



Nakamichi

1000ZXL Computing Cassette Deck



A.B.L.E.™ (Azimuth, Bias, Level, Equalizer)

The Extraordinary Auto-Calibration Computer That Achieves A Response Of 18~25,000 Hz ± 3 dB

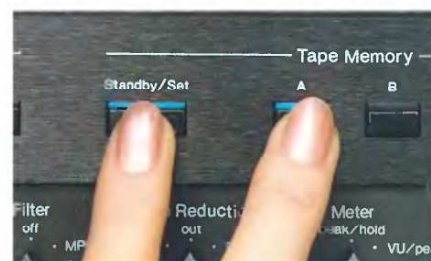
The cassette format is capable of far better performance than most audiophiles realize. To achieve it requires extraordinarily precise adjustment of four critical recording parameters — Azimuth, Bias, Level, and Equalization — to match the characteristics of the particular tape being used.

Bias, Level, and Equalization are electrical parameters, and cassette recorders that afford manual control over one or two of them have been available. Manual adjustment of all *three* is very tedious since the functions interact in such a way that adjusting any one requires readjustment of the other two. Such "iterative" adjustments are simple work for a computer that can make many corrections per second.

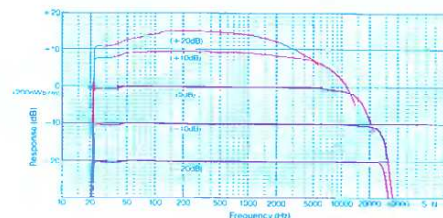
Operation of the A.B.L.E. Computer.
The "brain" of the A.B.L.E. computer is an 8-bit microprocessor capable of independently adjusting bias, level, and recording equalization through a 256-step range, separately for left and right channels. There is no need for a tape-selector switch since the wide control range encompasses all of today's tapes and provides for the future too.



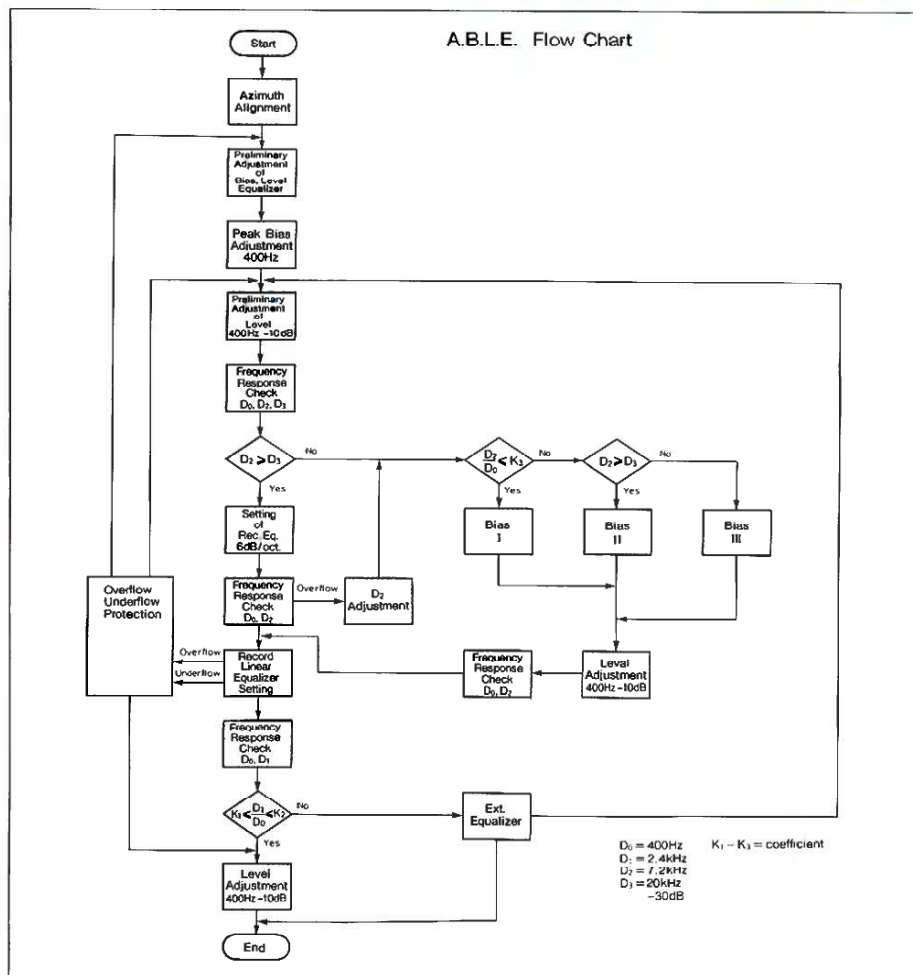
Simultaneously pressing PLAY and RUN starts the computer which then follows the procedure of the flow chart. First, azimuth is adjusted since an error of only 0.1 degree results in more than a 3-dB loss at 25 kHz. This Nakamichi exclusive is absolutely essential to achieve wideband in-phase recordings. After preliminary adjustments, the computer checks response and begins an iterative refinement. The recording equalizer is separated into two circuits — linear and 6 dB/octave — each of which is manipulated to achieve utterly flat response (20~20,000 Hz ± 0.75 dB)



During adjustment, the display indicates which step is being performed. At completion, the tape rewinds to "0000" and STANDBY/SET lights. To store the ideal recording parameters — and the playback-equalization and noise-reduction settings — press STANDBY/SET and one of the four TAPE MEMORY buttons.



Record/Playback Frequency Response
Tape: ZX, EQ: 70 μ s Bias: Normal



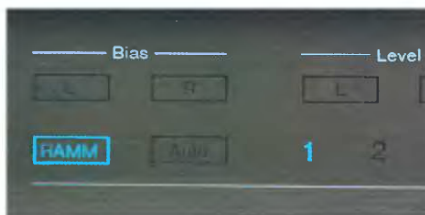
RAMM (Random Access Music Memory)

The True Random-Access Program-Selection System With Subsonic Encoding And Automated Playback

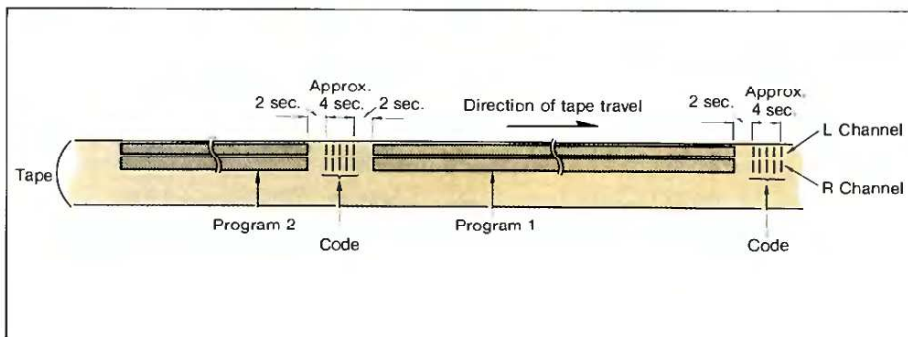
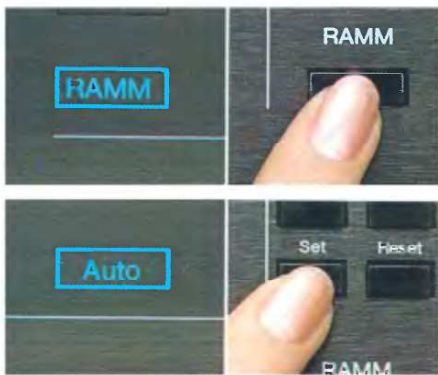
Someday other cassette recorders may feature error-free, true-random-access playback. But the future is here in the 1000ZXL! This unique RAMM is radically different from past systems that search for blank spaces between programs. The 1000ZXL RAMM tags each program with a unique 5-Hz, 20-bit digital code. The first 7 bits automatically choose playback equalization and noise reduction so you can't make a mistake! The remaining 13 bits identify the program. There are 15 unique addresses for each tape side and 30 playback commands to select programs in any order with whatever repetitions are desired. There are two recording modes.

Automatic Encoding is very convenient when copying phonograph discs. Press RAMM and SET. The RAMM and AUTO lights glow, and a "1" appears in the display. When recording commences, the first address is recorded (indicated by a flashing "1"), and the RAMM advances to prepare for the second program. (A "2" appears in the display.) Whenever a break of 2 seconds occurs in the program, the next code is recorded automatically.

Manual Encoding permits segmentation within a program and also is useful when 2-second gaps are not assured. Press RAMM, and the first address is recorded. A "2" appears in the display. The next address is recorded each time RAMM is pressed. Manual encoding can be mixed with automatic encoding by pressing RAMM while in the automatic mode. The code takes 4 seconds to record, but it may overlap the program with no ill effect. Playback always commences from the beginning of the code.



RAMM Playback. Up to 30 commands can be programmed to play selections in any desired order. Using the "◀" and "▶" buttons, advance the display to the desired program number (indicated by a flashing numeral.) Press SET to memorize the command. Change the display to the program desired next and press SET. When all commands have been entered, the 1000ZXL plays each program in the order in which you entered the commands.

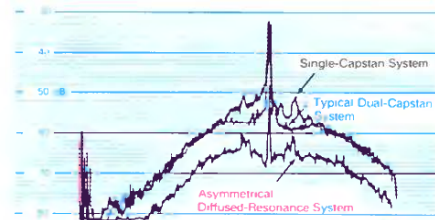


Mechanism

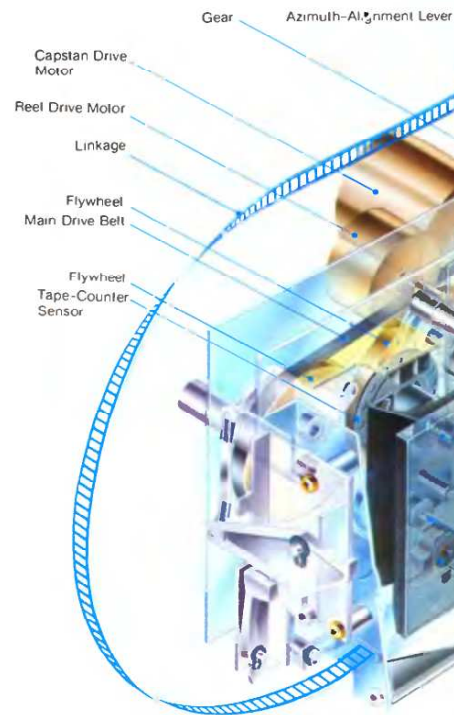
Nakamichi's Asymmetric Diffused-Resonance Transport Is In A Class By Itself

While dual-capstan transports are quite common in today's better recorders, the 1000ZXL mechanism is radically different from others. It has separate motors for capstan and reel drives, a third to adjust record-head azimuth, and a fourth that operates a unique cam control system. Special attention has been paid in damping chassis resonance and in stabilizing tape tension.

Asymmetrical Dual Capstans. Dual capstans afford good tape isolation, but capstans that rotate at the same speed cause common resonance modes which increase flutter and modulation noise. Nakamichi has solved



Modulation Noise Analysis



al, Dual-Capstan,
nsport

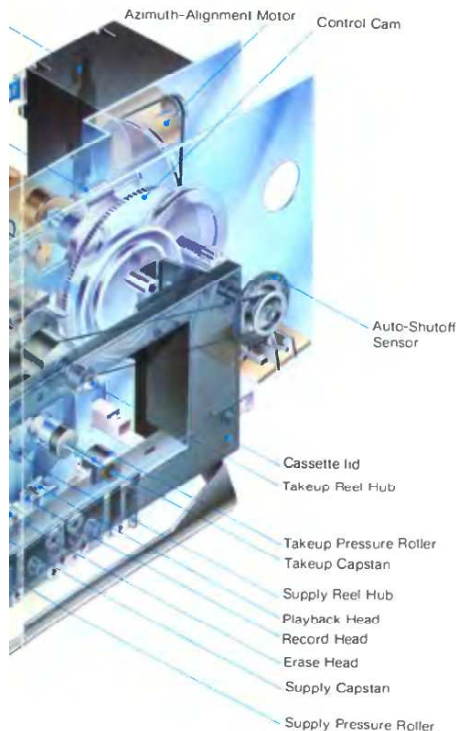
Head/Amplifier/Display

Discrete 3-Head Technology, Superb Electronics, And Comprehensive Displays Highlight the 1000ZXL

these problems and perfected the dual-capstan concept by adopting capstans of different diameters (3 mm on supply, 2.5 mm on takeup.) Further, a unique tape-pad lifter removes this major cause of scrape flutter and modulation noise.

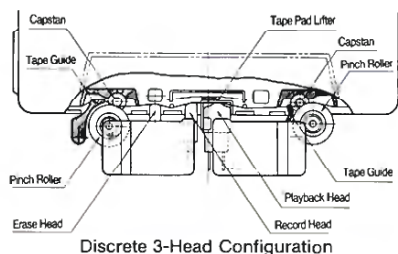
Damped Chassis. No matter how perfectly made, each rotating part induces chassis vibration. Transmitted to the tape, these vibrations increase modulation noise and muddy the sound. Thus, Nakamichi has adopted a resin-coated aluminum chassis that is inherently inert and absorbs vibration.

Logic-Controlled, Motor-Driven Cam. Eschewing heat and shock producing solenoids, Nakamichi has developed a unique motor-driven-cam control system which is free of vibration, quiet and cool in operation, and exceedingly accurate and gentle. C-MOS logic permits direct access between modes, a special cueing function, record mute via the REC button, and full remote control via one of two options. With the RM-300, even the RAMM can be programmed remotely.



Head Technology

In Nakamichi's discrete 3-head system, record and playback heads share the cassette's central opening, but they are physically and magnetically independent so perfect magnetic-azimuth alignment is possible. The erase head occupies the left opening, and the dual-capstan system provides stable tape tension throughout.



R-8L P-8L E-8L

The P-8L Playback Head features a laminated Crystalloy core with an ultra-narrow 0.6-micron gap to resolve the extremely short wavelengths of 25-kHz recordings. A new geometry virtually eliminates "contour effect," and response extends to the subsonic region.

The R-8L Record Head has a 3.5-micron gap formed to produce an extremely sharp critical recording zone and thus minimize post erasure. The Crystalloy core has greater saturation induction than ferrite and greater linearity than Sendust to create high-level recordings of exceedingly low distortion.

The E-8L Erase Head employs a low-loss ferrite core and high-saturation Sendust poletips. The dual-gap design cleanly erases all types of tape. A low erase frequency — 52.5 kHz phase-locked to the 105-kHz bias supply — maximizes efficiency.

Amplifier

For optimum performance, attention must be paid to recorder electronics. We have acquired considerable expertise in this area, and the 1000ZXL represents the culmination of our knowledge.

The Playback Amplifier is directly coupled to the P-8L head to reduce noise and distortion. Double NF circuitry assures accurate equalization.

The Recording Amplifier too is directly connected to the R-8L head and double NF circuitry is used in the equalizer. Three low-noise, high-overload microphone preamps (L, R, and Blend) provide Tri-Microphone recording and line/mic mixing. Active-subsonic and MPX filters can be used individually or jointly.

Display

The 56-Segment FL Level Indicator spans the range from -40 to +10 dB with remarkable resolution. Dual cursors provide a choice of VU/Peak or Peak/Peak-Hold ballistics so accurate indications free of overshoot are assured.



The A.B.L.E./RAMM Display indicates system condition, the choice of playback equalization and noise reduction, and the RAMM addresses.



A 4-Digit Electronic Tape Counter indicates tape position from -999 to 9999. Via the memory switch, it enables memory playback and memory stop. Accurate indications are assured by a precise pulse-detection system, and overshoot, if any, is corrected automatically.



1000ZXL Computing Cassette Deck

The Ultimate Recording Instrument
Redefines The State Of The Art

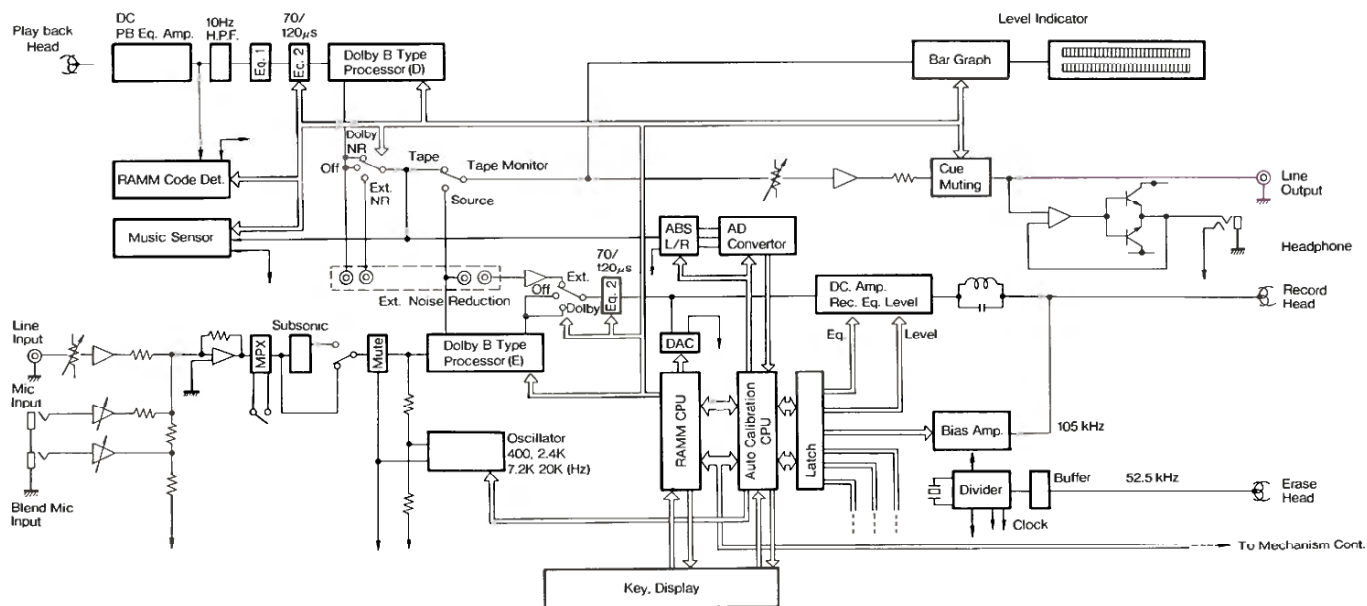
Perhaps once a decade, a unique recorder is created — an instrument of the future — designed without compromise to defy obsolescence and redefine the state of the art. The Nakamichi 1000 was such a machine. Introduced in 1973, it was the world's first three-head cassette recorder — the first to achieve 20-kHz response — the first to afford off-tape monitoring. Truly, it established the state of the art in the 1970s.

What the Nakamichi 1000 was to the 1970s, the 1000ZXL is to the 1980s — a radical departure from conventional technology — a creative leap into another dimension — into the future. A recorder that establishes a new frontier in bandwidth — response to an incredible 25 kHz! A recorder that adapts itself not only to today's premium tapes but to those of tomorrow as well! A recorder that secretly encodes 15 separate

programs so that each can be located reliably at your command! A recorder that senses how a tape is recorded and establishes ideal playback conditions automatically! A recorder that is as simple to operate as it is sophisticated in operation. A recorder that harnesses the power of two microprocessors — A.B.L.E. and RAMM — to redefine the state of the art! The Nakamichi 1000ZXL — a recorder of the future, created today!



Nakamichi 1000ZXL Block Diagram



Features

- Auto Calibration of Azimuth, Bias, Level, And Equalization
- 4 Tape Memories Store Recording Conditions ● 15-Program RAMM (Random Access Music Memory) With 30-Command Memory For True Random-Access Playback ● Auto Calibration Playback Equalizer, Noise Reduction, And RAMM Program Indicators ● Discrete 3-Head Technology ● 4-Digit Electronic Tape Counter With Tape-Start Memory ● 56-Segment FL (Fluorescent) Recording-Level Indicators With 50-dB Range, Choice of Peak or VU Ballistics, And Peak-Hold Cursor
- Three Microphone Inputs Plus Microphone/Line Mixing
- Built-in Double Dolby B Plus Provision For External Noise-Reduction Systems such as High-Com II and NR-100 Dolby C-Type Processor ● Quartz-Controlled Bias Oscillator With Parametric Erase Circuitry ● MPX and Subsonic Filters
- Test Tone Oscillator (400 Hz, 200 nWb/m) ● Asymmetrical, Diffused-Resonance, Dual-Capstan Transport ● C-MOS Logic Control Via Motor-Driven Cam ● Full Remote Control Of Tape Operation Via RM-200 ● Timer Operation
- Pitch Control ($\pm 6\%$) ● High-Output Headphone Amplifier
- Standard EIA 19-inch Rack Mount

Options



NR-100 Dolby C-Type Noise Reduction processor
Designed Exclusively For Use With The Nakamichi 1000ZXL, 700ZXL, And 700ZXE Cassette Recorders



RM-300 Remote Control Unit
Full Remote Control Of Tape Operation And RAMM Via RM-300 With 4-Digit Electronic Counter

- Specifications and appearance subject to change for further improvement without notice.
- Dolby NR under license from Dolby Laboratories Licensing Corporation.
- The word "DOLBY" and the Double-D Symbol are trademarks of Dolby Laboratories Licensing Corporation.
- High-Com is the trademark of AEG-TELEFUNKEN.
- ABLE is the trademark of Nakamichi Corporation.

Specifications:

Tape Speed	1-7/8 ips (4.8 cm/s)
Frequency Response	20 - 20,000 Hz ± 0.75 dB (w/Auto Calibration) (-20 dB Record Level)
Signal-to-Noise Ratio	Dolby B-Type NR Better than 66dB Dolby C-Type NR (W/Optional NR-100 Processor) Better than 72dB
Total Harmonic Distortion.....	Less than 0.8% (ZX Tape) Less than 1.0% (SX/EXII Tape)
Wow and Flutter	Less than 0.08% WTD peak Less than 0.04% WTD rms
Erasure	Better than 60 dB below saturation level at 100 Hz
Separation	Better than 37 dB at 1 kHz, 0 dB
Crosstalk	Better than 60 dB at 1 kHz, 0 dB
Bias Frequency	105 kHz
Erase Frequency	52.5 kHz
Input (Line)	50 mV, 50k ohms
(Microphone)	0.2 mV, 10k ohms
(Noise Reduction)	100 mV, 50k ohms
Output (Line)	1 V (400 Hz, 0 dB, Output control at max.), 2.2k ohms
(Noise Reduction)	100 mV, 2.2k ohms
(Headphones)	45 mW (400 Hz, 0 dB, Output control at max.), 8 ohms
Power Requirements	100, 120, 120/220-240, 220, or 240V AC, 50/60 Hz (according to country of sale)
Power Consumption	60 W (max)
Dimensions	527(W)x258(H)x322(D) millimeters 20-3/4(W)x10-5/32(H)x12-43/64(D) inches
Weight	Approx. 19 kg (41 lbs 14 oz)

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