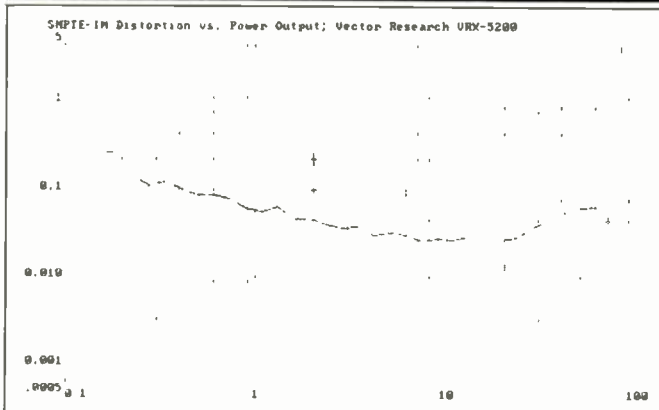

Fig. 10—SMPTE-IM distortion vs. power output for 8-ohm loads.

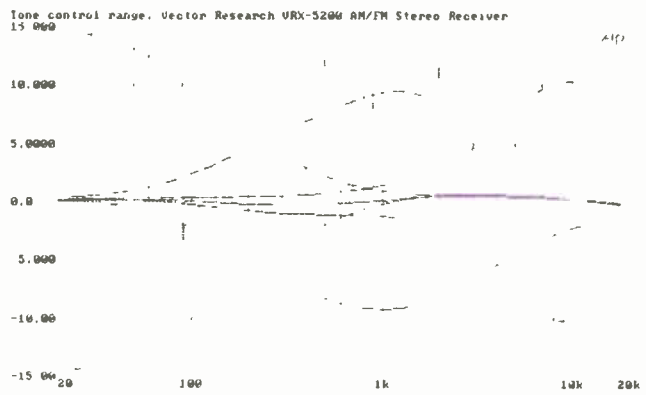

Fig. 12—Tone-control characteristics, including midrange control; see text.

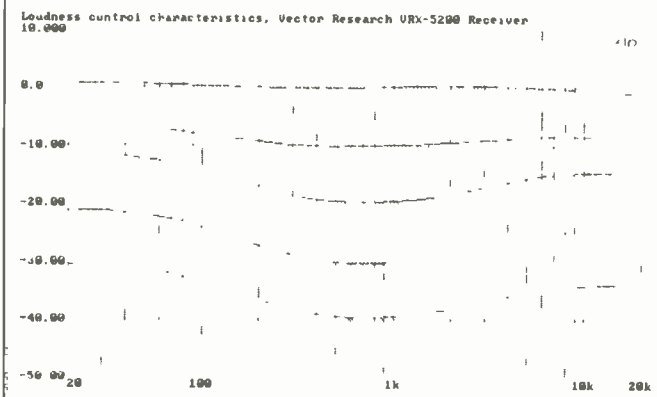

Fig. 11—Loudness compensation characteristics for volume settings from maximum (0 dB) to −40 dB.

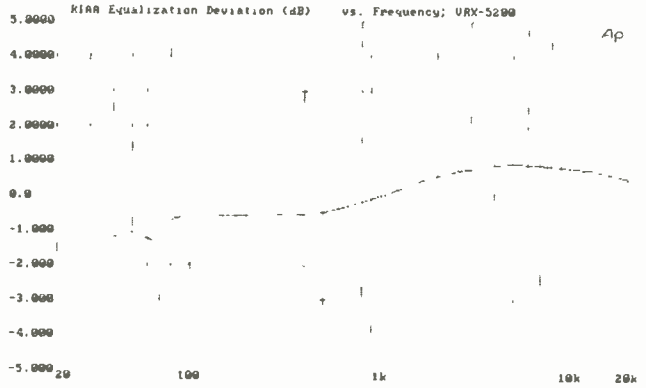

Fig. 13—Deviation from RIAA equalization.

Use and Listening Tests

I was particularly interested in checking the effectiveness of the simple matrix surround decoding featured in this receiver. My lab/listening area is equipped with a pair of reference speaker systems and a smaller pair of monitor speakers mounted above my test bench, so I connected both sets of speakers to the terminals on the VRX-5200R. My KEF 105.2 reference speakers flank my video monitor, so I was able to approximate the way a user might set up the receiver in a complete A/V system. The surround-sound effects I heard were quite good, considering that this receiver does not have gain-enhancement circuitry. The rear channels simply reproduce L − R signals, which is not unlike the arrangement popularized by David Hafler and others in those prehistoric days of quadraphonic sound. (Does anyone else remember those primordial matrix ambience and surround systems?)

But let's get back to more serious listening and evaluation. I liked the front-panel control setup even more during my listening tests than I did while testing the unit on the bench. Most of the things I wanted to do were possible with the supplied remote control. Had I wanted a more versatile remote—one that could control other video and audio components by "learning" their codes—I could have tried Vector Research's optional, more elaborate universal control, Model VRC-125 ($99.95).

Of course, the 50 to 60 watts per channel available from this receiver were really not enough to drive my relatively inefficient KEF reference speakers to the kind of lifelike levels I prefer for listening. But when the VRX-5200R was connected to a more efficient pair of speakers, such as those I use on the lab bench or in my office (yes, I actually listen to music while I write test reports), the sound levels were more than adequate. Further, distortion was imperceptible, and musical transients were clean, with little or no hangover evident. Although the VRX-5200R is essentially a mid-powered receiver with a relatively modest price tag, what I liked most about it is that it has many of the operating and control features of higher powered receivers costing a great deal more. *Leonard Feldman*