

Ultimate Power.



With a worldwide reputation for sonic excellence, the new Luxman Receivers also deliver more power than ever before.

For over 60 years, Luxman audio components have been internationally recognized for their superb sonic quality.

However, the recent introduction of compact discs with wide dynamics and high-accuracy loudspeakers with low impedance

ratings has created a need for receivers with "real" output power.

With the tremendous dynamic power of the new Luxman receivers, our reputation for "Ultimate Fidelity" is likely to change to "Ultimate Power."

LUXMAN

A Division of Alpine Electronics of America, Inc. (213) 326-8000

2

LUXMAN
R-117
RECEIVER

Manufacturer's Specifications

FM Tuner Section

Usable Sensitivity: Mono, 10.3 dBf.

50-dB Quieting Sensitivity: Mono, 13.2 dBf; stereo, 36.6 dBf.

Frequency Response: 30 Hz to 15 kHz, +0.5, -1.0 dB.

S/N: Mono, 80 dB; stereo, 75 dB.

THD: Mono, 0.08% at 1 kHz; stereo, 0.1% at 1 kHz.

Stereo Separation at 1 kHz: Wide i.f., 50 dB; narrow i.f., 35 dB.

Alternate-Channel Selectivity: Wide i.f., 50 dB; narrow i.f., 75 dB.

Capture Ratio: 1.5 dB.

Image Rejection: 100 dB.

Spurious-Response Rejection: 100 dB.

AM Tuner Section

Usable Sensitivity: 500 μ V/meter.

S/N: 50 dB.

THD: 0.5% at 30% modulation.

Adjacent-Channel Selectivity: 50 dB.

Amplifier Section

Power Output (8-Ohm Loads): 160 watts continuous per channel, 20 Hz to 20 kHz.

Dynamic Power Output: 440 watts into 8 ohms, 600 watts into 4 ohms, 700 watts into 2 ohms.

THD: 0.03%.

SMPTE IM: 0.03%.

Damping Factor: 80.

Input Sensitivity: MM phono, 2.5 mV; MC phono, 0.22 mV; high level, 150 mV.

Phono Overload: MM, 150 mV; MC, 13.2 mV.

S/N: MM phono, 88 dB (re: 5 mV); MC phono, 70 dB (re: 0.5 mV); high level, 100 dB (re: 0.5 V).

Frequency Response: Phono, RIAA $\pm$ 0.5 dB from 20 Hz to 20 kHz; high level, 5 Hz to 180 kHz, +0, -3 dB.

Tone-Control Range: Bass, $\pm$ 10 dB at 100 Hz; treble, $\pm$ 10 dB at 10 kHz.

Subsonic Filter: Cutoff frequency, 15 Hz; slope, 6 dB/octave.

Loudness Compensation: +3 or +6 dB at 100 Hz, +2 or +4 dB at 10 kHz.

General Specifications

Power Requirements: 120 V a.c., 60 Hz, 66 watts (with no signal).

Dimensions: 17 $\frac{1}{4}$ in. W $\times$ 5 $\frac{1}{2}$ in. H $\times$ 16 $\frac{11}{16}$ in. D (43.8 cm $\times$ 14 cm $\times$ 42.4 cm).

Weight: 35.2 lbs. (16 kg).

Price: \$1,200.

Company Address: 19145 Gramercy Pl., Torrance, Cal. 90501.

For literature, circle No. 91



I was beginning to think there was something wrong with my FM stereo generator—until I measured the FM performance of this top-of-the-line Luxman AM/FM receiver. It not only restored my faith in my lab equipment, but renewed my belief in the ability of some companies to produce all-in-one receivers that equal some of the finest separate tuners and amplifiers I have ever measured or listened to.

I have been following Luxman's somewhat erratic history from the time they first introduced a few amplifiers, tuners, and receivers in the early 1970s. The then-independent company was often referred to as "the McIntosh of Japan." Indeed, Japanese audiophiles that I've met recently still think of Luxman in those terms. When the relatively small company became a division of the much larger Alpine Electronics in the early 1980s, some of the products introduced by the new management were not up to the standards of the original Lux Corporation. The new division seemed to be groping for a place in the highly competitive audio electronics field without having a clear design philosophy. Happily, the "new" Luxman management has brought the company back on track. They have allowed its dedicated and innovative engineers (many of whom have been with Luxman for a decade or more) to do what they do best: Design and produce superlative audio components that sound as good as they measure on the lab bench.

Among the special features of the R-117 is the ability to route signals from a CD player directly to the input of the power amplifier section, bypassing the input selector, record-out selector, dubbing switches, signal processor, subsonic filter, and balance control.

The power amplifier section uses a differentially connected, dual FET input stage and push-pull driver and output stages. It uses power transistors as drivers and has dual paralleled output transistors. The high dynamic headroom of the amplifier section is achieved through the use of signal-controlled Darlington switches that increase output-stage voltages by two-thirds for 30-mS intervals when output power reaches 175 watts per channel. The high-current emitter resistors for the output devices are monolithic, not wire-wound, to eliminate any possible inductive distortion components. A triple-shielded power transformer and fast-recovery diode rectifiers help to maintain steady supply voltages under widely varying load conditions. Speaker selection and protection relays are rated for 60-ampere peak currents.

The FM tuner section employs dual-gate MOS-FET devices for pre-selector r.f. and mixer stages, and uses five-gang varactor tuning. Separate buffer transistors for the PLL and mixer outputs are used for increased oscillator stability. There are three wide-band ceramic filters in the i.f. section, and an additional amplifier stage and ceramic filter are inserted in the signal path when the narrow-band mode is employed for increased selectivity. Quadrature FM detection is used for audio recovery, and a PLL multiplex decoder is used for stereo. An automatic high-blend circuit reduces noise during weak-signal reception, though at some sacrifice in stereo separation.

The infrared remote control supplied with this receiver will also control other Luxman components, such as a CD player, cassette deck, or turntable, and will work with Luxman's

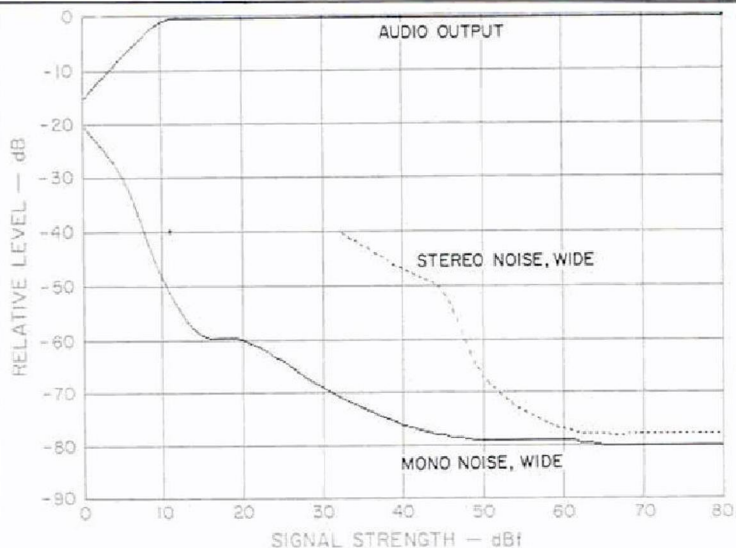


Fig. 1—Mono and stereo quieting characteristics for wide-band i.f. mode, FM tuner section.

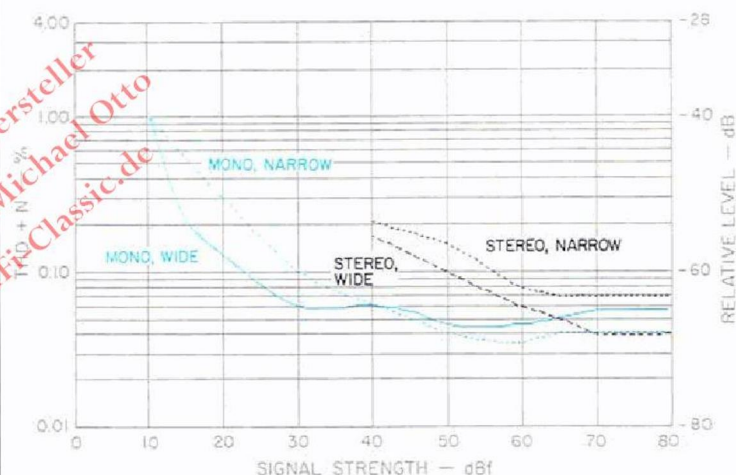


Fig. 2—THD + N vs. signal strength at 1 kHz for narrow and wide i.f. modes, FM tuner section.



In the wide i.f. mode, mono usable sensitivity was an incredibly low 8.2 dBf—and in narrow mode it was even lower!

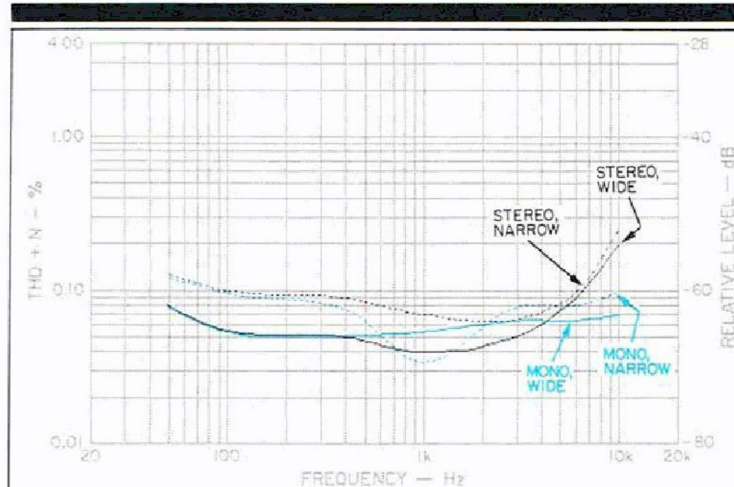
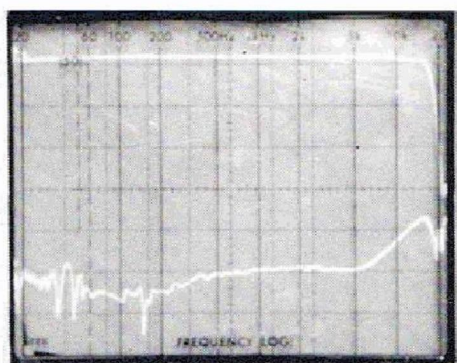
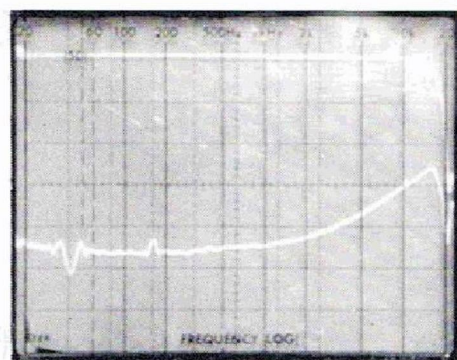


Fig. 3—THD + N vs. modulating frequency for narrow and wide i.f. modes, FM tuner section.



A



B

Fig. 4—FM frequency response (top trace) and separation vs. frequency for wide (A) and narrow (B) i.f. modes, FM tuner section.

multi-room remote systems as well. Two sets of preamp-out jacks and one set of main-amp input jacks allow connection of additional amplifiers or other audio equipment at a point beyond the receiver's tone controls and signal processors. Extra signal-processing input and output jacks are provided in addition to the two sets of tape monitor loops.

A total of 20 station frequencies can be memorized by the tuner circuitry. A switch inside the receiver allows you to tune in 25- or 50-kHz increments, if you wish, to avoid interference when receiving those cable FM transmissions that shift frequencies away from the standard 200-kHz multiples. Video signal sources can be connected to the receiver, and a video output terminal permits connection of a TV monitor. Wide-band video buffer amplifiers handle these video signals.

Control Layout

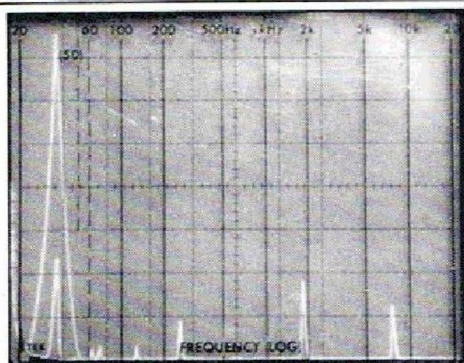
At the left edge of the R-117's all-black front panel are a power switch and a stereo phone jack. A display area near the power switch indicates tuned-to frequency, station preset number, stereo reception, signal strength, tuning mode, and "memory mode" when storing a preset station frequency. A multipath interference indicator, also found here, lights when the appropriate button is pressed—if and when multipath interference is present.

Ten numbered buttons below the display are used in tandem with an additional "shift" button to store the 20 preset stations. Nine buttons to the right of the display select desired program sources (FM, AM, tape 1 or 2, phono, CD, videodisc, and video 1 or video 2). If the "CD Straight" button (also located in this area) is pressed, the CD input is connected directly to the power amplifier section, and no other program sources can be selected. Four buttons below the program selectors and their associated indicator lights are used to choose among four possible program sources for record-output assignment: Tuner, phono, CD, and videodisc. Two additional buttons in the same row control video 2-to-1 and tape 2-to-1 dubbing.

Two speaker selector buttons are in the lower left corner of the front panel. Nearby are an "FM Muting" button, the "Multipath" button mentioned above, a two-position i.f. bandwidth selector, an "Auto Seek" button for selecting the automatic signal-seeking tuning mode, a "Memory Scan" button that lets you listen to each preset station for 5 S, the "shift" button previously mentioned, the preset "Store" button, and small rotary bass and treble control knobs. Farther to the right, along the bottom section of the panel, are a "Tone Defeat" button, a subsonic filter button, a three-position loudness compensation switch ("Off" plus two levels of compensation), a balance control, and an MM/MC phono cartridge selector. A massive volume control with an inset illuminated indicator is at the upper right corner of this feature-laden front panel.

As you might expect, the rear panel is crammed full of jacks and terminals. The FM antenna terminal is a 75-ohm coaxial type, but Luxman provides a 300-to-75-ohm matching transformer in case you prefer to use a flat-ribbon transmission line. An AM loopstick is packed separately and snaps into place in a rear-panel clamp. There are 38 audio and video input and output jacks, twin sets of speaker

Dynamic headroom was very high, allowing the amp section to deliver peaks of 450 watts into 8 ohms and 680 watts into 4 ohms!



A
B

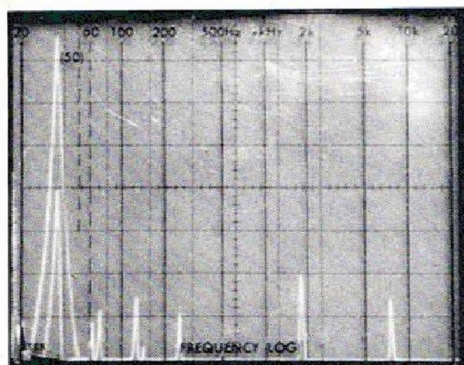


Fig. 5—Separation and crosstalk components for 5-kHz FM modulating signal, plus subcarrier and sideband components, for wide (A) and narrow (B) modes.

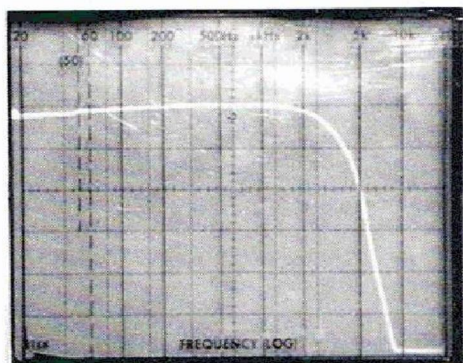


Fig. 6—AM frequency response.

output terminals, six convenience a.c. receptacles, and a chassis ground terminal. Also provided are DIN connectors for a unified remote-control system (if you use the R-117 with other Luxman components) and for an external remote sensor. A signal processor on/off switch opens the signal path so that an external device, such as a graphic equalizer, can be connected to the separate signal processor jacks.

Tuner Measurements

I could hardly believe my meters or my FM generator when I started to measure the performance of this receiver's FM tuner section. Usable FM sensitivity in mono measured an incredibly low 8.2 dBf in the wide i.f. mode—and an even lower 7.8 dBf in the narrow mode! The 50-dB quieting figure was just as impressive, measuring only 11 dBf. In FM stereo, usable sensitivity and 50-dB quieting were determined by the switching threshold rather than by actual tuner sensitivity. This threshold was set to 33 dBf in my sample, so by the time the tuner switched over to stereo, quieting had already exceeded 40 dB in the wide mode and was around 50 dB in the narrow mode. Figure 1 shows how FM mono and stereo quieting varied as a function of signal strength for the wide mode. Above 45 dBf or so, there was essentially no difference between this set's wide- and narrow-mode quieting characteristics. Maximum signal-to-noise ratio obtained for strong FM signal inputs (65 dBf or greater) measured 80 dB in mono and an almost equally high 78 dB in stereo.

Figure 2 shows how THD + N varied as a function of signal strength for a 1-kHz FM signal in mono and stereo and for narrow and wide i.f. settings. Strangely, at 65 dBf, THD + N in mono/narrow was marginally lower than in mono/wide (0.04% as against 0.05%). However, I was amazed at the fact that in stereo/wide, the lowest distortion reached with strong signals for a 1-kHz modulating signal was also only 0.04%. Even the "worst-case" 65-dBf stereo THD + N reading (0.07% in stereo/narrow) was better than what I usually read under the best conditions for an all-in-one receiver.

Figure 3 depicts THD + N as a function of modulating frequency for all four operating modes (mono wide and narrow, and stereo wide and narrow). For the three test frequencies that are supposed to be reported according to the IHF/EIA Standard (100 Hz and 1 and 6 kHz), THD + N did not exceed 0.1% in any of the four operating modes and was considerably lower than that over the midrange portion of the spectrum.

Figures 4A and 4B are 'scope photos of my spectrum analysis sweeps of FM frequency response and separation. Frequency response over the entire FM broadcast range was among the best I have ever measured. Deviation was no more than ± 0.3 dB from 30 Hz to 15 kHz. In the wide i.f. mode (Fig. 4A), separation measured just over 50 dB at 1 kHz, 50 dB at 100 Hz, and 41 dB at 10 kHz. Switching to the narrow mode (Fig. 4B), mid-frequency separation decreased slightly, to 45 dB; it measured 46 dB at 100 Hz and 40 dB at 10 kHz. One nice thing about this tuner is that its narrow setting is not so narrow that it significantly increases distortion or reduces separation. By the same token, the

I was able to use the R-117's narrow i.f. mode without giving up much separation or noticing any audible increase in distortion.

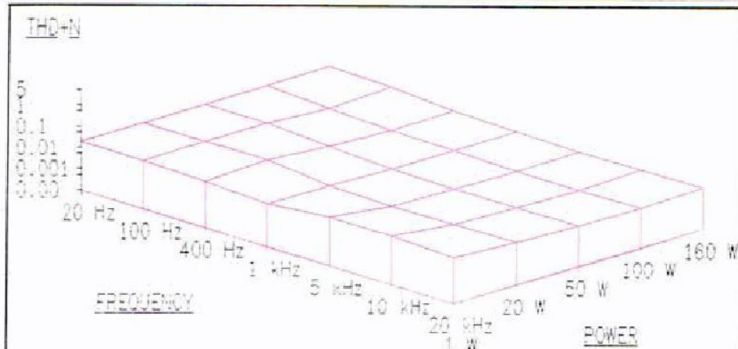


Fig. 7—THD + N vs. frequency vs. power level with 8-ohm load.

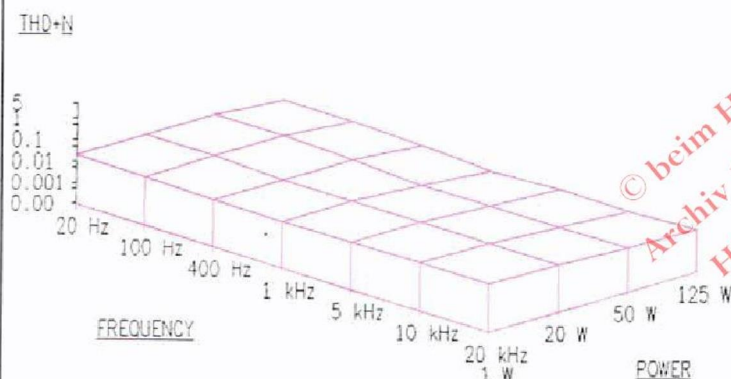


Fig. 8—Same as Fig. 7 but with 4-ohm load.

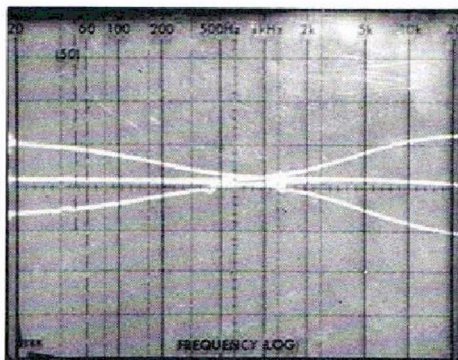


Fig. 9—Tone-control characteristics.

wide setting is not so wide that it introduces serious interference problems in crowded signal areas. In all likelihood, you will find, as I did, that you can leave the R-117 in its wide mode most of the time. This is what comes of intelligent choices of alternate-channel selectivity. I measured 52 dB in the wide mode and 80 dB in the narrow mode (against published figures of 50 and 75 dB, respectively).

As a further indication of this intelligent design, consider Figs. 5A and 5B. Here, a constant 5-kHz FM signal was used to modulate the left channel of my signal generator while the spectrum analyzer was swept linearly from 0 Hz to 50 kHz. The tall spike at the left of each photo and the shorter spike within it represent the desired 5-kHz output and the crosstalk of 5 kHz in the unmodulated channel. The only differences between results for the wide mode (Fig. 5A) and the narrow mode (Fig. 5B) are that the latter shows a slight decrease of separation and a very minor increase in harmonic distortion (represented by the height of the spikes just to the right of the 5-kHz spikes). Also evident in the narrow mode is a very slight increase in subcarrier sideband product output (represented by the two rightmost spikes in each photo).

Capture ratio in the wide i.f. mode measured 1.6 dB; in the narrow mode it was only 1.0 dB. AM rejection was superb, measuring a full 72 dB in the wide mode. Image and spurious-response rejection were both in excess of 100 dB.

In view of the better-than-average result for frequency response that I obtained for this receiver's AM section (−6 dB at 4 kHz, as shown in Fig. 6), I decided to make a few more AM measurements than I usually do. Usable sensitivity was a bit poorer than specified, 600 μ V/meter at 1 MHz. Signal-to-noise ratio, on the other hand, was better than that specified by Luxman, measuring 54 dB. THD was also much better than the published spec; my reading was 0.2% for a strong signal input with 30% modulation applied as against a claimed 0.5%. Selectivity measured 50 dB, and image rejection was about 48 dB.

Amplifier Measurements

The power amplifier section of the Luxman R-117 was as conservatively rated and designed as the tuner section. I was able to crank the amp up until it delivered 190 watts per channel of continuous power at 1 kHz into 8-ohm loads before THD reached the specified 0.03% level. With a 20-Hz signal applied, power output for rated THD was still way above the specified value of 160 watts; I measured an output of 180 watts per channel. Output was 185 watts per channel with a 20-kHz signal applied. Lowering the output to the specified 160 watts per channel, THD + N measured 0.008% at 1 kHz, 0.0085% at 20 kHz, and 0.02% at 20 Hz. SMPTE IM at rated output was only 0.015%, and CCIF (twin-tone) distortion was an insignificant 0.006%. Figure 7 shows how THD + N varied as a function of frequency and power output per channel into 8-ohm loads.

Although Luxman does not provide an FTC-type power output specification for 4-ohm loads, they do offer a clue as to what can be achieved by stating the expected dynamic power output. Accordingly, I simply increased input signal levels until the rated 8-ohm THD of 0.03% was reached at 4

In terms of quality, the R-117 is reminiscent of the separate preamps and amps that earned Luxman its initial high marks.

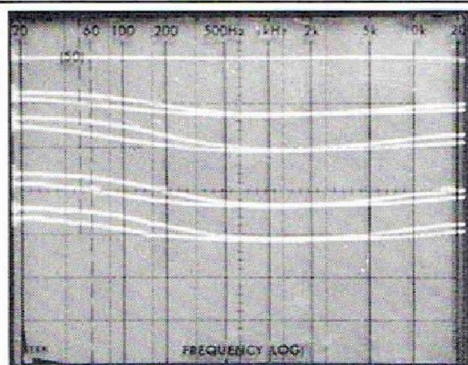


Fig. 10—Loudness-compensation characteristics. Note effects of two settings of the loudness switch.

ohms. This occurred when the amplifier was delivering 268 watts per channel at 1 kHz, 240 watts per channel at 20 Hz, and 248 watts per channel at 20 kHz. The plot of Fig. 8 shows how THD + N varied as a function of frequency and power output when 4-ohm loads were connected to the receiver.

Damping factor at 8 ohms, using a 50-Hz test signal, measured 125. Dynamic headroom was very high, thanks to the special supply-switching arrangement described earlier. I measured 4.5 dB of dynamic headroom at 8 ohms, which means that for short-term signal peaks, the amplifier can deliver as much as 450 watts per channel! While there was no reference power level against which to measure dynamic headroom at 4 or 2 ohms, I determined that the amplifier could actually deliver peak power levels of 680 and 800 watts per channel with such low impedances!

Frequency response through the high-level inputs was flat to within 1.0 dB from 13 Hz to 55 kHz and extended from 7.5 Hz to 150 kHz for the -3 dB roll-off points. With the subsonic filter turned on, the -3 dB point was 19 Hz. Phono sensitivity measured 0.35 mV for the MM inputs and 17 μ V for the MC inputs; both measurements were referenced to 1 watt output with the volume control set at maximum. High-level input sensitivity was around 12 mV for 1 watt output. Phono overload measured 170 mV in the MM setting and 15 mV in the MC mode. Equalization was very accurate, deviating from the RIAA playback curve by no more than 0.5 dB at the bass end of the spectrum.

My signal-to-noise readings differed from those specified by Luxman, but I think I know the reason why. Although Luxman did use an input reference signal of 5 mV (for phono) or 0.5 V (for the high-level inputs), I suspect that their output reference was rated power (160 watts at 8 ohms), whereas I measure S/N with respect to 1 watt output. There is no direct way to correlate the two readings, since it is not possible to determine whether most of the residual

noise originates ahead of the volume control or after it. In any case, using my method, the S/N numbers are certainly nothing for Luxman to be ashamed of: 78 dB for MM phono and 80 dB for the high-level inputs. With the volume control turned down to its minimum, I measured 86 dB below 1 watt, the residual noise of the power amplifier section. That last figure can be correlated to rated output, and the calculation results in an amp-section S/N reading of 108 dB referred to full rated output.

Figure 9 shows the full boost and cut range of the bass and treble tone controls, both of which can be fully bypassed if you wish. The sweep here (as well as for Fig. 10) is logarithmic, from 20 Hz to 20 kHz. The loudness contour traces shown in Fig. 10 are a bit different from those I usually obtain; each trace (except for the top one, which corresponds to maximum volume setting) really shows two response characteristics. These correspond to the two settings of the loudness control switch. In the owner's manual, Luxman suggests that the milder setting (less bass and treble boost at each correspondingly lower volume setting) be used for moderate listening levels, while the setting that yields somewhat more boost at the frequency extremes be used only at very low listening levels. This two-position arrangement, although certainly not as effective as a continuously variable independent loudness control, is nevertheless better than a simple "on/off" type of loudness control switch.

Use and Listening Tests

I spent much of my auditioning time with this receiver listening to FM broadcasts. In my area, the FM dial is fairly densely populated, but rarely am I able to receive more than 45 or so signals with sufficient quieting to justify listening to them. In the case of the Luxman R-117, the satisfactory station count rose to 51! (I would hasten to add that in these FM listening tests, I use a rotatable multi-element outdoor antenna.) Despite the fact that I was able to listen in the wide i.f. mode during most of my tests, I found that I was able to use the narrow setting without sacrificing much separation and without noticing any audible increase in distortion.

Most of the remainder of my listening experiments were conducted using recently acquired CDs, including a couple of Delos releases featuring Haydn symphonies and concertos (D/CD 3061 and 3062). Thanks to the Luxman's excellent electronics and to Delos' superb recording techniques, the sounds of cello and piano were truly magnificent, with dynamics and transient response that were almost indistinguishable, at times, from those of a live performance. For "bigger" sound, I played the two-disc Verdi *Requiem* recently released by Telarc (CD-80152). The clarity of the solo vocalists and the chorus, and the ease with which I was able to focus on specific voices against the full force of the Atlanta Symphony Orchestra, attest to the absence of dynamic distortion, which is not easily measured on the test bench.

All in all, Luxman has come up with an all-in-one receiver which, in terms of quality, is reminiscent of the separate amplifiers and preamplifiers for which the company earned its initial high marks.

Leonard Feldman