

# YAMAHA CR-820

*Natural Sound FM/AM Stereo Receiver*

*Pure, low distortion power and wide NDCR*

*FM section with NFB-PLL-MPX, OTS, and pilot cancellation*

*Completely independent tape recording and audition*

*Continuous loudness and additional presence control*





# Yamaha: Dedication to Musical Excellence

Today the world's largest manufacturer of musical instruments is also a leader in audio fidelity. For nearly a hundred years Yamaha craftsmen have been designing full, natural sound into our renowned pianos, organs, wind and string instruments—a rich musical tradition that makes us unique in the audio world. Part of the reason is our generations of musical sensitivity. But it's also due to our immense technological and production capabilities—built over decades of supplying fine musical instruments to the world.

## The Basics

Audio performance depends upon a wide range of technologies. While Yamaha's computer-controlled circuit design and testing is second to none, our musical instrument experience has given us expertise in many other crucial fields. The Yamaha factories which produce LSIs and semiconductors for our electronic organs were also important in the development of the revolutionary Yamaha vertical FET used in our top-line B-1 power amplifier and C-1 preamp. They are also responsible for our unique vapor deposition production of the world's only pure beryllium dome speaker diaphragms. After years of blending and forming the metals in our brass instruments, we were able to develop the special alloys used in our powerful speaker magnets. Piano frame diecast techniques are behind the ideal weight and acoustic properties of our turntable platters and speaker frames. And Yamaha piano soundboard research and cabinet woodcrafting is reflected in our resonant-free speaker enclosures and beautifully detailed component cabinetry.

## In-House

Every crucial part of every Yamaha audio component is Yamaha-made. That's how we set our own quality standards. And that's how we can afford to innovate every step of the way: when a part or material doesn't do justice to the music we simply develop one that does.

## The Payoff

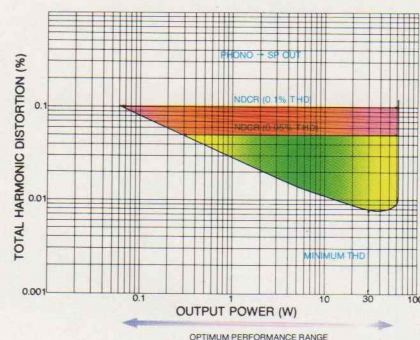
When you have musicians and audio engineers speaking the same language the result is full natural sound fidelity, plus innovative features which translate directly into improved tonality or operating convenience. Yamaha's insistence on total music performance, not just isolated specs, is behind a revolutionary new approach to audio component design—one that gives the CR-820 receiver (as well as all other models in the line) music fidelity audibly superior to any other receiver and rivaling many separate tuner, preamp and power amplifier combinations.

## Balanced Design for Top Overall Performance

Every circuit, from input to output, has its part to play in assuring the highest musical quality. Yet many manufacturers concentrate on the power amp section, in an effort to increase power without comparable improvements in tuner and preamp sections. That is why they quote specs for individual sections, not overall (input to output) performance. Yamaha's approach is different: a balanced design in which each section perfectly matches and complements the other two. To prove it, we show you the overall performance, from input to output at normal volume settings. And to express this concept Yamaha provides a whole new measurement of audio performance: NDCR.

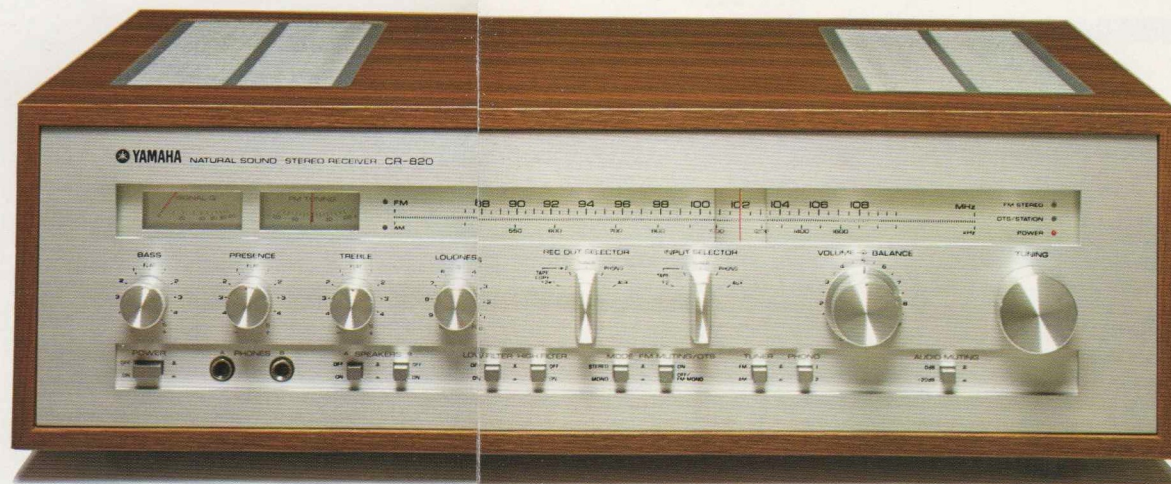
## Noise Distortion Clearance Range

The CR-820 was created with one goal in mind: to provide distortion-free natural sound in your home under real listening conditions. Noise Distortion Clearance Range (NDCR) is the new Yamaha method of making sure this goal is realized. NDCR shows the whole range of powers for which total harmonic distortion and noise are below a given level. This is an important departure from RMS power at a given distortion level, because RMS power alone cannot tell the whole story concerning the actual in-home listening situation. Unlike the RMS measurement, NDCR measures total performance, from Phono Input to Speaker output—and at the normal listening level of -20 dB volume control setting, instead of the unrealistic RMS maximum output power (0 dB). In the CR-820 the NDCR results are truly impressive: 100 mW to 50 W. At any volume level, whisper-soft or ear-splitting loud, the pianissimos and fortes have the same superb, pure fidelity.



## The Great Tradition

Yamaha is the proud manufacturer of ultra-high performance components for the spare-no-expense audiophile, including our B-1 and B-2 FET basic amplifiers, C-1 and C-2 preamps, and the renowned CT-7000 tuner. Many of the unique circuits and features developed for that series, like LED function indicators (in the C-1) and multipath indication (CT-7000), have been incorporated in the CR-820.



## THE POWER AMP

### Distortion Cut In Half—To An Incredible 0.05%!

Our first complete receiver line, with 0.1% distortion, astounded the audio world. In fact, no other manufacturer has equalled that figure for its whole line. But now we've gone a big step further. Our new selection cuts distortion to a mere 0.05% IM and THD (20-20,000 Hz, 8 ohms, both channels driven at rated output). That's why the CR-820 offers clean, pure performance unequalled by any other receiver in its class.

## THE PREAMP

### Superb S/N Ratio

Precision circuit design gives the CR-820 outstanding signal-to-noise characteristics. This results in an extra measure of clean, quiet music performance.

### Accurate RIAA Equalization

The CR-820's outstanding equalizer section is faithful to every detail on your records, to within  $\pm 0.5$  dB of RIAA characteristics. The dynamic range of 120 mV at 1 kHz is ample for unstrained enjoyment of high cutting-level discs with high output cartridges.

### Continuously Variable Loudness Contour

The CR-820 features the same continuously variable loudness compensation control as on the prestigious C-1 preamplifier. Rather than a simple on-off loudness switch, it lets you set for a natural tonal balance at any listening level below your chosen maximum, compensating perfectly for the ear's constantly changing loss of sensitivity to bass and treble frequencies at lower levels.

### Excellent SVR for Negligible Dynamic Crosstalk

The CR-820 incorporates a new Yamaha-developed power supply circuit. It is even more effective than costly dual power supplies in eliminating "dynamic crosstalk," the spurious signal in one channel that can arise when a loud signal in the other channel draws heavy current from the power supply. Extremely high SVR (supply voltage rejection) keeps this form of distortion well below the level of audibility, for a tremendous improvement in detailed accuracy, even in the loudest and most complex passages.

### Record One Program While Listening to Another

This original Yamaha feature lets you use the Rec Out selector to choose a source for recording, while listening to that source or any other selected by the Input selector. You can record an FM program while listening to a favorite record on your turntable, and you can let a friend tape a record or copy tapes without having to give up listening to the tuner.

### Full Tone and Filter Controls

**Tone Controls**  
In addition to Bass and Treble controls, with carefully chosen turnover frequencies and perfectly flat center positions, the CR-820 also features a special Presence equalizer, as introduced on our state-of-the-art C-1 control amp. This lets you emphasize the vocalist against the group, or the soloist in relation to the accompaniment, adding extra musical impact.

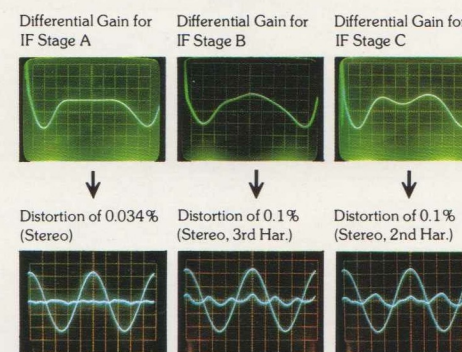
**Filters**  
Both High and Low filters are provided, with sharp 12 dB/octave cutoffs, for reduction of record scratches and tape hiss, or turntable rumble and warped records which cause power-sapping subsonic noise.

## THE TUNER

### Direct Assessment of Differential Gain

The world-famous CT-7000 tuner offered switched narrow/wide selection modes for ideal reception under all conditions. Now, however, direct visual checks of the critical differential gain linearity enabled Yamaha engineers to give you the best of both mode settings in the CR-820: the high selectivity of the narrow mode (75 dB) and the low distortion of the wide mode (0.15% for stereo at 1 kHz)—without the need to choose between them!

### Linear Differential Gain Characteristics



### FM/Original: Direct Comparison

The CR-820 was developed by comparing the reproduction of a sound source heard first through the amplifier section alone, and then after the sound was modulated and received by the tuner. Thus any coloration introduced by the tuner could be detected and eliminated for a perfect match.

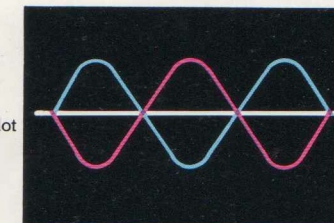
### Unique Negative Feedback Multiplex

Full NFB (pat. pending) applied to the whole MPX section reduces distortion in this unique Yamaha circuit to the level where it cannot be measured even on the most sensitive test equipment. Combined with phase-locked loop circuitry for ultra-high stability, this NFB circuitry offers something very near the ultimate in FM reception quality.

### Pilot Signal Cancellation (pat. pending)

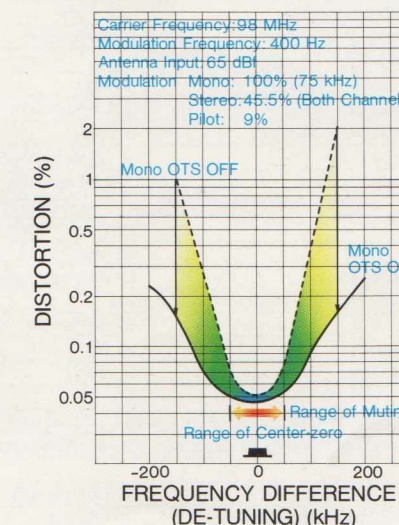
Conventional cutoff filters usually reduce treble response far below even 15 kHz in the process of preventing the 19 kHz pilot signal from interfering with the audio signal. But the CR-820 uses a perfect mirror-image of the 19 kHz sine wave to cancel out the pilot signal perfectly. Tuner response soars up to 18 kHz for superb treble fidelity which is clear and audible.

Red Trace: 19 kHz Pilot Signal  
Blue Trace: Pilot Cancellation Waveform



### Optimum Tuning System

OTS assures crystal-clear FM reception by locking onto the selected station automatically, even compensating for incorrect manual tuning. It automatically switches off for easy tuning when you touch the tuning knob, and on again when you release it. A bright LED shows circuit status.



### Signal Strength and Quality Meter

Indicating normal signal strength during AM reception, this meter often "flutters" visibly when reading signal strengths for FM, if multipath interference is present. Similar to the method used in the unparalleled CT-7000 tuner, it lets you easily find the best antenna orientation for minimum interference and optimum sound quality.

### Great AM Too!

AM quality on the CR-820 is better than ever. In fact, the AM signal is passed through the FM multiplex decoder, to take advantage of its low distortion characteristics. A special equalizer compensates for the MPX de-emphasis curve.

### Other Important Features

- Audio Muting
- FM Muting
- Provision for Two Sets of Speakers and Two Headphones
- LED Indicators of Major Receiver Functions
- Stereo/Mono Mode Switch
- Three AC Outlets



## SPECIFICATIONS

### AUDIO SECTION

#### MINIMUM RMS OUTPUT POWER PER CHANNEL

60 Watts (4 ohms) from 20 to 20,000 Hz at no more than 0.05% Total Harmonic Distortion

50 Watts (8 ohms) from 20 to 20,000 Hz at no more than 0.05% Total Harmonic Distortion

CONTINUOUS RMS POWER	70 watts (4 Ω)
(both channels driven, 1 kHz)	55 watts (8 Ω)
TOTAL HARMONIC DISTORTION, 20 to 20,000 Hz	
Phono to Rec Out	0.012%, 2 V output
Aux, Tape to Sp Out (8 Ω)	0.02% at 25 W
IM DISTORTION (Aux, Tape 1, 2)	0.05% at 50 W
INPUT SENSITIVITY/IMPEDANCE	
Phono	2 mV/50 kΩ
Aux, Tape 1, 2	120 mV/45 kΩ
MAXIMUM INPUT LEVEL	
Phono	120 mV at 1 kHz
OUTPUT LEVEL/IMPEDANCE	
Rec Out terminals (Phono)	120 mV/220 Ω (rated)
	7.2 V (max. 1 kHz)
FREQUENCY RESPONSE	
Phono RIAA deviation	± 0.5 dB
Aux, Tape 1, 2 to Sp Out	20 Hz to 20 kHz ± 0.5 dB
TONE CONTROL CHARACTERISTICS	
Bass turnover frequency	350 Hz
Bass boost/cut	± 13 dB at 50 Hz
Treble turnover frequency	3.5 kHz
Treble boost/cut	± 10 dB at 20 kHz
Presence boost/cut	± 6 dB at 3 kHz
FILTERS AND LOUDNESS CONTROL CHARACTERISTICS	
Low	25 Hz (12 dB/octave)
High	10 kHz (12 dB/octave)
Loudness control	Level-related equalization
SIGNAL-TO-NOISE RATIO (IHF-A Network)	
Phono	92 dB (for mV, shorted)
Aux, Tape	97 dB
Residual noise	0.12 mV
NOISE DISTORTION CLEARANCE RANGE (NDCR) for 0.1% into 8 Ω, 20 Hz to 20 kHz, from 100 mW to 50 watts with Vol -20 dB (Phono Input to Sp Out)	
POWER BANDWIDTH (IHF)	10 Hz to 50 kHz (at 0.05% THD)
DAMPING FACTOR (at 1 kHz)	40 into 8 Ω
<b>FM SECTION</b>	
TUNING RANGE	88 to 108 MHz
USABLE SENSITIVITY	
300 Ω	10.3 dBf/1.8 μV
75 Ω	10.3 dBf/0.9 μV
50 dB QUIETING SENSITIVITY	
Mono	15.3 dBf (3.2 μV)
Stereo	37.3 dBf (40 μV)
IMAGE RESPONSE RATIO (98 MHz)	85 dB
IF RESPONSE RATIO (98 MHz)	90 dB
SPURIOUS RESPONSE RATIO (98 MHz)	100 dB
ALT. CHANNEL SELECTIVITY (IHF)	75 dB
AM SUPPRESSION RATIO (IHF)	65 dB

CAPTURE RATIO	1.0 dB
SIGNAL-TO-NOISE RATIO (at 65 dBf, IHF)	
Mono	77 dB
Stereo	73 dB
DISTORTION (at 65 dBf)	
Mono 100 Hz	0.1%
1 kHz	0.1%
6 kHz	0.2%
Stereo 100 Hz	0.15%
1 kHz	0.15%
6 kHz	0.3%
INTERMODULATION DISTORTION (IHF)	
Mono	0.05%
Stereo	0.15%
SUB-CARRIER PRODUCT RATIO	60 dB
STEREO SEPARATION	
50 Hz	30 dB
1 kHz	40 dB
10 kHz	30 dB
FREQUENCY RESPONSE	
50 Hz to 10 kHz	± 0.3 dB
30 Hz to 15 kHz	+ 0.5 - 1.0 dB
10 Hz to 18 kHz	+ 0.5 - 3.0 dB
MUTING THRESHOLD	19.2 dBf (5 μV)
<b>AM SECTION</b>	
TUNING RANGE	525 to 1,605 kHz
SENSITIVITY (IHF, bar antenna)	300 μV/m (49 dB/m)
SELECTIVITY (1,000 kHz)	30 dB
SIGNAL-TO-NOISE RATIO	50 dB (at 80 dB/m)
IMAGE RESPONSE RATIO (1,000 kHz)	55 dB
IF RESPONSE RATIO (1,000 kHz)	40 dB
SPURIOUS RESPONSE RATIO (1,000 kHz)	55 dB
TOTAL HARMONIC DISTORTION	0.4% (at 80 dB/m)
TUNER SECTION OUTPUT LEVEL/IMPEDANCE	
FM (100% mod. at Rec Out)	450 mV/6.5 kΩ
AM (30% mod. at Rec Out)	120 mV/6.5 kΩ
<b>GENERAL</b>	
SEMICONDUCTORS	74 Transistors, 4 ICs, 1 FET, 30 Diodes, 5 Zener Diodes, 5 LEDs, 4 Ceramic Filters.
POWER SUPPLIES	U.S.A. and Canada: AC 120 V, 60 Hz Australia: AC 240 V, 50 Hz Other Areas: AC 110/120/130/220/230/240 V, switchable; 50/60 Hz
POWER CONSUMPTION	240 W (Aust. 400 W)
DIMENSIONS (W x H x D)	508 x 167 x 395 mm (20" x 6 5/8" x 15 1/2")
WEIGHT	13 kg (28 lbs. 10 oz.)

Specifications subject to change without notice.

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