

# YAMAHA CR-1020

Natural Sound FM/AM Stereo Receiver

High output power and wide NDCR

Wide range output meters and multifunction FM meters

Ultra low distortion FM section with NFB-PLL-MPX and OTS

Completely independent recording and audition





# 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-I power amplifier and C-I 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.

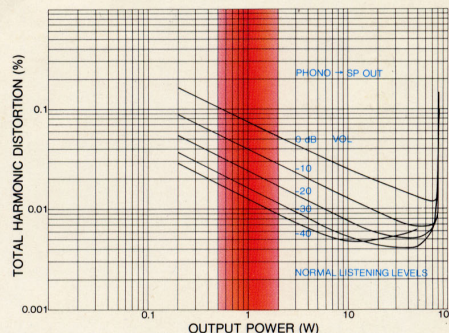
## The Payoff

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-1020 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 Total Performance—Input to Output

"Balanced Design" means we balance the quality of the tuner, preamp and power amp in every Yamaha receiver. We don't boast of massive power output built at the expense of tuner sensitivity, signal-to-noise ratio, distortion or other important performance parameters. To us the music-lover using 35 watts of power is entitled to the same quality sound as one needing 100 W. Because we design each section component by component, there are no weak links in a Yamaha receiver. What's more, each section is matched from its very first design stages to the other two, so not only is each section comparable to a fine separate component, but all three work together for superb music fidelity. That's why we dare to publish overall performance

specifications for our receivers, from Phono In to Speaker Out, while other manufacturers measure the power amplifier separately from the rest of the system.



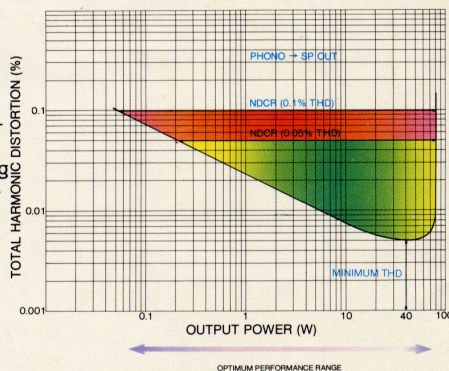
## Noise Distortion Clearance Range: An All-New Audio Design Philosophy

The CR-1020 is part of a new series of Yamaha audio components created for one key purpose: to provide distortion-free natural sound in your home under real listening conditions. To realize this goal we had to create a whole new method of measuring performance—Noise Distortion Clearance Range.

What does it show? NDCR is a range—the whole range of powers for which total harmonic distortion and noise are below a given level. It requires that all pertinent measurements be made under actual listening conditions: through all amplification circuits used in actual listening (i.e., Phono Input to Speaker Out), and at the volume control settings preferred for normal listening levels. Up to now distortion has usually been measured for only part of the amplifier circuitry (main amp, equalizer amp). What's more, this measurement has usually been made at maximum volume setting. But components which perform well at this level often show remarkably inferior signal-to-noise, distortion and even frequency response characteristics at realistic listening levels. That is why Yamaha's Noise Distortion Clearance Range is measured at -20 dB volume setting rather than the conventional 0 dB: the performance ratings you see represent the actual in-home sound you hear, not simply test-bench figures. The actual NDCR range for the CR-1020 is a superb

achievement in distortion-free performance: 100 mW to 70 W. Translated into home listening, think of it this way: if you set your volume control for normal listening, average power to your speakers will be 1-2 watts. A pianissimo passage in this case will be approximately 100 mW. So the full NDCR range achieved by the CR-1020 means superb, pure fidelity in every conceivable listening situation.

To us at Yamaha NDCR is more than just a measurement. It reflects the design approach to all our music products. Because we pay such close attention to their sound in actual use, our engineers developed this assessment method to help build in the same tonal response for home audio enjoyment.



## In the Great Tradition

You may know that Yamaha produces ultra-high performance audio component systems for the spare-no-expense audiophile. The experience and knowledge gained in developing these world-class products is built into the CR-1020, at a price well within the grasp of a far wider circle of fans. It features wide-range output power meters like those on the B-I

and B-2 power amplifiers. A mid-frequency presence control first offered on the C-I control amp. LED indication of operation functions (C-I). A signal quality meter as featured on the revolutionary CT-7000 tuner. Not to mention the spin-off from advanced circuit design and quality control methods.



# THE PREAMP

## Superb S/N Ratio

The CR-1020's precision circuit design has resulted in unparalleled signal-to-noise performance. The result is clear, noise-free music at any listening level.

## Accurate RIAA Equalization

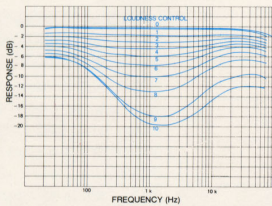
Record reproduction in the CR-1020 is faithful to every detail in the recording, with only  $\pm 0.2$  dB deviation from RIAA characteristics, thanks to the use of high precision ( $\pm 1\%$ ) mylar film capacitors and metallic film resistors. The dynamic range, extending to a generous 230 mV at 1 kHz, copes comfortably with high output cartridges and discs with high cutting levels.

## Non-Step Master Volume Control

The overall volume control on the CR-1020 has a smooth attenuation curve specially designed for precise control, free from the sometimes awkward gaps of attenuator-type controls. It maintains tight stereo balance at all levels.

## Continuously Variable Loudness Contour

Most receivers, if they offer loudness compensation at all, have a simple on-off switch. But it is impossible for this type of control to compensate for the ear's constantly changing loss of sensitivity to bass and treble frequencies as the volume is turned down. On the CR-1020, as on the prestigious C-I control amp, a separate, continuously variable loudness control lets you retain the same natural tonal balance at any and all listening levels.



Continuous Loudness Control Contours

## Completely Separate Recording and Listening

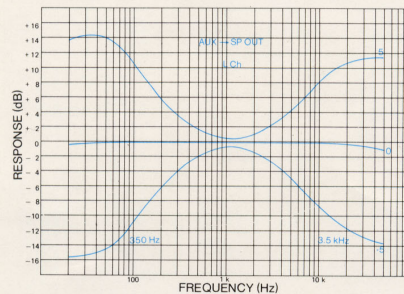
This Yamaha original feature lets you choose a source for recording by the Rec Out selector, while at the same time you can listen to that or any other source set by the Input selector. You can record an FM program while listening to a favorite record on your turntable, and you can let a friend tape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

## Comprehensive Tone and Filter Controls

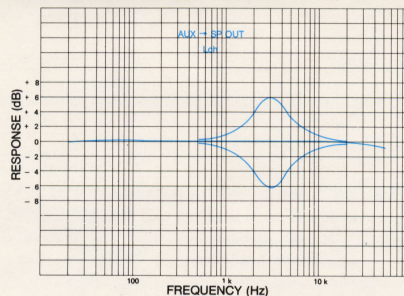
### Tone Controls

The carefully chosen turnover frequencies of the bass/treble controls assure precise tone settings to match listening room acoustics, speaker response, the music, and your personal taste. The extra Presence control, just like that on our world's first all-FET C-I preamp, offers a smooth, natural curve for compensation of the mid-range frequencies centered on 3 kHz. Use it to bring the vocalist or soloist 'forward' away from the accompaniment, adding extra musical impact.

### Tone Control Characteristics

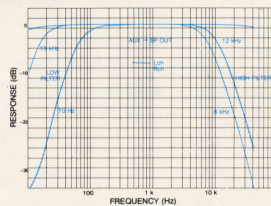


### Presence Control Characteristics



### Filters

Both high and low filters have two filters per switch, with sharp 12-dB/octave cutoffs, ideal for reducing annoying interference under a wide variety of conditions. The choice of settings lets you precisely select the best characteristics to eliminate tape hiss, record scratch, or turntable rumble. The low filter may be left in the 15 Hz position during normal operation to cut power-sapping subsonic noise from warped records, while the 70 Hz position is ideal for canceling turntable rumble or acoustic feedback.



Filter Characteristics

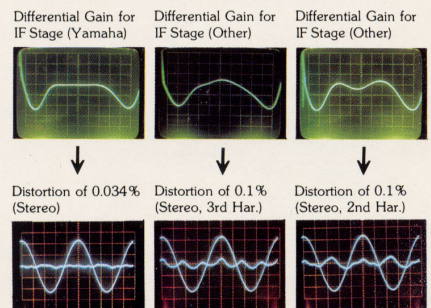
# THE TUNER

## Direct Assessment of Differential Gain

The CR-1020 goes even a stage further than the sophisticated circuit design which gave the world-famous Yamaha CT-7000 tuner switched narrow/wide selection modes for ideal reception under all conditions. The Yamaha design team has now been able to check visually the critical differential gain linearity by using a specially designed analyzer.

This results in the exceedingly low distortion shown below, while maintaining exceedingly high selectivity (80 dB), all without the need for a narrow/wide switch.

### Linear Differential Gain Characteristics

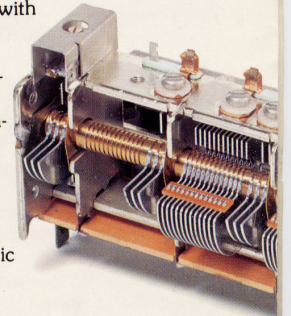


## FM/Original: Direct Comparison

All through the development of the CR-1020, Yamaha music specialists listened to the sound source first through the amplifier section alone, and then as received by the tuner section after FM modulation. Thus even the most subtle differences between the original sound and any coloration introduced by the tuner section could be detected and eliminated for perfect reproduction of the source.

## Unique Four-Gang Tuning Capacitor

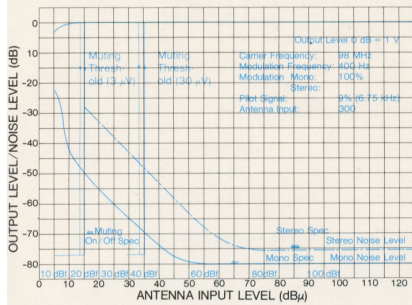
This Yamaha-developed element is precision formed for superb frequency calibration, accuracy and stability. It is complemented by dual gate MOSFETs in the front end and a balanced type ratio detector which combines with two ICs in the IF stage. The results are an ultra-high standard of frequency calibration, complete stability, virtually complete rejection of interference waveforms and wide dynamic range.



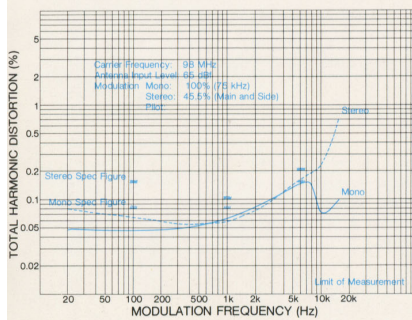
Four-gang variable capacitor



### Output/Noise Level vs. Antenna Input Level



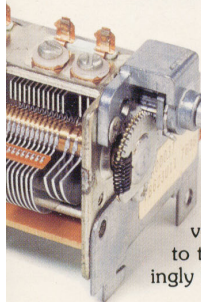
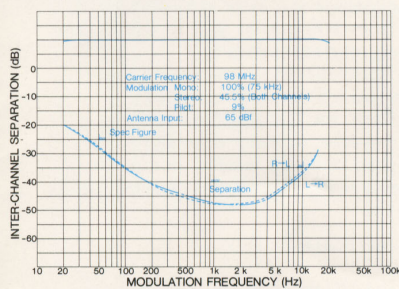
### Modulation Frequency vs. Total Harmonic Distortion



### Negative Feedback Multiplex Section (pat. pending)

Yamaha's innovative ability in the face of inadequate conventional techniques is unmistakably shown in the MPX section. Yamaha is currently alone in incorporating the whole MPX section in a negative feedback loop, with full NFB reducing distortion to a level where it cannot be measured by the most sensitive test equipment.

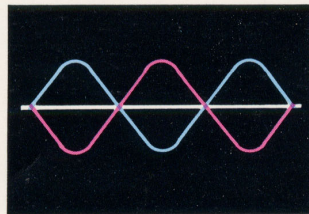
### Stereo Separation vs. Frequency Response



This technique, and the use of phase-locked loop circuitry (which locks onto the carrier signal) for unvarying stability, adds up to FM stereo reception at its very best, and contributes to the CR-1020's astoundingly low overall distortion.

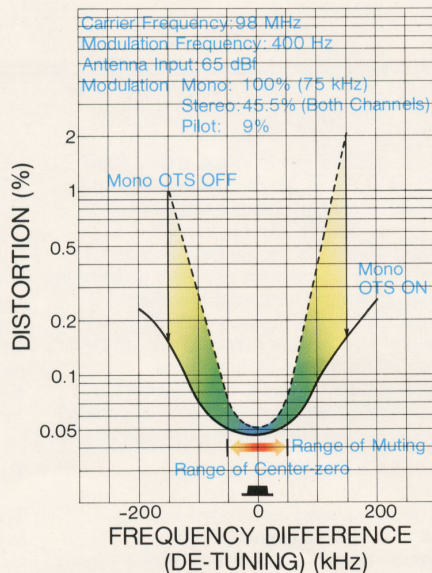
### Completely Effective Pilot Signal Cancellation (pat. pending)

Instead of the cutoff filter normally used to prevent the 19 kHz FM stereo pilot signal from interfering with the audio signal, the CR-1020 features a special 19 kHz sine wave cancelling signal. This inverted mirror image of the pilot signal cancels it out perfectly. Unlike the crude cutoff filter, it does not begin to operate in the audible range (frequencies as low as 15 kHz!), so that tuner response extends to 18 kHz for more faithful reproduction of the treble region. You can hear the difference in richer brass tones, clearer flutes and violins, during FM stereo reception.



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

### Optimum Tuning System



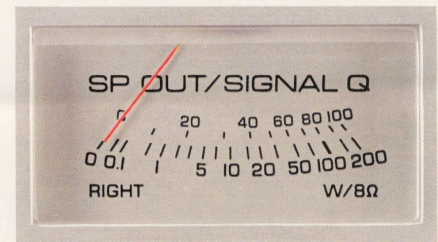
The Optimum Tuning System of the CR-1020 locks onto the selected FM station automatically, assuring the optimum position for distortion and separation. Even if your manual tuning is not perfect, the OTS will correct to give minimum distortion and the best stereo FM separation.

The OTS switches off automatically when you touch the tuning knob (for easy tuning), and goes into action again after the knob is released. It can also be switched off manually, to assure that a desired weak station will not be overpowered by a strong neighboring station.

### Multi-Function FM/AM Signal Meter

In the AM mode this meter functions as a normal signal strength meter. During FM reception, however, in addition to giving a corresponding indication of FM station signal strength, the needle swings back and forth to indicate the presence and extent of multipath interference. By watching this variation as you adjust the orientation of your antenna, you can obtain the cleanest signal. Similar in principle to the method of multipath indication in the unparalleled CT-7000 tuner, this meter versatility marks an important step forward in securing top quality reception.

### Signal Strength/Quality Meter



### A Superior AM Section Too!

Advanced circuitry gives the AM section an audio quality virtually undistinguishable from FM. In fact it has the multiplex demodulator section in common with the FM section, with a special equalizer to compensate for the built-in FM frequency de-emphasis curve. This means ultra-low distortion without having to build a separate AM circuit!

### Other Important Features

- Audio Muting
- FM Muting
- FM Blend
- Provision for Three Sets of Speakers and Two Headphones
- LED Indicators of Major Receiver Functions
- Mode Switch (Stereo/Mono/L/R/Rev)



**Packed with All-New Convenience and Plenty of Power:  
RMS Output 70 Watts Per Channel (Both Channels Driven into  
8 Ohms, 20-20,000 Hz)  
with No More Than an Incredibly Low 0.05%  
Total Harmonic Distortion!**



## THE POWER AMP

### 50% Less Distortion: An Incredible 0.05%!

When Yamaha introduced a complete receiver line in which every model had only 0.1% distortion, audiophiles were astounded. Other manufacturers rushed to improve their distortion specs, but even after several years most failed to approach the 0.1% mark, and none succeeded in reaching it for their whole line. Now the new Yamaha receiver line achieves another breakthrough: 0.05% IM and total harmonic distortion under the same 20-20,000 Hz, 8 ohms, both channels driven at rated output conditions. In other words, our state-of-the-art distortion figures have now been cut in half, resulting in even cleaner, purer performance.

### Excellent SVR for Negligible Dynamic Crosstalk

When a loud signal in one channel draws heavy current from the power supply, it can

cause a spurious signal in the sound from the other channel. To reduce this 'dynamic crosstalk,' many receivers incorporate a dual power supply. But for the CR-1020 Yamaha engineers succeeded in developing a new power circuit with excellent stability in the face of momentary supply voltage changes. Known as "supply voltage rejection," this feature means there will be no audible effect from supply voltage fluctuations. The result is a convincing improvement in bass response, assuring detailed accuracy during even the loudest passages.

### Logical Chassis Layout

CR-1020 engineers developed a great new system for increased preamp protection against interference from power transformer hum leakage. By using the power transistor heat sinks as effective electrical shields between power amp and preamp sections, Yamaha engineers have secured outstanding S/N ratio and deafening silence.

### Full Range Power Meters

Like the meters in the now famous B-1

and B-2 power amplifiers, the CR-1020 power meters feature logarithmic compression of the scale. The advantage is a clear indication of levels from 100 mW to 200 W (for 8-ohm speakers, corresponding to a range from -40 dB to +6 dB without the need to switch meter sensitivities. In addition, the CR-1020 meters have a quick rise time, actually three times faster than ordinary meters, so they can indicate even the briefest of transient peaks.

### Pre Out/Main In Plus...

The CR-1020 provides an output signal from the preamplifier section at the Pre Out terminals for use with an oscilloscope, frequency divider, or Dolby unit, even during normal receiver operation. This is a big improvement over conventional plug connections, which must be un-plugged (preventing normal receiver operation) for a pre out signal.

Most important, pre out/main in connection and disconnection is via a switch, with terminals inside the chassis, shielded from the interference that plugs often pick up.



## SPECIFICATIONS

### AUDIO SECTION

#### MINIMUM RMS OUTPUT POWER PER CHANNEL

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

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

CONTINUOUS RMS POWER	90 watts (4 Ω)
(both channels driven, 1 kHz)	75 watts (8 Ω)
TOTAL HARMONIC DISTORTION, 20 to 20,000 Hz	
Phono 1, 2 to Rec Out	0.01% 7.5 V output
Aux. Tape to Sp Out (8 Ω)	0.02% at 35 W
Main In to Sp Out (8 Ω)	0.015% at 35 W
IM DISTORTION (Aux. Tape 1, 2)	0.05% at 70 W
INPUT SENSITIVITY/IMPEDANCE	
Phono 1, 2	2 mV/47 kΩ
Aux. Tape DIN 1, 2	120 mV/45 kΩ
Main In terminals	775 mV/100 kΩ
MAXIMUM INPUT LEVELS	
Phono 1, 2	230 mV (at 1 kHz)
OUTPUT LEVEL/IMPEDANCE	
Rec Out terminals (Phono)	120 mV/500 Ω (rated) 15 V (max. 1 kHz)
DIN Out terminals	30 mV/52 kΩ (rated), 19 mV (max.)
Pre Out terminals (rated)	775 mV/750 Ω (5 V max.)
FREQUENCY RESPONSE	
Phono 1, 2 RIAA deviation	± 0.2 dB
Aux. Tape 1, 2 to Sp Out	10 Hz to 100 kHz ± 2.5 dB
Main In to Sp Out	10 Hz to 100 kHz ± 2.5 dB
TONE CONTROL CHARACTERISTICS	
Bass turnover frequency	350 Hz
Bass boost/cut	± 15 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	15 and 70 Hz (12 dB/octave)
High	8 and 12 kHz (12 dB/octave)
Loudness Control	Level-related equalization
SIGNAL-TO-NOISE (IHF-A Network)	
Phono 1, 2	95 dB (for 10 mV, shorted)
Aux. Tape	100 dB (5.1 kΩ shorted)
Main	112 dB (5.1 kΩ shorted)
Residual noise (at Vol Min)	0.1 mV
NOISE-DISTORTION CLEARANCE RANGE (NDCR) for 0.1% into 8 Ω, 20 Hz to 20 kHz from 100 mW to 70 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
METER RANGE	100 mW to 200 W into 8 Ω
<b>FM SECTION</b>	
TUNING RANGE	88 to 108 MHz
USABLE SENSITIVITY	
IHF: 300 Ω (75 Ω)	10.3 dBf/1.8 μV (10.3 dBf/0.9 μV)
DIN: Mono	1.3 μV (40 kHz Dev: S/N 26 dB)
Stereo	40 μV (40 kHz Dev: S/N 46 dB)
50 dB QUIETING SENSITIVITY	
Mono	15.3 dBf (3.2 μV)
Stereo	37.2 dBf (40 μV)
ALT. CHANNEL SELECTIVITY	
	80 dB (IHF)
	60 dB (DIN: ± 300 kHz, 40 kHz Dev)

IMAGE RESPONSE RATIO (98 MHz)	85 dB
IF RESPONSE RATIO (98 MHz)	90 dB
SPURIOUS RESPONSE RATIO	
(98 MHz)	100 dB
AM SUPPRESSION RATIO (IHF)	65 dB
CAPTURE RATIO	1.0 dB
SIGNAL-TO-NOISE RATIO (at 65 dBf, IHF/DIN, 40 kHz Dev.)	
Mono	77 dB/71 dB
Stereo	73 dB/67 dB
DISTORTION (at 65 dBf)	
Mono 100 Hz	0.08%
1 kHz	0.08%
6 kHz	0.15%
Stereo 100 Hz	0.15%
1 kHz	0.1%
6 kHz	0.2%
INTERMODULATION DISTORTION (IHF)	
Mono	0.05%
Stereo	0.1%
SUB-CARRIER PRODUCT RATIO	60 dB
STEREO SEPARATION	
50 Hz	35 dB
1 kHz	50 dB
10 kHz	45 dB
FREQUENCY RESPONSE	
50 Hz to 10 kHz	± 0.3 dB
30 Hz to 15 kHz	± 0.5 dB
10 Hz to 18 kHz	+ 0.5, -3 dB
MUTING THRESHOLD	14.8 dBf/3 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	109 Transistors, 4 ICs, 3 FETs, 58 Diodes, 7 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	520 W
DIMENSIONS (W x H x D)	521 x 146.5 x 415 mm (20½" x 5¾" x 16¾")
WEIGHT	18.3 kg (40 lbs., 4 oz.)

Specifications subject to change without notice.

For details please contact:

SINCE 1887



# YAMAHA

NIPPON GAKKI CO., LTD., HAMAMATSU, JAPAN