



Nakamichi 580

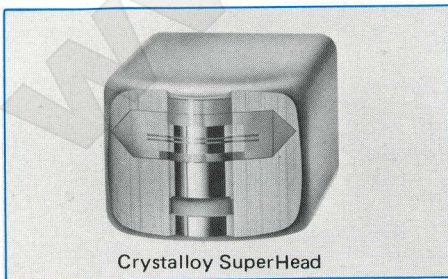
2 Head Cassette Deck



New Performance Analysis Techniques

When Nakamichi set out to make a better-sounding cassette deck, the first step was to look for new methods of assessing performance. While conventional measurements, such as frequency response, signal-to-noise ratio, distortion, wow-and-flutter, etc., go a long way toward describing the sonic characteristics of a tape deck, they leave many unanswered questions. For example, why is it that two machines with nearly identical measured performance sound so different from one another? Today, there are many sophisticated dynamic measurement techniques to answer similar questions in the world of amplifiers, but the tape recorder industry is still relying on measurement standards established decades ago. It is clearly time to search for new ways to describe and predict the way a tape deck sounds. For the past several years, Nakamichi has been deeply involved in precisely this type of research. Extensive use of narrow-band, real-time spectrum analysis has uncovered new areas of improvement. Many of these areas have traditionally been considered unimportant because they do not produce improvement in conventionally measured performance. Careful A-B listening tests prove, however, that these "unimportant" parameters have a clearly audible effect, especially in cassette decks which already excel by conventional standards.

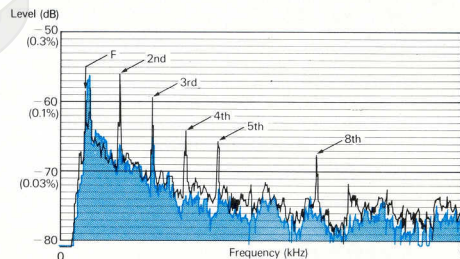
Application of these discoveries has resulted in the improvement of three basic areas. The Nakamichi 580 Cassette Deck thus incorporates innovative magnetic head technology, transport design and electronic circuit design.



The Heads

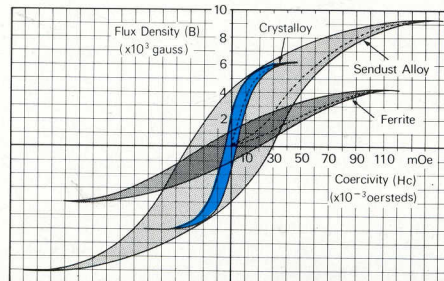
The Crystalloy SuperHead

The 580 uses the record/play SuperHead, originally introduced on the 600 II Cassette Console. The latest version of this head boasts an incredibly narrow 0.9 micron gap. This is narrower than most playback-only heads in three-head designs, and it assures distortion-free playback of the highest frequencies. Yet, during record, the amazing SuperHead magnetizes the tape as if it has a much wider gap, thanks to proprietary manufacturing techniques that virtually eliminate head core saturation. The proof is in the 580's remarkable frequency response, guaranteed to be within ± 3 dB from 20 to 20,000 Hz (EX or SX tape, -20 dB record level, with or without Dolby NR). There are many three-head cassette decks on the market that cannot come close to matching this performance. The magnetic properties of Crystalloy, furthermore, are far closer to ideal than anything else currently available, including sendust alloy. Its linearity, for example, is second to none, which means distortion is very low. And thanks to special surface "cutouts", the SuperHead lasts a long time. (Laboratory



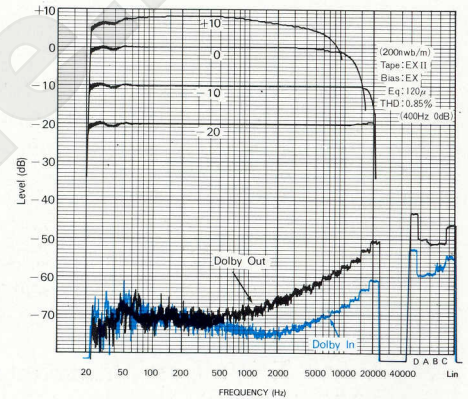
Distortion Components

Fundamental Frequency: 400Hz
Record Level: -10 dB
Conventional Head —
Crystalloy SuperHead - - -



A comparison of magnetic head material characteristics showing superior linearity of Crystalloy at initial magnetization (dotted line).

tests reveal no substantial loss of performance after 10,000 hours of use. That's 10 years at three hours per day!)

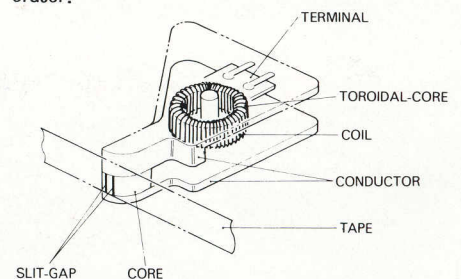


Nakamichi 580 Frequency Response/Noise Analysis

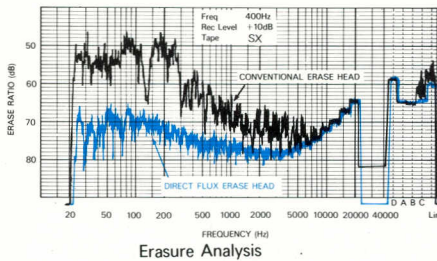
Tape: Nakamichi EX-II
Eq: 120 μ s

The Direct Flux Erase Head

Most manufacturers would be very satisfied indeed with a unique device like the record/play SuperHead. But Nakamichi's in-depth research has shown that even the best of record/play heads can be further improved by providing more complete erasure than normally available. Any noise left on the tape before it reaches the record head can be detrimental to sound quality. The noise is "modulated" by the record head signal, and the recording is thus robbed of clarity. This has been a much neglected area because most designers assume that all an erase head needs to do is bring the previously recorded signal down to the level of tape hiss. But in our tests, we found that recordings made on "virgin" or bulk-erased tape sounded better and had less modulation noise than a recording made on normally erased tape. The implication was clear: an erase head should ideally do the same thing as a powerful bulk-eraser.



The Direct Flux Erase Head



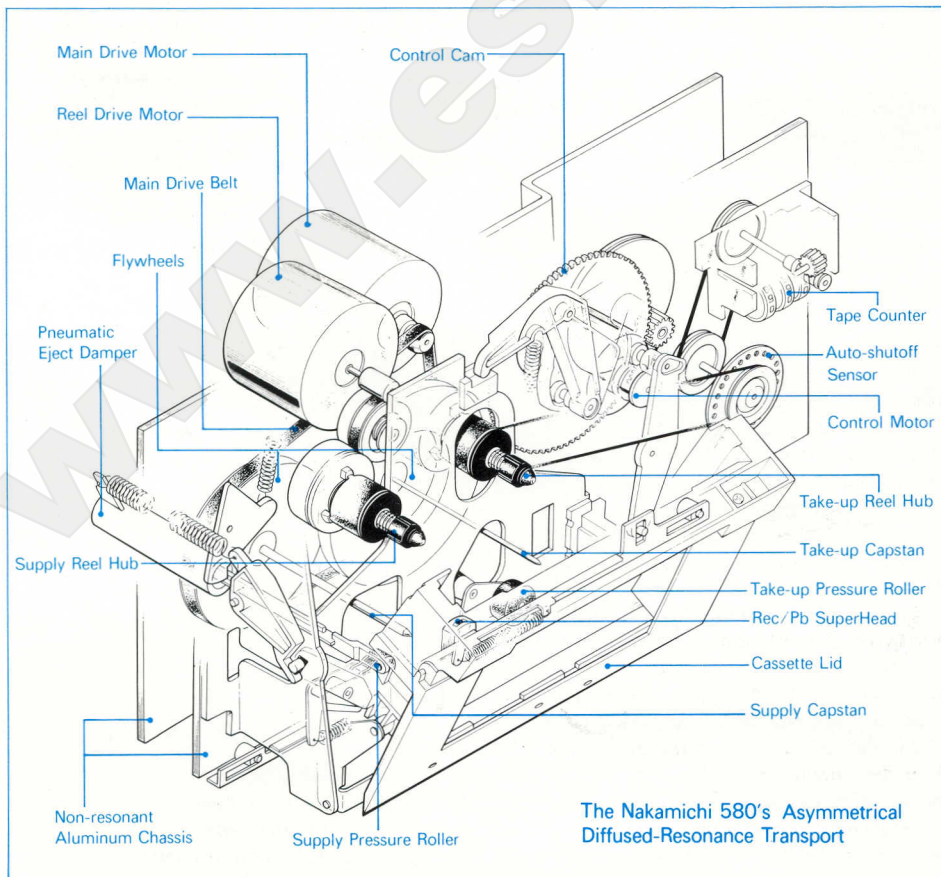
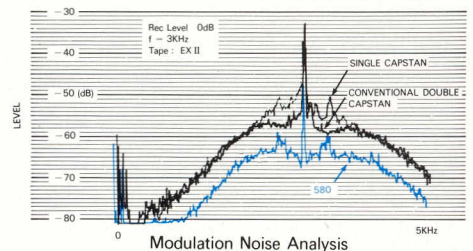
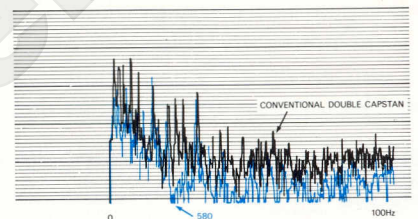
This is exactly what Nakamichi's new Direct Flux Erase Head does. It actually outperforms many bulk-erasers, thereby assuring that the tape noise is down to virgin levels before a recording is made. This revolutionary head relies on an entirely new principle. All other erase heads, regardless of the materials or number of gaps used, boil down to the same basic operating principle: that of the AC electromagnet. The Direct Flux Erase Head is patent pending, and it is actually similar to a miniature transformer. It is capable of generating tremendous current and converting this current directly to erase

flux, without any flux leakage or saturation effects common to conventional designs. The erase flux is directed into the tape coating via two slit-gaps, which, unlike conventional gaps, do not represent electrical discontinuities. A conventional erase head actually depends on flux leakage and, therefore, can never achieve the efficiency of the Direct flux Erase Head.

The Transport

The 580's double-capstan transport goes far beyond low wow-and-flutter. There are many double-capstan cassette transports which perform well when tested with a standard wow-and-flutter meter. But with everything else equal, some of these transports sound better than others. It took highly sophisticated real-time analysis to reveal the reasons. The culprit, once again, is modulation noise. There are many resonances in a transport mechanism caused by the various moving parts, and these

resonances can have a profound effect on the quality of the recording. The 580 uses Nakamichi's newest Diffused-Resonance transport. This transport controls resonances in two very specific ways.



For resonances below 20 Hz, the double-capstan system has been designed so that no two parts rotate at exactly the same speed. A close look at the 580 drive mechanism reveals that the two capstans are not of the same diameter. The same is true of the pressure rollers and flywheels. This assures that the resonant frequencies for any given rotating part are totally unique. (No other part produces the same resonances.) Detailed spectrum analysis shows that conventional double-capstan transports have tremendous resonant peaks below 20 Hz. This is caused by the addition of resonances generated by nearly identical rotating parts. The 580's Diffused-Resonance transport exhibits no such resonant peaks. Resonances, rather, are dispersed over a wider range of frequencies in a random manner. This not only results in lower unweighted wow measurements, but in significantly reduced modulation noise as well.

Resonances between 20 and 100 Hz (the flutter region) require a different treatment. These resonances are largely caused by vibrations, which are generated by virtually all moving parts, especially the motors. Most transport chassis are made of steel, which actually transmits these vibrations to the capstan and ultimately onto the tape as yet another form of modulation noise. The 580 utilizes special aluminum alloys and plastics which are known for their vibration-damping qualities. When



Nakamichi 580

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dropped onto a hard surface, these materials do not "ring", but rather emit a dull "thud". The transport thus absorbs vibrations and keeps them from reaching the capstans. The resulting reduction in modulation noise lends unprecedented clarity to the recording.

The Electronics

Record and playback electronics, no matter how good they may be, can never make up for poor heads or faulty transport design. On the other hand, a cassette deck with such advanced magnetics and mechanics must have equally sophisticated electronics to ensure that these improvements are not lost. Nakamichi has pioneered many firsts in cassette deck electronics. We were the first to incorporate playback phase compensation, which, for the first time, enabled a cassette deck to pass a square wave with reasonable accuracy. Nakamichi introduced active head impedance compensation in the record amplifier long before the practice became popular. (One manufacturer recently "rediscovered" this circuit and is heralding it as a major technological breakthrough.) And now, in the 580, Nakamichi introduces the double negative feedback (NF) circuit configuration in both, the record and playback amplifiers.

There are, basically, two types of negative feedback loops which can be used in amplifier design. The AC feedback loop is more common because it offers the greatest amplifier stability. Unfortunately, AC feedback causes phase shift at low frequencies, which can introduce distortion and alter bass response. Recently, there have been attempts at DC negative feedback design, but DC feedback alone is very unstable. Nakamichi's novel double NF circuit gives you the best of both worlds. As the name implies, there are two feedback loops, an AC and a DC path. The DC loop provides low distortion and extended-bass performance while the AC path maintains amplifier stability. The record amplifier of the 580 takes things a step further by eliminating the usual series coupling capacitor, which is a source of non-linearity and distortion. The 580's record amplifier is thus the closest thing yet to a true "DC" amplifier in cassette deck electronics.

The Sound

Each of the three areas above (heads, transport, electronics) contributes in subtle ways to improve the sonic capabilities of the 580. But

when the three are combined, the effect is no longer subtle. Listening panels asked to judge the performance of the 580 in "blind" A-B tests consistently point to improved clarity, realism and a more precise stereo image as the deck's major attributes. In terms of sound quality, the 580 clearly outperforms many cassette decks priced substantially higher.

The Features

The 580 is designed with a thoughtful selection of features which make the deck more convenient and enjoyable to use.

Motor-Controlled Head Assembly

The 580's Diffused-Resonance transport is basically a 2-motor system: one phase-locked-loop DC servomotor drives the flywheels/capstans, and a second DC motor is used for the fast-wind functions. There is, however, a third motor in the 580's transport; it replaces the solenoid which is commonly used in logic-controlled transports. The use of a motor to govern head assembly movement makes the 580 an extremely quiet machine. More importantly, head insertion is far more gentle than with solenoids, so critical alignments are less likely to be disturbed.

Pause/Cue Feature

Since a motor can be stopped anywhere in its motion (unlike a solenoid, which is either all the way in or all the way out), the 580's transport lends itself to a pause feature more useful than most. In pause, the heads stay engaged — only the pressure rollers disengage. When recording, this means start-ups and stops are instant, without any "clicks" put on the tape. The 580 also features high-speed cueing, a feature normally found only on professional open-reel decks. If you press the 580's pause/cue button during fast-forward or rewind, the play head will move up and barely contact the moving tape. The playback amplifier is activated and the winding speed is reduced to one-third of its original speed. You can further reduce winding speed to about one-fifth at this point by pressing and holding either the fast-forward or rewind button. In this manner, you can "rock" the tape back and forth until you've located the desired spot. To come out of the cueing mode, simply push the stop or play button.

Timer Operation

With the addition of any ordinary appliance timer, the 580 can be used for unattended recording or automatic playback at a preset time of day. When the timer switch on the 580 is depressed, the deck is automatically programmed to begin recording or playing when the power comes on. Record or playback can be selected with the timer mode switch. For accurate starting times, a digital timer, such as the Nakamichi DS-200, is highly recommended.

Remote Control

The logic controlled transport naturally lends itself to remote control operation. With the 580, you have the choice of two optional remote controls which duplicate all of the front panel transport functions, including cueing. The RM-10 is a remote control with 5 meters (15 feet) of cable. The RM-580 is a wireless remote control system which comes in two sections: a transmitter and a receptor. The latter is plugged into the 580 and placed near the deck. The battery-operated transmitter sends commands encoded in 7-bit pulse-code-modulation using an infra-red carrier. You can control the 580 from as far as 10 meters (30 feet) away as long as direct line-of-sight is maintained between the transmitter and receptor.

The Nakamichi "Regulars"

- Dolby Noise Reduction System
- Separate Bias and Eq Selectors
- Defeatable MPX Filter
- Tape-start Memory
- Built-in 400 Hz Test Tone
- Front Panel Access to Rec Cal and Bias
- 47 dB-range Peak Level Meters
- Full IC Logic w/Total Tape-end Shutoff
- High-output Headphone Amplifier

ANOTHER OUTSTANDING CHAPTER IN NAKAMICHI'S BOOK OF CASSETTE DECK ACHIEVEMENTS

Nakamichi is interested in only two things: how to make the best, and how to make the best better.

These days, choosing the right cassette deck is at best a difficult task. With so many sizes, shapes and features, it's hard to tell which combination will best suit your needs. And, if you rightly place performance ahead of gadgets, the choice is no less difficult because there is as much fiction as there is fact in published specifications. Unless you are a technical wizard, it is nigh impossible to make meaningful comparisons on the basis of printed information alone.

When Nakamichi introduced the legendary Model 1000 in 1973, the cassette became a true high-fidelity medium. Since that time, Nakamichi has applied its advanced technology to an entire line of cassette decks. It was Nakamichi that made it possible to achieve flat frequency response to

20,000 Hz with dynamic range exceeding that of commercially recorded program material in a medium-priced 2-head cassette deck. The least expensive Nakamichi decks have distortion below the level of tape noise and inaudible wow-and-flutter. If the specs can't get much better, is it possible to make a cassette deck that actually sounds better?

The answer, perhaps surprisingly, is yes. Nakamichi has uncovered new magnetic head technology, new transport technology and new electronic circuit design techniques, all of which combine to make startling improvements in reproduction accuracy — improvements which are not necessarily reflected in the published specifications.

These innovations are included for the first time in the Nakamichi 580. It is a product that paves the way for an entire new generation of critically accurate cassette decks.



Specifications:

Power Requirements	100, 120, 120/220-240, 220 or 240V; 50/60Hz
Power Consumption	20W Max.
Tape Speed	1-7/8 ips. (4.8 cm/sec.) ±1%
Wow and Flutter	Less than 0.1% WTD Peak, 0.05% WTD rms at playback
Frequency Response	20-20,000 Hz ±3 dB (SX, EXII Tapes, -20 dB Rec. Level)
Signal to Noise Ratio	Better than 60 dB at 400 Hz, 0 dB, IHF-A WTD rms. (Dolby In, SX Tape)
Total Harmonic Distortion	Better than 1.5% at 400 Hz, 0 dB (SX, EXII Tapes)
Erase	Better than 60 dB below saturation level at 1 kHz
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, 50 k ohms
Output Level	1V (400 Hz, 0 dB, Output Level at Max) 3.3 k ohms
Headphone	45 mW
Dimensions	500(W) x 130(H) x 350(D) mm 19-11/16(W) x 5-1/8(H) x 13-25/32(D) inches
Weight	8.3 kg, 18 lb 5 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.

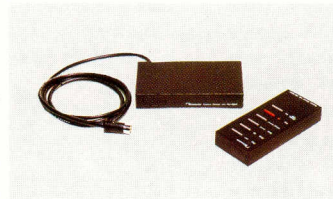
Optional Accessories



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



RM-10 Remote Control



RM-580
Wireless Remote Control



DM-10 Head Demagnetizer

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