

PIONEER SX-D5000

PIONEER

STEREO RECEIVER WITH NON-SWITCHING™ DC POWER AMP QUARTZ-PLL TUNER
AND ELECTRONIC TOUCH TUNING



The Pioneer Receiver With a Different Look -



and Different Touch



- Non-Switching™ DC Power Amp Design
- Quartz-PLL Synthesized Tuner
- Six FM/Six AM Memory for Instant Station Recall
- FLUROSCAN™ Power Output and Tuning Meters
- Innovative Design and Easy Operation

PIONEER SX-D5000

The Pioneer SX-D5000: A Completely New Approach to the Making of Fine Stereo

It doesn't take much shopping around to make the discovery that most stereo receivers these days look pretty much alike, with the tuning dials dominating the frontface, with knobs and controls often adding to the clutter.

Now comes Pioneer to make a major new contribution to the aesthetics of receiver design. And make a break from the concept of the traditional receiver. The SX-D5000 is totally redesigned. All controls (except

VOLUME and BALANCE) and switches are sliders and pushbuttons, not levers, rockers or rotary knobs. Indications are all digital, even the one for tuned frequency. You don't have to be a stereo expert to see how these new lines and contours add up to a distinctive kind of elegance. To see how the SX-D5000 gives the appearance of a precision transceiver, with all controls neatly grouped into three.

Visually attractive, functional, operationally comfortable—a rare combination of design qualities in a receiver. Would you expect less from Pioneer?

The SX-D5000 is what receivers should be like in the 1980s. Once again, Pioneer makes the first impression.

The New Pioneer "Non-Switching™" DC Power Amp

Too Hot to Handle

The traditional alternative to the Class-B amp is Class-A. The former amp employs the on-off switching of transistors in order to minimize heat loss. In Class-A, a large amount of bias (or idle current) is applied to keep the transistors ON at all times, whether or not a signal is present for amplification. This avoids switching distortion. However, as much as 75% of the energy consumed is bled off in the form of heat, adding up to waste, potential damage and inefficiency. Attempts to create a hybrid

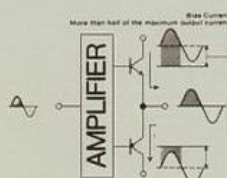
"A/B" and other alternatives have always ended in frustration.

Pioneer VARI-BIAS™ to the Rescue

Frustration, however, is often the mother of invention. Not so long ago our engineers began to work on what they call "a very simple high-speed bias servo" to increase Class-A efficiency. An inspired breakthrough led to the Pioneer Vari-Bias™ circuit, which constantly monitors the amplitude of incoming signals, then automatically controls the amount of bias fed to the power transistors.

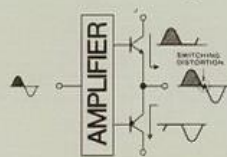
While they "rest" during no-signal periods they get only a trickle—just enough to keep them from switching off. Actually, this circuit is so simple it does not limit the transient response of the transistors in any way (which is not always the case with other, similar circuit designs).

Modes of Amplification



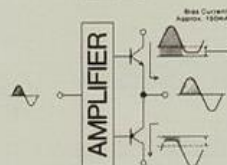
CLASS-A OPERATION

Paired transistors are always turned on, amplifying its assigned waveform within the range above and below its quiescent operating point. Therefore, no switching distortion can occur. But that bias current is always at the center point and thermal loss is considerable.



CLASS-B OPERATION

Paired transistors alternately turn on and off, amplifying the positive half-cycles and negative half-cycles. This lets amplifiers run cooler with high efficiency. But, as the power transistors are driven below its idle current into cutoff, switching distortion (also called "notching distortion") occurs.



"NON-SWITCHING" AMP OPERATION

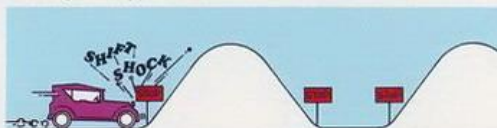
Paired transistors are always turned on; they do not switch on and off. Since the bias is controlled by our new Pioneer Vari-Bias circuit to prevent either output transistor from being driven below its idle current into cutoff, no switching distortion is generated and the thermal loss is low.

Non-Switching™ Is Put To "Driving Test"



CLASS-A transistors don't switch on and off because a bias current is applied at a fixed level even when no signal is present. This is like driving in "low gear" all the

way: a safe trip, but it wastes energy. NO SWITCHING DISTORTION. BUT VERY POOR EFFICIENCY.



CLASS-B transistors are arranged in sets, one set resting while the other works. This is similar to constantly shifting gears: it saves energy, but causes a jerky ride.

HIGH EFFICIENCY. BUT ALSO HIGH SWITCHING DISTORTION.



PIONEER'S NON-SWITCHING™ amplifier has an "automatic transmission" in the form of the Pioneer Vari-Bias circuit. It applies a bias current, but only in the amount

needed at any given time. EFFICIENCY IS VERY HIGH, AND THERE'S ABSOLUTELY NO SWITCHING DISTORTION to spoil the transient quality of your music!

DC with a Difference

Still another advantage of the SX-D5000's power amp is its special DC or Direct Current configuration. What makes it special is the coupling capacitors we've used at the input of the amp to safeguard the circuits and your speaker systems. If this precaution is not taken, ultra-low-frequency signals which might be picked up, say, from a warped record can cause annoying "Doppler distortion" in drivers, adversely modulating the audible frequencies. Pioneer's "DC with a Difference," however, removes signal-delaying capacitors from the negative feedback loops to reduce phase distortion. This contributes immensely to sharp and densely-textured sonic imagery in the final reproduction.

Power Amp Highlights

- **Continuous Power Output is 80 watts* per channel, min. at 8 ohms from 20 hertz to 20,000 hertz with no more than 0.005% total harmonic distortion.**
- **HEAT SINK** is the "I-Skived" type, which



uses thinly-sliced metal fins on a lightweight but solid frame to provide as much as 50% better heat dissipation than in conventional types.

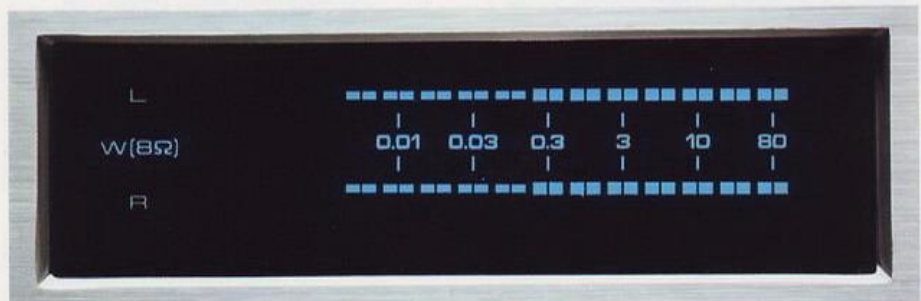
- **PROTECTION CIRCUITRY** has gold-plated dual-contact relays for fast response and unfailing dependability should power-related mishaps occur. The receiver and your speakers are fully protected; the circuitry mutes power on/off noise, protects power transistors and speakers from abnormal direct-current potentials and overload at the output.

*Measured pursuant to the Federal Trade Commission's Trade Regulation Rule on Power Output Claims for Amplifiers.

Accurate Preamp and Versatile Control

FLUROSCAN™ Power Output Meter

For added accuracy, we've chosen the Pioneer-exclusive FLUROSCAN™ meter instead of the needle-type analog types. For superior readability, the bar-graph sections of each channel have 12 separate fluorescent segments each. They thus achieve a large and clearly-calibrated display that is easier to read than ordinary VU-type meters. Range is 0.01 to 80 watts, referred to an 8-ohm speaker load.

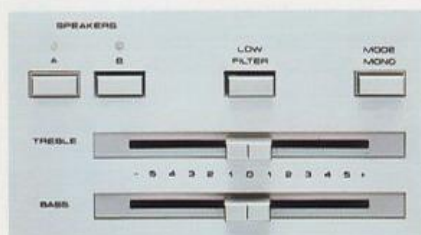


Low-Noise Phono Equalizer

Two low-distortion monolithic ICs (Integrated Circuits) are used, one in each channel, in the phono equalizer, to provide exceptionally good signal-to-noise ratio (82dB). Given this circuit design with its precise construction, RIAA equalization is achieved accurately within $\pm 0.2\text{dB}$ over the 20 to 20,000Hz range with never more than 0.005% total harmonic distortion. Phono overload is 200mV, permitting you to use high-output cartridges if you desire.

Low-Distortion Tone Control Amp

This is also an IC-built circuit block, employing NFB (negative feedback) to lower distortion to 0.005% or less (4V output) over the 20 to 20,000Hz range. BASS and TREBLE adjustments are made on the two slider controls—each with 11 click stops—so they never add audible distortion to your music.



When the controls are centered at the ("0") positions, the tone amp is defeated entirely and you get a flat response at the output.

Attenuator-Type Master Volume Control

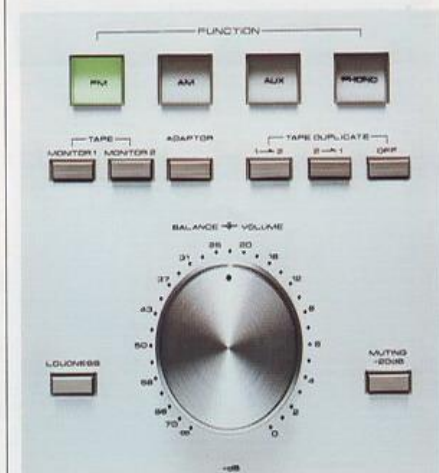
We've improved the "feel" of the master volume control by providing it with decibel calibrations from 0 down to -70dB. You know at a glance how much power your receiver is delivering *on the average*, which should be reflected on the FLUROSCAN™ power meter. For operating convenience, the control has 41 detents or click stops.

Preamp/Control Highlights

- **FUNCTION INDICATORS (FM/AM/AUX/PHONO)**—Pioneer's "Light Touch" buttons are employed to indicate the selected function. The buttons are lit and glow green when engaged.
- **SPEAKERS (A, B) switches** with LED indicators.
- **LOW (SUBSONIC) FILTER** (18Hz with -6dB/oct. curve).
- **TAPE MONITOR** and **DUPLICATE** switches for decks 1 and 2; deck-to-deck dubbing is easily accomplished between the two in either direction.
- **LOUDNESS**, **BALANCE**, **MODE** (Stereo/Mono) and **MUTING** (-20dB) controls.

- **ADAPTOR switch** to patch in a signal processor unit such as a graphic equalizer, dynamic processor or reverberation unit.

- **PRE/POWER AMP SEPARATION** is possible via jumpers on back panel, still another rare receiver feature of the SX-D5000.



Drift is Banished by Pioneer's Quartz-PLL Synthesizer

Quartz-PLL is a Gem

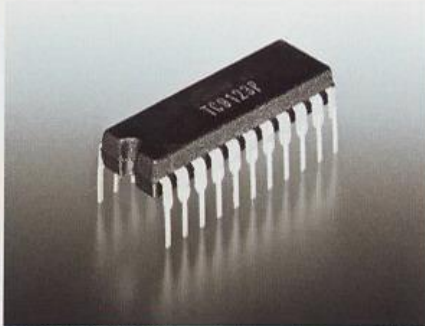
Two problems you may be familiar with in your own stereo system: Hiss-ridden, distortion-marred reception from your favorite stations. And "drift"—along with incidental noise and distortion—that puts a perfectly tuned station out of tune as heat inside a receiver builds up. These are the problems that the design of the SX-D5000, and its Quartz-PLL synthesizer, avoids.

The front end of the SX-D5000 uses a gem-like quartz crystal as the most accurate and dependable controller of the local-oscillator frequency yet devised. It's so accurate that it's used in transmitters at broadcasting stations. The steady frequency derived from the quartz crystal is compared with the desired station frequency via a PLL (Phase-Locked Loop) *thousands of times* per second. Drift simply cannot develop. Tuning is always accurate and precise.

Reliable performance is enhanced by a combination of the superior qualities of quartz with the astonishing capabilities of two micro-electronic C-MOS LSIs (Complementary Metal-Oxide Semiconductor Large-Scale Integrated Circuits), one to provide frequency synthesis and the other to make possible AUTOSCAN, MEMORY and "LAST CALL" (features to be discussed below).



FM/AM AUTOSCAN & MEMORY sections use this highly reliable control LSI



QUARTZ-SYNTHESIZER section has an independent LSI

Electronic Varicaps for Ganged Tuning Capacitor

In the SX-D5000 a team of varicaps (variable-capacitance diodes) for FM and AM is used instead of the conventional mechanically ganged variable capacitors. Because they work purely electronically, degradation of basic specifications—even over long periods of time—does not occur. Varicaps provide both the desired tuning capacity of conventional capacitors and the extra advantage of being able to control preset fixed voltages commanded by special ICs at will. This means you can preset your favorite stations and tune them in without scanning the entire FM or AM dial—at the touch of a button.

The use of an FET (Field Effect Transistor) as the RF (Radio Frequency) amp means still higher sensitivity, better rejection of interference and improved resistance to overload in any area.

FM IF with Special Filters

The front end signal goes in what's called the IF (Intermediate Frequency) section for amplification and removal of noise. In this section we've used three special 2-pole ceramic filters with flat group-delay response to assure still lower distortion.

Integrated Circuits Made to Pioneer's Specifications

Two Pioneer-exclusive ICs are employed in the IF and MPX demodulator sections of the SX-D5000 for reliability and dependability. One (PA-3007A) serves as an FM IF amp/detector. It improves the signal-to-noise ratio, lessens distortion and eliminates "TV buzzes." The 82dB signal-to-noise ratio of this unit is rare.

The other IC is called PA-4006A, and it contains a PLL (Phase-Locked Loop) stereo demodulator. It makes FM stereo listening cleaner and more accurate. The PA-4006A also doubles as automatic pilot signal canceler, eliminating the 19kHz "switching" signal and ensuring that the audio output is never compromised; even if the modulation percentage of the transmitter changes (as it often does when you tune to a relayed, not main, transmission), the canceller tracks the change.

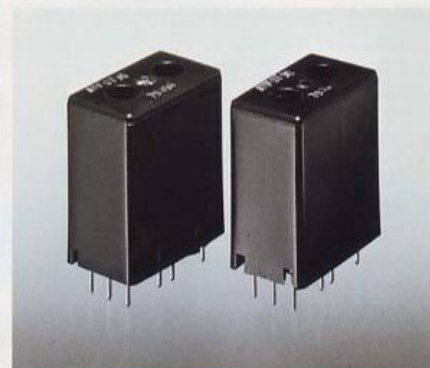


New Air-core Quadrature Discriminator

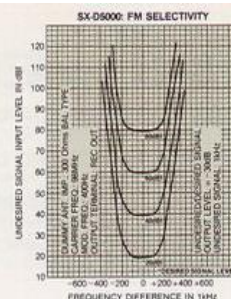
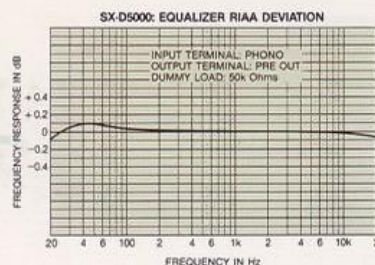
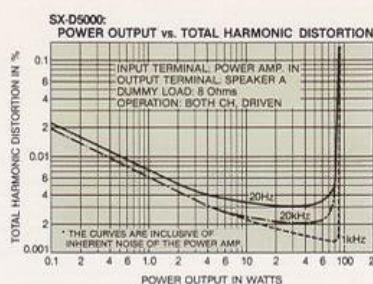
Pioneer's new-type quadrature discriminator is a combination of an air-core micro-inductor and a detection transformer in a single pack. Benefits include a higher signal-to-noise ratio, wider channel separation, wider frequency response and a more natural tonal quality. These qualities are enhanced by the use of a separate low-pass filter, one in each channel at the output of the PLL stereo demodulator.



New Quadrature Discriminator Transformer



Separate LOW PASS FILTERS in Left and Right Channels of FM for impeccable tonal quality

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SX-D5000 SPECIFICATIONS**POWER AMPLIFIER SECTION****Continuous Power Output is 80 watts* per channel, min. at 8 ohms from 20 hertz to 20,000 hertz with no more than 0.005% total harmonic distortion.**

Total Harmonic Distortion: (20Hz to 20,000Hz, 8 ohms)	No more than 0.005% (continuous rated power output) No more than 0.004% (40 watts per channel power output)
Intermodulation Distortion: (50Hz: 7,000Hz = 4:1)	No more than 0.005% (continuous rated power output) No more than 0.004% (40 watts per channel power output)
Frequency Response:	3 to 450,000Hz +0dB, -3.0dB
Input Sensitivity/Impedance:	1V/50k ohms (POWER AMP. IN)
Output:	
SPEAKER:	A, B, A + B, OFF
HEADPHONES:	Low impedance
Damping Factor:	60
(20 to 20,000Hz, 8 ohms)	
Hum and Noise:	115dB
(Short-circuited, A network)	

PREAMPLIFIER SECTION

Input Sensitivity/Impedance:	
PHONO:	2.5mV/50k ohms
AUX:	150mV/50k ohms
TAPE PLAY 1:	150mV/50k ohms
TAPE PLAY 2:	150mV/50k ohms
ADAPTOR IN:	150mV/50k ohms
PHONO Overload Level:	
PHONO:	200mV (1kHz, T.H.D. 0.005%)
Output Level/Impedance:	
TAPE REC 1:	150mV
TAPE REC 2:	150mV
ADAPTOR OUT:	150mV
PRE OUTPUT (R _L : 50k ohms):	1V/1k ohms
Total Harmonic Distortion:	No more than 0.005% (20 to 20,000Hz, 4V output)
Frequency Response:	
PHONO (RIAA, Equalization):	20 to 20,000Hz ± 0.2 dB
AUX, TAPE PLAY 1, 2, ADAPTOR:	5 to 100,000Hz +1.0dB, -3.0dB
Tone Control:	
BASS:	± 8 dB (100Hz)
TREBLE:	± 8 dB (10kHz)
Filter:	
LOW (SUBSONIC):	18Hz (6dB/oct.)
Loudness Contour:	+6dB (100Hz), +3dB (10kHz)
(Volume control set at -40dB position)	
Hum and Noise (Short-circuited, A network)	
PHONO:	82dB
TUNER, AUX, TAPE PLAY 1, 2, ADAPTOR:	100dB
Muting:	-20dB

FM TUNER SECTION

Usable Sensitivity:	Mono: 10.2dBf (1.8 μ V)
50dB Quieting Sensitivity:	Mono: 15.7dBf (3.2 μ V), Stereo: 34.2dBf (28.2 μ V)
Signal-to-Noise Ratio: (at 85dBf):	Mono: 82dB, Stereo: 78dB
Distortion (at 65dBf):	
100Hz:	0.1% (mono), 0.2% (stereo)
1kHz:	0.07% (mono), 0.1% (stereo)
6kHz:	0.1% (mono), 0.2% (stereo)
Frequency Response:	30 to 15,000Hz ± 0.5 dB
Capture Ratio:	1.0dB
Alternate Channel Selectivity:	80dB (400kHz)
Spurious Response Ratio:	80dB
Image Response Ratio:	80dB
IF Response Ratio:	90dB
AM Suppression Ratio:	60dB
Muting Threshold:	35.7dBf (32 μ V)
Stereo Separation:	50dB (1kHz), 35dB (30Hz to 15kHz)
Subcarrier Product Ratio:	65dB
SCA Rejection Ratio:	65dB
Antenna Input:	300 ohms balanced 75 ohms unbalanced

AM TUNER SECTION

Sensitivity:	300 μ V/m (IHF, ferrite antenna) 15 μ V (IHF, external antenna)
Selectivity:	30dB
Signal-to-Noise Ratio:	45dB
Image Response Ratio:	30dB
IF Response Ratio:	60dB
Antenna:	Ferrite loopstick antenna

SEMICONDUCTORS:

FETs:	11
ICs:	24
Transistors:	98
Diodes:	100

MISCELLANEOUS

Power Requirement:	120V 60Hz only
Power Consumption:	250W (UL), 530VA (CSA)
Dimensions:	Without package: 19-5/8(W) x 6-13/16(H) x 18-1/8(D) inches 499(W) x 173(H) x 460(D) mm
Weight:	Without package: 35 lb. 11 oz./16.2kg

*Measured pursuant to the Federal Trade Commission's Trade Regulation Rule on Power Output Claims for Amplifiers.
NOTE: Specifications and design subject to possible modification without notice.