Equipment profiles

Luxman Model R-1120 Stereo AM/FM Receiver

MANUFACTURER'S SPECIFICATIONS
FM Tuner Section
Usable Sensitivity: Mono, 10.3 dBf (1.8 μV); Stereo, 17.2 dBf (4.0 μV).
50-dB Quieting: Mono, 14.1 dBf (2.8 μV); Stereo, 36.8 dBf (38 μV).
S/N: Mono, 74 dB; Stereo, 70 dB.
Selectivity: 80 dB.
THD: Mono, 0.1 per cent @ 100 Hz & 1 kHz, 0.2 per cent @ 6 kHz; Stereo, 0.2 per cent @ 100 Hz & 1 kHz, 0.4 per cent @ 6 kHz.
Frequency Response: 20 Hz to 15 kHz, +0.2 dB, −1.5 dB.
Capture Ratio: 1.3 dB.
Image Rejection: 80 dB.
I.f. Rejection: 85 dB.
AM Suppression: 55 dB.

When Lux Audio of America Ltd. first introduced the products of their parent company, Lux Corporation of Japan some three years ago they chose to do so with a line of high-end amplifiers, tuners, and preamplifiers which were designed for what was then deemed the ultimate in performance and quality. Lux Corporation, a 53-year old company by now, had for some time previously been marketing integrated receivers in other parts of the world in various price categories. It was only when they developed their latest receivers, about a year ago, that the company decided to sell them in the U.S., to complement the rest of their well-accepted line of audiophile products. Indeed, in an effort to get across the idea that these receivers are not just "me too" products, they have elected to call them tuner-amplifiers to convey the idea that their performance is as good as might be obtained from separate components.

All of the Lux receivers bear a family resemblance. Front panels are dominated by a large bronze-tinted dial area, the upper section of which is fitted with less often used controls and switches (all neatly camouflaged to avoid a cluttered look), while major controls are positioned on the light-colored lower section of the panel with ample physical separation between them. Upper, secondary controls include a Dolby FM switch (active only if one purchases the optional Dolby decoder board which plugs into an empty multiple-pin connector inside the chassis), a tape monitor switch (for up to two tape decks), tape-dubbing switch, mono/stereo mode switch, loudness switch, subsonic, low- and high-cut filter switches, power switch, and a sensitivity switch which governs the firing points of a series of LED power indicators located in the dial area (6 LEDs per channel, calibrated from −18 dB to 0 dB and responsive to power output peaks of from 120 mW to 120 W in two ranges).

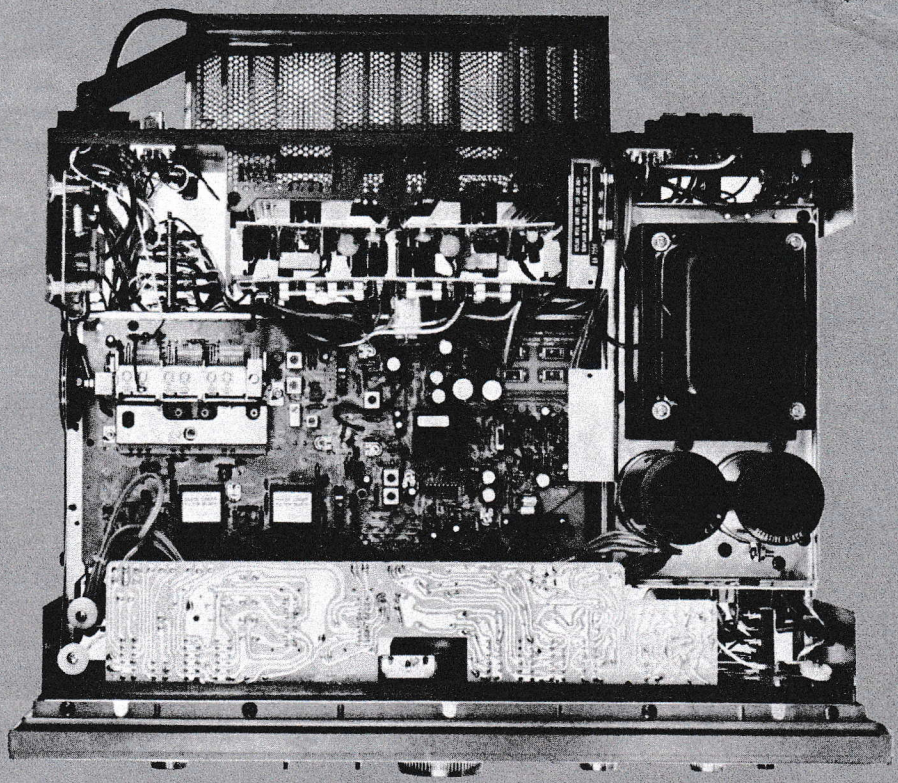
Linear FM and conventional AM frequency scales are positioned below these controls and are softly illuminated when power is applied. Below the dial scales, at the left, are indicator lights for Dolby and stereo FM plus illuminated signal-strength and center-of-channel meters. An additional LED serves as a power-on indicator and, when power is first applied, flashes intermittently until voltages have been stabilized, after which speakers are electrically connected to the output stages. This LED will also become illuminated if

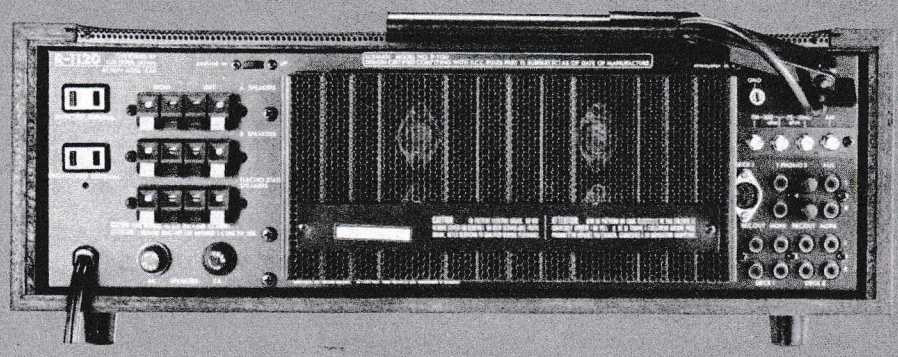
Stereo Separation: 45 dB @ 100 Hz, 48 dB @ 1 kHz, and 42 dB @ 6 kHz.
Sub-Carrier and SCA Rejection: 60 dB.

AM Tuner Section
Usable Sensitivity: Internal antenna, 200 μV/M.
S/N: 52 dB.
Image Rejection: 75 dB.
I.f. Rejection: 80 dB.
Selectivity: 32 dB.
THD: 0.5 per cent.

Amplifier Section
Power Output: 120 W/channel, 8 ohm loads, 20 Hz to 20 kHz.
Rated THD: 0.03 per cent.
Rated IM: 0.03 per cent.
Frequency Response: High level, 15 Hz to 60 kHz, −1 dB.
Input Sensitivity: Phono, 2.6 mV; High Level, 160 mV.
Phono Overload: 160 mV.
S/N: Phono, 72 dB (94 dB "A" weighted re: 10 mV input); High Level, 95 dB "A" weighted.
Treble Control Range: ±13 dB or ±8 dB @ 10 kHz (depending upon turnover setting).
Bass Control Range: ±11 dB or ±6 dB @ 100 Hz (depending upon turnover setting).
Filter Cut-off and Slope: Subsonic, 15 Hz, 12 dB/octave; Low, 70 Hz, 12 dB/octave; High Cut, 7 kHz, 12 dB/octave.

General Specifications
Power Consumption: 500 W @ rated output.
Dimensions: 19 5/16 in. (49 cm) W x 7 3/32 in. (18 cm) H x 16 21/32 in. (40.8 cm) D.
Weight: 37.4 lbs. (17 kg).
Price: $995.00.





the protection circuits of the amplifier section are activated for any reason.

Major controls include an input program selector (with two phono settings, AM, FM and AUX), bass and treble control knobs, which, when pulled outward provide alternate tone-control turnover frequencies, dual-concentric volume and balance controls, a speaker selector switch, headphone jack, and a centrally located, massive flywheel-coupled tuning knob.

The rear panel of the R-1120 is equipped with three sets of spring-loaded speaker terminals, two of which are for the connection of conventional speaker systems, while the third is specifically intended for use with electrostatic-speaker systems. Speaker-line fuses are located below the speaker terminals. To the right of the metal grille (which protects the output transistors mounted directly to protecting heat sinks) are four antenna terminals (for 75-ohm or 300-ohm FM, and external AM-antenna transmission lines), a chassis ground terminal, two sets of phono input jacks, AUX, tape-in and tape-out jacks, and a DIN multiple-pin connector which parallels the Tape-1 in and out jacks. An antenna-attenuator switch is also located in this section of the rear panel (for use when overly strong FM signals are received), as is a large AM ferrite-bar antenna which can be rotated away from the chassis for best reception.

A block diagram of the R-1120 circuit is shown in Fig. 1. The FM tuner section uses a four-gang tuning capacitor and a dual-gate MOS-FET r.f. stage in its front end. Linear-phase ceramic and block filters are used in the i.f. section to achieve sharp skirt selectivity while maintaining adequate bandwidth for low-distortion mono and stereo audio recovery. A quadrature detector/limiter circuit is incorporated in a single IC, and the composite audio signal recovered from this circuit is fed to an IC PLL decoder, followed in turn by an IC low-pass filter which suppresses subcarrier output. A modified form of AFC circuitry which Lux calls its "Closed Lock Loop Tuning System" locks in received signals but is limited to a locking range of only ±100 kHz to prevent "pulling" of adjacent strong-signal channels.

The AM tuner section of the R-1120 uses a three-gang tuning capacitor and an amplified form of AGC circuitry as well as a ceramic filter in its i.f. section.

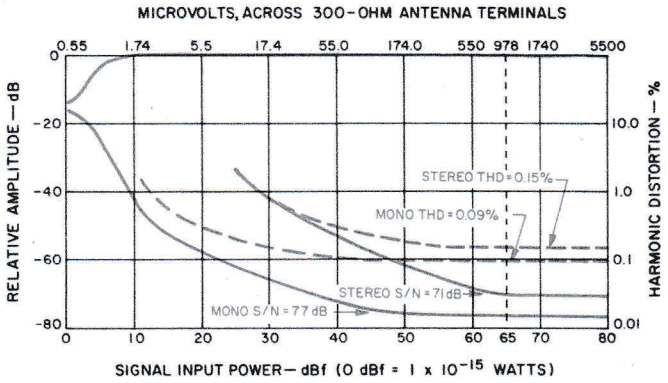


Fig. 2 — Mono and stereo quieting and distortion characteristics of the FM section.

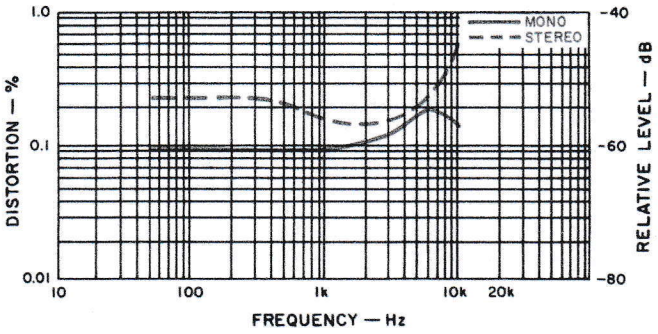


Fig. 3 — Distortion vs. frequency in the FM tuner section.

FM Tuner Section Measurements

Usable sensitivity in mono measured 10.3 dBf, exactly as claimed. In stereo, usable sensitivity was 22.1 dBf, being governed by the stereo switching threshold rather than by actual noise and distortion measurements (THD is down to 1.3 per cent by the time stereo mode is switched in automatically). The 50-dB quieting point required only 12.5 dBf of signal strength in mono and 36 dBf in stereo, both figures better than claimed by Lux. Best S/N in mono measured 77 dB, while for stereo the S/N for 65-dBf signal inputs was a high 71 dB. Harmonic distortion of 1 kHz measured 0.09 per cent in mono and 0.15 per cent in stereo, again exceeding published claims. All of these results are plotted graphically in Fig. 2, while in Fig. 3 we have plotted distortion versus frequency for both the mono and stereo modes.

Capture ratio measured 1.2 dB, while alternate channel selectivity was 83 dB. Image and i.f. rejection both measured 85 dB, and spurious response rejection was in excess of 90 dB. Sub-carrier and SCA rejection both measured in excess of 70 dB, exceeding published claims by far. There would be no need for an MPX filter on a tape deck when recording FM programs from this receiver. Muting threshold is ideally set at a level of 13.5 dBf. Frequency response for FM is plotted (including 75 microsecond de-emphasis) in Fig. 4, along with crosstalk into the undesired opposite stereo channel. Response was flat within −1.2 dB out to 15 kHz, and separation measured a high 51 dB at mid-frequencies, 48 dB at 100 Hz, and 38 dB at 10 kHz.

AM Section Performance

In response to many reader requests, we have begun to measure a few of the AM performance characteristics of stereo receivers. In the case of the Lux R-1120 (and nearly every other receiver we have tested recently), frequency response was not really something to rave about, as illustrated in the sweep-frequency display of Fig. 5. While other performance specifications such as S/N, THD, image, and i.f. rejection all met or exceeded their published ratings, Lux, like so many other receiver makers, chose to limit the bandwidth of the AM section with the results shown in Fig. 5. Perhaps the expected coming of stereo AM will prompt all manufacturers to take another look at their AM design philosophy. In the meanwhile, you'll have to search elsewhere if you want wide-response AM reception.

Amplifier and Control Section Measurements

The power amplifier section of the R-1120 is conservatively rated and delivered 150 watts per channel into 8-ohm loads at 1 kHz before the low rated THD of 0.03 per cent was reached. For a rated IM of 0.03 per cent, power output was even higher, with readings of 167 watts per channel, as shown in Fig. 6. Power bandwidth for rated output (120 watts per channel) extended from 15 Hz to just a bit over 20 kHz (extremes of frequency at which THD did not exceed 0.03 per cent), as illustrated in the graph of Fig. 7. Damping factor for the power amplifier section measured 52 at 50 Hz and referred to 8 ohms.

Phono input sensitivity measured 2.8 mV for rated output, and overload was a very high 250 mV (at 1 kHz), as against the 160 mV claimed by the manufacturer. Signal-to-noise in phono measured 78 dB ("A" weighted) referred to actual input sensitivity, which translates to 86 dB referred to a 10 mV input. RIAA equalization was accurate to within ±0.3 dB, while frequency response measured through the high level in-

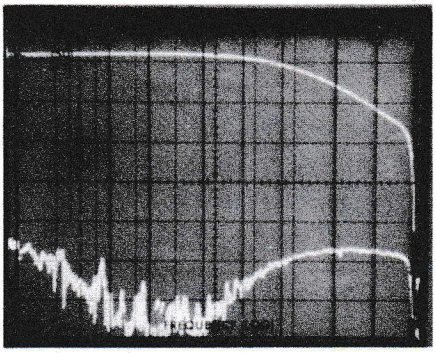


Fig. 4 — Frequency response and separation characteristics (including the 75 μS de-emphasis) of the tuner section. (Each vertical division in all 'scope photos is 10 dB per division.)

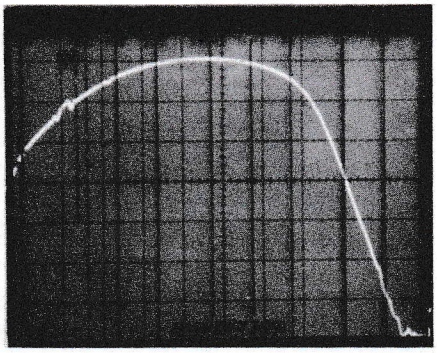


Fig. 5 — AM frequency response.

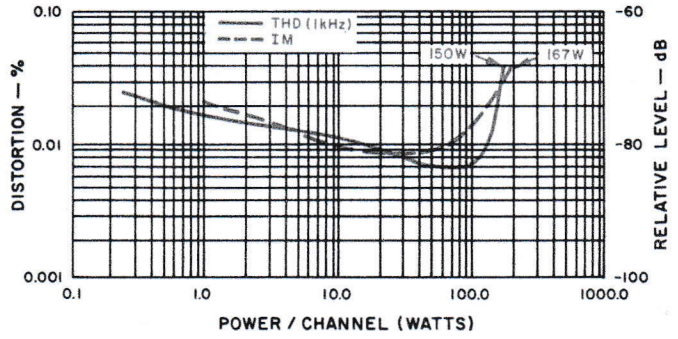


Fig. 6 — Distortion vs. power output.

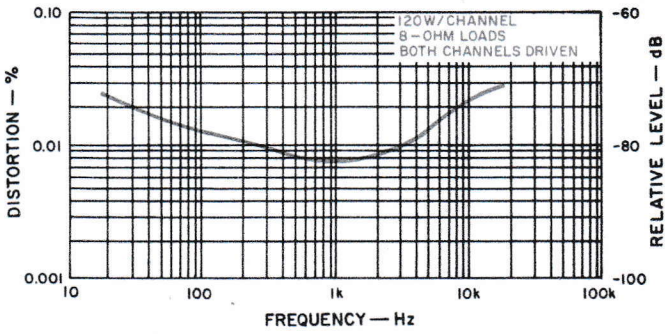


Fig. 7 — Distortion vs. frequency at rated output.

puts was flat from 4 Hz to 170 kHz for the −3 dB roll-off points (10 Hz to 65 kHz for a −1 dB roll-off). Hum and noise in high-level mode was 100 dB below rated output ("A" weighted), while residual noise was a bit lower still, with readings of 103 dB, "A" weighted.

Tone-control range with the bass and treble control knobs depressed (2 kHz and 400 Hz turnover) is plotted in the sweep-frequency 'scope photo of Fig. 8, while the range of control available with the alternate turnover settings (200 Hz and 4 kHz) is plotted in Fig. 9. The subsonic filter response was exactly −3 dB at 15 Hz as claimed but cannot be seen in Fig. 10, since the sweep rang in this presentation is from 20 Hz to 20 kHz. The alternate low-cut filter action as well as the high-cut filter response are clearly illustrated in Fig. 10, however, and exhibit their 12-dB/octave slope rates and specified cut-off points precisely.

Action of the loudness compensation circuitry is depicted in the multiple sweep 'scope photo of Fig. 11, and Lux chose to emphasize both bass and treble response in their loudness circuitry.

Use and Listening Tests

It has been often stated that bench measurements alone do not tell everything about an audio product. This is particularly true when it comes to products made by a few companies such as Lux. Certainly, this is not the most feature-laden receiver we have ever put through our lab, nor is it particularly "bargain priced." Yet, Lux seems to have the ability to produce product after product that just *sounds* better. This was particularly true of phono reproduction which was especially impressive when reproducing program sources having extreme musical transients. There was no hint of stridency at the high end and bass reproduction was tight and true. As for the FM tuner section, again, measured specifications do not tell the entire story. Certainly, there are tuners and receivers today which have lower measured distortion

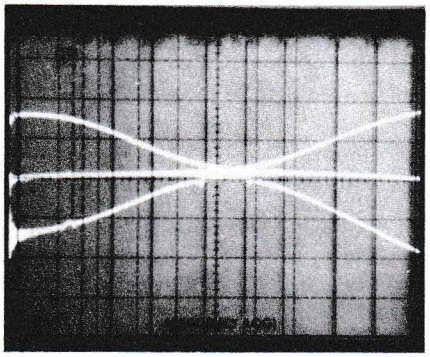


Fig. 8 — Bass and treble control range at the 400-Hz and 2-kHz turnover settings.

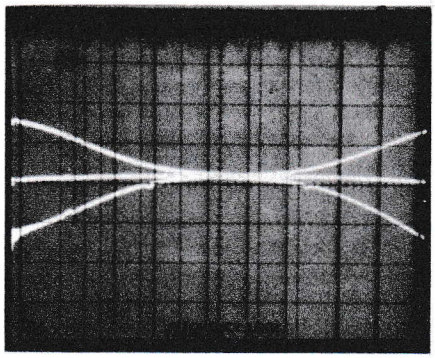


Fig. 9 — Bass and treble control range at the 200-Hz and 4-kHz turnover settings.

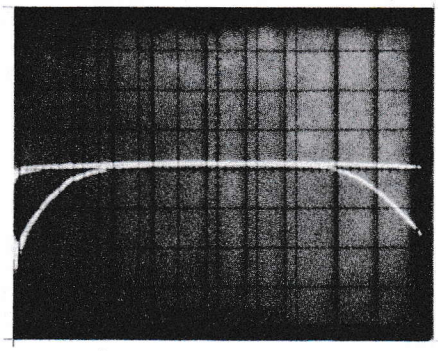


Fig. 10 — Low-cut and high-cut filter response.

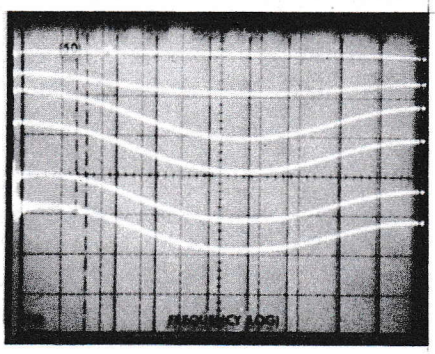


Fig. 11 — Loudness compensation, in 10 dB increments, of the volume control.

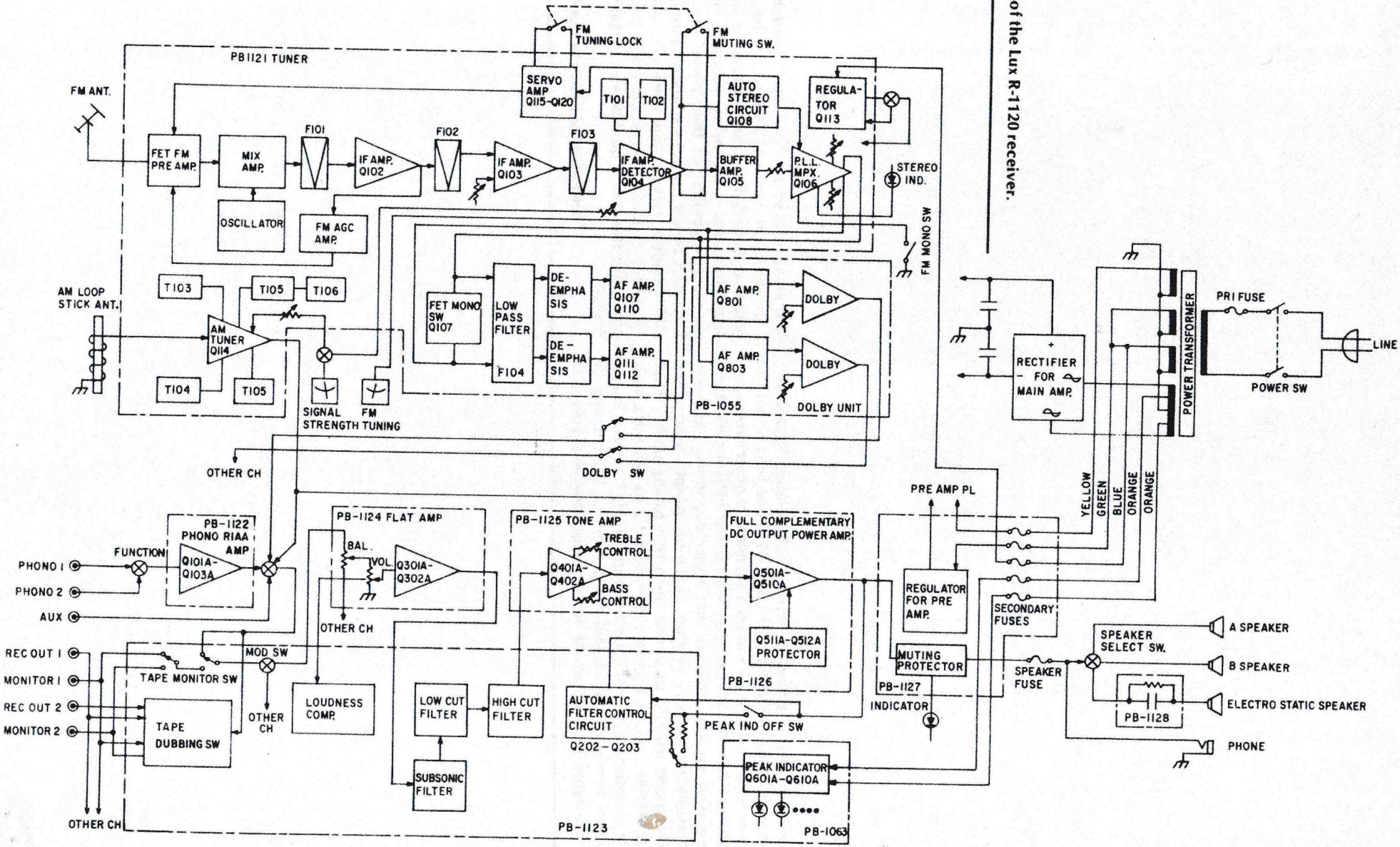


Fig. 1—
Block diagram of the Lux R-1120 receiver.

figures and even somewhat better 50-dB quieting figures, yet, when listening to FM over the Lux R-1120 one senses that the tuner is able to capture and hold signals that other tuners and receivers have trouble with (at least in our listening location) and it is equally obvious that tuner alignment has been carefully performed, so that center-of-channel indications correspond exactly to lowest distortion tuning points. Dial calibration, too, was perfect from 88 MHz to 108 MHz, and the inobtrusive "Closed Lock Loop Tuning" system keeps signals firmly locked yet did not prevent us from tuning to weak-signal stereo stations whose frequency was only 400 kHz away from some of our local "powerhouse" stations.

In short, the Lux R-1120 must not be judged on a simple watts-per-dollars basis but should be auditioned carefully and compared with other receivers in the same price category, regardless of their power output ratings. Its 120-watt plus power output capability should be ample for use with all but a few ultra-low sensitivity speakers and, speaking for ourselves at least, we would rather trade 3 or 4 dB of extra power for the sound quality and elegant design of the Lux R-1120.

Leonard Feldman

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