

P r e e m i n e n t R e f e r e n c e C o m p o n e n t

RX-Z1

Digital Home Theater Receiver

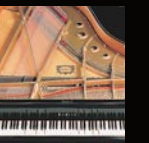


RX-Z1: The World's Preeminent Home Theater Receiver

Preeminent means "standing above others" and that's exactly what this receiver does. From its extraordinary sound quality, to its wide array of surround programs and other advanced functions, to its unmatched CINEMA DSP technology, to its compatibility with every movie sound format, and even to its impressive design, this is a receiver that has no equal. Once again, Yamaha asserts its leadership in home theater — with the RX-Z1.

Behind the Superior Sound

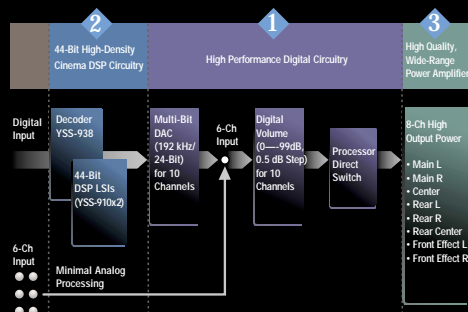
Yamaha has been one of the most popular and innovative manufacturers of home audio components for more than three decades. In recent years we have helped to create the new category of home theater entertainment, and now offer a wide range of products for every budget and preference. Our top-of-the-line components are the most sophisticated in the world, and much of the same technology goes into our compact and affordable systems. What's more, our commitment to high quality home theater is not limited to sound; we have also introduced a high performance video projector designed to maximize the image quality of movies. For the finest in music and movie enjoyment at home, make your system a Yamaha.



From digital input, through digital processing, to amplification, maximum signal quality is maintained every step of the way.

DIGITAL ToP-ART

Digital ToP-ART (Total Purity Audio Reproduction Technology) is the name Yamaha has given to a design philosophy whose goal is to maximize digital quality while minimizing analog circuitry. The culmination of the best digital engineering and design possible today, it brings together several key elements to create the best-sounding, easiest-to-use A/V components available. In the RX-Z1, Digital ToP-ART can be divided into three categories.

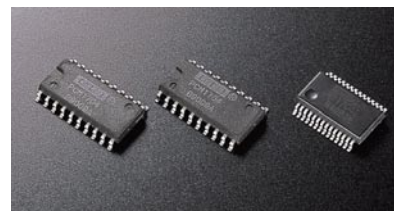


High Performance Digital Circuitry

Positioned between the DSP circuitry and the power amplifier stage, the High Performance Digital Circuitry makes a large contribution to the RX-Z1's outstanding audio performance. It exemplifies the Digital ToP-ART concept of maximizing the quality of the digital circuitry while minimizing analog circuitry, and also adheres to the ToP-ART philosophy of logical, straight-line circuit layout for optimum signal purity. It is composed of a DAC block, a volume control block and the Processor Direct circuitry.

Superior Digital-to-Analog Converter System

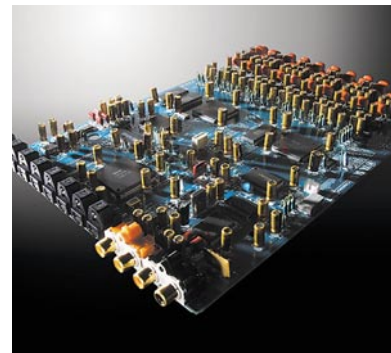
For the important digital-to-analog converters, Yamaha has chosen the PCM1704 manufactured by the high-end audio expert, Burr-Brown. The RX-Z1 uses 10 of these DACs, for the eight main channels and the two subwoofer outputs. The PCM1704 is a high-performance, precision 24-bit BiCMOS Sign-Magnitude DAC with ultra-low distortion of only 0.0008% (K-grade THD + N) and S/N ratio of 120dB. It offers superior low level linearity, with excellent full-scale performance under varying operating conditions. Its major benefit is performing accurate sound field reproduction for high quality multi-channel reproduction such as Dolby Digital and DTS. For two-channel stereo, the PCM1704 provides outstanding separation and accurate musical delineation. An additional advantage is its 192kHz/24-bit conversion capability, making it



Burr-Brown 192 kHz/24 Bit PCM1704 DAC Systems



High-Quality Digital Volume Devices (Crystal Semiconductors' CS3310 LSIs)



The elegantly designed, compact processing board ensures optimum performance for multi-channel audio sources. It has a fully shielded cabinet to prevent interference.

compatible with the latest (and future) high resolution digital audio sources.

Digitally Regulated Volume Control

Digital volume controls have become popular in home audio products, but for various reasons, analog is the better choice for this key component. Yamaha has combined the best of both by designing a high precision digital device (Crystal Semiconductors' CS3310 LSIs) that controls an analog signal. This provides two benefits. First, a digitally controlled device is more accurate for balancing levels between channels and offers much finer control than an analog device (0dB to -99dB in extremely accurate 0.5dB steps). Second, an analog volume control permits good signal resolution of very low signal levels. This is important for subtle signals that are often masked by louder signals and are not resolved as clearly.

The RX-Z1 also features an improved rotary knob axis that provides a superior tactile sensation as the knob is turned. Finally, the selected volume level and a bar graph display are both shown on the front panel display and the on-screen display.

Processor Direct Switch

The RX-Z1 has a Processor Direct Switch that when engaged, provides a direct signal connection between the processor board and the power amplifier section. This shortens the signal path, feeding the pure, robust signal directly to the eight amplification channels for cleaner, more efficient operation and higher quality sound.

44-Bit High-Density Cinema DSP Circuitry



With CINEMA DSP, Yamaha has raised digital sound field processing to the state of fine art. This proprietary technology gives movies much greater impact in your home theater, affording all the realism, excitement and nuance that the director intended to convey.

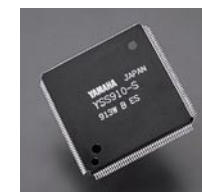
44-Bit CINEMA DSP

The RX-Z1 utilizes a 44-bit DSP LSI, the Yamaha YSS-910. This powerful computer offers extremely precise calculation of signal data — each additional bit provides twice the resolution and half the distortion — meaning it can resolve subtle audio nuances that bring the listening experience closer to reality than to reproduction. Two YSS-910s are used, one for processing sound fields, the other for processing SILENT CINEMA, Virtual CINEMA DSP and system configurations (controlling system parameters digitally reduces noise and improves precision). Because two are used, each is able to operate at higher speeds and with greater precision.

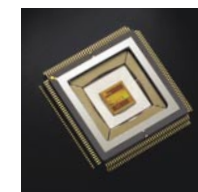
What's more, the YSS-910 provides accurate synchronization of images and sound, known as "lip-sync." Most audio LSIs do not have the necessary speed and precision to handle this, but with the YSS-910, not only has accurate lip-sync been achieved, but its parameters can be adjusted by the user.

Advanced Decoding Circuitry Including Yamaha's Exclusive YSS-938 32-Bit Floating Point Quantization LSI

The decoding circuitry performs Dolby Pro



YSS-910 44-Bit DSP LSI



YSS-938 32-Bit LSI

Yamaha EMC Center

The EMC (Electro-Magnetic Compatibility) Center stands in a quiet mountain setting where there are few sources of electro-magnetic noise. Its facilities include two open sites and an electro-magnetic signal-free room that can meet various nation's standards, as well as interference verification facilities of many kinds that can accurately

Logic II, Dolby Digital, Dolby Digital EX, DTS Digital Surround, DTS-ES, DTS-ES Matrix 6.1, DTS-ES Discrete 6.1, DTS 96/24, and DTS Neo:6 decoding with extreme accuracy, as well as all digital sound field processing. It also outperforms other systems in the precise synchronization of images and sound. Its low 3V power consumption minimizes digital noise.

Tri-Field and Quad-Field CINEMA DSP

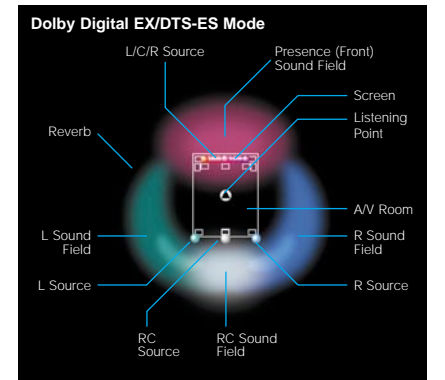
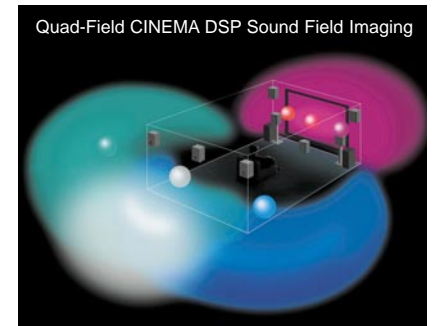
Tri-Field CINEMA DSP projects three sound fields into the home theater, resulting in a powerfully realistic three-dimensional soundscape for 5.1 channel sound. Quad-Field CINEMA DSP adds an additional rear center sound field, allowing enjoyment of 6.1-channel movie sound formats. See pages 10 — 13 for detailed information.

Optimum Space Utilization

The use of highly integrated LSIs allows an interior design that maximizes power and sound quality by positioning all the digital processors and related circuitry in one small area. This leaves most of the space open for the power amplifier components: transformers, capacitors, heat sink and so on. This means that these parts can be much larger than usual for greater power, that they can be separated for minimum chance of interference, and that circuits can be arranged in straight lines for maximum signal purity.

Wide Choice of Surround Sound Programs

The RX-Z1 lets users select from 42 surround programs which include a total of 62 variations. These are divided into HiFi (music) and CINEMA DSP (movie) programs. Users can choose them according to the type of music or movie they are listening to, and can also have

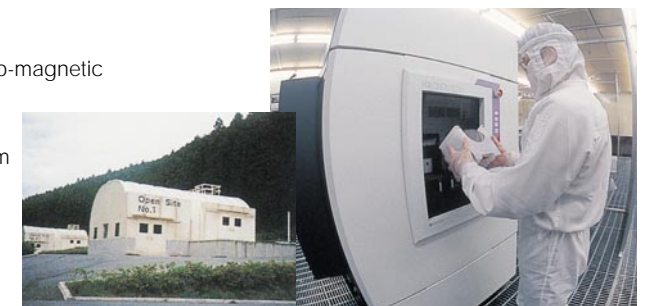


fun experimenting with various combinations (rock music in a church, for example).

What's more, each of these programs has a number of parameters that can be "fine-tuned" to bring out the best of a CD or movie soundtrack. This capability is often cited in reviews as a distinct Yamaha advantage. In *Sound & Vision's* review of the RX-V1*, for example, the reviewer stated that, "with suitably subtle settings in the Village Gate mode, the (jazz) CD sounded exceptionally natural, with well-placed ambience and remarkably cohesive, three-dimensional timbres. In fact, it was among the most realistic reproductions of nightclub jazz piano that I've ever heard. Cool!"

*Previous version of RX-Z1

measure unnecessary electro-magnetic signals produced by digital instruments. Yamaha products are tested here from the development stage in order to create products that meet all types of strict electro-magnetic standards.



High Quality, Wide-Range Power Amplifier Section

The RX-Z1 is designed to deliver the full impact and dynamism of movies by supplying generous amounts of power (including bass power!). That's why despite all the digital processing magic, it is first and foremost a powerful receiver. By drawing on our long years of amplifier expertise (we've created some of the world's legendary power amps and preamps) and refusing to make any compromises on quality, we've endowed the RX-Z1 with awesome capabilities. It incorporates a powerful 8-channel amplifier with high dynamic power and sophisticated circuitry like linear damping.

Total Low-Impedance Design

All current signal paths, from the power supply to the power amplifier to the speaker drive circuits, utilize a low-impedance design. This improves the separation characteristics among multi-channels and allows the use of a wider variety of low-impedance speakers.

8-Channel High Power, Discrete Amplifier Configuration

The RX-Z1 will deliver as much as 130W of power at a negligible 0.015% distortion to each of six channels (two main, two rear, one center and one rear center). Plus 45W to each of the two front effect channels. This is more than enough to fill

even the largest rooms with vibrant music and Richter-scale sound effects.

High Dynamic Power Capability

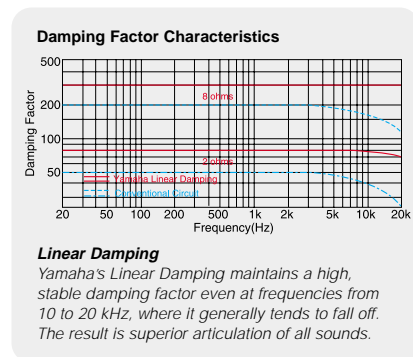
The RX-Z1 is capable of delivering large amounts of reserve power for accurate reproduction of the high energy peaks that are especially prevalent in digital audio sources. This emphasizes the music's dynamic qualities and provides a sharper sound image.

Linear Damping (Main L/R and Center Channels)

Level variations due to high amp impedance tend to reduce an amplifier's damping factor, and frequency variations cause it to fluctuate. This circuit cancels the effect of these variations, maintaining a high, stable damping factor, for superior articulation of all sounds and better frequency response.

Anti-Vibration, Anti-Resonance Chassis and 1.6mm (5/8") ToP-ART Base

Supporting the heavy heat sinks, transformer, and circuit board is Yamaha's 1.6mm (5/8") ToP-ART base, which has exceptional anti-resonance and damping characteristics. Beneath this base is the bottom of amplifier, part of the heavy chassis which is also designed for maximum vibration damping.



Naturally Cooled Anodized Heat Sinks

The two large, anti-resonance, aluminum-extruded, naturally cooled heat sinks undergo black anodization processing to ensure maximum heat dissipation efficiency. They are located on the base frame with the power amplifier circuit boards to prevent interference with the preamplifier and digital processing sections. The fact that they are naturally cooled means that they are so efficiently designed that a fan is not necessary for cooling. The power block is equipped with a fan, but it is only used for extreme heat build-up and is not activated during normal operation, preventing the occurrence of even the slightest unwanted noise.

Every Internal Component Is a Top Performer — And It Makes a Difference!

In order to realize the goals of massive power and superlative sound quality, Yamaha technicians completely re-evaluated all the parts used in previous receivers. As a result, many were replaced with more expensive or custom-designed units.

● Extra-Large Custom-Made Block Electrolytic Capacitors

Developed specifically for the RX-Z1, the 27,000µF block electrolytic capacitors use low-magnification foil and are exceptionally high quality.

● Extra-Large (9.8kg/21.6 lbs.), Low-Impedance Transformer

The massive power supply transformer has a new core material and improved design, allowing it to output 200VA, 20% higher than the previous model. Cables have been upgraded from 22-gauge to 20-gauge.

● Wire-Wrapped Connectors

The connectors from jumper cables to PCB, transformer, etc. are wire-wrapped, as shown in the photo. This takes a great deal of effort (so much, in fact, that Yamaha is the only manufacturer who does it), but provides much greater signal reliability.

● FE Mica Capacitors and Metallic Mylar Film Capacitors

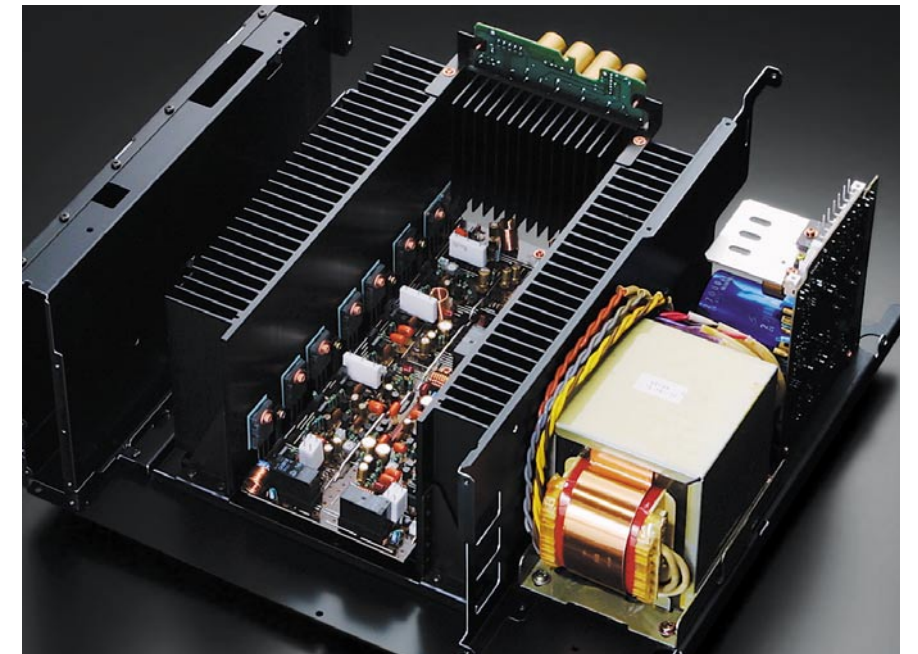
At this level of sound quality, even these small parts make a difference. The high precision FE mica and metallic mylar film capacitors use polypropylene material and are the highest performance types on the market.

● High Performance Power Transistors

Superior power transistors, upgraded from 150W in the RX-V1 to 180W, enable the RX-Z1 to achieve a wide bandwidth with frequency response extending to 100kHz. Although human hearing only extends to about 20kHz, the harmonics of these frequencies go much higher, and reproducing them enhances overall tonality and musicality. This also means that the RX-Z1 will perform superbly with the next generation of wider range digital audio products such as DVD-Audio and SACD.

● Schottky Barrier Diodes

Low forward voltage drop and fast switching make these diodes ideal for fast switching applications, contributing to the high S/N ratio.



Ultra-heavy-duty chassis with two large, anti-resonance, aluminum-extruded, naturally cooled anodized heat sinks.

● Twin Direct Signal Path Speaker Relays

Speaker switching is accomplished by relays right in front of the speaker terminals, rather than at the switch position. This results in a shorter signal path and minimum output impedance.

● High Quality Printed Circuit Board

The printed circuit board is made of new material and has impedance-reducing extra-thick 70µm copper foil to maintain high signal quality.

● Inlet-Type Power Cable

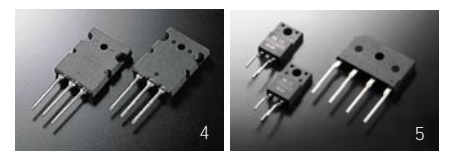
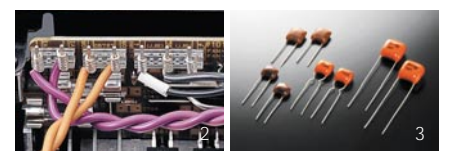
The inlet-type power cable is separate, rather than attached to the unit. It is a thicker type (16-gauge) than ordinary power cables, for higher power handling capacity.

● Thick PC Board Wiring with 1.6mm (5/8") φ Copper Jumper Cables

The audio signal is routed within the amplifier through exceptionally thick, top quality wire, ensuring that signal purity is maintained.

● Improved Preamplifier Power Supply

A large capacity, stable-voltage preamplifier power supply with an extra-large heat sink ensures rock-steady operation for analog and digital signal processing and video signals. And with no interference from the power amplifier section, this power supply is unaffected by noise.



(1) Extra-Large Custom-Made Block Electrolytic Capacitors, (2) Wire-Wrapped Connectors, (3) FE Mica Capacitors and Metallic Mylar Film Capacitors, (4) High Performance Power Transistors, (5) High Sound Quality Schottky Barrier Diodes, (6) Twin Direct Signal Path Speaker Relays and (7) Inlet-Type Power Terminal



RX-Z1 Digital Home Theater Receiver



Extensive A/V Connections and Convenient Facilities

Full Complement of Input/Output Terminals

The rear panel provides input terminals for all audio and video sources, as well as those for future digital broadcasting such as Digital TV, Cable TV and Satellite Digital TV. All digital inputs are designed to be compatible with the 96kHz format (coaxial inputs are 192kHz compatible). All A/V input terminals are equipped with S-video terminals. In addition, RCA pin jacks allow switching to component video to achieve higher picture quality. The changeover device for the component video signal uses reliable relay connectors and does not go through the amplifier section in order to avoid any deterioration of picture quality.

There are also two video monitor output terminals, so the unit can be connected to both a TV monitor and a projector (projection TV) simultaneously (the Component Video Monitor Out signal is HDTV compatible).

Ready for Custom Installation

As befits a high performance home theater receiver, the RX-Z1 is ideal for use in custom installations. It is equipped with an RS-232C interface that allows two-way communication between the receiver and a touch-pad controller. It provides interactive control functions that are more versatile than that of an ordinary remote control, and has Zone 2 output that enables multi-room control capability. It also provides +12V trigger output. You can also use the Front Effect Amplifier to drive Zone 2 speakers. Its volume is independently adjustable by remote control. For 6-channel operation, you have to mix the front effect down to main channels.

Mono/Split Subwoofer Output Terminals

5.1 and 6.1 channel sound formats include an LFE (Low Frequency Effect) channel, an important factor in adequate reproduction of low frequencies. The RX-Z1 offers Mono and Split Subwoofer Output terminals, and the low frequencies of channels programmed by the speaker mode programming function can be output from the subwoofer. Subwoofer level is easily adjusted with a test tone.

Total Convenience

A comprehensive On-Screen Display with a convenient Set Menu allows selection and adjustment of a wide variety of functions. It even includes a speaker display that makes it easier to balance speaker output in the Speaker Test Mode. DSP programs can be selected with the remote control so the listener can compare the effects from the listening position.

Rec Out Selector

The audio or video source can be recorded on VCR 1, 2 or 3 or CD-R or MD/Tape. By using the Rec Out Selector, a popular Yamaha feature, users can record a different source from the one they are listening to.

Auto Priority Input Terminal Selection and Auto Decoder Selection

The RX-Z1 input terminals will handle any kind of input signal. According to the type of signal, terminals are selected in priority order of RF (AC-3), coaxial digital, optical digital and analog. Furthermore, according to the type of movie sound format, the proper decoder and surround sound program

are automatically selected. For example, if the Movie Theater Sci-Fi program is selected and the input is a DTS-ES signal, the DTS-ES decoder is automatically engaged and the program switches to Movie Theater DTS-ES Sci-Fi.

HDTV Compatible Component Video Out

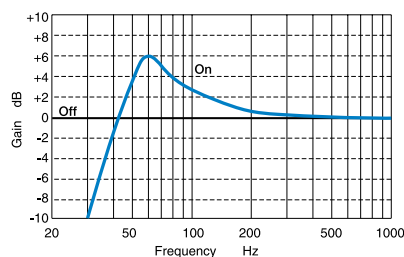
The frequency response of the Component Video Monitor Out signal is DC—100MHz, making it compatible with HDTV monitors.

Fixed and Assignable Terminals

Yamaha offers terminals that can be either independently assigned to sources or defaulted to fixed settings.

Bass Extension

Turn the bass extension switch on to provide +6dB boost to the main speakers' low end centered at 60Hz. Frequencies under 50Hz will be cut by 12dB/oct. to prevent overdrive.



Bass Extension Characteristics

40-Station AM/FM Random Access Preset Tuning

The RX-Z1 makes station selection easy. Users can preset as many as 40 stations for instant one-touch tuning, and with each one the tuning mode (stereo or mono) is also memorized.

Direct PLL IF Count Synthesizer Tuning

Direct PLL IF Count Synthesizer Tuning combines direct PLL (phase-locked loop) tuning LSI circuitry with a microprocessor-controlled IF count process to lock precisely onto the broadcast frequency.

Auto FM Station Memory and Preset Editing

Auto FM Station Memory automatically presets the 40 strongest FM stations on the dial so you don't have to do it manually. You can then use Preset Editing to arrange AM and FM stations in groups as you wish.



Oil-Damped Hidden Control Panel

Front Panel Video Aux Input Terminals with Optical Digital and S-Video Terminals: Auxiliary terminals with optical digital input make it convenient to connect a digital game machine so you can enjoy DVD games and movies.

RX-Z1 Inputs and Outputs

	Analog		Digital				Video					
	In	Out	Coaxial In	Coaxial Out	Optical In	Optical Out	Composite In	Composite Out	S Video In	S Video Out	Component Video In	Component Video Out
PHONO	■											
CD	■		■		■							
CD-R	■	■	■		■	■						
MD/TAPE	■	■	■		■	■						
DVD	■		■		■				■			■
D-TV/LD	■		■		■				■			
LD			■		■							
CABLE	■		■		■				■			■
SAT	■		■		■				■			■
VCR 1	■	■	■		■				■			■
VCR 2	■	■	■		■				■			■
VCR 3/DVR	■	■	■		■				■			■
Video Aux	■		■		■				■			■
Monitor Out												■

Fixed (■), Fixed/Assignable (■) and Assignable (■) Terminals.

RF (AC-3) terminal for LD input (●) is assignable as coaxial digital terminal.

* HDTV Compatible Component Video Monitor Out



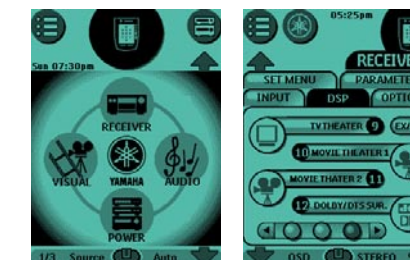
RX-Z1 Extensive System Connections

- 7 Optical, 3 Coaxial Digital and 1 RF (AC-3) Input Terminals (fixed and assignable except Video Aux [on Front Panel])
- 2 Optical Output Terminals (fixed and assignable)
- 3 Component Video Input Terminals (fixed and assignable) and 1 Component Video Monitor Output Terminal
- 8 A/V (with S-Video) and 4 Audio Input Terminals
- 3 A/V (with S-Video) and 2 Audio Output Terminals
- 6-Channel External Decoder Input Terminals for Future Sound Formats
- Pre-Main, Center and Front Effect Couplers, and Rear and Rear Center Preout Terminals
- Custom Installation Compatibility
 - Zone 2 Out
 - IR Port
 - Control Out (+12 V Trigger Out)
 - RS-232C Interface
- Upgrade Capability (through RS-232C Interface) for Future Sound Formats and Software

The Smartest and Friendliest Remote Control You've Ever Used.



Intelligent Remote Control Unit



- Large Dynamic LCD Touchscreen with High-Resolution (320 x 240 Pixel; 12⁵/₈" x 9¹/₂" Display)

- Easy command of all DSP functions, including program selection and parameter adjustments.

- Multi-Command and Learning Capability with Large Capacity (2 MB) Flash Memory
- Preprogrammed Codes (Approx. 500 Brands) for a Wide Variety of A/V Connections
- Edit Your Own Macros at the Touch of a Button (More than 255 Commands per Macro)
- Easy Customization via Your PC: RS-232C Interface and Edit Programs
- Seven Programmable Direct Access Buttons
- Backlighting for Easy Operation (LCD and Direct Access Buttons)
- Infrared Sending and Learning Eyes
- Auto Power On/Off for Saving Battery Consumption



Dramatically Different
Than Other Systems.

CINEMA DSP
DIGITAL



Yamaha has been one of the most popular and innovative manufacturers of home audio components for more than three decades. In the 90s, we helped to make the dream of home theater a reality, and went on to lead the industry with the world's most sophisticated technology and components. Now we offer a wide range of products for every budget and preference, all of which realize our commitment to superb quality.

Going Beyond Conventional Multi-Channel Systems

Conventional 5.1-Channel/6.1-Channel System vs. CINEMA DSP

Conventional 5.1 and 6.1 channel audio reproduction systems base their sound on Dolby Digital and DTS decoding, using matrix and steering technologies to create surround sound effects. Yamaha CINEMA DSP is much more advanced, actually creating richly realized

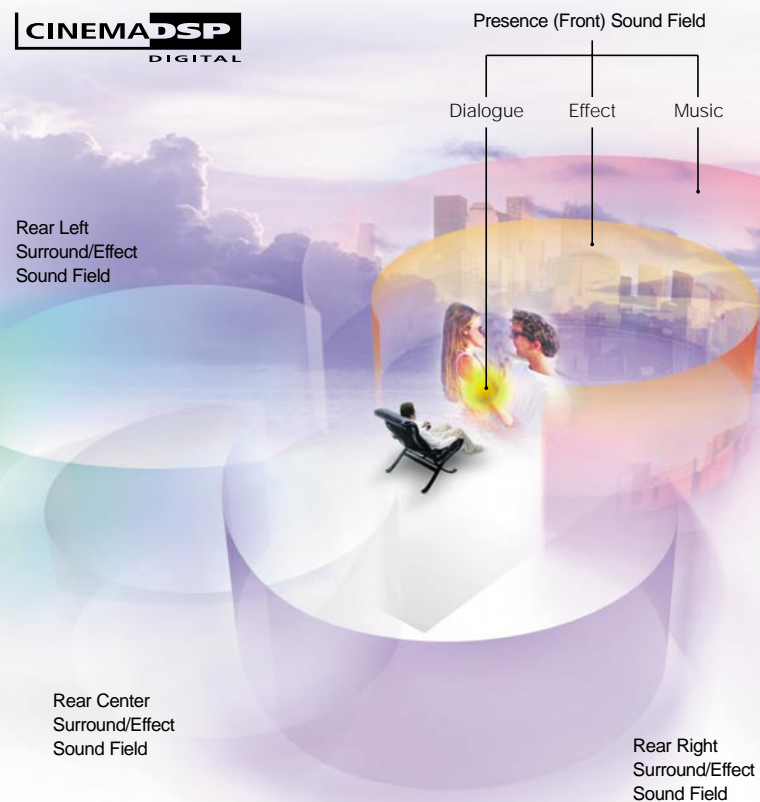
independent sound fields that merge to envelop you in an unmatched surround sound experience. With dialogue, music and effects from the presence (front) and rear sound fields (plus rear center with 6.1-channel Quad-Field CINEMA DSP), it will seem as if the walls of your room have disappeared and you are in the middle of your own immense theater!

Conventional 6.1-Channel System



Quad-Field CINEMA DSP

CINEMA DSP
DIGITAL



The Basics of CINEMA DSP: How It Turns a Home into What Can Truly Be Called a Theater.

Movie Surround Formats

There are three types of surround sound formats developed for movie theater use that can be enjoyed at home: Dolby Pro-Logic, widely used in ordinary theaters and for home videos, and Dolby Digital and DTS that are used for LaserDisc and DVD. The latter two formats feature five independent main channels and a subwoofer channel, the newest surround stereo format, and are encoded from the same master tapes as those used for movies.

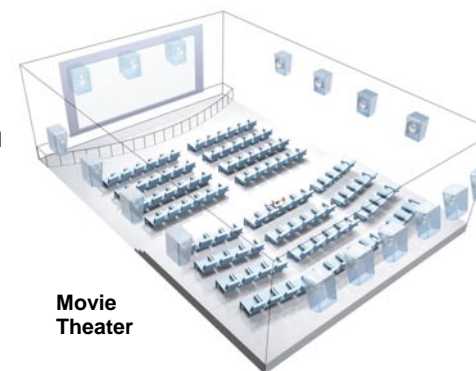
Movie Sound Design

Movie sound is designed to be integrated so that the voices are clearly fixed on the screen, sound effects are behind them, the music spreads out behind that, and the surround sound envelops the audience.

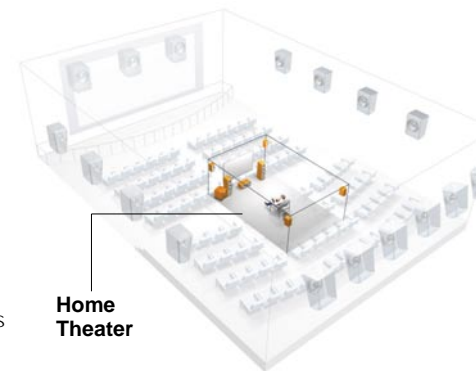
The sound is "designed" in a dubbing theater that has sound mixing and movie screening equipment. The film sound track is encoded in the surround formats described above, and is recorded on tapes and discs for home use.

Movie Theater Sound Versus Home Theater Sound

A major difference between movie theater sound and home sound is in the positioning of the speakers. In a movie theater, the sound is designed so that it can be reproduced as desired using multiple surround speakers embedded in the left, right and rear walls and positioned so that they emphasize the relationship between sound from the screen and channels. This provides a more uniform quantity of sound



Movie Theater



Home Theater

Sound Field Measurement and Analysis

Sound source directions can be separated into three basic ones as seen from the listening position: the front direction, the left rear direction and the right rear direction. We measured the sound field that is created by the center speaker, representing the front direction, and the sound fields made by each of the multiple surround speakers in the left and right rear directions.

Each diagram for the three virtual sound sources shows a completely different pattern of distribution, and, naturally, the sound fields are independent for each of the different sound sources. The effects of the multiple surround speakers on the wall surfaces are observed in the right and left surround channel sound fields. Priority is given to processing each of three independent sound fields in the ideal sound processing for Dolby Digital and DTS 5.1-channel software.

Tri-Field CINEMA DSP for Use with Dolby Digital and DTS Brings Out the Best in Movie Sound Design

Based on the results of these analyses, Tri-Field CINEMA DSP positions three sound fields. One is a presence sound field that ideally presents the fixed voice positions, sound effects and music, and the other two are independent stereo sound fields that create a large-scale surround space suitable to the source position of the left and right channels, thus giving a three-dimensional feeling of depth to the three front channels in the screen direction.

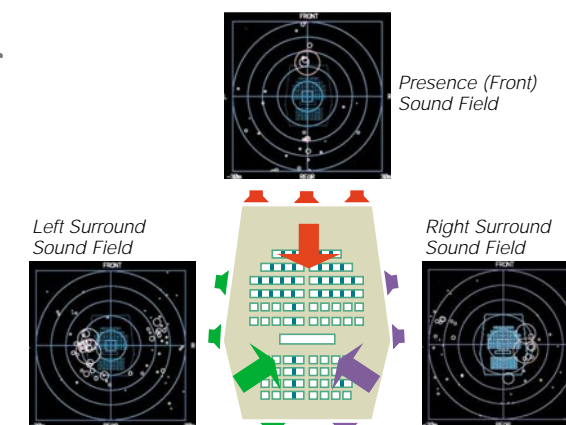
to the wide audience area.

There is a large difference in the absolute volume of space between a theater where there are at least several hundred seats and a family listening room, and that produces a big difference in the feeling of scale if the sound from a theater is reproduced, with no modification, in a home.

Correcting these differences enables sound reproduction in the home that is closer to the ideal.

Virtual Sound Source Distribution in a Theater

Movie theater speakers are separated into three groups: behind the presence sound field the screen, the left surround (from the left side to the rear of the theater) and right surround (from the right side to the rear of the theater).



Enjoy a Greater Sense of front to Rear Depth and Motion.

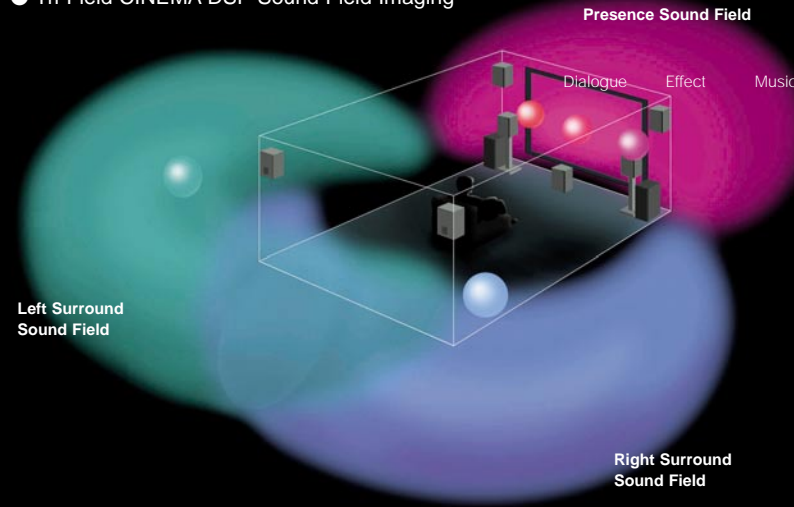


Tri-Field CINEMA DSP: Creating Realistic Cinema Sound

Three Discrete Sound Fields

Utilizing the extensive data accumulated from acoustic testing and from working closely with movie sound technicians, the Tri-Field CINEMA DSP system creates three discrete (independent) sound fields. A Presence sound field locates the dialogue from the actors on the screen and also provides front sound effects and music, and two stereo Surround sound fields (left rear and right rear) produce a large-scale sound environment with a three-dimensional feeling of depth and properly positioned sound sources.

● Tri-Field CINEMA DSP Sound Field Imaging



The Secret's in the Software

Although the RX-Z1 does use the world's most sophisticated audio LSIs, the true secret of the success of Tri-Field CINEMA DSP lies in Yamaha's outstanding sound field software, that is, the digital processing of the data that is programmed into the chips. The overwhelming sense of realism is due to fact that data from real sound fields is used (performance venues and the dubbing theaters that movie sound technicians use), processed in ways that only Yamaha can achieve. Other systems can only give you the sense of watching

from the outside, whereas with Tri-Field CINEMA DSP, you feel as though you are actually INSIDE the scene.

Two More CINEMA DSP Benefits

One of the main advantages of CINEMA DSP is the large choice of sound field programs that Yamaha has developed. These are designed to match specific movie sound formats, types of movies, and other sources. They include several multimedia modes for television shows, concert videos, sporting events and

video games.

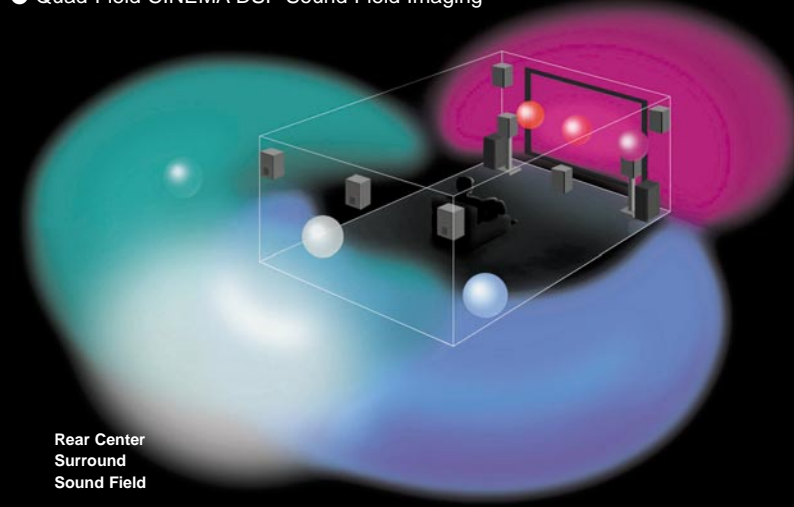
Another benefit is that unlike other home theater systems, the full sonic potential of CINEMA DSP is realized in rooms of any size and shape. Performance is not dependent upon the acoustic character or quality of the room, because all processing is done electronically by sophisticated microprocessors, not by using the rear or side walls to reflect sounds.

Quad-Field CINEMA DSP: The Best Way to Enjoy 6.1 Channel Sound

Ready for 6.1 Channels

When DVD discs are made using a 6.1 channel matrix encoding process, 6.1 channels of sound will be reproduced upon playback, provided that there is a matrix decoder in the rear channels and a sixth channel of amplification. The RX-Z1 has the matrix decoder built-in and six channels of amplification, ensuring full enjoyment of all Dolby Digital and DTS-encoded movies.

● Quad-Field CINEMA DSP Sound Field Imaging



Decoding the Signal

The audio signal is first decoded to 5.1 channels, then the rear center channel is derived from the left and right channels by the matrix decoder. The sixth channel of sound has the same full frequency response as the other channels, except the LFE. When a disc encoded with rear center channel information is detected, the 6.1 Matrix Auto function automatically activates the matrix decoder. What's more, enjoyment of 6.1 sound is not

limited to the playing of specially encoded discs. Most DVD discs that are encoded with only 5.1 channels of sound can reproduce rear center channel sound by manually activating the matrix decoder.

Quad-Field CINEMA DSP Processing

After Dolby Digital/DTS decoding, the signals are processed by the Quad-Field CINEMA DSP processor, bringing out the full benefits of 6.1 channel sound, including a superior sense of front to rear depth and soundstaging.

Listeners Can Choose from a Wide Variety of Sound Field Programs.



The RX-Z1 provides 42 surround programs that include a total of 62 variations. Designed to match various movie genres and types of sources, they create a strikingly realistic listening experience. The "correct" program variation is automatically set according to the source and program selection. Also, by using the remote control, listeners can switch programs from their seat to compare the different effects.

MOVIE THEATER 1



Spectacle

This program transports you into the middle of the scenes you are watching. In a very wide space, every sound, even large sounds, are heard clearly. A new level of sound realism.



Sci-Fi

Reproduces dialogue, music and effects of the latest SF high-tech movie soundtracks with excellent separation. Capable of conveying the impression of a huge space.

MOVIE THEATER 2



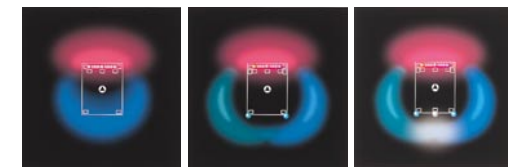
Adventure

Designed for action movies, this program has moderate reverberation to simulate the newest movie theaters with dead acoustics. Dialogue is centered and expressive.

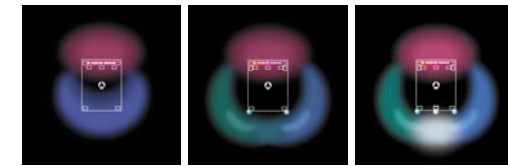


General

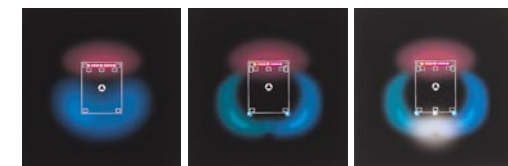
Moderate reverberation results in clear dialogue, with a three-dimensional sound field around and behind the screen for a soft, expansive sound. Presence sound field is well balanced.



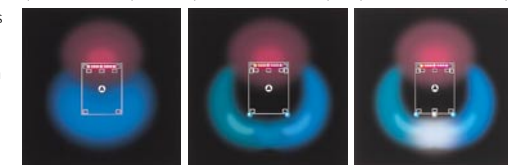
Stereo Input (70mm Spectacle) 5.1-Channel Input (Tri-Field CINEMA DSP) 6.1-Channel Input (Quad-Field CINEMA DSP)



Stereo Input (70mm Sci-Fi) 5.1-Channel Input (Tri-Field CINEMA DSP) 6.1-Channel Input (Quad-Field CINEMA DSP)

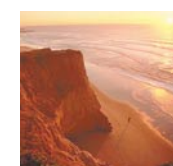


Stereo Input (70mm Adventure) 5.1-Channel Input (Tri-Field CINEMA DSP) 6.1-Channel Input (Quad-Field CINEMA DSP)



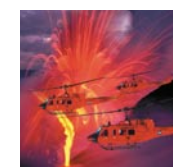
Stereo Input (70mm Adventure) 5.1-Channel Input (Tri-Field CINEMA DSP) 6.1-Channel Input (Quad-Field CINEMA DSP)

Dolby Pro-Logic, Dolby Pro Logic II, Dolby Digital, Dolby Digital EX, DTS Digital Surround, DTS-ES, DTS-ES Matrix 6.1, DTS-ES Discrete 6.1, DTS NEO:6 and DTS 96/24



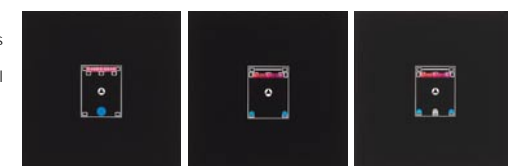
Surround Format Direct Output Programs

Front L/C/R channels' decoded signals are output as is, and surround signals only are processed by four-channel DSP. The result is an extremely large-scale surround sound field. For precise reproduction of the various movie sound formats.



Enhanced

Surround format decoders provide precise decoding for faithful sound reproduction. Superior separation, with smooth movement and good localization.



Stereo Input (Dolby Pro-Logic) 5.1-Channel Input (Dolby Pro Logic II, Dolby Digital, DTS Digital Surround and DTS 96/24) 6.1-Channel Input (Dolby Digital EX, DTS-ES Matrix 6.1/Discrete 6.1, NEO:6 and DTS 96/24)



SILENT CINEMA: Enjoy Movies Without Disturbing Others

The SILENT CINEMA mode allows private listening enjoyment of multi-channel music or movie sound, including Dolby Digital and DTS Digital Surround, through ordinary headphones. This mode will even provide an accurate simulation of 6.1-channel surround sound.



SILENT CINEMA Sound Field Imaging

Virtual CINEMA DSP: Surround Sound from Only Two Speakers.

With just two left and right speakers, Virtual CINEMA DSP will create virtual rear left/right speakers, giving you the sense of being in a full-scale surround sound field. So even in rooms with no space for rear speakers, you can enjoy the full effects of Dolby Digital and DTS movie sound formats.



Virtual CINEMA DSP Sound Field Imaging

RX-Z1 Surround Programs: 42 Surround Programs (62 Variations)

HIFI DSP Programs		Variations
HALL 1	● Hall A in Europe	1
	● Hall B in Europe	1
	● Hall C in Europe	1
HALL 2	● Hall D in U.S.A.	1
	● Hall E in Europe	1
	● Live Concert	1
CHURCH	● Tokyo	1
	● Freiburg	1
	● Royaumont	1
JAZZ CLUB	● Village Gate	1
	● Village Vanguard	1
	● The Bottom Line	1
ROCK CONCERT	● The Roxy Theatre	1
	● Warehouse Loft	1
	● Arena	1
ENTERTAINMENT	● Disco	1
	● Party	1
	● 8 Ch Stereo	1
Program Subtotal	18	18
CINEMA DSP Programs		Variations
ENTERTAINMENT	● Game	1
CONCERT	● Pop/Rock	1
VIDEO 1	● DJ	1
CONCERT	● Classical/Opera	1
VIDEO 2	● Pavilion	1
TV	● Mono Movie	1
THEATER	● Variety/Sports	1
MOVIE	● Spectacle	5
THEATER 1	● Sci-Fi	5
MOVIE	● Adventure	5
THEATER 2	● General	5
ENHANCED	● Enhanced	5
Program Subtotal	12	32
Surround Formats		Variations
	● Dolby Digital	1
	● Dolby Digital EX	1
	● DTS Digital Surround	1
	● DTS 96/24	1
	● DTS-ES Matrix 6.1	1
	● DTS 96/24 ES (6.1)	1
	● DTS-ES Discrete 6.1	1
	● Dolby Pro Logic	1
	● Dolby Pro Logic II Music	1
	● Dolby Pro Logic II Movie	1
	● DTS Neo:6 Music	1
	● DTS Neo:6 Cinema	1
Program Subtotal	12	12
Program Total	42	62

Remarks

- HIFI DSP Programs
- A/V Programs
- CINEMA DSP
- Tri-Field CINEMA DSP Capable
- Quad-Field CINEMA DSP Capable

Auto Priority Input Terminal Selection and Auto Decoder Selection

Digital input terminals are provided to handle any kind of digital input. Functions are programmed to select priority in order of coaxial digital, optical digital and analog when different digital formats are input from the same source. The sound decoder is also automatically selected and processed according to the combination of the format of input signals and the selected sound field programs.

Digital Sound Field Processing is a technology developed by Yamaha in 1986 to measure the sound fields, or acoustic characteristics, of concert halls, jazz clubs and other performance spaces. It is capable of bringing the realism of a live performance into your listening room.

The Sound Field of a Hall Affects the Music

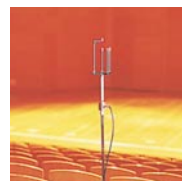
The sound you hear in a concert hall contains not only the sound that comes directly from musical instruments but also early reflections — the sound that reaches you after reflecting off the walls and ceiling — and late reverberations — the sound that bounces off the ceiling and walls many times before it reaches you, gradually attenuating in level.



Components of these reflections are different from hall to hall, according to size, building materials and other factors. That's why each hall has a unique sound field.

Yamaha HiFi DSP Uses Actual Sound Field Data

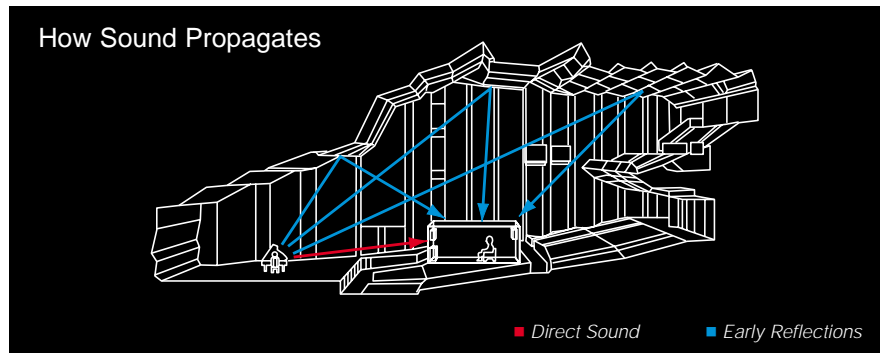
The RX-Z1's HiFi DSP programs incorporate sound field data recorded at concert halls, opera houses, and other musical venues in the United States and Europe. To gather this data, our engineers used a system called Single Point Quad Miking. Four microphones are placed in close proximity to capture direct and reflected



Single Point Quad Miking Microphone



DSP Uses Actual Sound Field Data
Single Point Quad Miking array precisely measures the acoustic patterns of a sound space and are placed on the same plane or in proximity to each other to capture pulsive sounds, and their impulse responses are recorded.



sounds, which are recorded. Each reflection is then resolved by a correlating process which determines the location and strength of its "virtual" sound source. A virtual sound source is the hypothetical source of a reflected sound, and is represented in terms of the direction from which a reflection comes, the time it takes to reach the listener, and its strength. A distribution pattern of virtual sound sources and echoes is then generated by projecting three-dimensional spatial information on a two-dimensional plane, making it possible to see the character of a sound field expressed as a graphical pattern of reflections.

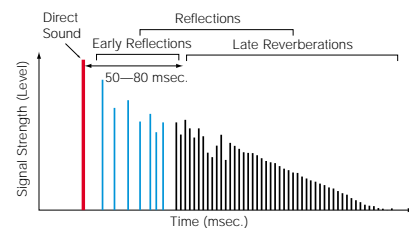
Measurement and Reproduction of Imaginary Sound Source Distribution in All Directions

The actual sound field data used by the RX-Z1 accurately reproduces each of the important initial reflected sounds, even the direction. The data represents imaginary sound source distributions such as the one shown in the diagram. The center of the diagram represents the point where the data was gathered, with the top being the stage direction. The concentric circles represent the delayed reflected sound as the actual distance travelled, with 1 meter equivalent to about 3/1,000 second.

Each of the small circles represents each of the sources of the reflected sound that reaches the ears of the listeners. Assuming that there was a source of reflected sound on a line extended in the



Virtual sound sources are blue or white
Distribution of Sound Field Data
Round scale is a reflection strength.



direction that the sound was ultimately heard after it was reflected, this is the imaginary sound source. The size of the circle represents strength, while the direction from the center point represents the direction the final reflected sound travels from. The greater the delay in the reflected sound, the further it is located from the center point.

The Result is Realistic Sound

With Yamaha Digital Sound Field Processing it is thus possible to recreate the actual sound of a venue. When Jazz Club mode is selected, for instance, you are listening to the acoustical characteristics of a real jazz club. Maybe it's the Village Gate Club or the Cellar Club, both in New York City. Or select "stadium" and hear your favorite rock group in Anaheim Stadium. Yamaha Digital Sound Field Processing makes it possible to hear your favorite artist perform in the venue of your choice.

The Bottom Line
With an extremely wide floor, the 300-seat club has a realistically live sound field.

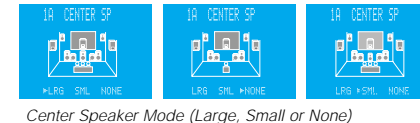


Imaginary Sound Source
Distribution of Sound Field Data
EFCT TRIM 0 dB
INIT.DELAY 30 ms
ROOMSIZE 1.0
LIVENESS 5
S. DELAY 5 ms*
* Dolby Digital/DTS Input

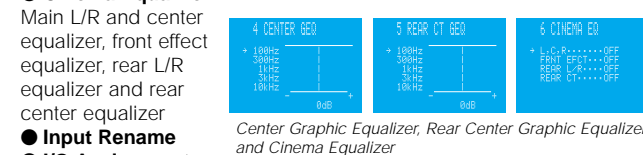
The "Set menu" consists of eighteen items featuring the speaker set functions, center graphic equalizer, CINEMA EQ and parameter initialize, etc. You can choose the appropriate item and adjust or select the values as necessary.

Speaker Set Functions

Programs the output mode that is best for the speaker type and programs the signals that output the LFE (Low Frequency Effect) and bass signals. Available models are: Center speaker mode (Large, Small or None), main speaker mode (Large or Small), rear L/R speaker mode (Large, Small or None), rear L/R speaker mode (Large, Small or None), LFE [Low Frequency Effect]/bass out mode (Subwoofer, Main Speaker or Both), front effect speaker mode (Yes or None) and main level mode.



- Low Frequency Test
- Headphone Tone Control
- Center Graphic Equalizer
- Rear Center Graphic Equalizer
- Cinema Equalizer



Coaxial input terminals, optical output terminals, optical input terminals and component video input terminals

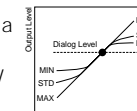
- Input Mode
- Designates input mode for sources connected to the Coaxial (Optical) In jack when the unit is turned on. AUTO (automatically detects signal and sets correct mode) and LAST (selects last input mode for that source)

- Parameter Initialize
- LFE (Low Frequency Effect) Level
- Dynamic Range

This function lets you control the dynamic range of Dolby Digital sources to enjoy the mode best suited to the viewing circumstances: from a mode that lets you enjoy cinematic dynamic range to a mode perfect for late-night viewing.

- MAX mode that provides the full dynamic range of a cinema.
- STD mode with a dynamic range recommended by sound engineers for general home viewing.
- MIN mode most suitable for late-night viewing.

Highest compression ratio provides dynamic range close to that of TV broadcasts.



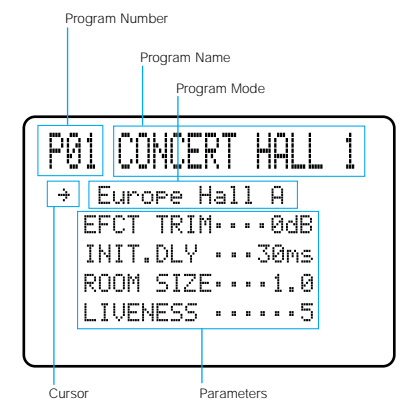
- Speaker Delay Time
 - Audio Delay Time
 - Display Set
- Controls Dimmer level (the brightness of indicators on the unit, OSD Sift (the position of on-screen display), and Blue Back (the screen color).



Speaker Delay Time (msec setting, meters setting or feet setting)

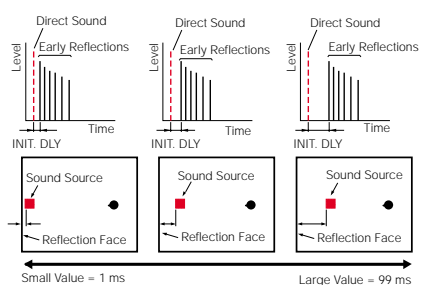
- Memory Guard
 - Zone 2 Set
 - 6-Channel Input Set
- Prevents changes in programmed levels and parameters.
- Selects the zone 2 mode and cuts the tuner signal from the Zone 2 Out signal. This means that the tuner of the Zone 2 receiver can be chosen from any of the rooms.
- Selects the Auto mode of Dolby Digital EX and DTS-ES decoding.

CINEMA DSP and HiFi DSP have sound field programs preset for the re-creation of the most effective sound fields. Normally there is no need to change programs. And should you change programs, you can restore the preset values by initializing parameters from the Set Menu.



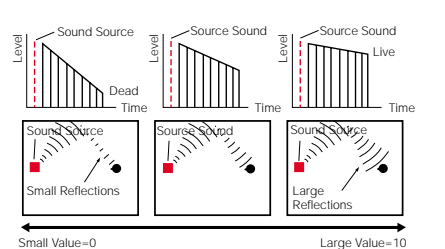
Effect Trim adjusts the level of all the effect sounds within a narrow range.

Initial Delay changes the apparent distance from the source sound by adjusting the delay between the direct sound and the first reflection heard by the listener. (Presence Initial Delay, Rear Center Initial Delay and Surround Initial Delay)



Room Size adjusts the apparent size of the surround sound field. The larger the value, the larger the surround sound field becomes. (Rear Center Room Size and Surround Room Size)

Liveness adjusts the reflectivity of the virtual walls in the hall by changing the rate at which the early reflections decay and in the rear center sound field. (Surround Liveness and Rear Center Liveness)



Reverberation Time adjusts the amount of time it takes for the dense, subsequent reverberation sound to decay by 60 dB (at 1 kHz). This changes the apparent size of the acoustic environment over an extremely wide range.

Reverberation Delay adjusts the time difference between the beginning of the direct sound and the beginning of the reverberation sound.

Reverberation Level adjusts the volume of the reverberation sound.

For 8-Channel Stereo adjusts the volume level of each channel in 8-channel stereo mode.

For Dolby Pro Logic II Music
PANORAMA, DIMENSIONS and CENTER WIDTH

For DTS Neo:6 Music
CENTER IMAGE

RX-Z1

Digital Home Theater Receiver

RX-Z1 Main Specifications

Min. RMS Output Power	Main Ch	130 W +130 W (0.015% THD)
(8 ohms, 20—20,000 Hz)	Center Ch	130 W (0.015% THD)
(8 ohms, 20—20,000 Hz)	Rear Ch	130 W + 130 W (0.015% THD)
(8 ohms, 20—20,000 Hz)	Rear Center Ch	130 W (0.015% THD)
(8 ohms, 1 kHz)	Front Effect Ch	45 W + 45 W (0.05% THD)
High Dynamic Power, Low-Impedance Drive Capability	Yes	
Dynamic Power/Ch	8 ohms	165 W
	6 ohms	200 W
	4 ohms	260 W
	2 ohms	360 W
Linear Damping	Yes	
Damping Factor (8 ohms, 20—20,000 Hz)		200 (main/center channels)
Input Sensitivity/Impedance		
CD (100 W/8 ohms)		150 mV/47 k-ohms
Phono (MM)		2.5 mV/47 k-ohms
Main In		1 V/47 k-ohms
Frequency Response (CD, Main L/R)		10—100,000 Hz +0/-3 dB
Bass Extension Characteristics (Main L/R, 60 Hz)		+6 dB

Low Pass Filter Characteristics (Subwoofer Out)		90 Hz/24 dB/oct.
Tone Control Characteristics		
Bass	Bass/Cut (50 Hz)	+3 dB/-6 dB
	Turnover Frequency	350 Hz
Treble	Boost/Cut (20 kHz)	+3 dB/-6 dB
	Turnover Frequency	3.5 kHz
Total Harmonic Distortion (20—20,000 Hz)		
Phono (MM) to Rec Out (1 V)		0.01%
CD to Preout (Main L/R, 1 V)		0.005%
Main In (Sp Out L/C/R, 65 W/8 ohms)		0.005%
Signal-to-Noise Ratio (CD)		100 dB (250 mV)
Monitor Out Frequency Response		
Composite		5 Hz to 10 MHz -3 dB
S-Video		5 Hz to 10 MHz -3 dB
Component Video		DC-100 MHz -3 dB
Dimensions	(W x H x D)	435 x 211 x 471 mm
		17-1/8" X 8-5/8" X 18-9/16"
Weight		28 kg; 61 lbs. 11 oz.



CINEMA DSP™
DIGITAL

Yamaha's unique technology for the creation of sound fields is capable of powerfully reproducing the three-dimensional environment that movie sound engineers aim to convey, in any audio format from monaural to the latest 6.1-channel digital surround. It is compatible with DVD and all other A/V sources.

Yamaha CINEMA DSP technology has received a patent in the U.S. (Patent No. 5,261,005).

- Dolby Digital and Double D are trademarks of Dolby Laboratories Corporation.
- DTS, ES and DTS Digital Surround are trademarks of Digital Theater Systems, Inc.
- Burr-Brown products are trademarks of Texas Instruments, Inc.
- Theater photos: Warner Mycal Cinemas "Minato Mirai."
- Screen images are simulated.
- Product designs and specifications are subject to change without notice.

For details please contact:

Visit us at our website: <http://www.yamaha.com>

 **YAMAHA**
CREATING 'KANDO' TOGETHER
YAMAHA CORPORATION

A-1150UEN