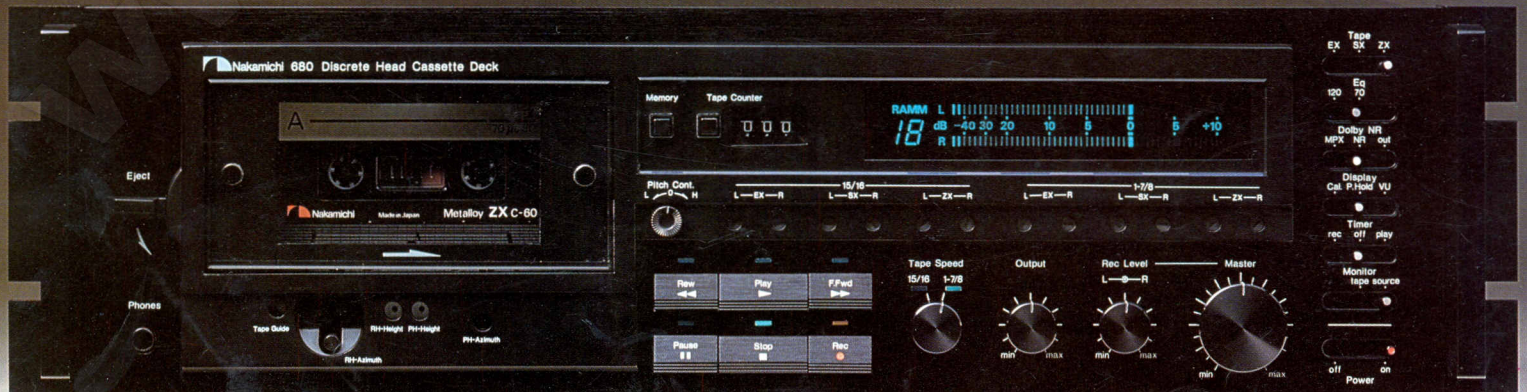




Nakamichi 680

2-Speed Discrete Head Cassette Deck



ONLY NAKAMICHI'S CONSTANT COMMITMENT TO EXCELLENCE IN THE FINE ART OF RECORDED SOUND COULD HAVE CREATED THE NAKAMICHI 680—THE WORLD'S FIRST HIGH-FIDELITY HALF-SPEED CASSETTE DECK.

The Second Nakamichi Revolution

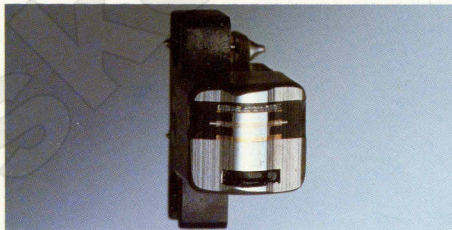
Seven years ago, Nakamichi accomplished the "impossible"—the world's first three-head cassette deck—the world's first cassette deck with full-bandwidth, 20-20,000 Hz response. Now, Nakamichi has accomplished its second revolution—the world's first half-speed cassette deck with true high-fidelity reproduction.

Think of it! Three hours of music enjoyment—a full opera, four or more record albums—on a single C-90 cassette! Half-speed response that rivals the performance of many decks at full cassette speed—capable of capturing the full 20-15,000 Hz band broadcast on FM without losing a thing. Switch to standard speed, and the 680 provides state-of-the-art Nakamichi performance to 22,000 Hz—more than adequate for the most demanding live recording or audio-ophile-disc duplication—response unmatched, not even approached, by any cassette recorder in the world save the Nakamichi 1000 and 700!

Whether operated at tape-saving half-speed, or at ultra-fidelity full speed, the Nakamichi 680 is the world's most advanced cassette recorder.

Most Light Rays Cannot Pass Through The 0.6-micron Gap Of The 680 Play Head

Only Nakamichi's advanced Crystalloy magnetic heads can meet the challenge of half-speed operation. Achieving flat frequency response to 15 kHz at a 15/16 ips speed is equivalent to 30 kHz response at standard speed. The Nakamichi Crystalloy play head has a critically formed 0.6 micron gap—actually smaller than the wavelength of most visible light—and is capable of resolving the ultra-short wavelengths of 15 kHz recordings at half speed. The P-9F head—an exclusive development of Nakamichi research—is the key element in the 680's singular performance.



Crystalloy Playback Head

R-8L Crystalloy Record Head

Metal-tape compatibility and ultra-short wave-length recording requires extremely precise control of the "critical recording zone." Compromise designs are incapable of achieving the excellence in recorded sound that is Nakamichi's commitment. The R-8L record head with carefully controlled 3.5 micron gap provides the fine resolution required for half-speed recording and the remarkable flux-handling ability needed to extract the full potential from metal-alloy tapes.

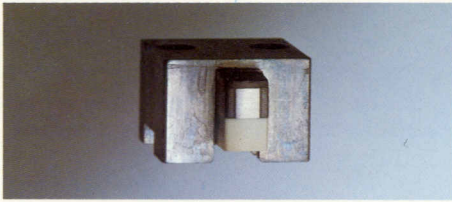
E-8L Direct-Flux Erase Head

Few people have accurately identified its cause, but Nakamichi research has shown that the poor sound quality frequently experienced when re-recording previously used tapes can be the result of incomplete erasure. Most conventional erase heads cannot totally remove low-frequency signals even from conventional tapes. With the coming of metal-alloy tapes total erasure becomes even more difficult. In pursuing this research, Nakamichi engineers discovered another phenomenon. During playback, conventional erase

680 2-Speed Discrete Head Cassette Deck



heads can be responsible for the partial removal of extremely short-wavelength recordings, that is, very high-frequency signals, and this problem becomes more severe when recording and playing at half speed.

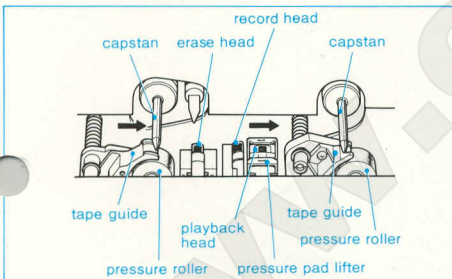


Direct-Flux Erase Head

After extensive research and development, a radically new erase head was developed. The E-8L direct-flux, dual-gap head functions in a manner similar to a transformer and generates the extremely strong magnetic field necessary to totally eliminate all recorded material from tapes of any type—including metal-alloy—without partial-erasure side effects during playback. Tests have shown that the E-8L is actually more efficient than professional bulk erasers but safe for use even at half speed.

Nakamichi Discrete Head Configuration With Adjustable Azimuth

It shouldn't be surprising that Nakamichi is the leader in three-head cassette-deck technology. We invented the concept and introduced the world's first three-head cassette recorder seven years ago. Others have followed, and now three-head technology is synonymous with quality. Yet all three-head recorders are not the same. Most use "sandwich" heads that combine the record and play sections in a single housing. While these certainly offer advantages over "combination" record/play heads, they do not afford the full benefits of three discrete heads.



680 Discrete Head Configuration

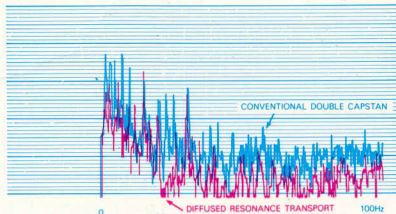
Nakamichi's dedication to excellence in recorded sound has led us to the conclusion that sandwiching two heads into a single housing does not assure that the effective magnetic gaps are precisely parallel—even if they are mechanically parallel—and that such a configuration does not eliminate changes in performance due to the vagaries of cassette housings (the purported advantage of the "sandwich" head.) These differences are not so apparent if 15 kHz response is all that is to be expected from a standard cassette deck. They are of crucial importance, if that response is to be achieved at half speed and if 22 kHz response is to be realized at standard speed.

The 680 utilizes Nakamichi's exclusive discrete head configuration with simplified record-head azimuth adjustment to assure the ultimate in performance from any high-quality cassette. A simple check of azimuth alignment on the fluorescent display is all that is required to achieve true high-fidelity sound at half speed.

Diffused-Resonance Transport

Controlled listening tests conducted in Nakamichi's concert hall have revealed that high frequency flutter and modulation noise, caused by the tape scraping past the recording heads, blur the sound in a discernible fashion. These motion irregularities, while not perceived as a change in pitch (wow), nonetheless destroy the clarity of reproduction, but they are ignored by normal wow-and-flutter meters.

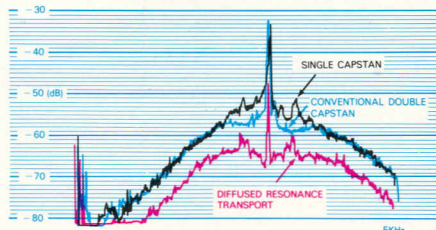
The Asymmetrical, Diffused-Resonance Transport with integral tape-pad lifter is Nakamichi's solution to these



Wow/Flutter Analysis (UNWTD)

problems. A double-capstan, closed-loop drive isolates the tape from supply and takeup reel irregularities. The tension in the tape holds it against the head obviating the need for a pressure pad, and, to eliminate this source of "scrape flutter," the pad is lifted away from the heads. The two capstans differ in diameter and are driven at different speeds with flywheels of different inertias (Asymmetrical design). Thus, the mechanical resonances (inevitable with any rotating body) are "diffused" and cannot build up at specific frequencies. The transport is constructed from special plastics and aluminum alloys chosen for their vibration-damping properties.

The speed of the capstan motor is precisely controlled by an advanced PLL (Phase-Locked-Loop) circuit. A second motor controls the reels so that differences in reel friction cannot affect the precision of tape motion. A third motor drives a cam that positions the heads gently but precisely against the tape eliminating the jarring thump of solenoid operation. The motor-driven cam also engages the reel brakes and, in fact, performs all the operations normally associated with solenoids. This advanced motor-driven-cam control system—uniquely, Nakamichi—is operated with C-MOS logic so that complete remote control and direct intermode access is available.



Rec Level: 0dB
f = 3kHz
Tape: EX11
Modulation-Noise Analysis

Because of the unique cam operation, the pause function is virtually instantaneous in starting and stopping the tape for precise editing. Pressing the pause/cue button during fast forward or rewind reduces the tape speed to one-third and moves the playback head close to the tape so that you hear the program. Pressing the rewind or fast-forward button again further reduces the tape speed for precise location of program breaks.

FL Level Indicators

Since introducing the wide-range peak-responding meter in 1973, Nakamichi has consistently eschewed metering gimmicks. Setting the proper recording level is the most important step in achieving high-fidelity recordings on cassette, and this is no area for short cuts or frivolous novelty.

Do not confuse the 680's high-resolution wide-range FL display with other similar-looking "bar-graph" indicators. The 680 fluorescent display spans a recording-level range in excess of 50 dB—more than twice the range of typical "bar-graphs"—and it does so with remarkable resolution (better than 1 dB over the most critical region.) In fact, the 680 display has more than 4 times the resolution elements of many others. Not until such a display could be developed would Nakamichi forgo the wide-range resolution of traditional meters.



RAMM and FL Meter Display

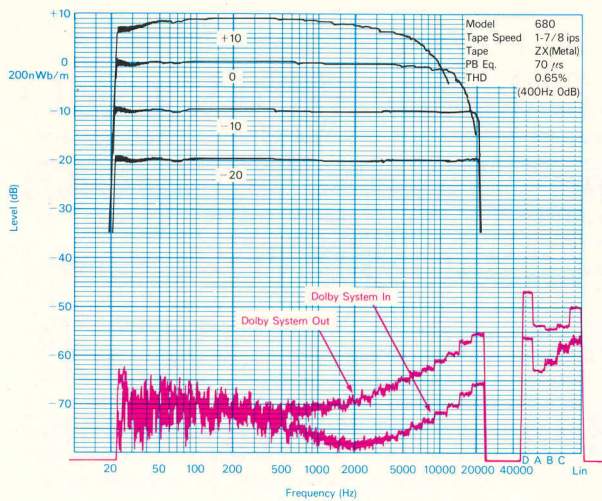
Each 680 display is actually three meters in one; the main display indicates either peak or average (VU) signal level, while a "cursor" indicates the highest signal level that occurred during the musical passage.

Random Access Music Memory (RAMM)

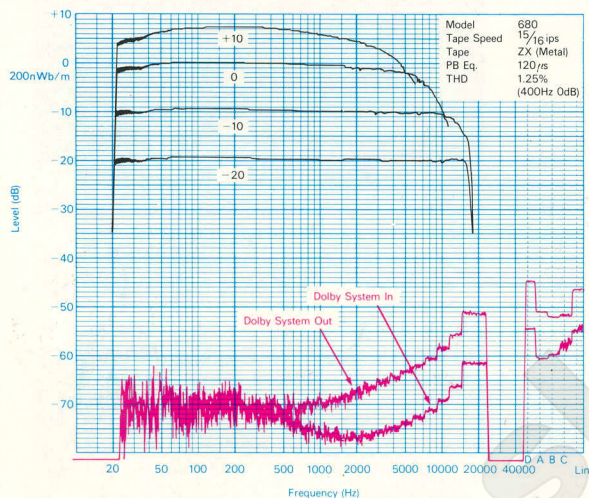
In conjunction with its cueing mode, the 680 features automatic program search through its computer-like RAMM. The 680 can be commanded to skip over up to 18 programs, find the desired selection, and commence playing. Access to the "music memory" is via the standard mode buttons—pause, record, rewind, and fast forward—so that the 680 can be programmed remotely as well as through its own keyboard. The fluorescent display indicates when the 680 is in RAMM operation and also the number of passages to be skipped. "Blank" sections can be recorded to assure proper program breaks via a "Record Mute" function activated by pressing the record button while the tape is in motion.

Other Features

- DC Recording Amplifier
- Double NF Circuitry
- Remote Control via RM-200 Accessory
- Timer Operation
- Separate Bias and Eq Selectors
- Dolby NR with Front-Panel Calibration
- Built-in 400-Hz Test Tone
- Defeatable MPX Filter
- EIA-Standard 19-inch Rack-Mount Adaptors
- High-Output Headphone Jack
- Adjustable Tape Speed ($\pm 6\%$)
- Tape-Start Memory
- Automatic Shut-Off
- DC Output Jack for Black-Box Series Accessories



Frequency Response/Noise Analysis (Standard Speed)



Frequency Response/Noise Analysis (Half Speed)

Specifications:

Standard Speed (1-7/8 ips)

Frequency Response	10 -22,000 Hz \pm 3 dB (at -20 dB rec level)
Signal-to-Noise Ratio	Better than 66 dB (IHF A-WTD RMS, ref. 400 Hz, 3% THD, w/Dolby NR, ZX tape, 70 μ sec Eq)
Total Harmonic Distortion	Less than 0.8% at 400 Hz, 0 dB w/ZX tape Less than 1.0% at 400 Hz, 0 dB w/SX, EX-II tapes
Wow and Flutter	Less than 0.08% WTD peak, 0.04% WTD RMS
Erasure	Better than 60 dB below saturation level at 1 kHz

Half Speed (15/16 ips)

Frequency Response	10 -15,000 Hz \pm 3 dB (at -20 dB rec level, ZX tape)
Signal-to-Noise Ratio	Better than 60 dB (IHF A-WTD RMS, ref. 400 Hz, 3% THD, w/Dolby NR, ZX tape, 120 μ sec Eq)
Total Harmonic Distortion	Less than 1.5% at 400 Hz, 0 dB w/ZX tape
Wow and Flutter	Less than 0.14% WTD peak, 0.08% WTD RMS
Erasure	Better than 60 dB below saturation level at 1 kHz

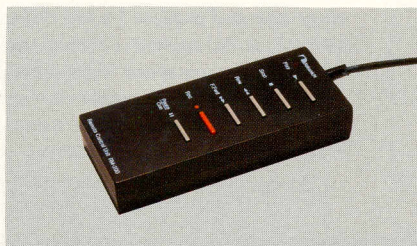
General

Separation	Better than 37 dB at 1 kHz, 0 dB
Crosstalk	Better than 60 dB at 1 kHz, 0 dB
Bias Frequency	105 kHz
Input	50 mV, 50k ohms
Output	1V (400 Hz, 0 dB, output control at max.) 3.3k ohms
Headphone Output	45 mW (at 400 Hz, 0 dB, 8 ohms)
DC Output Jack	\pm 10V DC, 125 mA max.
Power Source	100, 120, 120/220-240, 220 or 240V AC; 50/60 Hz (according to country of sale)
Power Consumption	30 W max.
Dimensions	482(W) \times 143(H) \times 340(D) millimeters 19(W) \times 5-5/8(H) \times 13-3/8(D) inches
Approximate Weight	9 kg. 19 lb. 13 oz.

- Specifications and appearance design are subject to change for further improvement without notice.
- Dolby NR under license from Dolby Laboratories.
- The word "DOLBY" and the Double-D-Symbol are trademarks of Dolby Laboratories.



ZX Cassette Tape C-60, C-90
SX Cassette Tape C-60, C-90
EXII Cassette Tape C-60, C-90
EX Cassette Tape C-60, C-90



RM-200 Remote Control



DM-10 Head Demagnetizer

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