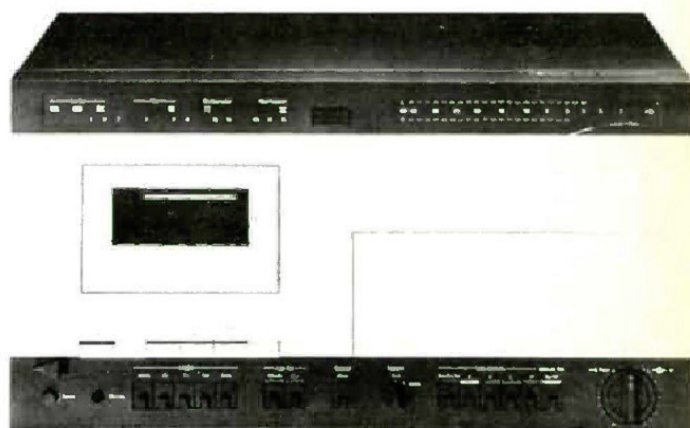


NORMAN EISENBERG AND LEN FELDMAN

## Nakamichi 700ZXL Cassette Recorder

**General Description:** The Nakamichi 700ZXL is "one step down" from the model 1000ZXL (*MR&M*, June 1981). It weighs about eleven pounds less, and it is priced somewhat lower, but it retains most of the features of the model 1000ZXL. It is, most observers agree, more stylish-looking than the 1000ZXL. The 700ZXL has the self-calibration process known as "A.B.L.E." which stands for azimuth, bias, level and equalization, and which is accomplished automatically by microprocessor. In the 1000ZXL, this process included the deck's ability to automatically identify generic tape types. In the 700ZXL the user must operate a tape-selector switch and an EQ switch before the A.B.L.E. process begins. Another difference between the two decks is that the 1000ZXL has a control that permits the operator to deviate from what the deck's built-in "brain" regards as the optimum bias setting for a given tape. In the 700ZXL that control is missing, and so the main criterion for optimum bias becomes, in accordance with the deck's design philosophy, that setting which provides the widest and most linear frequency response.

In other respects the two decks are quite similar. The three heads (erase, record and play) are physically as well as electrically discrete, and azimuth adjustment of the record head is provided as part of the "A.B.L.E." feature. Also included in the 700ZXL is the "RAMM" (random access music memory) feature which may be used to record an inaudible signal on the blank portion of tape between selections, or during a given selection, which then may be used to program the machine for desired stops and starts. A memory option permits locating the start of any selection and to automatically play or repeat it. The logic-controlled transport is operated via feather-touch buttons with fast button options between any modes. A cueing facility is provided



for hearing a tape when in rewind or fast-forward—it is engaged by pressing the pause button after having activated rewind or fast-forward.

Calibration data for four different tapes, as well as noise-reduction data, can be stored in the deck's memory; the memory functions on batteries when AC power to the deck is removed.

The front panel has four main sections. Across the top are the indicators for automatic calibration, tape type, playback EQ, noise-reduction, four-figure digital tape counter and LED signal level display which is calibrated from  $-40$  to  $+10$  dB.

The large left-half center of the panel contains the cassette compartment with the transport buttons below it. To the right are various controls including: playback pitch; timer (for unattended record or play with an external timer); memory; a blend mic level control for a mono center microphone which also can be mixed with the other level controls; separate level for left and right microphones; output level; main tape selector; main EQ selector (70 or 120 usec); noise-reduction selector; built-in test tone switch (400 Hz for use in level calibration with other audio components); filter for MPX and subsonics.

Across the bottom of the panel are the main power switch; headphone jack; the RAMM controls; the auto calibration controls; the counter reset button; the source/tape monitor switch; the tape data memory controls; a button for setting playback EQ or noise-reduction manually; and finally, the line input controls for left and right channels.

The rear of the deck contains three microphone jacks (left, right, center); line in and out jacks; a special jack panel for interfacing an external noise-reduction system; the compartment for the memory batteries; an AC voltage selector; two remote control connectors for the tape transport and for the RAMM system; the power cord; a grounding terminal.

**Test Results:** Performance of the Nakamichi 700ZXL was generally similar to that of the 1000ZXL, with the costlier version just nosing out the new model in some areas, although the 700ZXL actually had a lower wow-and-flutter measurement. Be that as it may, the 700ZXL did confirm or exceed its published specifications, and operation through all its options and functions proved flawless.

With the "A.B.L.E." activated, the deck was measured for various parameters. For the  $-3$  dB point, response at the  $-20$  dB level went to beyond 25 kHz for all three tapes tested (Nakamichi EX, ferric oxide; SX, chrome-equivalent; ZX, metal). The results are shown in Figures 1, 2 and 3.

We were provided with Nakamichi's new noise-reduction add-on accessory—on of the first Dolby-C units to hit the market. While its use with the 700ZXL does not, of course, tell us any more about the deck itself, we found it interesting to compare frequency response tracking with, and without, Dolby-C in the circuit. We did so using an expanded scale on our Sound Technology display (2 dB per division as opposed to the usual 10 dB per division). The results, shown in Fig. 4, indicate that inserting the Dolby-C caused no more than about 1 dB of mistracking as compared with the response obtained without Dolby-C. Do not be upset by what seem to be

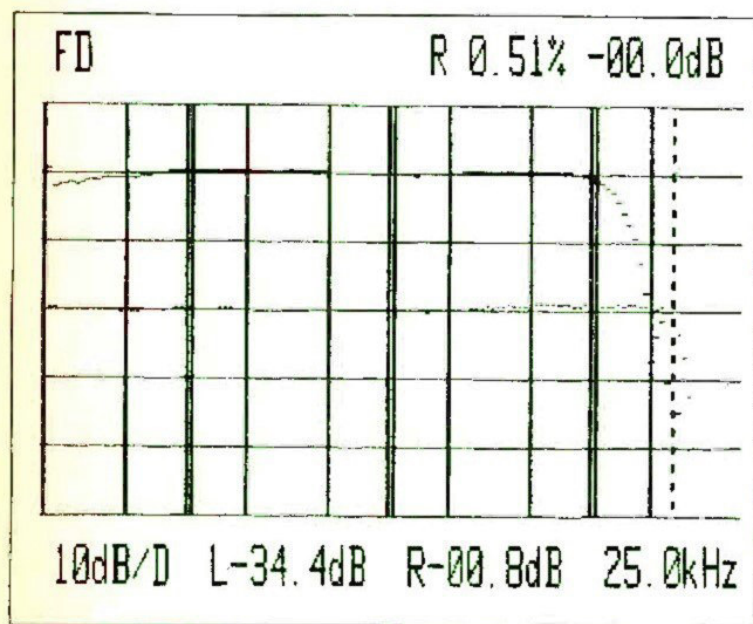


Fig. 1: Nakamichi 700ZXL: Frequency response at 0 dB and  $-20$  dB (Nakamichi EX tape).

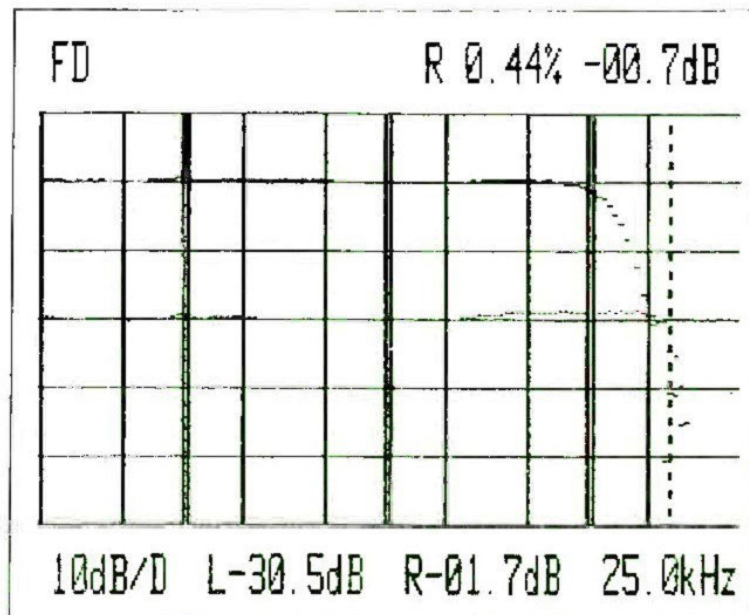


Fig. 2: Nakamichi 700ZXL: Frequency response at 0 dB and  $-20$  dB (Nakamichi SX tape).

poor response curves in Fig. 4—remember, the vertical scale here has been greatly expanded in order to observe minute differences between the two curves.

Figures 5, 6 and 7 depict 3rd-order distortion levels of the three tapes used in our tests as a function of recording levels. The levels increase from left to right, with "0 dB" (or 200 nWb/m) represented by the double vertical line. Note that headroom for both the EX and SX samples was between 7 and 8 dB (re: 3% 3rd-order HD), so we have listed it as  $+7.5$  dB in the "Vital Statistics" table. The SX (metal) tape had 9 dB of headroom as shown in Fig. 7.

Channel separation from 20 Hz to 20 kHz is depicted

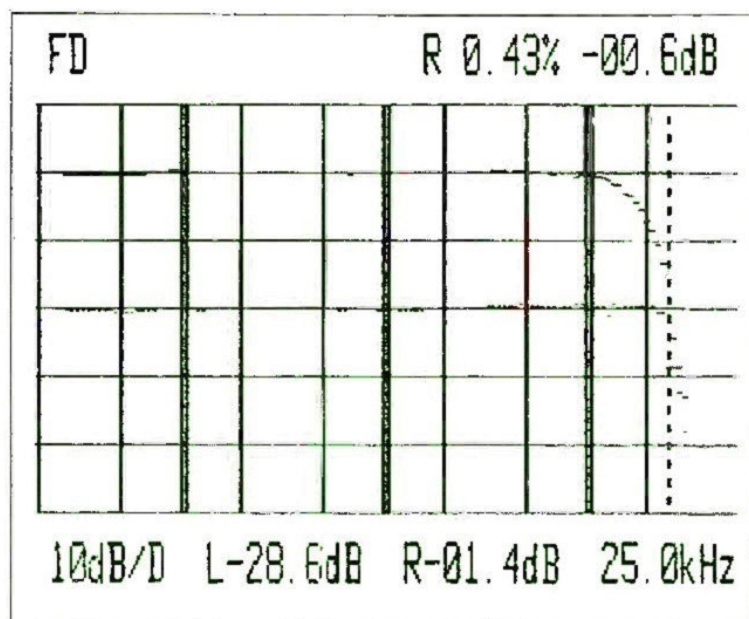


Fig. 3: Nakamichi 700ZXL: Frequency response at 0 dB and  $-20$  dB (Nakamichi ZX tape).

in Fig. 8. The cursor (invisible within the central double vertical line) is set at 1 kHz, where a separation reading of 41.5 dB was obtained, as tabulated at the lower right of the display. What is interesting about this curve is how uniform it remains over a wide range of frequencies. Even at 10 kHz, separation still reads well above 30 dB. This results directly from Nakamichi's superb tape heads, and the consistency with which correct azimuth alignment is maintained between the separate record and play heads by means of the deck's "A.B.L.E." system.

At the time we measured this unit, our test setup had not yet been equipped with its spectrum analysis feature. So we used our older general purpose spectrum analyzer to compare noise-plots for no Dolby, Dolby-B and Dolby-C in conjunction with the 700ZXL. If one needed proof that Dolby-C cuts out more noise, and works down to a lower audio frequency, simply compare the middle curve of Figure 9 (Dolby-B) with the lower curve of Fig. 9 (Dolby-C).

**General Info:** Dimensions are 19 11/16 inches wide; 10 5/16 inches high; 9 27/32 inches deep. Weight is 30 lbs., 14 oz. Price: \$3000.

**Individual Comment by L.F.:** If you're a regular reader of *MR&M* all you have to do to find out how I feel about the Nakamichi 700ZXL is to pick up the June 1981 issue in which NE and I reported on its "big brother," the model 1000ZXL. The introduction of the 700ZXL should come as no surprise to those who have followed the history of Nakamichi—that producer of the world's most magnificent cassette decks. After Nakamichi introduced its famous model 1000 in the early 1970s, it followed that achievement with a model 700 which did many of the fine things that the 1000 had done. Best of all, the 700 sold for about \$700 as compared to the original price of the 1000 which was a bit over \$1000.

Would that the new 700ZXL were again priced at

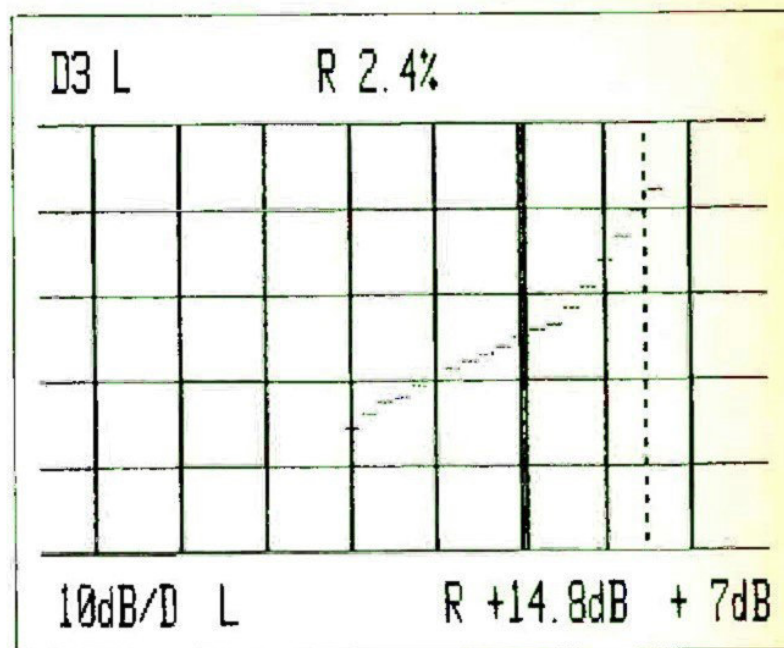
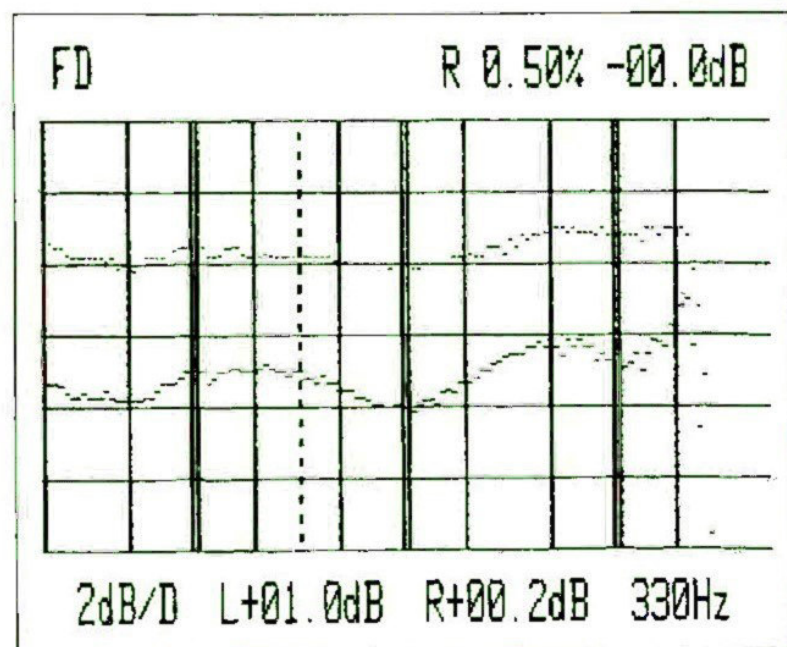


Fig. 5: Nakamichi 700ZXL: Third-order distortion vs. record level, using EX tape.

around 70 percent of the 1000ZXL. Unfortunately for many of us, that is not the case this time. The 700ZXL carries a suggested price which is only \$800 less than the \$3800 cost of the 1000ZXL. On the plus side, one gives up very few of the features of the larger model in selecting the 700ZXL and again, in my view, the 700ZXL is actually a more handsome looking unit. It does lack the ability to automatically identify generic tape types during the "A.B.L.E." process, but even the laziest of recordists should not object to having to flip a couple of switches for this function. A more serious "missing feature" (again, referring only to the bigger 1000ZXL for comparison) is the control that permitted us to disagree with what the microprocessor judged to be the optimum bias for a given tape; with that control absent, we will have to accept "flat frequency response" as the number-one criterion whether we like it or not. The "A.B.L.E."

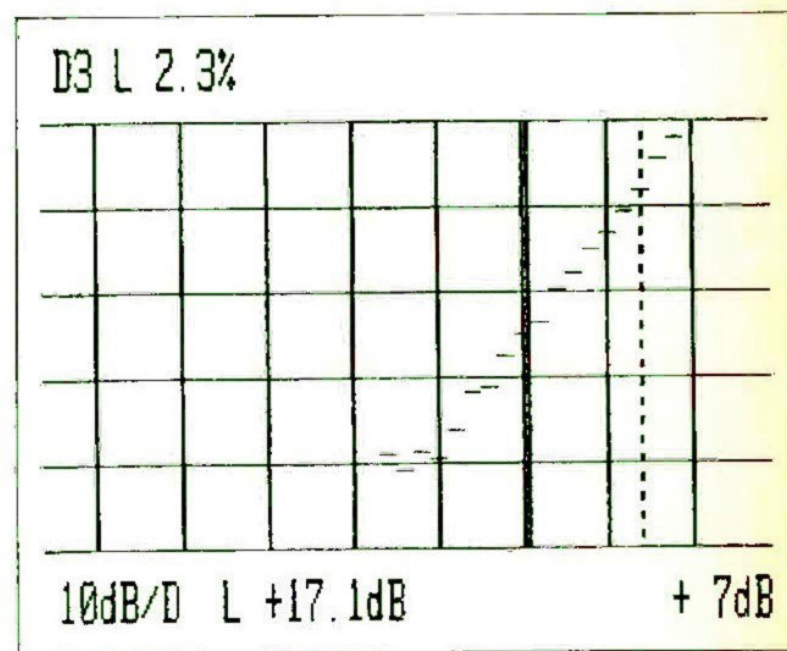


Fig. 6: Nakamichi 700ZXL: Third-order distortion vs.

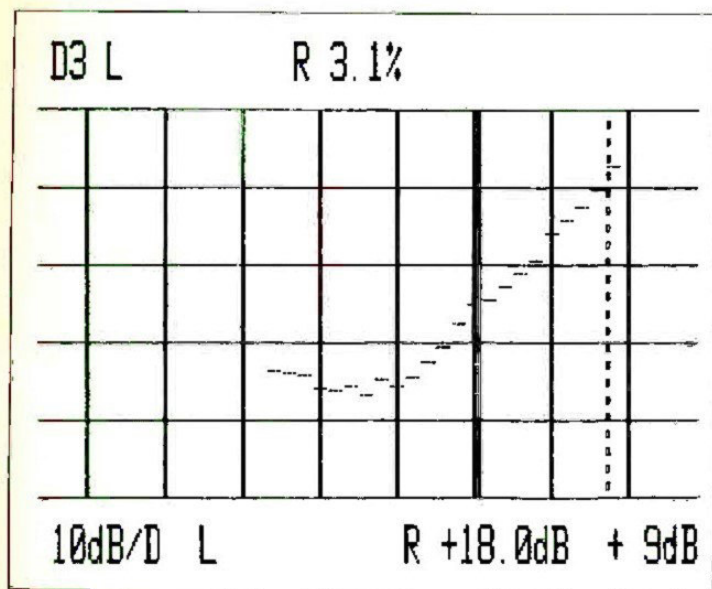


Fig. 7: Nakamichi 700ZXL: Third-order distortion vs. recording level, using ZX tape.

system really goes after that, as our test results show.

As a recordist of long musical selections, leaning towards the classics and good long jazz presentations, I am less intrigued by the RAMM system than would be the lovers of rock and pop who juxtapose many short selections on a single cassette side. Still, this system does work, it does what it's supposed to do quickly and efficiently, which is what you'd expect of any feature incorporated in a Nakamichi product.

I've recently learned that Nakamichi has built a "limited edition" version of its famed model 1000ZXL. It has a lot of gold-plated parts and lot of close-tolerance parts inside. The going price for this version is, I am told, a staggering \$6000. Faced with that kind of price, the model 700ZXL is—as they say—a real bargain!

**Individual Comment by N.E.:** The Nakamichi 1000ZXL and its "kid brother" the 700ZXL may be the world's best pair of siblings in the cassette recorder field, but "best" here actually means only a little better than many other decks costing one-third or so as much. Without a doubt, Nakamichi helped change the whole course of cassette machine development when it showed its model 1000 back in 1973, and I have said so many times in print and in conversation. But how much farther can this format be pushed? There are many who say that the cassette format, by definition, has built-in limitations, and that even when things look great "on paper" they do not necessarily translate in practical or effective terms into better sounding results.

Even if they did, that big leap in cost—from the about \$1000 level to the \$3000-and-up level—seems hard to justify except possibly for the most finicky and well-heeled devotee of the format. I am not arguing against the obvious technical excellence of the 700ZXL or the 1000ZXL. What I do question is whether or not this kind of product represents an order of technology that is overdeveloped beyond what is called for, and possibly

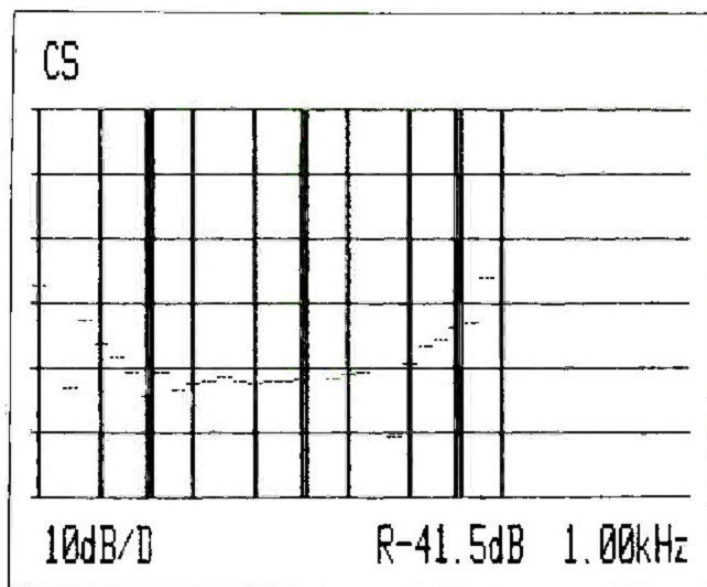


Fig. 8: Nakamichi 700ZXL: Channel separation vs. frequency.

too beyond what people can afford to pay for it.

If you can satisfy yourself that response on a cassette to 25 kHz is really an improvement over response to only 20 kHz or so, by all means go out and enjoy yourself. If you want a system to automatically find selections on a cassette, you can have it. If automatic calibration adjustments seem to you better than manual adjustments, fine—there they are. But these embellishments come at a premium price, and the question of the point of diminishing returns (or no return) does seem to come up.

Incidentally, on the Dolby-C and its improvement of S/N to better than 70 dB—in our November 1981 issue we reported on the Yamaha K-960 with built-in dbx which lifted S/N to better than 85 dB. This is not a comment on the relative quality or performance of the two decks, but it does seem to say something interesting about noise-reduction.

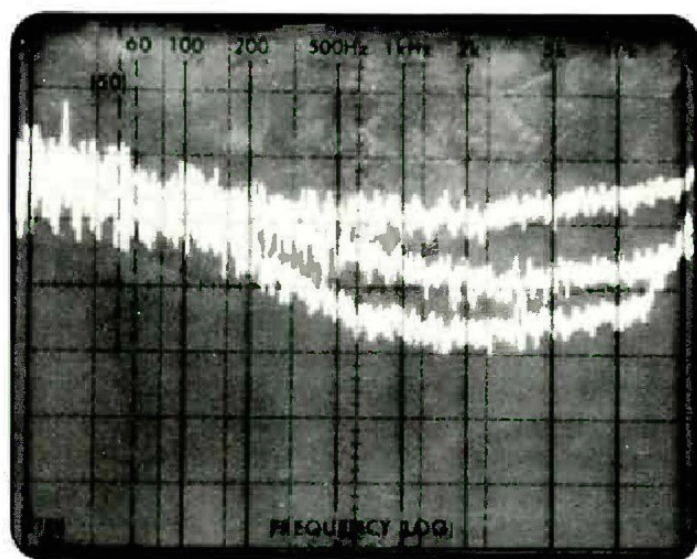


Fig. 9: Nakamichi 700ZXL: Spectrum analysis of tape noise. Upper curve taken with no noise reduction; middle curve with Dolby B; lower curve with Dolby C.

## NAKAMICHI 700ZXL CASSETTE RECORDER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response, standard tape	$\pm 3$ dB, 18 Hz to 24 kHz	$\pm 3$ dB, less than 20 Hz to 26 kHz
high-bias tape	$\pm 3$ dB, 18 Hz to 24 kHz	$\pm 3$ dB, less than 20 Hz to 25.5 kHz
metal tape	$\pm 3$ dB, 18 Hz to 24 kHz	$\pm 3$ dB, less than 20 Hz to 26 kHz
Wow-and-flutter (WRMS)	0.04%	0.033%
Speed accuracy	NA	+ 0.36% (adj.)
S/N Ratio, Dolby off (re: 3% THD record level)		
standard tape	NA	55.7 dB
high-bias tape	NA	59.2 dB
metal tape	NA	59.5 dB
Same, Dolby-B on		
standard tape	NA	65.2 dB
high-bias tape	NA	67.7 dB
metal tape	66 dB	68.4 dB
Same, external Dolby-C added		
standard tape	NA	70.5 dB
high-bias tape NA	72.5 dB	
metal tape	NA	74.3 dB
Record level for 3% THD (0 dB = 200 nWb/m)		
standard tape	NA	+ 7.5 dB
high-bias tape	NA	+ 7.5 dB
metal tape	NA	+ 9.0 dB
3rd-order distortion at 0 dB record level		
standard tape	1.0 (THD)	0.45%
high-bias tape	1.0 (THD)	0.32%
metal tape	0.8 (THD)	0.39%
Line output at 0 dB	1000 mV	930 mV
Headphone output at 0 dB	45 mW	45 mV
Mic input sensitivity for 0 dB	0.2 mV	0.2 mV
Line input sensitivity for 0 dB	50 mV	48 mV
Fast-wind time, C-60	NA	50 seconds
Bias frequency	105 kHz	Confirmed
Power consumption	65 watts	45 watts