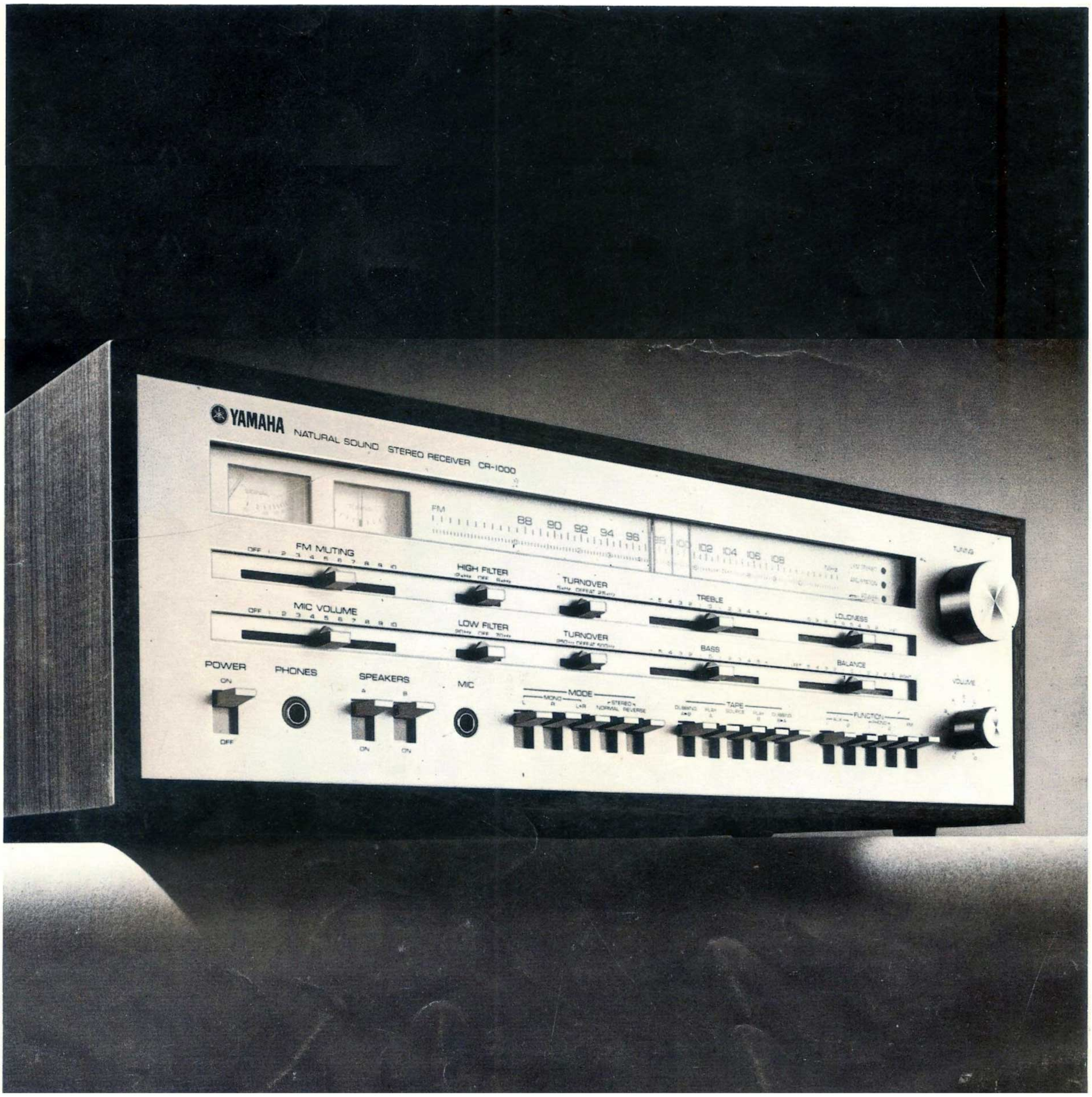
YAMAHA CR1000

HIGH POWER, LOW DISTORTION FM STEREO RECEIVER



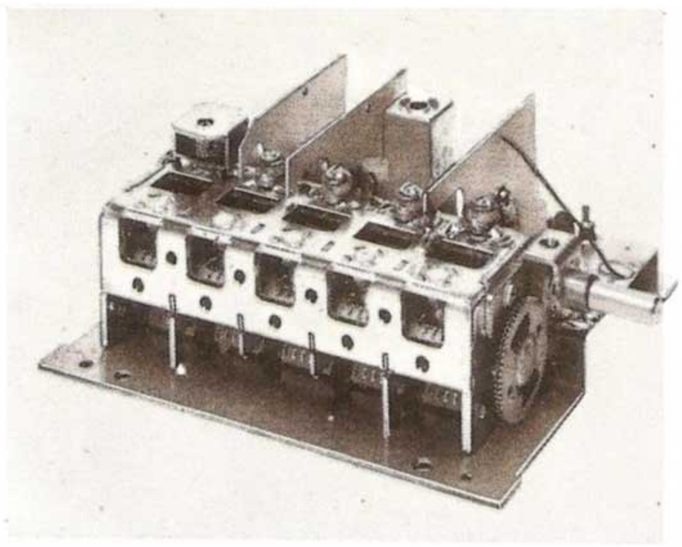
Yamaha blends an outstanding FM tuner and low-distortion, high-power amplifier for a new world of stereo perfection.

The performance specifications of Yamaha's CR-1000 professional-class stereo receiver are distinguished in two ways: they are superb and, like all Yamaha stereo specifications, they are conservatively rated *and* guaranteed. This of course says a great deal about the kind of quality the audiophile should expect from this receiver; but it says even more about the company that would build it. By any standards, the CR-1000 is an important achievement. It is a combination of an outstanding FM tuner and an extremely low-distortion, high-power, versatile amplifier, both of which could stand by themselves as independent hi-fi components. (It does *not* include an AM tuner because the discriminating music lover would most likely prefer to be without it.) The unit features the world's first application of negative feedback to the FM tuner's multiplex switching circuit, resulting in very low harmonic distortion and intermodulation distortion. Power is prodigious: RMS continuous output of 70 watts per channel into 8 ohms, both channels driven, at 0.1% total harmonic distortion over 20 - 20,000Hz. Because the FM tuner uses an elaborate 5-gang tuning capacitor, as well as a triple tuning circuit with dual-gated MOS-FET's, the quality of FM reception is at the highest level presently possible for a tuner of any cost. Which leads us to another significant facet of the CR-1000. With all its excellence, you shall discover its price to be surprisingly agreeable. This, by itself, makes the CR-1000 a most unique stereo proposition.

FM TUNER SECTION

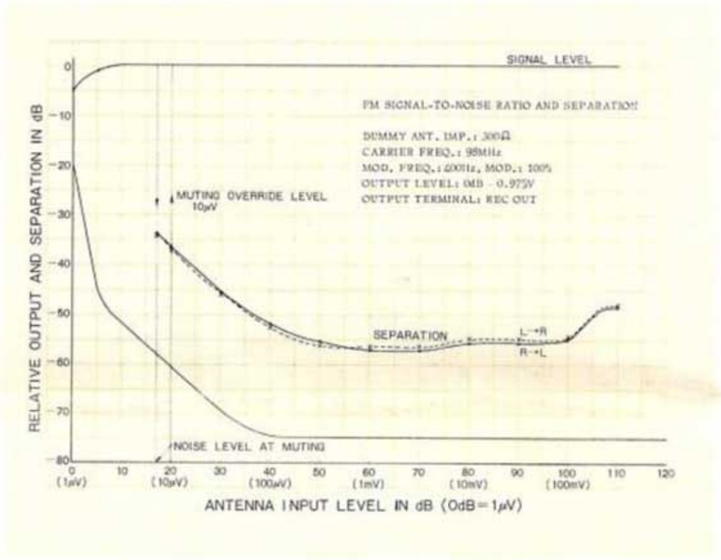
Super-Sensitive FM Front End with Dual-gated MOS FET's and Frequency-Linear 5-Gang Tuning Capacitor

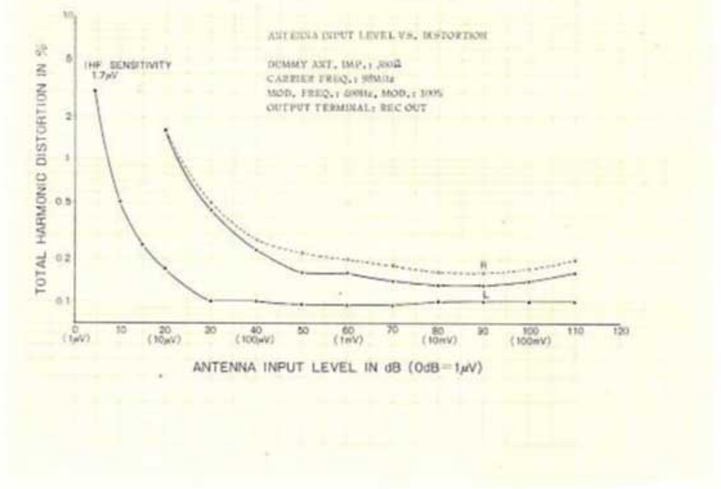
Is there a limit to the degree of excellence possible in an FM tuner? If there is stereo engineers have not yet discovered it, and the FM tuner section of the Yamaha CR-1000 is indicative of the advanced state of the art. Beginning at the beginning, it employs a pair of super-low-noise dual-gated MOS FET's, which are desirable for their superior capability to reject cross modulation. These are used in the advanced "triple tuned" FM RF amplifier and mixer stage. Then there is also an advanced frequency-linear 5-gang tuning capacitor that greatly improves the tuner's image and spurious response rejection. These components add up to striking FM tuner capability, and first-rate performance specifications. IHF sensitivity is 1.7μV; image frequency rejection is better than 110dB. Or, interpreted in terms of actual FM reception, these figures guarantee extra-ordinary response to each input signal.

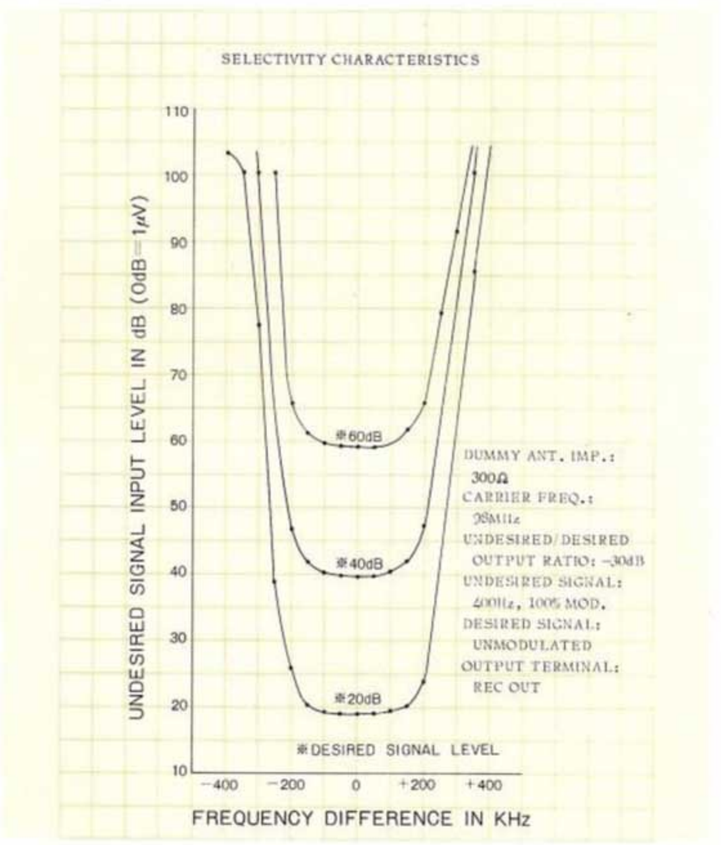


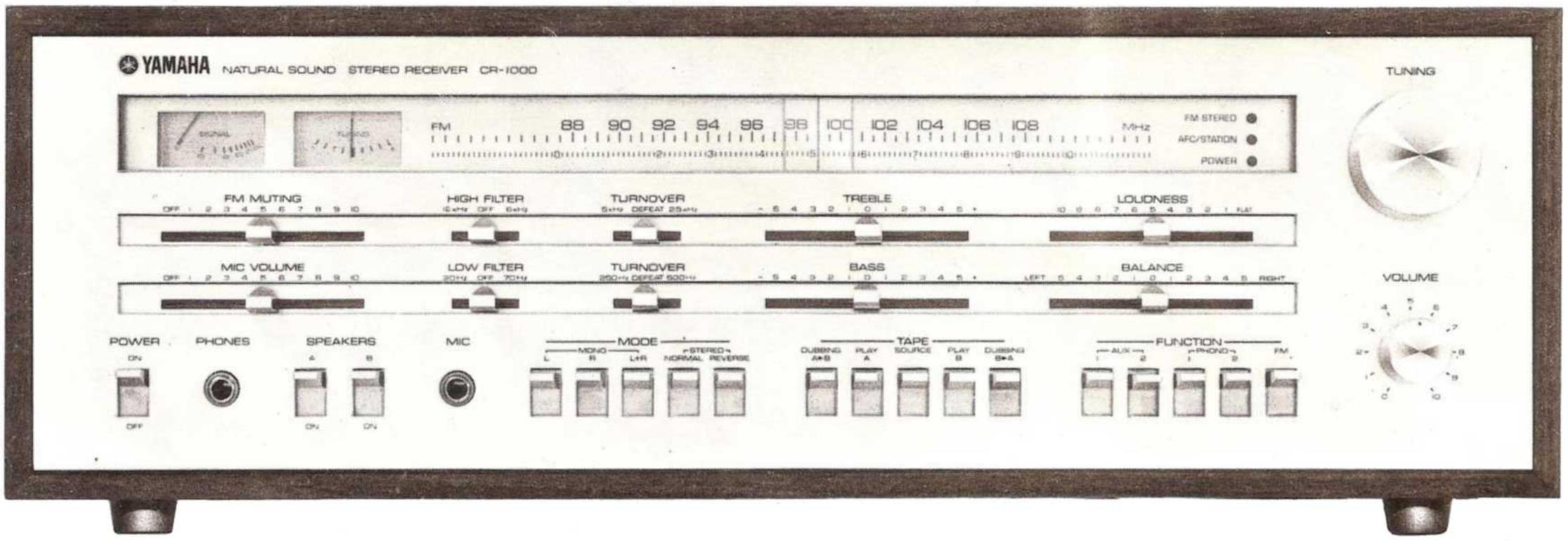
IC IF Amplifier with 7-Stage Differential Amplifier and Six Ceramic Filters

The FM IF amplifier is an elaborate technical triumph. Its components consist of a discrete differential amplifier, two special high-gain integrated circuits housing six differential amplifiers, plus three ideally phase-linear bi-resonator ceramic filters. Together, these components give the IF amplifier superb phase linearity and extraordinary band-pass characteristics, resulting in a striking 80dB selectivity, 1.0dB capture ratio, and ultra-low distortion of 0.15% at 400Hz when used in FM mono reception, or 0.3% at 400Hz in FM stereo reception. This, of course, translates into superb FM reception. Your favorite FM station will be received free of interference from neighboring stations, and virtually free of distortion. Even in difficult urban areas, where station jamming is often inevitable, the CR-1000 delivers your station loud and clear.



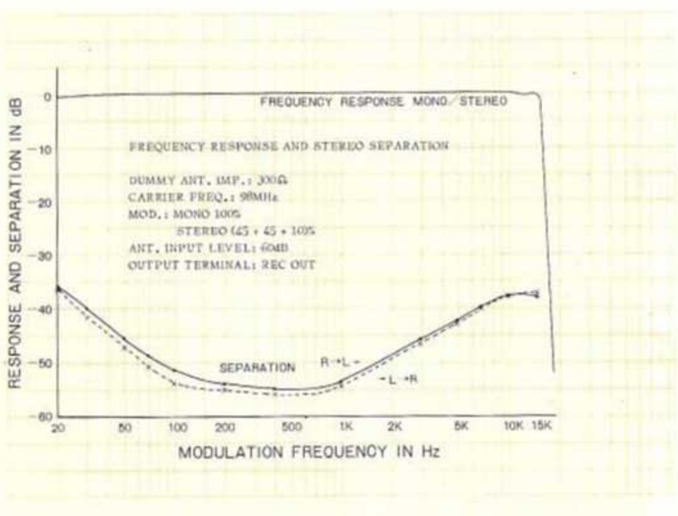


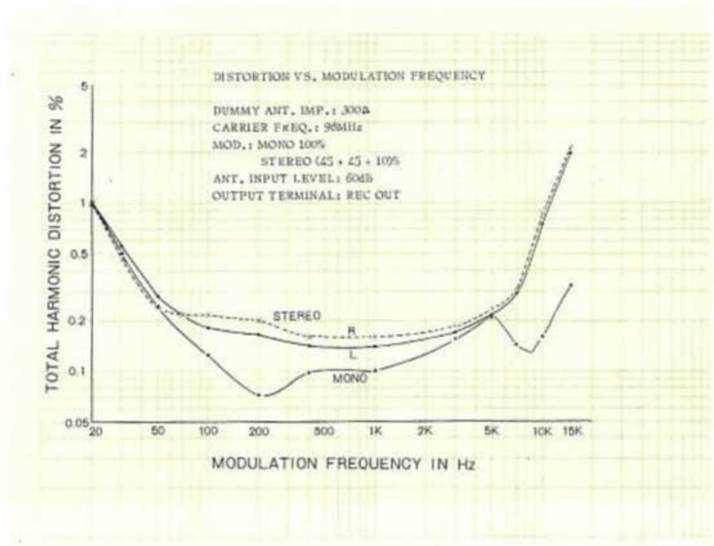




A Yamaha Exclusive: Multiplex Demodulator with Negative Feedback-Applied Transistor Switching Circuit

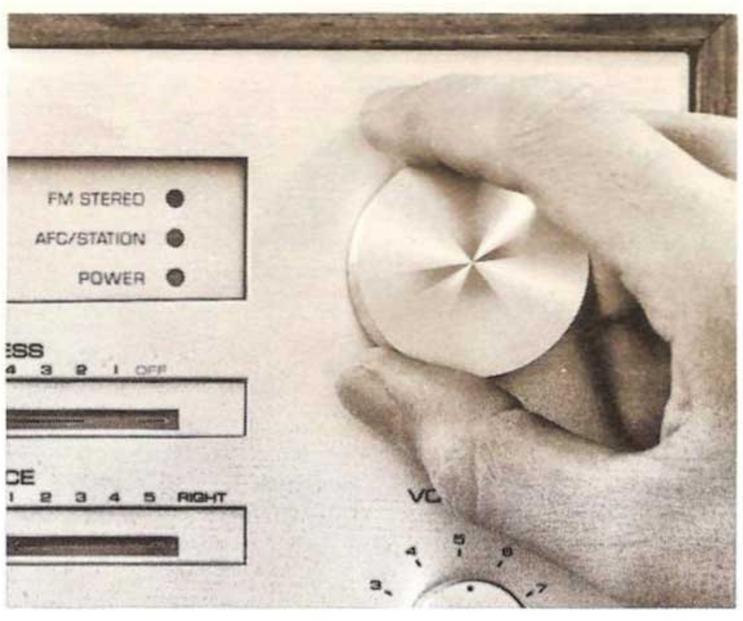
The super-sensitive front end and the selective IF amplifier combine with a sophisticated FM multiplex demodulator to deliver unparalleled FM stereo reception. But the Yamaha CR-1000 goes even this excellence one better, for its FM demodulator, for the first time in stereo technical history, adopts negative feedback in its unique transistorized switching circuit (patent pending). What this circuit does is to compound part of the switched left-channel and right-channel signals *a second time* and feed them back to the original composite signals, thus reducing distortion of the multiplex demodulator to an unprecedented low 0.05% and, of greater importance, eliminating need for a conventional SCA filter that invariably degrades high-frequency FM stereo separation. An additional significant component is its sharp-cutting active carrier leak filter that reduces carrier leakage to less than 60dB, while extending the tuner's flat frequency response curve well over 15kHz. To judge this aspect of the tuner's performance, one does well to review the tuner's stereo separation figures: 45dB at 400Hz, 35dB at 10kHz. Both exceptional by any standards of stereo excellence. Understandably, the tuner is also virtually free from beat interference and intermodulation distortion.





Yamaha-Exclusive Auto-Touch Tuning

To select your desired FM station, you simply touch the Tuning knob and the built-in AFC (Automatic Frequency Control) circuit shuts itself off for accurate tuning. Once you have "tuned in" the station, this AFC circuit activates as soon as you release the knob, guaranteeing steady, drift-free reception regardless of fluctuations in the power supply voltage or changes in the temperature of the tuner circuitry.



Permanent Light-emitting Diode Indicators for Power, FM Stereo and AFC/Station

Yamaha has used LED (light-emitting diode) lamp indicators for power, automatic switchover from FM mono to FM stereo reception, and the automatic AFC/STATION selection. These lamps last a lifetime. The AFC/STATION indicator glows in half-brightness when a station is tuned in; it changes to full brightness as you release the Tuning Knob, indicating that the AFC circuit is working.

Wide-Dynamic-Range Signal Strength Meter & Precise Center Meter

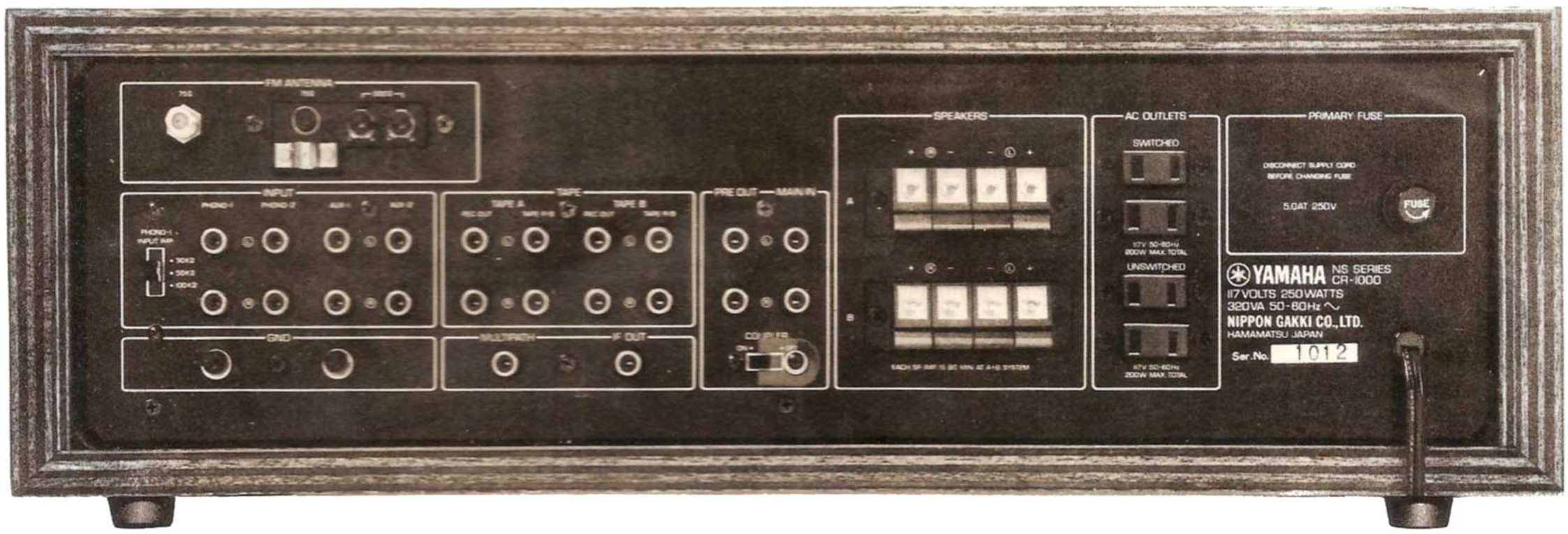
Even the CR-1000's signal strength meter is unusual. The exclusive meter circuit for this meter is an AGC (Automatic Gain Control) circuit able to indicate input signal strengths up to 100dB. Unlike conventional meters on other receivers and tuners, this one does *not* easily deflect the full length of its scale. Thus precise orientation of your FM antenna is accomplished with ease. The center-of-channel meter, located adjacent to the signal meter, deflects to the center of its scale when the tuner is precisely tuned to the center of the FM discriminator output. This center, of course, is where distortion is minimal and the stereo separation is maximized.

Thump-free, Switched, Double FM Muting with Muting Level Control

The input and output stages of the FM multiplex demodulator are *doubly muted* to achieve an excellent 80dB or more muting of the undesirable interstation noise common to the FM band. This double muting system delivers a smooth muting effect, one that avoids unpleasant thump noise or sound distortion as each station is tuned in and out. Further, the degree of muting is easily adjustable by the front-panel FM MUTING control so that an optimum signal-to-noise ratio for the signal strengths is obtained in the listener's area. If you wish to tune in a feeble station, the FM muting can be cancelled altogether by tuning the same control to OFF.

Wide, Precise, Ultra-Smooth Tuning Dial

The wide, frequency-linear FM dial, with slide rule type design, looks precise, durable and smooth—and is. Yamaha devoted extra research on this important



feature to develop a smooth, over-sized flywheel and precise tuning mechanism.

You will find that the dial pointer moves smoothly without backlash or vertical wobbling for fast and pinpoint tuning at all times.

300-Ohm and 75-Ohm Antenna Terminals

Both 300-ohm and 75-ohm antenna terminals are provided on the rear panel of the CR-1000 to connect an FM antenna with either ordinary feeder cable or more noise-resistant coaxial cable.

PREAMPLIFIER SECTION

Direct-Coupled Phono Equalizer

The advanced phono equalizer in the CR-1000 direct-couples a unique SRPP (shunt-regulated push-pull) input stage employing carefully selected junction FET's, and a SEPP (single-ended push-pull) output stage of quality silicon transistors. Since it is able to accept up to 280 milivolts in input signal, the CR-1000 delivers a super-wide dynamic margin (phono overload) of almost 100 times or 40dB for its phono input sensitivity is 3 millivolts. This circuitry also gives the receiver an exceptionally high signal-to-noise ratio of 80dB while pulse-like noise is minimized. Equally important: The phono equalizer achieves an almost identical facsimile of the RIAA disc playback characteristic, with the deviation kept within ±0.2dB! But figures are only one way to size up this receiver. What they tell you is that every shade and tone of sound cut into your recordings will be reproduced with utter faithfulness. How you actually hear these sounds, of course, will depend on your turntable and your speaker system.

Three-Stage Direct-Coupled, Low-Noise, Low-Distortion Tone Control and Filter Amplifiers

These expensive amplifiers are distinguished by extremely low distortion and high signal-to-noise ratio. The tone control amplifier has Yamaha's unique collector-to-emitter negative feedback to achieve optimum tone control curves. Significantly, the turnover frequency is selectable—between 250Hz and 500Hz for the Bass, and between 2.5kHz and 5kHz for the Treble. The filter amplifier—also the advanced three-stage direct-coupled design—boasts a sharp 12dB/octave cut-off characteristic. And, as you can see on the receiver's front panel, both Low and High filters offer a choice of two cut-off frequencies.

Continuous Loudness Control

This control compensates for the inability of the human ear to perceive low-level bass and treble signals according to the actual sound volume sensed by the ear. It is an exclusive feature with Yamaha. In designing it, Yamaha has taken into consideration the efficiency of your speakers, the acoustics of your listening room and many other factors so as best to provide continual adjustment of the loudness contour. Use of the control is simple and leads to better understanding of its function. You first set the loudness control to the FLAT position. Then set the volume control to the loudest volume you usually desire. Finally you reduce the volume by turning the *loudness control* (NOT the volume control) whenever you wish to listen at a lower volume than that for which the volume control has been set. With the control operated in this way, your ears always sense the same balance of the lows, midranges and highs at all volume levels.

Specialized Microphone Amplifier for Mic Mixing

Most amplifiers and receivers use their phono equalizer amplifier as a double for the microphone amplifier. The CR-1000 has its own specialized and high-performance microphone amplifier. Thus, you can make hi-fi live recordings with ease by connecting a microphone to the receiver's mic jack. If, at the same time, you tune in an FM stereo station or play a record or recorded tape, you can mix microphone sounds with the music, sing along with the vocalist, be your own disc jockey—and then record the whole "show" into a tape deck.

Two Tape Record/Monitor Circuits with Dubbing

The CR-1000 will accept two 3-head professional type tape recorders. You may record on both together, or on either. You may monitor or playback either, and copy from either to the other.

Other Features

Separable Preamplifier and Power Amplifier

The preamplifier and power amplifier of the CR-1000 are instantly separated by the adjustment of a rear-panel switch.

Connects Two Pairs of Speaker Systems

You can connect up to two pairs of speaker systems to the CR-1000; you may listen to one or both pairs simultaneously.

Logical Front-Panel Control Arrangement: All Switches and Controls Have a Smooth, Firm, Professional Feel and are Arranged for Ease of Operation

Two Phono Input Circuits, with Input Impedance Selector (100, 50 or 30 Kilo-Ohms) for One

Four Convenient AC Outlets, Two Controlled by the Receiver's Power Switch

Two Large Grounding Terminals

Headphone Jack

Foolproof One-Touch Speaker Terminals

IF Output for 4-channel Capability

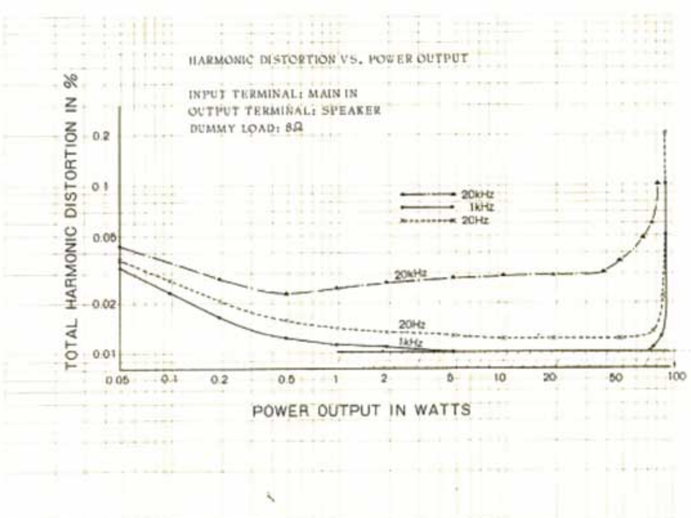
Multipath Output for Improved Antenna Setting

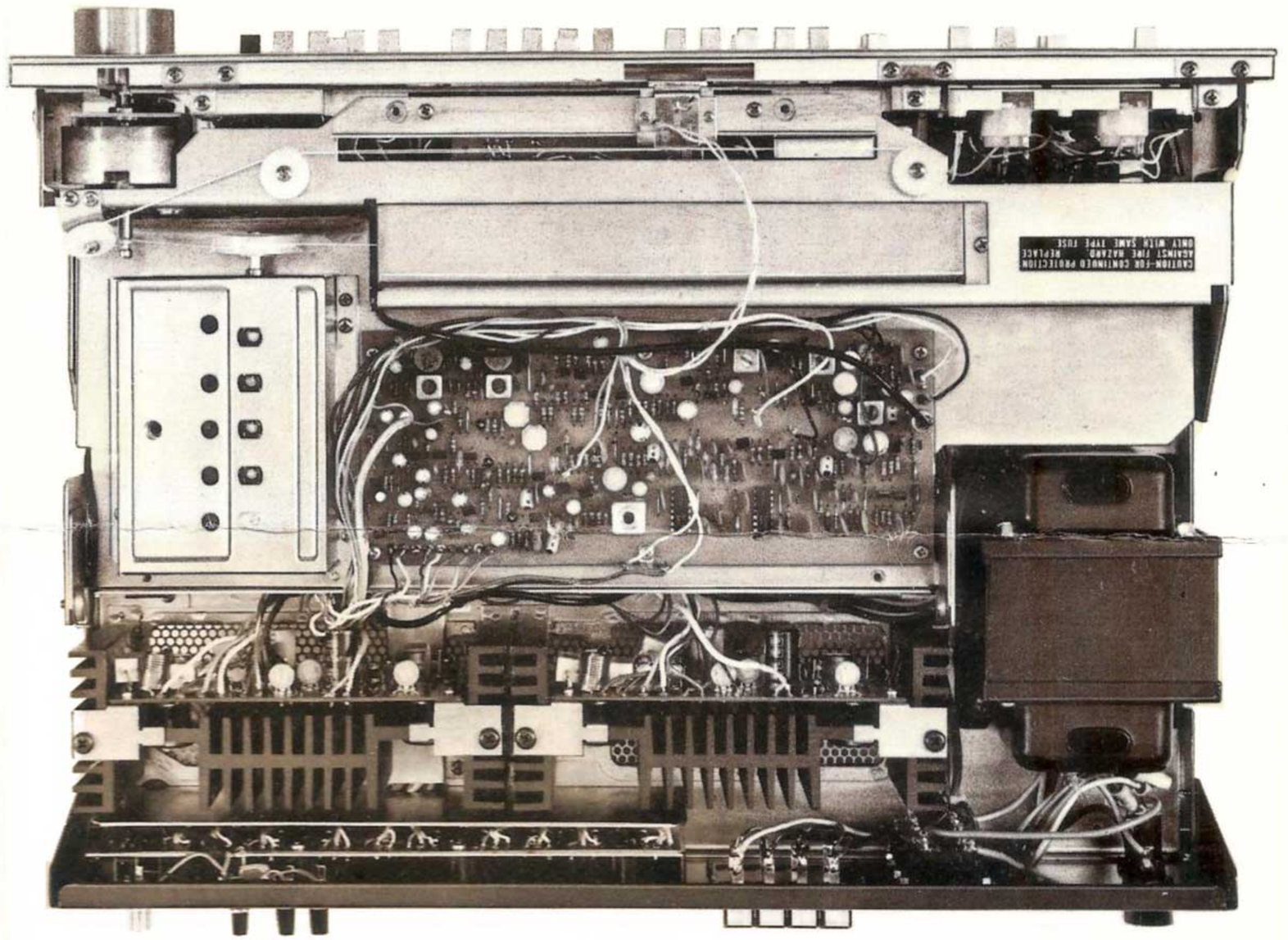
POWER AMPLIFIER SECTION

Direct-Coupled OCL Pure Complementary Power Amplifier

The CR-1000's power amplifier direct-couples a two-stage differential amplifier and an OCL (output-capacitor-less) pure complementary Darlington amplifier. The stability and safety of a direct-coupled amplifier, as superior as its output performance may be, is always directly influenced by the stable operation of the differential amplifier and the effectiveness of temperature compensation provided for it. The differential amplifier in the CR-1000's power amplifier, with its FET and choice silicon transistor, is supplied with a constant-current bias for exceptional stability. There is also a specialized transistor to provide optimum temperature compensation.

The direct-coupled OCL power amplifier itself allows negative feedback to be applied evenly from DC to far above the audio spectrum, while reducing distortion and expanding the power bandwidth to 5 - 50,000Hz with total harmonic distortion of 0.5%. It also extends the damping factor and output characteristics through the very low frequencies, contributing excellent transient response capabilities in the low frequency range.





Two 10,000 Micro-Farad Power Supply Capacitors for High Power

This is a very high powered receiver. The power supply circuit features a closely-regulated, oversized power transformer and two super 10,000μF capacitors. It allows the power amplifier to deliver 75 watts per channel into 8 ohms, both channels driven, at 1kHz, 0.1% T.H.D., or in the critical 20 - 20,000Hz range, 70 watts per channel into 8 ohms, both channels driven, at 0.1% T.H.D. Importantly, too, all tuner and amplification stages except the final output stage are driven by a constant-voltage power supply, which means the supply voltage is always the same regardless of the output voltage or fluctuations in the household line voltage, and thus the tonal quality is never affected. This also contributes greatly to the amplifier's superb transient response and stability in the low frequency range.

Built-in Protection for Power Transistors and Speakers

The CR-1000 is provided with double protection circuits for the important power transistors and for your valuable speakers in the unlikely event that the direct-coupled power amplifier should malfunction. One is a circuit that detects the power dissipation of the power transistors and regulates the input signal the moment the power exceeds the ASO (area of safe operation). A second means of protection is a new relay-equipped speaker protection circuit (patent pending) that prevents direct current from reaching your speakers—and harming them. The circuit returns to normal operation automatically when the abnormal condition disappears. It also cancels the popping noise that is generated when you turn the power switch on or off.

SPECIFICATIONS

AUDIO SECTION

POWER OUTPUT

Dynamic Power (IHF) 200 watts (4Ω)
200 watts (8Ω)

Continuous RMS Power (each channel driven)
100/100 watts (4Ω) at 1,000Hz
80/80 watts (8Ω) at 1,000Hz

Continuous RMS Power (both channels driven)
100+100 watts (4Ω) at 1,000Hz
75+75 watts (8Ω) at 1,000Hz

Continuous RMS Power (both channels driven)
85+85 watts (4Ω) at 20 to 20,000Hz
70+70 watts (8Ω) at 20 to 20,000Hz

TOTAL HARMONIC DISTORTION

Power Amplifier Only
less than 0.1% at rated power
less than 0.04% at 1 watt

Preamplifier Only (PHONO to PRE OUT)
less than 0.1% at rated power
(AUX to PRE OUT)
less than 0.02% at rated power

Overall (AUX to Power Output)
less than 0.1% at rated power

INTERMODULATION DISTORTION
(70Hz : 7,000Hz=4:1 SMPTE method)

Power Amplifier Only
less than 0.1% (8Ω) at rated power
less than 0.05% (8Ω) at 1 watt

Overall (AUX to Power Output)
less than 0.1% (8Ω) at rated output

POWER BANDWIDTH (IHF, distortion 0.5% const.)
5 to 50,000Hz

FREQUENCY RESPONSE (at 1 watt)

Overall (AUX, TAPE PB to Power Output)
10 to 50,000Hz +0.5dB, −1dB

Overall (MIC to Power Output)
100 to 10,000Hz +0.5dB, −6dB

Power Amplifier Only
10 to 100,000Hz +0dB, −1dB

Deviation from RIAA (30 to 15,000Hz)
+0.2dB, −0.2dB

LOAD IMPEDANCE 4 to 16Ω

DAMPING FACTOR (8Ω) 70 at 1,000Hz

CHANNEL SEPARATION (at rated power, 1,000Hz)

Power Amplifier Only	60dB
Overall from PHONO 1, 2	50dB
Overall from AUX, TAPE PB	50dB
Overall from MIC	50dB

HUM AND NOISE (IHF, Closed circuit A Network)

Overall from PHONO 1, 2	better than 80dB
Overall from MIC	better than 70dB
Overall from AUX, TAPE PB	better than 90dB
Power Amplifier Only	better than 100dB
Volume at Minimum	better than 90dB

INPUT SENSITIVITY AND IMPEDANCE
(at rated power, 1,000Hz)

PHONO 1	3mV (30kΩ, 50kΩ, 100kΩ)
PHONO 2	3mV (50kΩ)
PHONO 1, 2 Max. Input Capability	280mV (T.H.D. 0.1%)
MIC	3mV (50kΩ)
MIC Max. Input Capability	450mV (T.H.D. 0.3%)
AUX 1, 2	150mV (40kΩ)
TAPE PB A, B	150mV (40kΩ)
Power Amplifier Input	775mV (40kΩ)

OUTPUT LEVEL AND IMPEDANCE (at rated power, 1,000Hz)

TAPE REC OUT A, B	150mV (2kΩ)
PRE OUT	775mV (2kΩ)
	3,000mV (Max. Output T.H.D. 0.1%)

TONE CONTROLS

BASS	+15dB, −15dB at 50Hz
TREBLE	+10dB, −10dB at 10,000Hz

FILTERS

LOW	−3dB at 20Hz, 70Hz (12dB/oct.)
HIGH	−3dB at 6,000Hz, 12,000Hz (6dB/oct.)

LOUDNESS CONTROL
(Continuous Loudness Volume at Minimum)
+10dB at 100Hz, +5dB at 10,000Hz

TUNER SECTION

FM:

Tuning Range	88 to 108MHz
Usable Sensitivity (IHF)	1.7μV
Quieting Slope	55dB at 5μV
	60dB at 10μV
Image Frequency Rejection	110dB
IF Rejection	110dB
Spurious Response Rejection	110dB
AM Rejection	55dB
Capture Ratio	1.0dB
Alternate Channel Selectivity (IHF)	80dB
Signal-to-Noise Ratio	75dB

Total Harmonic Distortion

MONO	0.15% at 400Hz
	0.3% at 50 to 10,000Hz
STEREO	0.3% at 400Hz
	1.0% at 50 to 10,000Hz
Stereo Separation	45dB at 400Hz
	35dB at 50 to 10,000Hz

Frequency Response
+0.5dB, −0.5dB at 50 to 10,000Hz
+1.5dB, −1.5dB at 20 to 15,000Hz

Sub-Carrier Suppression 60dB

Muting Override Signal Level
10 to 30μV variable

Antenna Impedance 300Ω balanced
75Ω unbalanced

IF Out Level and Impedance 400mV/1kΩ

GENERAL

Semiconductors
2 IC's; 2 MOS FET's; 98 Transistors; 10 FET's; 3LD's; 56 Diodes; 5 Zener Diodes

Power Source AC 117V, 50/60Hz

Power Consumption

Max.	430 watts
Rated	250 watts

AC Outlets

Switched	2 (total 200 watts)
Unswitched	2 (total 200 watts)

Dimensions 510mm (20″) W×174mm (6¾″)H ×335mm (13¼″)D

Weight 19.0kg (41.8 lbs)

Design and specifications subject to change without notice for improvements.

For details please contact:

SINCE 1887 YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN