Nakamichi 582 Stereo Cassette Deck

MANUFACTURER'S SPECIFICATIONS

Frequency Response: 20 Hz to 20 kHz.
Harmonic Distortion: 1.0 percent for EXII and SX tapes, 0.8 percent for ZX metal-alloy tape.
Signal/Noise Ratio: 66 dBA with Dolby NR.
Separation: 37 dB.
Crosstalk: 60 dB.
Erasure: 60 dB.
Input Sensitivity: 50 mV.
Output Level: Line, 1.0 V; headphone, 45 mW.
Flutter: 0.05 percent wrms, 0.1 percent W. peak.
Dimensions: 19-11/16 in. (500 mm) W x 5⅛ in. (130 mm) H x 13-¾ in. (350 mm) D.
Weight: 18.3 lbs. (8.3 kg).
Price: $890.00

The Nakamichi 582 deck is of immediate interest because of its ability to use the newly introduced metal-particle tapes. This excellent performing unit also shows its sophistication in its three-head configuration, the transport drive scheme, and other features detailed below. The front-loading tape compartment moves out and tilts with use of *Eject*. After cassette insertion, the top of the door is pushed for smooth closing and latching. Snapping out the clear window obtains excellent accessibility for maintenance tasks. Five small holes in the bottom of the door provide access for height and azimuth adjustments of the record and play heads and for tape-guide alignment. These are all best left to qualified service personnel, with the exception of record azimuth, as discussed later. The heads were of particular interest because of Nakamichi's different approach. The record and play heads both fit within the center opening of the cassette, but the head structures are actually separate. The head surfaces are also cut away beyond the areas of tape contact, which the manufacturer claims will extend head life. Another innovation is the pressure-pad lifter on top of the play head to eliminate the influences of pressure-pad variations.

Tape transport is logic controlled with actuation by six narrow horizontal bars, each with its own status light. The functions are standard with the exception that the use of *Pause* while in fast wind shifts the moving tape close to the play head for a *Cue* mode, with winding at one-third normal speed. Pressing either wind bar at that time will reduce the speed further, which facilitates shuttling back and forth to find the exact spot. This is a well-thought-out scheme for cueing, with the desirable slow wind speeds. It was mildly disappointing, however, that there was no provision for flying-start recording; perhaps not essential, but it's a helpful feature for copying. The 582 does have the nicety of loose-loop take-up which takes the slack out of any cassette when it is inserted, something not mentioned in the Nakamichi literature.

Six rotary switches with small bar knobs provide selection for (1) memory, timer play or record, or *Off;* (2) EX (ferric), SX (chrome-type) or ZX (metal-particle) tapes; (3) 70- or 120-μS EQ; (4) 400-Hz or 15-kHz test tones or *Off;* (5) Dolby NR: out, in and with multiplex filter, and (6) tape or source monitor. There are front-panel adjustments for bias and record

Fig. 1 — Frequency responses with Nakamichi SX tape.

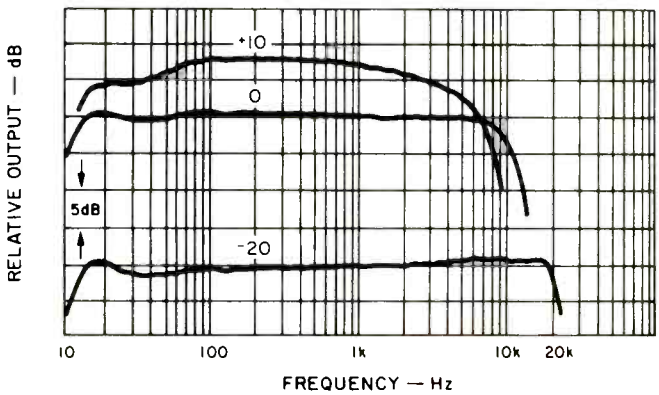
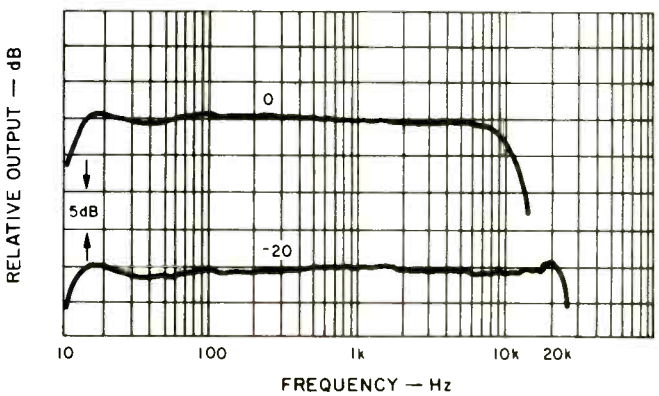


Fig. 2 — Frequency responses with Nakamichi EX-II tape.



level (sensitivity) for each channel and for each tape type. The small access holes aid in aligning the screwdriver provided for the purpose. Record levels are controlled with a dual-section pot in conjunction with a balance pot with center-position detent. The balance pot is different from many in that rotation to gain a relative increase in left, for example, actually reduces the level in right. The output pot has the same style knob, convex-shaped with a knurled band around the edge, easily turned, albeit different.

The wide-range (-40 to +7 dB) meter scales are printed in white and red on the same black background as the rest of the front panel, very legible with the top lighting used. The white lettering used for panel labels and designations was easily read with fairly low levels of illumination. The counter and its reset, the power switch, and the jack for headphones complete the front panel.

There are line in/out phono jacks and a DIN socket on the rear panel. There are sockets for d.c. power to one or more Nakamichi Black Box series components and for an optional remote control, wireless or with cable. The d.c. will power such accessories as a mike mixer, a subsonic filter or a line amplifier. With the top-and-side cover removed, attention could be directed at the internal construction. There were two large PCBs, with the main one about twice the size of the one with all the logic. All of the soldering was excellent, and interconnections were made with multi-pin plugs and wirewrap. Parts were all identified, although the cards were components-down. Some adjustments were marked on the top (solder) side. Mechanical construction was rigid with side and center girders between front and rear panels. The three-motor system appeared to be of quality construction, although there was some slight out-of-roundness noted in the spindle-drive hubs. The use of different diameters was noted, part of Nakamichi's "diffused-resonance" scheme. More on that later. It was interesting to watch the action of the control-cam head-positioning mechanism, driven by the third motor.

Performance

The playback responses of the 582 deck were within ± 1 dB for both equalizations and all frequencies, with the exception of a bit more boost at the highest frequencies on one channel with 70-μS EQ. Level indications from the Dolby standard tape were just 0.6 dB high. As received, the unit was all set up for the Nakamichi EX-II, SX and ZX tapes supplied by the manufacturer. The alignment between the record and playback heads was checked with the record/playback of a 10-kHz tone. The phase error was about 40 degrees which is about half the discrepancy that has been measured on one-housing, sandwich-type record-and-playback heads. Using the built-in 15-kHz (15,278 Hz actual) test tone, alignment was trimmed using the meter indications to -45 degrees, equivalent to -30 degrees at 10 kHz, which is quite good. The tone itself is actually recorded at -20 dB, but a 20-dB amplifier inserted in this test mode obtains the 0-dB indication, which makes alignment much easier. As a means of gaining some information on the effects of tape skew and the stability of the alignment between the separate-but-close record and play heads, no adjustments were made to the record head azimuth for any of the tapes used for the entire duration of the tests. All responses taken showed no signs of high-frequency roll-off, and a 10-kHz phase check at the very end gave results of -35 degrees, substantially the same as at the start — excellent stability. The phase jitter was 40 degrees, better than average for a cassette deck.

The record/playback responses for the three Nakamichi tapes were all outstanding, as shown in Table I and the plots. Take note of the fact that all three are within ± 1 dB from less

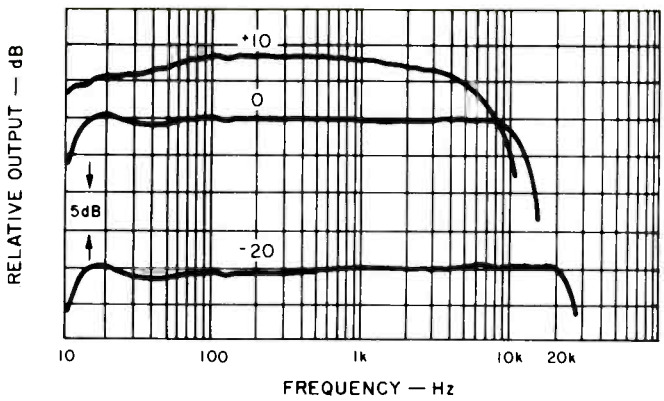


Fig. 3 — Frequency responses with Nakamichi ZX tape.

than 20 Hz to 20 kHz or more at -20 dB. Further note the excellence of the 0-dB responses, particularly for the metal-particle ZX tape. Plots were made of both SX (chrome equivalent) and ZX with +10-dB record level. There is obvious compression with both tapes, but metal-particle is more linear. On the other hand, the results with SX are excellent indeed, superior to many other decks. The Dolby tracking and channel matching was superb in all cases, with any differences less than a dB except at the high-frequency roll-off point. Using the built-in 400-Hz tone (411 Hz actual) to adjust record sensitivity and the 15-kHz tone to set bias, a number of tapes were matched to deliver similar results. Among the best were Fuji FX-I and FX-II, Maxell UD XL I and UD XL II, TDK AD, SA and MA (metal particle), and Scotch Metafine (metal particle). For the tapes mentioned, the responses were within 0.5 dB, as per Crown RTA-2 analyzer, even in Dolby mode, *without* realigning the record head. The record sensitivity controls had close to a 10 dB-range, and with one tape, there was 12-dB peaking at 16 kHz with minimum bias and a reduction of 10 dB across the band with maximum bias, plenty of range. In the multiplex-filter position, the response was down 32.5 dB at 19.05 kHz. Bias in the output during recording was satisfactorily low. The record/playback response of a 1-kHz square wave had a good shape, with some ringing on the leading edge.

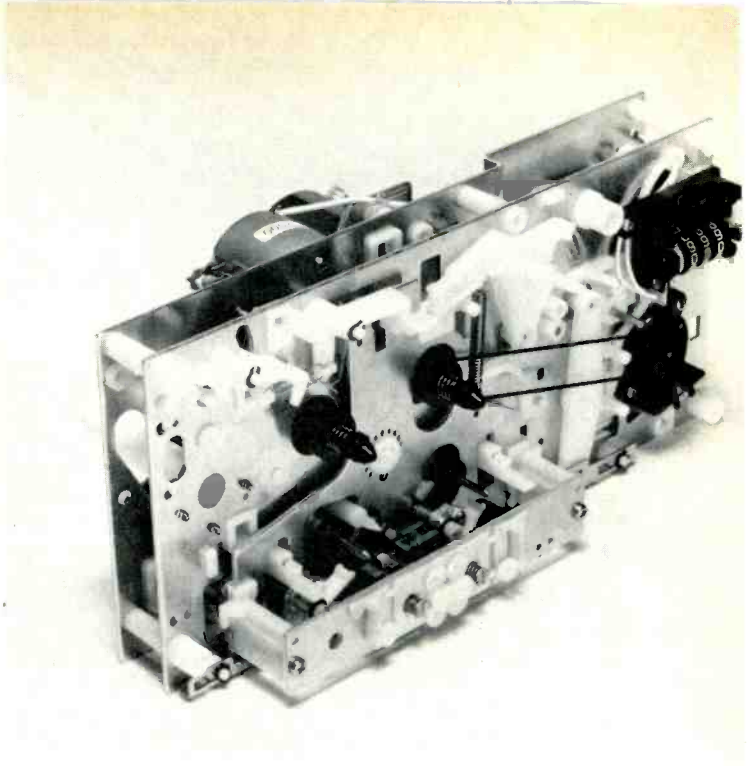
Data on HDL_3 vs. record level was taken on the three tapes at 1 kHz in Dolby mode. The curves were very linear for all tapes with the exception of some curvature at maximum levels. The distortion values were low and quite close for the three tape types, and all had high-level 3-percent points. HDL_3 was measured at -10 dB with ZX tape in Dolby mode from 20 Hz to 7 kHz, with excellent results. HDL_2 and HDL_5 were low at all frequencies and levels, additional evidence of

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

Tape Type	With Dolby NR				Without Dolby NR			
	Dolby Lvl		-20 dB		Dolby Lvl		-20 dB	
	Hz	kHz	Hz	kHz	Hz	kHz	Hz	kHz
Nakamichi EX-II	11	9.9	11	22.8	11	10.0	11	25.2
Nakamichi SX	12	9.7	11	20.6	12	9.9	11	22.0
Nakamichi ZX	11	12.0	11	22.5	11	12.0	11	23.7

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

Tape Type	IEC A WTD (dBA)				CCIR/ARM (dB)			
	W/Dolby NR		Without NR		W/Dolby NR		Without NR	
	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%
Nakamichi EX-II	59.8	66.3	50.3	56.6	58.8	65.3	48.2	54.5
Nakamichi SX	61.6	67.9	52.3	58.3	60.5	66.8	50.4	56.4
Nakamichi ZX	61.5	69.6	52.4	60.2	60.9	69.0	50.6	58.4



excellence in magnetic design. HDL; figures were about 40 percent higher without Dolby NR. Signal-to-noise ratios were measured with and without Dolby NR with both IEC A and CCIR/ARM weightings (see Table II). The results are all excellent, and the metal-alloy ZX tape is about 2 dB better than the chrome-type SX tape. At a frequency of 1000 Hz and a record level of 0 dB, erase and crosstalk were about 80 dB down, both *much* better than the specified 60 dB. Separation between tracks was 47 dB, also better than spec. Erasure of the more-challenging 100 Hz with the high-coercivity ZX tape was still a good 67 dB.

Line input sensitivity was 45 mV, and input overload was at a very high 22 V. Output clipping was at a level equivalent to 16.6 dB above meter zero. The sections of the record-level pot were within a dB over a 60-dB range down from maximum. The input impedance was above 50 kilohms out to 10 kHz, with some drop above that frequency. The impedance was reduced when the balance control was rotated for more than a few dB correction, probably an unlikely setting. The line output was 1.0 V to a high impedance in record or in play, both channels—excellent matching and right to spec. The output impedance averaged 2.7 kilohms across the band, which is fine for most situations, but the output did drop 1.5 dB with the standard IHF 10-kilohm load. The sections of the output pot tracked within a dB over a 50-dB range from maximum. The headphone jack was driven at 580 mV (or 43 mW) with the 8-ohm load, plenty high for all types of phones.

The meters had responses 3 dB down at 4 Hz and 25.8 kHz. Their dynamic response was faster than VU-type meters, but they required more than 100 mS for full indication. As they do not meet the British or IEC standards for peak-reading meters, they might be considered "fast-response" meters. Scale calibrations were generally within a fraction of a dB. Tape play speed was about 0.4 percent fast. There was no variation in average tape speed with the changing of line voltage, but there were some small changes with time. Typical values for flutter were 0.095 percent weighted peak and 0.065 percent wrms. In testing for "diffused resonance," spectrum analysis of the flutter test tones in playback of the 582 and another deck with lower readings did show that the 582

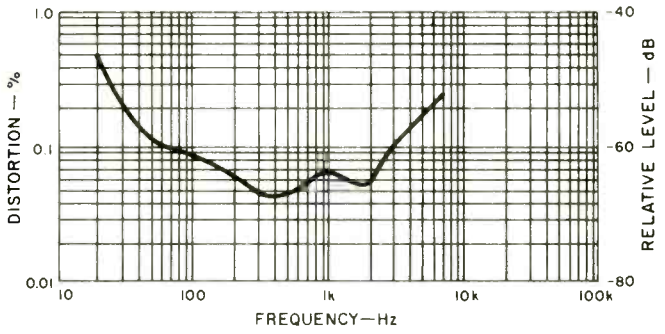


Fig. 4 — Third harmonic distortion vs. frequency in Dolby mode at 10 dB below Dolby level with Nakamichi ZX tape.

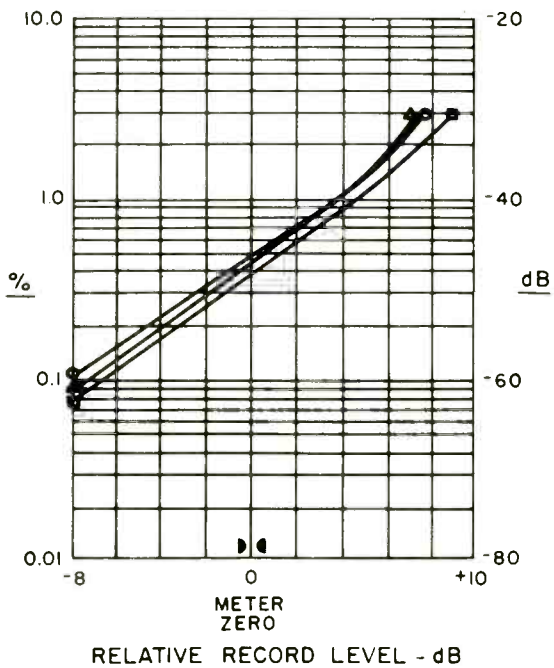


Fig. 5 — Third harmonic distortion vs. level in Dolby mode at 1 kHz with Nakamichi EX-II, SX, and ZX tapes.

did not evidence discrete sidebands as the second deck did. Still, it would seem desirable to keep resonance effects low at the same time they are diffused. Wind times averaged just over 50 seconds, smooth and fast. All response times in tape transport control were 1 second or less. The loose-loop take-up upon cassette insertion automatically put in a 2-second delay to complete that process before accepting a *Play* command.

In-Use Tests

Tape loading and removal was always smooth and simple. Maintenance was easily performed with the removal of the snap-on door cover. The tape-motion controls always worked reliably without any form of malfunction, including the use of *Pause/Cue* for monitoring the tape during fast winds. It was nice to have the status lights in each of the control bars. As suggested earlier, I personally like to make flying-start recordings, but others may find this lack a small thing. The meters were very easy to use with all types of music, and the impression was of faster response than what the tests showed. All switches and pots worked smoothly throughout the testing. Any head adjustments or use of the 400-Hz or 15-kHz tones were most easily accomplished, aided by the meter indications.

The owner's manual has excellent text and very good illustrations. There is coverage on tape selection, and detailed information on record-head alignment and on record-level and bias adjustments for proper tape matching. In the record/listen tests, particular attention was given to piano sources, including a live concert of a Liszt *Hungarian Rhapsody*. Absolutely no indication of flutter appeared during critical listening. The fineness of the reproduction pointed up the limitations in some of the source material, although a Samuel Barber work provided more challenge, which was easily met. The ZX tape was used to copy an open-reel tape of a live performance of Handel's *Dixit Dominus*. At times, the level was purposely set very high, but the results remained impressive even then. Record, pause, and stop noises were substantially non-detectable, with the exception of stop clicks, barely out of the noise. The Nakamichi 582 has a high price for which it delivers superb performance in most every area and the capability to match and use many formulations, including the new metal-particle supertapes. *Howard A. Roberson*

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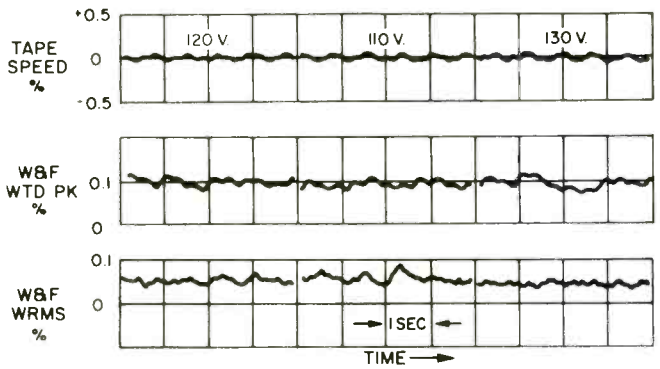

Fig. 6 — Wow and flutter (three trials) and tape play speed vs. time and line voltage.

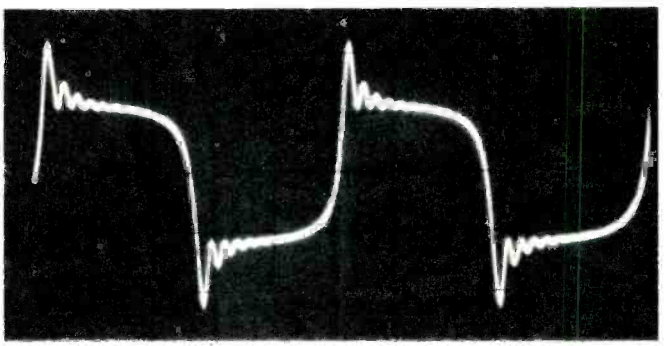

Fig. 7 — Record/playback of a 1-kHz square wave.