

Sonic Studios™ SDHC Flash Portable Audio Recorder Technical Review

MODEL: Edirol/Roland R-09HR

This is a brief *technical review/commentary* based on bench testing of the R-09HR with firmware version 1.04. Newest [firmware version 1.05](#) (not reviewed) expands SDHC flash card compatibility (more models & makes) up to 32 GIG capacity.

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[ROLAND](#)

[INPUTS](#)

[BATTERY](#)

[TIPS](#)

[MEMORY](#)

[NOISE](#)

[ADD-
ON](#)

[PRE](#)

[MOD-4](#)



This review is narrowly focused ONLY on deck operational features, ease of use, consistent .wav file recording ability/quality, and design fault issues related to stereo-surround field recordists with direct connected external mics/Preamp; issues not usually discussed in commercial magazine / Internet reviews.

In other words, how suitable is the EDIROL/ROLAND R-09HR as an 'all-in-one' 2-channel audio recording solution for both amateur / professional field recordist? And if connected to a full featured external preamplifier, how well does it handle the LINE input levels?

Introduction:

The R-09HR is third in Edirol's line of palm size flash decks with additional capabilities, cosmetic improvements, lower preamplifier noise, and solid PCB through-hole mounted input jacks.

This latest deck is slightly taller, a tad bit thinner than previous R-09 version, and with excellent non-slip quieter handling rubberized outer case, gives an immediate good feeling of quality. The same OLED type display is still a washout in daylight (see VIEWCASE solution [below](#)), but otherwise now far easier to view being about a third larger in size.

Both analog MIC/LINE input jacks reside on the lower end of the deck's right edge along with up/down REC level adjust buttons making holding the deck with out of the way trailing external input cords easier. This deck seems a natural for easy one-handed operation using thumb and two middle fingers.

One of the most compact devices having **both** 88.2/96K recording modes!

Previous R-09 limited recording bandwidth to 48K rate, or about 22,000 Hz frequency. Most other handheld size decks sporting higher bandwidth feature only 96K sample rate mode. While the Microtrack II features 88.2K mode, it's analog bandwidth tested only to 22,000 Hz, that's not the expected 42,000 Hz bandwidth for this recording mode.

R-09HR tested fully analog/digital bandwidth capable for both 88.2K and 96K modes, so no liability for those wanting clean whole-integer 44.1K conversions from high definition/extended bandwidth master 88.2K recordings!

Summary: In my opinion, an excellent all around recorder at an excellent price with no found flaws. As opposed to the R-09, the R-09HR's 10 dB quieter internal MIC preamplifier should make most acoustic/natural sound recordists happy using at least self-powered low-to-high sensitivity mics for most recording purposes.

INPUTS

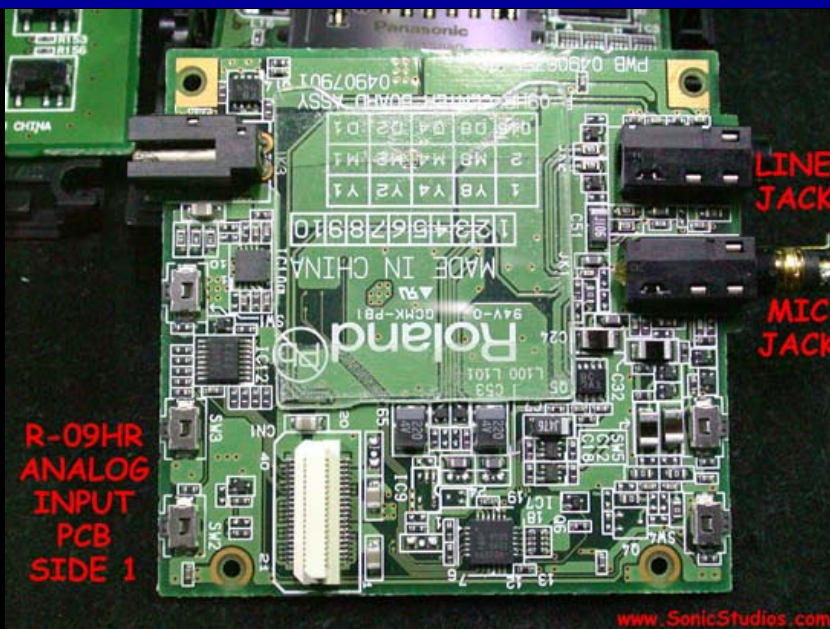
Two 3.5mm stereo jacks serve for analog MIC/LINE input. These inputs are automatically selected by simply inserting a mini-stereo plug into either jack. Two up/down buttons located above the input jacks operate at #0 as signal mute, and from #1-to-#80 for adjusting the REC level in ~ 0.5 dB steps.

MIC input low/high sensitivity is set with a slide switch located on the deck's backside. In fact, all backside manual operated slide switches are *always* active even with 'HOLD' (also on the back side) is active, and when recording; a good feature from my experience.

MIC power (PIP) on/off function is slide-switch operated supplying up to +2.9 volts for powering external mics. Unfortunately, as usual for current *stock* flash deck models, R-09HR's mic PIP feature will NOT power my own DSM microphones; exception (so far) is stock Sony PCM-D50 flash deck.

INPUT MODES	REC LEVEL ADJUST # vs. SIGNAL INPUT FOR 0dB VU FS			COMMENTS
	#1 MAX INPUT	#80 MIN INPUT	88.2K -3 dB BW	
MIC HIGH	-20 dBu	-48 dBu	12 - 42.5K Hz	INPUT modes seem to have at least 6 dB overlapping zones.
MIC LOW	+1.3 dBu	-26 dBu	9 - 42.5K Hz	
LINE	+28 dBu	-12 dBu	7 - 42.5K Hz	

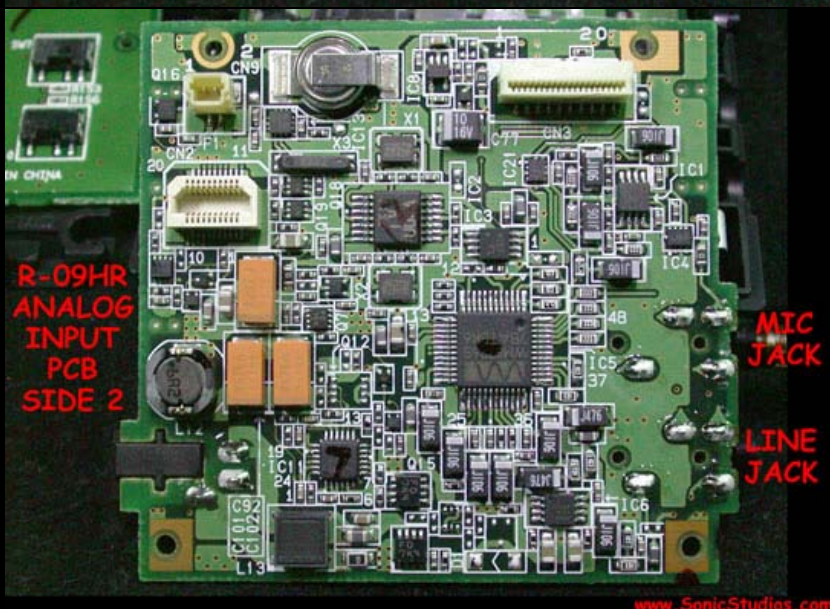
THE MECHANICS OF THE INPUT JACKS



THE EARLIER R-09 VERSION DECK had two complaints from many using the analog input jacks.

- 1) The mic input was too noisy for most acoustic recording requirements, and only those recording loud amplified live performances or going in LINE level with external preamplifiers were satisfied.
- 2) BOTH MIC/LINE input jacks had no internally secure mounting causing many owners grief when the jacks broke off the PCB traces with normal use.

At left is a photo taken of the new R-09HR analog input board showing the same *looking* input jacks as were used on the original R-09.



When the analog input board is turned over, the same *looking* input jacks now clearly show same, *unused* board mushroom rivet holes underneath.

BUT NOW the new R-09HR is using jacks with proper *through-hole* soldering pads totally securing the jack's terminals firmly to the PCB board assembly.

So with normal care keeping these jack's clean and free from fingerprint coated plugs, and not over stressing by using straight plugs with stiff cord known to especially be a liability if moving around and/or keeping deck inside crowded equipment bag, the recordist should not have any bad experiences with noise or breaking with these better designed/mounted jacks.

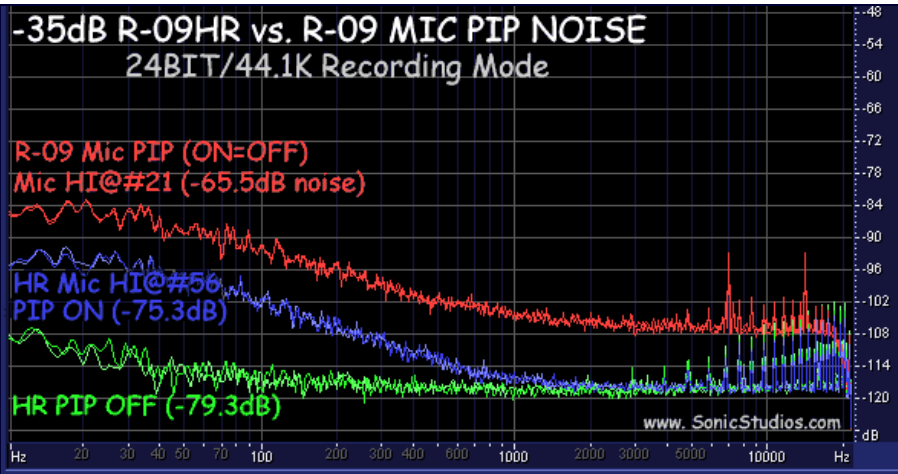
BATTERY

R-09HR uses (2) AA alkaline or NiMH type cells for estimated 5 hours recording time.

Advanced 'Oxy nickel' Alkaline Batteries now offered by Sony and Panasonic lasting *maybe* 7 hours, same estimated runtime using NiMH 2600+ ma capacity rechargeable cells, and *longest* possible 9 hours (*especially if recording continuously in warm ambient*) with Energizer L91 or equivalent 2900 ma. capacity photo lithium type cells.

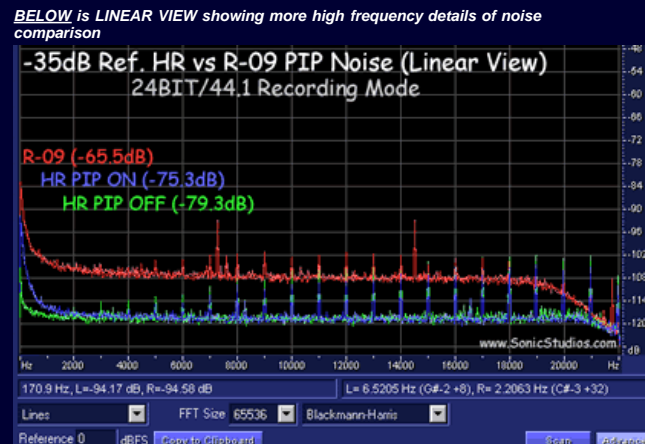
All noise tests done with 1000 ohm input resistor load to ground.

SHOWN AT LEFT IS (LOG VIEW) GRAPH comparison of *previous* R-09 version deck having *exactly* same MIC input

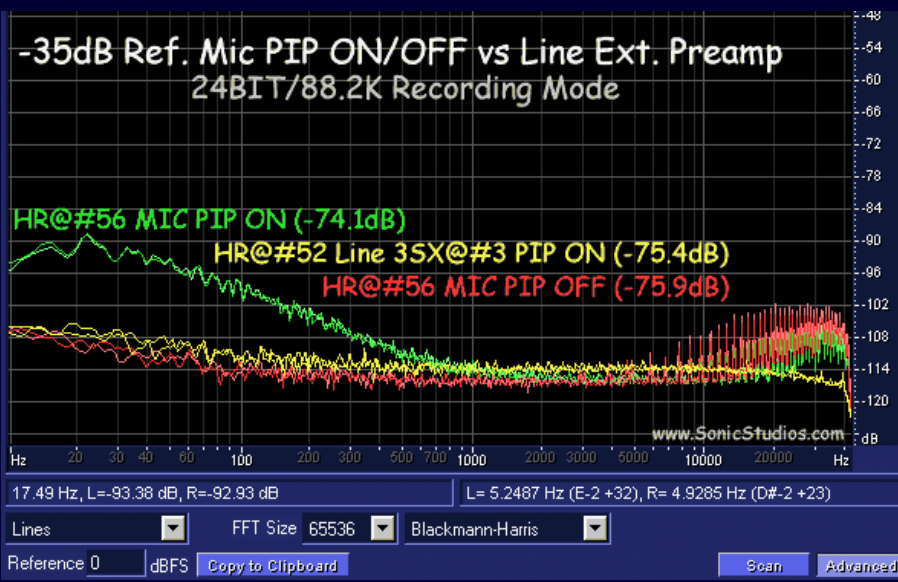


HERE is a 15 second .wav file comparing previous R-09 mic input noise followed with 5 seconds of newer R-09HR MIC PIP=OFF, then ending 5 seconds of R-09HR PIP=ON as depicted in the noise graph above, but amplified by 35 dB so very audible.

noise regardless of PIP being turned ON/OFF compared to R-09HR with lower noise, BUT HAS higher PIP ON noise level compared to PIP OFF mode

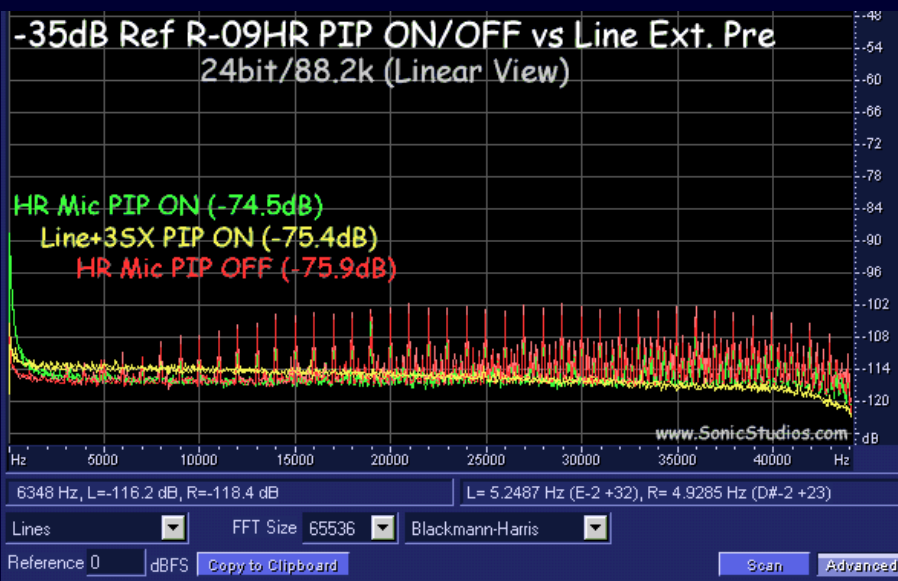


LOG VIEW comparing MIC input with/without PIP turned on, and LINE input connected to PA-3SX preamplifier with always ON PIP feature.



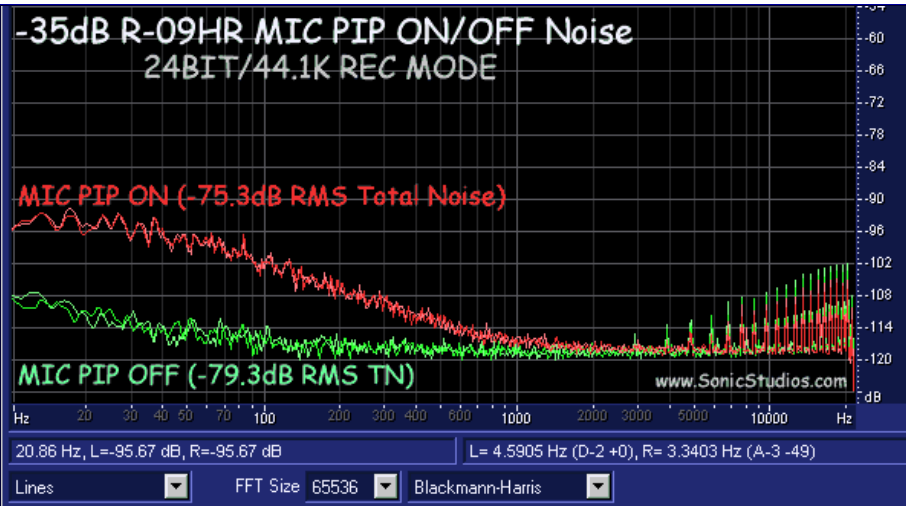
Notice excessive below <1000 Hz low frequency noise present when R-09HR's PIP is ON verses OFF mode.

Also note total RMS dB noise figures in (-dB) are all within 1 dB of each other, but *audible* noise and effects on the character of the audio is very different matter as indicated by the frequency and type of noise shown of each input mode's spectrum. This is exactly why dB marketing/specification numbers to often DO NOT tell much of anything about what might be heard or effect recorded audio quality.

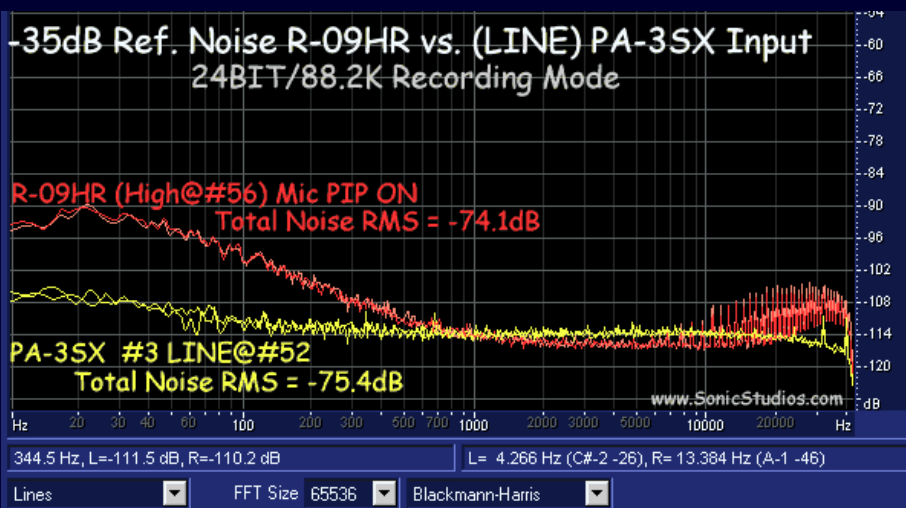


GRAPH at left same comparison test as above, but LINEAR VIEW showing high frequency details of noise.

Notice HR's MIC input noise has spikes at EXACTLY 1000 cycle intervals, starting ~ at 6000 Hz continuing all the way up beyond 40K Hz. These troubling noise spikes are NOT present with LINE + Ext. Preamp input mode.



NOISE SPECTRUM of *just* R-09HR's MIC input PIP on/off modes (no LINE mode) for easier comparison and viewing clarity.



LOG VIEW NOISE SPECTRUM of *just* R-09HR's MIC input (PIP=ON, no PIP = OFF mode) compared to LINE input PA-3SX PIP=ON preamp mode for easier viewing.

Also notice HR's mic input noise floor is *lower* than LINE ext. preamp mode *between* 1000-to-10K Hz frequencies. When audibly compared, the LINE input mode's noise *actually* sounds quite a bit louder to the ears, but easy to assume the LINE + external preamp mode allows the *cleanest* possible audio quality without all that low/high frequency noise present in the MIC input modes.



ACCESSORY attachment to the deck's back has advantages of keeping carrying size minimized and connections secured.

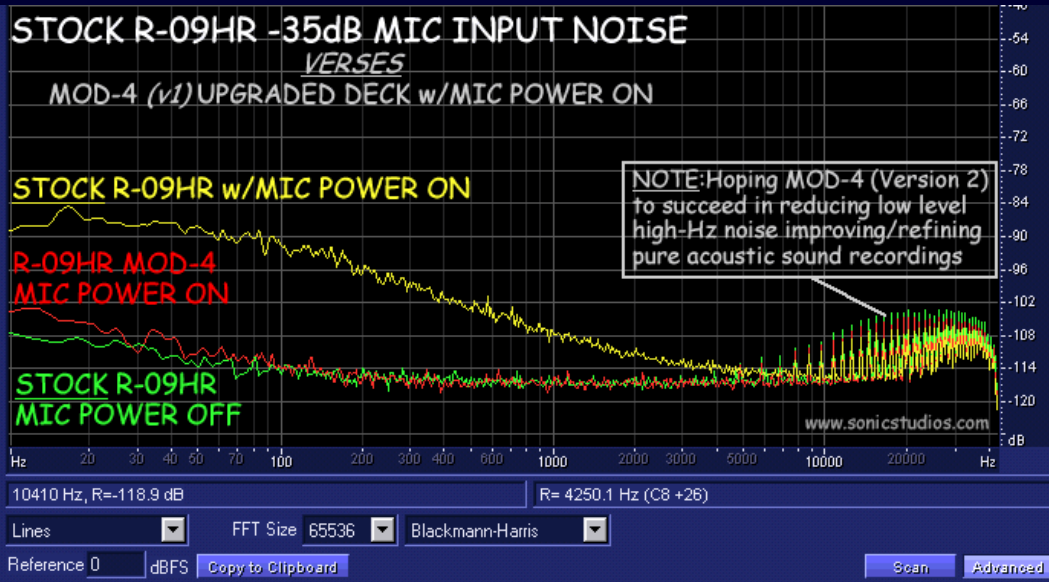
Outboard mic powering modules and external mic preamp are available in smaller-than-deck size allowing easy temporary attachment using adhesive backed Velcro patches cut and placed so not to disrupt normal deck functions, controls, and battery replacement maintenance.

Image of deck's back at left shows suggested patch size and placement.

Compact accessories (*like the preamplifier shown at right*) still allow clear access to backside R-09HR slide switches, and the Velcro patches themselves are just sized enough to securely hold the preamp, and so minimum effort is required removing the preamplifier for quick battery changes requiring clear battery hatch access.



MOD-4 DSM MIC POWERING UPGRADE



While LINE input using external PA-3SX preamplifier (shown above) both powers DSM mics, and removes virtually all R-09HR noise/audio quality concerns, there are logistical/cost advantages to having a simpler deck+mic 2-piece recording rig.

MOD-4 internal deck modification allows full performance DSM mic powering for having the most compact high definition recording system possible.

Usual past mic powering MOD-1/2/3 did little or nothing in reducing deck mic input noise issues if any existed for a particular deck model.

R-09HR using MOD-4 is different in also reducing this deck's mic-power ON excessive/audible low frequency noise to be virtually identical to the mic-power OFF noise level.

DRILL DEEPER INTO MOD-4 AND CUSTOM GEAR MODIFICATION IN THIS [TS THREAD](#)

EDIROL R-09HR DECK + MOD-4 PIP UPGRADE + DSM MIC = THE MOST COMPACT HIGHEST DEFINITION FIELD SYSTEM



This 2-piece deck+mic configuration is the simplest most portable recording package possible today with no audio bandwidth or imaging quality compromises.

Customer supplied deck is MOD-4 upgraded at \$150 USD + Shipping.

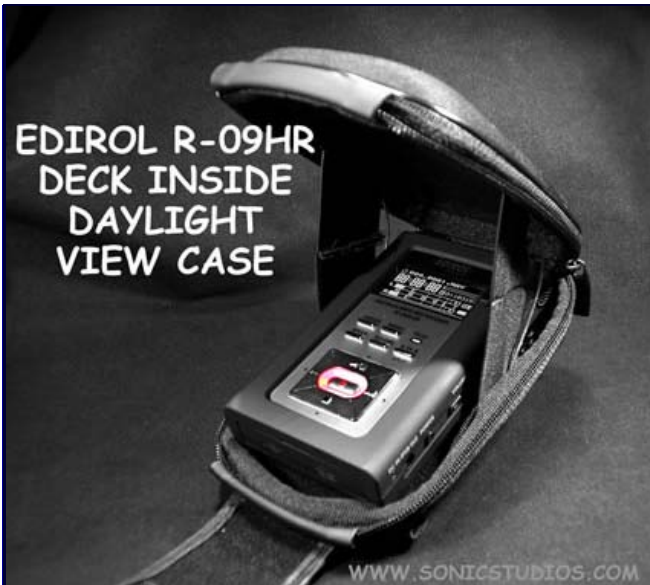
Customer also chooses appropriate DSM mic model with or without WHB/N windscreen suited to range of sounds desired, and ambient working conditions.

2-channel headworn DSM mic cost depends on model and output plug, and WHB/N configuration.

Pricing starts at \$350 USD for DSM-6/M model with 3.5mm -stereo output plug going to \$950 USD for most specialized models configured with miniXLR plug, and WHB/N windscreen headband.

DAYLIGHT VIEWCASE

EDIROL R-09HR
DECK INSIDE
DAYLIGHT
VIEW CASE



The soft-molded padded R-09HR case serves both to protect, and allow easy OLED display viewing in daylight conditions.

\$30 USD

(includes USA shipping)

[SEE ORDERING OPTIONS](#)

External R-09HR SDHC memory can now be up to 32 GIG SDHC card capacity with newest 1.04 firmware upgrade.

SanDisk ULTRA II SDHC

Most everyone using this type for audio recording has good experiences.

Kingston Elite Pro SDHC

Most everyone using this type for audio recording has good experiences.

Kingston 8 GIG SDHC (type 6)

Used this type for R-09HR/LS-10 deck reviewing and bench testing so far with good experience.

Transcend SDHC

NOT *everyone* using this type for audio recording has good experiences.

ADVISORY: As with most memory products, most consistent performance is with purchasing name brand showing suitable specifications for your application, AND verified reports from satisfied users of same deck model/firmware who are ALSO recording at the exact same file rates you intend to use.

Also be aware that manufacturers of flash memory sometimes change internal controller IC that may not work as previously made same model cards.

This has most **recently** happened with Transcend made flash with many buyers disappointed using same model cards working flawlessly for most with same model deck/firmware, but using *previous* Transcend production runs of *same* model card.

CAUTION: AVOID SURPRISES!!! ALWAYS TEST newly purchased flash **BEFORE USING FOR IMPORTANT PROJECTS**, and **DO SO AGAIN** after every firmware upgrade as deck may fault **previously** working OK cards **not tested** by Edirol/Roland technical staff!

Might be BEST TO NOT USE ACCELERATED super speed flash memory technology for audio recording purposes.

Advanced flash with acceleration write/read modes using data burst techniques might be speedier for writing/reading *non-continuous* written camera files. Non-continuous burst protocol modes sometimes disrupt reliable continuous mode audio recording on some decks/firmware versions, and certainly offer NO advantages for continuous written audio recording.

Memory with best chance of satisfaction for audio purposes have published continuous write speeds in excess of 2 Mbytes/sec. Best to avoid buying memory cards showing *only* (number) X BURST write/read ratings.

Recording Time unit: minutes

Settings	Size of Memory Card				
	512MB	1GB	2GB	4GB	8GB
WAVE (24bit/96kHz)	13	27	55	110	220
WAVE (24bit/88.2kHz)	15	30	60	120	240
WAVE (24bit/48kHz)	27	54	110	220	440
WAVE (24bit/44.1kHz)	29	59	120	240	480
WAVE (16bit/96kHz)	20	40	80	160	320
WAVE (16bit/88.2kHz)	22	44	88	176	352
WAVE (16bit/48kHz)	40	81	166	332	664
WAVE (16bit/44.1kHz)	44	88	180	360	720
MP3 320kbps	196	392	797	1540	3080
MP3 128kbps	490	980	1993	3990	7980

* Each recording time is approximate. The times may change depending on the card specifications.
 * In case that there are plural files, the sum of recording time would be shorter than above.

Input/Output

- **Audio Inputs**
 Internal Stereo Microphone
 Mic input
 (Stereo miniature phone type, plug-in powered mic)
 Line Input (Stereo miniature phone type)
 * The Internal/External MIC and the LINE IN can't be used at the same time; only the LINE IN is effective.
- **Audio Outputs**
 Phones (Stereo miniature phone type)
- **Nominal Input Level (Variable)**
 Mic Input: -33dBu (Default input level)
 Line Input: 2dBu (Default input level)
 * 0 dBu = 0.775 V rms
- **Input Impedance**
 Mic input: 30 k ohms
 Line Input: 15 k ohms
- **Output Level**
 20 mW (In case 16 ohms load)
- **Recommended Load Impedance**
 16 ohms or greater
- **Frequency Response**
 20 Hz-40 kHz
- **USB Interface**
 Mini-B type
 * Support USB 2.0/1.1 mass storage device class
- **Effects (Playback only. Excludes playback in 88.2 kHz or 96 kHz)**
 Playback Reverb: 4 types (Hall 1, Hall 2, Room, Plate)
 Speed Change: 50-15% of playback speed

TIP: Freshly format the flash card INSIDE the deck after all needed recordings have been successfully transferred leaving no wanted files for best card performance with each new use. ALWAYS format new cards, format after deck firmware upgrades, and whenever cards are removed from the deck for purpose of transferring files with a separate card reader. NEVER computer format flash as in-deck format *sometimes* adds specific *required* file folders.

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[Home Page](#)

DSM™ Patented Stereo-Surround Microphone Technology



DSM Stereo Mic

Eye-gear/Headband/HRTF Baffle mountable matched omni mics



DSM MIC+WHB/N FOR INSIDE/OUTSIDE SOUND RECORDING

Stops wind blast noise; transparent acoustic design; records real wind sounds

4 Channel Surround DSM™ Microphone System Headworn or HRTF LiteGUY Baffle Mounted



1 (Front Left) 2 (Front Right) 3 (Back Left) 4 (Back Right)

Passive DSM™ Mic Powering/Bass Filters



PA-10XP DSM Mic Powering Adapter (for Micro Track 24/96)

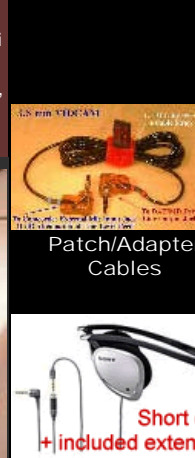
miniXLR Input (option)

Battery Powered-Portable Mic Preamplifiers

High-definition, low noise, very wide bandwidth preamp designs to fit any field/event/studio application using DSM™ stereo-surround mics.



MONO ONLY 'Lombardo' Lapel Mic for interview, Narration, Lecture, and clip-on acoustic instrument Recording



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