

Nakamichi 660ZX/670ZX

Discrete Head Cassette Decks
Auto Azimuth Alignment

660ZX Auto Azimuth Alignment

Exclusive Nakamichi Auto Azimuth Alignment in a full bandwidth, discrete 3-head recorder. Except for off-tape monitoring, the 660ZX has every feature of the 670ZX; performance is identical too! An extraordinary value!



670ZX Auto Azimuth Alignment

Full off-tape monitoring facilities with Double Dolby and two complete sets of electronics. 10-22,000 Hz ± 3 dB response! Nine program RAMM and wide-range, peak-responding meters. Removable 19-inch rack mounts. Outstanding!

Automation Starts Here

Breaching The 20-kHz Barrier

Bells and whistles do not interest Nakamichi. Our philosophy is that technology must serve the practical needs of the recordist and result in *meaningful* sound improvement. This philosophy produced the world's first 3-head cassette recorder, the world's first half-speed high-fidelity recorder, and recorders that, in general, encompass a bandwidth unmatched by competitive decks.

The extraordinary bandwidth of all Nakamichi products gives them a clean, open sound that other recorders cannot match. It stands to reason that yet better bandwidth should improve sound clarity even more—not because the ear can respond beyond 20 kHz but because extended range at -20 dB implies greater bandwidth at *higher* recording levels. In short, exceptional bandwidth at "standard" recording level means greater high-frequency headroom, less intermodulation distortion, and better phase accuracy.

Extending bandwidth beyond 20 kHz demands Discrete-Head Technology—separate record and playback heads, each optimized for its intended purpose; heads that are *physically* as well as magnetically independent so that the *magnetic* gaps can be aligned precisely. Combination R/P heads are incapable of such response because a compromise gap must be chosen. "Sandwich" heads with separate record and play sections in a common housing allow *mechanical* alignment but not *magnetic* alignment.

The Importance Of Azimuth Alignment

Accurate alignment is essential to achieve high-frequency response and inter-channel phase coherency for stable stereo imaging. Few realize how rapidly losses increase. A 3-minute (0.05-degree) error produces a minor loss—less than 0.7 dB at 22 kHz—but an error of 6 minutes (0.1 degree) increases the loss to 2¾ dB, and, doubling to 12 minutes (0.2 degree) results in a loss of 16 dB! And, few stop to consider that an azimuth error of 6 minutes means that left and right channels are completely out of phase at 15 kHz! Clearly, azimuth error should be kept well below 0.1 degree, yet even quality cassette housings cannot guarantee this precision. A slightly misaligned pressure pad or guide roller, a slightly inaccurate molding cause tape skew and static and dynamic azimuth misalignment.

The Role Of The Transport

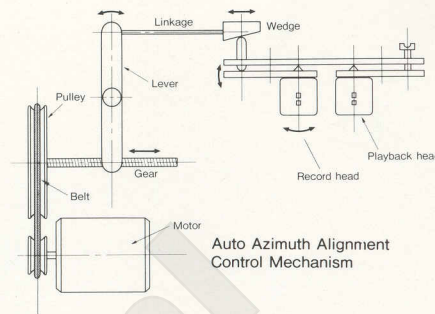
The transport has one function: to wrest control of the tape from the housing and move it smoothly and accurately past the heads. This was our goal in developing the Asymmetrical, Diffused-Resonance deck. Dual capstans isolate tape from the cassette hubs, but unlike ordinary two-capstan machines that are prone to resonance reinforcement, the ZX drive employs asymmetrical components to diffuse resonances and prevent reinforcement. A Motor-Driven Cam replaces solenoids and eliminates that source of vibration while preserving remote control and unusually effective cueing. Precision shoes at each capstan guide the tape much more accurately than common forked stampings. The cassette pressure pad is pushed out of the way removing this source of skew, modulation noise, and scrape flutter; tension in the tape between the capstans provides a more stable tape-to-head contact. The practical result of this new technology—exclusively Nakamichi—is extraordinarily low modulation noise and totally inaudible flutter.

Auto Azimuth Alignment

The Asymmetrical, Diffused-Resonance, Dual-Capstan Transport is sufficiently precise and immune to cassette tolerances to achieve 20-kHz response—witness the 480- and 580-Series recorders! To guarantee response *beyond* 20 kHz and assure the phase accuracy that that implies requires another step. Variables remain over which we have no control—tape-width tolerance, pack wind, etc. Compensating for these factors requires minute corrections in azimuth for the particular cassette in use. Hence we developed *Auto Azimuth Alignment* featured on the 660ZX, 670ZX, and highly acclaimed 680ZX.

Activating Auto Azimuth Alignment records a common-phase 400-Hz tone on the two stereo channels. The playback head immediately reproduces the tone; a phase comparator deter-

mines the relative phase (error) between the two channels and drives a servo motor to correct the error. After speed reduction, the motor moves a lever via a rack-and-pinion. The lever is linked to the record-head base and pivots the head slightly to bring the channels into perfect phase synchronism. While the adjustment is taking place, the PLAY LED blinks; in approximately 2 seconds, the adjustment is complete and the LED glows steadily.



Similarities/Differences/Features

The 660ZX and 670ZX are very similar to the renowned 680ZX. The Auto Azimuth Alignment systems are identical, and, except for half-speed operation, the transports are the same too. In essence, a 670ZX will do everything a 680ZX will do except half-speed recording. And, except for off-tape monitoring, 660ZX performance is identical to that of the 670ZX. All ZX recorders employ 3 discrete heads; all feature Auto Azimuth Alignment; all provide REC CAL without tape rewind. Since 660ZX/670ZX recorders operate exclusively at standard speed, the maximum number of programs that can be skipped by the programmable RAMM (Random Access Music Memory) is 9; 47-dB peak-responding meters replace the 680ZX FL display.

Other features you expect from premium Nakamichi recorders are included on the 660ZX/670ZX: Crystalloy Record and Playback Heads; Dual-Gap, Direct-Flux Erase Head; Compatibility with Ferric, Chrome/Chrome-Equivalent, and Metal Tape; Separate Bias and EQ Selectors; Dolby NR with Front-Panel Calibration, Test-Tone Generator, and Defeatable MPX Filter; REC MUTE; Easy Cue; Unattended Operation via Accessory Timer; Memory Start; ±6% Pitch Control; Individual Left and Right Record-Level Controls with Master Fader; High-Output Headphone and Output-Level Control; Full Remote Control (via RM-200 accessory); IC-Logic with High-Speed Auto Shutoff and Slack-Tape Pickup; DC Power for Nakamichi Blackbox Accessories; and, that sine qua non, Nakamichi Sound and Nakamichi Performance!

Specifications:

Power Source	100, 120, 120/220-240, 220 or 240V; 50/60 Hz (according to country of sale)
Power Consumption	27 W Max
Tape Speed	1-7/8 ips (4.8 cm/s) Adjustable ±6%
Wow-and-Flutter	Less than 0.08% WTD Peak Less than 0.04% WTD rms
Frequency Response	10–22,000 Hz ±3 dB (ZX Tape) (–20 dB record level) 10–20,000 Hz ±3 dB (SX, EXII Tape)
Signal-to-Noise Ratio	Better than 66 dB at 400 Hz, 3% THD (Dolby NR in, 70 µs) A-WTD rms (ZX Tape)
Total Harmonic Distortion	Less than 0.8% (ZX Tape) (400 Hz, 0 dB) Less than 1.0% (SX, EXII Tape)
Erasure	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	50mV, 50k ohms
Output Level	1V, (400 Hz, 0 dB, Output Level at Max)
Headphone	45mW
Dimensions	482(W) x 143(H) x 340(D) millimeters 19(W) x 5-5/8(H) x 13-3/8(D) inches
Approximate Weight	9 kg, 19 lb 13 oz

*Specifications and appearance subject to change without notice.

*Dolby NR under license from Dolby Laboratories

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Printed in Japan S-8007210B