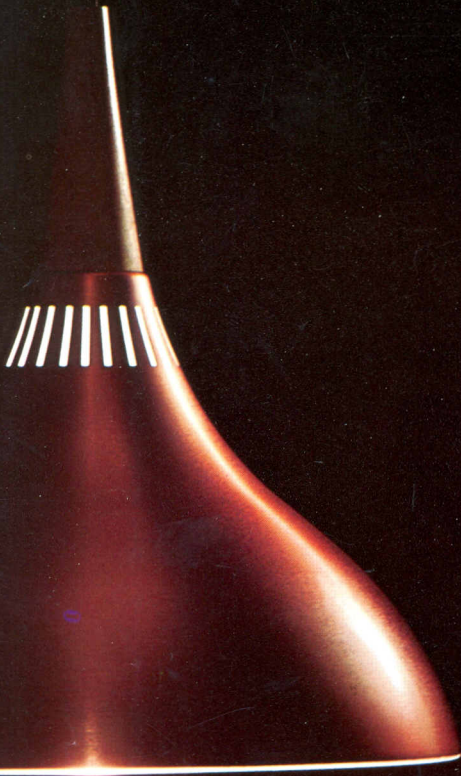




# Nakamichi 600

2 head cassette console



# FREQUENCY RESPONSE: 40—18,000Hz ± 3dB

## 3% DISTORTION AT +7dB RECORD LEVEL (Ref:400Hz,0dB=200nWb/m)

Fantastic claims for a two-head cassette deck? Perhaps so, but they are, in reality, guaranteed minimum specifications for the Nakamichi Model 600 Cassette Console.

The 600 is yet another example of Nakamichi's philosophy: to challenge the unimaginable; to do only that which only Nakamichi can do.

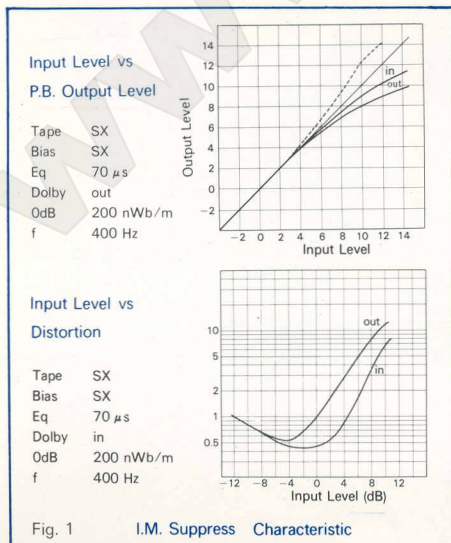
Like other Nakamichi cassette decks the 600 offers performance associated not too long ago with only top quality open reel tape decks, and from this standpoint it represents a high-value-per-dollar investment. The best part, though, is that the 600 is only the beginning of a new series of Nakamichi products (including the Model 610 Control Preamp) that will permit a degree of creative flexibility never before attainable with non-professional tape recording equipment, cassette or open reel.

If you find the features and performance described in this brochure slightly difficult to believe, please examine and audition a Nakamichi 600 at your Nakamichi dealer in the very near future.

### INCREASED DYNAMIC RANGE



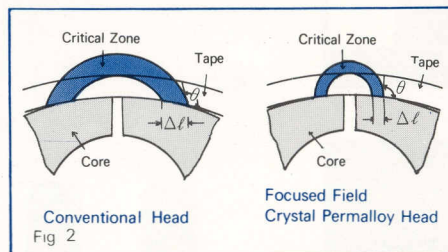
Most cassette decks on the market today offer little to no recording headroom (the ability to record high level signals without distorting) mainly because their heads are inferior. Many manufacturers "cover up" for this deficiency by using certain methods, the most well known of which are arbitrarily setting the "0 dB" point on the meters a few dB below Dolby reference level (200 nanowebers per meter), and altering the frequency response of the meters so that they are more sensitive to the



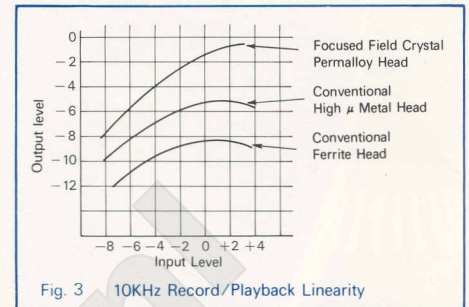
higher frequencies. These "tricks" are virtually never found on open reel machines because the higher tape speeds provide ample headroom. Neither are these methods employed on Nakamichi cassette decks for the same reason: Nakamichis, unlike other cassette decks, have headroom. Thanks to our focused-field crystal permalloy head, the true peak indicating meters and the unique Intermodulation Suppressor circuitry, one can record the majority of program material with midrange peaks reaching full scale meter indication, which in the case of the 600 is an unprecedented +7 dB (0 dB=200 nW/m)! The I.M. suppressor allows recording at higher levels than normally possible by reducing, during playback, the saturation and distortion one encounters at high recording levels. It works on the principle that the saturation and distortion characteristics of any given tape are predictable and, therefore, can be reduced using special compensation techniques (see Fig. 1). The resulting increase in dynamic range can be appreciated as a dramatically improved signal-to-noise ratio.

### EXCEPTIONAL FREQUENCY RESPONSE

While other cassette deck manufacturers have been content with the upper frequency response limit of 15,000 Hz, Nakamichi has always aimed for response exceeding the very limits of human hearing. Although frequency response to 20,000 Hz was achieved a few years ago with the introduction of our three-head cassette decks, it was not until the Nakamichi 600 that such prodigious performance could be expected of a two-head cassette recorder. The guaranteed minimum specification for the 600 is 40—18,000 Hz ± 3 dB at a recording level of 20 dB below Dolby reference (0dB=200 nanowebers per meter). This kind of performance is not the result of electronics wizardry. It is, once again, the unique Nakamichi focused-field crystal permalloy record/playback head that accounts for the excellent frequency response, dynamic range, etc.



In order to maximize record/playback performance it is necessary to utilize the entire thickness of the magnetic tape coating while minimizing the area of the critical zone during the recording process (see Fig. 2). In more specific terms, for proper recording the angle  $\theta$  must be very nearly a right angle ( $90^\circ$ ), and the thickness  $\Delta l$  must be minimized. Conventional



heads, as can be seen, do not meet these criteria nearly as well as the Nakamichi focused field head. As a result, the conventional heads produce higher distortion and are unable to properly record the higher frequencies.

For optimum playback performance it is necessary to utilize a head with a critically narrow gap (1 to 1.5 micron). Conventional heads with physical gaps of 1.5 microns actually exhibit magnetic characteristics of heads with much wider gaps (usually on the order of 2 microns or more). This widened "effective gap" is caused by stresses imposed on conventional heads during their manufacture. The micro-precision assembly techniques developed and used exclusively by Nakamichi ensure little to no discrepancy between physical and effective gaps thereby ensuring superior high frequency playback performance (see Fig. 3).

### OUTSTANDING TRANSPORT STABILITY

It should not be necessary to make an issue of the mechanical excellence of the Nakamichi 600. Like all Nakamichi Cassette Decks, the 600 employs a precision transport of proven stability and reliability. While it has recently become "In Vogue" to devote much advertising copy to low wow-and-flutter figures, Nakamichi Cassette Decks have always been guaranteed to meet wow-and-flutter specifications which a few short years ago were unattainable except on the very finest open reel machines. The Nakamichi 600 is guaranteed to have less than 0.12% wow-and-flutter measured using the DIN 45507 weighted peak method. Nakamichi has always specified wow-and-flutter in DIN standard weighted peak because it is our opinion that the weighted RMS (WRMS) method, which has become prevalent of late, is less meaningful than the former. Weighted peak correlates more realistically to the ability of the human ear to detect wow-and-flutter. In terms of WRMS, the 600 has less than 0.08% wow-and-flutter, a more impressive but less useful specification since two machines with identical WRMS figures can have widely different weighted peak figures. The Nakamichi 600, furthermore, employs a highly stable DC servo motor drive system that delivers constant and accurate speed regardless of fluctuations in line voltage or frequency. This kind of stability cannot be achieved with the AC motor drives often found in other cassette decks.

## SPECIAL FEATURES

### 1. Separate Bias and Equalization Switches

The ability to switch bias and equalization independently is uncommon among cassette decks. It allows the more advanced cassette enthusiast to experiment with various settings and choose the combination that will yield the desired performance with any one of the many high quality cassette tape formulations on the market today. With our EX II tape, for example, one may choose to utilize the 70 microsecond equalization (for high coercivity tapes) with the EX bias instead of the conventional 120 microsecond equalization. In this manner, one can "juggle" the parameters to achieve a significant improvement in signal-to-noise ratio by sacrificing a certain amount of high frequency headroom.

### 2. Built-in 400 Hz tone and record level calibration controls

The Dolby noise reduction circuitry in the Nakamichi 600 is a highly sophisticated network requiring critical calibration for proper performance. Any mismatch between the record and playback levels can cause audible coloration. Since the many different cassette tape formulations currently on the market vary in output (sensitivity), the 600 provides user adjustable record level calibration controls and a built-in low distortion 400 Hz oscillator to ensure that a tone recorded at 0 dB will play back at 0 dB ( $\pm 1$  dB).

### 3. User adjustable bias

With so many different types of cassette tapes now on the market it is virtually impossible to determine one or two bias settings that will be appropriate for all formulations. This is especially true with Nakamichi cassette decks because of their excellent frequency response. Although most users will decide on one or two tapes for all of their recording, it will occasionally be necessary to readjust the bias to a new type of tape. The Nakamichi 600 provides front panel bias calibration controls for that purpose.

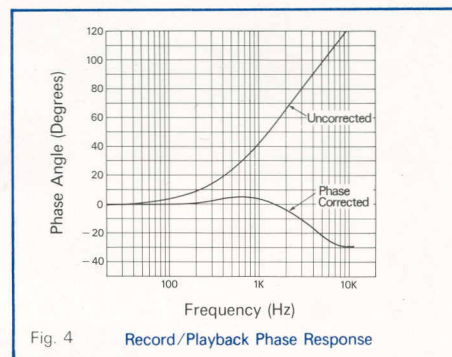
## SUPERIOR PERFORMANCE WITH DOLBY

Cassette enthusiasts are perhaps well aware of the fact that most cassette decks exhibit a severe deterioration of high frequency record/playback response when the Dolby noise reduction circuitry is activated. For this reason most manufacturers give the frequency response specification for their machines with the Dolby off. Nakamichi cassette decks are guaranteed to meet or exceed the specified frequency response with or without Dolby. How is this possible? It is not only that the Dolby circuitry found in Nakamichi equipment is of the highest quality and sophistication. In order for the Dolby system to go about its function of reducing tape noise without otherwise affecting

the recorded material, the tape deck itself must perform impeccably. The Dolby system, in other words, can exaggerate the deficiencies of an inferior tape recorder. A machine with inadequate high frequency headroom, for example, will "fool" the Dolby circuitry into misbehavior (it's actually the machine and not the Dolby that is misbehaving): the lack of headroom during record will result in a tape with less than the full boost provided by the Dolby Record circuit; the tape will, nevertheless, receive the complete attenuation of the Dolby Playback circuit because the Dolby circuit has no way of "knowing" that the tape deck suffers from insufficient headroom. The result is that all-too-common deterioration of high frequency response. Nakamichi cassette decks and some of the better open reel decks have shown that a properly functioning Dolby system can never be faulted for reducing highs or otherwise coloring the sound.

## PHASE CORRECTION CIRCUITRY

Phase shift has long been accepted as an inevitable by-product of the tape recording medium. Certain types of phase shift, however, are particularly audible because they manifest themselves in ways other than as pure phase shifts. If the harmonics of a musical tone, for example, were shifted in phase relative to the fundamental frequency, the audible result can be a slight drop in the level as well as a subtle change in the quality of the tone (see diagrams). In addition, however, the same phase shift will cause the Dolby and I.M. Suppressor circuits to err in the processing of the signal. The colorations at this point can no longer be termed subtle. The Nakamichi 600 incorporates phase correction circuitry that eliminates the colorations caused by phase shifts. (see Fig.4)



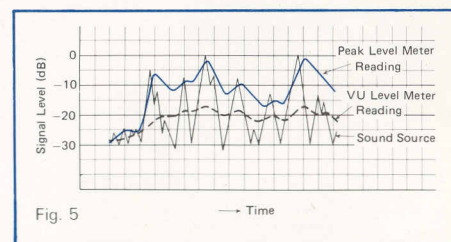
## BUILT-IN MPX FILTER

The recording of FM Stereo broadcasts can be a problem when using a Dolbyized tape deck without a multiplex filter. The presence of the 19 kHz FM Stereo carrier signal will cause the Dolby circuits to "mishandle" the higher frequencies of the program material. This is true, incidentally, with decks that cannot respond as high as 19 kHz because the Dolby circuitry processes the signal before it reaches the record

head. The MPX filter switch on the front panel of the Nakamichi 600 will, at the user's choice, activate a network that filters out the 19 kHz signal.

## PEAK READING METERS WITH 47dB RANGE

As can be seen from Fig. 5, normal VU meters simply cannot accurately indicate the musical peaks of any given program material. Depending on the type of music, therefore, it is quite possible with normal VU meters to record at levels high enough to saturate the tape and distort the peaks. The Peak Level meters on the Nakamichi 600 have an exceptionally fast rise time coupled with a slow decay time, making them accurate indicators of musical peaks and very easy to read. The expanded scale, furthermore, gives useful readings throughout the entire dynamic range of most musical sources. Combined with the 600's superior headroom characteristics, the Peak Level meters aid the recordist in achieving consistently low-noise distortion-free recordings.



## UNPARALLELED OPERATING CONVENIENCE

### 1. Front panel access

As the recordist advances his knowledge of the art, the quest for perfection will bring about the desire to have one's recorder exactly "tuned" to the type of tape in use. The Nakamichi 600 will appeal to such perfectionists since the bias, record level and I. M. Suppressor calibration controls are all located on the front panel. This eliminates the need to reach behind or disassemble the deck for these more advanced maintenance operations.

### 2. "Human Engineered" operating angle

The angled panel design is largely responsible for an ease of operation and maintenance that should be experienced.

### 3. Memory Tape Counter

Recording from the middle of a cassette? Set the counter to "000" and activate the Memory. When the recording is complete, push the REWIND button, and the 600 will "find" the starting point automatically.

### 4. Master Input Level Control

Once the proper balance between the left and right channels has been set using the left and right input level controls, the overall record level may be adjusted simultaneously for both

channels with the Master Input Level Control. Fade-in and fade-out effects are also facilitated by this control.

### 5. Unattended Record or Playback with external timer

The 600 has been designed so that unattended recording and playback may be performed with the addition of a conventional electrical appliance timer. (See Fig. 6)

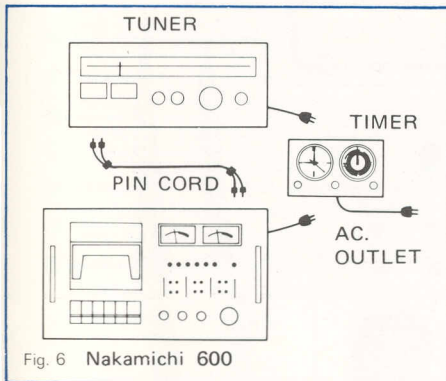


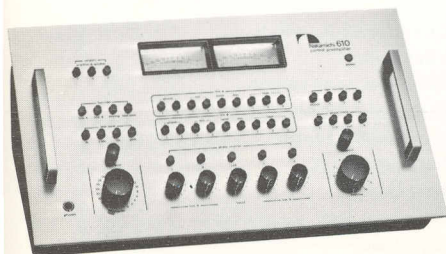
Fig. 6 Nakamichi 600

### HIGH RELIABILITY DESIGN AND CONSTRUCTION

The highly attractive yet functional exterior of the Nakamichi 600 is matched internally by the beauty and reliability of plug-in circuit boards. The lack of hand-wired components is truly astonishing for a machine with so many circuits of high complexity. The transport mechanism represents the latest of many generations of innovative refinements that add up to high performance and long life. All electrical and mechanical parts are of the finest grade.

### LIVE RECORDING WITH THE 600

The 600's unquestionably superb performance makes it a natural choice for live cassette recording. The Nakamichi 610 Control Pre-amplifier allows the stereo mixing of any five of 19 separate inputs including five wide dynamic range low impedance microphone inputs. The combination of the 600, the 610 and high quality microphones, such as the Nakamichi Electret Condenser and Studio Condenser microphones, will permit the live recording enthusiast to make recordings of undeniably professional quality. The entire system, furthermore, will become an invaluable tool to the creative recordist who demands flexibility as well as uncompromising performance.



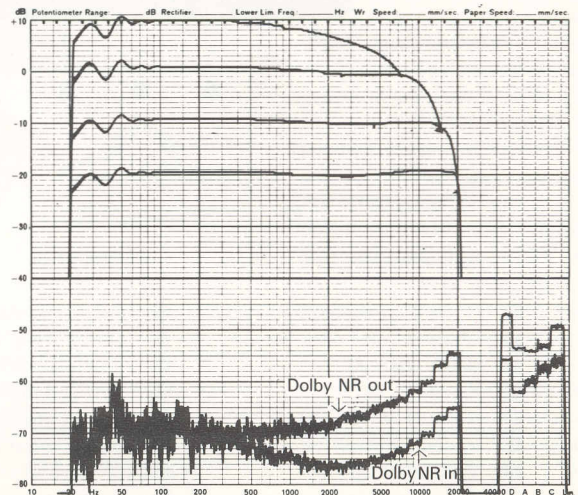
### Specifications

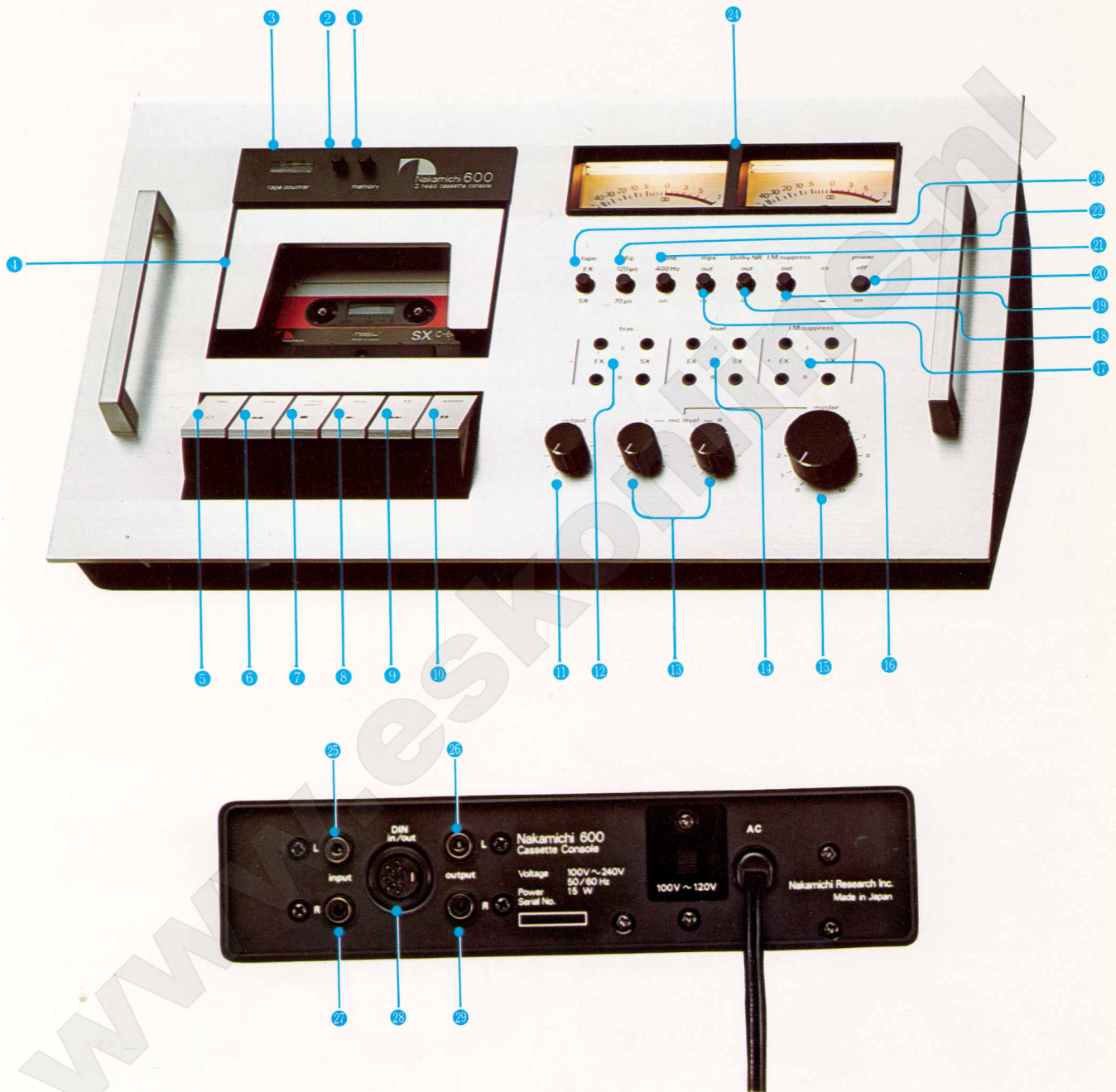
Power Source .....	100-117/220-240V 50/60 Hz
Power Consumption .....	15 W Max.
Tape Speed .....	1-7/8 ips. (4.8 cm/sec.) ±1%
Wow and Flutter .....	Less than 0.12% WTD Peak
Frequency Response .....	40-18,000 Hz ±3 dB (SX, EXII Tapes, -20 dB Rec. Level)
Signal to Noise Ratio .....	Better than 60 dB 400 Hz, 0 dB WTD rms. (Dolby In, SX Tape, WTD) .....
	Better than 68 dB 400 Hz, 3% THD WTD rms. with IM Suppressor
Total Harmonic Distortion .....	Less than 1.5% 400 Hz 0 dB Less than 0.5% 400 Hz 0 dB with IM Suppressor-In (SX, EXII Tapes)
Erase .....	Better than 60 dB below saturation level at 1 KHz
Separation .....	Better than 35 dB, at 1 KHz, 0 dB
Crosstalk .....	Better than 60 dB, at 1 KHz, 0 dB
Bias Frequency .....	105 KHz
Transistors .....	57
Diodes .....	27
IC's .....	1
Input .....	60 mV, 50 K ohms
Output Level .....	580 mV (400 Hz, 0 dB, Output Level at Max)
Dimensions .....	15.75 (W) x 6.70 (H) x 9.33 (D) inches 400 (W) x 170 (H) x 237 (D) mm
Approximate Weight .....	14.3 lbs (6.5 Kgs)

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

### Nakamichi 600 Frequency Response Noise Level

Tape	SX
Bias	SX
Eq	70 μs
T.H.D.	1.2%
	(I.M. Suppressor out)
OdB	200 nWb/m)





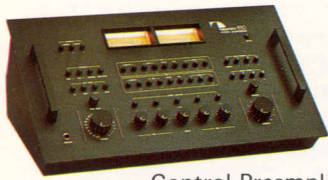
- 1 Tape start memory
- 2 Tape counter reset button
- 3 Tape counter
- 4 Cassette lid
- 5 Record button
- 6 Rewind button
- 7 Stop/eject button
- 8 Play button
- 9 Fast forward button

- 10 Pause (momentary stop) button
- 11 Output level control
- 12 Bias calibration controls
- 13 Left and right input level controls
- 14 Record level calibration controls
- 15 Master input level control
- 16 I.M./suppressor calibration controls
- 17 MPX filter switch
- 18 Dolby noise reduction switch

- 19 I.M. suppressor switch
- 20 Power switch
- 21 400Hz test tone switch
- 22 EQ (equalization) selector switch
- 23 Tape selector switch
- 24 Peak level meter
- 25 Input jacks
- 26 DIN in/out jack
- 27 Output jack



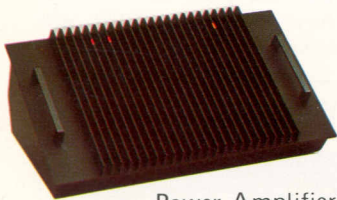
2 Head Cassette Console 600  
Black Version



Control Preamplifier 610  
Black Version



Control Preamplifier 610



Power Amplifier 620



SYSTEM-ONE Rack Mount  
with Program Timer

### Nakamichi Cassette Tapes and Demagnetizer

All Nakamichi cassette tapes are single coated formulations that feature extra quality control for superior consistency, and jam/skew resistant micro-precision housings. They are available in C-60 and C-90 lengths.



#### SX Tape

A high coercivity/high resolution formulation of ionized cobalt on gamma ferric oxide — utilizes 70 microsecond equalization for the best possible signal-to-noise ratio — features low abrasion and very high output.



#### EX II Tape

A high-density/high-output/ low-noise ferrico-balt formulation featuring excellent overload characteristics for an unusually wide dynamic range — utilizes EX bias and is intended for use primarily with the standard 120 microsecond equalization.



#### EX Tape

A pure ferric high-output/low-noise formulation with superior consistency and wide dynamic range — for use with 120 microsecond equalization.



#### Demagnetizer

A specially designed demagnetizer featuring built-in power switch and exceptional ease of use with cassette recorders.

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