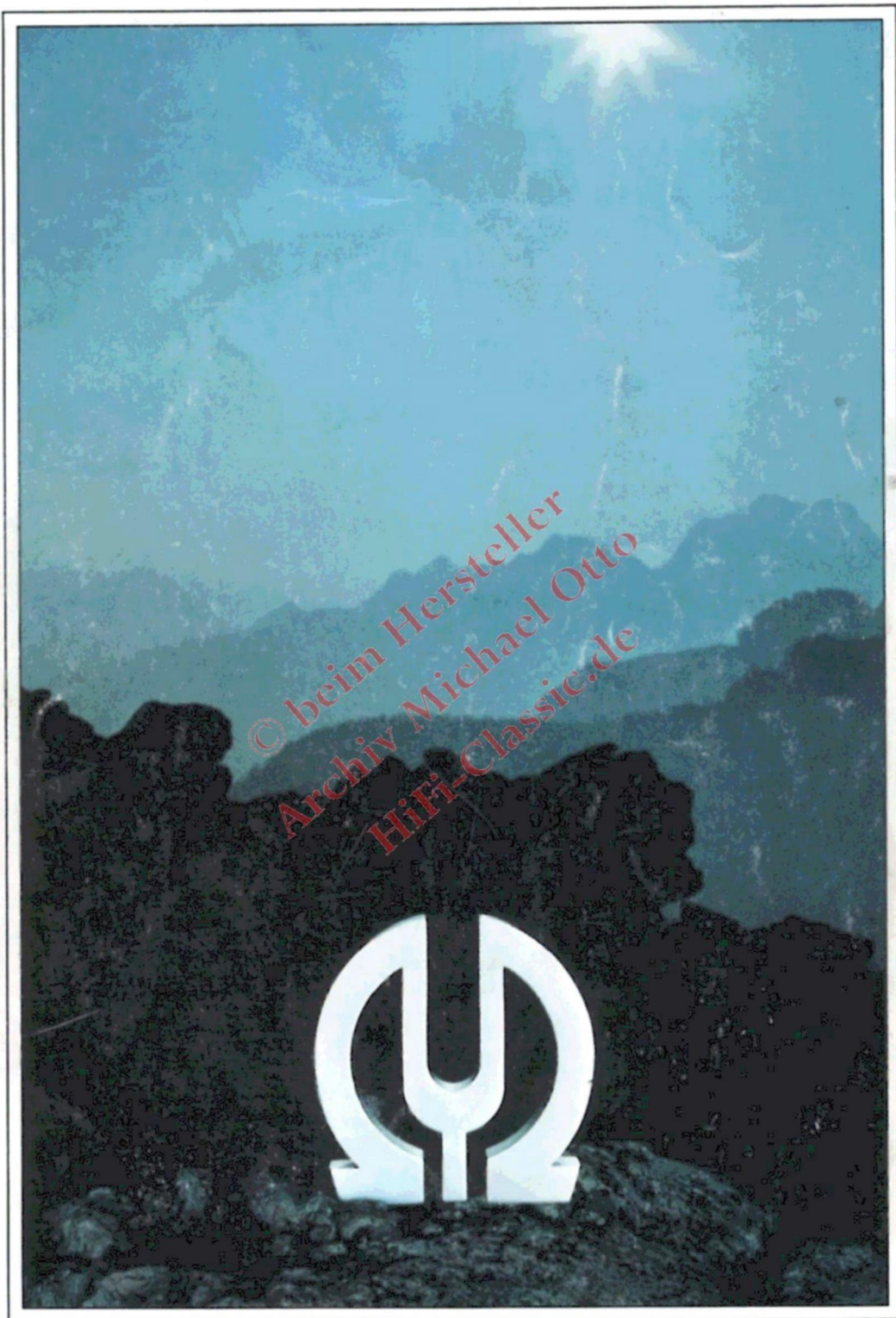


PIONEER®



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HI-FI STEREO 1979/80

Sound is a mechanical, radiant energy with three dimensions: pitch, intensity and duration. At any point in time, this energy will have a specific frequency (pitch) and a specific intensity (loudness). And a moment later, all these "variables" will have shifted in relation to one another, with the energy distributed into new patterns.

THE TASK OF HIGH FIDELITY

All of these changes register to the ear the way the modulations of a landscape, with mountains and valleys, abrupt drops and rises, register to the eye. It is the task of hi-fi to transform this constantly-changing energy from mechanical form to electromagnetic form and back again while preserving all the subtleties of the original.

Because certain areas of performance—frequency, noise and distortion—can be objectively verified in the lab using sine waves and other controlled inputs, they have become the major focus of nearly all hi-fi technology today. But these are chiefly static measures which have

little relation with actual music. The signals measured contain less audio information—less "data density"—than actual musical inputs do.

To improve hi-fi significantly, the Pioneer engineers have gone beyond the static parameters and developed a more creative approach to circuit design which takes into account the transient, pulsive and musical inputs introduced when hi-fi equipment is put to work in your listening room.

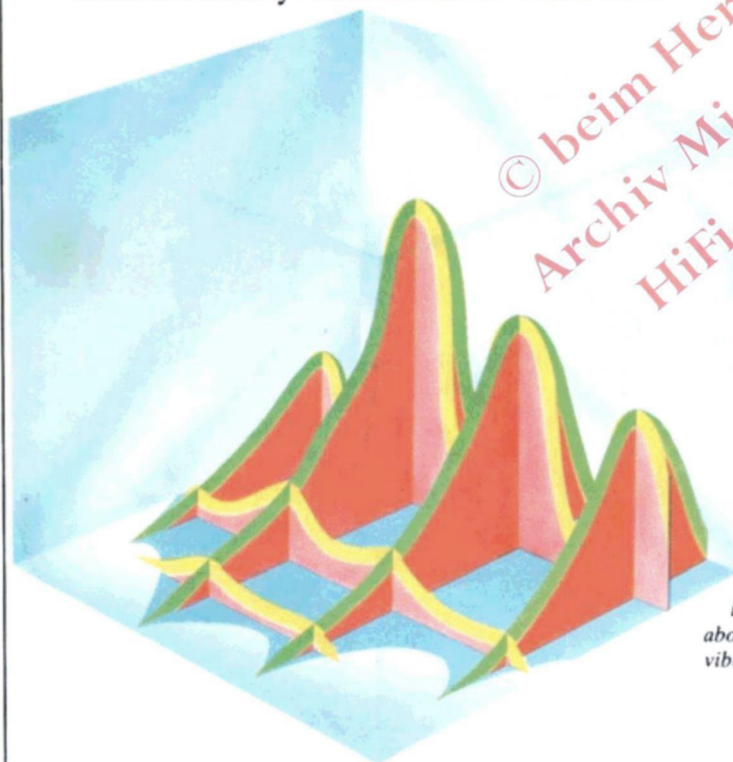
By basing their research of electronic circuitry on a continual comparison with real sound, they have determined three technical parameters—frequency range, dynamic range and time response—which relate directly to the three dimensions of sound.

They have thus been able to duplicate with unprecedented accuracy the dynamic qualities, or "thrust" of live music.

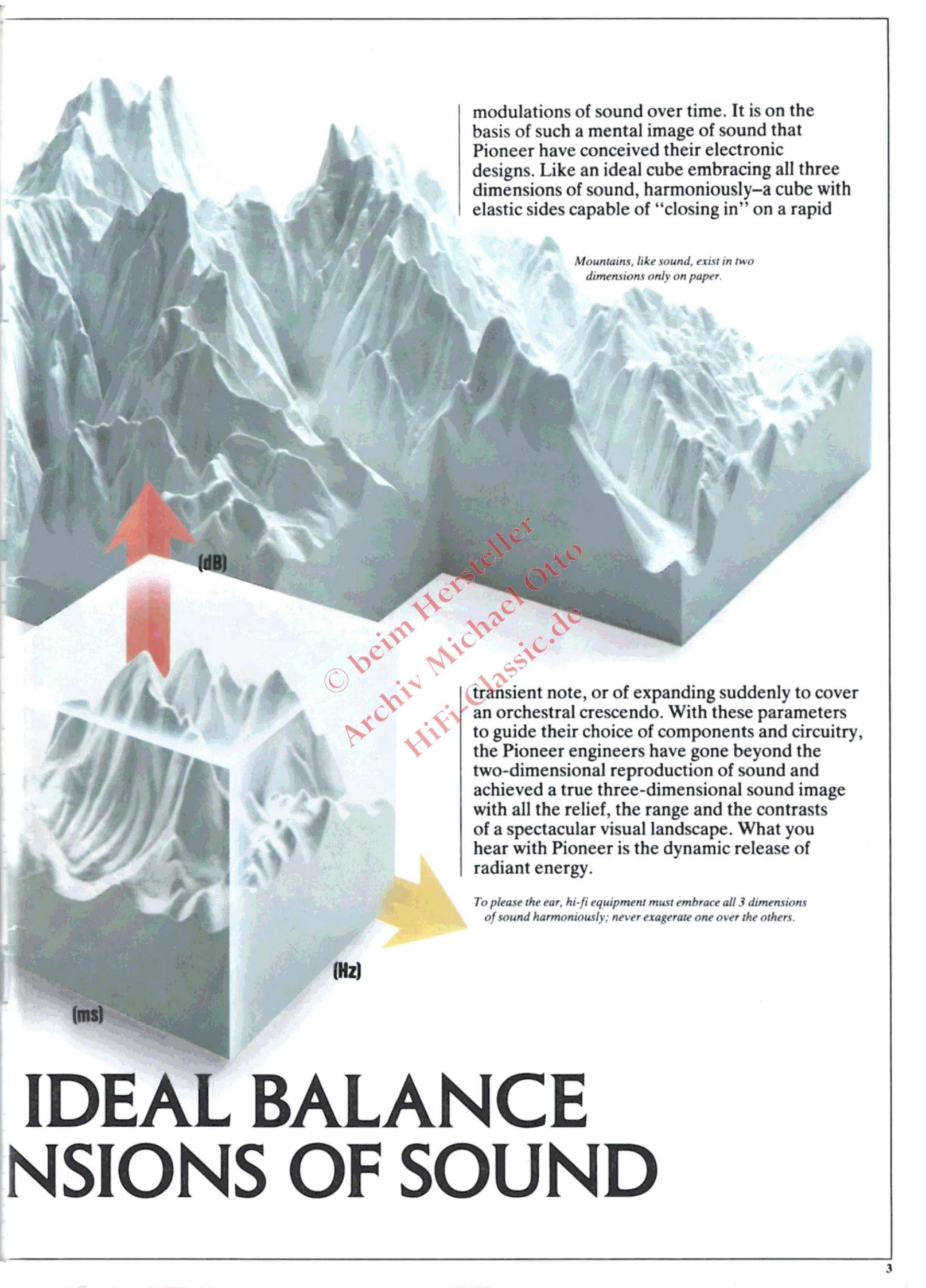
VISUALIZING THE INVISIBLE

The diagram at the left is one way of visualizing the non-visual energy of sound. It illustrates how dependent each of the dimensions is upon the others and makes it clear that there is no sense in treating only one dimension at a time. When all the instruments of an orchestra are filled in, the three-dimensional diagram quickly begins to look like a model of a mountain range, with peaks and valleys corresponding to the

In the first millisecond, most of a note's energy is concentrated in its fundamental frequency. But more quickly than one can think about it, the energy becomes redistributed among the several secondary vibrations.



PIONEER AND THE OF THE THREE DIME



modulations of sound over time. It is on the basis of such a mental image of sound that Pioneer have conceived their electronic designs. Like an ideal cube embracing all three dimensions of sound, harmoniously—a cube with elastic sides capable of “closing in” on a rapid

Mountains, like sound, exist in two dimensions only on paper.

transient note, or of expanding suddenly to cover an orchestral crescendo. With these parameters to guide their choice of components and circuitry, the Pioneer engineers have gone beyond the two-dimensional reproduction of sound and achieved a true three-dimensional sound image with all the relief, the range and the contrasts of a spectacular visual landscape. What you hear with Pioneer is the dynamic release of radiant energy.

To please the ear, hi-fi equipment must embrace all 3 dimensions of sound harmoniously; never exaggerate one over the others.

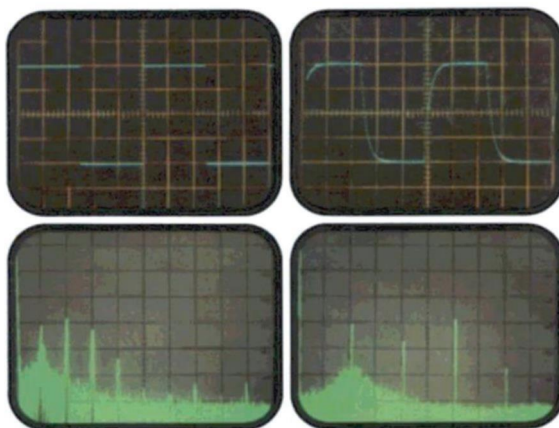
IDEAL BALANCE DIMENSIONS OF SOUND

AMPLIFIERS

In designing the Pioneer range of hi-fi stereo amplifiers, the Pioneer engineers have not only sought to do justice to the three structural dimensions of sound. They have also carefully studied the functional relationships among them. Instead of merely designing circuitry capable of reproducing a square wave, for example, they have sought, and achieved, overall musical capability for their amplifiers.

"OVERALL MUSICAL CAPABILITY"

What we mean by "overall musical capability" is: going beyond the objective measurements of electronic gear to the subjective and very real qualities of music, as it is perceived, intuitively, by the senses. This requires a very deep understanding of sound and great technical flexibility. And the recognition by engineers that figures sometimes add up to nothing. The fact is, specs are necessary, but not sufficient conditions for good music. And only a creative approach to amplifier design which places as much emphasis on listening tests as on lab measurements can result in true musicality.



Square wave response of M-22 at 1 kHz and at 100 kHz (2 V/cm) indicating excellent transient response; and distortion spectrums for M-22 at 1 kHz and 20 kHz for 30 W of output.

The culmination of Pioneer's creative design can be heard with the esoteric Series Twenty Class-A components which achieve the exceptional warmth and presence of valve-type amplifiers without the drawbacks of the old designs, and with the new Magni-Wide integrated amplifiers—SA-9800, SA-8800 and SA-7800—which achieve a real three-dimensional sound through the use of the very latest electronic circuitry.



Attenuator-type volume control of SA-9800.

THE SERIES TWENTY— A CLASS APART

The Series Twenty was launched two years ago as a challenge to the audio industry, designed to prove just how "high" fidelity could really reach if the cost factor were eliminated. Operating strictly in the Class-A mode, the amplifier (M-22) is admittedly low on efficiency (watts of output per power input) but unbeatably high on performance: low noise, "objective" distortion measurements taken to the third decimal, and a subjective "listening test" delivery praised by audio specialists world wide. In technical terms, the M-22 obtained the highest compliment which can be paid a hi-fi component when the British journal **Practical Hi-Fi** said the amplifier "can be regarded as the classic straight wire with gain". The engineer's dream of perfect linearity. But also one of the rare esoteric systems whose sound quality is so remarkable that it has repeatedly startled even the most untrained ears.

U-24 Stereo Programme Source Selector. Push-button-type switching system designed to multiply the input/output capabilities of the C-21 and other top preamplifiers. Allows hook-up of 3 turntables, 3 power amps, 2 auxiliary inputs, plus 4 tape inputs/outputs with all-combination monitoring and dubbing.

C-21 Stereo Preamplifier. With 2-stage differential amplifier in both equalizer and flat amplifiers and cur-

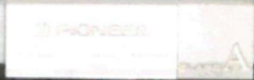
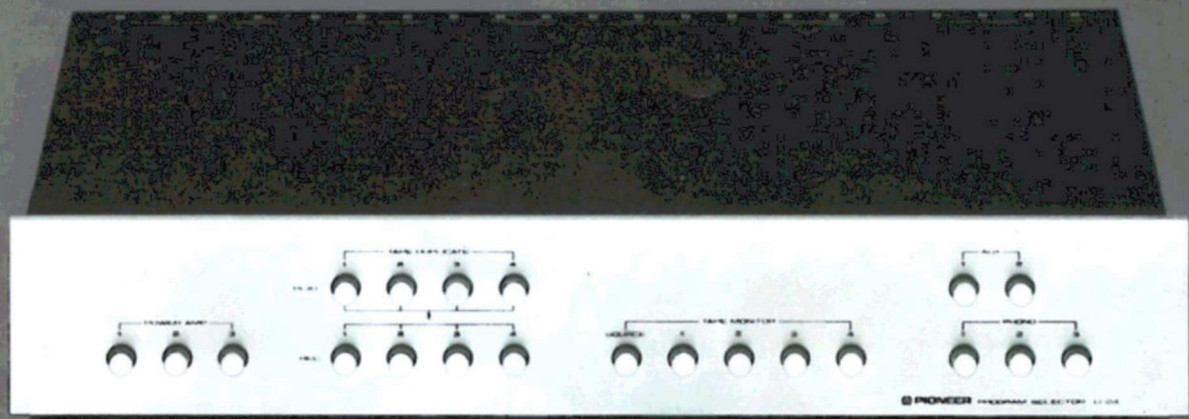
rent mirror loaded Single-Ended Push-Pull output. Permits 36 different phono loads and provides extra dynamic range thanks to wide spread between 2.5 mV input sensitivity and 300 mV overload level. Frequency response in AUX is a very wide 10 to 100,000 Hz (+0 dB, -0.2 dB). S/N ratio (AUX): 100 dB (IHF).

D-23 Multi-Amp Electronic Crossover Network. Versatile slope selection for the most advanced audio

applications. Each amp connected to this sophisticated CR filter system drives each speaker unit directly, without the intervening passive crossover network of conventional two or 3-way speakers. Four ranges with 11 crossover points (1 per 1/3 octave). Choice of 3 independent cut-off slopes of 6, 12 and 18 dB/octave.

M-22 All-Stage Class-A Stereo Power Amplifier. Non-switching, Class-A DC amp design providing

incomparable 3 dimensional response with improved channel separation and accurate image placement. Frequency response is a wide, wide 2 Hz to 150 kHz (+0 dB, -1 dB). And dynamic range is extended thanks to split power supply and low noise differential amp. S/N ratio: 106 dB. Continuous power output 30 watts per channel, min. RMS at 8 ohms, from 10 to 30,000 Hz, with no more than 0.01 % THD.



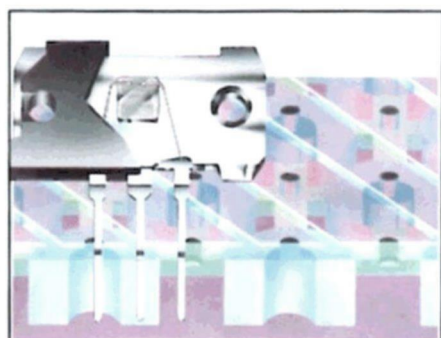
U-24
C-21
D-23
M-22

AMPLIFIERS: THE LINEUP

Establishing a new philosophy of amplifier design was only the first step toward remarkably improved hi-fi. The next step was to systematically remove all the distortions which affect the three target areas of frequency range, dynamic range, and timing.

3 CONDITIONS FOR 3 DIMENSIONAL SOUND

Dynamic range—the contrast between the softest and the loudest musical passages—is limited by now familiar distortions which tend to increase with power, as well as by componentry noise, which “hides” the softest sounds. Pioneer’s super-linear Ring Emitter Transistors (RETs), used for power output in the Magni-Wide amps in conjunction with a unique new biasing circuit, solve the distortion and power problems. The Pioneer Vari-Bias circuit (PVB) causes the RETs to operate without switching or crossover, virtually as Class-A power amps. Like the smooth automatic transmission of a car, it ensures a supersmooth “ride” for the electrons of the audio signal. And a combination of high grade components with a super-stable DC power supply extends the lower limit of dynamic range.



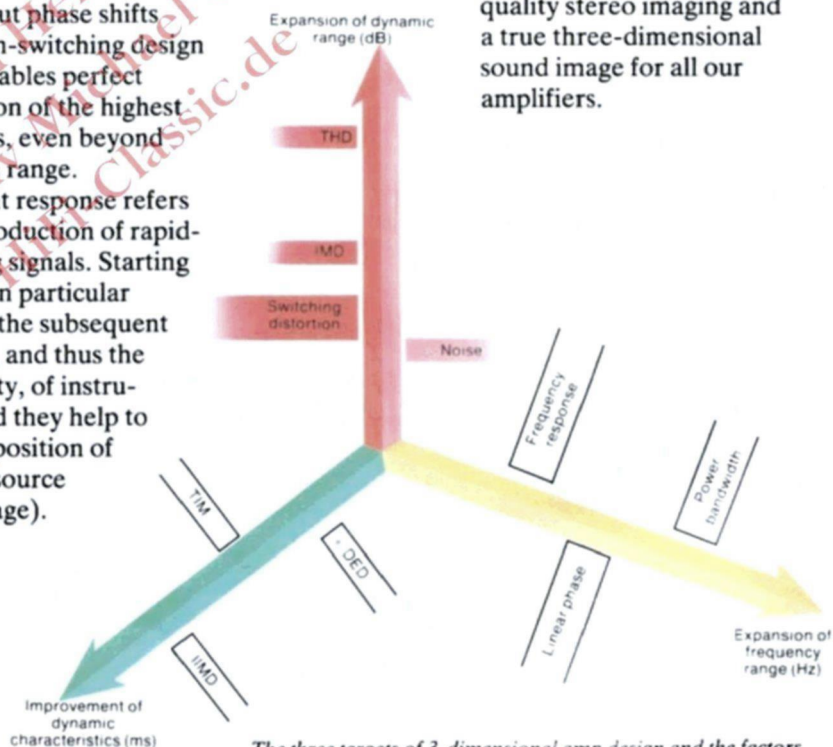
One of the 8 RET power transistors in the SA-9800, showing the semiconductor chip at its heart and a cross-section of this chip revealing ring emitters.

Frequency range is affected by phase shifts in the very low frequencies, by unstable frequency response, and by limited power bandwidth. Pioneer’s sophisticated DC amp techniques allow treatment of signals way down into the DC region (around 0 cycles per second) without phase shifts and the non-switching design (again!) enables perfect reproduction of the highest frequencies, even beyond the audible range.

Transient response refers to the reproduction of rapidly changing signals. Starting transients in particular determine the subsequent harmonics, and thus the tonal quality, of instruments. And they help to locate the position of the sound source (stereo image).

Fortunately, an amplifier capable of reproducing very high frequencies (cycles of 0.01 millisecond duration) will have no trouble with most transients. So Pioneer has had little trouble dealing with such distortions as Dynamic Envelope Distortion (DED) and Transient Intermodulation Distortion (TIM). And by carefully studying and matching impedances between amplifiers and speakers (i.e., by driving our amps under real speaker loads), we have significantly reduced one distortion which most amplifier designs don’t even consider: Interface IMD, caused by power returning from a speaker input and mixing with the amp’s output, somewhat like the undercurrent of a water wave.

The result of these techniques and of our Magni-Wide design policy is top quality stereo imaging and a true three-dimensional sound image for all our amplifiers.



SPEC-1 Professional Standard Stereo Preamplifier. Highly versatile preamp for 2 phono, tuner, 2 AUX and 2 tape with monitoring and dubbing. Admirably suited for live recordings, thanks to professionally calibrated volume attenuator, elaborate tone controls, microphone mixing capability and complete command of mode: single channel or full

mono, or reverse stereo. Features high and low 12 dB/octave filters, 3-position muting and adjustable phono input level. Direct-coupled 3-stage SEPP phono equalizer and split power supply. Only 0.03% THD from 20 to 20,000 Hz (2 V output).

SPEC-2 Professional Standard Stereo Power Amplifier. Continuous power output 250 W/channel, min. RMS at 8 Ω, from 20 to 20,000 Hz with no more than 0.1% THD and IMD. Class-A pre-driver stage, cascaded differential amplifier, Push-Pull drive, triple Push-Pull direct-coupled OCL output. Features independent level controls for

each channel, rear panel selector for 4 Ω or 8 Ω speakers, logarithmic peak level meters and advanced electronic protection circuit. Frequency response: 5 to 80,000 Hz (+0 dB, -1 dB).



SPEC-3 Professional Standard

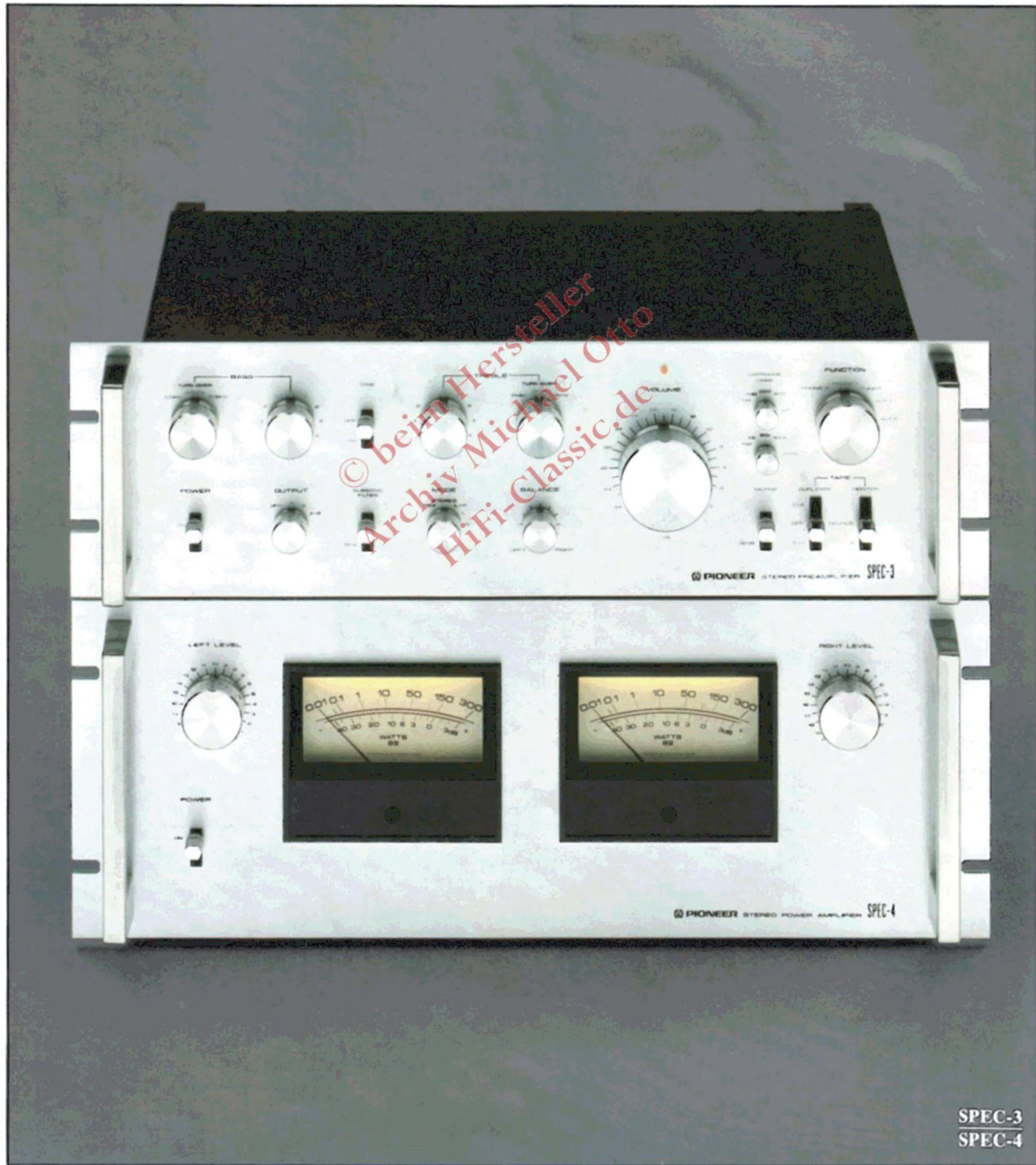
Stereo Preamplifier. Highly versatile preamp for 2 phono, tuner, 2 AUX, 2 tape with monitoring and dubbing, plus DIN tape jack. Recommended for serious disc and recording enthusiasts, as choice of 8 cartridge load settings permits continual upgrade of record playing equipment and two-way tape duplicate permits easy editing of recordings. Special features include subsonic filter,

4-gang, 32-step attenuator-type volume control, 3-step Turnover Tone Controls and elaborate stereo/mono options. Only 0.01 % THD from 20 to 20,000 Hz (2 V output, phono).

SPEC-4 Professional Standard

Stereo Power Amplifier. Continuous power output 150 W/channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, 0.01 % THD and IMD. Entirely separate split power supply with two huge transformers and two pairs of 22,000 μ F electrolytic capacitors is like having two separate mono amps on one chassis. Which means exceptional power reserve and stereo separation. DC configuration current mirror loaded differential amp with direct coupled output extends frequency range and

dynamic range and guarantees clean transient response. Frequency response: 5 to 100,000 Hz (+0 dB, -1 dB).



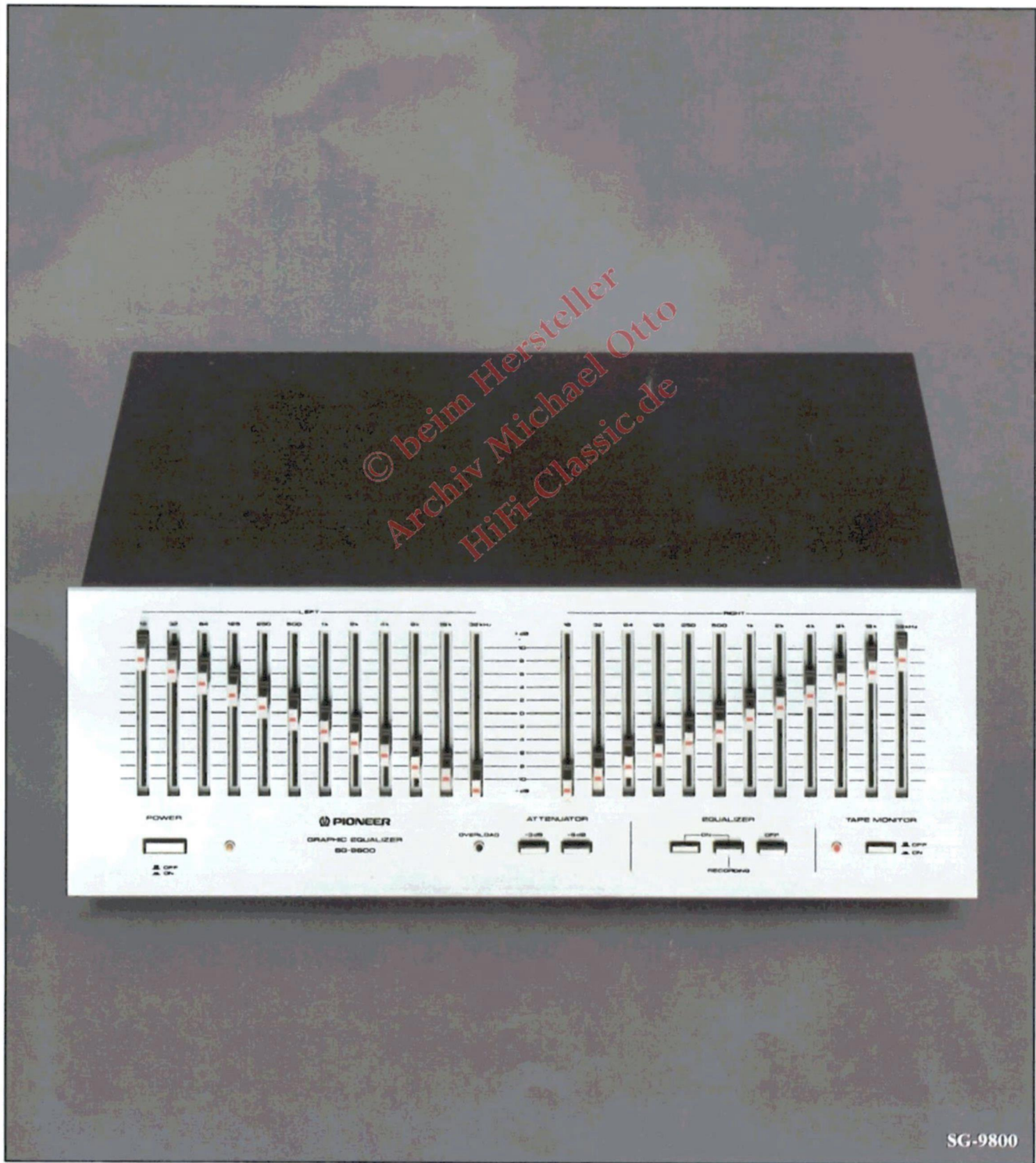
SPEC-3
SPEC-4

SG-9800 Stereo Graphic Equalizer.

For actual "hand tailoring" of hi-fi sound field through precise control (± 10 dB) of 12 different frequencies per channel (see specifications).

Wide frequency response (5-100,000 Hz) ensures clean modulation of audible range and punctual controls make it possible to emphasize specific instruments or voices. The SG-9800 can be used to improve the performance of other components by compensating for "holes" or "bumps" in their frequency response and can compen-

sate for irregularities in a listening room. It can also serve as a filter to reduce audible rumble from a turntable, by using the 16 Hz and 32 Hz slide controls, for example, and to modify the characteristics of a recording. Advanced design with 27 ICs replacing conventional coils and capacitors yields S/N ratio of 92 dB!



SG-9800

SA-9800 Magni-Wide Stereo Integrated Amplifier. Continuous power output 100 W/channel, min. RMS at 8 Ω , from 10 to 20,000 Hz, with 0.005 % THD and 0.002 % IMD. Regulated DC power supply ensures low noise for S/N ratio of 110 dB (AUX). All-DC power, flat amp, MC head and phono amps yield extra wide frequency response of 5 to 100,000 Hz (+0 dB, -1 dB) and eliminate phase and transient distortion. Super-linear RET non-switching direct-coupled output provides extra wide frequency/power range.

Features easy-to-read 20 segment fluorescent tube peak meters for instant peak displays, turnover tone controls, professional calibre volume attenuator, 12 dB/octave high and low filters, loudness, audio muting, all combination mode control, multiple cartridge load settings, two way tape duplicate.



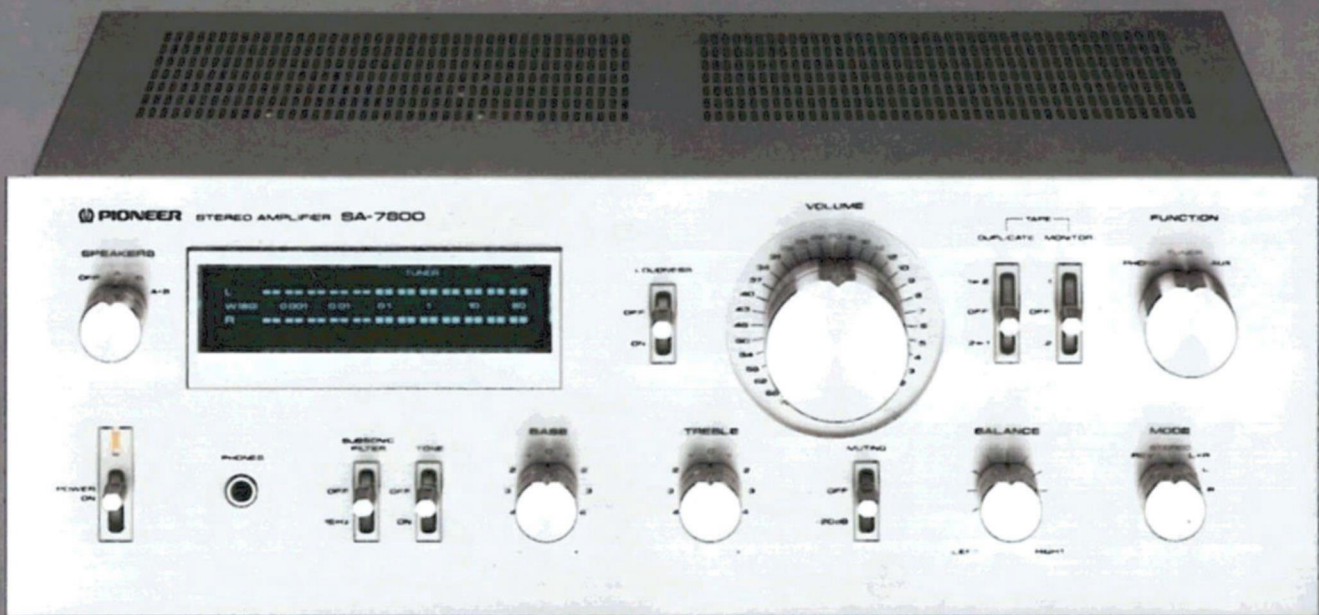
SA-8800 Magni-Wide Stereo Integrated Amplifier. Continuous power output 80 W/channel, min. RMS at 8 Ω , from 10 to 20,000 Hz, with 0.005 % THD and 0.002 % IMD. If you've upgraded your system to the limit at the speaker and cartridge ends, this may be just the amp to make the best of it. DC power and flat amps mean less phase and transient distortion. Non switching RET power transistors guarantee low distortion over super wide frequency/power range. New Fluoroscans meters allow precise control of out-

put for optimal speaker performance. Wide, wide frequency response of 5 to 100,000 Hz (+0 dB, -1 dB) means you'll hear all the sound in direct cut discs. Features include professional calibre volume attenuator, two-way tape dubbing, full mode selector and wide range of cartridge settings.

SA-7800 Magni-Wide Stereo Integrated Amplifier. Continuous power output 65 W/channel, min. RMS at 8 Ω , from 10 to 20,000 Hz, with only 0.009 % THD and 0.003 % IMD. DC design like that of SA-8800 and other Magni-Wide features deliver true 3 dimensional sound image with full control of mode and full tape copying capabilities. An amplifier to be watched while you listen, for visual comparison of the modulations you hear with the blue Fluoroscans meters.



SA-8800



SA-7800

SA-708 Stereo Integrated Amplifier. Continuous power output 65 W/channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with no more than 0.02 % THD. DC differential amp based on Magni-Wide design without capacitors in the negative feedback loop. Absence of phase delays results in better transients, low noise for improved dynamic range, and an outstanding stereo image. Frequency response is a wide 10 to 50,000 Hz (± 1 dB). Dual IC phono equalizer and high phono overload level (200 mV) let you take full

advantage of wide dynamic range direct-cut discs. Abundant control features, including two-way tape dubbing, Fluoroscans meters and 4-speaker capability make the 708 perhaps the "best buy" on the market.

SA-608 Stereo Integrated Amplifier. Continuous power output 45 W/channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with no more than 0.02 % THD. A good model for those who want the outstanding transient response of a DC power amp but don't need all the preamp control features of Pioneer's more elaborate models. Frequency response (10 to 50,000 Hz with no more than 1 dB variation from linear) is perfectly matched to

dynamic characteristics and power output. Signal-to-noise is a proud 100 dB. And you get the same single block Dual-IC phono equalizer as with the SA-7800.



SA-508 Stereo Integrated Amplifier. Continuous power output 25 W/channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with no more than 0.03 % THD. An AC amp with the same design parameters as the Magni-Wide series, resulting in an equally impressive 3 dimensional sound balance for a moderate sized listening room. And all the essentials for good control of 4 hi-fi speakers are included. Electronic Fluoroscans meters backed by 3 separate ICs

have 12 distinct segments for power reading per channel. Output stage is capacitor-less and differential input amp is current mirror loaded for extra low distortion.

SA-408 Stereo Integrated Amplifier. Continuous power output 20 W/channel, min. RMS at 8 Ω , from 30 to 20,000 Hz, with inaudible THD and IMD of 0.1 %. This elegant, small-sized amp is designed for small listening rooms with book-shelf type speakers and represents a fine "centrepiece" for a "first system" with a single turntable, a tuner and a cassette tape deck. Low profile

(88 mm) and narrow body (220 mm deep), combined with cool operation, make it possible to install this model almost anywhere, even inside of furniture.



SA-508



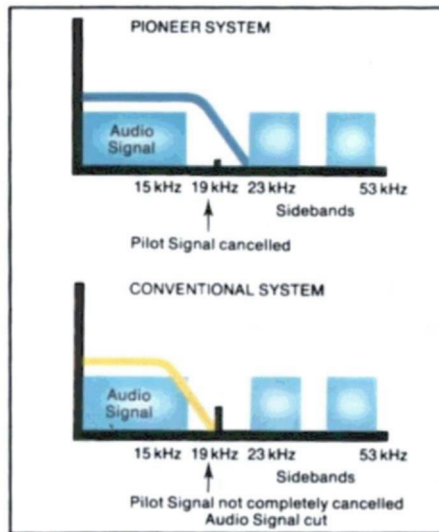
SA-408

TUNERS

As a programme source, radio presents two major advantages: it is free of distortions caused by such factors as soiling and warping of records and it provides a far greater range of quality programme material than any single individual is likely to possess, not to mention live transmissions.

SOUND IN THE AIR

However, the precariousness of audio signals carried through the air requires an extremely subtle technology of rock-steady reliability for tuners. Tuners are subject to interferences from magnetic and electrical fields generated by household appliances and automobiles and they tend to "drift" away from the set station. "Sensitivity" itself is useless without a reliable "front end" to strip the signal of noise and distortion, and without a stable oscillator or a tuning lock system to hold on to the signal. What's more, FM sound can be degraded if the filters used to remove the high frequency "pilot signal" sent along by the transmitter to trigger the tuner's stereo decoder are not "sharp" enough.



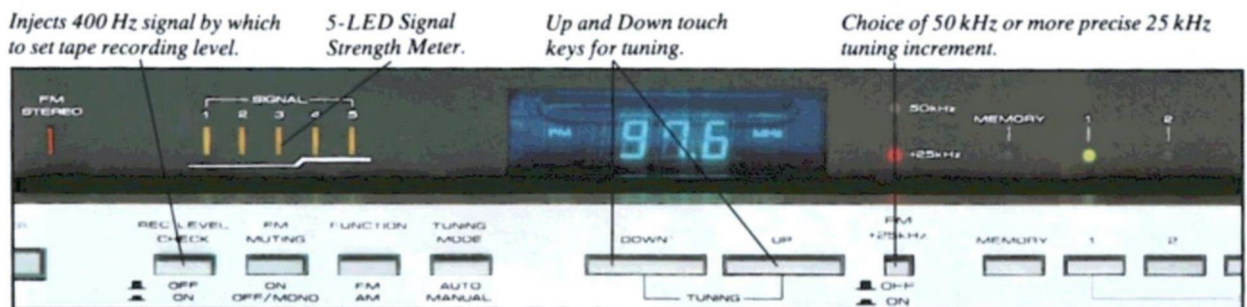
Comparison of Pioneer's Automatic Pilot Signal Canceller system with conventional pilot filters.

CATCHING THE SIGNAL AND KEEPING IT

The Pioneer tuners' legendary sensitivity is rendered possible by the quality of their "front end" circuitry. Thanks to its FET-equipped front end, even a moderately priced tuner like the TX-608, for example, can be given more "reach", without the danger of picking up a signal too weak for its capabilities. All our tuners have

exclusive Pioneer ICs to amplify the IF signal, followed by phase-linear ceramic filters for a clean, clear IF output. A special quadrature discriminator conserves signal stability against temperature and humidity changes, and another Pioneer exclusive IC in the FM stereo demodulator removes the station's pilot signal—with perfect precision and without filtering out music as well. As for holding on to a particular station, the most reliable automatic frequency controls are used, including quartz lock in the TX-9800.

But Pioneer has used quartz lock for some time. This year's state-of-the-art Pioneer tuner is the all-electronic TX-D 1000, with a digital memory for preset tuning. We adopted the particular circuitry of this model only after extensive testing proved it to be so reliable as to be definitive, in terms of the application of microprocessor technology to hi-fi. The specs are irreproachable, and the automatic functions are a dream come-true.



The tuning "dial" of the electronic TX-D 1000.

TX-D 1000 Digital AM/FM-Stereo Tuner. A true frequency synthesizer tuner with full logic control and electronic presets for 6 AM and 6 FM stations. Conventional tuning knob has been replaced by up and down touch keys for manual tuning. In automatic tuning you simply touch up or down key and tuner searches

automatically for good signal. Signal strength shows on 5-LED display and tuner begins to play. Special features include a recording level test generator, quartz lock on station frequency, exclusive Pioneer automatic pilot signal canceller and a completely orientable AM ferrite bar antenna. As for performance, 50 dB

quieting sensitivity in stereo is an outstanding 37.5 dB. FM selectivity is 60 dB. And distortion is a completely inaudible 0.08% (1 kHz, stereo).

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TX-D 1000

TX-9800 Quartz-Lock AM/FM Tuner. In the running for "most handsome tuner" on the market, and a good match for Pioneer's SA-9800 amplifier. Features drift-free quartz-lock tuning, WIDE/NARROW IF band selector for both FM and AM giving improved reception in all signal conditions, exclusive Pioneer Automatic Pilot Signal Canceller, 5-gang variable capacitor for FM tuning, and sliding manual indexes to help you remember best stations. S/N ratio (80 dB, stereo) and sensitivity (0.45 μ V DIN sensitivity,

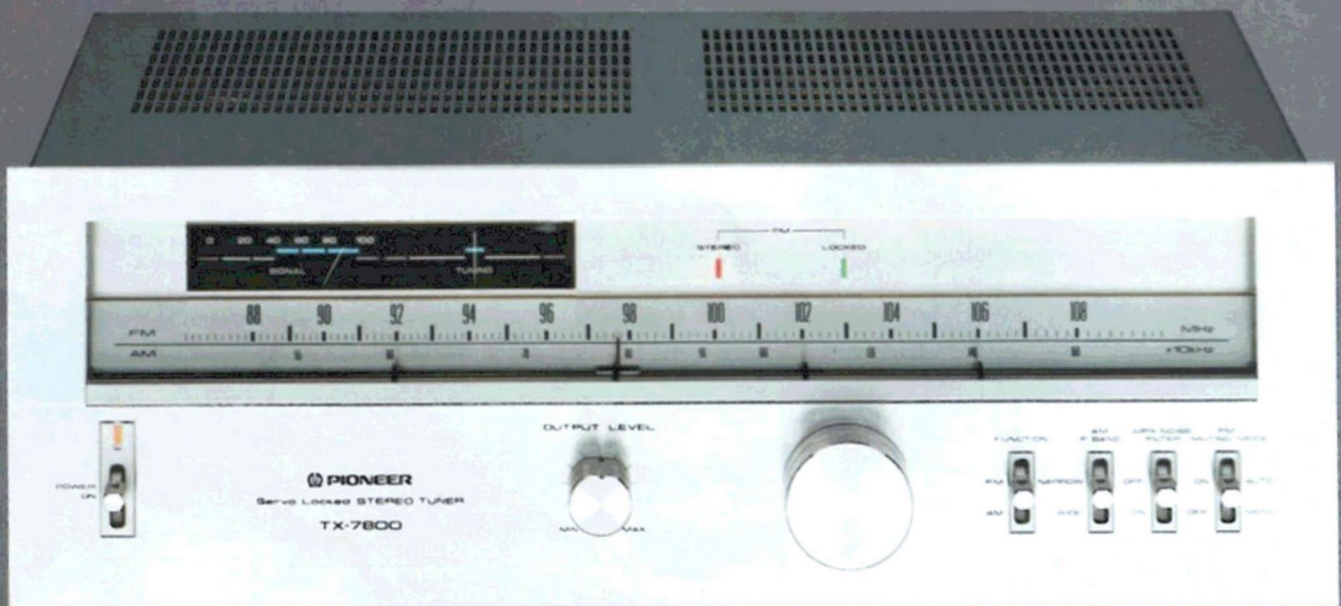
mono) are remarkable, thanks to 3 MOS-FETs in FM front end with 5 phase-linear ceramic filters.

TX-7800 AM/FM-Stereo Tuner. Basically the same design as the TX-9800, for a lower price, due to replacement of the quartz-lock with advanced servo-lock system to fight station drift, which can lock in ± 200 kHz from desired station. Features WIDE/NARROW band selector for AM, MPX noise filter, Auto Pilot Signal Canceller, sliding station markers and output level control for

matching with other sources and different amplifiers. Also boasts high sensitivity (0.55 μ V, DIN, mono) and low distortion: 0.08 % in stereo (1 kHz, at 85 dBf).



TX-9800



TX-7800

TX-608 AM/FM-Stereo Tuner.

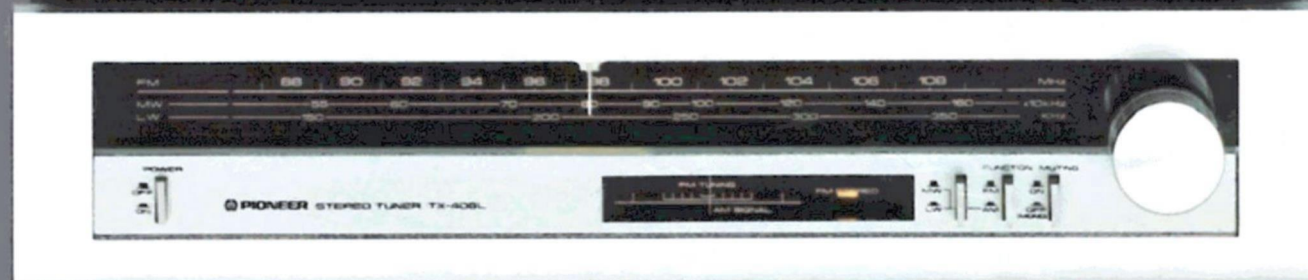
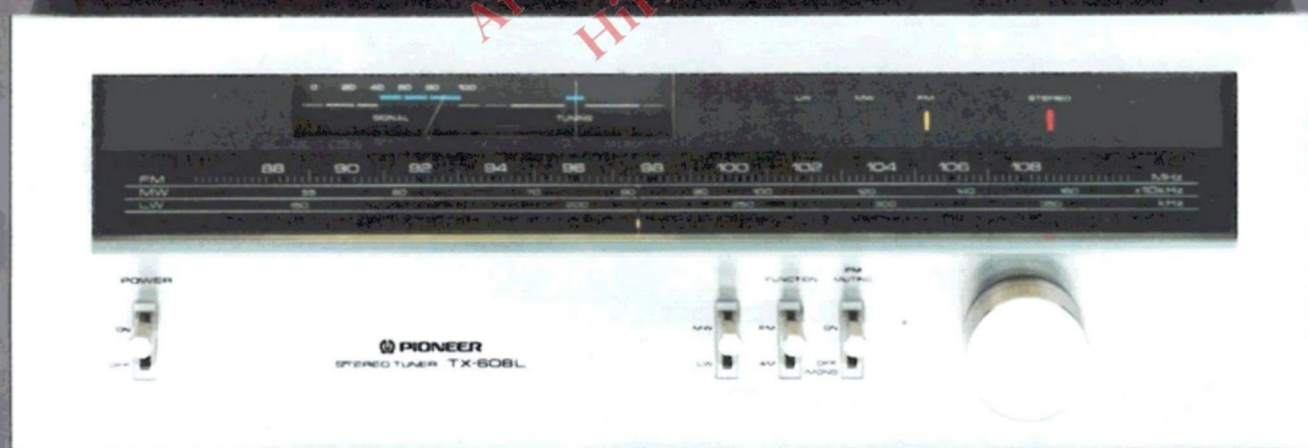
With extra long tuning dial and dual tuning meters for accurate tuning. Circuitry includes a FET front end for high sensitivity, paired phase-linear ceramic filters in IF section for clean audio output and interference rejection, and a PLL-IC MPX section with built-in pilot signal canceler. DIN sensitivity of $0.8 \mu\text{V}$ (mono) and high S/N ratio (74 dB, stereo; 80 dB, mono) put this tuner far above its popular price category in terms of performance.

TX-608 L 3-Band Stereo Tuner.

Exactly the same circuitry and performance as TX-608, but with separate medium and long wave broadcast bands specifically adapted to Europe. LW selectivity is an excellent 40 dB and S/N ratio is 50 dB.

TX-408 L 3-Band Stereo Tuner.

A very low-cost model with separate signal strength and centre-of-channel tuning meters for accurate FM tuning and separately calibrated LW and MW tuning dials for AM enthusiasts. FM Stereo S/N ratio: 72 dB. DIN sensitivity (FM): $0.8 \mu\text{V}$.



TX-608
TX-608 L
TX-408 L

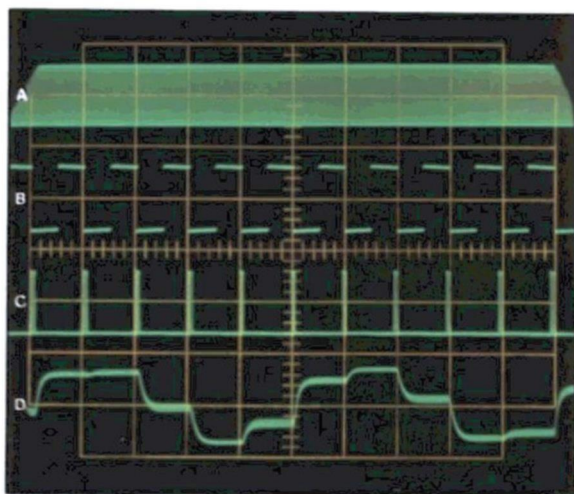
RECEIVERS

Like the Pioneer amplifier series, the Pioneer receivers benefit from the remarkable advances in sound reproduction made possible by direct current power supplies and direct-coupling of amplifier stages, without coupling capacitors in the negative feedback loop to interfere with transient response. Moreover, they include Pioneer's most reliable tuner features.

SOURCE AND POWER COMBINED

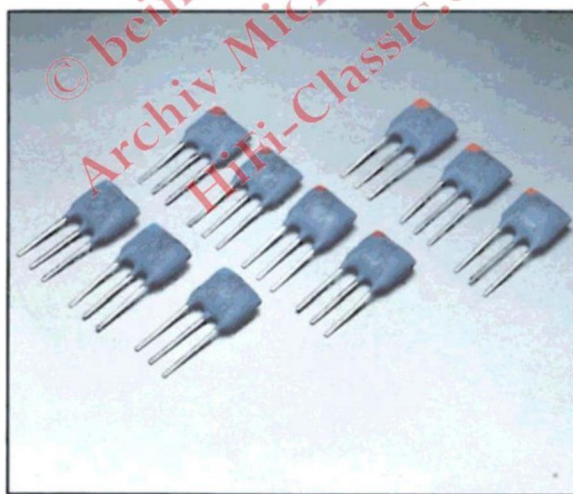
In the receiver, both a source of sound and power amplification are combined in a single component, making it a practically autonomous hi-fi system requiring merely the addition of a pair of stereo speakers. Unlike many other receiver lines, which tend to have lower quality tuners in less powerful receivers, the Pioneer receivers are all equipped with high quality tuner sections. We assume that an audiophile who doesn't care for much power may actually care very much about sound quality.

Among the top tuner features found in Pioneer receivers are



Waveform photos showing operation of Pioneer quartz lock circuit.

- A— Quartz oscillator produces accurate 6.4 MHz frequency.
B— Two digital ICs have divided 6.4 MHz into 100 kHz square waves.
C— 100 kHz sampling pulses produced by high-speed digital IC.
D— Pulses sample VCO frequency to produce control voltages relative to phase differences.



Phase linear ceramic filters used in SX-1980.

an Automatic Pilot Signal Canceller of surgical precision, sophisticated front end circuitry, drift proof quartz lock, and special controls which allow you to eliminate multipath distortion to prepare recordings off the air in the best conditions.

A HOUSEFUL OF SOUND

In terms of power, the Pioneer receivers offer a range from 270 watts per channel to 20 watts per channel with completely inaudible distortion. Besides the DC design and the good transient response which results, the most powerful receivers use a huge toroidal core transformer in their power supply, with separate windings for the left and right audio channels giving better stereo separation. Such transformers—the most costly and the most efficient in hi-fi—have fewer windings, so less energy is lost and more signal is delivered. The Pioneer receiver is more than just the centre of a hi-fi system. It can be the centre of a sound-conscious interior and fill an entire flat, even a house with sound.

SX-1980 Quartz-Lock AM/FM Receiver. The monster of high fidelity: 58,000 cubic cm and 540 watts (roughly 1/2 horsepower in mechanical terms) of power! Equipped with direct-coupled DC power amp, independent left/right power supplies and unique Quartz-Lock tuning completely immune to station drift. Con-

tinuous rated power output is 270 W per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, 0.03% THD and IMD. An extraordinary S/N ratio of 120 dB. Just -1 dB variation from perfectly flat response over a wide, wide 5 to 80,000 Hz. This is the machine for a large home with additional speaker systems upstairs and

in the garden. Drives 2 pairs of speakers simultaneously and features a pro-calibre volume control, multi-position cartridge load selectors, 2 phono inputs, 2-way tape duplicate, audio muting, Pioneer Twin Tone Controls with tone defeat, 12 dB/octave filters, and multipath detector.



SX-1980

SX-1080 AM/FM-Stereo Receiver.

With direct-coupled DC power amp. Continuous power output 120 watts per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with no more than 0.05 % THD and IMD. An ideal match for the HPM-110 speaker: that and a high end turntable constitute a total system for one attuned to classical music or other material with wide dynamic range. Wide (5 to 80,000 Hz) and linear (+0 dB, -1 dB) frequency response and excellent sensitivity: 50 dB quieting sensitivity of 37 dBf (39 μ V). Fea-

tures include professional volume attenuator, dual tuning meters, 4-speaker (A+B) capability, high and low filters to purify the sound of older records, Turnover Tone Controls with linear option for comparisons, tape monitoring and dubbing, auto pilot signal canceller and multipath detector for radio lovers, plus all the features of other comparably priced receivers.

SX-980 AM/FM-Stereo Receiver.

With direct-coupled-DC power amp. Continuous power output 80 watts per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with 0.05 % max. THD and IMD and flat frequency response (+0 dB, -1 dB) from 5 to 80,000 Hz. You pay for a little less muscle and get the same very high end performance as with the SX-1080 for a reasonable price. The SX-980 is loaded with high grade

components (over 90 expensive semiconductors, including 3 FETs and 8 ICs). All the features of the SX-1080 except audible multipath detector.



SX-1080



SX-980

SX-890/W 4 AM/FM-Stereo Receiver. With direct-coupled-DC power amp. Continuous power output 60 watts per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with no more than 0.05% THD and IMD. A handsome, smaller equivalent of the 80's series made for those who expect a rich 3-dimensional sound, but can do without certain manipulations of their stereo. Minimax tone and volume controls, loudness contour, rumble filter, tape duplicate, 4 speaker capability. PLL stereo MPX in tuner includes exclu-

sive Pioneer IC equipped with auto pilot canceller. Precise dual meters for power and tuning. Indicator lights for all functions. Unbeatable price/quality ratio.

SX-790/W 4 AM/FM-Stereo Receiver. With direct-coupled-DC power amp and same outstanding frequency response as top model, SX-1980. Continuous power output 45 watts per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with no more than 0.05% THD and IMD. CR-type tone control network circuited after control amp. Indicator lights show whether source or tape recording is functioning. Low noise filter, dual VU meters, and combined signal strength/station centre meter for tuning. Auto pilot canceller. S/N

ratio of 90 dB (AUX). Easily drives powerful high efficiency speakers like Pioneer's HPM-110 or HPM-70 for 108 dB of sound pressure in a medium to large (800 m³ to 1,200 m³) listening room.



SX-890/W4



SX-790/W4

SX-690/W 4 AM/FM-Stereo

Receiver. Direct-coupled power amp output with 2 hybrid ICs and differential amp in first stage for improved stability. Continuous power output 30 watts per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz, with an inaudible 0.1 % THD and IMD. Tuner section includes exclusive Pioneer PLL MPX IC with auto pilot canceller. Features 4 speaker capability, boost and cut CR-type tone controls, two tape and auxiliary sources, loudness contour and indicator lights for tape

monitor and source. With its respectable power output and 75 dB S/N ratio in phono, this is the receiver for a first system of high quality, for those wishing to spend more on a high-priced turntable, for example.

SX-590/W 4 AM/FM-Stereo

Receiver. Performance comparable to SX-690, with less muscle: continuous power 20 watts per channel, min. RMS at 8 Ω , from 20 to 20,000 Hz and no more than 0.3 % THD and IMD. Lower power can easily be made up with more efficient speakers. One of the best buys in the market for its price category, considering the wide frequency response: 10 to 60,000 Hz (+ 0.5 dB, - 1.5 dB). Small size permits concealment in home furniture for those who prefer invisible-fi.



SX-690/W4



SX-590/W4

LX-690/W 4 3-Band Stereo Receiver. Medium and long wave capability make this receiver ideal for persons who want information as well as entertainment from their radio. Front panel control for internal or external antenna also makes it suitable for all reception conditions. Includes same MPX IC with pilot signal canceller, same tone control and NFB circuitry as SX-690. High gain, low noise FM front end achieves high sensitivity ($1.9 \mu\text{V}$) thanks to combination of 3-gang variable capacitor and dual-gate

MOS-FET. And continuous power output of 30 W/channel, min. RMS at 8Ω , from 20 to 20,000 Hz (0.1% THD and IMD) guarantees quality hi-fi sound.

LX-590/W 4 2-Band Stereo Receiver. The smaller brother with continuous power output of 20 W/channel, min. RMS at 8Ω , from 20 to 20,000 Hz (0.3% THD and IMD), enough to fill an average flat with sound from all types of sources. High selectivity LW section provides a very clean reception of programmes in Europe's most crowded broadcast band. Includes same precise Auto Pilot Signal Canceller for FM as Pioneer's most expensive models.



LX-690/W4



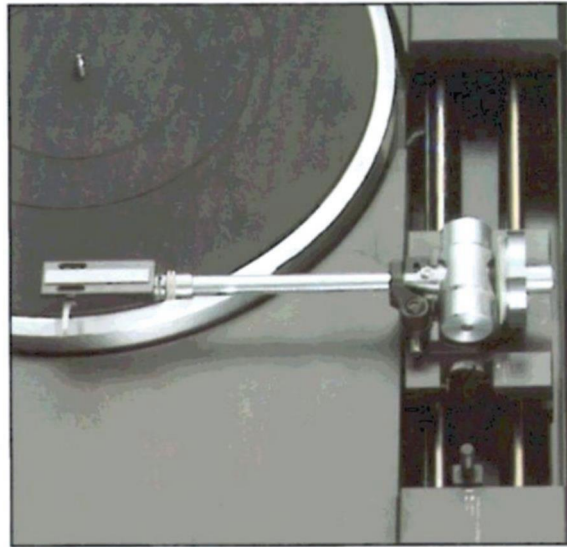
LX-590/W4

TURNTABLES

To keep the audio signal intact as it is transformed by the phono cartridge from its mechanical energy form in the undulations of the record groove into an electromagnetic signal, the record must be kept rotating at a constant speed. And the stylus and arm assembly must move with near absolute compliance along the groove without interference from vibrations of any type.

AN ABSOLUTELY PRECISE 33 1/3 RPM

In regard to rotational accuracy, which is the major factor in accurate reproduction of pitch, the Pioneer range is a marvel of perfection. The most accurate timing device known to man—the quartz crystal—has been used in all our turntables except the budget priced direct-drive PL-200 and the all-time favorite belt-drive PL-512. By electronically comparing platter speed with the quartz' natural oscillation via highly sensitive Hall elements,



Linear tone arm of PL-L 1000.

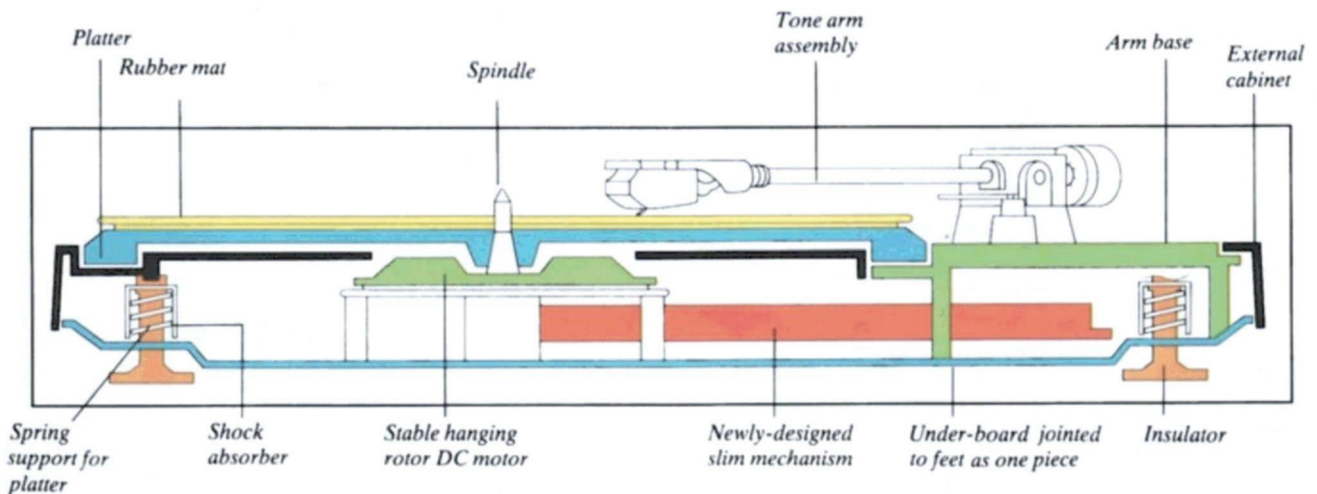
the Pioneer turntables never fail to give you exactly 33 1/3 revolutions per minute (or 45 rpm, if you so choose), no matter what the load.

A TANGENTIAL ARM UNLIKE ANY OTHER TONE ARM

Now Pioneer present what may well be the most advanced turntable design in hi-fi: the PL-L 1000, a linear track-

ing system which puts to shame all the tangential arm prototypes seen to date. Like other tangent arms, it moves in a straight line across the disc, exactly like a record cutting stylus. But unlike other tangential arms, which suffer from vibrations due to the arm drive mechanism, the Pioneer arm achieves a truly remarkable S/N ratio, because its direct-drive linear motor generates its motive force without the intervention of mechanical parts, by converting electrical energy directly into kinetic energy. In addition, this arm can

be manually operated and allows you to change the cartridge like any universal tone arm. So you can use the best cartridge you can afford, for the best turntable you can afford.



Side view of Pioneer coaxial suspension system used in all direct-drive models. Shown here with Pioneer-exclusive slim motor used in PL-200 X - 300 X and - 400 X.

PL-L 1000 Linear Arm Direct-Drive Turntable. Full automatic electronically controlled turntable with all controls, including arm lift, operable from front panel with dust cover closed. Platter is driven directly by Pioneer's finest quartz-controlled Hall motor for unbeatable $\pm 0.035\%$ (DIN) wow and flutter.

Unique Pioneer-designed tangential arm powered by a direct-drive linear motor allows stylus to be literally pulled along the record groove and across the record in a straight line. Result is lower tracking error, lower cross talk and distortion due to virtually insignificant lateral pressure, less resonance due to shortness and rigid-

ity of arm, and truly exceptional S/N ratio of 78 dB (DIN-B). Tone arm height is adjustable by ± 3 mm. Insulated cabinet has a 3 mm thick aluminum die-cast panel for mounting of tone arm and platter motor.



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PL-L 1000

PL-600 X Full-Automatic Quartz Direct-Drive Turntable. DC servomotor locked to quartz timer via Phase Locked Loop (PLL) IC and Hall element for speed monitoring. Sample and hold system converts speed-proportional frequency directly into drive voltage with no "ripple". Platter is connected directly to one-piece motor shaft/spindle. LED and phototransistor opto-electronic system detects tone arm position and triggers separate DC arm motor for lift and return. Two ICs, each equivalent to 5,000 transistors,

control other automatic functions. All controls, including arm elevation, designed to be handled from front panel with dust cover closed. Wow and flutter are kept to a remarkable $\pm 0.035\%$ (DIN).



PL-600 X

PL-500 X Full-Automatic Quartz Direct-Drive Turntable. With same motor and drive system as PL-600 X and a separate Warren motor for automatic tone arm operations, including repeat. All functions are handled from front panel with dust cover closed, by soft-stroke micro-switches. Employs Pioneer coaxial

suspension to fight both air-transmitted and ground-transmitted vibrations. Special steel base plate. Wow and flutter: $\pm 0.035\%$ (DIN).



PL-500 X

PL-400 X Full-Automatic Quartz Direct-Drive Turntable. With DC Hall motor which avoids speed fluctuations due to instability of household AC current. This is a turntable of the Pioneer range, offering all the same features as higher-priced models, but without a second motor for tone arm. You still get Pioneer's outstanding sound quality and special

features such as coaxial suspension and anti-howling cabinet. And wow and flutter are still kept to an amazing $\pm 0.035\%$ (DIN).



PL-400 X

PL-300 X Quartz Direct-Drive Auto-Return Turntable. Same motor as in PL-400 X, which is actually the world's thinnest direct-drive DC motor for turntable use, with spindle raised to assembly's centre of gravity to improve balance and reduce wobble. This permits extra-slim overall design. Single-stripe strobe is all that is needed to let you monitor the always-perfect rotational

accuracy of this full-stop auto-return model. Tone arm and motor are protected from vibration by Pioneer's coaxial suspension. Wow and flutter: $\pm 0.035\%$ (DIN).



PL-300 X

PL-200 X Direct-Drive Auto-Return Turntable. With FG (frequency generator) servomotor using a 200-pulse speed monitoring system. We've yet to find a competing model with direct-drive and such features as a 4-stripe strobe, $\pm 2\%$ pitch control, coaxial suspension and steel bottom plate at such a low price, not to mention wow and flutter of only $\pm 0.035\%$ (DIN).



PL-512 Belt-Drive Manual Turntable. The only reason we keep this belt-drive model when all our production line is geared to producing direct-drives is . . . popular acclaim. Indeed, the PL-512 has been a favorite of audio novices as well as audio purists (who actually prefer handling their equipment manually) for so long that we'd be accused of murder if we did away with it. Here's why: the 4-pole synchronous motor and high-precision drive system, using the belt to damp vibrations, achieve a remarkable $\pm 0.06\%$ (DIN)

wow and flutter rate within the first 3 seconds and for hours thereafter. And thanks to the corrugated insulator feet and the 30 mm thick high-density particleboard cabinet, there's almost no unwanted vibration. The 65 dB S/N ratio (DIN-B) may be another reason. Check it out for yourself.



PL-512

CASSETTE DECKS

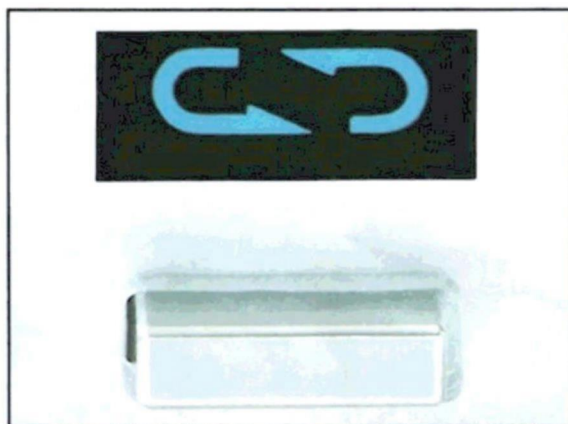
Cassettes initially conquered the audio world on the basis of their convenience. Now we're proud to say all the Pioneer decks have joined the hi-fi world on the merits of their sound quality.

THE REVOLUTIONS AGAIN

As with discs, precise reading of signals stored on magnetic tape requires near absolute regularity of rotation. Pioneer's tape transport motors are servo-controlled via Hall elements, so that any deviation from 4.75 cm per second is immediately detected and corrected. (In the CT-F 1250, the timing pulse, or reference signal, is provided by a quartz crystal oscillator, as in Pioneer's most advanced direct-drive turntables.) Accuracy is also enhanced by Pioneer's exclusive Tape Slack Canceller which tenses the tape before play.

A WORD ON NEW METAL TAPES

Besides offering every conceivable tape deck option, from auto-reverse in the CT-F 750 to auto-search and play in the CT-F 650, not to mention the micro-processor memory functions of the two top models, the entire Pioneer range has been especially redesigned



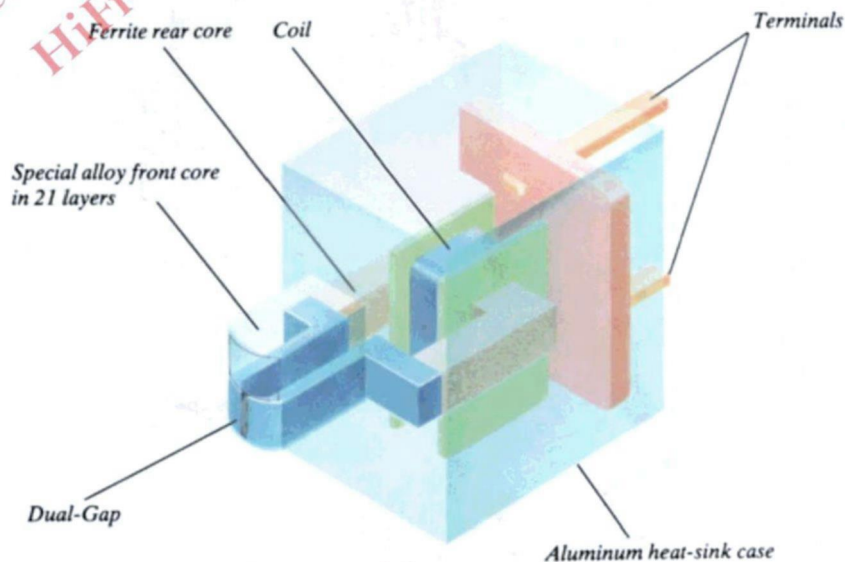
Display window of CT-F 750 indicating it is set in auto-reverse and repeat mode for endless play.

this year to accommodate the pure metal tapes now appearing on the market. These tapes, using non-oxidized metal particles, can absorb much more sound information, with lower noise and distortion, than the best oxidized tapes.

However, the special qualities of metal tapes cannot be reliably procured merely by modifying the bias and equalization circuits on conventional decks. The heat generated by their

more abrasive surfaces and their resistance to erasure require complete redesigning of conventional decks. This Pioneer has done. Even the head amplifiers have been redesigned and given more "headroom". And while other makes have had to abandon certain speed control mechanisms to accommodate "large window" erase heads for metal, Pioneer have developed a unique composite core, dual-gap "small window" system which has allowed them to conserve their

closed-loop Dual Capstan drive. The front part of this head is formed of a special alloy of iron, aluminum and silicon in no fewer than 21 separate "slices", each less than 0.1 mm thick, which offers a saturation magnetic flux density far superior even to that required for metal tapes. These are the kind of features which make a Pioneer deck a real investment in non-obsolescence and in long-term, low-wear reliability.



New Pioneer "Small Window" erase head for metal tapes.

CT-F 1250 Quartz Direct-Drive Stereo Cassette Deck. An advanced microprocessor-controlled 2-motor, 3-head system equipped with Pioneer's exclusive metal erase head. Digital memory for auto-play, stop and rewind at any point on the tape. LED assisted tape calibration for fine setting of bias, equalization and

recording level to ensure recordings of same level as original and for all tapes, including those now in the experimental stage. Features auto-tape slack canceller, 24-segment fluorescent level meter switchable for average, peak and peak hold display, electronic 4-digit counter, which can be read from a distance, $\pm 5\%$ pitch

control, REC muting, mix/line mixing, and switch for external timer. Specifications include remarkable wow and flutter; widest cassette frequency response ever (25 to 18,500 Hz (± 3 dB) with FeCr and metal tapes); and more than 59 dB S/N ratio, without using the Dolby!



CT-F 950 Microprocessor-controlled Stereo Cassette Deck with Double Dolby®. Two motors: one electronically-controlled DC servo-motor for tape transport and dual-capstan direct-drive DC motor for reel drive, backed by a dual-in-line, 24-pin C-MOS LSI (Large Scale Integrated Circuit). Double Dolby 3-head design allows you to hear effect of Dolby noise reduction as you record.

Digital memory functions like those of CT-F 1250: auto play, stop, rewind, and repeat. Includes auto-tape slack canceller, Pioneer exclusive metal tape erase head, automatic CrO₂ and metal tape detector, and fluorescent Digitron vacuum-tube level meter displaying average, peak and peak hold. Peak reading allows you to accurately follow the shortest musical transients and peak hold lets you know, after one brief practice run, what maximum level to expect from any programme. High over-

load level (100 mV 30,000 Ω) for microphone input allows wide-dynamic live recording. Wow and flutter: ±0.14 % (DIN).

* Dolby is a trademark of Dolby Laboratories, Inc.



CT-F 950

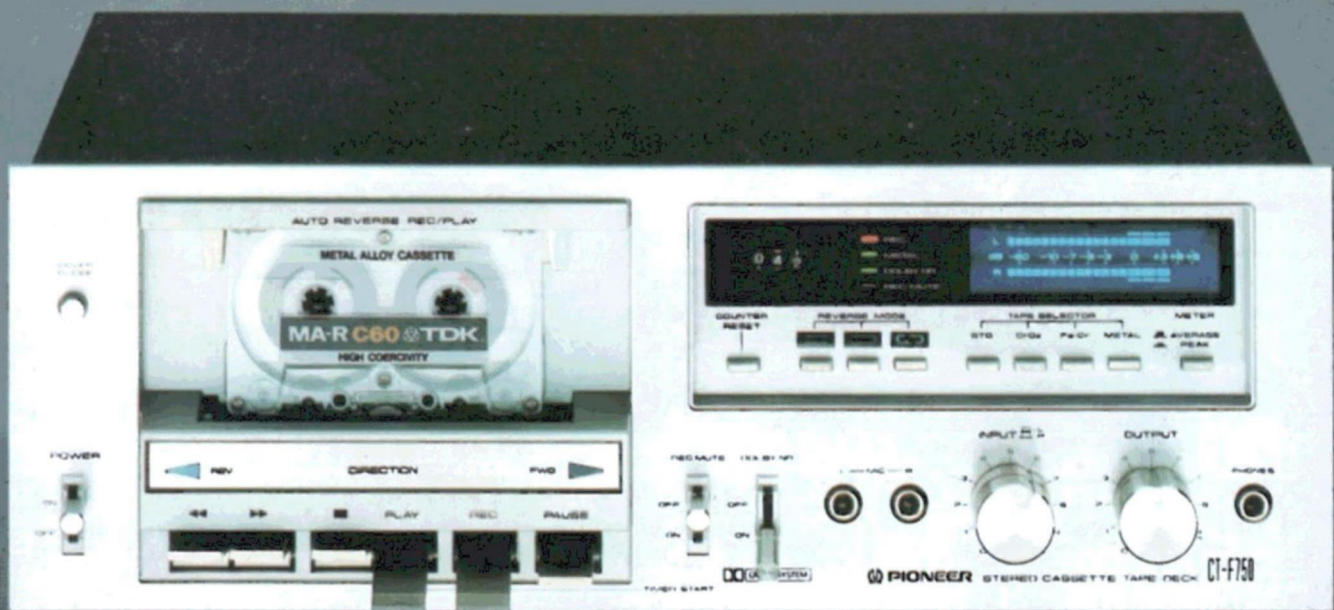
CT-F 850 2-motor, 3-head Stereo Cassette Deck. With electronically controlled DC servomotor and closed-loop dual-capstan system for reel drive. Three-in-one combination SENDUST head allows monitoring of actually recorded sound. Fast-acting average or peak reading fluorescent level meter. Auto CrO₂ tape detector. Auto-tape slack canceller. External timer adaptor. Like the CT-F 950, an investment in non-obsolescence, thanks to all-tape calibration.

CT-F 750 2-motor, 3-head Auto-Reverse Stereo Cassette Deck. For long-playing convenience in both REC and play with DC servo and dual-capstan motors. This is the first auto-reverse deck which is also metal-tape-capable. Unique (4-channel) stationary REC/PLAY head is more reliable than swivel or revolving 2-channel types. Noise free turnabout in less than 0.3 second. Features REC(ording) mute switch for editing tape as you record, with no need to set input control at 0, where you might forget it. Plus auto-

tape slack canceller, peak or average reading fluorescent meter, auto-stop, external timer adaptor for unattended recording, and special PA-4001 IC head amplifier. Wow and flutter: $\pm 0.17\%$ (DIN). Frequency response (FeCr and CrO₂): 25 to 16,000 Hz. S/N ratio: more than 59 dB, without using Dolby noise reduction. Mic overload level: 100 mV.



CT-F 850



CT-F 750

CT-F 650 Auto-Search Stereo Cassette Deck. Special model with Pioneer Music Select (PMS) system and cue and review capability, which automatically selects specific sections of the tape for playback, and lets you monitor at double speed for quick manual cueing of desired portion. REC MUTE triggers timing light for 4-second spacing of recordings. Metal tape capable thanks to specially designed anti-abrasive Hard

Permalloy REC/PLAY head, PA-4001 IC head amplifiers and Pioneer exclusive small window erase head. Also features fluorescent peak meters and external timer adapter. Wow and flutter: $\pm 0.17\%$ (DIN).

CT-F 600 Basic 2-head Stereo Cassette Deck. With all the required hifi features including Dolby* noise reduction, electronically controlled DC servomotor and multiple tape selector. Fluorescent peak meter warns you when you are recording too high with too many peaks beyond +3 dB. Built in timer system.

*Dolby is a trademark of Dolby Laboratories, Inc.



CT-F 650



CT-F 600

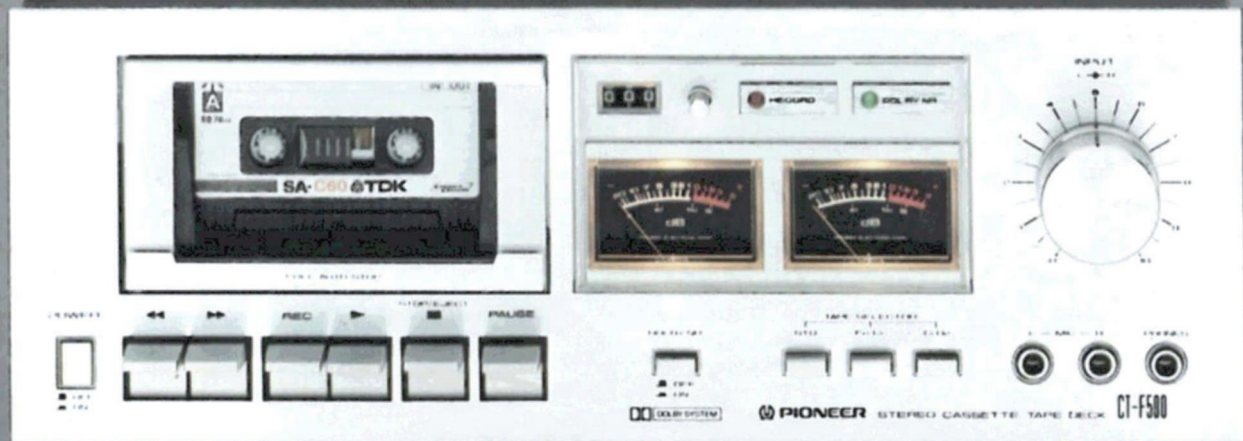
CT-506 Full Auto-Stop Stereo Cassette Deck. With same design and features as CT-F 500 and rectangular controls, made especially for rack-mounting in one of Pioneer's cabinets.

CT-F 500 Full Auto-Stop Stereo Cassette Deck. With vertical loading door damped pneumatically for smooth, noise free operation and easily removed for access to heads. Drive system using single DC servomotor with two belts for independent drive of capstan and take-up reel and a large die cast flywheel is as stable as many competing 2-motor systems. Record/play head is "Hard Permalloy" and erase head is of fer-

rite. Wow and flutter: $\pm 0.17\%$ (DIN). Frequency response: 40 to 15,000 Hz (± 3 dB) with CrO₂ tape. Signal-to-noise ratio (Dolby on): 64 dB.



CT-506



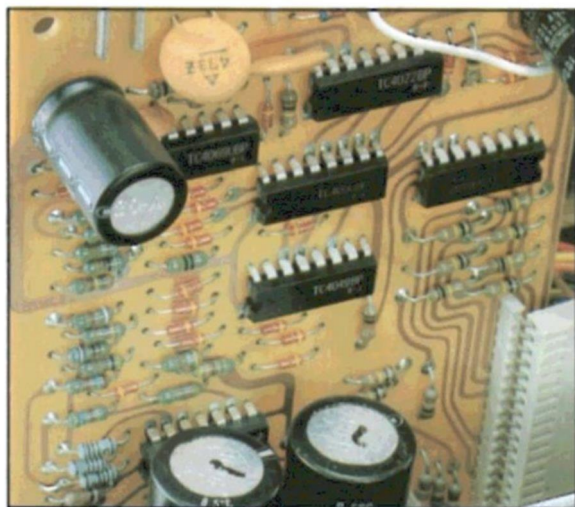
CT-F 500

OPEN REEL TAPE DECKS

Extended frequency response is the major advantage of the open reel format. Technically, because the tape runs more quickly, more data can be packed into a given moment. Which means a richer musical spectrum. In practical terms, the large reels afford longer play than discs and cassettes, with an exceptional sound quality. As the traditional "favorite tool" of audio professionals, open reel decks have always been equipped with a maximum of recording controls.

OPEN REEL DECKS THAT LOOK LIKE CASSETTE DECKS

Pioneer have long furnished open reel decks to the audio experts. Witness the paragon of versatility, the RT-2022, which can even be transformed by the user from a



Inside the RT-909: several ICs to handle the electronic counter and the peak display.

2-track, 2-channel system into a 4-track, 4-channel system simply by switching head assemblies and adding an amplifier (sold as separate acces-



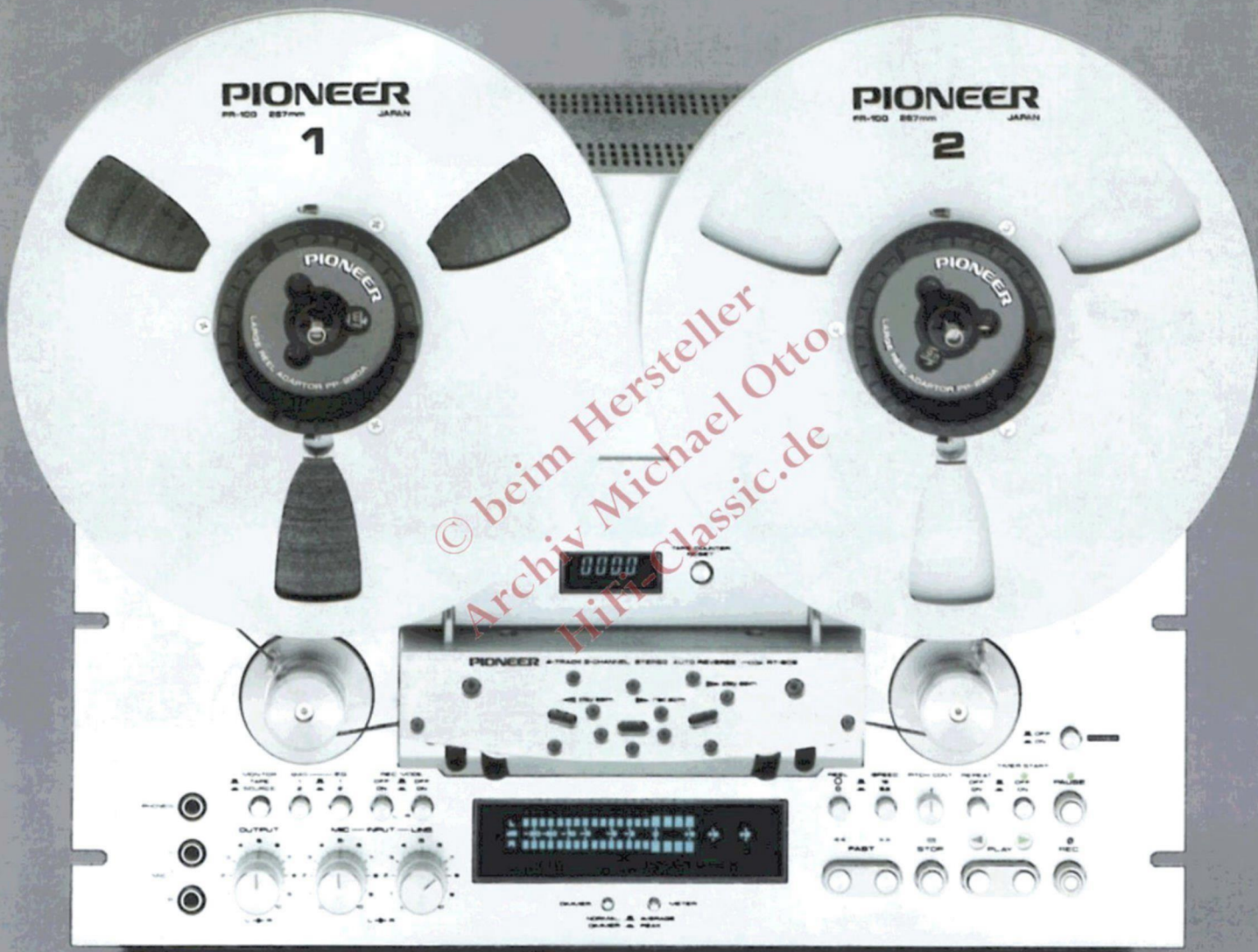
The RT-909's super reliable tape transport system.

sories). Now, we present two decks that combine the operational ease of cassette decks with the professional capabilities of open reel: the RT-909 and the RT-707. They even **look like** cassette decks! But they offer even longer play than with conventional open reels, thanks to auto-reverse, and a truly exceptional sound. The RT-707 was the first professional-type deck created which can be rack-mounted alongside other hi-fi components. And the RT-909 brings all the advanced electronics used to boost the quality of cassette sound right into the open reel world. Each of these decks is liable not only to draw cassette enthusiasts toward open reel, but also to change the habits of quite a few open reel traditionalists.

RT-909 Auto Reverse Direct-Drive Stereo Tape Deck. Two-speed, 3-motor, 4-head design giving you a professional standard frequency response from 20 to 28,000 Hz (DIN) with all the operational ease of a hi-fi cassette deck. Features a 24 segment fluorescent meter switchable for peak or average level reading and

a 4-digit electronic counter. Closed loop dual-capstan tape transport works with a frequency-controlled DC motor and two other logic controlled reel motors to achieve wow and flutter of $\pm 0.1\%$ (DIN) at high play speed (19 cm/sec.). Permits

monitoring of recording and accomodates professional 26.5 cm \varnothing reels for extra long play, even without using the repeat.



RT-707 Auto Reverse Direct-Drive Stereo Tape Deck. Three-motor, 4-head system with FG Servomotor for capstan drive and 2 6-pole special induction motors for reel drive. Two playback heads, auto-reverse and repeat, combined with 4-track format, make continuous play possible—at 9.5 or 19 cm/sec. Features 4 bias/equalizer values, $\pm 6\%$ pitch control, electronic switching, line/mic mixing, independent L/R chan-

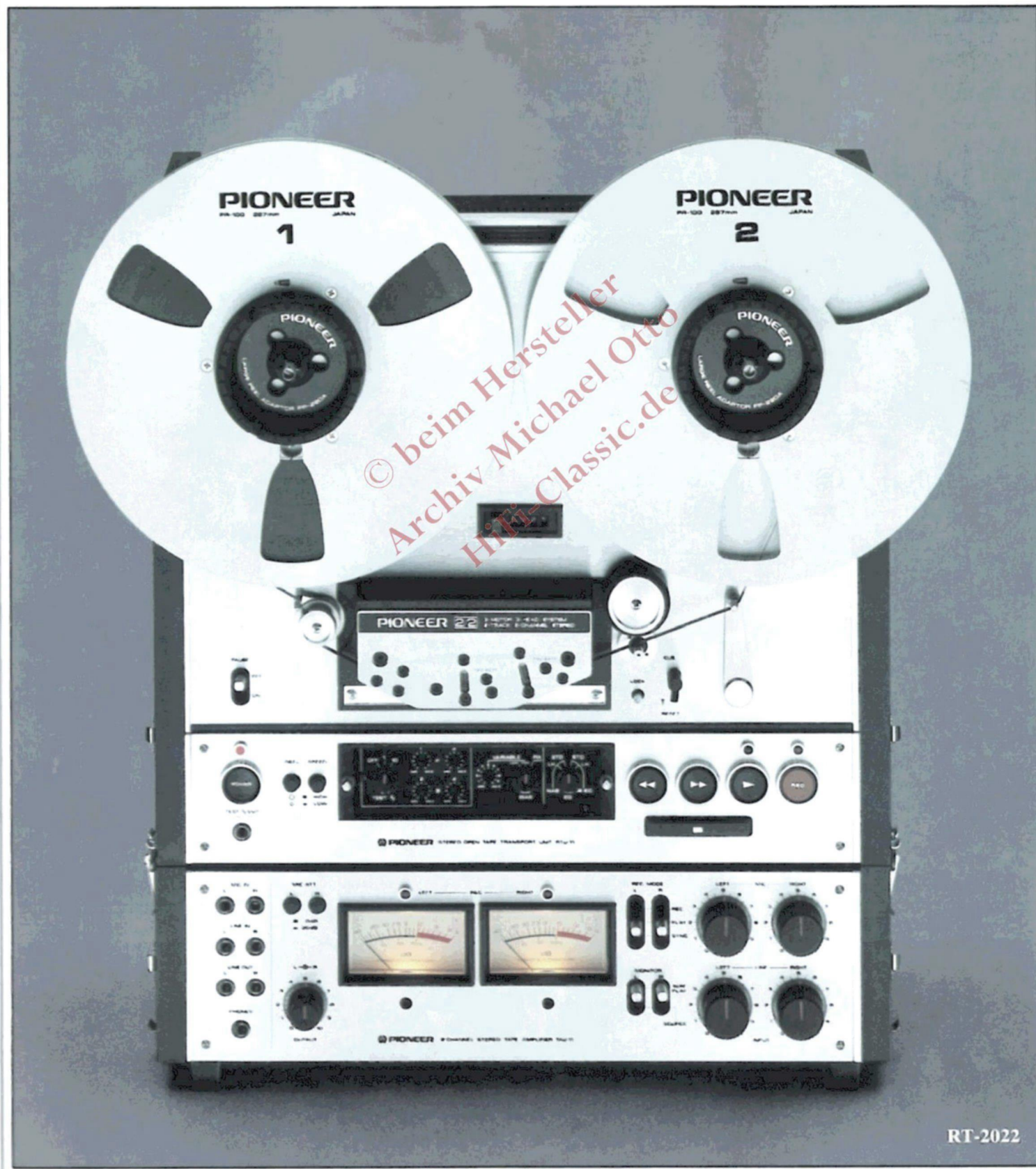
nel recording, and pause indicator light. Frequency response: 30 to 24,000 Hz (DIN, at 19 cm/sec.). Wow and flutter: $\pm 0.14\%$ (DIN, 19 cm/sec.).



RT-2022 High-Speed Belt-Drive Professional Deck. Three-motor, 3-head system with separable amplifier, tape transport and head units. Tape heads can be easily replaced with JT-2044 T unit for quick switch from 2-track to 4-track and even to 4-track, 4-channel format with an extra TAU-11 amplifier. Record heads also "play" for monitoring of perfect sync during multi-tracking with unit's synchronomonitor mechanism.

Tape speeds: 19 and 38 cm/sec. High speed offers extended frequency response and dynamic range, and reduced wow and flutter (thanks to increased flywheel effect). Features variable bias, NAB and IEC equalization, lock-type pause and cueing for easy editing, independent line/mic mixing controls for sound on sound, sound with sound, and echo recordings, delayed logic function buttons, expanded dynamic range meters, built-in test oscillator for checking of record and playback conditions, and full remote control

mechanism for use with optional accessory. Frequency response: 30 to 35,000 Hz (DIN, at 38 cm/sec.). S/N ratio: 55 dB (DIN). Wow and flutter: $\pm 0.06\%$ (DIN). Takes 26.5 cm \varnothing professional reel.



RT-1011 L Four-Track Belt-Drive Stereo Tape Deck. Three-motor, 3-head system with built-in mixing amplifier and autorecord facility for use with preset timer. Four-track format offers up to four hours of playing time with professional 26.5 cm reel. That's why construction is extra rugged, with 5 mm thick front chassis panel and diecast framework. Features solenoid-operated direct-changeable function buttons, hyperbolic permalloy heads, 2-speed hysteresis synchronous motor for 19 cm/sec. and 9.5 cm/sec. capstan

drive and two special induction motors for reel drive. Ultra-stable motor is coupled with a large (100 mm \varnothing) flywheel and precision (0.2 μ error) capstan. Offers two bias and two equalization values and lockable pause for recording and editing. Frequency response: 30 to 24,000 Hz (DIN, 19 cm/sec.). S/N ratio: 50 dB (DIN).



HEADPHONES

Monitor 10 Dynamic stereo headphones with 57 mm free-edge polyester film cone drivers. High sensitivity of 100 dB/mW permits connection directly to tuner, tape deck or preamp, and high input capacity (700 mW) allows very loud listening level with receiver or amplifier, without fear of overload. Left and right channel cords independently grounded. Luxuriously finished ear-

cups, headband and plug, and tangle proof 5 metre 4-core curled type cord. Frequency range: 20 to 20,000 Hz. Weight: 530 g without cord.

SE-505 2-way Dynamic stereo headphones with volume and tone controls, click-stop head band. Features a 45 mm "woofer" diaphragm of polyester film and a 32 mm polyester "tweeter" with aluminum

voice coil. Frequency range: 20 to 20,000 Hz. Sensitivity: 99.4 dB/mW. Maximum input: 500 mW per channel. Weight: 690 g without 5 metre curled cord.

SE-305 Dynamic stereo headphones with 4.5 cm polyester film diaphragm. Frequency range: 20 to 20,000 Hz. Sensitivity: 99.1 dB/mW. Maximum input:

500 mW per channel. Weight without 5 metre curled cord: 435 g.

SE-205 Dynamic stereo headphones with 70 mm cone-type speaker and headband adjustable via special slide knob. Frequency range: 20 to 20,000 Hz. Sensitivity: 97.4 dB/mW. Maximum input: 500 mW per channel. Weight: 450 g without 2.5 metre straight cable.

SE-305

SE-505

Monitor 10

SE-205

LOUDSPEAKERS

Loudspeakers, being mechanical rather than electronic transducers, have more difficulty in reproducing high frequencies and transients (both rapid time functions) than an amplifier, for example, does. Indeed, in the high frequencies they often fall flat. While it is true that the midrange contains the majority of musical data, it is also true that without extremes (of pitch, in this case) there is no real middle—just a mush.

The highest frequencies are handled in Pioneer's HPM series by high polymer molecular film supertweeters: tweeters without "drivers", and with diaphragms that vibrate piezo-electrically. That is, in response to a high frequency electrical current, all the molecules move in and out as one mass, changing electromagnetic into mechanical energy. They have no inertia to speak of, so they move very fast. The sound which results is as high-pitched and as punctual as that of the instrument which produced it. And the overall range of the speaker system is also extended.

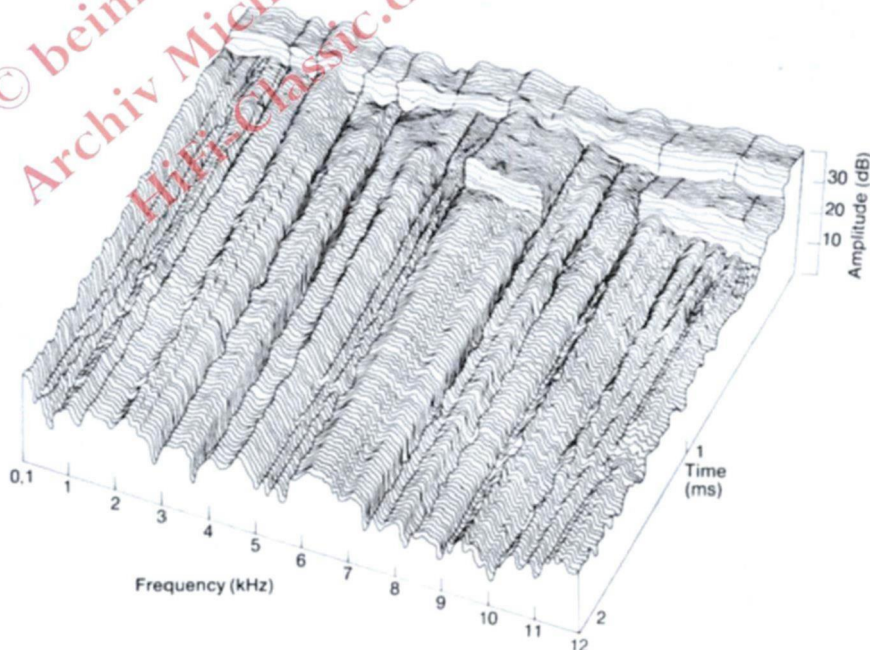
At the bottom of Pioneer's HPM systems the huge woofers rely on another molecular phenomenon: the strength of the carbon fibres used in the woofer diaphragms lies in their sticking together under all sorts of stress. The cone moves as one piece, with complete rigidity. That's why Pioneer's HPM systems also deliver all the bass, giving the midrange cones a well defined task and allowing you to locate each instrument in a 3-dimensional space.



Drawing of HPM-150's advanced high polymer molecular supertweeter.

THE TIME DIMENSION OF SPEAKER RESPONSE

In addition to the typical analyses of speaker response carried out by all manufacturers who publish 2-dimensional frequency response curves for their speakers, Pioneer engineers have also studied tone burst response and improved the transient response of their speakers. Using pulse signal generators and computerized plotters, they have obtained 3-dimensional displays, like the one shown below, which give a much better idea of how the speaker's frequency response evolves in the moments following the test signal.



Cumulative decay spectra of HPM-110: 3-dimensional graph plotting frequency response over a time span of 2 milliseconds.

HPM-150 4-way, 4-speaker floor-type bass reflex system with 40 cm carbon fibre blended woofer cone for deep bass response. All drivers are mounted in solid, vibration proof diecast aluminum frames. Original Pioneer piezoelectric omnidirectional supertweeter of high polymer mylar is horn loaded for extra effi-

ciency and provides 270 degrees of horizontal dispersion. Tweeter and midrange level controls on front baffle help tailor the output to your listening room and for different types of music. Maximum input: 250 W. Frequency range: 25 to 25,000 Hz. Sensitivity: 92.5 dB/W at 1 metre. Almost 1 metre tall.



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HPM-150

HPM-110 4-way, 4-speaker bass reflex system with 180° semicylindrical HPM supertweeter and level controls on front baffle. All drivers, including 30 cm woofer, are mounted in die-cast aluminum frames which expel unwanted resonances beyond the frequency range of each driver. Advanced crossover network controls smooth 6 dB/octave overlap slopes between speakers. High sensitivity (92.5 dB) of this

200 W-maximum speaker system means you can use it even with a 50 W amp. Frequency range: 30 to 25,000 Hz. Dimensions (H×W×D): 670×390×393 mm.



HPM-110

HPM-70 Large "bookshelf" type 4-way, 4-speaker bass reflex system with 25 cm carbon fibre blended woofer cone featuring a polyurethane roll edge to suppress edge reflection and resonance. Extra tough 10 cm midrange cone, wet pressed for improved transient response, covers the major harmonics of most musical instruments (1.9 to 3 kHz). A convex flange tweeter handles the highs up to 12 kHz, and Pioneer's exclusive 180° dispersion supertweeter does the rest. All drivers are mounted in

die-cast aluminum frames and bass reflex port is lined with a silver ring. Maximum input: 120 W. Frequency range: 35 to 25,000 Hz. Dimensions (H×W×D): 610×350×321 mm.



HPM-50 Bookshelf type

3-way, 3-speaker bass reflex system with 25 cm carbon fibre blended woofer/midrange cone suspended in polyurethane foam roll edge. Tweeter, also of carbon fibre, has been especially designed to handle long (high-volume) excursions over a wide range (2.5 to 12 kHz). HPM super-tweeter delivers same efficient, wide dispersion of highs up to 25,000 Hz as in Pioneer's more expensive systems. All drivers are mounted in die-cast aluminum frames. Maximum input: 80 W.

Frequency range: 35 to 25,000 Hz. Recommended amplifier power of 20-100 W. Dimensions (H x W x D): 570 x 325 x 317 mm.

HPM-30 Bookshelf type 3-way, 3-speaker bass reflex system with 20 cm carbon fibre blended woofer/midrange cone, carbon fibre tweeter and HPM supertweeter. Using this speaker pair with any amplifier in the 20 to 60 watts range may be the most effective way of upgrading the sound of a low-priced hi-fi system for little additional cost. The tonal balance is comparable to that of similar, more powerful speakers in the HPM series. Like the HPM-70 and the HPM-50, the HPM-30 distinguishes itself in frequency response thanks to

its piezoelectric supertweeter. Frequency range: 40 to 25,000 Hz. Maximum input: 60 W. Dimensions (H x W x D): 530 x 300 x 293 mm.

**HPM-50****HPM-30**

CS-X2 Compact 2-way, 2-speaker bass reflex system with 16 cm woofer. Especially designed for Pioneer mini component system, but appropriate for any 20–60 W amplifier. Maximum input: 50 W. Frequency range: 60 to 20,000 Hz. Sound pressure level for 1 watt input at 1 metre distance: 90 dB. Dimensions (H×W×D): 380×220×205 mm.

CS-X3 Miniature 2-way, 2-speaker infinite baffle system designed for bookshelf or wall mounting. Weighs an amazing 3.6 kg for its paperback book size, so you may be sure no unwanted vibrations will damage its performance. Low bass is possible thanks to air suspension construction and a mighty magnet backing the 10 cm straight cone woofer. Highs are enhanced by a special damping agent and polyester fibre in the

dome-type tweeter. Frequency range: 50 to 20,000 Hz. Maximum input: 50 W. Dimensions (H×W×D): 188×118×112 mm.



THE PIONEER SYSTEMS

Pioneer have composed five different coordinated systems of separate components. The professional-style metal rack and the three handsome wood and glass cabinets with matching speakers each contain the most ideal combination of Pioneer separate components for its price category. And Pioneer offer flexible system-cabinet combinations for the X-99, X-77 and X-55 systems. First you select the sound system best suited to your listening tastes; then the particular cabinet construction which matches your needs as a user and decorator.

For example, the most serious audio connoisseurs can build a veritable hi-fi studio around the professional, EIA (Electronics Industry Association of America) standard rack: JAR-2S. The vertical cabinet, CB-900, on the other hand, may look best surrounded by tall bookshelves in a study. And the two shorter cabinets may be exactly what the decorator ordered for a living-room with stylish, low furniture.

Notice that each system has all the



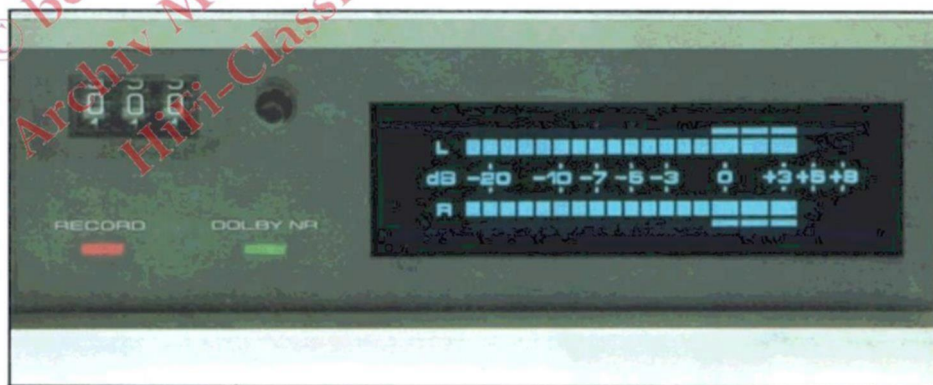
Pioneer's special accessory tray.

components of an extended hi-fi system: not just an amplifier, tuner and turntable, but also a cassette deck, the

whole needing only a single AC wall outlet. And how many other makes offer a direct-drive turntable powered by a DC servomotor in a system as low-priced as the X-55? Or the advanced power monitoring convenience provided by high-speed fluorescent level meters in the Pioneer amplifiers?

... AND THE PIONEER SYSTEMS ARE MOBILE

The Pioneer systems give you more than a dust-proof storage compartment for records, tapes and components. They also have special compartments for optional audio accessories and for a timer clock (DT-400). And best of all, they have wheels for ultimate convenience. Yes, pass the word along: the Pioneer systems are mobile!



High-speed and precise fluorescent tube level meters of CT-F 600 cassette deck.

Pioneer Professional Standard Rack JAR-2S. A high-class installation combining Pioneer's SPEC-1 preamplifier, SPEC-2 power amplifier, TX-9800 Quartz-Lock tuner, RT-707 Auto-Reverse tape deck and SG-9800 graphic equalizer in EIA-standard iron rack.



System X-55

SA-508 Stereo Integrated

Amplifier. 25 W/channel, min. RMS at 8 ohms, from 20 to 20,000 Hz, with no more than 0.03 % THD. Direct-coupled OCL output and Fluoroscan power meters.

TX-608 Stereo FM/MW Tuner*. FM stereo S/N: 74 dB. DIN sensitivity (FM): 0.8 μ V.

PL-200 Direct-Drive Auto-Return Turntable. Wow and flutter: ± 0.035 % (DIN).

CT-F 600 Stereo Cassette Deck.

Full auto-stop, Dolby**, DC servomotor and fluorescent level meters. Wow and flutter: ± 0.17 % (DIN).

CS-434 Two-way, 2-speaker bass reflex speakers with 20 cm woofer.

Maximum input: 30 W. Dimensions (W x H x D): 520 x 841 x 415 mm.

Shown in CB-700 cabinet.

System X-99

SA-708 Stereo Integrated

Amplifier. 65 W/channel, min. RMS at 8 ohms, from 20 to 20,000 Hz, with no more than 0.02 % THD. Magni-Wide DC amp with Fluoroscan meters.

TX-608 Stereo FM/MW Tuner. Same as in System X-55.

PL-400 Quartz Direct-Drive Full Automatic Turntable. Wow and flutter: ± 0.035 % (DIN).

CT-F 650 Stereo Cassette Deck. With Dolby, Pioneer Music Select (auto search) system, and fluorescent

level meters. Wow and flutter: ± 0.17 % (DIN). S/N ratio: 59 dB. **CS-636 Three-way, 3-speaker bass reflex speakers** with 25 cm woofer. Frequency range: 50 to 20,000 Hz. Maximum input: 80 W. Dimensions (W x H x D): 520 x 1229 x 415 mm. Shown in CB-900 cabinet.

* The Tuner TX-608 is also available with long waves in some countries. Ask your Pioneer dealer for this information.



X-55

X-99

System X-77

SA-608 Stereo Integrated Amplifier. 45 W/channel, min. RMS at 8 ohms, from 20 to 20,000 Hz, with no more than 0.02 % THD. DC amp with OCL output and Fluoroscan power meters.

TX-608 Stereo FM/MW Tuner. Same as in system X-55.

PL-300 Quartz Direct-Drive Auto-Return Turntable. Wow and flutter: ± 0.035 % (DIN).

CT-F 600 Stereo Cassette Deck. Same as in System X-55.

CS-535 Three-way, 3-speaker bass reflex speakers with 20 cm woofer. Maximum input: 60 W. Dimensions (W×H×D): 520×1229×415 mm. Shown in CB-900 cabinet.

System X-33

SA-408 Stereo Integrated Amplifier. 20 W/channel, min. RMS at 8 ohms, from 20 to 20,000 Hz, with no more than 0.1 % THD and IMD.

TX-408 L Stereo FM/LW/MW Tuner. S/N ratio (FM stereo): 72 dB. DIN sensitivity: 0.8 μ V.

PL-512 X Auto-Return Belt-Drive Turntable. With 4-pole synchronous motor and static balanced S-shaped tone arm. Wow and flutter: ± 0.06 % (DIN).

CT-506 Stereo Cassette Deck. Vertical loading, full auto-stop and Dolby noise reduction. DC servomotor for ± 0.17 % wow and flutter (DIN).

CS-333 Two-way, 2-speaker bass reflex speakers with 20 cm woofer. Maximum input: 30 W. Dimensions (W×H×D): 515×812×397 mm. Shown in CB-300 cabinet.

**Dolby is a trademark of Dolby Laboratories, Inc.



X-77

X-33

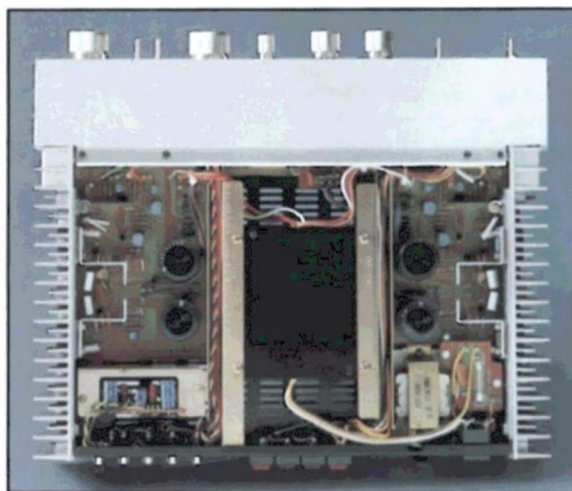
THE PIONEER MINI

The Pioneer mini system represents a new size standard for hi-fi, which nevertheless respects the two most important requirements of all hi-fi: ease of operation and sound quality. Unlike smaller, higher priced mini and "micro" systems, the Pioneer mini system represents a practical, long-term development in human engineering taking into account all the needs of audiophiles. For example, it is one of the only such systems to include a turntable (still the major hi-fi source), and the turntable has set the scale for every other component.

TWO-MOTOR TURNTABLE AND CASSETTE TAPE ADVANCE METER

At the heart of this system, which has been conceived to work as a perfectly coordinated unity, is a low-profiled, combined pre/main stereo amplifier. The power amp section is all-stage direct coupled with a current mirror loaded differential first stage and capacitorless output (OCL) for improved transient response. The power supply contains an expensive oversized toroidal core transformer and 4 electrolytic capacitors.

Next comes the TX-3000 AM/FM-stereo tuner, with a 3-gang variable



Inside the SA-3000 amplifier, the huge toroidal core transformer hangs upside down under metal shield.



Special cassette drawer in CT-3000 makes possible an extra slim cassette deck design.

capacitor like that of the TX-608 and a 50 dB quieting sensitivity of 16.2 dBf.

The fully automatic turntable, PL-3000, actually has two motors, including a Hall brushless DC servomotor

for direct drive of the platter. It also has the same coaxial suspension system as Pioneer's larger models.

The Dolby cassette deck's slot-in loading system has helped reduce size for a slim profile, but still allows you to see the cassette at all times. A special feature not found on any other Pioneer deck—a meter indicating how much tape is left on the supply reel—is located in the left VU meter window. Finally, the mini components have a specially designed speaker system: the compact, two-way CS-X2, with a perfectly matched maximum input of 50 watts.

A MINI WITH OPTIONS

What's more, Pioneer offers a specially designed audio rack (B-3000), measuring 38 × 40 × 35 cm, which you can set up vertically or horizontally, according to your needs. If you prefer a practically invisible speaker system, you may also equip your mini system with

Pioneer's unique 50-watt CS-X3. And if you can't do without the supertweeter in Pioneer's HPM series, the 3-way HPM-30 of our regular speaker line may be just what you need.

SA-3000 Stereo Integrated Amplifier. Continuous power output 40 W/channel, min. RMS at 4 and 8 Ω, from 20 to 20,000 Hz, with no more than 0.02% THD. IMD, thanks to the differential design, is taken down to 0.005% at rated output.

TX-3000 AM/FM-Stereo Tuner. With unique Glide-Guide tuning system in which built-in tuning meter

tells you which way to turn for station centering. S/N ratio: 77 dB (stereo). THD in stereo: 0.15% (1 kHz). Frequency response: 20 to 15,000 Hz (+0.2, -1 dB). Includes Pioneer's exclusive FM Automatic Pilot Signal Canceller.

PL-3000 Direct-Drive Stereo Turntable. Full automatic 2-motor system with antihowling suspension and newly designed concentrated-

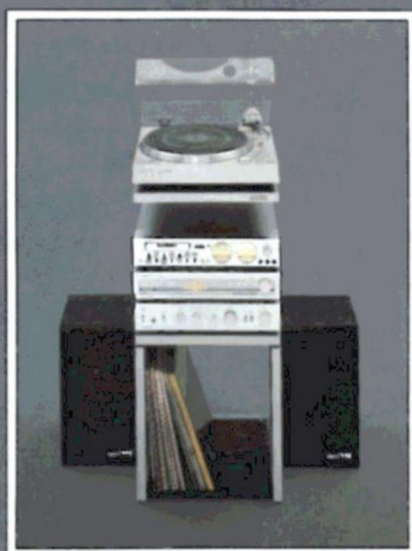
mass tone arm for superior tracking. Wow and flutter is only ±0.042% (DIN). S/N ratio: 73 dB (DIN-B).

CT-3000 Stereo Cassette Deck. With Dolby® noise reduction for a S/N ratio of 64 dB. Two-head system with specially designed SENDUST REC/PLAY head, and tape advance meter. Features auto CrO₂ tape detector and stereo mic jacks. Fre-

quency response with FeCr tape: 35 to 15,000 Hz. Wow and flutter: ±0.17% (DIN).

CS-X2 Compact Speaker System. Two-way design with a 16 cm woofer and 2.5 cm soft dome tweeter. Frequency range: 60 to 20,000 Hz. Dimensions (W × H × D): 220 × 380 × 205 mm.
B-3000 Two-Piece Metal Audio Rack. Dimensions: 380 × 401 × 350 mm.

*Dolby is a trademark of Dolby Laboratories, Inc.

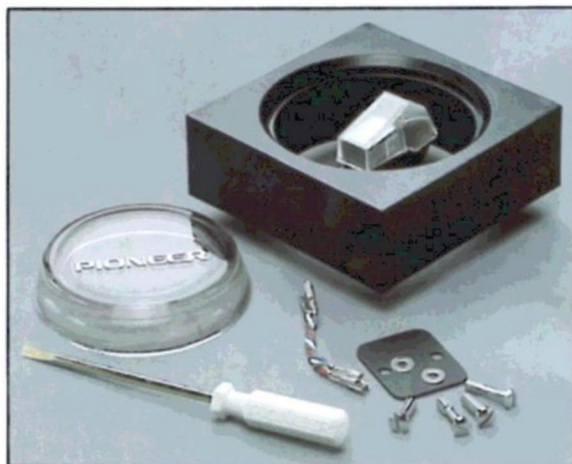


PL-3000
CT-3000
TX-3000
SA-3000
CS-X2
B-3000

PIONEER ACCESSORIES

"During the week, I only get to listen to music in the morning and at night, before going to sleep. So I only listen to my clock radio. . ." We have heard this plaint before. You may even have uttered it at some time. But is that a reason not to enjoy real hi-fi? We suggest that you plug your Pioneer amplifier and cassette deck into the AC outlets of the DT-400 Timer Clock and listen to clock hi-fi. The sleep timer will turn off your stereo after you fall asleep, and wake you with music in the morning.

Like all the other Pioneer accessories, DT-400 can be an indispensable complement to a



Even the lowest-priced Pioneer cartridge, PC-110/II, is delivered in a handsome container with all the necessary equipment for correct mounting.

hi-fi system. Like the DT-400, all the Pioneer accessories have an important role to play in increasing the flexibility of your system or improving its performance, for a relatively negligible additional expenditure. Some, like the PA-5000 tone arm and the PC-1000/II phono cartridge, can bring as much improvement as a new pair of speakers. Another, the MA-62 A Disco Mixer, is the first step toward professional use of hi-fi equipment. The others are simply high quality "additionals" to make your hi-fi system more complete. So that people who start with Pioneer can stay with Pioneer all the way.

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DT-400 24-Hour Electronic Timer. Especially designed for use with Pioneer's cassette and open reel tape decks when making unattended recordings. Time is displayed on a blue fluorescent tube in 4 digits, switchable to show hours and minutes or seconds. Accuracy is guaranteed by synchronization with line fre-

quency. The DT-400 can be set to go on and stay on, or to go off again in up to 59 minutes. Can be used as wake-up alarm with hi-fi receiver or cassette deck. Two AC outlets on back for connecting components. Reliable LED "ON" display with power failure indication. Dimensions: 190×75×163 mm. Same

brushed aluminum front panel as Pioneer hi-fi components.

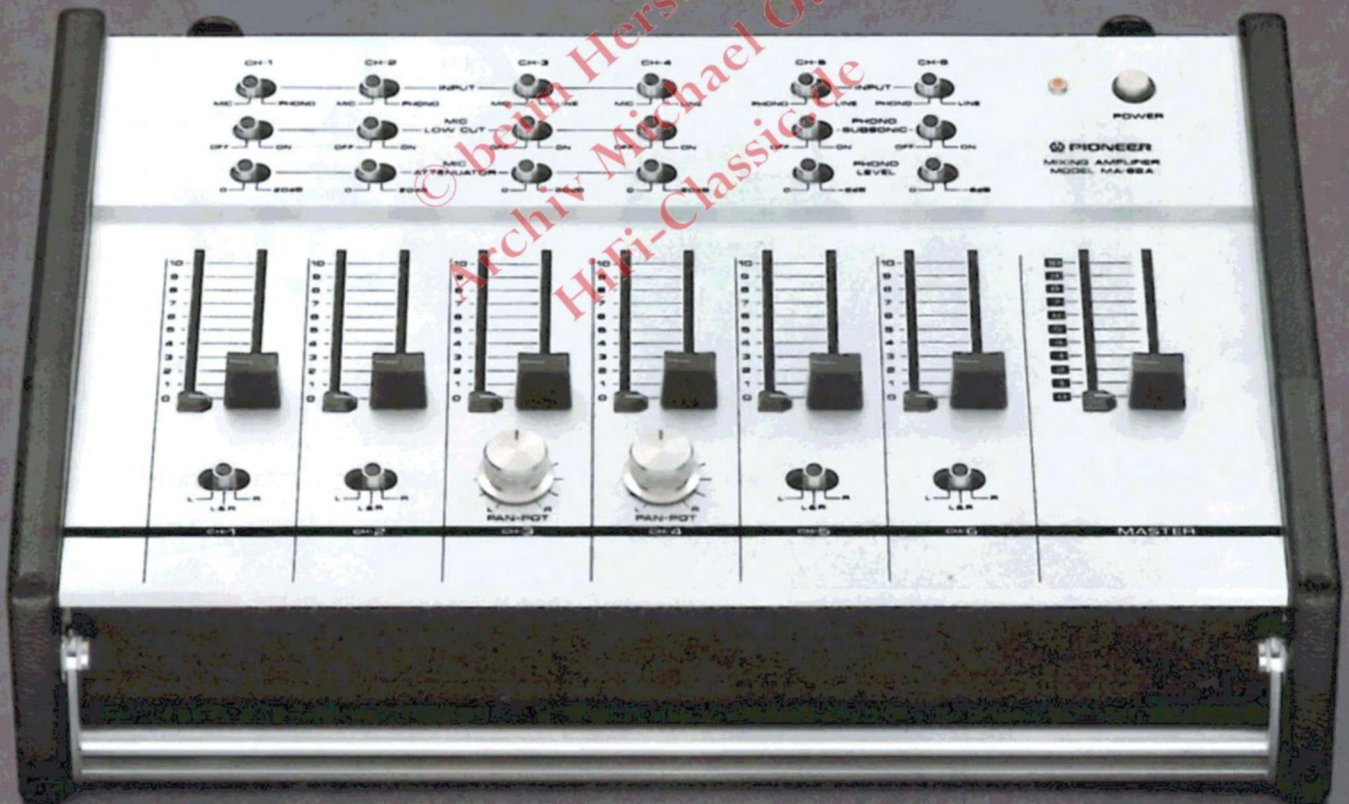


DT-400

MA-62 A Portable Mixing

Amplifier. Compact 6-channel-in unit with multi-purpose control capability for phono/mic/line mixing, panning and attenuation and subsonic phono filtering. Four mic inputs, 4 mono line inputs, 4 mono phono inputs (for two stereo pairs each) allowing up to six combinations. Permits multi-mic mixing with tape system. Features convenient top

panel connections and "scratch board" for channel identification. Phono signal-to-noise ratio: 60 dB. Channel separation: more than 70 dB (1 kHz).



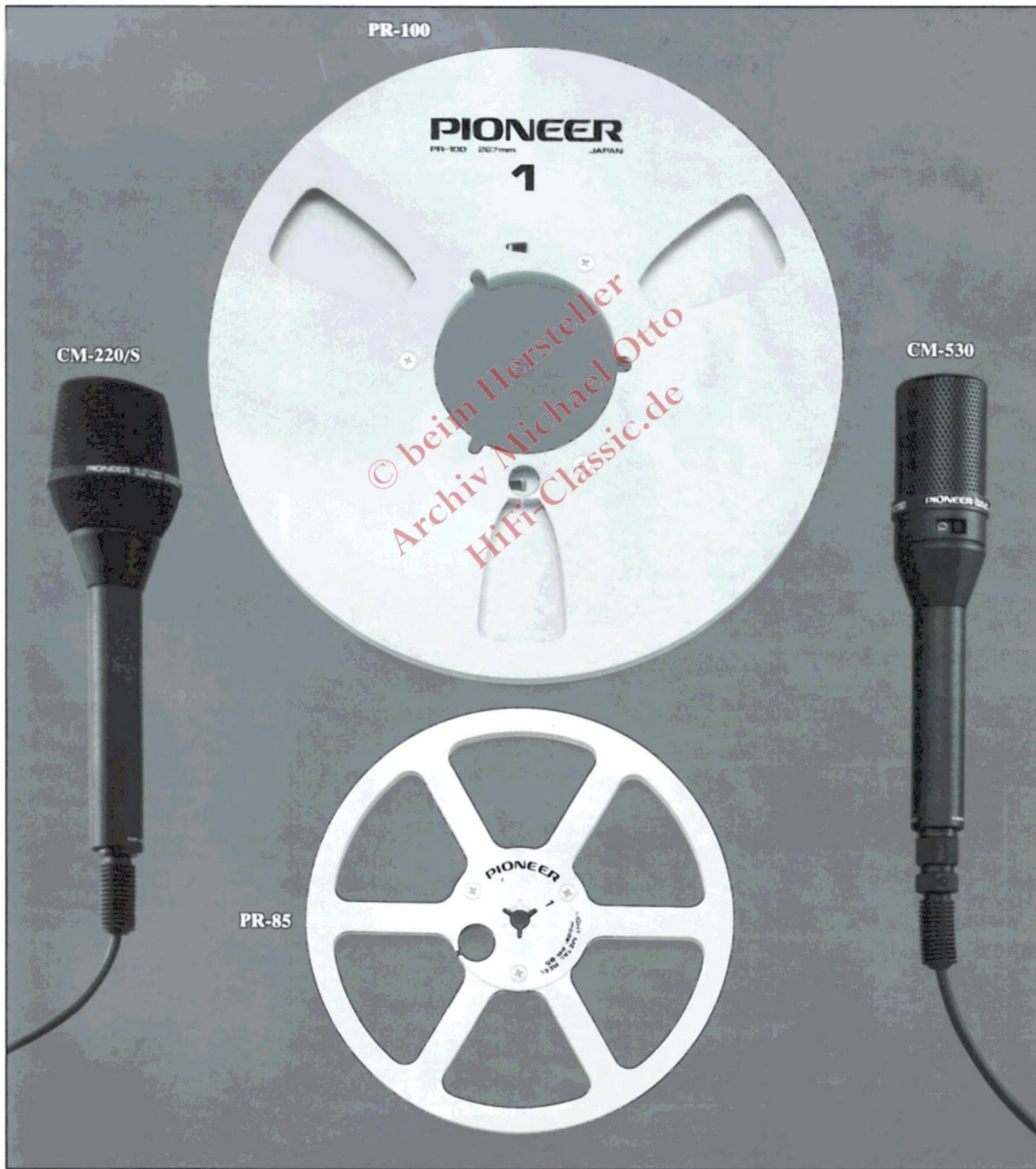
MA-62 A

PR-85 Light weight 17.5 cm metal reel for use with the RT-707 open reel tape deck.

PR-100 NAB standard 26.5 cm metal reel for RT-909, RT-2022 and RT-1011 L decks.

CM-220/S Electret condenser one-point stereo microphone with hypercardioid directivity characteristics. Frequency response: 40 to 18,000 Hz. S/N ratio: 47 dB. Sensitivity: -65 dB (at 1 kHz). Output impedance: 1 k Ω . Weight: 310 g (including cord).

CM-530 Electret condenser type microphone with omnidirectional/cardioid switchable directivity. S/N ratio: 40 dB. Frequency response: 30 to 20,000 Hz (cardioid), 20 to 19,000 Hz (omni). Output impedance: 600 Ω . Weight: 415 g (with cord).

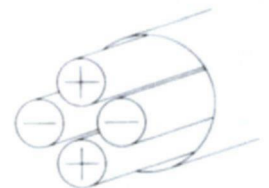




PA-5000 Static-balanced S-shaped universal tone arm with extra light aluminum alloy pipe and magnesium alloy headshell. Special alloy avoids partial resonance caused by bends in the arm pipe which often cause distortion in less well designed S-shaped arms. Gimballed support system provides high sensitivity and arm height adjustment lever calls upon special Helicoid system for fine height change of ± 3 mm. Newly developed anti-skating system applies lateral pressure directly without affecting sensitivity. Effective arm length: 250 mm. Overhang: 14 mm. Offset angle: $20^{\circ}30'$. Note: The PA-5000 features a unique counterweight incorporating several precision engineered parts, which damps both stylus and tone arm resonance. When moved by stylus vibrations, due to warped or uncentered records, a 50 g "dynamic absorber" weight inside the counterweight applies a "brake". The weight is supported inside by means of a spring and several concentric rubber washers, called a Bellows damper. It is coupled to the tone arm via stainless steel stranded wires.



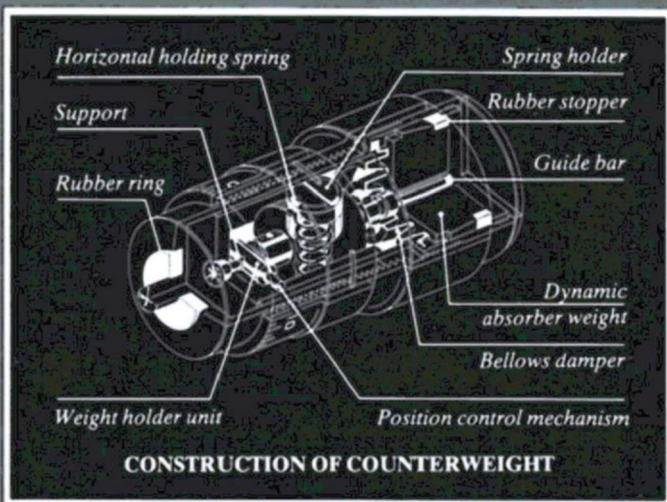
JC-200 Low impedance speaker cord, adopting "Star Quad" design shown in cross-section below, to reduce harmonic and crosstalk distortions. Very low impedance results in excellent phase characteristics, reduced magnetic stray flux, minimum deterioration of low-level signals, and extra-flat reproduction up to the extra high range.



Star Quad Wires

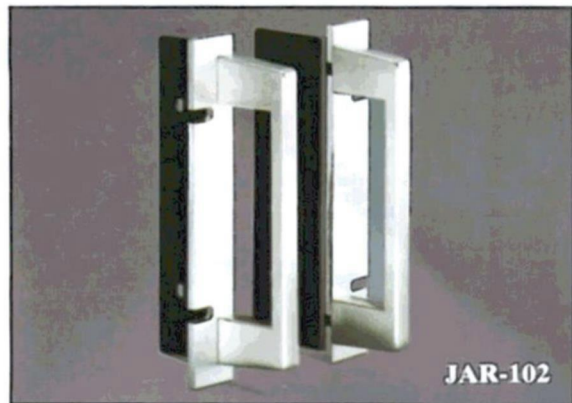


Opposing magnetic fluxes cancel each other and form a non-magnetic field.

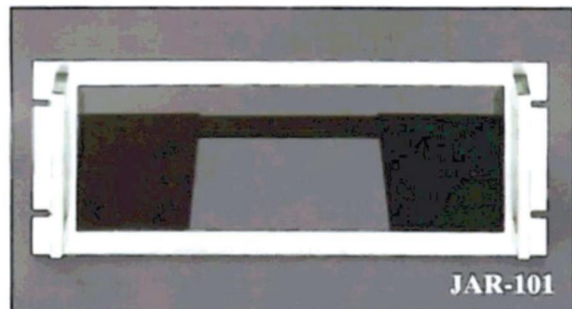


CONSTRUCTION OF COUNTERWEIGHT

PA-5000



JAR-102



JAR-101



JAR-102 Special aluminum handles for mounting the CT-F1250 cassette deck in Pioneer's JAR-2 S Rack.

JAR-101 Special aluminum adaptor frame for mounting audio components such as the TX-9800 stereo tuner and the SG-9800 graphic equalizer, not conforming to EIA standards, in Pioneer's JAR-2 S Rack.

TX-9800 tuner with JAR-101 rack adaptor frame.



PC-150

PC-110/II

PC-1000/II

PC-135

PC-110/II Moving magnet type phono cartridge.

- Frequency response: 15 to 25,000 Hz (± 3 dB).
- Channel separation: 25 dB (at 1 kHz).
- Stylus pressure: 1.7 to 2.5 grams.
- Output voltage at 1 kHz (5 cm/sec.): 3.5 mV.
- Load resistance: 30 to 250 k Ω (47 k Ω , optimum).
- Weight: 5.1 grams.

PC-1000/II Moving magnet type phono cartridge.

- Frequency response: 10 to 80,000 Hz (± 3 dB).
- Channel separation: 30 dB (at 1 kHz).
- Stylus pressure: 0.7 to 1.7 grams.
- Output voltage at 1 kHz (5 cm/sec.): 2.5 mV.
- Load resistance: 30 to 100 k Ω (47 k Ω , optimum).
- Weight: 6.4 grams.

PC-150 Moving magnet type phono cartridge.

- Frequency response: 15 to 25,000 Hz (± 3 dB).
- Stylus: 0.5 mil diamond.
- Stylus pressure: 1.7 to 2.5 grams.
- Output voltage at 1 kHz (5 cm/sec.): 3.5 mV.
- Load resistance: 30 to 100 k Ω .

PC-135 Induced magnet type phono cartridge.

- Frequency response: 10 to 25,000 Hz (± 3 dB).
- Channel separation: more than 25 dB (at 1 kHz).
- Stylus pressure: 1.5 to 2.3 grams.
- Output voltage at 1 kHz (5 cm/sec.): 3 mV.
- Load resistance: 50 k Ω .
- Weight: 5.4 grams.

SELECTOR	U-24
Program source selection	PHONO × 3, AUX × 2, TAPE MONITOR × 4, DUPLICATE; any combination among tape 1-4, Power AMP × 3
Terminals for connecting amp	PHONO × 1, AUX × 1, TAPE PLAY × 1, REC × 1, PREOUT × 1
Dimensions (W × H × D) mm	420 × 81 × 329
Weight (kg)	4.4
AMPLIFIER SECTION	D-23
Cut-off frequency LOW (HIGH CUT) MID-LOW (LOW CUT) MID-LOW (HIGH CUT) MID-HIGH (LOW CUT) MID-HIGH (HIGH CUT) HIGH (LOW CUT)	63, 80, 100, 125, 160, 200, 250, 320, 400, 500, 630 Hz 320, 400, 500, 630, 800, 1 k, 1.25 k, 1.6 k, 2 k, 2.5 k, 3.2 kHz 1.6 k, 2 k, 2.5 k, 3.2 k, 4 k, 5 k, 6 k, 8 k, 10 k, 12.5 k, 16 kHz
Slope	6 dB/oct, 12 dB/oct, 18 dB/oct
Level control	0 to -30 dB (1 dB step), -∞ left and right channel individual control
Input impedance	50 Kohms
Total Harmonic Distortion 1 V output	(20 Hz to 20 kHz) 0.005 %
Frequency response (LOW END, HIGH END)	10 Hz-100 kHz (+0, -1 dB)
Signal-to-noise ratio	100 dB (1 V output)
MISCELLANEOUS	
Power consumption	14 watts
Dimensions (W × H × D) mm	420 × 150 × 352
Weight (kg)	8.7

STEREO AMPLIFIERS

Continuous power both channels driven 20 Hz-20 kHz, 8 Ω 20 Hz-20 kHz, 4 Ω 1 kHz, 4 Ω (DIN)
Total Harmonic Distortion at rated output power 20 Hz-20 kHz Phono (20 Hz-20 kHz) AUX (20 Hz-20 kHz)
Frequency response at phono at AUX
Signal-to-noise ratio (IHF) Phono AUX
Input sensitivity/impedance Phono 1 Phono 2
Cartridge load Tuner, AUX, Tape Input 1, 2
Bass control Sub (50 Hz) Main (100 Hz)
Treble control Sub (20 kHz) Main (10 kHz)
Low filter
High filter
Phono overload level Phono 1 Phono 2
Maximum power consumption
Dimensions (W × H × D) mm
Weight (kg)

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STEREO AMPLIFIERS	SA-9800	SA-8800	SA-7800	SA-708
Continuous power both channels driven at: 8 Ω 4 Ω 1 kHz, 4 Ω (DIN)	2 × 100 W (10 Hz-20 kHz) 2 × 100 W (10 Hz-20 kHz) 2 × 185 W	2 × 80 W (10 Hz-20 kHz) 2 × 80 W (10 Hz-20 kHz) 2 × 140 W	2 × 65 W (10 Hz-20 kHz) 2 × 65 W (10 Hz-20 kHz) 2 × 125 W	2 × 65 W (20 Hz-20 kHz) 2 × 65 W (20 Hz-20 kHz) 2 × 116 W
Total Harmonic Distortion at rated output power 8 Ω	< 0.005 %	< 0.005 %	< 0.009 %	< 0.02 %
Frequency response at AUX input	5 Hz-100 kHz (+0 dB, -1 dB)	5 Hz-100 kHz (+0 dB, -1 dB)	5 Hz-100 kHz (+0 dB, -1 dB)	10 Hz-50 kHz (±1 dB)
S/N (IHF) Phono MM MC Tuner, Tape, PB, AUX	90 dB 72 dB 110 dB	90 dB - 110 dB	87 dB - 110 dB	86 dB - 100 dB
Input sensitivity/impedance Phono 1 Phono 2 MM MC Cartridge load	2.5 mV/50 kΩ 2.5 mV/50 kΩ 100 mV/100 Ω 100, 10 kΩ, 25 kΩ, 50 kΩ, 100 kΩ 100 pF, 200 pF, 300 pF, 400 pF, 500 pF 150 mV/50 kΩ	2.5 mV/50 kΩ 2.5 mV/50 kΩ - 100, 10 kΩ, 25 kΩ, 50 kΩ, 100 kΩ 100 pF, 200 pF, 300 pF, 400 pF, 500 pF 150 mV/50 kΩ	2.5 mV/50 kΩ - - - - 150 mV/50 kΩ	2.5 mV/50 kΩ - - - - 150 mV/50 kΩ
Tuner, AUX, Tape Mic Line	- - -	- - -	- - -	- - -
Bass control (100 Hz)	±10 dB turnover: 200 Hz, 400 Hz	±10 dB	±10 dB	±7.5 dB
Treble control (10 kHz)	±10 dB turnover: 2.5 kHz, 5 kHz	±10 dB	±10 dB	±7.5 dB
Low filter	15 Hz (12 dB/oct)	15 Hz (6 dB/oct)	15 Hz (6 dB/oct)	15 Hz (6 dB/oct)
High filter	8 kHz (12 dB/oct)	8 kHz (6 dB/oct)	-	-
Phono overload level MM MC	250 mV 10 mV	250 mV -	200 mV -	200 mV -
Dimensions (W × H × D) mm	420 × 150 × 425	420 × 150 × 425	420 × 150 × 376	420 × 150 × 337
Weight (kg)	18	15	12.4	9.7

C-21	M-22	SPEC-1	SPEC-2	SPEC-3	SPEC-4
-	2 × 30 W (10 Hz-30 kHz)	-	2 × 250 W	-	2 × 150 W
-	-	-	2 × 250 W	-	2 × 180 W
-	2 × 70 W	-	2 × 300 W	-	2 × 185 W
-	< 0.01 %	-	< 0.1 %	-	< 0.01 %
0.006 %	-	-	-	< 0.01 %	-
0.005 %	-	< 0.05 %	-	< 0.005 %	-
-	2 Hz-150 kHz (+0 dB, -1 dB)	-	5 Hz-80 kHz (+0 dB, -1 dB)	-	5 Hz-100 kHz (+0 dB, -1 dB)
20 Hz-20 kHz (±0.2 dB)	-	30 Hz-15 kHz (±0.2 dB)	-	20 Hz-20 kHz (±0.2 dB)	-
3 Hz-300 kHz (+0 dB, -1 dB)	-	10 Hz-70 kHz (+0 dB, -0.5 dB)	-	10 Hz-100 kHz (+0 dB, -0.5 dB)	-
-	106 dB	-	110 dB	-	115 dB
80 dB	-	70 dB	-	80 dB	-
100 dB	-	90 dB	-	100 dB	-
2.5 mV/100 Ω 10 kΩ, 25 kΩ, 50 kΩ, 75 kΩ, 100 kΩ	-	2.5 mV/50 kΩ	-	2.5 mV/100 Ω 10 kΩ, 50 kΩ, 100 kΩ	-
-	-	2.5 mV-10 mV/50 kΩ	-	2.5 mV/100 Ω 10 kΩ, 50 kΩ, 100 kΩ	-
100 pF, 150 pF, 200 pF, 300 pF, 400 pF, 500 pF 150 mV/50 kΩ	-	-	-	100 pF, 200 pF, 300 pF, 400 pF 150 mV/50 kΩ	-
-	1 V/50 kΩ	-	2 V/50 kΩ	-	1 V/50 kΩ
-	-	± 4.5 dB	-	± 10 dB (25 Hz, 50 Hz, 100 Hz) turnover frequency 100 Hz, 200 Hz, 400 Hz	-
-	-	± 7.5 dB	-	-	-
-	-	± 4.5 dB	-	± 10 dB (8 kHz, 16 kHz, 32 kHz) turnover frequency 2 kHz, 4 kHz, 8 kHz	-
-	-	± 7.5 dB	-	-	-
15 Hz (6 dB/oct)	-	15 Hz, 30 Hz (12 dB/oct)	-	15 Hz (6 dB/oct)	-
-	-	12 kHz, 8 kHz (12 dB/oct)	-	-	-
300 mV	-	500 mV	-	300 mV	-
-	-	500 mV-1,000 mV	-	300 mV	-
15 W	280 W	17 W	1,265 W	15 W	760 W
420 × 81 × 357	420 × 153 × 370	480 × 186.5 × 365	480 × 186.5 × 445	480 × 142 × 390	480 × 187 × 445
6.3	22	11.2	24.3	7.7	24.5

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SA-608	SA-508	SA-408	SA-3000	SG-9800	MA-62 A
2 × 45 W (20 Hz-20 kHz) 2 × 45 W (20 Hz-20 kHz) 2 × 82 W	2 × 25 W (20 Hz-20 kHz) 2 × 25 W (20 Hz-20 kHz) 2 × 48 W	2 × 20 W (30 Hz-20 kHz) - 2 × 33 W	2 × 40 W (20 Hz-20 kHz) - 2 × 61 W	- - -	- - -
< 0.02 %	< 0.03 %	< 0.1 %	< 0.02 %	< 0.006 %	< 0.2 %
10 Hz-50 kHz (+0 dB, -1.5 dB)	20 Hz-40 kHz (± 2 dB)	20 Hz-40 kHz (± 2 dB)	10 Hz-100 kHz (+0 dB, -3 dB)	5 Hz-100 kHz (+0 dB, -3 dB)	20 Hz-25 kHz (+0 dB, -1 dB)
78 dB	76 dB	72 dB	86 dB	-	60 dB
-	-	-	-	-	-
100 dB	98 dB	97 dB	100 dB	92 dB	67 dB
2.5 mV/50 kΩ	2.5 mV/47 kΩ	2.5 mV/50 kΩ	2.5 mV/50 kΩ	-	2.5 mV/50 kΩ 2.5 mV/50 kΩ
-	-	-	-	-	-
-	-	-	-	-	-
150 mV/50 kΩ	150 mV/50 kΩ	150 mV/50 kΩ	150 mV/50 kΩ	-	- 0.25 mV/4.7 kΩ 50 mV/50 kΩ
-	-	-	-	-	-
± 7.5 dB	± 7.5 dB	± 9.5 dB	± 10 dB	± 10 dB (16 Hz, 32 Hz, 64 Hz, 125 Hz, 250 Hz, 500 Hz)	-
± 7.5 dB	± 8 dB	± 9.5 dB	± 10 dB	± 10 dB (1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz, 32 kHz)	-
15 Hz (6 dB/oct)	15 Hz (-6 dB/oct)	-	-	-	30 Hz (6 dB/oct)
-	-	-	-	-	-
180 mV	140 mV	150 mV	230 mV	-	250 mV
-	-	-	-	-	-
420 × 150 × 271	420 × 150 × 271	420 × 98 × 265	380 × 83 × 295	420 × 150 × 355	400 × 132 × 264
7.9	6.7	5	7.6	7.1	5.8

TUNERS	TX-D 1000	TX-9800	TX-7800	TX-608
AUDIO SECTION				
Output level/impedance				
FM (100% MOD) Fixed	650 mV/100 Ω	650 mV/4.2 kΩ	650 mV/4.2 kΩ	650 mV/4.3 kΩ
Variable	-	50 mV-1.3 V/3.6 kΩ	0-1.3 V/3.6 kΩ	-
AM (30% MOD) Fixed	650 mV/100 Ω	200 mV/4.2 kΩ	200 mV/4.2 kΩ	650 mV/4.3 kΩ
Variable	-	15 mV-400 mV/3.6 kΩ	0-400 mV/3.6 kΩ	-
FM SECTION (87.5-108 MHz)				
Sensitivity				
(DIN) mono: 26 dB S/N (75 Ω)	0.8 μV	0.45 μV	0.55 μV	0.8 μV
(DIN) stereo: 46 dB S/N (75 Ω)	25 μV	17.5 μV	18.5 μV	25 μV
(IHF) mono	10.8 dBf (1.9 μV)	8.8 dBf (1.5 μV)	9.3 dBf (1.6 μV)	10.8 dBf (1.9 μV)
Signal-to-noise ratio (IHF) (stereo)	75 dB (at 65 dBf)	80 dB (at 85 dBf)	79 dB (at 85 dBf)	74 dB (at 65 dBf)
Signal-to-noise ratio (DIN) unweighted (stereo)	66 dB	67 dB	67 dB	66 dB
Total Harmonic Distortion (1 kHz) stereo	0.08%	0.07%	0.08%	0.2%
Capture ratio	1 dB	0.8 dB (Wide), 2 dB (Narrow)	1 dB	1 dB
Selectivity (±400 kHz)	60 dB	30 dB (Wide), 85 dB (Narrow)	75 dB	60 dB
Frequency response	20 Hz-15 kHz	20 Hz-15 kHz	20 Hz-15 kHz	20 Hz-15 kHz
Stereo separation (1 kHz)	55 dB	55 dB (Wide)	50 dB	40 dB
Image response ratio	80 dB	120 dB	85 dB	60 dB
Subcarrier product ratio	60 dB	70 dB	70 dB	50 dB
MW SECTION (525-1,605 kHz)				
Sensitivity (IHF, ext. antenna)	15 μV	15 μV	15 μV	15 μV
Signal-to-noise ratio	50 dB	55 dB	50 dB	50 dB
Image response ratio	30 dB	70 dB	45 dB	40 dB
Selectivity	30 dB	20 dB (Wide) 50 dB (Narrow)	15 dB (Wide) 50 dB (Narrow)	35 dB
LW SECTION (150 kHz-350 kHz)				
Sensitivity (IHF, ext. antenna)	-	-	-	-
Signal-to-noise ratio	-	-	-	-
Image response ratio	-	-	-	-
Selectivity	-	-	-	-
Dimensions (W×H×D) mm	420×98×336.5	420×150×390	420×150×390	420×150×284
Weight (kg)	5	8.5	7.5	5.2

TURNABLES	PL-L 1000	PL-600 X	PL-500 X	PL-400 X/400	PL-300 X/300	PL-200 X/200
Motor	quartz PLL Hall motor	quartz PLL Hall motor	quartz PLL Hall motor	quartz PLL Hall motor	quartz PLL Hall motor	DC servo
Drive System	direct drive	direct drive	direct drive	direct drive	direct drive	direct drive
Speeds	33 ¹ / ₃ , 45 rpm	33 ¹ / ₃ , 45 rpm	33 ¹ / ₃ , 45 rpm	33 ¹ / ₃ , 45 rpm	33 ¹ / ₃ , 45 rpm	33 ¹ / ₃ , 45 rpm
Turntable platter	∅ 31 cm alloy die-cast	∅ 33 cm alloy die-cast	∅ 33 cm alloy die-cast	∅ 32 cm alloy die-cast	∅ 32 cm alloy die-cast	∅ 32 cm alloy die-cast
Rumble DIN B, weighted	> 78 dB	> 78 dB	> 75 dB	> 73 dB	> 73 dB	> 73 dB
Wow and flutter (DIN)	±0.035%	±0.035%	±0.035%	±0.035%	±0.035%	±0.035%
Usable cartridge weight (g)	4-14.5	4-9	4-10	4-10	4-10	4-10
Effective arm length (mm)	190	237	221	221	221	221
Dimensions (W×H×D) mm	494×154×456	456×140×384	440×140×388	440×145×365	440×145×365	440×145×365
Weight (kg)	12	12	9.5	10.5	10.5	10.5

RECEIVERS	SX-1980	SX-1080	SX-980	SX-890/W 4
AUDIO SECTION				
Continuous power both channels driven at				
20 Hz-20 kHz, 8 Ω	2×270 W	2×120 W	2×80 W	2×60 W
20 Hz-20 kHz, 4 Ω	-	2×140 W	2×95 W	2×60 W
1 kHz, 8 Ω (DIN)	2×270 W	2×130 W	2×90 W	2×65 W
1 kHz, 4 Ω (DIN)	-	2×200 W	2×120 W	2×85 W
THD at rated output power 20 Hz-20 kHz	<0.03%	<0.05%	<0.05%	<0.05%
Frequency response at AUX input	5 Hz-80 kHz (+0 dB, -1 dB)	5 Hz-80 kHz (+0 dB, -1 dB)	5 Hz-80 kHz (+0 dB, -1 dB)	5 Hz-80 kHz (+0 dB, -1 dB)
S/N (IHF) Phono	87 dB	76 dB	76 dB	76 dB
Tuner, Tape, PB, AUX	100 dB	90 dB	90 dB	90 dB
FM SECTION (87.5-108 MHz)				
Sensitivity (IHF)	8.75 dBf (1.5 μV)	9.8 dBf (1.7 μV)	9.8 dBf (1.7 μV)	10.3 dBf (1.8 μV)
Sensitivity (DIN)				
Mono (26 dB S/N) 75 Ω	0.6 μV	0.6 μV	0.6 μV	0.7 μV
Stereo (46 dB S/N) 75 Ω	21 μV	22 μV	22 μV	22 μV
Capture ratio	1.0 dB	1.0 dB	1.0 dB	1.0 dB
Selectivity (±400 kHz)	80 dB	80 dB	80 dB	75 dB
S/N (mono)	83 dB	80 dB	80 dB	80 dB
THD (stereo) 1 kHz	0.1%	0.15%	0.15%	0.15%
Frequency response	30 Hz-15 kHz (+0.2 dB, -0.5 dB)	30 Hz-15 kHz (±0.5 dB)	30 Hz-15 kHz (±0.5 dB)	30 Hz-15 kHz (+0.2 dB, -0.8 dB)
Stereo separation (1 kHz)	50 dB	50 dB	50 dB	45 dB
Subcarrier suppression	65 dB	65 dB	65 dB	55 dB
AM SECTION (525-1,605 kHz)				
Sensitivity (IHF) (ext. ant.)	15 μV	15 μV	15 μV	15 μV
Selectivity	26 dB	30 dB	30 dB	26 dB
Max. power consumption	1,400 W	1,100 W	800 W	550 W
Dimensions (W×H×D) mm	560×211×497	526×176×440	526×176×440	480×140×320
Weight (kg)	35.4	21.3	18.8	12.2

TX-608 L	TX-408 L	TX-3000
650 mV/4.3 kΩ	650 mV/3.6 kΩ	650 mV/4.3 kΩ
650 mV/4.3 kΩ	150 mV/3.6 kΩ	200 mV/4.3 kΩ
0.8 μV 25 μV 10.8 dBf (1.9 μV)	0.8 μV 25 μV 11.2 dBf (2 μV)	0.7 μV 20 μV 10.3 dBf (1.8 μV)
74 dB (at 65 dBf) 66 dB	72 dB (at 85 dBf) 60 dB	77 dB (at 65 dBf) 64 dB
0.2%	0.2%	0.15%
1 dB	1 dB	1 dB
60 dB	60 dB	60 dB
20 Hz-15 kHz	30 Hz-15 kHz	20 Hz-15 kHz
40 dB	40 dB	45 dB
60 dB	55 dB	60 dB
50 dB	40 dB	55 dB
15 μV	30 μV	15 μV
50 dB	50 dB	50 dB
40 dB	40 dB	40 dB
35 dB	25 dB	30 dB
50 μV	45 μV	-
50 dB	50 dB	-
45 dB	40 dB	-
40 dB	25 dB	-
420 × 150 × 284	420 × 98 × 254	380 × 83 × 335
5.2	3.1	4

PL-512 X/512	PL-3000
4-pole synchronous	DC servo
belt drive	direct drive
33 ¹ / ₃ , 45 rpm	33 ¹ / ₃ , 45 rpm
∅ 30 cm alloy die-cast	∅ 31 cm alloy die-cast
> 65 dB	> 73 dB
± 0.06%	± 0.042%
4-10	4-9
221	221
440 × 132 × 365	384 × 145 × 360
6.5	7.9

LONG WAVE RECEIVERS	LX-690/W 4	LX-590/W 4
AUDIO SECTION		
Continuous power both channels driven at 20 Hz-20 kHz, 8 Ω	2 × 30 W	2 × 20 W
20 Hz-20 kHz, 4 Ω	2 × 37 W	2 × 25 W
1 kHz, 8 Ω (DIN)	2 × 33 W	2 × 22 W
1 kHz, 4 Ω (DIN)	2 × 38 W	2 × 26 W
Total Harmonic Distortion at rated output power 20 Hz-20 kHz	< 0.1%	< 0.3%
Frequency response at AUX input	10 Hz-60 kHz (+0.5 dB, -1.5 dB)	10 Hz-60 kHz (+0.5 dB, -1.5 dB)
S/N (IHF) Phono Tuner, Tape, PB, AUX	75 dB 90 dB	73 dB 90 dB
FM SECTION (87.5-108 MHz)		
Sensitivity (IHF)	10.8 dBf (1.9 μV)	10.8 dBf (1.9 μV)
Sensitivity (DIN) Mono (26 dB S/N) 75 Ω Stereo (46 dB S/N) 75 Ω	0.7 μV 22 μV	0.7 μV 22 μV
Capture ratio	1.0 dB	1.0 dB
Selectivity (± 400 kHz)	60 dB	60 dB
S/N (mono)	80 dB	80 dB
THD (stereo) 1 kHz	0.15%	0.15%
Frequency response	30 Hz-15 kHz (+0.2 dB, -1 dB)	30 Hz-15 kHz (+0.2 dB, -1 dB)
Stereo separation (1 kHz)	40 dB	40 dB
Subcarrier suppression	50 dB	50 dB
MW SECTION (525-1,605 kHz)		
Sensitivity (IHF) (ext. ant.)	12 μV	-
Selectivity	30 dB	-
LW SECTION (150-350 kHz)		
Sensitivity (int. antenna)	320 μV/m	320 μV/m
Selectivity	35 dB	35 dB
Max. power consumption	280 W	210 W
Dimensions (W × H × D) mm	435 × 144.5 × 314	435 × 144.5 × 314
Weight (kg)	9.1	8.4

SX-790/W 4	SX-690/W 4	SX-590/W 4
2 × 45 W 2 × 45 W 2 × 48 W 2 × 60 W	2 × 30 W 2 × 37 W 2 × 33 W 2 × 38 W	2 × 20 W 2 × 25 W 2 × 22 W 2 × 26 W
< 0.05%	< 0.1%	< 0.3%
5 Hz-80 kHz (+0.5 dB, -1 dB)	10 Hz-60 kHz (+0.5 dB, -1.5 dB)	10 Hz-60 kHz (+0.5 dB, -1.5 dB)
76 dB 90 dB	75 dB 90 dB	73 dB 90 dB
10.3 dBf (1.8 μV)	10.8 dBf (1.9 μV)	10.8 dBf (1.9 μV)
0.7 μV 22 μV	0.7 μV 22 μV	0.7 μV 22 μV
1.0 dB	1.0 dB	1.0 dB
75 dB	60 dB	60 dB
80 dB	80 dB	80 dB
0.15%	0.15%	0.15%
30 Hz-15 kHz (+0.2 dB, -0.8 dB)	30 Hz-15 kHz (+0.2 dB, -1 dB)	30 Hz-15 kHz (+0.2 dB, -1 dB)
45 dB	40 dB	40 dB
55 dB	50 dB	50 dB
15 μV	15 μV	15 μV
26 dB	26 dB	26 dB
420 W	280 W	210 W
480 × 140 × 320	435 × 144.5 × 314	435 × 144.5 × 314
11.2	8.9	8.3

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Archiv Michael Otto
HiFi-Classics.de

STEREO HEADPHONES	MONITOR 10	SE-505	SE-305	SE-205
Matching impedance	4-16 Ω	4-16 Ω	4-16 Ω	4-16 Ω
Frequency response	20 Hz-20 kHz	20 Hz-20 kHz	20 Hz-20 kHz	20 Hz-20 kHz
Maximum input per channel	700 mW	500 mW	500 mW	500 mW
Characteristic sound pressure level (DIN)	100 dB/mW	99.4 dB/mW	99.1 dB/mW	97.4 dB/mW
Speaker	5.7 cm dynamic	2-way dynamic 4.5 cm + 3.2 cm	4.5 cm dynamic	7 cm dynamic
Net weight (g)	530	690	435	450
Connecting cable	5 m curled type with 3-P plug	5 m curled type with 3-P plug	5 m curled type with 3-P plug	2.5 m cable with 3-P plug

TAPE-DECKS	CT-F1250	CT-F850	CT-F850	CT-F750
REC/PB Head	1 × Comb. uni-crystal ferrite	1 × Comb. uni-crystal ferrite	1 × Comb. Sendust	1 × Hard Permalloy
Erasing Head	1 × Small Window	1 × Small Window	1 × Small Window	1 × Small Window
Frequency response (REC/PB)				
Standard/LH tape (±3 dB)	25 Hz-16 kHz	25 Hz-15 kHz	25 Hz-15 kHz	25 Hz-14 kHz
Chromium Dioxide tape (±3 dB)	25 Hz-17.5 kHz	25 Hz-17 kHz	25 Hz-17 kHz	25 Hz-16 kHz
Ferrichromium Dioxide tape (±3 dB)	25 Hz-17.5 kHz	25 Hz-17 kHz	25 Hz-17 kHz	25 Hz-16 kHz
Metal tape (±3 dB)	25 Hz-18.5 kHz	25 Hz-18 kHz	25 Hz-18 kHz	25 Hz-17 kHz
Signal-to-noise ratio				
Dolby off	> 59 dB	> 59 dB	> 59 dB	> 59 dB
Dolby on	> 69 dB	> 69 dB	> 69 dB	> 69 dB
Wow and flutter				
DIN (weighted)	±0.12 %	±0.14 %	±0.14 %	±0.17 %
WRMS	< 0.03 %	< 0.04 %	< 0.04 %	< 0.05 %
Inputs (sensitivity/max. input/impedance)				
Mic	0.3 mV/100 mV/30 kΩ	0.3 mV/100 mV/30 kΩ	0.3 mV/100 mV/10 kΩ	0.3 mV/100 mV/10 kΩ
Line	63 mV/25 V/50 kΩ	60 mV/25 V/100 kΩ	64 mV/25 V/85 kΩ	65 mV/25 V/56 kΩ
DIN Jack	-	-	-	-
Outputs (max. level/impedance)				
Line	640 mV/50 kΩ	640 mV/50 kΩ	630 mV/50 kΩ	640 mV/50 kΩ
DIN Jack	-	-	-	-
Headphones	90 mV/8 Ω	90 mV/8 Ω	98 mV/8 Ω	85 mV/8 Ω
Drive system	2 motor	2 motor	2 motor	1 motor
Dimensions (W × H × D) mm	420 × 187 × 369.5	420 × 187 × 368.5	420 × 150 × 361	420 × 150 × 335
Weight (kg)	10.9	10.1	9.2	7.8

LOUDSPEAKER SYSTEMS	HPM-150	HPM-110	HPM-70	HPM-50	HPM-30
Enclosure type	bass reflex 4-sp., 4-way	bass reflex 4-sp., 4-way	bass reflex 4-sp., 4-way	bass reflex 3-sp., 3-way	bass reflex 3-sp., 3-way
Speakers woofer	1 × 40 cm cone	1 × 30 cm cone	1 × 25 cm cone	1 × 25 cm cone	1 × 20 cm cone
midrange	1 × 10 cm cone	1 × 10 cm cone	1 × 10 cm cone	-	-
tweeter	1 × 4.5 cm cone	1 × 4.5 cm cone	1 × 4.5 cm cone	1 × 4.5 cm cone	1 × 4.5 cm cone
supertweeter	high polymer	high polymer	high polymer	high polymer	high polymer
Crossoverfrequency	750/2,600/8,50 Hz	3,000/4,000/12,000 Hz	2,000/3,000/12,000 Hz	2,500/12,000 Hz	1,500/12,000 Hz
Frequency range	25 Hz-25 kHz	30 Hz-25 kHz	35 Hz-25 kHz	35 Hz-25 kHz	40 Hz-25 kHz
Sensitivity (at 1 m)	92.5 dB/W	92.5 dB/W	92.5 dB/W	91 dB/W	88 dB/W
Operating power to get 96 dB SPL at 1 m distance (DIN)	2.1 W	2.1 W	2.1 W	3.2 W	6.5 W
Maximum input power	250 W	200 W	120 W	80 W	60 W
Nominal input power	125 W	100 W	60 W	40 W	30 W
Nominal impedance	6.3 Ω	8 Ω	8 Ω	8 Ω	8 Ω
Dimensions (W × H × D) mm	450 × 984.5 × 450	390 × 670 × 393	350 × 610 × 321	325 × 570 × 317	300 × 530 × 293
Weight (kg)	37.3	26.7	17.5	13	11

BREEL-TO-REEL TAPE DECKS	RT-909	RT-707	RT-2022	RT-1011L
Drive system	3-motor Solenoid operation	3-motor Solenoid operation	3-motor Solenoid operation	3-motor Solenoid operation
Tape heads	4 track/2 ch. PB × 1 4 track/2 ch. REV PB × 1 4 track/2 ch. REC × 1 4 track/2 ch. Erase × 1	4 track/2 ch. PB × 1 4 track/2 ch. REV PB × 1 4 track/2 ch. REC × 1 4 track/2 ch. Erase × 1	2 track/2 ch. PB × 1 2 track/2 ch. REC × 1 2 track/2 ch. Erase × 1	4 track/2 ch. PB × 1 4 track/2 ch. REC × 1 4 track/2 ch. Erase × 1
Tape speeds	19 cm/sec. 9.5 cm/sec.	19 cm/sec. 9.5 cm/sec.	38 cm/sec. 19 cm/sec.	19 cm/sec. 9.5 cm/sec.
Wow and flutter				
38 cm/sec. (DIN)	—	—	±0.06%	—
19 cm/sec. (DIN)	±0.1%	±0.14%	±0.15%	±0.15%
9.5 cm/sec. (DIN)	±0.16%	±0.18%	—	±0.19%
Frequency response at				
38 cm/sec. (DIN)	—	—	30 Hz–35 kHz	—
19 cm/sec. (DIN)	20 Hz–28 kHz	30 Hz–24 kHz	30 Hz–26 kHz	30 Hz–24 kHz
9.5 cm/sec. (DIN)	20 Hz–18 kHz	30 Hz–16 kHz	—	30 Hz–16 kHz
Signal-to-noise ratio (DIN unweighted)	> 60 dB	58 dB	60 dB	58 dB
	—	52 dB	55 dB	50 dB
Total Harmonic Distortion	< 1%	< 1%	< 0.8%	< 1%
Inputs (sensitivity/max. input/impedance)				
Mic	0.316 mV/80 mV/27 kΩ	0.25 mV/125 mV/27 kΩ	0.11 mV/100 mV/27 kΩ	0.25 mV/80 mV/20 kΩ
Line	50 mV/25 V/50 kΩ	50 mV/25 V/100 kΩ	34 mV/25 V/100 kΩ	50 mV/25 V/100 kΩ
DIN Jack	—	16 mV/8 V/1.3 kΩ	—	15 mV/1.5 V/1.5 kΩ
Outputs (max. level/impedance)				
DIN Jack	—	700 mV/50 kΩ	—	316 mV/50 kΩ
Line	900 mV/2.6 kΩ	700 mV/50 kΩ	900 mV/50 kΩ	316 mV/50 kΩ
Headphones	100 mV/8 Ω	70 mV/8 Ω	133 mV/8 Ω	40 mV/8 Ω
Dimensions (W × H × D) mm	480 × 340 × 318	480 × 230 × 356	460 × 552 × 274	428 × 431 × 227
Weight (kg)	21.5	20	28.5	18.6

CT-F 650	CT-F 600	CT-F 500/CT-506	CT-3000
1 × Hard Permalloy	1 × Hard Permalloy	1 × Hard Permalloy	1 × Hyperbolic Sendust
1 × Ferrite	1 × Ferrite	1 × Ferrite	1 × Ferrite
25 Hz–14 kHz 25 Hz–16 kHz 25 Hz–16 kHz 25 Hz–17 kHz	40 Hz–13 kHz 40 Hz–15 kHz 40 Hz–15 kHz —	40 Hz–13 kHz 40 Hz–15 kHz 40 Hz–15 kHz —	35 Hz–14 kHz 35 Hz–16 kHz 35 Hz–15 kHz —
> 59 dB > 69 dB	> 58 dB > 68 dB	> 54 dB > 64 dB	> 54 dB > 64 dB
±0.17% < 0.05%	±0.17% < 0.05%	±0.17% < 0.05%	±0.17% < 0.05%
0.3 mV/100 mV/10 kΩ 50 mV/25 V/75 kΩ —	0.3 mV/100 mV/10 kΩ 50 mV/25 V/75 kΩ 15 mV/5 V/9.1 kΩ	0.3 mV/110 mV/10 kΩ 65 mV/14 V/100 kΩ 9 mV/2 V/2.2 kΩ	0.3 mV/100 mV/10 kΩ 70 mV/25 V/100 kΩ —
640 mV/50 kΩ — 85 mV/8 Ω	640 mV/50 kΩ 400 mV/50 kΩ 85 mV/8 Ω	700 mV/50 kΩ 700 mV/50 kΩ 100 mV/8 Ω	450 mV/50 kΩ — 60 mV/8 Ω
1 motor	1 motor	1 motor – DC servo	1 motor
420 × 150 × 335	420 × 142.5 × 287.5	380/420 × 140 × 261	382 × 84 × 329
7.1	5	5	6.4

Dolby is a trademark of Dolby Laboratories, Inc.

CS-636	CS-535	CS-434	CS-333	CS-X3	CS-X2
bass reflex 3-sp., 3-way	bass reflex 3-sp., 3-way	bass reflex 2-sp., 2-way	bass reflex 2-sp., 2-way	air suspension bookshelf 2-sp., 2-way	bass reflex 2-sp., 2-way
1 × 25 cm cone 1 × 10 cm cone 1 × 6.6 cm cone —	1 × 20 cm cone 1 × 77 cm cone 1 × 6.6 cm cone —	1 × 20 cm cone — 1 × 6.6 cm cone —	1 × 20 cm cone — 1 × 6.6 cm cone —	1 × 10 cm cone — 1 × 2.5 cm dome —	1 × 16 cm cone — 1 × 2.5 cm dome —
2,000/7,000 Hz	3,000/5,000 Hz	2,000 Hz	2,000 Hz	3,800 Hz	3,500 Hz
50 Hz–20 kHz	60 Hz–18 kHz	75 Hz–18 kHz	80 Hz–18 kHz	50 Hz–20 kHz	60 Hz–20 kHz
92 dB/W	92.5 dB/W	92 dB/W	92 dB/W	80.5 dB/W	90 dB/W
2.5 W	2.1 W	2.5 W	2.5 W	33.6 W	4 W
80 W	60 W	30 W	30 W	50 W	50 W
40 W	30 W	15 W	15 W	25 W	25 W
8 Ω	8 Ω	8 Ω	8 Ω	6.3 Ω	6.3 Ω
350 × 610 × 312	320 × 560 × 250	270 × 500 × 230	260 × 455 × 232	118 × 188 × 112	220 × 380 × 205
11	9.5	6	5	3.6	6.5

The products in this catalogue are not necessarily all available in this country. Specifications and design subject to possible modification without notice.

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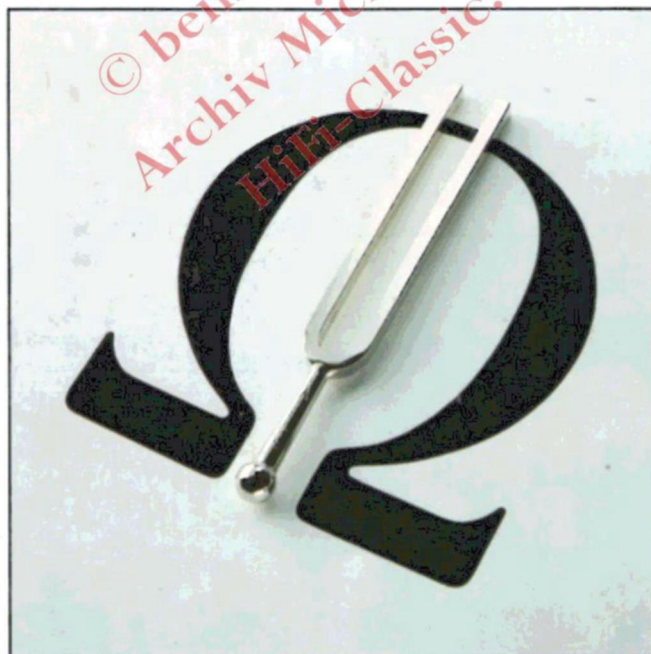
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