

Nakamichi Model 630 FM Tuner/Preamplifier



MANUFACTURER'S SPECIFICATIONS

Tuner Section

Usable Sensitivity: Mono, 2.5 μ V (13 dBf); 25 μ V (33 dBf).

50-dB Quieting: Mono, 5 μ V (19 dBf); Stereo, 50 μ V (39 dBf).

S/N: Mono, better than 70 dB, better than 75 dB w/Dolby; Stereo, better than 68 dB, better than 73 dB w/Dolby.

Selectivity: Wide, 40 dB; Narrow, 80 dB.

THD @ 1 kHz: Wide, 0.05 per cent mono, 0.08 per cent stereo; Narrow, 0.15 per cent mono, 0.5 per cent stereo.

Frequency Response: 50 Hz to 15 kHz, +0, -1.5 dB.

Capture Ratio: Wide, 1.0 dB.

Image Rejection: 100 dB.

I.F. Rejection: 100 dB.

Spurious Rejection: 100 dB.

AM Suppression: 60 dB.

SCA Suppression: 75 dB.

MPX Filter: -70 dB @ 19 kHz.

Stereo Separation: Wide, 50 dB @ 1 kHz, 35 dB @ 10 kHz; Narrow, 30 dB @ 1 kHz, 30 dB @ 10 kHz.

Tuner Output: 290 mV, 50% modulation.

Preamplifier Section

Rated Output: 1.0 V (0.2 V @ Rec. Out, 40 mW/8 ohms @ Headphone Out).

Max. Output at Clipping: 5 V (4 V @ Rec. Out, 300 mW @ Headphone Out).

Input Sensitivity: Phono, 1.0 2.0, or 5.0 mV (selectable); High Level, 100 mV.

Frequency Response: Phono, RIAA \pm 0.3 dB; High Level, 20 Hz to 50 kHz, +0, -1.5 dB.

S/N (IHF "A"): Phono, 80 dB re 1 mV in.; High Level, 102 dB.

THD: Less than 0.003 per cent.

Tone Control Range: \pm 9 dB @ 20 Hz and 20 kHz.

General Specifications

Dimensions: 16 in. (40.6 cm) W x 6 11/16 in. (17 cm) H x 9 5/16 in. (23.6 cm) D.

Weight: 15 1/2 lbs. (7 kg).

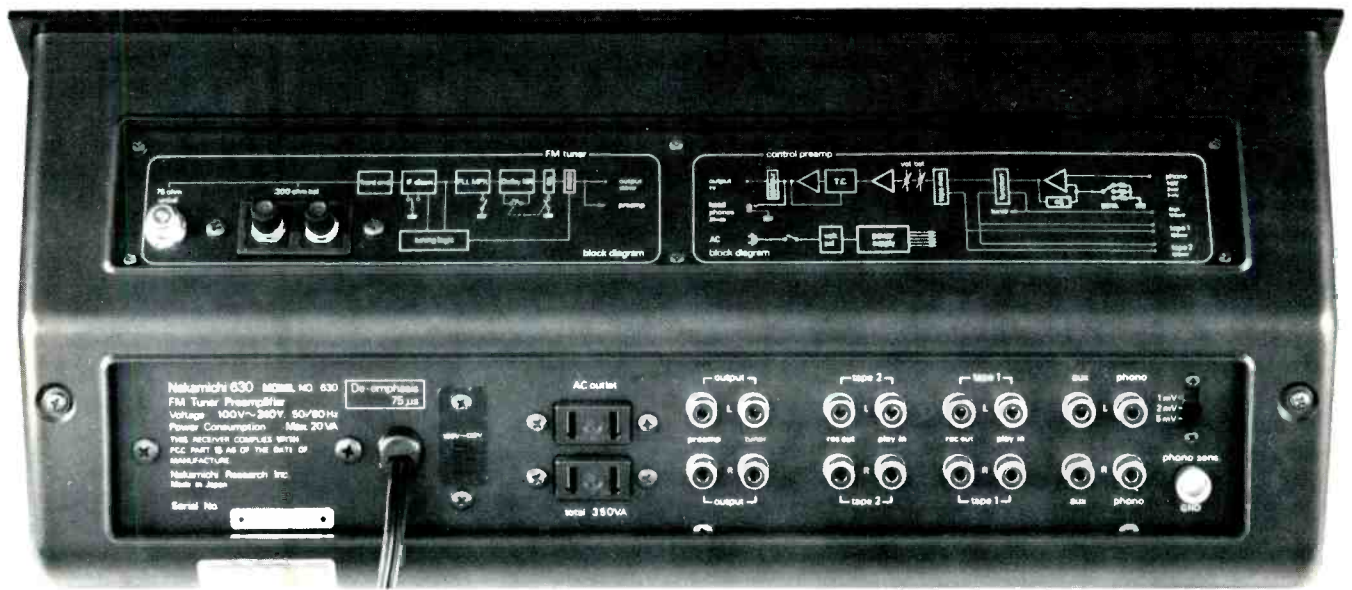
Price: \$630.00.

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If you are familiar with Nakamichi's attractive 600 series of components which, up till now have included their Model 600 sloped-front stereo cassette deck, their 610 pre-amplifier/control unit (which emphasized the particular needs of the serious recordist), and their trim-looking 620 power amplifier, the Model 630—newest unit in this component series—will come as no surprise. What is somewhat surprising is the fact that Nakamichi chose to include a high-quality preamplifier/control section in this their first tuner design. Although this tends to present a marketing redundancy of sorts (the owner of this tuner-preamp is not likely to opt for the 610 matching unit), Nakamichi reasons (rightly, we think) that this particular configuration offers the user a wide choice of power amplifier options (including their own new 420, their matching 620, or even a pair of 620s, which can be bridged for 350 watts per channel operation into 8 ohms) while maintaining reasonable dimensions, yet avoiding the pitfalls that, the company maintains, are always present in massive, high powered, all-in-one receivers. There are surprisingly few good tuner/preamps on

the market these days (this format was popular in earlier hi-fi times), and the Nakamichi 630 is a welcome addition to the roster.

The front panel of the 630 is different from any tuner we have ever seen. The dominating control is a large-diameter linearly calibrated (at every 200 kHz) tuning knob which is vernier-turned by a concentrically located inner knob. Action is every bit as smooth (if not smoother) than that obtained from the most carefully designed conventional fly-wheel/dial pointer/dial string arrangements. Above the tuning dial is an illuminated graticule, that points to the frequency selected, while above it are five LEDs. The central LED lights up when a signal is perfectly center-tuned, while the LEDs to either side of it denote direction of tuning to be employed when the dial is slightly off-tune. Another LED at the left lights up in the presence of a stereo signal, while the rightmost LED of this quintet illuminates in the presence of fairly strong (and hence, noise-free) signals of any kind. This multi-LED arrangement obviates the need for more conventional tuning meters and pointers. Five rotary controls at the



lower left of the panel include a master volume control, bass and treble tone controls, a balance control, and a contour control. The contour control, in combination with the master volume control, provides *true* loudness compensation facilities that can be used effectively regardless of the program source input levels, power amplifier gain, or loudspeaker efficiency. The combination is a welcome change from the "loudness switch/volume control" combination found on so much equipment which rarely, if ever, permits correct loudness compensation because of its arbitrarily established boost and taper characteristics. A headphone jack (driven by a built-in headphone amplifier) is also located in this lower left area of the panel.

At the upper left are a power On/Off pushbutton and two rows of six buttons each. Buttons in the upper row select phono, AUX, FM, Dolby noise reduction, FM muting, and wide or narrow i.f. circuitry. Lower row buttons take care of source or two tape monitor circuits, dubbing from either connected tape deck to the other, and mono (L+R)/stereo selection.

The rear surface of the 630 is actually two surfaces because of the sloped construction of the unit. Antenna connections

for 75- and 300-ohm antennas are located on the upper surface, along with a helpful block diagram which traces signal paths through the tuner/preamp. The lower surface contains a pair of switched power receptacles, two pairs of output jacks (one of which delivers output from the tuner section only, bypassing the preamp control section), two sets of tape-out and tape-in jacks, AUX and phono input jacks, a three-position slide switch which selects phono input sensitivity, and a chassis grounding terminal.

Circuit Highlights

As usual, Nakamichi has managed to assemble an enormous amount of high-quality circuitry within the small physical confines of the 630. The phono-preamp section utilizes a unique "triple transistor" first stage and class-A, push-pull, current-drive circuitry not unlike that used in their more elaborate Model 610 preamp/control unit. The high sensitivity of the phono input makes it suitable for direct use with several available higher-output moving coil cartridges without requiring the normal signal boosting transformer or pre-amp.

The front end of the 630 employs a five-gang linear vari-

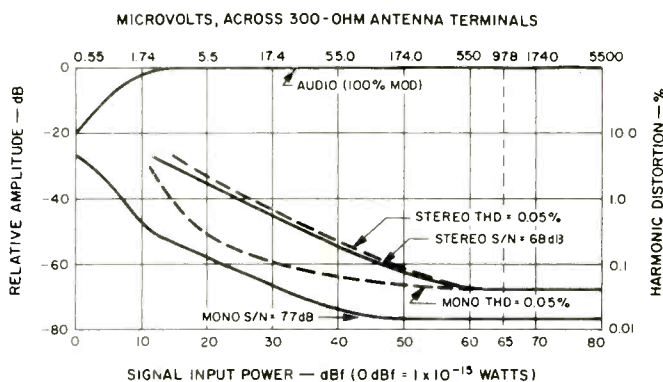


Fig. 1—Mono and stereo quieting and distortion characteristics for the FM section in the "Wide" i.f. mode without Dolby.

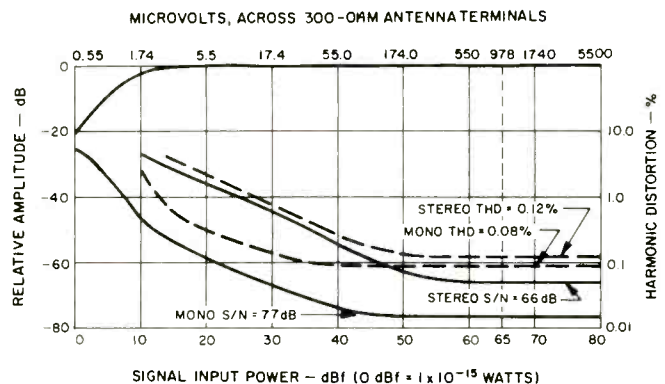


Fig. 2—Mono and stereo quieting and distortion characteristics in the "Narrow" i.f. mode without Dolby.

able capacitor, and all components are hand wired directly to the front-end chassis. Low-noise, dual-gate MOSFETs are used in the r.f. section. The i.f. section employs a six-element LC filter with linearized phase. The "narrow" i.f. filter position utilizes ceramic filters that also offer low phase shift. The entire i.f. section is fully shielded. The MPX section uses the familiar phase-lock-loop circuitry. A separate Dolby noise reduction circuit is included, and when that function is selected on the front panel, FM de-emphasis is automatically switched to the required 25 microseconds.

FM Performance Measurements

Considering the price of the 630, its FM tuner section offers unusually excellent performance. Usable sensitivity measured $1.8 \mu\text{V}$ in mono (10.3 dBf) and $3.5 \mu\text{V}$ in stereo (16.1 dBf). The 50-dB quieting point was reached with input signals of $2.6 \mu\text{V}$ (13.5 dBf) in mono and $35 \mu\text{V}$ (36.1 dBf) in stereo. Ultimate quieting in either the wide or narrow positions for mono was 77 dB, while in stereo, S/N was 68 dB in the wide i.f. position and 66 dB in the narrow setting. Distortion, using the wide setting, was an incredibly low 0.05 per cent in both mono and stereo for a 1 kHz, 100 per cent modulated signal, and even in the narrow position, THD was 0.08 per cent for mono and 0.12 per cent for stereo. These results are plotted graphically in Figs. 1 and 2. Distortion at other audio frequencies (in the wide-band position) are plotted in the curves of Fig. 3, and it should be noted that stereo THD is virtually identical to mono THD at all but the highest audio frequencies. At 6 kHz, (the highest reportable frequency for THD measurements according to the new IHF/IEEE Tuner Standards) THD was a mere 0.14 per cent with virtually no

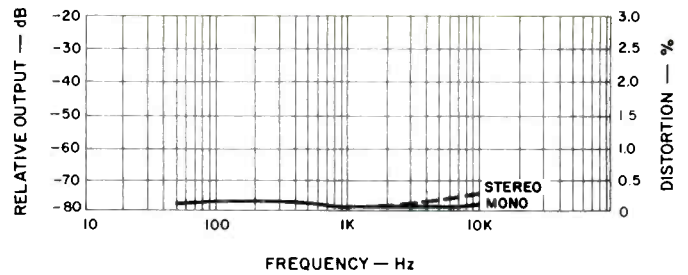
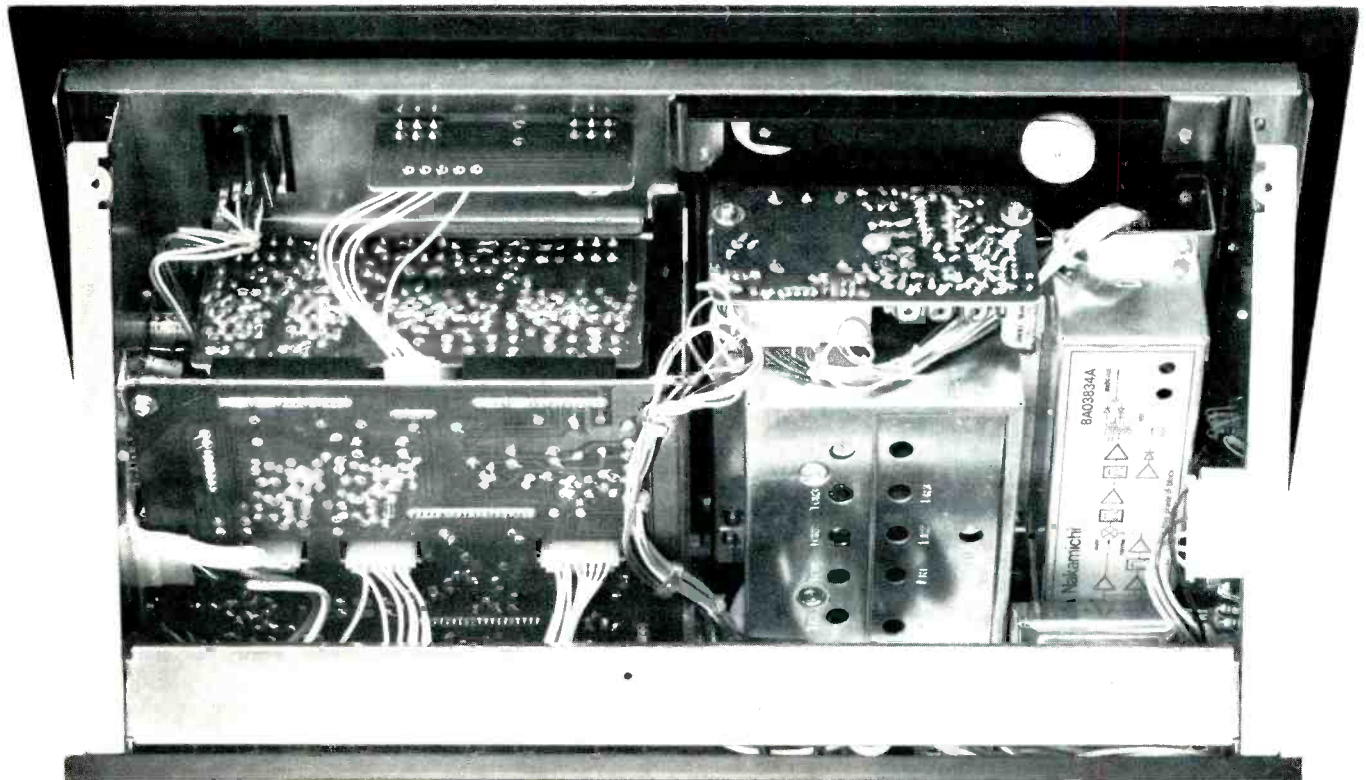


Fig. 3—Distortion vs. frequency in the "Wide" i.f. mode.

evidence of "beats." Switching to the narrow position, THD at this high audio frequency in stereo was still a very low 0.28 per cent. Spurious, image and i.f. rejection claims were all confirmed to at least 100 dB (the limit of our test facilities), while capture ratio measured 0.9 dB in the wide position. Whatever residual sub-carrier output products were present were buried "below the noise" and were indistinguishable, as such.

Figure 4 is a spectrum analyzer plot of the frequency response of the tuner section, in which the de-emphasis characteristics of 25 microseconds and 75 microseconds are displayed. Also evident, is the steep notch filtering which occurs at the 19-kHz point (sweep is from 20 Hz to 20 kHz).

Stereo separation versus modulating frequency is plotted for both the narrow and wideband i.f. positions in the 'scope photo of Fig. 5. As might be expected, results are a bit better at high frequencies using the wide position, but even in the narrow position, separation remained above 35 dB even at 10 kHz. Muting level was set on our sample to $10 \mu\text{V}$ (25.0 dBf)—a bit on the high side in view of the excellent



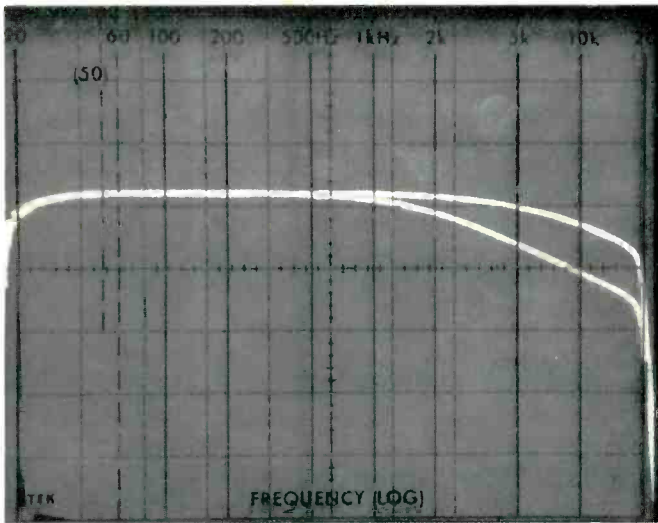


Fig. 4—Frequency response including the 25- and 75- μ s de-emphasis.

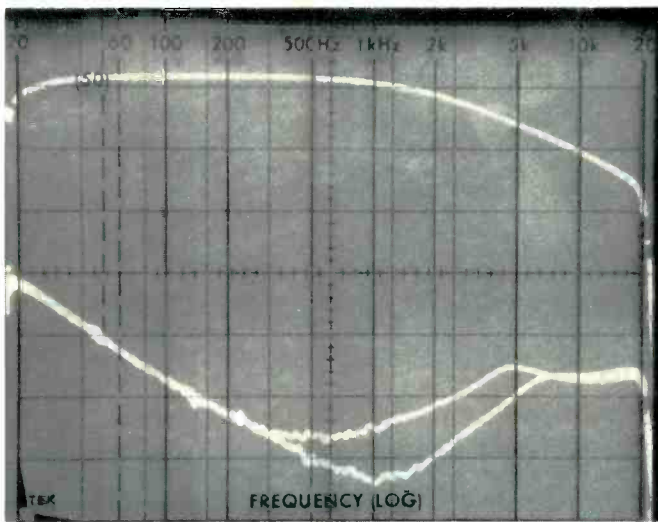


Fig. 5—Separation vs. frequency in both the "Wide" and "Narrow" i.f. positions. (Note that the unit's de-emphasis circuitry has not been compensated for.)

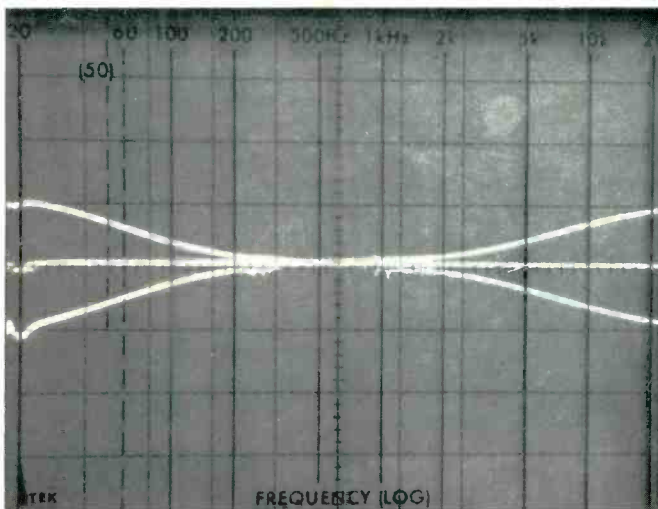


Fig. 6—Bass and treble control range of the Nakamichi 630.

quieting characteristics of the tuner. We were puzzled, too, by the fact that the "tuning" light (which indicates correct center-tuning) was effective only down to signal levels of 12 μ V (26.8 dBf), while the "signal" light required an input signal strength of 200 μ V or so before it became illuminated. Dial calibration was off by no more than 0.2 MHz from 88 to 108 MHz. Stereo signals can be received at signal levels down to below 1.0 μ V, though of course they are not usable at that signal strength.

Preamplifier Section Measurements

Available phono input sensitivities (for 1.0 volt out) measured 0.9, 1.9, and 4.6 mV, while input sensitivity at the high level inputs measured precisely 100 mV as claimed. Maximum output before clipping (at the main preamplifier output) measured 5.7 volts. RIAA equalization was accurate to within 0.2 dB from 30 Hz to 15 kHz, while frequency response, measured via the high level inputs, was flat to within 1.0 dB from below 10 Hz to 100 kHz. Phono overload (referred to the least sensitive phono input setting) measured 280 millivolts, while signal-to-noise in phono measured 75 dB (unweighted) and 81 dB (IHF "A" weighting). Range of bass and treble controls is plotted in the 'scope photo of Fig. 6. Tone control range is a bit more moderate than that found on most preamplifiers (a point in their favor, in our opinion), and, as can be clearly seen in the 'scope photo, hinge points for both the bass and treble action have been effectively set outside the critical mid-frequency region. THD measurements at both the phono and high level inputs were limited by the residual distortion of our signal generating equipment (approximately 0.002 per cent at 1 kHz).

Use and Listening Tests

The Nakamichi 630 is one of those audio components that invites auditioning. Its controls are smooth, effectively organized, and well engineered. Consider the contour control arrangement, for example. One simply sets the volume control for maximum desired loudness with a given program input, while the contour control is set fully clockwise, to "normal." Then, if lower level listening is desired, one simply reduces the setting of the contour control, without touching the volume control. Listening level is reduced while at the same time proper bass and treble emphasis are introduced for high-perfect Fletcher-Munson compensation. Makes a lot more sense than some of the other loudness compensation approaches we have seen!

As for FM reception, one can only appreciate the low distortion and signal-pulling capabilities of this tuner section when one is fortunate enough to receive signals that are worthy of the product. Tuning is effortless, positive, and stable, and we encountered absolutely no drift even after hours and hours of continuous listening. The "tuning" light offers indications that are fully as precise as those obtained with conventional center-of-channel tuning meters, and its illumination is confined to a narrow enough frequency spread to insure very-nearly lowest possible distortion so long as it remains lit. While the preamplifier section is not nearly as flexible as the separate Model 610, its audible performance cannot be faulted in any way. Furthermore, the available "tuner output" jacks permit direct connection to a tape deck or to another preamplifier if one should desire to purchase the 630 and the 610 because of its added recording flexibility. Considered as a tuner alone, the Nakamichi 630 is well worth its asking price. When one considers that it also contains a complete preamplifier control section, its value is even further enhanced.

Leonard Feldman

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