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NAKAMICHI RX-505 CASSETTE DECK

Manufacturer's Specifications
Frequency Response: 20 Hz to 20 kHz.
Harmonic Distortion: 0.9% at 0 dB.
Signal/Noise Ratio: 64 dBA; 70 dBA with Dolby C NR.
Separation: 36 dB.
Crosstalk: 60 dB down.
Erase: 60 dB at 100 Hz.
Input Sensitivity: Line, 50 mV.
Output Level: Line, 1 V; headphone, 12 mW at 8 ohms.

Flutter: 0.04% wtd. rms, $\pm 0.08\%$ wtd. peak.
Fast-Forward Time: 60 S for C-60.
Dimensions: 17 $\frac{3}{4}$ in. (450 mm) W x 5-11/16 in. (144 mm) H x 11-13/16 in. (300 mm) D.
Weight: 22 lbs., 1 oz. (10 kg).
Price: \$1,090.00.
Company Address: 19701 South Vermont Ave., Torrance, Cal. 90502.
 For literature, circle No. 92



The RX-505 cassette deck features Nakamichi's UDAR (Unidirectional Auto Reverse) system, first made available in the lower-cost RX-202 deck. Initially, it sounds contradictory—unidirectional *and* auto reverse—but, briefly, here's how it works: The cassette is loaded, open (tape) edge up, in a carrier that rides on a drawer which moves out from the deck with a push of "Eject/Load." The drawer moves back in when the button is pushed again or when one of the transport modes is selected. In the latter case, the deck goes into the selected mode as soon as the cassette is seated. Reverse play or record can be selected at any time, by pressing "Reverse" (near the upper right) or by switching on "Auto Reverse" (at the left).

The big difference from other decks is that the transport does *not* reverse direction. Instead, the cassette drawer moves out, the carrier rotates 180°, and the drawer moves back in, seating the cassette for playing or recording its other side. It's really a mechanization of what the user normally does, taking the tape out and turning it around to use the other side.

The RX-505 has three discrete heads, each optimized for its particular task. Nakamichi also uses a tape-pad lifter, taking the position that their tape-path design provides good guidance and that the pad actually causes scrape flutter and other problems. I do like Nakamichi's practice of making record and playback head adjustments very accessible. It is true that some uninformed diddlers might be tempted to create their own problems, but some decks provide very poor access for such needed tasks, giving even experts a bit of a challenge.

The deck includes a number of other Nakamichi features: Their asymmetrical, dual-capstan, diffused-resonance transport; the automatic master fader; dual-speed cueing, and punch-in recording.

The cassette-carrier drawer is in the center, and with its clear, removable plastic cover, looks somewhat like a bay window. An "A" on the carrier indicates it is in the normal position. If "Reverse" is pushed, the drawer moves out, the carrier rotates and moves back in, showing a "B." A push of "Eject/Load" moves the carrier out and rotates it back to "A." These two control buttons are at the upper right corner, where they are somewhat out of the way but easy to find after a little practice.

If the drawer meets resistance in either direction of travel for more than a second or two, it will move back to its original position—an excellent design feature to prevent damage. With power off, it is possible to move the drawer out or to push it back in, but it cannot be pushed back and forth, and there should be no need for that. The plastic cover can be snapped out as needed, and, with the deck in pause or play, the heads are quite accessible for maintenance tasks, although a little neck bending is needed.

Just to the left of the cassette well is the four-digit counter display, at top, with its reset button just below. The counter reads minus numbers when rewound past "0000." The "Memory" switch below has three positions: "Stop/Off/Play." Near the bottom of the panel are the "Auto Fade" ("Off/On") and "Reel Hub" ("Large/Std") switches, and they merit some discussion.

With "Auto Fade" switched on, the deck begins a 2-S

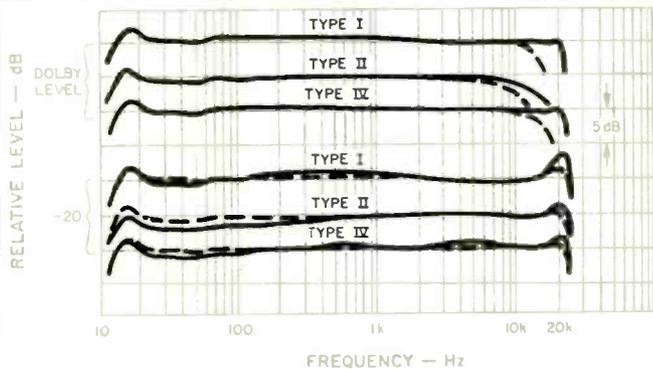


Fig. 1—Frequency responses with (solid lines) and without (dashed lines) Dolby C

NR, using Type I (Nakamichi EXII), Type II (Nakamichi SX), and Type IV (Nakamichi ZX) tapes.

fade-out about 20 S before the end of side A; this is some distance before the leader begins, so the tape surface should be stable at this point. After the fade-out, the tape is reversed, and the sound is faded up again.

The hub-size switch should be left on "Std" for most tapes. But if the tape has a large hub (as most C-46s do), the "Large" setting must be used to get correct timing for the fades.

Next, to the left, are the main control buttons. All of them are angled out from the panel, which improves visibility and ease of use. "Play" at top and "Stop" just below are full width. Next down, from left to right, are "F.Fwd," "Cue" and "Rew." The symbols on the fast-wind and play buttons are a little confusing at first because they seem backwards, but they do match which way the upside-down tape will go. Next down are "Rec Mute," "Pause" and "Rec."

The bottom row consists of "Master Fader Down," "Program Seek" and "Master Fader Up." Normally, the master fader is all the way up, and levels are set by the input-level pots. During recording, however, the signal can be faded in and/or out, quickly and automatically, with a simple push of the appropriate "Master Fader" button. A light push gets a fade up (or down) in about 2 S; a harder push secures a 1-S fade. "Program Seek" initiates a fast wind from stop or play mode to the beginning of the next program and begins playback. If seek is activated during rewind, playback starts from the beginning of the current selection. You push the button twice to move one selection further away—but that's as far as the system can take you.

At the far left are the switches for "Power" (top), "Timer" ("Play/Off/Rec"), and "Auto Reverse" (which can be set for single-reverse recording or playback, off, and for continuous reversing at the tape ends in playback only). Next down are the "Skip" and "Auto Rec Pause" switches. In "Skip," any blank of more than 40 S will initiate fast forward to the end of the side, a tape flip, and then playback after skipping the leader. This is a nice feature to have with the many tapes whose music finishes quite some time before the end of the

The RX-505's transport does not reverse itself, but mechanizes what the user normally does in flipping the tape over.

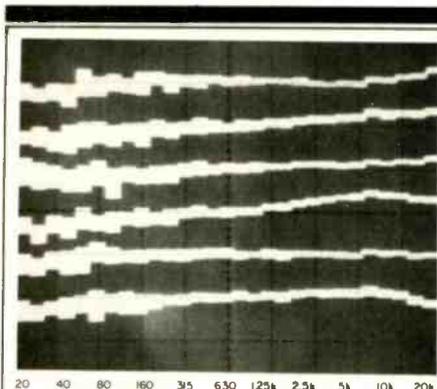


Fig. 2—Forward and “reverse” record/playback responses, overlaid. From top to bottom: EXII tape without NR, EXII with Dolby C NR, SX tape without NR, SX with Dolby C NR, ZX without NR, and ZX with Dolby C NR. (Vertical scale: 5 dB/division.)

tape. “Auto Rec Pause” will drop the deck out of recording mode if there is no incoming signal for 45 S, wind the deck back to a point 15 S after the end of the music, and enter “Rec/Pause.” This can be helpful if the recordist isn’t around when the record runs out. At the bottom is the jack for headphones.

To the right of the transport drawer are two vertical, bargraph-type level meters, each divided into 10 steps with two red LEDs per step. Just above are red indicators for Dolby B and C NR. Alongside are the “Rec Level” pots for each channel, the output pot, and the center-detented “Bias Tune” control. Both “Rec Level” knobs are on the small side; the even-smaller ones for output and bias are somewhat difficult to turn for small adjustments.

Next, to the right, are interlocked tape-selector switches (“ZX” [Type IV]/“SX” [Type II]/“EX” [Type I]), the EQ switch (“70/120”), and two Dolby NR switches: “On/Off” and “C-Type/B-Type.” All of these switch buttons are dark and nearly the same height (or thickness) as the plate with the designations. Except in bright light, it was very difficult to be certain of how the switches were set by looking, though the Dolby-NR status lights did help. The panel designations themselves were hard to read, being gold on black.

The last column of switches on the right start with “Eject/Load” at the top, followed by “Reverse” (both of which were referred to earlier when covering control of the cassette drawer). The next switch down, “Auto Rec Standby,” is a convenience that all users can benefit from: A push of this switch, and the tape is rewound to the start, fast wound to the end of the leader and recorded blank for 6 S, after which the deck goes into “Rec/Pause.” Two taps of the switch near the end of side A will automatically fast-wind the deck to the end of that side, reverse the tape, and do the same setup procedure for side B. One carp I have about this switch is its location, just above the “Monitor Tape/Source” switch, which has very nearly the same design. I would prefer that “Auto Rec Standby” be defeated in record mode, to prevent actuating it by mistake, as I did a number of

times. At the bottom are the on/off switches for the subsonic and multiplex filters.

On the back panel are line-in/line-out phono jacks and a socket for the optional remote control. By removing the top and side cover, I was able to examine the interior. The microprocessor card was to the left of the center drawer/platform, with the amplifier card (into which the vertical Dolby NR card plugs) to the microprocessor card’s right. There were three pigtail fuses soldered onto the power-supply card at the back of the chassis. The soldering on the cards was excellent, and the parts were of high quality. Interconnections were made with multi-conductor cabling with some wirewrap.

The transport was quiet in all of its modes. The construction was quite rigid and well supported on the frame around the drawer assembly. The drawer itself was well designed, and it operated smoothly during the cycles observed.

Measurements

The playback responses were within ± 1.2 dB for both equalizations, except for a rise at the two highest frequencies for 70 μ S. Playback of a standard level was indicated correctly, within the resolution of the meter segments. Tape play speed was less than 0.1% fast, substantially exact. Record/playback responses were checked for a wide range of tapes for all three types. With the bias adjust pot, it was possible to get at least very good results for almost all Type I tapes and a majority of the Type II tapes—but the high-sensitivity Type II tapes had mediocre responses with Dolby C NR, and the bias could not be reduced enough for good results with a couple of the Type IV tapes. All subsequent tests were conducted with the supplied tapes: Nakamichi EXII, SX and ZX. Each of them gave best performance overall with the bias set at about 11:00 o’clock.

The record/playback responses for the three tapes with and without Dolby C NR were excellent, as shown in Fig. 1 and indicated by the 3-dB points listed in Table I. Take particular note of the outstanding flatness from 20 Hz to 20 kHz at Dolby level with Dolby C NR. The -20 dB responses are excellent, in general, but the 20-kHz peak with EXII and the low-end droop with SX are not to be applauded.

It seemed likely that, with this transport design, there would be no essential difference between forward and “reverse” response. When record/playback responses to pink noise were taken for both tape directions and overlaid (Fig. 2), the correspondence was exact out to the 20-kHz band.

The record/playback response with SX tape varied about ± 2 dB at 10 kHz over the range of the bias control. Other characteristics are listed in Table II, and they are all very good to outstanding. Take note of the 77-dB erasure of metal tape at 100 Hz, for example. The switchable subsonic filter introduced less than 3 dB of attenuation at 20 Hz but about 20 dB at 10 Hz.

Third-harmonic distortion versus level for the three tapes with Dolby C NR is listed in Table III. All of the figures are excellent, and those for ZX tape are outstanding: Just 0.25% at Dolby level and only 0.02% at -10 dB. The very high signal-to-noise ratios in Table IV reflect the low-distortion performance. All three tapes were excellent, and ZX made almost 80 dBA.

The sound with ZX tape I classified as great, and I could record up to +10 on some material without strain.

Table V shows the results of measuring HDL₃ from 30 Hz to 6 kHz, both at -10 dB (where I usually run such tests) and at Dolby level. At both levels, the distortion rises but moderately at the frequency extremes, and the figures are about the best I have ever measured.

Table VI lists input/output characteristics. The line output impedance would be on the high side for loads of less than 20 kilohms. The sections of the output pot tracked within 1 dB for about 40-dB attenuation from maximum. There was good volume with all headphones I tried, although one set was slightly low for those who would want very high listening levels. The output polarity matched the input, both in source and tape monitoring.

It was impossible to check the accuracy of half of the meter double-segment turn-ons because they did not line up with any specific scale markings. Those that did were accurate within 1 dB. The lack of resolution around zero complicated the checking of meter responses, but it did appear that the burst response time met the standard for peak program meters, as did the decay time of 1.5 S.

The meters did not, however, have true peak response, as indicated by an offset-pulse test. In this test, the deck is first fed a normal tone burst (one switched on and off at its zero crossing) and the meter reading noted. Then the deck is fed a burst of the same peak-to-peak amplitude but switched at its negative peak. A true peak-reading meter will indicate 6 dB higher for this burst. The RX-505's meter reading did not change.

Measurement of the playback of a recorded 3-kHz tone revealed no changes in tape speed when line voltage was varied from 110 to 130 V. The flutter was very consistent from one end of a C-90 to the other, and was exactly to specification: 0.06% wtd. rms. and ±0.08% wtd. peak. The fast-wind time for a C-60 was 54 S. Changes in mode were always less than a second, except that reversing the tape took about 2 S.

Use and Listening Tests

The owner's manual includes a fair amount of detail, and it is well written. There are good figures and accompanying text to explain the special modes. After some usage, it didn't seem as though cassette insertion was any more complicated than for a typical front loader. It did take me a little while to get used to the transport switch arrows pointing the "other" way. All of the controls and switches functioned as expected and without failure, with the exception of the master fader, which was erratic at times as to how much pressure was needed to operate it.

The record, pause and stop clicks were very low, down at the level of tape noise with Dolby C NR. I found that it was possible to load and start recording fastest by holding "Play," and then twice pushing "Rec" the moment the cassette was seated and the tape heads had lowered into position. As I get annoyed with abrupt cutoffs and turn-ons in the middle of music, I found "Auto Fade" very useful. The automatic fades and tape flip took just 6 to 8 S, but when I tried to go through the same fade-out/flip/fade-in cycle manually, I had to stare in at the tape hub to see when the fade should start; even so, I usually took 10 to 12 S overall, about twice as long, with little assurance that I had made good

Table I—Record/playback responses (-3 dB limits).

Tape Type	With Dolby C NR				Without NR			
	Dolby Lvl		-20 dB		Dolby Lvl		-20 dB	
	Hz	kHz	Hz	kHz	Hz	kHz	Hz	kHz
Nakamichi EXII	10.4	20.5	10.4	23.7	10.4	13.8	10.4	23.5
Nakamichi SX	10.5	17.8	10.4	22.7	10.5	11.8	10.4	23.1
Nakamichi ZX	10.4	21.8	10.4	22.7	10.4	16.3	10.4	22.8

Table II—Miscellaneous record/playback characteristics.

Erasure At 100 Hz	Sep. At 1 kHz	Crosstalk At 1 kHz	10-kHz A/B Phase		MPX Filter At 19.00 kHz
			Error	Jitter	
77 dB	54 dB	-94 dB	40°	10°	-34.0 dB

Table III—400-Hz HDL₃ (%) vs. record level (0 dB = 200 nWb/m).

Tape Type	NR	Record Level						HDL ₃ = 3%
		-10	-8	-4	0	+4	+8	
Nakamichi EXII	Dolby C	0.09	0.13	0.20	0.36	0.71		+ 7.8 dB
Nakamichi SX	Dolby C	0.05	0.07	0.15	0.40	1.2		+ 7.2 dB
Nakamichi ZX	Dolby C	0.02	0.04	0.10	0.25	0.53	1.3	+11.3 dB

Table IV—Signal/noise ratios with IEC A and CCIR/ARM weightings.

Tape Type	IEC A Wtd (dBA)				CCIR/ARM (dB)			
	W/Dolby C NR		Without NR		W/Dolby C NR		Without NR	
	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%
Nakamichi EXII	66.1	73.5	49.4	56.9	66.5	73.9	46.3	53.8
Nakamichi SX	69.9	76.6	53.6	60.2	70.6	77.3	51.1	57.7
Nakamichi ZX	69.0	79.8	52.5	63.4	69.8	80.6	50.1	61.0

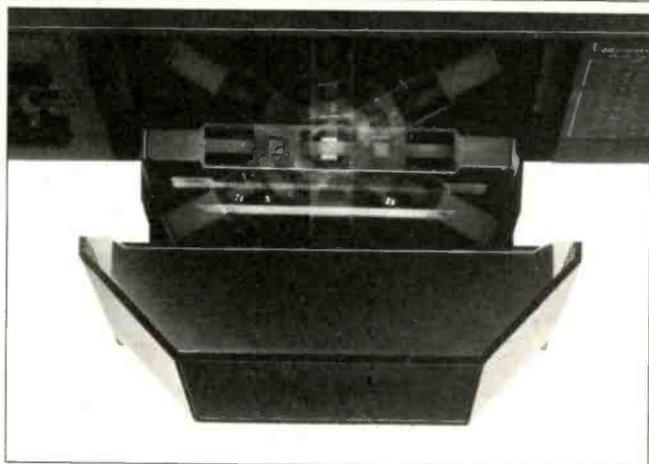
Table V—HDL₃ (%) vs. frequency with Dolby C NR.

Tape Type	Level	Frequency (Hz)							
		30	50	100	400	1k	2k	4k	6k
Nakamichi ZX	-10	0.16	0.08	0.06	0.02	0.03	0.02	0.03	0.05
	0	0.67	0.40	0.34	0.25	0.22	0.22	0.40	0.32

Table VI—Input and output characteristics at 1 kHz.

Input	Level		Imp., Kilohms	Output	Level		Imp., Ohms	Clip (Re: Meter 0)
	Sens.	Overload			Open Ckt.	Loaded		
Line	45 mV	>30 V	58	Line Hdphn.	840 mV	709 mV	2.15k	+18.5
					708 mV	519 mV	18	

In the fundamentals—response, distortion, noise and flutter—the RX-505 is one of the best decks overall.



To maintain azimuth accuracy, the RX-505's UDAR (Unidirectional Auto Reverse) system physically reverses the cassette instead of merely reversing the transport's motion.

fades in the right place. "Auto Rec Pause" worked fine also, and the deck kept recording until the level fell below -50 dB or so—outstanding performance.

Record/playback performance was excellent, in general, for a number of wide-range sources. Discs used included Holst's *The Planets* with Georg Solti and the London Philharmonic Orchestra (London/Mobile Fidelity MFSL 1-510) and *Baroque Brass* with the Empire Brass Quintet (dbx SS-3001, the dbx-encoded disc version of Sine Qua Non SQN-SA2014). The results with EXII tape were very good, and I noted that the Dolby C NR matching was excellent. The sonic quality with SX tape was less satisfactory, in my judgment, adding some unneeded presence with Dolby C NR. At higher levels there was some evidence of reaching saturation, which better metering might have prevented. The sound with ZX tape I classified as great, and I could record up to +10 on some material without strain.

The Nakamichi RX-505 offers the unusual and successful UDAR transport, with several conveniences which increase its versatility. I am not enthusiastic about the metering or the possible confusion on button positions, but in the fundamentals—frequency response, distortion, noise and flutter—this is definitely one of the best decks overall. With its innovative and helpful features, the RX-505 deck really offers much for its price.

Howard A. Roberson

Some Critical Comment About the PS-10!



"The PS-10 loudspeakers by Design Acoustics could be the last pair you'll ever buy...the speakers are able to handle anything you can deliver and provide tight bass and excellent imaging..."

— Paul Terry Shea
Rolling Stone

"In our listening test, the PS-10's delivered a smooth, balanced sound...its compact size and unobtrusive looks should enable it to fit in almost anywhere both aesthetically and acoustically."

— Julian D. Hirsch
Stereo Review

"The overall sound is smooth, clean, and detailed. Bass is surprisingly well maintained for so small a speaker. Imaging is also outstanding, with firm, stable stereo localizations and a good sense of spaciousness and depth."

— The Editors
High Fidelity

"To these ears they provided a very open and transparent kind of sound, with excellent and stable stereo imaging."

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