Equipment profiles

Pioneer Model SX-1980 Stereo AM/FM Receiver

MANUFACTURER'S SPECIFICATIONS

FM Tuner Section

Mono Usable Sensitivity: 8.7 dBf (1.5 μV).
50-dB Quieting: Mono, 11.5 dBf (2.2 μV); Stereo, 36 dBf (34 μV).
S/N: Mono, 83 dB, stereo, 74 dB.
THD: Mono, 0.05 per cent @ 100 Hz, 0.07 per cent @ 1 kHz, and 0.2 per cent @ 6 kHz; Stereo, 0.1 per cent @ 100 Hz, and 1 kHz, and 0.2 per cent @ 6 kHz.
Frequency Response: 30 Hz to 15 kHz, +0.2, −0.5 dB.
Capture Ratio: 1.0 dB.
Selectivity: 80 dB.
Image and i.f. Rejection: 120 dB.

When the Pioneer SX-1980 first reached our test laboratory, it had the distinction of being the "world's most powerful receiver." Almost before we could unpack it and get it up on the bench, that title passed on to Technics by Panasonic who now offers a 330-watt-per-channel receiver and, it is entirely possible that by the time you read this, someone will have surpassed that power level in an all-in-one receiver.

If high power alone were all that this receiver boasted, we would probably not be writing and publishing this report. In fact, the Pioneer SX-1980 is an exceedingly well-designed unit that offers just about every conceivable control feature that you might want even if you were shopping for "separates." And, while it is quite large and heavy, the cubic volume it occupies is probably a good deal less than would be the case if you purchased separates that performed as well. In terms of cost, the truism about better cost/performance ratios holds true for this receiver (as compared with separates) despite its huge power output capability.

Major controls along the lower section of the front panel include nine toggle switches and six rotary knobs. Four of these knobs take care of bass and treble settings. As in previous Pioneer receivers, main and sub-bass and treble controls are provided, each pair having different turnover frequencies for an almost limitless combination of tonal settings. A small channel balance control is located at the lower right, next to a large dB-calibrated, step-detented, master volume control. The nine toggle switches are a power *On/Off* switch, *Tone Defeat*, *Tape Duplicate and Monitor*, *Stereo/Mono*, *Loudness*, and *Audio Muting*.

Above these controls and switches, framed in the large dial area of the panel, are a row of 13 pushbuttons, two rotary switches, a phone jack at the left, and a microphone input jack at the extreme right. The two rotary switches offer variable phono-1 cartridge loading (providing resistive choices from 10 to 100 kilohms and capacitive loading choices from 100 to 400 pF). Three of the pushbuttons choose up to two of the three sets of speakers which can be connected to the receiver. The next two buttons activate the low-and high-cut filters. Three more buttons provide an audible indication of multipath problems, 25 or 75 microsecond de-emphasis, and muting defeat. Five more buttons select desired program source. Of the two phono inputs available, one can be used as an alternate microphone input.

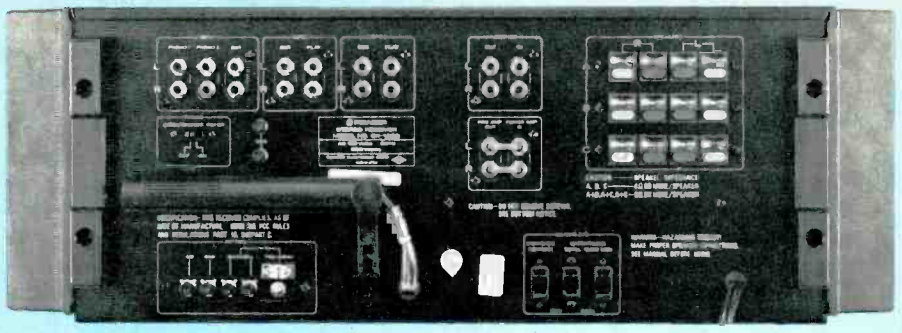
Below the dial scales themselves are four movable "indexing tabs" which can be positioned for easy referencing of favorite stations. Above the linearly calibrated FM dial scale and the AM dial scale are four meters, two for center-of-channel and signal-strength indication and two for monitoring power delivered to the speaker loads. Above the tuning meters are speaker and program-source indicator lights, while to the right are the stereo indicator light, a light that tells the user to "fine tune" the signal, and another light which illuminates when the signal has been properly tuned in and is "quartz locked" by this tuning feature which is associat-

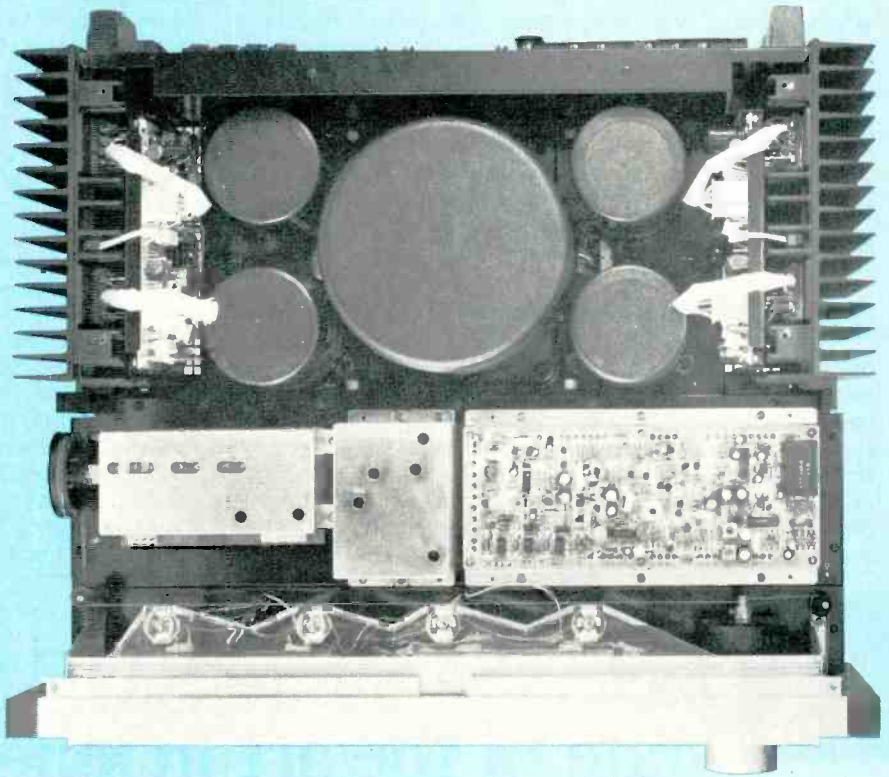
AM Suppression: 60 dB.
Muting Threshold: 19.2 dBf (5 μV).
Sub-Carrier and SCA Rejection: 65 dB.
Stereo Separation: 50 dB @ 1 kHz; 40 dB, 30 Hz to 15 kHz.

AM Tuner Section
Sensitivity: 300 μV/m internal, 15 μV external antenna.
Selectivity: 26 dB.
S/N: 55 dB.
Image & i.f. Rejection: 55 dB.

Amplifier Section
Power Output: 270 watts per channel, 8 ohms, 20 Hz to 20 kHz.
Rated THD: 0.03 percent.
Rated IMD: 0.03 percent.
DaFping Factor: 40.
Input Sensitivity (for rated output): Phono, 2.5 mV; High Level, 150 mV; Mike, 7.5 mV.
S/N "A" weighted: Phono, 87 dB; High Level, 100 dB.
Tone Control Range: Main Bass, ± 10 dB @ 100 Hz; Sub-Bass, ±5 dB @ 50 Hz; Main Treble, ±10 dB @10 kHz; Sub Treble ±5 dB @ 20 kHz.
Low Filter Cutoff: 15 Hz @ 12 dB/ octave.
High Filter Cutoff: 8 kHz @ 12 dB/ octave.

General Specifications
Maximum Power Consumption: 1400 W, 120 V, 60 Hz.
Dimensions: 22 1/6 in. (56.3 cm) W x 19 9/16 in. (49.6 cm) D x 8 5/16 in. (21.1 cm) H.
Weight: 78 lbs. (35.4 kg).
Price: $1250.00.

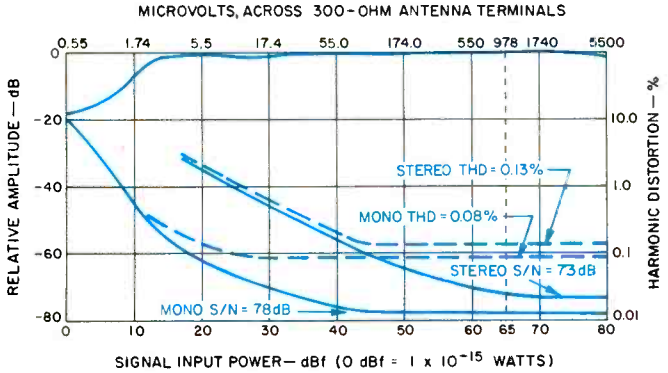




ed with the large tuning knob and activated when the user releases the tuning knob.

The rear panel of the Pioneer SX-1980 has three banks of spring-loaded speaker terminals and, near these, there are preamp-out/main amp-in jacks plus three convenience a.c. receptacles (two unswitched, one switched). Antenna inputs for 300 ohm, 75 ohm coaxial, and external AM are located below the pivotable built-in ferrite bar antenna. Tape-in and tape-out jacks, phono (two pairs), and AUX jacks are at the upper left of the panel and below the phono inputs is an interference filter switch which can be activated to reduce r.f.i. and other forms of external interference. Additional output and input jacks are located above the preamp-out/main amp-in jacks for possible connection of accessory devices such as a Dolby noise reduction unit, dynamic range expander, graphic equalizer, etc.

Fig. 1 — Mono and stereo quieting and distortion characteristics.



Construction and Circuit Highlights

The large, toroidally wound power transformer, visible in the internal view of the SX-1980, has individual secondary windings which supply separate, dual-polarity voltages for each channel's output stages, and 22,000 μF filter capacitors are used. The power amplifier stage is d.c.-configured, with all capacitors removed from the feedback loop. A single-stage differential-input amplifier is used with low-noise dual transistors, a current-mirror load, and a three-stage Darlington triple single-ended push-pull output stage. The pre-drive amplifier section features a power limiter circuit and an overdrive limiter which control the power output so that the power transistors are protected from damage when excessive loads are applied under high power conditions.

The FM front-end incorporates a two-stage r.f. circuit using a five-gang tuning capacitor and three dual-gate MOS-FETs. The i.f. amplifier section combines five dual-element ceramic filters with four ICs including a quadrature detector. The stereo MPX circuit

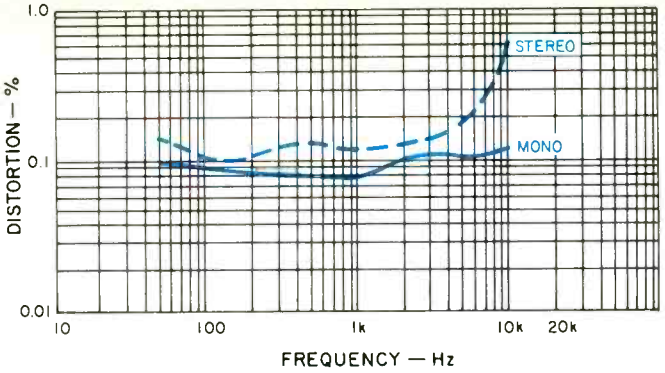


Fig. 2 — Distortion vs. frequency in the FM section.

employs a PLL IC with a self-contained, pilot-cancelling circuit.

The local oscillator is "locked" by means of a reference quartz-crystal oscillator in 100-kHz increments using a circuit that Pioneer has dubbed its APC (Automatic Phase Control) or "touch tuning system."

A dual-FET is used in the first-stage differential amplifier of the phono equalizer circuit while the final stage employs a pure complementary single-ended, push-pull configuration. Equalizer components have been chosen with close tolerances to maintain correct RIAA playback response within 0.2 dB.

FM Tuner Section Measurements

The FM tuner section of the SX-1980 is one of the best we have ever measured on an all-in-one receiver. Usable sensitivity measured 1.5 μV (8.7 dBf) exactly as claimed (and as low as we have ever measured). Usable stereo sensitivity was a low 4.0 μV (17.3 dBf), and 50-dB quieting was obtained with a mono input signal of only 2.0 μV (11.2 dBf) as against 2.2 μV claimed, and 28 μV (34.2 dBf) for stereo as against 36 dBf (34 μV) claimed. Best signal-to-noise ratio in mono measured 78 dB, and 73 dB for stereo. For a 1-kHz test modulating signal, THD was 0.08 per cent in mono and 0.13 per cent in stereo, a bit short of values claimed but, nevertheless, low enough to be insignificant in listening terms. Quieting and THD characteristics as a function of signal input levels are graphed in Fig. 1. Distortion at other frequencies are plotted in Fig. 2 for both mono and stereo modes. At the IHF test frequencies of 100 Hz and 6 kHz, the unit measured 0.09 per cent and 0.12 per cent for mono and 0.15 per cent and 0.2 per cent for stereo. Frequency response, plotted together with separation characteristics in Fig. 3, was flat from 30 Hz to 15 kHz, within +0, −0.5 dB. Stereo separation measured an outstanding 58 dB at mid-frequencies and remained at 55 dB for 100 Hz and 43 dB at 10 kHz. Stereo threshold was measured at 4.0 μV (17.3 dBf), while muting threshold was set at 6.0 μV (20.8 dBf).

Selectivity measured 83 dB, and capture ratio was exactly 1.0 dB as claimed. Image, spurious, and i.f. rejection were all in excess of 100 dB (the limit of our test equipment capability), while AM suppression measured a very high 63 dB. Sub-carrier products were "buried" beneath the noise floor in stereo, as was an SCA test signal.

AM frequency response is plotted in the frequency-sweep display of Fig. 4 and was no better than that observed for most stereo

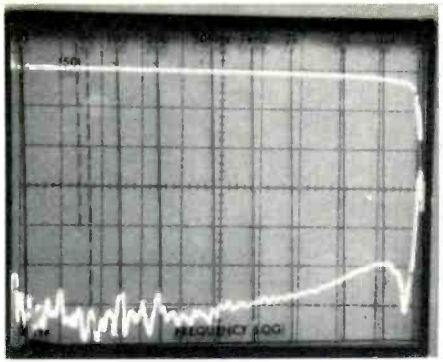


Fig. 3 — Frequency response and separation. (Each vertical division equals 10 dB.)

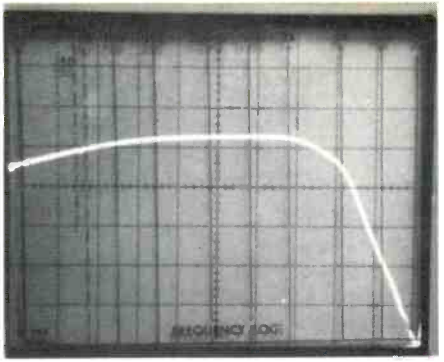


Fig. 4 — AM frequency response.

receivers, with roll-off beginning at around 2.5 kHz. Sensitivity was good, however, thanks to the three-gang tuning capacitor and separate r.f. stage used in this circuit. Distortion was quite low, with readings of under 0.5 per cent for a 30 per cent modulation level at 1 kHz.

Power Amplifier Section Measurements

As readers of *Audio* Magazine are aware, the IHF (Institute of High Fidelity) has recently approved new Standard Methods of Measurement for Audio Amplifiers (See June, 1978, issue of *Audio*). We are gradually converting our test procedures to comply with these new standards. In order to permit valid comparisons between manufacturer's claimed performance and our test results, however, we will continue to offer "old" and "new" test readings, where applicable, until manufacturers have had an opportunity to convert their specification sheets to the new standards.

As for the power amplifier section of the SX-1980, it delivered 283 watts per channel of average continuous power into 8-ohm loads for the rated THD of 0.03 per cent. For rated IMD (0.03 per cent), equivalent power output was 302 watts per channel. At rated power (270 watts per channel), THD measured a very low 0.006 per cent, while IM (using the SMPTE method) was 0.017 per cent. FTC-rated continuous power measured 276 watts, and power band for rated power extended from 14 Hz to 20 kHz. Low-frequency damping factor (measured at 50 Hz) was 40, as claimed. Dynamic headroom measured 2.3 dB. Power output (for a 1-kHz test signal) versus distortion-plus-noise and IMD is plotted in Fig. 5, while distortion versus frequency at rated output is graphed in Fig. 6.

Preamplifier and Control Section Measurements

RIAA equalization was among the most accurate we have measured for any receiver, remaining within ±0.1 dB of the prescribed playback curve from 30 Hz to 15 kHz. Phono input overload (for a 1-kHz test signal) measured 330 millivolts. Signal-to-noise referred to actual input sensitivity and full output ("A" weighted) was 87 dB while, using the new IHF method (5-mV in and 1-watt output) with an "A" weighting filter, the S/N became 79 dB. Weighted S/N using rated output as a reference and applying 140 mV with volume control at full measured 107 dB. Using a 0.5-V input and 1-watt output as a reference, the S/N measured 80 dB. Residual hum and noise ("A" weighted) with volume control at minimum,

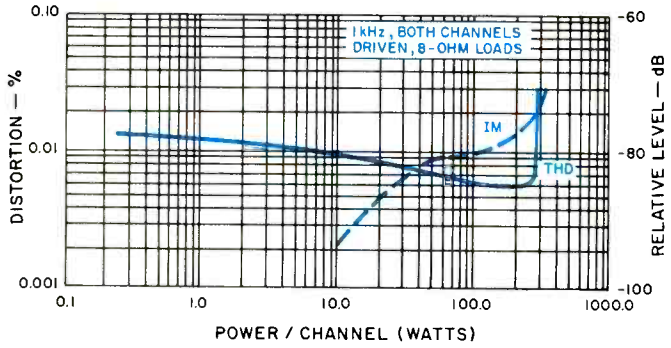


Fig. 5 — Power output vs. distortion.

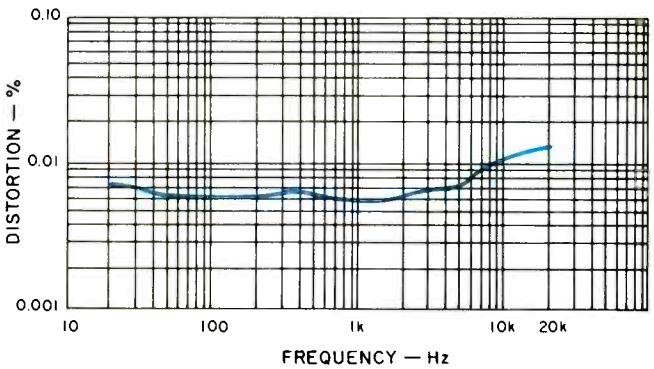


Fig 6. — Distortion vs. frequency in the amplifier section.

referred to 1 watt, measured 84 dB, corresponding to 108 dB below full rated output. Overall frequency response via the AUX inputs extended from 3.5 Hz to 110 kHz for the –3-dB roll-off points.

Main- and sub-tone control characteristics of the SX-1980 are plotted in the 'scope photos of Figs. 7 and 8. It should be noted that each of these bass and treble controls operates independently, so that combined use of both is not only possible but provides a very great variety of tonal settings to meet acoustic needs of the listening room and to compensate for subtle deficiencies in speaker or other component response. If there is one clear advantage in having the enormous power capabilities of the SX-1980 available, it is the ability to apply as much or as little bass or treble boost as one deems necessary without having to worry about amplifier overload, even when using relatively inefficient speaker systems. Needless to say, however, extreme use of the controls (and especially the "main" treble control) could lead to tweeter failure at high power levels, since most tweeters cannot sustain the kind of power levels deliverable by this receiver.

The sub-sonic filter characteristics are not visible in the sweep-frequency plot of Fig. 9 because the range of sweep on our spectrum analyzer extends from 20 Hz to 20 kHz, whereas the sub-sonic filter begins to act just below the 20-Hz low-frequency extreme. The sharp action of the high-cut filter, however, confirms its 12 dB/octave characteristic and is seen to be optimized at a suitable cutoff frequency to effectively reduce high-frequency hiss without seriously impinging upon musical fundamentals. Nor is the response of this high-cut filter redundant with any of the possible cut positions of either the main or sub-treble controls. Figure 10 is a display of the action of the loudness circuit which is typical of those found in most receivers and of somewhat questionable usefulness, since no means is provided for setting desirable input levels from either the phono or the auxiliary inputs to provide meaningful and correct loudness compensation. Still, for those who prefer this kind of bass and treble boosted lower level listening, there it is.

Use and Listening Tests

Calibration of the FM dial scale was almost perfect, with a maximum error of only 50 kHz observed at the 88 MHz extreme. Station reception was limited only by the quality of the transmission and program material. We found the audible multipath indicator to be extremely effective in reducing this form of interference and insuring proper antenna orientation. Happily, the "quartz lock" feature (unlike some others we have tested) is perfectly aligned with respect to the i.f. and detector system so that it can remain in use (it is defeatable when the muting button is depressed) even for weaker stations and provides tuning which results in lowest measured distortion at all frequencies on the FM dial.

Though Pioneer does not make too much of a point regarding their variable capacitance and resistan3e selector associated with the phono input, in the course of our listening tests we came to regard this as a very important feature indeed. It is surprising how few people realize the importance of proper cartridge loading for best pickup response and tonal quality. Even those who do seldom bother to add the required amount of capacitance across their phono cartridge terminals. We used several cartiridges in our listening tests and, aside from variations in tracking ability, were pleased at how "close" they sounded to each other once we selected the correct cartridge load.

As for overall sound quality of the amplifier/preamplifier combination, it was without serious fault. Transient reproduction was as good as that we have heard on some of the finest separate d.c.-configured power amplifiers and integrated amps. Hum and noise in phono were well below program-source's residual noise, making the dynamic range capability of the receiver awesome to hear. While I can think of few instances in which I would actually require 270-plus watts of continuous power per channel, I can imagine that there are instances in which multiple speaker operation in more than one room (or even stacking double pairs of speakers in a single listening room) might justify such power levels for home listening.

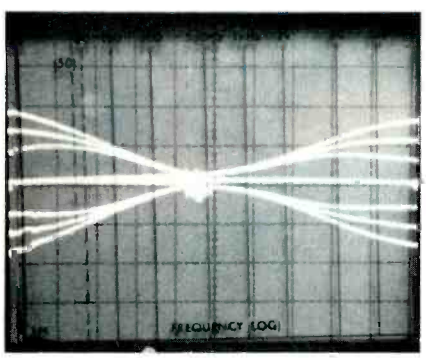


Fig. 7 — Range of main bass and treble controls.

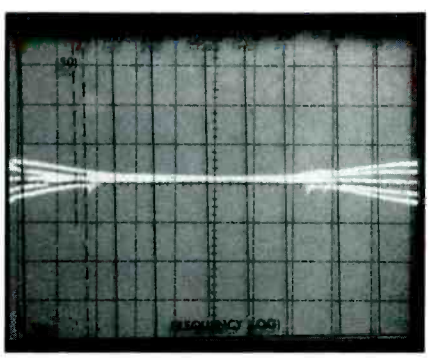


Fig 8 — Range of secondary bass and treble controls.

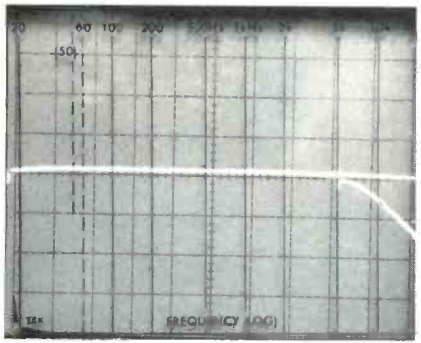


Fig. 9 —
Response of the high-cut filter.

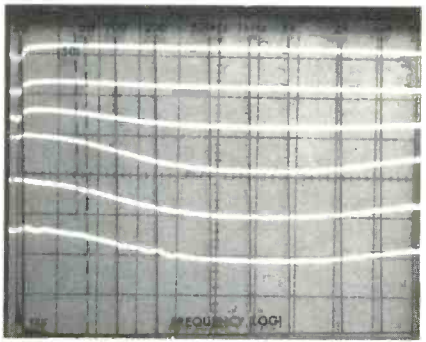


Fig. 10 —
Response of the loudness control at various levels.

Thumbing through a recent listing of popular home loudspeaker systems, I found relatively few that could handle this power level without being damaged. This suggests that speaker fusing would be important if you plan to use this receiver with anything but those few speakers that can take in excess of 300 watts of raw power without going up in smoke. Don't depend upon the built-in power meters to warn you of excessive power levels to the speakers, since they are strictly average-reading devices calibrated in terms of 8-ohm resistive loads. Even "8-ohm" speakers can exhibit impedances well below their nominal values at several frequencies at which time the "voltage" read by the meters would produce far more power than is indicated. Though the new "Dynamic Headroom" measurement is specified in dB, it should be mentioned that based upon the short-term signal used to measure the 2.3 dB headroom of this amplifier, it was producing nearly 460 watts of short-term power under these test conditions!

In summary, the chief appeal of the SX-1980, to me, is *not* its enormous power capability, but rather its excellent tuner circuitry (at least in the FM section), its enormous control flexibility, and the overall sound quality which it delivered during more than a week of solid listening tests. If Pioneer wants to engage in the power race, I am at least pleased to see that in doing so they have not sacrificed the more important characteristics of receiver design.

Leonard Feldman

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