

Nakamichi 700 II

3 Head Cassette System

KONLINE.MI





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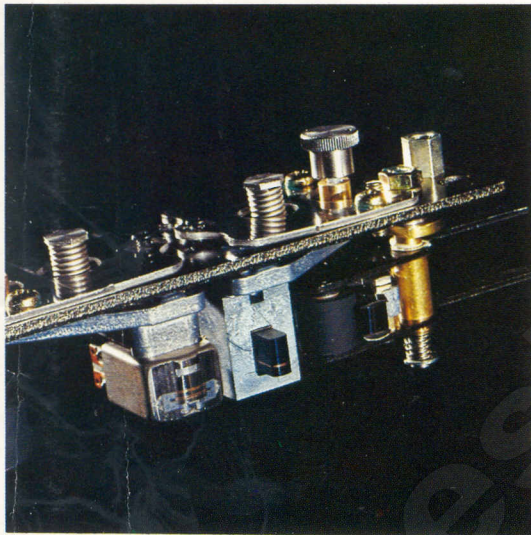
STYLE, SOPHISTICATION, AND UNSURPASSED THREE-HEAD PERFORMANCE

When first introduced in 1973, the Nakamichi 700 offered the essential performance of the world-renowned Nakamichi 1000 at a comparatively modest price. These were the first cassette decks to incorporate three separate heads: erase, record and play. They were the first to feature user-adjustable head azimuth. The first to incorporate a full IC-logic transport. And they were the first cassette decks to offer frequency response out to an honest 20,000 Hz.

But at Nakamichi, research never stops with the introduction of a product. Subtle but significant refinements — some not reflected in the published specifications — have kept the 700 ahead of the competition. The latest series of improvements have resulted in the Nakamichi 700 II. The 700 II features the new Nakamichi playback SuperHead which offers thousands of hours of service and low distortion. Subtle changes in the transport mechanism have reduced wow & flutter to new lows. "Touch Command" transport controls bring convenience to a new high. Unusual phase-compensation circuitry in the playback amplifier contributes to the unprecedented linearity of the deck. And the three microphone inputs have lower distortion than ever.

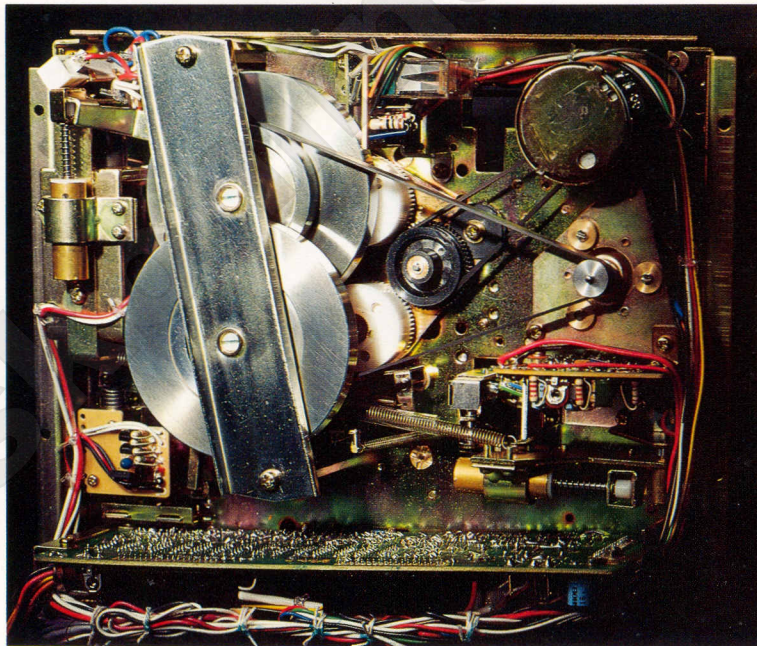
The audible improvement is dramatic. Reproduction is open, with a musicality and breadth that elude all but the finest open-reel decks. The Nakamichi 700 II takes its place beside the 1000 II. Together they represent the new standard of the world.

HEADS



A tape deck is no better than its heads. While a designer can create electronics which overcome the limitations of inferior heads along one parameter, other parameters must suffer. For example, one may extend the frequency response of a limited head, but only at the expense of increased distortion and decreased headroom. No such compromises are made in the 700 II. Its heads are designed and assembled by Nakamichi, exclusively for Nakamichi products. Years of research in metallurgy and magnetics have yielded special core materials for low distortion. Proprietary low-stress techniques for forming the gap and shaping the surface contribute to outstanding high frequency response. As a result, Nakamichi heads are among the best available.

TRANSPORT



The closed-loop double-capstan transport of the Nakamichi 700 II benefits from the latest methods in computer-assisted manufacturing. The mechanism is not only unprecedented in its precision, but also famous for its ruggedness and long service life. Careful design of the moving parts assures that the same accuracy established during final assembly of the transport will be yours to enjoy for years to come.

IC LOGIC



Behind the electronic transport control (IC) logic governs the status of the amplifiers, the oscillator, and the circuits are also Alignment Beam you to set the for optimum hi every time you fast and extreme logic systems are highly com the deck very s

MUSIC

ELECTRONICS

FEATURES



"Touch Command" integrated circuit in the transport mode, record and playback calibration of the bias. Integrated for the unique. The beacon allows record head azimuth frequency response. Adjustment is accurate. The IC in the Nakamichi 700 II, but they make it easy to operate.



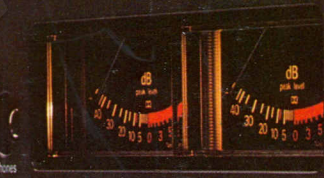
Manufacturers will frequently mate an elaborate tape transport to electronics that are either outmoded or indifferent. While Nakamichi is at the frontiers of cassette transport design, Nakamichi is also dedicated to making state-of-the-art electronics. And so the record and playback amplifiers of the 700 II boast extremely low distortion, unprecedented dynamic range, and — for the first time in a cassette deck — sophisticated phase correction circuitry.



With the 700 II, Nakamichi has done more than produce a deck with minimal distortion, extended frequency response and wide dynamic range. A full complement of features make this precision accessible in day-to-day use. The peak-reading meters, for example, indicate from -40 all the way up to +10 dB, allowing you to take complete advantage of the deck's dynamic range. The record calibration controls provide flawless Dolby Noise Reduction tracking for quiet, uncolored reproduction. And the Nakamichi three-microphone live recording system makes it easy to create superb recordings with the sense of occasion typically lacking in commercial discs.



Nakamichi 700 3 Head Cassette System



eject cal.

memory on off

blend mic

mic input

line input

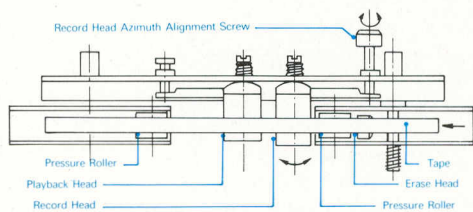
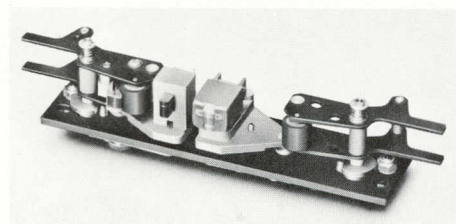
output

record calibration

EX SX L R L R

tape SX EX Eq 70µs 120µs in out monitor source tape power on off



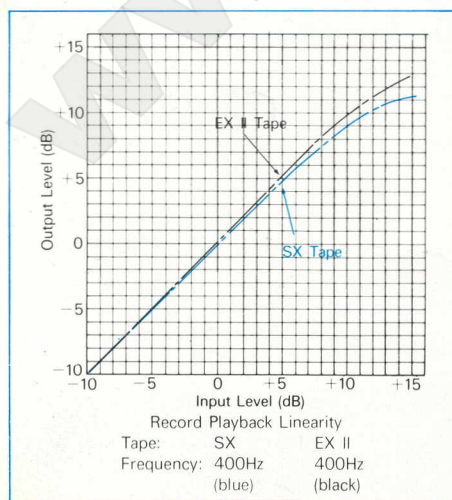


HEADS

Why three heads?

It's no simple matter to manufacture a good three-head cassette deck. Alignments that didn't exist with two heads become critical with three. The few small openings in the front of the cassette housing limit any cassette deck's access to the tape. And these openings must accommodate pressure rollers, guides, and all three heads: erase, record, and play. The design requirements are so complex that one may well ask, "Why three heads?"

Many people suppose that the ability to listen to the tape as it is being recorded, and compare the tape to the source, is the main advantage of three separate heads. But as convenient as the ability to monitor the recording may be, convenience alone does not justify separating the record/playback head into separate heads. Nakamichi makes three-head cassette decks because first-rate record and playback heads



require different gap widths, different electrical properties and different core materials. Professional open-reel decks have long incorporated three heads for just these reasons.

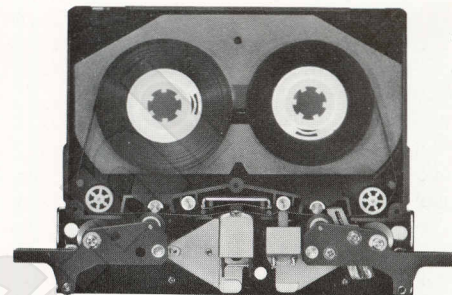
A record head operates at high energy levels to completely penetrate the tape coating with its magnetic field. To do this, its gap must be relatively wide. In contrast, a playback head must be sensitive enough to respond to the weakest signals on the tape. Playback heads operate at 40 to 60 dB lower energy levels than record heads. This sensitivity requires not only a narrower gap but a different magnetic core material as well. Ferrite, which serves well as the core for record heads, is inappropriate for playback heads, exhibiting non-linearities in low-energy, narrow-gap applications. Thus, a two-head deck — any two-head deck — is necessarily a compromise. The Nakamichi 700 II Three-Head System has been designed without compromise. Compared to the best two-head designs, Nakamichi's true three-head system provides more extended high frequency response, better signal-to-noise performance, and wider dynamic range.

Nakamichi's Unique Playback SuperHead

While most tape deck manufacturers must buy their heads from outside sources, Nakamichi makes all the heads for its decks. The high performance of the 700 II owes much to Nakamichi's long history in magnetics research and years of experience as a head manufacturer. Unconventional materials and low-stress manufacturing techniques combine to place Nakamichi's heads among the finest available.

Nakamichi's SuperHead is a case in point. Gap width has been optimized for playback at 0.9 micron. Crystalloy, a unique alloy of nickel, niobium, and tantalum, provides the SuperHead with excellent low-energy linearity. This linearity accounts, in part, for the low distortion of the 700 II.

The SuperHead is not unique in composition alone. The shape is also unconventional. The "shoulders" of the head have been shaped to reduce "contour" (or "shoulder") effect. Contour effect occurs when the recorded wave-



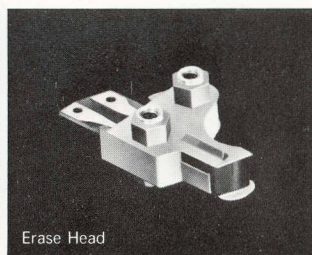
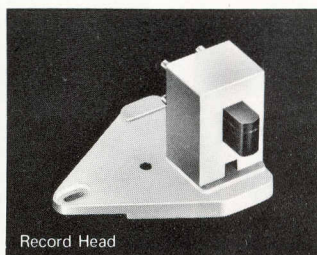
lengths approach the physical dimensions of the head. Interactions between different parts of the head and the tape cause alternating cancellation and reinforcement for irregular low frequency response. The special curvature of the SuperHead provides the Nakamichi 700 II with smooth and extended low frequency performance.

Special cutouts in the head surface immediately above and below the region of tape-contact facilitate extremely even head wear and long head life. The SuperHead is conservatively rated for 10,000 hours of service. That's five hours of use each day for almost six years.

The extraordinary design of the SuperHead requires extraordinary care in assembly. Most people don't realize that minute distortions in a head's molecular structure during the manufacturing process can permanently impair the performance of the head. For this reason, each stage of the SuperHead's construction has been specially designed to minimize mechanical stress. Instead of the usual stamping process, Nakamichi uses less punishing methods to shape the core material. The cutouts that provide the SuperHead's excellent wear characteristics are carefully formed without abrasion. Final cutting and polishing is done by diamond. These precautions ensure extraordinary linearity, flat frequency response and clear, open sound.

The Crystal Ferrite Record Head

Although the properties of ferrite make it largely unsuitable for narrow-gap applications, such as for playback heads, it can be successfully used in wide-gap record heads. Even so, not all ferrite heads are created equal. Most ferrite heads suffer from high internal heat, which

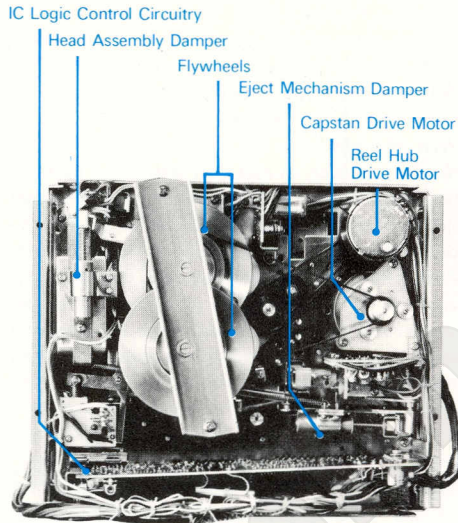


ultimately extends the head's magnetic field to two or three times the gap width. This widening of the "effective" gap degrades the head's ability to record the highest frequencies.

What causes these thermal problems in conventional ferrite heads? Usually the answer lies in imprecise manufacturing techniques. Thanks to sophisticated design and low-stress manufacturing processes, the Nakamichi Crystal Ferrite record head is free from these effects. The Nakamichi head puts more signal onto the tape with less distortion, especially at the highest frequencies.

The Crystal Ferrite Erase Head

Today's high-coercivity tape formulations provide tremendous improvements in dynamic range and high frequency response. But they are also more difficult to erase. Nakamichi uses a Crystal Ferrite erase head efficient enough to take the highest of today's high-energy tape formulations in stride. And built-in steel tape guides help to ensure precise tracking.



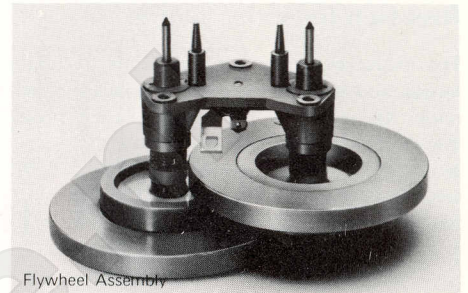
TRANSPORT

Rather than the more common single capstan and pressure roller found on most cassette decks, the Nakamichi 700 II employs a closed-loop double-capstan drive system. The two capstans each have their own flywheel, and the two flywheels are driven by a DC servomotor via a single belt. This system constantly maintains the proper tape tension and also isolates the tape from mechanical vibration. A separate induction motor drives the reel hubs. The design of the motors, flywheels and capstans all contribute to the remarkable stability of the transport. The Nakamichi 700 II holds both wow & flutter and tape modulation noise to a bare minimum.

Close dimensional tolerances for each moving part result in a transport of unprecedented precision. Computer-controlled machining reduces cylindrical aberrations in the crucial capstan/flywheel assembly. The assembly is then carefully unitized, assuring perfect parallel alignment of the capstans. A special pneumatic damping system cushions the insertion of the head assembly to protect this alignment for years of use. Damping also treats the cassette housing gently. A similar pneumatic damper governs the cassette ejector mechanism.

Staggered Flywheels

To keep the double capstans turning at constant speed, each should be coupled to a flywheel with high moment of inertia. At any given speed, there are two ways to achieve high moment of inertia: high mass and large dia-



meter. With a closed-loop, double-capstan cassette transport, the capstans are less than five centimeters apart. It is difficult to design two flywheels of sufficient size so close together. Moreover, the bearings that support the capstan shafts can handle only a certain amount of flywheel mass. Nakamichi's solution is a staggered flywheel assembly, which affords increased diameter without increased mass. And Nakamichi has concentrated the available mass toward the outer edge of the flywheel to maximize moment of inertia and minimize wow & flutter.

Optical-Sensing DC Servomotor

The capstan DC servomotor uses an internal optical sensor to check its own speed. A slotted disc turns with the motor, causing pulses of light to fall on a light-sensing photo-diode. This sensor feeds information about the motor's speed to the control electronics on a nearby circuit board. These electronics, in turn, govern the speed of the motor by controlling the motor's drive voltage.

The speed stability of the motor is largely dependent on the number of pulses the generator can provide per rotation. While most systems are limited to about 50 pulses, Nakamichi's optical sensor uses nearly 120 pulses per rotation. The "quick reflexes" of the servomotor assure immunity to fluctuations in line voltage, line frequency, and cassette housing friction. The DC servomotor contributes to the absence of wow & flutter in the 700 II (less than 0.1% DIN weighted peak, less than 0.05% WRMS).



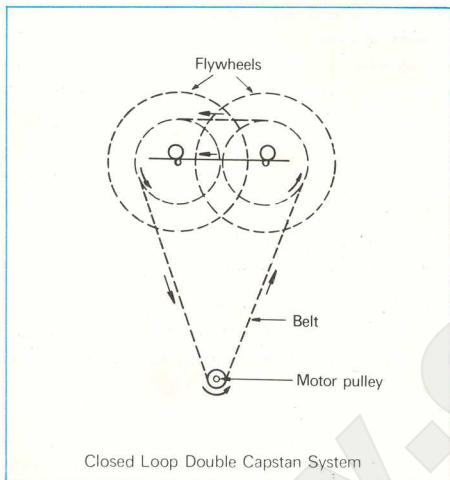
DC Servomotor
Capstan Drive System

Reel-Hub Induction Motor

The induction motor provides proper reel-hub torque and the fast-forward and rewind functions. An ingenious ball-bearing clutch slows the rapid wind near the end of the tape for a gentle stop. Typical rewind time for a C-60 cassette is less than 50 seconds. The fast wind functions are thus smooth and quick.

Optimum Tape Tension is Maintained

The components of the Nakamichi 700 II transport are individually excellent. Together they comprise the closed-loop, double-capstan system, a design of remarkable performance.



The double-capstan layout is a triumph of both sophistication and elegance.

The diagram of the closed-loop double-capstan system shows the symmetrical layout of the motor, flywheels, and capstans. But the symmetry is deceptive. When the flywheels are

turning, the tension of the drive belt is higher on the take-up side than on the supply side. This produces a constant difference in torque between the two flywheels. As a result, the stretch of tape between the two capstans is kept at a constant tension, regardless of external factors such as reel hub tension or cassette housing friction. The precise amount of torque differential is a direct consequence of the layout, dimensions and elasticity of the drive belt. This method of maintaining tape tension is elegant in concept, and in practice it provides greater control than some more complicated systems using three motors and servo-controlled back-tension.

Isolation from External Vibration

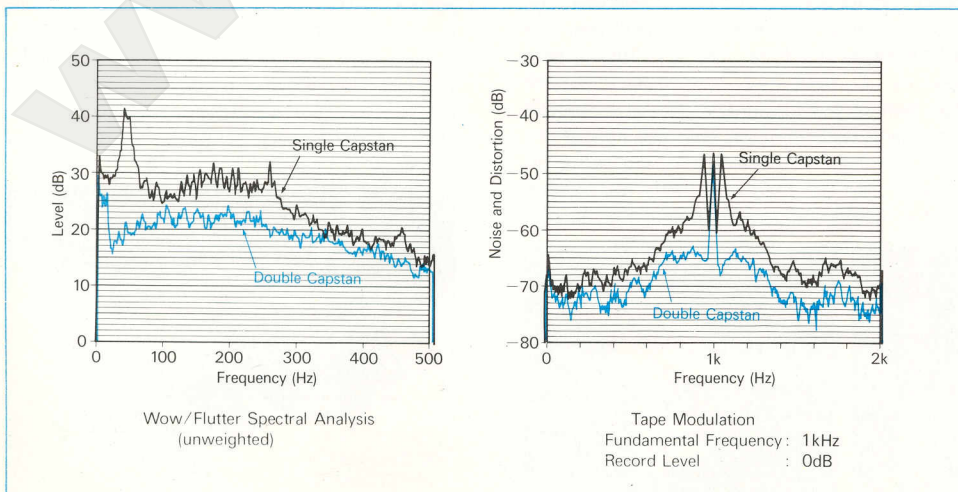
Torque variations in the supply and take-up hubs of the cassette, as well as imperfect tape guides and rollers in the cassette itself, cause mechanical vibrations to travel along the exposed length of tape. These variations disturb head-to-tape contact and cause flutter. The closed-loop double-capstan system effectively isolates the length of tape between the two pressure rollers from external mechanical vibrations.

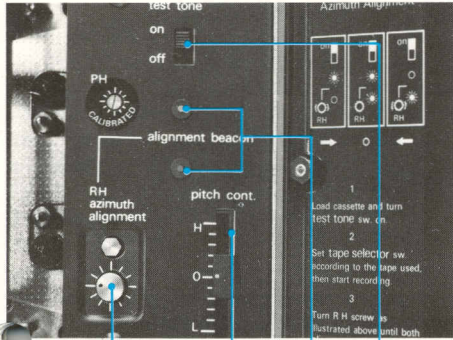
Extremely Low Modulation Noise

When a single-frequency tone is tape-recorded, the output is usually the tone plus impurities near the original frequency. On a spectrum analysis graph, what went into the deck looking like a single vertical line, comes out looking like a mountain with sloping sides. This is called modulation noise. The effect is caused by modulation of the original signal by vibrations of the tape as it passes through various parts of the transport. All tape decks exhibit this to

some degree. In cassette decks the problem is often exacerbated by the cassette housing.

A well-designed transport can reduce modulation noise. The isolation of the tape from external vibration afforded by double capstans serves to lower modulation noise. Moreover, the resonances of transport parts between the two capstans have been selected outside the audible frequency range. And finally, the entire capstan/flywheel assembly has been mechanically de-coupled. The Nakamichi 700 II thus minimizes modulation noise.



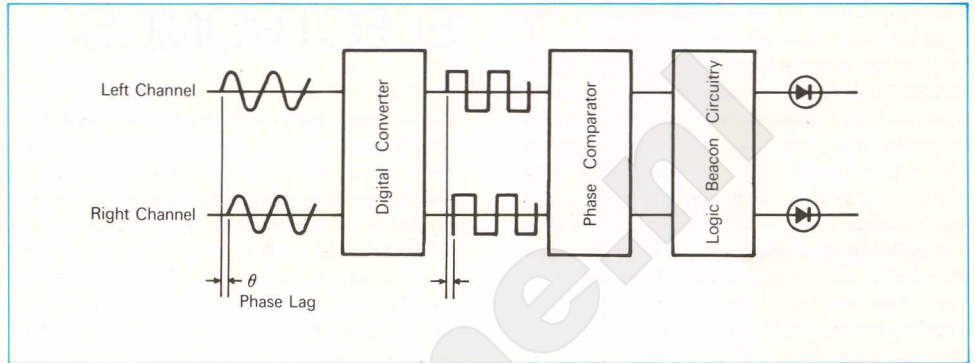
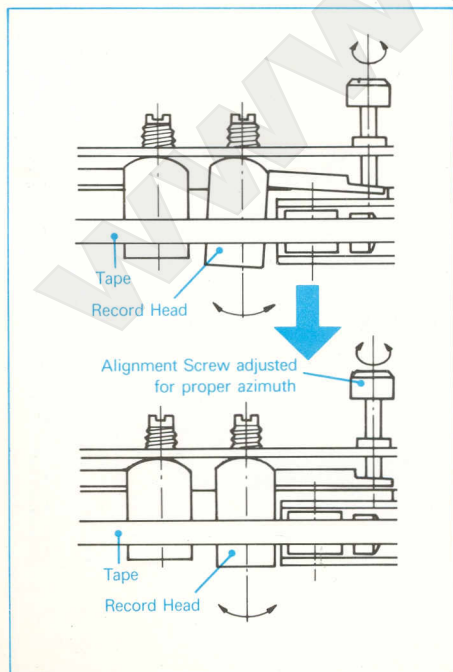


Record Head Azimuth Alignment Screw
Playback Pitch Control
Alignment Beacon
400Hz Test Tone Switch

IC LOGIC

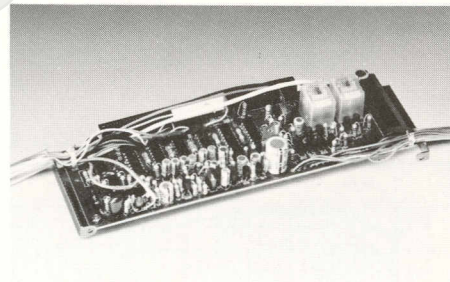
User-Adjustable Azimuth

The Nakamichi 700 II is one of a handful of tape decks that offers user-adjustable azimuth. The adjustment puts the record head gap functionally parallel to the playback head gap before recording each side of each cassette. Variations in cassette housings make it impossible to maintain parallelism between the two gaps without azimuth adjustment. Two-head machines, where the same gap functions for both record and playback, need no such adjustment. Neither do three-head open reel decks where the tape has no housing to interfere with proper



geometry. But azimuth error is a serious factor for three-head cassette decks. It can cause phase distortion and severe losses in high frequency response. For a cassette deck that guarantees flat frequency response to 20 kHz, even slight azimuth error would mean disaster.

The azimuth alignment of the 700 II uses complex logic circuitry to make adjustment a simple matter. During the recording of the built-in 400 Hz test tone, the playback of the tone is converted to digital pulses by an integrated circuit (IC) and then fed to a phase comparator IC. If there is any azimuth error between the record and playback heads, a difference in phase between the left and right channels will be detected by the phase comparator. The comparator will then cause only one of the Alignment Beacon light-emitting diodes (LED's) to glow. When the record head azimuth is properly adjusted, both LED's will flash alternately. The



comparator IC will be reading no phase difference and the heads will be effectively parallel. Surprisingly, a 400 Hz tone is more precise than a high-frequency tone because the longer wavelength at 400 Hz yields only one position of the head for zero phase difference: the position of perfect alignment.

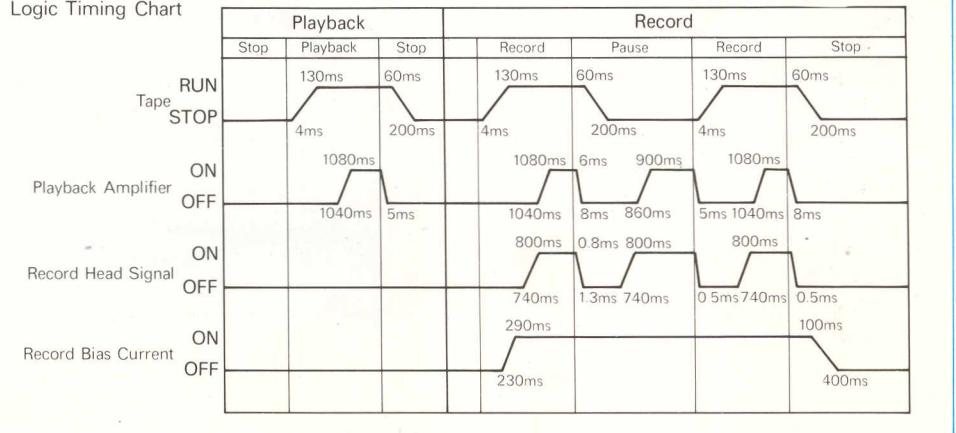
Here's how you would adjust record head azimuth: 1) turn ON the 400 Hz test tone, 2) put the deck into RECORD, 3) turn the azimuth screw until the two LED's flash alternately. Simple. And accurate.

"Touch Command" Controls

The Nakamichi 700 II incorporates totally non-mechanical "Touch Command" controls for the transport functions. These controls are more than just elegant and convenient. They activate a comprehensive IC logic system which governs the operation of the 700 II. Not only does the IC logic system place the transport into motion, it also controls the status of the record and playback amplifiers, the insertion of the head assembly, the activation of the bias oscillator, and the deactivation of the transport at the end of tape or in the event of a tape snag.

The logic system claims a number of advantages. First, there is no need to worry about

Logic Timing Chart



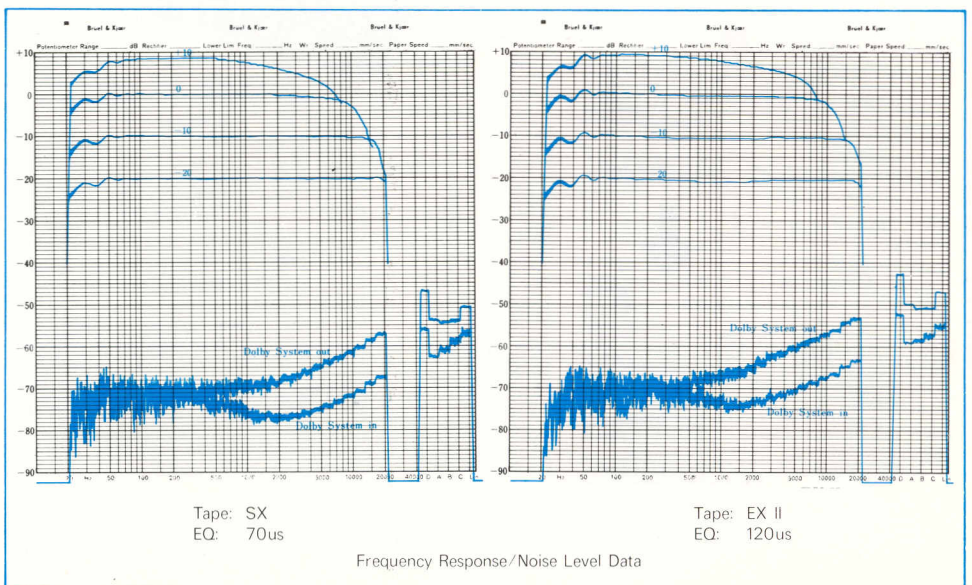
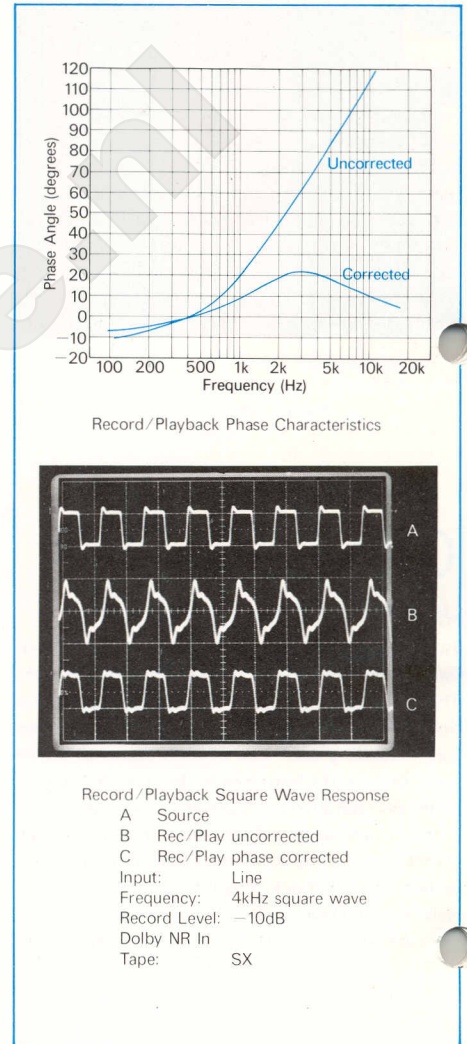
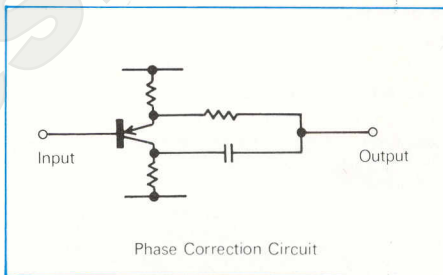
pushing buttons in the proper sequence. The logic circuitry does all the thinking for you. You can go directly from FAST FORWARD to REWIND to PLAY in any sequence without concern. You can touch more than one control simultaneously. You can even turn the power off while the tape is in motion, and the IC logic will prevent any harm to the transport or the tape. Second, you run a lower risk of tape jams and spills because the logic control disengages the mechanism at the first sign of excessive friction. You can test the system yourself by stopping the reel hubs with a stylus. The transport disengages within 0.2 seconds. Third, the system is more reliable than conventional transports, because it requires fewer moving parts.

ELECTRONICS

Many tape deck manufacturers concentrate tremendous effort in developing the tape transport, only to mate the resulting jewel of mechanical engineering to hopelessly outdated electronics. While Nakamichi transports are famous for their precision and reliability, Nakamichi is also dedicated to make tape deck electronics every bit as good as the circuitry of the best preamplifiers and power amplifiers. Nakamichi's amplifier technology has produced record-breaking components such as the 620 Power Amplifier (less than 0.0005% total harmonic distortion at 1 kHz) and the 410 Preamplifier (better than -140 dB phono equivalent input noise). It is no surprise, then, that the Nakamichi 700 II incorporates some of the most advanced electronics to be found in any cassette deck.

Phase-Corrected Playback

Recent improvements in audio amplifiers have virtually eliminated phase shift. This means that a musical instrument's fundamental and harmo-



tics can now be reproduced in the proper time relationships. Yet most cassette decks continue to shift phase by 120 degrees or more, a natural consequence of the equalization circuits. Many tape deck manufacturers believe phase shifts to be unavoidable and inaudible. While the audibility of pure phase shifts is a controversial issue, the phase correction circuitry of the 700 II produces a clearly audible improvement. Nakamichi's phase corrector holds phase shift to within 30 degrees across the entire audio frequency range. This means that the playback waveform is faithful to the original input. For the first time in a cassette deck, a recorded square wave comes out looking remarkably like a square wave. Proper phase relations also mean that dynamic processing circuits, such as the Dolby Noise Reduction system, will more accurately handle complex signals.

"Double" Dolby Noise Reduction

As you might expect, the Nakamichi 700 II employs the famous Dolby Noise Reduction system. The Dolby system reduces tape hiss by as much as 10 dB at the highest frequencies. If the tape deck is of the highest quality, the added 10 dB in dynamic range is gained without any sacrifice in sound quality. Many cassette decks suffer a loss of high frequency response when the Dolby system is switched in. This stems from basic deficiencies in deck performance and not from any fault in the noise reduction system. Because Nakamichi heads have a superior ability to prevent early high-frequency response of the 700 II. The frequency response of all Nakamichi cassette decks is specified with the Dolby system "in", a highly unusual practice.

The three-head configuration of the 700 II requires what is often called "double Dolby". A total of four Dolby circuits are used: one each for the left and right channels of the record and playback amplifiers. The Dolby circuits of the 700 II are composed of discrete components and are manufactured and calibrated to the highest standards.

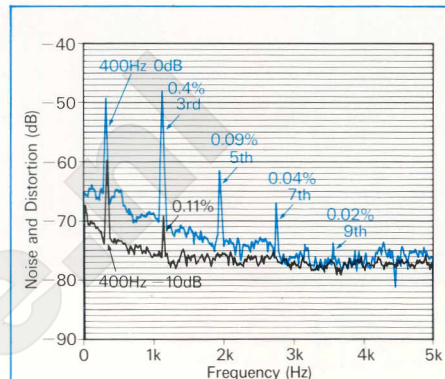
Three Wide-Range Mic Inputs

If the mic preamplifiers of a tape deck are driven to clipping even before the recording level is high enough to saturate the tape, the wide dynamic range of the deck becomes meaningless. Hence, each of the three microphone inputs of the Nakamichi 700 II has been designed with a wide usable dynamic range. This allows you to use the widest variety of microphones: from insensitive dynamic mics to sensitive, high-output condenser mics capable

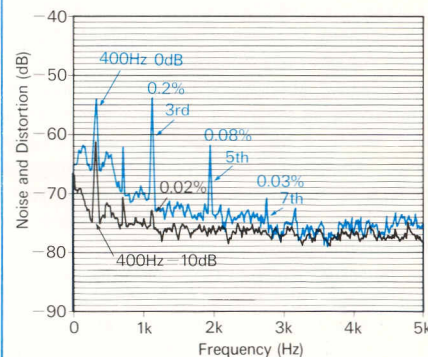
of handling high sound pressure levels. A mere 0.2 millivolts at the mic inputs of the 700 II will provide 0 dB record level at full gain. Maximum input, nevertheless, is an outstanding 1.5 volts. And the equivalent input noise level is below 0.45 microvolts. The mic preamplifiers of the Nakamichi 700 II provide performance that is rarely found, even in professional mixing consoles. Combined with the 700 II's 65 dB (or better) dynamic range, total usable range is in excess of 130 dB.

High-Output Headphone Amplifier

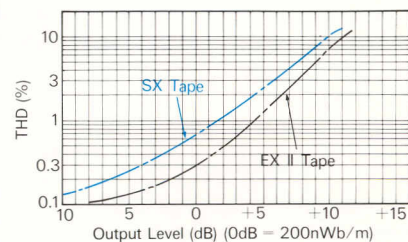
Unlike most home tape decks, the 700 II has a built-in headphone amplifier capable of 300 milliwatts per channel into 8 ohms. This output power is sufficient to achieve satisfying listening levels with most dynamic headphones. Moreover, the high headphone output permits the 700 II to be used for on-site recording with headphone monitoring.



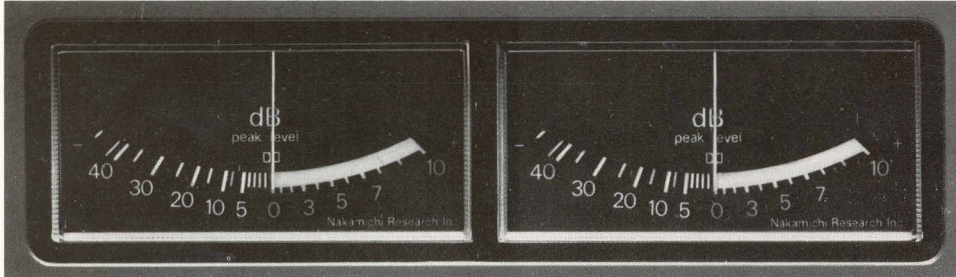
Harmonic Distortion Components (rec/play)
Fundamental Frequency: 400Hz
Record Level: 0dB (blue), -10dB (black)
Tape: SX



Harmonic Distortion Components (rec/play)
Fundamental Frequency: 400Hz
Record Level: 0dB (blue), -10dB (black)
Tape: EX II



Output vs. THD
Frequency: 400Hz
These measurements were made using the Bruel & Kjaer 3348 Real-Time Narrow Band Spectrum Analyzer.

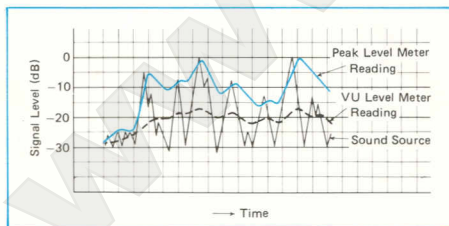


FEATURES

Wide-Scale Peak-Reading Meters

The level meters of the Nakamichi 700 II cover an unprecedented range from -40 to $+10$ dB (0 dB referenced to 200 nanowebers per meter). The upper end of the scale reflects the increased headroom and range of the 700 II. Thanks to the superb magnetic performance of Nakamichi's heads and recent advances in tape formulations, you can record "into the red" by as much as $+6$ to $+8$ dB depending on the signal source. The lower end of the scale acknowledges that music, especially orchestral music, rarely limits itself to the -20 dB range of conventional meters.

The meters of the 700 II indicate peaks, rather than average signal levels. Peak-level meters are more useful in avoiding tape saturation distortion than the slower, so-called VU meters found on most cassette decks. Quicksilver rise time (300 milliseconds) coupled with slow decay time (about 1.5 seconds) make the peak-reading meters both accurate and easy to read. Once you have experienced the accuracy of the 700 II's meters, it is difficult to go back to conventional meters.



Independent Bias and Equalization Switches

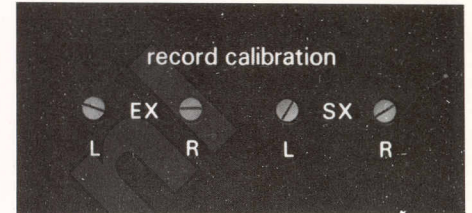
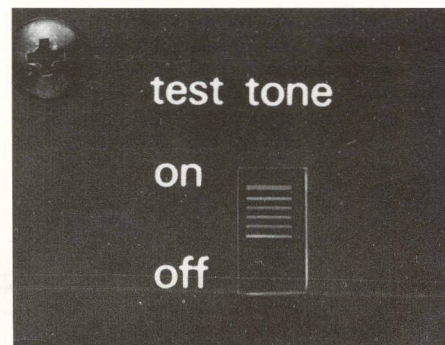
The 700 II features separate bias and equalization selection. The TAPE switch selects one of two preset bias levels: high bias for high-coercivity tapes like Nakamichi SX, "normal" bias for low-noise/high-output tapes like Nakamichi EX-II. Usually you would use $70 \mu\text{s}$ equalization with SX-type tapes and $120 \mu\text{s}$ with EX-type tapes. But the extra headroom of the 700 II permits you to record and play an EX tape



with $70 \mu\text{s}$ EQ for a 4 -to- 5 dB improvement in signal-to-noise ratio. Conversely, using an SX tape with $120 \mu\text{s}$ yields added high frequency headroom for recording source material rich in high frequency information (such as hardpitches, synthesizers, etc.). Neither choice would be possible with a single, combined tape selector switch.

Record Level Calibration

The Dolby Noise Reduction system processes signals according to relative levels. During the record process, for example, high level signals are unaffected by the Dolby circuit while lower-level high-frequency signals are boosted. If playback levels are not carefully matched to the record levels, the playback Dolby circuit will be unable to properly restore the high frequencies to flat response. Because different tape formulations provide different output levels for a given input, there is a potential for Dolby mistracking when you change formulations. By simply recording and re-playing the 400 Hz calibration tone, the user can adjust the sensitivity of the Nakamichi 700 II to precisely match the formulation. Proper Dolby tracking, and linear high frequency response, are assured.

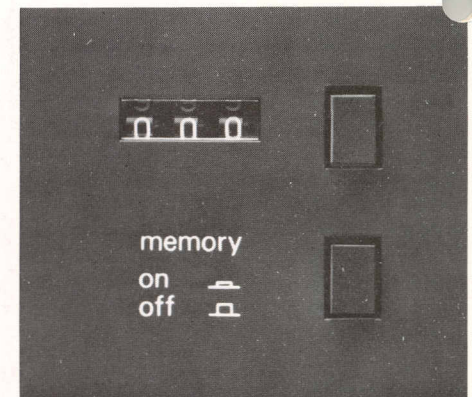


Switchable MPX Filter

Since the Dolby system responds to low-level high-frequency signals, traces of the 19 kHz multiplex pilot present in FM stereo broadcasts could cause false triggering of the noise reduction circuits. Switching the MPX filter of the 700 II "on" will prevent the 19 kHz pilot signal from reaching the record circuits. Thus, you may use the Dolby system while recording FM stereo broadcasts and still have the benefits of frequency response out to 20 kHz when you record from other sources.

Tape Start Memory

The Nakamichi 700 II features Tape Start Memory. This permits you to return over and over again to a predetermined position on the tape (for example, the start of a selection). By resetting the counter to 000 at the desired spot and switching on the Tape Start Memory, the transport will automatically stop at the original location from the rewind mode.



Remote Control and Timer Operation

All of the function controls of the 700 II are duplicated on the optional RM-10 Remote Control. The RM-10 permits full operation of the transport from a distance.

Also available is an optional DS-200 Digital Timer. The DS-200 enables you to make unattended recordings of FM broadcasts and other sources. The timer can also turn on your system

at a preset time and automatically place the 700 II in the PLAY mode.



DS-200 Programming Timer

Three-Point Live Recording System

While two may seem the ideal number of microphones for a stereo recording, it is actually extremely difficult to get proper stereo imaging from two mics. While two microphones suffice when hall acoustics are close to perfect, three mics can provide good results in a wide variety of recording situations. For this reason, Nakamichi cassette decks have a third "blend" mic input. "Blend" is essentially a monaural or "center" input which supplies identical signals to the left and right stereo channels. The three mic inputs of the Nakamichi 700 II can be used to create live recordings which are often much more realistic than recordings made with only two microphones. Two examples are illustrated below.

- 1) Recording a concerto can be an extremely difficult task with only two microphones, especially when hall acoustics are less than perfect. When recording a piano and orchestra with the Nakamichi 700 II and three microphones, the BLEND mic would be placed to pick up direct sounds from the piano. The left and right mics would be placed above and in front of the orchestra to provide the stereo separation and ambience effects. By mixing the BLEND mic with the stereo mics in proper proportion, you can achieve a full, natural sound.
- 2) Small instrumental groups are particularly difficult to relegate to two microphones; instrumental balance and room ambience are difficult to obtain. In such situations, a third microphone is a tremendous advantage.

For further information on the three-microphone recording technique and further examples of applications, consult the booklet entitled *The Nakamichi Live Recording System*. It is available on request from Nakamichi Research Inc.

Fig. 1

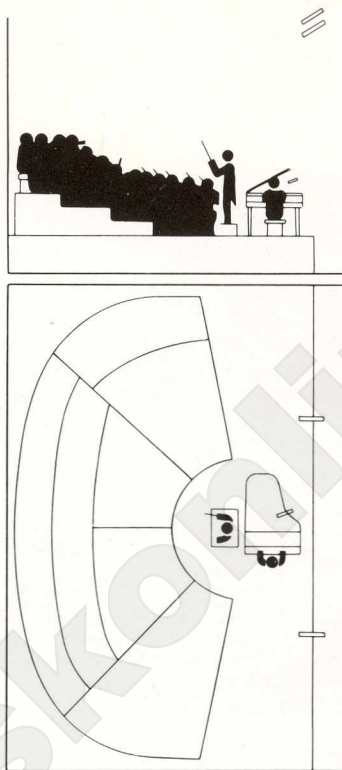
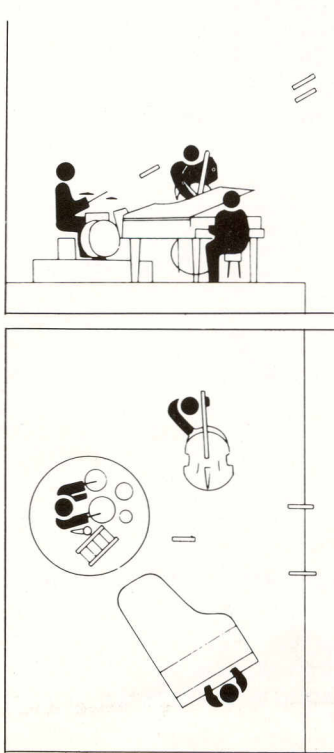


Fig. 2



Specifications

Power Supply	100, 117, 220, 240V 50/60 Hz
Power Consumption...	60W Max.
Tape Speed	1-7/8 ips. ±1%
Wow & Flutter	less than 0.1% (DIN 45507 weighted peak) less than 0.05% Wrms
Frequency Response ..	35 - 20,000 Hz ± 3 dB (Dolby NR In, SX or EX II Tape)
Signal to Noise Ratio ..	better than 65 dB (Dolby NR in, Wrms 400 Hz 3% distortion)
Total Harmonic Dis- ..	less than 1.5% (at tortion 400 Hz, 0 dB)
Erasure	better than 60 dB (at 1 kHz, saturation level)
Channel Separation	better than 35 dB (at 1 kHz, 0 dB)
Cross Talk	better than 60 dB (at 1 kHz, 0 dB)
Bias Frequency	105 kHz
Transistors	138 pcs.
Diodes	54 pcs.
ICs	9 pcs.
Input:	
Mic Input	0.2 mV 10 kΩ
Blend Mic	0.2 mV 10 kΩ
DIN Mic Input	0.2 mV 10 kΩ
Line	50 mV 50 kΩ
DIN Radio	5 mV 20 kΩ
Output:	
Line	1.0V (Max.) variable
DIN Line Output	1.0V (Max.) variable
Headphones	40 mW/8Ω (1 kHz, 0 dB)
Dimensions	20-1/2(W) x 10-11/16(H) x 5-1/8(D) inches 520(W) x 267(H) x 130(D) m/m
Weight	28 lbs. (approx.) 13 kg

- 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.



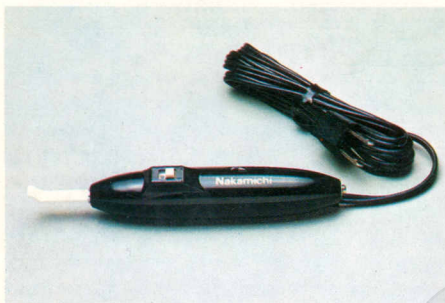
SX Tape C-60, C-90



EX II Tape C-60, C-90



EX Tape C-60, C-90



DM-10 Head Demagnetizer



RM-10 Remote Control Unit for 3 Head Decks



DS-200 Programing Timer

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