NAKAMICHI CR-7

£1500

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With the CR-7 Nakamichi have produced a top model that for the first time makes concessions to ease of use, perhaps realising that many owners of their fabulously expensive machines are ordinary people - not professionals.

The most astonishing innovation is use of a motor driven replay head, capable of tilting left or right for azimuth correction, in order to perfectly match and play pre-recorded tapes. It moves in increments of 2.6' (minutes of arc or sixtieths of a degree) up to two-thirds of a degree in either direction from upright. This is achieved by twiddling a front panel control knob titled "playback azimuth" or, if you like, from a remote control unit! The fluorescent record level display strikingly reformats automatically to indicate position as a yellow strip that moves left or right of a centre zero position.

The system works absolutely perfectly. It has sufficient resolution to make the sound quality difference between each step barely discernable, but enough range to correct quite substantial azimuth errors in pre-recorded tapes. The stereo stage moves bodily left or right, it focusses and gains depth and clarity as the ideal position is approached and, of course, upper treble is strengthened.

Less innovatory is the adoption for the first time of automatic tape tuning, carried out by an internal microprocessor. Operation of the system is self evident. There's one button labelled "Auto Calibration". Load a blank tape, press the button and legends flash, warning that the system is operating. Fifteen seconds later the deck has been tuned and is in record-pause mode, ready to start recording. The tune process adjusts record sensitivity and bias for flat frequency response (not record eq).

After tuning a tape, there's nothing else to do, other than select Dolby, before starting recording. Automatic tape type sensing, another first for Nakamichi if not for others, enables the deck to tell whether a ferric, chrome or metal tape has been inserted, according to identification slots on the rear spine. Not unsurprisingly, there's a manual override for those who may want, say, to record chrome tape with 120uS equalisation to improve its treble overload performance.

Once tuned, the CR-7 retains all conditions in a non-volatile memory powered by a lithium battery, so nothing changes even if power is turned off for a long period.

In earlier CR-7 tests, I observed poor tune system accuracy with some tapes, due to use of a high test tone. With this new sample I was surprised to note that Nakamichi have altered the automatic tuning system to give precisely the characteristics suggested, namely a flatter upper midrange at the expense of slight treble peaking (see Fig 2). This is a useful improvement. There's enough range to cope with all tapes – even the most extreme like BASF CR-MII.

The CR-7's dual capstan transport employs direct drive to the main capstan and belt drive from its flywheel to the slave capstan that applies back-tension. Nakamichi claim lack of cogging from the direct drive motor and absence of coherent wow. By this they mean similar components from each capstan that combine to form a single, strong wow problem, usually around 6Hz.

For fear of turning this look at the CR-7 into one of those interminable lists of facilities, I have rather ignored many that Nakamichi have used for the first time on it. Here's a quick list. The tape counter now has a hub-speed sensing mechanism allied to it, from which the microprocessor can compute tape time elapsed and time remaining, in addition to a conventional but high resolution four digit count. The bright yellow fluorescent numerals of the counter can easily be seen from a distance.

There's a switchable mpx filter, subsonic filter and fader. The line inputs work into separate level controls which are normally pre-set to achieve channel balance, after which a master control is used. As with all Nakamichi's there are no mic. or DIN inputs. Microphones must be connected, via their own high quality pre-amplifiers, to the line sockets. A headphone socket is fitted, volume from it being varied by the output level control.

Output is 1V (maximum) 0VU. Music peaks from metal tape can reach +6dB above this, or 2V. This high output level can be reduced if problems occur.

As always, this Nakamichi works with silky precision and an absence of clanks and bangs from solenoids. I cannot understand why it doesn't punch-in record, when the Dragon does and I am slightly disappointed by the ergonomics of the front panel. The transport operating buttons are much smaller than usual and a bit fiddly. I note that they are larger on the remote control unit, which is possibly adequate compensation.

SOUND QUALITY

The sound quality of top cassette decks like this is very tape dependant. With tapes that give near perfect high frequency output stability, notably BASF CR-EII and CR-MII, the natural smoothness and ease of treble

quality from the CR-7 was delightful.

With every strong treble signals, the BASF chromes, especially CR-EII, got a bit soft and diffuse compared with good metal tapes, but I noticed that the CR-7 was getting a lot of midband energy onto them with little sense of muddle. BASF CR-MII was most appropriate for the deck, being a superb chrome that the CR-7 fully exploits.

Bass had a cleanliness and strength about it that is rare with cassette, due to the common problem of head saturation. Nakamichi's independant heads avoid this.

The CR-7 does not sound as bright or thin as the Dragon with pre-recorded tapes. It substantially restores deep bass that I thought was generally missing from musicassettes. There's a more tonally neutral sound with improved body and depth, similar in quality to an LP in fact. I can only assume that the improved audio circuitry Nakamichi claim to have used throughout has brought this about. I feel it is a major factor in the subjective improvement the CR-7 offers over its own stablemates.

SUMMARY

In spite of its daunting appearance the CR-7 is a lot easier to use than previous top Nakamichi's, due to inclusion of computer tape tuning and automatic tape type selection. The tilting replay head, driven by servo motors to provide replay azimuth correction, is a unique feature. An accompanying display allows assessment of azimuth error. This facility is available from remote control, in addition to basic transport functions.

Performance from the entirely separate record and replay heads was exceptional in terms of frequency response and maximum achieveable recording levels. The dual-capstan transport was equally impressive, defining what the type can do. In terms of sound quality, both from recordings and from pre-recorded tapes, the CR-7 was unparalleled.

TECHNICAL PERFORMANCE

The spectrum analysis of wow and flutter, Fig 1, confirms Nakamichi's claims over speed stability. There's very little flutter to be seen in this picture and also little sign of wow, close in to the test tone spike at right. The sharpness of the spike is due to extremely low basic speed drift, which produces wow and flutter. This is attributable to direct drive. Modulation noise was an all time low at -46dB and band flutter energy negligible at -38dB.

The CR-7 generates very little noise, hiss levels with super quiet TDK SA-X measuring an unusually low -57dB with Dolby out. This is around -3dB better than most decks.

The independent (i.e. non siamesed) record and replay heads allow very high recording levels to be used before serious distortion sets in. The IEC IV (metal) Primary Reference Tape accepted +6.5dB MOL315 above 250nWb/m flux. That's MR-X Pro hit +8dB, which is around +10dB above 0VU on the meters. Treble overload, without Dolby HX Pro, was a little less impressive at 0dB with IEC IV and +1dB with That's MR-X Pro.

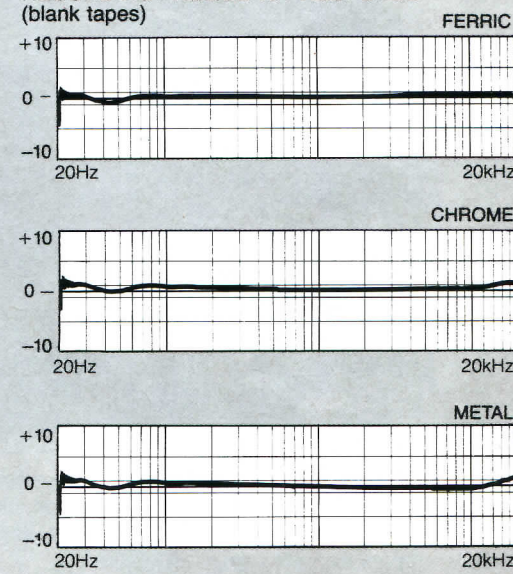
The independant heads do, however, produce less bass distortion than siamesed types, at around 0.6% against 1%-2%.

As the graphs show, recording frequency responses were flat after tape tuning. Results with That's MR-X Pro and TDK MA-X metals are depicted in Fig 2 - a high resolution frequency response analysis. Replay frequency response was equally flat also, giving fine results with pre-recorded tapes.

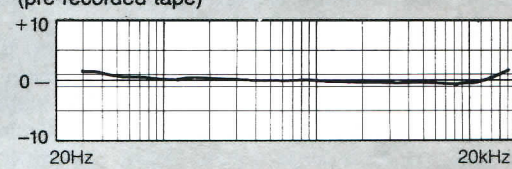
TEST RESULTS

REPLAY (pre-recorded tapes)	
frequency response (-2dB)	28Hz - 20kHz
speed accuracy	+0.5%
hiss (70uS, Dolby out)	-62dB
RECORDING (blank tapes)	
frequency response (IEC Primary Refs.)	
ferric (IEC I)	20Hz - 20kHz
chrome (IEC II)	20Hz - 20kHz
metal (IEC IV)	20Hz - 20kHz
separation (1kHz)	-54dB
distortion (315Hz)	0.2%
hiss (70uS, Dolby out)	-57dB
speed variations (DIN total)	0.04%
modulation noise (1k-3k)	-46dB
flutter energy (3k-3.13k)	-38dB
MOL/SAT (IEC Primary Refs)	315 / 10k
IEC I (ferric)	+4.6dB / -3dB
IEC II (chrome)	+1.5dB / -6dB
IEC IV (metal)	+6.5dB / 0dB

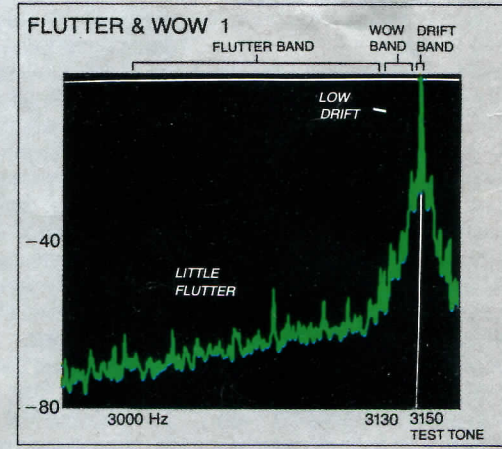
RECORDING FREQUENCY RESPONSE
(blank tapes)



REPLAY FREQUENCY RESPONSE
(pre-recorded tape)



FLUTTER & WOW 1



TAPE MATCHING 2