EQUIPMENT PROFILE

NAD 7130 RECEIVER

Manufacturer's Specifications

FM Tuner Section

Usable Sensitivity: Mono, 10.3 dBf.
50-dB Quieting Sensitivity: Mono, 14.2 dBf; stereo, 34.2 dBf.
S/N: Mono, 82 dB; stereo, 75 dB.
THD: Mono, 0.09% at 1 kHz, 0.2% at 100 Hz and 6 kHz; stereo, 0.09% at 1 kHz, 0.3% at 100 Hz and 6 kHz.
Frequency Response: 30 Hz to 15 kHz, ±0.5 dB.
Capture Ratio: Less than 1.5 dB.
Image Rejection: 75 dB.
Selectivity: 70 dB.
I.f. Rejection: 75 dB.
SCA Rejection: 70 dB.
Subcarrier Suppression: 60 dB.
AM Rejection: Greater than 62 dB.
Stereo Separation: 50 dB at 1 kHz, 40 dB at 100 Hz and 10 kHz.

AM Tuner Section

Usable Sensitivity: 300 μV/meter.
Selectivity: 35 dB.
Image Rejection: 50 dB.
I.f. Rejection: 50 dB.

Amplifier Section

Power Output: 30 watts per channel, continuous, into 8-ohm loads, 20 Hz to 20 kHz; clipping power at 8 ohms, 1 kHz, 45 watts per channel; clipping power at 4 ohms, 1 kHz, 48 watts per channel.
Rated THD: 0.03%.
SMPTE IM: Less than 0.03%.
IHF IM: Less than 0.03%.
Dynamic Headroom: 3.0 dB at 8 ohms.
Damping Factor: Greater than 50.
Slew Rate: 15 V/μS.
Slew Factor: Greater than 50.
Input Sensitivity: MM phono, 0.45 mV; MC phono, 0.04 mV; high level, 26 mV.
Phono Overload: MM, 170 mV at 1 kHz; MC, 18 mV at 1 kHz.
S/N: MM phono, 76 dB; MC phono, 70 dB; high level, 85 dB.
Frequency Response: Phono, RIAA ±0.5 dB; high level, 20 Hz to 20 kHz, ±0.5 dB.
Tone Control Range: Bass, ±7 dB at 100 Hz; treble, ±7 dB at 10 kHz.
Bass EQ: +3 dB at 60 Hz; +6 dB at 33 Hz.
Infrasonic Filter: −3 dB at 15 Hz.
Audio Muting: −20 dB.

General Specifications

Power Consumption: 150 watts.
Dimensions: 16.5 in. W × 4.25 in. H × 15 in. D (42 cm × 10.8 cm × 38 cm).
Weight: 17 lbs., 9 oz. (8 kg).
Price: $348.
Company Address: 675 Canton St., Norwood, Mass. 02062.
For literature, circle No. 92

NAD has done it again. I have always been amazed at the amount of honest performance that this company crams into its modestly priced components, and the 7130 is another example of that. NAD products have never stressed outward appearance, and, while the 7130 is a bit more stylish-looking than earlier NAD products, it still steers clear of fancy, shiny front-panel layouts and superfluous switches and knobs. The really impressive features are inside. For instance, the power amplifier section has a high-current output stage which delivers unusually high short-term power, far higher than the nominal 30-watt-per-channel rating would suggest. This high-current design also helps when the amp section is driving speaker systems whose impedances drop well below 4 ohms. The amplifier also has an impedance switch which actually alters supply voltage, to optimally interface with either 8-ohm or lower impedance speaker loads. Another interesting feature of this amplifier is a soft-clipping circuit, which permits listening levels to go beyond the rated power or even the standard dynamic headroom limits without subjecting the listener to the hard clipping characteristic of most solid-state power amplifiers.

The 7130's tuner section uses a dual-gate MOS-FET front end followed by a three-section, linear-phase i.f. circuit and a balanced quadrature detector. For signals weak enough to need additional quieting, NAD's useful Dynamic Separation cancels the out-of-phase portion of the high-frequency noise by selectively blending the highs. The discrete-transistor phono-preamplifier circuit can handle either moving-magnet or moving-coil cartridges; a rear-panel switch selects the proper gain and impedance for either type of cartridge.

If I have any quarrel at all with NAD and their claims for the 7130, it has to do with their description of the unit itself. They call the 7130 a "Digital" AM/FM stereo receiver. Presumably, this is in reference to the high-level input, which is now labelled "CD" instead of "AUX," but which is actually no different from any other high-level input pair. I had thought that NAD was beyond such hype.

Control Layout

The upper section of the NAD 7130's front panel is devoted to the tuner section. A display shows the frequencies as well as the band (AM or FM) in use. Also in the display is an indicator showing whether tuning is correct, flanked by arrows showing which way to tune if you're not directly on the station. Nearby are the "FM Stereo" and "Soft Clipping" indicator lights, as well as the five station preset buttons, which memorize one AM and one FM station apiece. An "Enter" button and an "AM/FM" selector button are in the same row. An up/down tuning bar at the upper right of the panel normally tunes in single 50-kHz or 10-kHz steps. However, the tuning bar can be used to seek the next FM station up or down the band, if the "FM Search" button just below it is pressed. (The search function does not work on AM.) Touching the "Enter" button while pressing the tuning bar increases the tuning or searching speed by a factor of about five.

The on/off switch is at the extreme left of the panel, and just below it is a stereo headphone jack. A four-position rotary speaker switch and the bass and treble tone controls

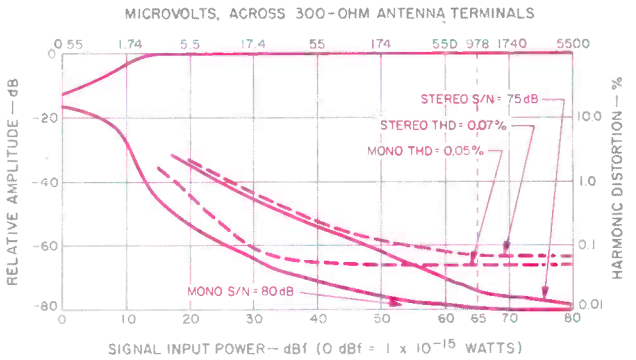

Fig. 1—Mono and stereo quieting and distortion characteristics, FM section.

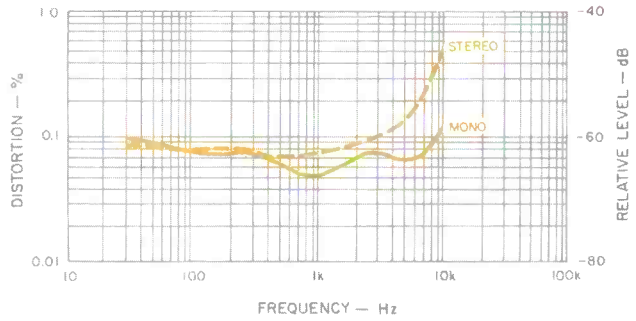

Fig. 2—THD vs. frequency, FM section.

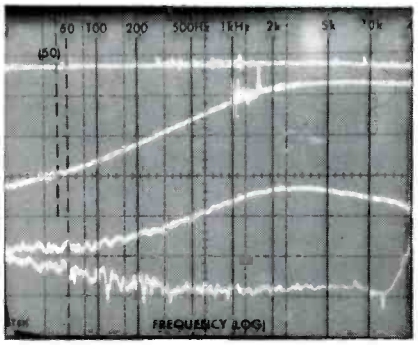

Fig. 3—Frequency response, FM section (upper trace), and separation vs. frequency. For strong signals, Dynamic Separation circuit does not affect separation (bottom trace), but as signal levels fall the circuit reduces separation, primarily in the treble (second curve from bottom) but eventually somewhat at low and mid-frequencies too (second curve from top, for 20-dBf r.f. input signal).

The FM tuner section was, in many ways, as good as separate tuners costing as much as, or more than, this entire receiver.

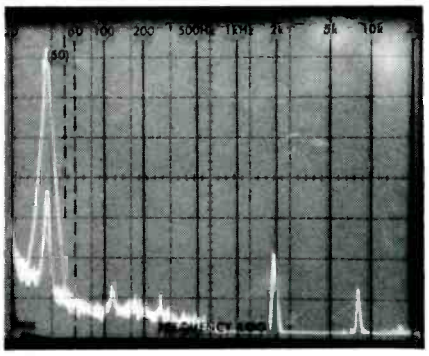

Fig. 4— Crosstalk and distortion products resulting from 5-kHz modulation in one channel.

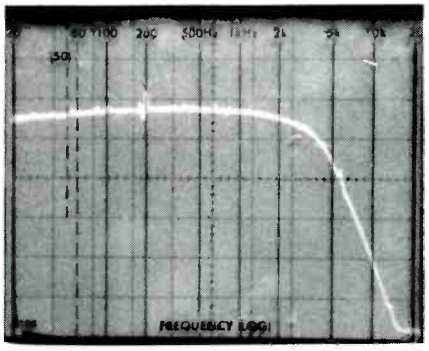

Fig. 5— Frequency response, AM tuner section.

are located along the lower edge of the panel, as are a rotary selector switch and dual-concentric master volume and balance controls. Secondary functions are controlled by additional small pushbuttons. These include the "Bass EQ" switch (which introduces a moderate amount of fixed boost in the lower bass region), an infrasonic-filter defeat button, a mono/stereo selector, and the Dynamic Separation defeat button. A "Tape Monitor" switch, a muting switch (labelled "Low Level" just to be a bit different) and a "Loudness Comp" switch complete the front-panel layout.

The rear panel has the usual array of input and tape output terminals, two sets of speaker-cable binding posts, 75-ohm and 300-ohm FM antenna input terminals, a pivotable AM rod antenna, a chassis ground terminal, and two a.c. convenience outlets (one switched, the other unswitched). In addition, there are three slide switches. The first of these selects MM or MC operation of the phono preamplifier circuitry, a second turns the "soft clipping" circuit on and off, and the third optimizes the amp section's output impedance and power supply for 8- or 4-ohm loads.

Tuner Measurements

The 7130's tuner section performed, in many respects, as well as separate tuners costing as much as or more than this entire receiver. Usable sensitivity measured 11.0 dBf in mono and 16.5 dBf in stereo. The 50-dB quieting point was reached with a signal input of 17 dBf in mono and 35 dBf in stereo. Best signal-to-noise ratio, with strong-signal inputs, was 80 dB in mono and almost as great—79 dB—in stereo. The high S/N reading in stereo was obtained with an 80-dBf signal, but even at the standard 65-dBf signal level, the stereo S/N was still an impressive 75 dB. Quieting characteristics of the FM tuner section are shown in Fig. 1, along with plots of harmonic distortion as a function of input-signal strength. THD for mono reached a low of 0.05% with strong signals applied; in stereo, THD measured 0.07%. Both readings were taken with a 1-kHz modulating signal.

Figure 2 shows how harmonic distortion varies with modulating frequencies for both mono and stereo operation of the tuner section. In mono or stereo, THD measured 0.075% at 100 Hz. At 6 kHz, mono THD was 0.07% and stereo THD measured 0.16%.

The action of the Dynamic Separation circuit is depicted in the frequency-response and separation curves of Fig. 3. The top trace in the 'scope photo shows a virtually flat frequency response for the output of one channel that was being modulated with a sweep signal from 20 Hz to 20 kHz. Deviation from flat response was −0.4 dB at 15 kHz. The lower three curves show separation versus frequency for three signal levels, with Dynamic Separation turned on. The lowest of these shows separation with strong input signals; I measured 55 dB at mid-frequencies, a very high 50 dB at 100 Hz, and 46 dB at 10 kHz. At progressively reduced signal strengths, high-frequency separation is reduced so as to cancel the increased noise which would otherwise interfere with enjoyment of the program; to a lesser degree, mid-frequency and low-frequency separation is also reduced. The trace showing most of this high blend was obtained at a signal strength of only about 20 dBf, just above the stereo-switching threshold, which I measured as being 16 dBf.

Figure 4 shows the results of my usual spectrum analysis of the distortion and crosstalk products resulting when a 5-kHz signal modulates one channel of the FM signal. The tall spike at the left is the desired 5-kHz output; contained within it is the 5-kHz signal seen at the unmodulated channel's output. To the right are very small harmonic-distortion components observed at the unmodulated channel's output, as well as a couple of spurious but inaudible output components related to the 19-kHz pilot signal and the 38-kHz suppressed carrier signal. All of these unwanted signal outputs are at far lower amplitudes than I would expect with a tuner or receiver in this price range.

Capture ratio for the FM tuner section measured 1.3 dB, while alternate-channel selectivity was 73 dB, slightly higher than claimed. Image and i.f. rejection each measured 75 dB, exactly as stated by NAD, while AM rejection measured 60 dB, a bit lower than claimed.

Figure 5 shows the frequency response of the AM tuner section. Even here, performance was better than I would have expected from such a moderately priced receiver. Usable output from the AM tuner extended to 5 kHz and beyond; this may not seem great in high-fidelity terms, but it is a higher cutoff frequency than that exhibited by the AM sections of many other tuners and receivers.

The power amp section produced 35 to 48 watts of continuous power with 8-ohm loads, substantially more than its rating.

Amplifier Measurements

The power amplifier section of the NAD 7130 produced substantially more than its rated continuous power. With 8-ohm loads, the amplifier could deliver 48 watts of power at mid and high frequencies, and 35 watts at 20 Hz. NAD has always designed its power supplies so that, under short-term conditions, its amplifiers can deliver far more than their continuous power ratings. The 7130 is no exception in this respect. I measured a dynamic headroom of exactly 3 dB, as claimed, which translates to short-term power peaks of 60 watts per channel, even with both channels driven. If you take into account the fact that, under real-world conditions, both channels are not usually called upon to deliver equal peaks simultaneously, the effective dynamic headroom may be even a bit higher than 3 dB. Table I presents the 7130's amplifier power output as a function of harmonic distortion and input-signal frequency.

Switching to 4-ohm loads, the amplifier delivered 49 watts at mid-frequencies and 42.5 watts at 20 Hz. At lower impedances, all attempts to measure continuous power output were thwarted by the protection circuitry. Nevertheless, short-term power with 2-ohm loads exceeded 80 watts per channel! Damping factor, referred to 8-ohm loads, measured 55, somewhat higher than specified. I measured CCIF (twin-tone) IM distortion as an insignificant 0.0033%, and IHF IM was well below my ability to read it on the spectrum analyzer, which means it was also well below the 0.03% claimed by NAD.

Figure 6 shows the range and characteristics of the bass and treble tone controls of this receiver. The controls' turnover points have been set so that even when maximum boost or cut is applied the critical mid-frequency response is barely altered. Action of the loudness-compensation circuitry (Fig. 7) is typical of this type of fixed loudness control. The response of the "Bass EQ" circuit is a bit more interesting (Fig. 8). The boost action is enough to help speaker systems which tend to roll off at around 45 Hz, but it turns around quickly and is not a factor at subsonic frequencies, where it would otherwise accentuate turntable rumble or other interference. If problems still occur in the infrasonic region, there is always the switchable infrasonic filter, which rolls-off anything below 15 Hz.

RIAA equalization was accurate to within 0.4 dB all the way down to 20 Hz. Overall frequency response via the high-level inputs was flat within 1 dB from 18 Hz to 30 Hz, and within 3 dB from 15 Hz to 40 kHz. Sensitivity of the high-level inputs measured 24 mV for 1 watt output. For the moving-magnet phono input, 0.45 mV at 1 kHz was required to produce an overall output of 1 watt. At the moving-coil inputs, sensitivity for 1 watt measured 0.04 mV.

Signal-to-noise ratio for the high-level inputs, referred to 0.5 V input and 1 watt output, measured a very high 91 dB, while residual hum and noise with the volume control at its

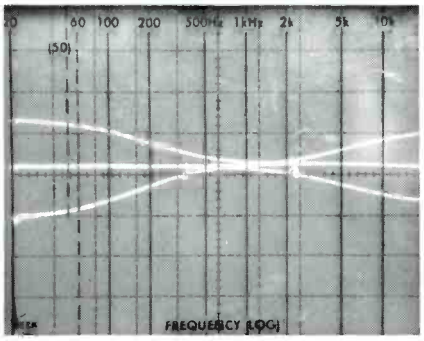

Fig. 6—Range of bass and treble controls.

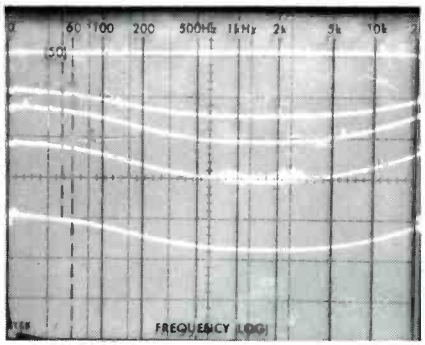

Fig. 7—Loudness-control response at various settings of volume control.

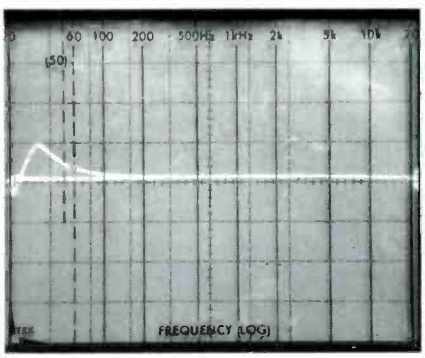

Fig. 8—"Bass EQ" circuit response, compared to flat response.

Table I—Power output per channel vs. THD, at six test frequencies and with an 8-ohm load. Note that this nominally 30-watt receiver was able to achieve 48 watts at middle and high frequencies, but could not do the same at 20 or 50 Hz.

	THD, %					
Power, Watts	20 Hz	50 Hz	400 Hz	1 kHz	5 kHz	20 kHz
1	0.030	0.028	0.015	0.015	0.016	0.020
10	0.025	0.022	0.010	0.012	0.023	0.028
30	0.028	0.027	0.022	0.022	0.028	0.030
48			0.030	0.030	0.035	0.030

I suspect this receiver will find its way into quite a few modestly priced audio systems, and I doubt it will ever be called the limiting factor.

minimum setting was 94 dB below 1 watt output. S/N of the phono preamplifier was even more impressive, compared to the results I usually get. In the MM setting, I measured a signal-to-noise ratio of 87 dB for the phono inputs, using a 5-mV input and adjusting the volume control for 1 watt output. Switching to the MC mode and adjusting the input level to 0.5 mV, with the volume control again set for 1 watt output, the S/N reading was still a very high 81 dB.

Use and Listening Tests

NAD continues to amaze me. These highly reputed products remind me of ugly ducklings that turn out to be swans. The front panel of the 7130 receiver is almost painfully plain. No fancy knobs, no fancy, etched nomenclature, no futuristic panel shapes or slopes, no three-dimensional effects. But beneath that plain exterior lurks superb sound-reproduction capabilities at a price that seems hard to believe. Equally hard to believe is the rather low continuous power rating of the receiver. My KEF 105.2 reference loudspeakers soak up a great deal of power, yet even those low-efficiency speakers delivered respectable levels of sound when driven by the NAD 7130. Not ear-shattering, you understand, but much louder than I would have expected before overload distortion of the amplifier was detected. It's the high dynamic headroom that makes the difference here. I know that there are some purists who will argue against the "soft" power supplies that make high dynamic headroom possible. Indeed, if we were dealing with a high-powered basic power amp or perhaps even a high-powered integrated amp I might agree that a stiff power supply makes some sense. But when you are trying to deliver the greatest sonic bang for the buck—something NAD does extremely well—anything you can do to keep a component's price down while at the same time keeping its sound quality (and quantity) up is worth doing.

I played everything, from some of my latest CDs to older LPs and cassettes, through the NAD 7130. I connected the receiver to a pair of B & W LM1s that I keep in my office and normally drive from a low-powered set of components. I also drove an old (but efficient) pair of Koss CM-1010 speakers with the receiver to see how the unit would behave with more efficient, vented enclosures. Finally, I hooked this little receiver up to a pair of floor-standing B & W Model DM3000s. The receiver behaved well in all of these circumstances, adapting itself to all of these loads without apparent difficulty. Indeed, adaptability seems to be one of the best characteristics of this little receiver. That's just as well, for I suspect that it will find its way into quite a few modestly priced systems, the speaker component of which could be almost anything. In such systems, I doubt that the NAD 7130 will ever be accused of being the "limiting factor."

Leonard Feldman