

# YAMAHA CR-640

*Natural Sound AM/FM Stereo Receiver*

*40W/ch min. RMS at 0.02% THD over 20-20,000Hz*

*Automatic LOCAL/DX Mode Selection in FM IF Stage*

*Superb FM Stereo Separation with Exclusive DC-NFB-PLL MPX IC*

*Recording Output Selector, Continuous Loudness Control*



# Yamaha: Dedication to Musical Excellence

## THE YAMAHA CR-640 RECEIVER— FINE AUDIO PERFORMANCE AND UNCOMMON CONTROL VERSATILITY

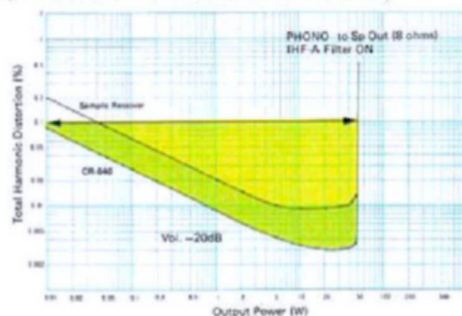
We have many unique advantages in the audio world.

Our wide range of technology, from electronics to metallurgy, enables us to develop for ourselves even the basic raw materials required for advanced hi-fi circuit designs. Another advantage is our musical heritage: Yamaha is founded on a dedication to music in all its forms. Our long experience as a leading manufacturer of musical instruments has made sensitivity to musical sound a habit hard to break. Our uniqueness gives rise to the originality clearly reflected in the reliable Natural Sound performance of every Yamaha high fidelity product. In a word, we pride ourselves on a creative blend of musical artistry, science and craftsmanship. Our Natural Sound fidelity is the result of an enduring relationship between musicians and audio engineers. With the result, at all times, being a total Dedication to Musical Excellence.

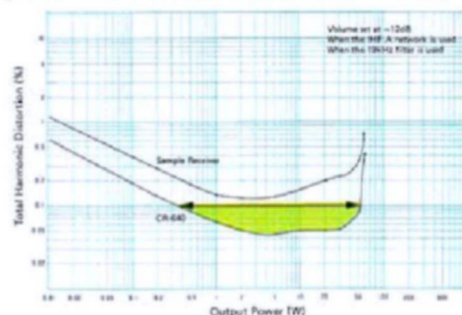
### Balanced Design for Total Performance—from Input to Output

"Balanced Design" means we balance the

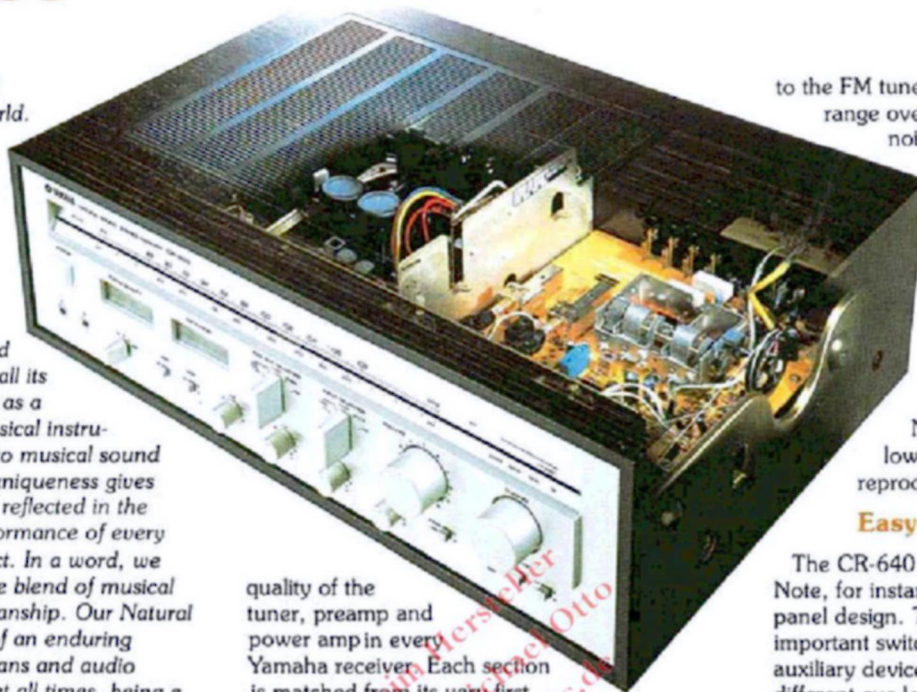
#### Yamaha CR-640 with good NDCR vs. sample receiver with poor NDCR (PHONO INPUT to SPEAKER OUTPUT)



#### (FM ANTENNA INPUT to SPEAKER OUTPUT)



According to our test, none of the measured competing models could clear the 0.1% FM STEREO NDCR.



quality of the tuner, preamp and power amp in every Yamaha receiver. Each section is matched from its very first design stage 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 a measure of the overall, in-use performance of our receivers, called NDCR (Noise and Distortion Clearance Range). Measured not of each section but for the entire signal path from the MM phono inputs to speaker outputs, and with the volume turned down to -20dB (near your average listening level), the NDCR indicates the power output range over which the composite total of noise and total harmonic distortion remains less than 0.1% across the entire 20-20,000 Hz audio frequency spectrum. We are happy to announce that the CR-640 offers a wide NDCR of 10mW to 60W!

The concept of NDCR can also be applied

to the FM tuner to indicate the power output range over which the composite total of noise and distortion stays less than 0.1% over 20-20,000 Hz for the actual signal path from the FM antenna inputs to the speaker outputs, and with the volume down to the usual listening level. The stereo FM NDCR of the CR-640 has been found to be a broad 500 mW to the full rated 40W.

The wide audio and FM NDCRs are your assurance of low-noise, low-distortion music reproduction at any volume.

### Easy to Operate

The CR-640 is designed for easy operation. Note, for instance, its clean three-tiered front panel design. The tuner scales, frequently used important switches and controls, and all other auxiliary devices are arranged on three different eye levels, so you can concentrate on enjoying music instead of fussing with controls and switches every time.

A number of unique features also add to easy operation. The REC OUT SELECTOR, for instance, lets you choose any program source to record into your connected tape deck, while you listen to any other source.

FM/AM tuning is also made exceptionally easier in the CR-640, but, as you will find out elsewhere in these pages, reception quality is first-rate all the way.

### Luxurious Wooden Cabinet

As you would expect of a quality hi-fi component, the CR-640 comes in a beautifully crafted, sturdy wooden cabinet to blend with any decor. It is finished in handsome, simulated ebony veneer, and matches Yamaha's other fine stereo components.

## THE PREAMPLIFIER SECTION

### BASS/TREBLE Controls for Dependable Tone Control

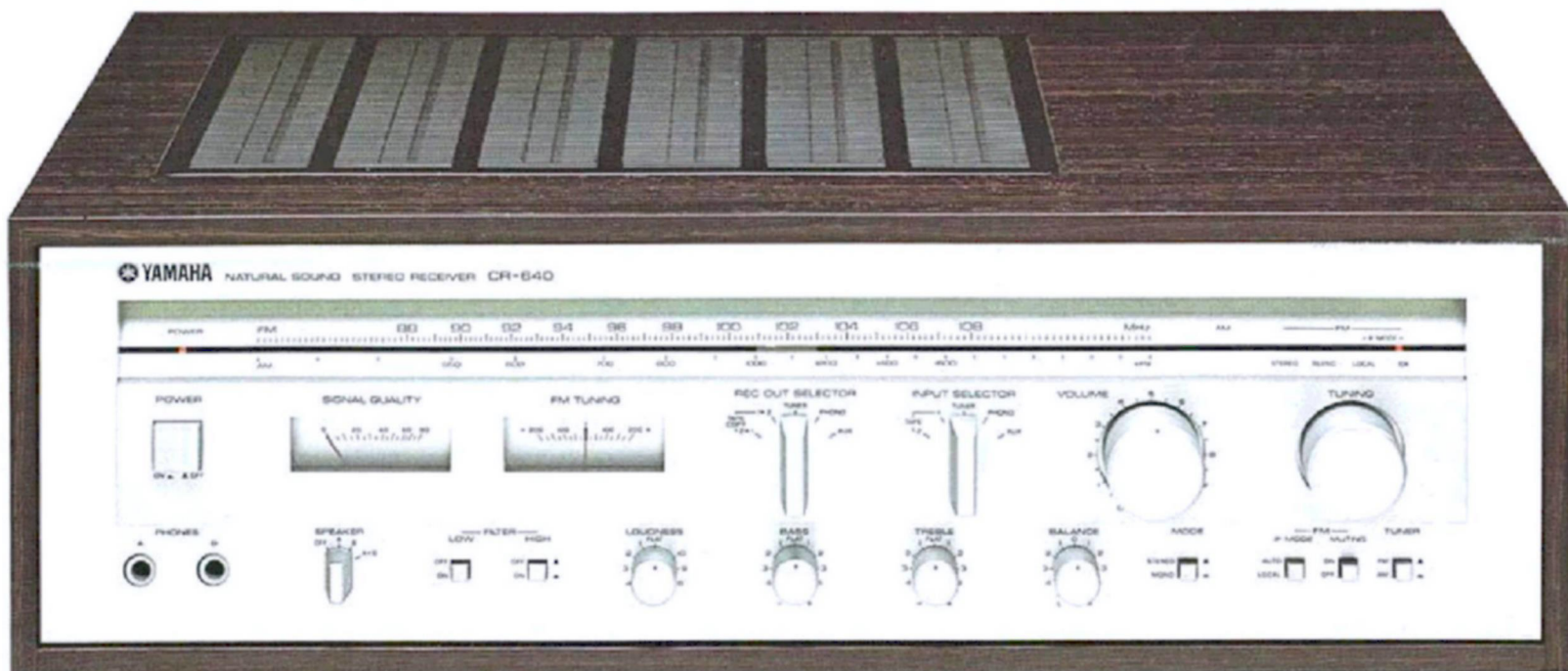
These controls on the front panel enable you to adjust the tonal character of reproduced sound and tailor it to the peculiarities of your listening room acoustics or speaker system performance, or simply to your own personal preference.

The BASS control lets you emphasize or de-emphasize the relative strength of low-frequency sound. It offers a control range of plus/minus 10dB at 350Hz. The TREBLE control does the same for high-frequency sound, offering the same plus/minus 10dB control range at 3.5kHz.

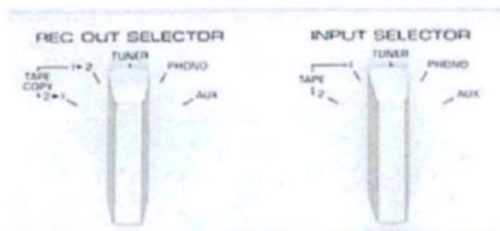
Both controls operate from a high-performance three-stage direct-coupled amplifier which generates minimum total harmonic distortion. When set to their FLAT positions, they provide a completely flat frequency response.

### REC OUT SELECTOR Permits Simultaneously Recording & Listening to Different Program Sources

This unique control lets you select the signal from one program source to send to the REC OUT terminals for recording into your connected tape deck(s), while the receiver itself can reproduce a different program source chosen with the INPUT SELECTOR. If you



have two tape decks connected to the receiver, you can also dub (copy) a recorded tape from one to the other.



### Continuously Variable Loudness Contour

The ear's sensitivity to bass and treble tones is known to decrease at low volume. The conventional simple on/off loudness switch compensates for this only at a certain volume level. But since the ear's sensitivity to such tones continuously varies as you increase or decrease the volume, a continuously variable loudness control like the one provided on the CR-640 is the only accurate way of compensating for this phenomenon.

To listen at low volume, you simply leave the master volume control itself at your normal listening level. Then turning the Continuous Loudness Control counter-clockwise will reduce the volume while continuously achieving accurate loudness equalization. The original balance of bass/midrange/treble frequencies heard at your usual listening level is thus retained at any lower volume.

### Exceptional 94 dB Phono S/N Ratio

The exceptional performance potential of the CR-640 is particularly evident in the reproduction of disc records. Superb performance specifications, such as a signal-to-noise ratio of 94 dB (10mV input) and a phono overload capacity of 140mV, assure, on one hand, that quiet, pianissimo notes will not be buried in the background noise; on the other, they mean

that all the vibrant, dynamic passages stored in your record will be thoroughly reproduced.

### Many Other Convenient Facilities

Low Filter (12 dB/oct. at 25 Hz), High Filter

(6 dB/oct. at 8 kHz), Mode Switch, Speaker Selector, two headphone jacks and three AC outlets are also provided to expand your enjoyment of music.

## THE FM/AM TUNER SECTION

### Outstanding 50 dB Quieting Sensitivity of 35 $\mu$ V for FM Stereo

The FM frontend achieves unparalleled resistance to RF interference—such as RF inter-modulation, image and spurious interference—and superb 50 dB Quieting Sensitivity of 35 $\mu$ V (36.1 dBf) in stereo because it employs a precision wide-air-gap three-ganged tuning capacitor and an RF amplifier using a low-noise J-FET with superior amplification linearity.

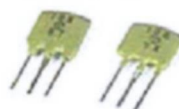
### Automatic Selection of LOCAL or DX Mode in FM IF Stage for Consistently Good FM Reception

The CR-640, assures you of quality FM reception, regardless of the signal condition. The built-in AUTO-DX circuit detects the signal strength and the amount of interference present, and, if necessary, automatically chooses the DX Mode IF Stage to increase the selectivity to 83 dB. Weak signals from a distant station are rid of all interference and clearly reproduced. And whenever the DX Mode IF Stage is in operation, the built-in Auto Blend Circuit is also automatically activated to enhance the high-frequency signal-to-noise ratio.

On the other hand, if the signal strength is sufficient and there is little interference, the LOCAL Mode IF Stage is chosen to hold distortion very low for outstanding hi-fi tonal quality.

Both the LOCAL and DX Mode IF Stages

### Uni-Resonance Ceramic Filters



benefit from the use of new Yamaha-developed Uni-Resonance Ceramic Filters featuring an extremely flat group delay response.

### Yamaha-Exclusive MPX IC

Designed exclusively by Yamaha for use in audio tuners, this large IC contains a total of 290 circuit devices, which make up: a DC NFB switching circuit; a subcarrier generator circuit using a unique Anti-Interference PLL System; and Yamaha's Tracking Type Pilot Pure Canceller Circuit. The last tracks the level and phase of the incoming pilot signal, and, without the need for a high-cut filter, cancels

### MPX Demodulator IC



it so thoroughly that the tuner's high-frequency response is fully extended.

When such a high-performance demodulator works with the equally

advanced FM frontend and IF stage, the result is clearly reflected in the FM tuner's excellent stereo reception quality: 84 dB signal-to-noise ratio (IHF), 0.09% (1 kHz) harmonic distortion, and 50 dB (1 kHz) stereo separation, all in the LOCAL Mode.

### Signal Quality Meter & FM Tuning Meter

Employing a Yamaha-developed interference detection system, this convenient meter not only indicates the level of the incoming FM signal accurately, but also displays various forms of interference—such as multipath interference—in the form of the meter pointer oscillation. There's also an FM Tuning Meter to

help you tune to the exact center frequency of the desired station.

### FM 75-Ohm One-Touch Connector

### AM Tuner Also Designed for Good Tonal Quality

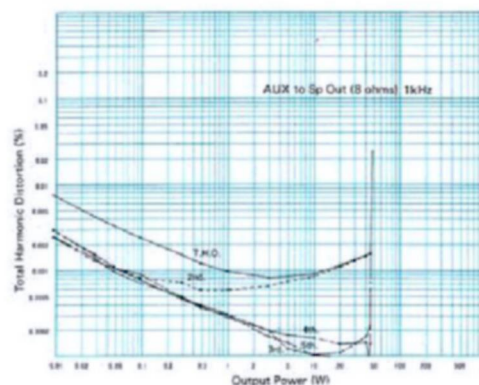
Highly advanced circuit designs and precision circuit parts in the AM tuner section create outstanding sensitivity and assure hi-fi AM reception. There's also a Yamaha-original

detachable low-impedance, low-noise AM loop antenna to enhance the signal-to-noise ratio.

### AM Tuner Loop Antenna



### Output Level vs. Total Harmonic Distortion (AUX to SP OUT/1kHz)



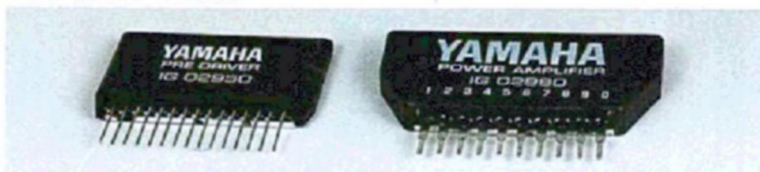
## THE POWER AMPLIFIER SECTION

### DC Amplifier Design for Low Distortion, Superior Transient Response

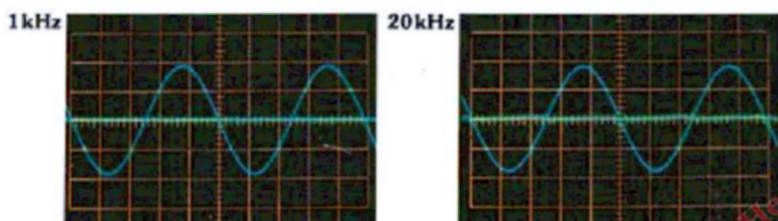
Our advanced DC power amplifier design eliminates capacitors from the negative feedback loop. The amplifier no longer suffers from the deterioration of transient response and phase characteristics traditionally caused by capacitors. It includes an elaborate three-stage Darlington-connected complementary parallel

push-pull OCL output stage constructed of highly advanced integrated circuits. Stable amplification of all signals from DC up to extremely high frequencies is achieved for very low distortion and uncommonly good transient response.

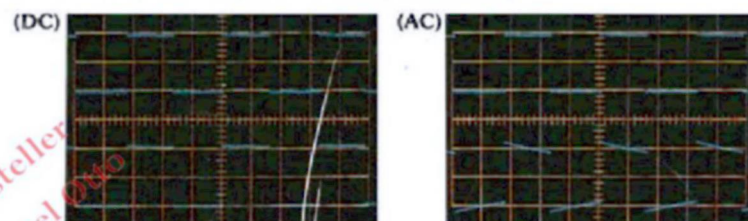
### Driver IC and Power IC



### PHONO to SP OUT Distortion Waveform (8ohms/30W)



### MAIN IN to SP OUT Square Wave Response (15Hz)



## SPECIFICATIONS

### AUDIO SECTION

Min. RMS Output Power per Channel, 20 - 20,000Hz, 0.02% T.H.D., 8 ohms	40W
4 ohms	40W
Min. RMS Output Power per Channel, 1kHz, 0.02% T.H.D., 8 ohms	45W
4 ohms	55W
DIN Standard Output Power per Channel, 1kHz, 1% T.H.D., 8 ohms	50W
4 ohms	60W
Dynamic Head Room, 8 ohms	1.0dB
4 ohms	3.7dB
Power Bandwidth, 1kHz, 0.05% T.H.D., 8 ohms	10Hz - 40kHz
8 ohms	40
Damping Factor, 1kHz, 8 ohms	40
Input Sensitivity/Impedance	
PHONO MM	2.5mV/47k ohms
AUX/TAPE	120mV/40k ohms
Max. Input Level PHONO MM	140mV
Output Level/Impedance	
REC OUT 1, 2	120mV/220 ohms
Frequency Response	
PHONO MM 20 - 20,000Hz	±0.4dB
AUX/TAPE 20 - 20,000Hz	±0.3dB
5 - 100,000Hz	+0.2, -2dB
Harmonic Distortion	
PHONO MM 3V, 20 - 20,000Hz	0.02%
	0.01% (20W/8 ohms)
Intermodulation Distortion	
AUX/TAPE	0.02% (40W/8 ohms)
AUX/TAPE	0.01% (20W/8 ohms)
Signal-to-Noise Ratio (IHF-A Network)	
PHONO MM/New IHF	94dB (10mV)/78dB
AUX/TAPE/New IHF	100dB/86dB
Residual Noise (IHF-A Network)	0.15mV
NDCR (IHF-A Network, 0.1% T.H.D., -20dB) PHONO MM	10mW - 40W
FM MONO (0.1% T.H.D., -11.5dB)	200mW - 40W

### STEREO 500mW - 40W

Tone Control Characteristics	
BASS boost/cut	±10dB
BASS turnover frequency	350Hz
TREBLE boost/cut	±10dB
TREBLE turnover frequency	3.5kHz
Filter Characteristics LOW	25Hz, 12dB/oct.
HIGH 1	8kHz, 6dB/oct.
Continuous Loudness Control (Level-related equalization)	
Attenuation	-20dB (1kHz)
Volume Tracking Error (0 ~ -60dB)	1.0dB
FM SECTION	
Tuning Range	87.6 - 108MHz
50dB Quieting Sensitivity Mono	3.2µV (15.3dBf)
Stereo	40µV (37.3dBf)
Auto Blend	25µV (33.2dBf)
Usable Sensitivity (IHF) 30%/div.	
300 ohms	1.6µV (9.3dBf)
75 ohms	0.8µV (9.3dBf)
Usable Sensitivity (DIN) Mono	1.2µV (6.8dBf)
Stereo	35µV (36.1dBf)
Signal-to-Noise Ratio (IHF) Mono	84dB
Stereo	80dB
Signal-to-Noise Ratio (DIN) Mono	76dB
Stereo	72dB
Image Response Ratio	50dB
Spurious Response Ratio	80dB
IF Response Ratio	80dB
Intermodulation (2.5MHz)	80dB
A Suppression Ratio	60dB
Capture Ratio	1.5dB
Alternate Channel Selectivity (IHF)	
DX	82dB
LOCAL	48dB
Alternate Channel Selectivity (DIN)	
DX	65dB
LOCAL	35dB
Harmonic Distortion, Mono 100Hz	0.1%
1kHz	0.08%

6kHz	0.15%
Stereo 100Hz	0.1%
1kHz	0.1%
6kHz	0.2%
Intermodulation Distortion Mono	0.08%
Stereo	0.08%
Stereo Separation 50Hz	45dB
1kHz	50dB
10kHz	45dB
Blend	10dB
Frequency Response, 50 - 10,000Hz	±0.4dB
30 - 15,000Hz	+0.4, -1.0dB
Subcarrier Suppression Ratio	60dB
Muting Sensitivity	5µV (19.2dBf)
AUTO DX Switching Condition	35µV (36.1dBf) or interference resulting in output S/N 50dB or less
Output Level/Impedance	450mV/3.9k ohms
AM SECTION	
Tuning Range	525 - 1,605kHz
Usable Sensitivity	15µV
Selectivity	30dB
Signal-to-Noise Ratio	50dB
Harmonic Distortion	0.4%
Image Response Ratio	40dB
IF Response Ratio	35dB
Spurious Response Ratio	60dB
Output Level/Impedance	150mV/3.9k ohms
GENERAL	
Semiconductors	43 Transistors, 9 ICs, 1 FETs, 12 Diodes, 3 Zener Diodes, 6 LEDs
Power Supplies	120V AC, 60Hz
Power Consumption	U.S.A.: 260W
	Canada: 390VA
Dimensions (W x H x D)	510 x 167 x 385.5mm (20" x 6-9/16" x 15-1/4")
Weight	12.6kg (27 lbs, 12 oz.)
Specifications subject to change without notice.	

NOTE: To measure the IHF Sensitivity of an FM tuner (or the FM section of a receiver), a 100% modulated test signal is commonly used. But in measuring the sensitivity of the CR-640, we use instead a 30% modulated signal. This is a severe test to the equipment under measure-

ment but presents a truer picture of its actual in-use performance than other tests. Note that the tuner section of the CR-640 outperforms other receiver even under this more rigorous sensitivity test.

For details please contact: