

What is DVD-Audio?

The new audio standard developed for the next generation, based on DVD-Video ROM technology. It offers 4 major characteristics:



CONSENSUS:

Developed by the DVD forum, together with the ISC (International Steering Committee), this format is supported by the music industry as the next-generation standard in digital audio.

ULTRA-HIGH QUALITY 2-CHANNEL STEREO:

Offers unprecedented audio quality, with a maximum 192 kHz sampling frequency and 24 bit quantization.

MULTI-CHANNEL WITH LINEAR PCM QUALITY:

Since it supports up to 6 separate audio channels, it can reproduce movie soundtracks and other multi-channel content with full impact.

VISUAL & INTERACTIVE CONTENTS:

Enables future-oriented interactive capabilities, including still image playback, digital effects, visual menus, and much more.



The new audio standard that offers specifications and performance that are far superior to Audio CD:

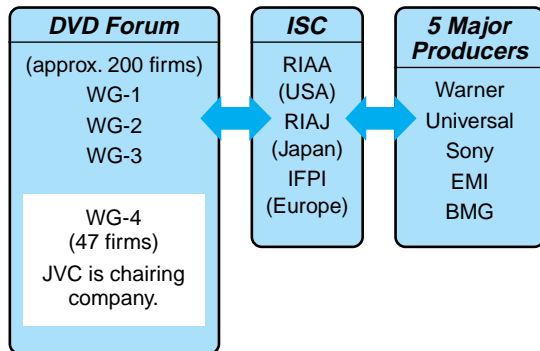
	DVD Audio	Audio CD
<i>Disc Size</i>	12cm	12cm
<i>Data Capacity</i>	8.5 GB (Single Sided) 17 GB (Double Sided)	640 MB
<i>Channels</i>	1-6 ch	2 ch
<i>Coding Mode</i>	Linear PCM or Packed PCM (MLP)	Linear PCM
<i>Sampling Frequencies</i>	48/96/192 kHz 44.1/88.2/176.4 kHz	44.1 kHz
<i>Quantization</i>	16/20/24 bits	16 bits
<i>Dynamic Range</i>	144 dB	98 dB
<i>Playback Time</i>	74 minutes or more	74 minutes
<i>Optional Contents</i>	Text, Still Picture, Video, Visual Menu	Text

Note:

Although 8cm discs are supported by these formats, they have been omitted from the chart since 8cm discs are not marketed in your region.

DVD-Audio: Based on Consensus

JVC has been a leader in DVD-Audio from the very start. Established in 1995, the DVD Forum's WG-4 (Working Group 4), chaired by JVC, developed the DVD-Audio standard in consultation with the ISC which represents the 5 major software producers that account for 90% of the world's music market.



Note on Copy Protection:

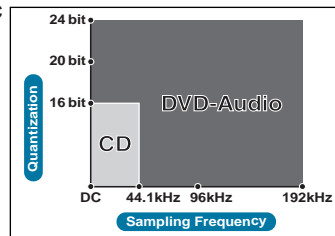
DVD-Audio ver. 1.2 incorporates CPPM (Content Protection for Prerecorded Media) to meet the copyright requirements of the music industry.

Developed with the consensus of the music industry, DVD-Audio is set to be the next standard in digital audio.

DVD-Audio: Unprecedented Quality

High-bit (24 bit) Quantization

Supporting **24 bit quantization**, DVD-Audio offers a **potential dynamic range of 144 dB** (theoretically), allowing products that deliver a 110 dB or broader dynamic range.



Up to 192 kHz Sampling Frequency

With a maximum **sampling frequency of 192 kHz**, DVD-Audio performance dramatically surpasses Audio CD quality.

48*/96*/192 kHz, 44.1*/88.2*/176.4 kHz are supported for stereo content. Support of 44.1 kHz and derivative frequencies maintains compatibility with the Audio CD family.

*Supports multi-channel content also.

Flexibility

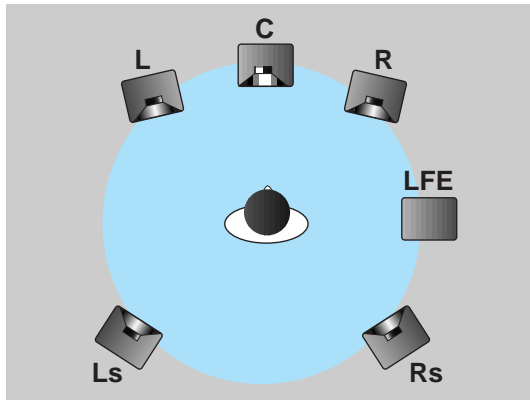
To offer content producers the flexibility they need, DVD-Audio permits various parameters such as **sampling frequency, quantization and number of channels** to be **changed per each track**.

DVD-Audio: Multi-Channel Support

Linear PCM 6-Channel Capability

In addition to stereo, the DVD-Audio format also supports multi-channel Linear PCM audio of **up to 6 channels**. Available speaker settings are L/R/C/Ls/Rs/LFE, thereby offering **compatibility with 5.1 channel surround sound systems**.

Content producers can choose to divide the channels into groups (e.g. front group and rear group) and give them different parameters (sampling frequency and quantization) to allow more efficient use of disc capacity.



Flexibility for Content Producers

Multi-Channel and Stereo

Both multi-channel and stereo versions of the same audio can be stored in the same track; the user selects which version to listen to.

If only multi-channel content exists on a disc while the user wants to listen in stereo, DVD-Audio supports multi-to-stereo downmixing to allow stereo listening. Based on an algorithm stored on the disc, multi-channel sound can be converted to stereo in the manner intended by the content producer.

Linear PCM and Packed PCM

In addition to Linear PCM which offers the highest quality for stereo content, DVD-Audio also supports Packed PCM (a.k.a. MLP™ or Meridian Lossless Packing) to accommodate the higher data amount of multi-channel content. For example, Packed PCM will allow 86 minutes of 96kHz/24bit/6ch content per disc, which is impossible with Linear PCM.

DVD-Audio Sampling, Quantization and Channels

Sampling Frequency	Quantization	Channels					
		1ch	2ch	3ch	4ch	5ch	6ch
48kHz or 44.1k	16 bit	Linear PCM					
	20 bit	Linear PCM					
	24 bit	Linear PCM					
96kHz or 88.2k	16 bit	Linear PCM					
	20 bit	Linear PCM					
	24 bit	Linear PCM			Packed PCM		
192kHz or 176.4k	16 bit	Linear PCM			Packed PCM		
	20 bit	Linear PCM					
	24 bit	Linear PCM					

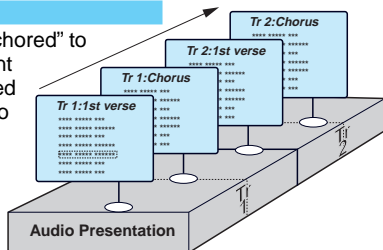
DVD-Audio: Visual & Interactive Contents

Still Picture Playback

While playing audio tracks, it is possible to **view MPEG2 or MPEG1 digital still pictures** that are part of the disc's content.

Slideshow

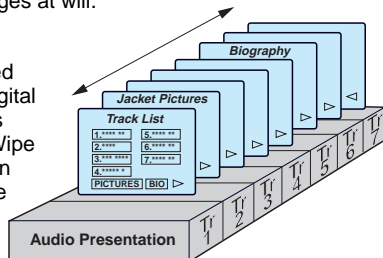
Images are "anchored" to the audio content and are displayed synchronously to accompany the sound (such as lyrics).



Browsable Pictures

Made possible since digital still data is read into the DVD-Audio player's cache memory, the user can browse through the images at will.

Also, if supported by the player, digital transition effects such as Fade, Wipe and Dissolve can be applied to the pictures.



Video Track Playback

Content producers will be able to place moving video data that is compatible with the DVD-Video format on the DVD-Audio disc, allowing **audio content to be enhanced with video clips**. LPCM, Dolby Digital and DTS are supported for the audio tracks of these video clips.

Visual Menu

Allows **interactive navigation** through a DVD-Audio disc, via on-screen menu.

Text (with Multi-Lingual support)

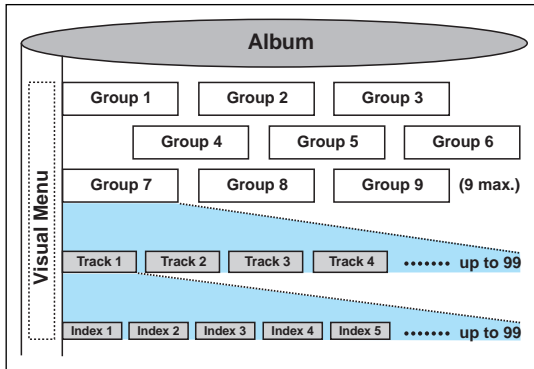
- **Album Text** offers Album (disc)/Group/Track/Index title information, artist name, and other information.
- **Track Text** displays information specific to the track being played in real-time.

Bonus Group

Content producers can include "bonus groups" on the disc that can be played only if a key number is correctly input. Unlike bonus tracks on CDs, these bonus groups require user interactivity to access, and can be tied-in with various promos such as having the user visit a Web site for the access key.

DVD-Audio: Data Hierarchy

The data on a DVD-Audio disc (called an “Album”), is subdivided into 3 levels. Getting a grasp of the terminology and the data hierarchy will make it easier to understand how DVD-Audio will operate.



The capacity of a DVD-Audio disc currently is 4.7 Gbytes, and some content providers may opt to use a two-sided disc to double the content volume. With high quality, and the ability to store high-capacity data very efficiently, the DVD-Audio format is an excellent medium for the latest audio and multimedia productions.

XV-D723GD

The Ultimate in Home Theater and Audio Performance

The XV-D723GD takes home theater entertainment to the next stage. JVC has equipped the latest technology to boost video quality to new heights, while the newly developed DVD-Audio format has been incorporated so people will be able to enjoy all the benefits of the new digital audio standard.



New Level of
Audio
Performance with
DVD-Audio



Excellent Video
Quality with
Progressive Scan
Output

Joy To Use with
Advanced
Convenience
Features

Audio Performance Features

New 192kHz/24-bit P.E.M. D.D. Converter

Dolby Digital/DTS Decoders

Video Performance Features

Progressive Scan Output

High-bit (10-bit)/Super High Sampling (54 MHz) Video DAC

Component Video, S-Video and Composite Video Outputs

High Quality Zoom

New VFP (Video Fine Processor)

High Performance Construction

Separate Audio/Video Construction

Airtight Disc Tray

Convenience Features

High-Resolution GUI

Multi-Brand Remote with Shuttle Dial



Audio Performance Features

To support the excellent quality made possible with the DVD-Audio format, the XV-D723GD is equipped with a full array of sound-performance maximizing technologies.

New 192kHz/24-bit P.E.M. D.D. Converter

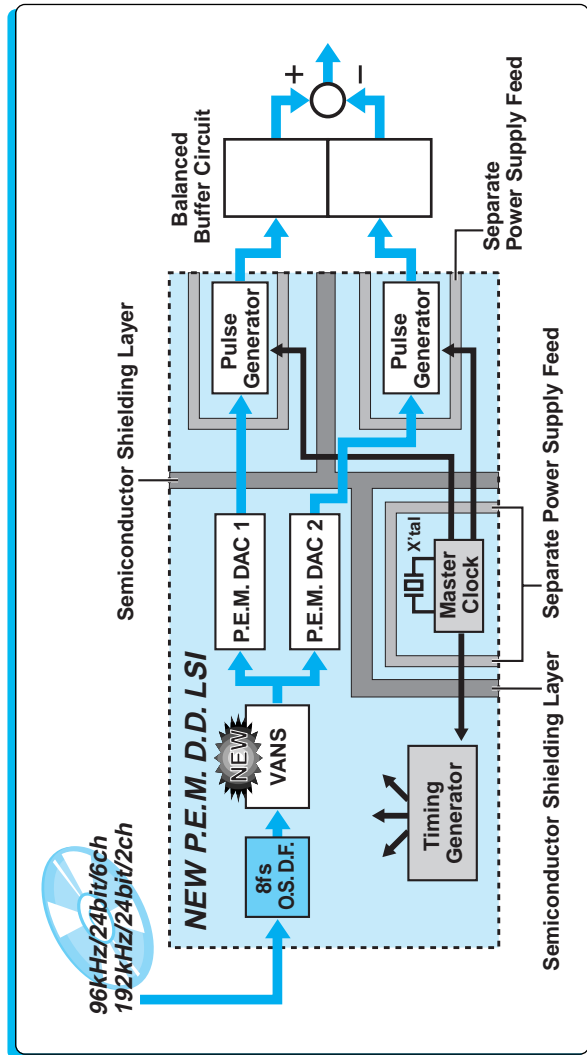
Developed to match the maximum 192kHz/24-bit audio resolution of DVD-Audio.

JVC's new 1-bit P.E.M. D.D. Converter LSI offers...

- **8-times oversampling** of DV-Audio input signal to assure high accuracy.
- **VANS** (JVC Advanced Noise Shaper), an exclusive 4th-order noise shaper eliminates noise by **shifting it out of the audible audio range** and into the inaudible ultra-high frequency range.
- **Dual layers of shielding and independent power supplies** to prevent Pulse Generator interference of Master Clock.
- Delivers more than **110 dB dynamic range** and **0.0012% total harmonic distortion** using 20-bit or greater quantization.

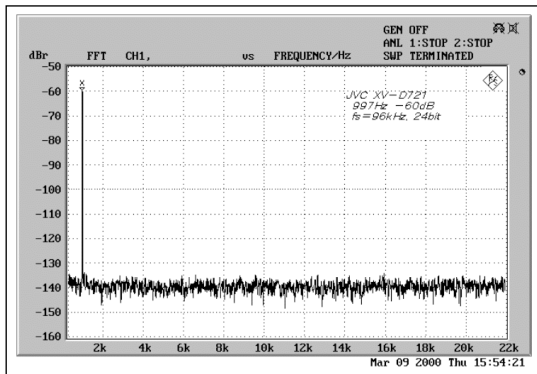
What is P.E.M. D.D. Converter?

It stands for "Pulse Edge Modulation Differential linearity-errorless D/A Converter", and is an advanced variation of the conventional 1-bit D/A converter that theoretically eliminates zero-crossing distortion. Incorporating dual P.E.M. DACs as well as new VANS circuitry, our latest version offers ample performance for the XV-D723GD.

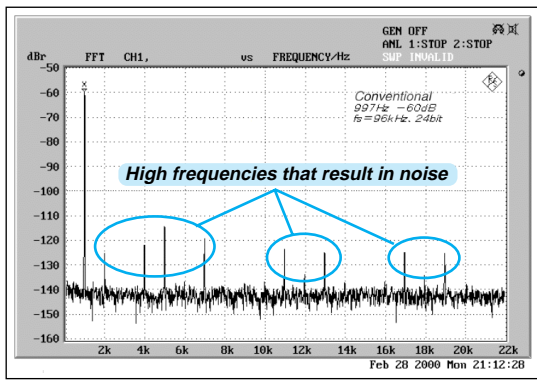


Comparison of Noise Suppression Characteristics

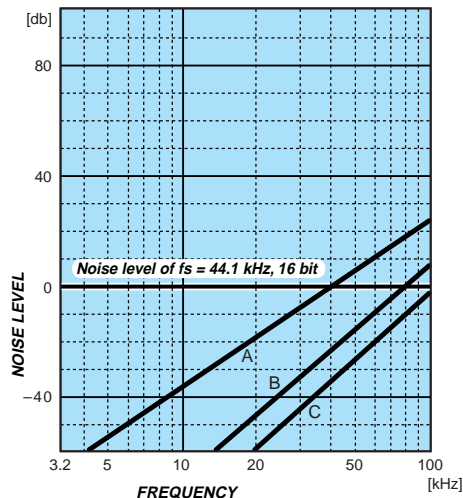
High Frequency Spectrum of 192kHz/24-bit P.E.M. D.D. Converter



High Frequency Spectrum of Conventional D/A Converter



Noise Shaping Characteristics of VANS



- A : Conventional 3rd-order noise shaper
- B : Previous VANS
- C : New VANS (Human hearing is in the range of 20 Hz – 20 kHz. New VANS eliminates most noise from this audible range.)

Dolby Digital/DTS Decoders

Equipped with a full set of decoders to accommodate the latest in home theater sound.

- **Compatible with MLP (Meridian Lossless Packing)** for high-quality multi-channel sound.
- Ready to be incorporated into an existing home theater system with **5.1-channel amp and speakers.**
- Easy to upgrade with **optical and coaxial digital outputs** for connection to external Dolby Digital/DTS Multichannel decoder.

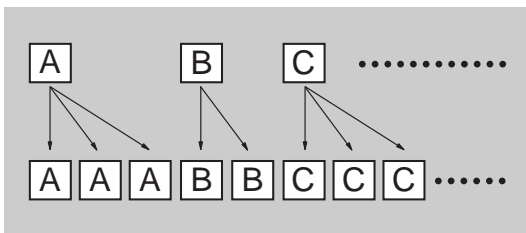
Video Performance Features

DVD-Video offers a solid, high-quality base for video images. The XV-D723GD is equipped with various technologies that maximize this potential quality.

JVC Progressive Scan Output

● Conventional : 2-3 Pull-Down Interlaced Conversion

Most movies on DVD are recorded at 24 frames per second (24fps) in MPEG format. A conventional interlaced DVD player converts 24 frames per second into 30 interlaced frames (or 60 fields) for display on a TV. Frame-for-frame conversion, however, would result in a wrong playback speed, so a technique called “2-3 pull-down” – which alternates two video fields (one frame is made of two video fields) with three video fields for each pair of DVD frames – is used to produce the 30 necessary frames. But this causes two fields to be blended in the same frame, resulting in blurry images in fast-moving scenes. And since the pictures are interlaced, scanning lines are noticeable on the TV screen, and vertical resolution is low.



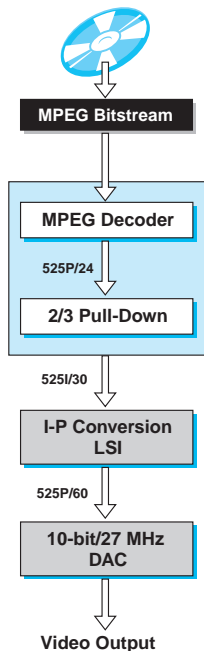
● JVC Advantage : Direct Progressive Scan Output

The common progressive converter used on some DVD players first converts progressive 24fps recorded on DVD into interlaced 30fps (2-3 pull-down conversion). Then the I/P (Interlaced/Progressive) converter LSI re-converts the interlaced 30fps into progressive 60fps. This two-step conversion can lead to the deterioration of the signal-to-noise ratio and resolution. JVC's Direct Progressive Scan Output features the “Direct Progressive Decoder” – a **newly-developed high-speed MPEG decoder** that can produce the video output at **twice conventional speed**. This allows the **direct conversion of DVD's 24fps into progressive 60fps** for display on your TV, thereby avoiding the quality disadvantages of I/P conversion. (See comparison diagram on next page.)

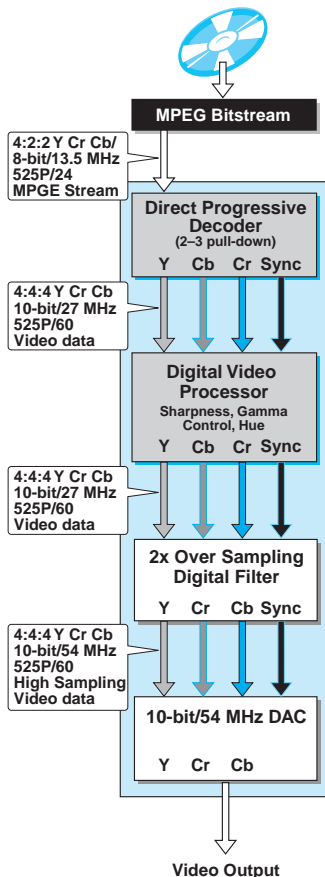
FOR DEMO:

- 1 Play a movie on DVD.
- 2 Pause the picture at a scene where there are large, bright, same-colored fields.
- 3 Switch back and forth between Interlace to Progressive; point out how scanning lines are visible in Interlace, and disappear in Progressive.

Conventional



XV-D721GD



High-bit (10-bit)/Super High Sampling (54 MHz) Video DAC

Newly developed to deliver a much higher level of performance.

The use of **10-bit/54MHz** high-bit/super high-sampling Video DAC (digital-to-analog converter) provides **2X oversampling** of the 27MHz progressive signal and **10-bit re-quantization** for a wide-range response and high-quality images free of foldover distortion.



4:4:4 Upsampling of DVD Signal

Ensures clearer and purer color reproduction.

To maximize color reproduction accuracy, DVD's original 4:2:2 (Y Cr Cb) component signal is **upsampled to 4:4:4**. Since this signal is also **oversampled to 54 MHz** for output, **greatly improved color reproduction** is achieved.

Even during interlaced output, the combination of 54 MHz DAC and 4:4:4 upsampling delivers beautiful images with increased depth in the overall picture.

Unique characteristics:

- Does not use an expensive I-P conversion LSI.
- Incorporates newly developed high-speed MPEG decoder and 10-bit/54 MHz DAC in a single chip.
- Controlled by RISC (Reduced Instruction Set Computer) CPU with 100 MIPS (Million Instructions per Second) which affords quick response and high precision.

New VFP (Video Fine Processor)

Gives the viewer the power to customize the picture to match his personal taste or compensate for a particular TV monitor's color.

NORMAL → CINEMA → USER 1 → USER 2



In addition to the "NORMAL" and "CINEMA" factory-preset modes, there are two user-settable modes in which the user can adjust up to 7 parameters to precisely attain the effect he wants.

GAMMA:

Adjusts the gamma curve of the gray slope which represents the gradual, linear transition from black to white. (±4 steps)



TINT:

Changes the color temperature without changing the saturation, allowing fine adjustment of colors that look inaccurate. (±16 steps)



SHARPNESS:

Uses a flicker filter to deliver clearer results when viewing on large-screen TVs. (4 steps)



COLOR:

To adjust the saturation of the colors, creating a richer looking or lighter looking picture. (±16 steps)

BRIGHTNESS:

To shift the gray slope up or down, thus raising or lowering the overall brightness of the picture. (±16 steps)

CONTRAST:

Changes the angle of the gray slope, thereby raising or lowering the contrast of the image. (±16 steps)

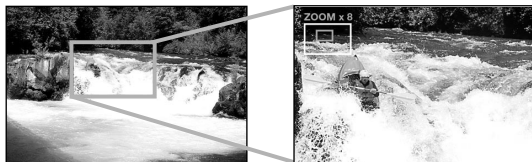
Y DELAY:

Delays the Y (luminance) signal in relation to the C (chroma) signal. (±2 steps)

High Quality Zoom

By virtue of a new, versatile graphic chip, the XV-D723GD is able to offer excellent picture quality 13-step zoom.

- **Very fine quality picture** at x2 and x4 zoom, with digital smoothing function.
- Selectable zoom magnifications ranging from **x1/8 to x1024**.
- Inset screen shows **relative location** of the zoomed area and the **zoom ratio**.



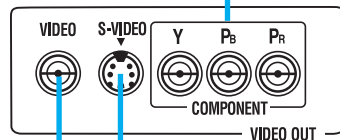
FOR DEMO:

- 1 Play back movie on DVD.
- 2 Zoom in on a face; mention how good the quality is while zooming in to x2 and x4, and point out how the image doesn't look too grainy.
- 3 Zoom in to x1024 briefly to show the maximum capacity, and zoom back out to normal.

Component Video, S-Video and Composite Video Outputs

Component video outputs for maximum signal purity, S-Video and Video outs for wide range of connectivity.

- **Component (Y/Pb/Pr)** outputs DVD's component video signals in component form to maintain maximum purity. By separating video signals into Pr (R-Y), Pb (C-Y) and Y (luminance), interference between luminance and chroma signals is eliminated, and separate color difference signal transfer reduces spurious signal generation.



- **Composite Video** output for connection to virtually any TV or video unit.

- **S-Video** output allows connection to TVs and other units equipped with S-Video input.

High Performance Construction

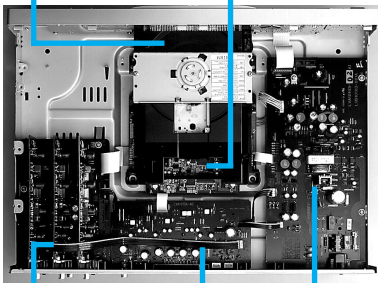
The superior quality of the XV-D723GD encompasses every detail, including the basic construction of the unit, to ensure high performance to satisfy both audiophiles and videophiles.

Separate Audio/Video Construction

Elaborate construction protects delicate audio signals from noise and other interference.

- Audio circuit block, video circuit block, servo/DSP circuit block and power supply block are all **independent to prevent mutual interference.**
- Audio circuit block is divided with **separate sub-blocks and signal paths for each channel.**

Mechanism Servo/DSP circuit (underside of unit)



Audio circuit block Video circuit block Power supply

Airtight Disc Tray

Uses rubber seal to seal-off the Mechanism from the outside.

- Serves to **shut out external vibrations** from interfering with playback.
- Helps **shut out dust** and other environmental particles.
- Internal motor noise does not leak out, offering a **more comfortable viewing experience** for the user.



Gold-Plated Connectors

High quality connectors as you'd expect on the finest audio equipment.

- Increases conductivity to **minimize signal loss** and **maximize signal purity.**

Convenience Features

JVC's XV-D723GD provides a superior human-machine interface, both on-screen and in-hand, to make DVD operation more enjoyable and worry-free.

High-Resolution GUI

By use of a high-speed graphic chip, the GUI (Graphical User Interface) offers images and letters that look much finer and smoother than were previously available.



- **Preference** screens allow selection of language and digital output settings. 7 on-screen languages selectable: English, French, Spanish, German, Chinese (Trad.), Chinese (Simplified), Japanese.



- **Speaker Setting** screen for selection of 2-channel, 5.1-channel, or Expert for detailed control over parameter settings.



- **DVD Control Panel** to access special features (angle, audio track, subtitles, playback modes) while displaying 1/4-size real-time playback screen.

- Currently selected language
- Bit Rate indicator (yellow = audio, green = video)

- **Parental Lock** lets you restrict playback or require a password.
- **VFP Setting On-Screen Menus** let you easily customize the picture based on a wide range of parameters.
- **3D-PHONIC Setting On-Screen Menu** to choose from among Action*/Drama/Theater/OFF presets to best suit the viewing material.

*Not available with some discs (encoded with Dolby Digital)

Multi-Brand Remote with Shuttle Dial

Shuttle flexibility and multi-brand versatility for total controllability.



- Preset with control codes for operating **various brands of TVs and CATV/satellite tuners.**
- **Shuttle dial** offers flexible **frame-by-frame** playback, **slow motion**, and **high-speed search** in both directions.

Smooth Visual Search

Search picture is much smoother than with previous DVD decks.

- **Less jerkiness** and interruptions.
- Smooth motion makes it **easier to find** the scene you want.

MEMO

MEMO