TRUE TO TYPE-IT'S BANG UP TO DATE

Gordon J. King enthuses over B&O's Beocord 9000 and its super-computer system which optimises the deck for any tape type. He's less ecstatic however, about Aurex's much more basic, albeit much less costly, PC-G2

How do you set a cassette deck for the best exploitation of a given tape? The answer is that there is not just one specific way of ensuring a balanced performance. There are numerous ways, each one having its own devotees. 'Best exploitation' is a bit of a misnomer, anyway, since there are several conflicting and interacting factors. In many cases the deck is set to suit the tape by adjusting its bias delivery, which is why you find a 'fine bias' control on some decks. With respect to a given tape, if the bias is increased the treble performance diminishes and the bass performance improves, while if the bias is decreased the bass performance diminishes and the treble performance improves. There is more to it than that simple law, however.

Bias apart, tape frequency response is established initially by play equalisation (eq) and record pre-emphasis, which refers to treble boost given to the recording signal to help maintain the upper frequency response. Play eq has long since been standardised at 120µs time-constant for Class I and 70µs for Classes II, III, and IV with further low-frequency tailoring corresponding to 3180µs time-constant for all classes (eg, an addition to IEC publication 94A). These eqs, however, must take account of play head losses such as gap width and tape/head intimacy which can make the effective gap width greater than the physical width. To compensate for these losses, therefore, the replay channel is often given a degree of treble lift in addition to the basic eq for the sake of the treble end. A poorly engineered head with rather large gap width can call for quite a fair amount of compensation and hence treble boost to maintain a viable upper-treble response.

The amount of record pre-emphasis is again to some extent related to the design of the head and deck. With inadequate pre-emphasis the treble response on overall record/play will tend to be droopy, while with excessive pre-emphasis the treble will tend to peak before dropping swiftly, depending on tape.

Assuming a correctly equalised deck, one way of setting it to the tape being used is to adjust the bias for equal sensitivities at, say, 400Hz and 8kHz when the recording is made 20dB below a reference level (I use Dolby reference level). On later decks with better heads an upper frequency of 15kHz can be better.

Another way is first to adjust the bias for equal LF and upper MF and then to fine-tailor the record pre-emphasis for the best upper-treble response on overall record/play. With some of the latest tapes this can be a superior way of tackling the problem provided due care is taken to avoid excessive boosting of the highs, since although this would yield a few dB more S/N ratio the record headroom would suffer.

These are, in fact, two of the ways by which the CCC (microcomputer) circuit of B&O's Beocord 9000 adjusts the deck to suit the tape being used; but to ensure that the bias is set reasonably high so as not to default the LF performance abnormally an upper-frequency of 7 kHz is adopted in conjunction with an LF signal of 333Hz for bias setting. Upper-treble is afterwards optimised for a flat response by the CCC adjusting the record pre-emphasis. Actually, as told in the review, five separate operations are handled by the CCC, which are bias separately for the left and right channels, record pre-emphasis at 17kHz, level sensitivity at 33Hz and 2% distortion referred to 0dB of the metering.

This is where the two (record and play) head sections come in. In CCC mode the record section writes suitable pulse-tones which are read approximately 85ms later by the play section. The pulse-tone from the play head is then passed to the appropriate measuring circuit which controls the calibration. In the event of an unsatisfactory result a new series of pulse-tones is written and measured until the requirements are achieved.

A remarkable thing about all this is that, regardless of the manual setting of the tape class or the class setting established by the cassette edge cutouts, the CCC will evaluate the tape and adjust the deck to the requirements of the tape itself. For example, a cassette with, say, Class II cutouts but containing Class I tape would eventually be evaluated by the CCC as Class I tape, the deck would be calibrated accordingly and the Class I indicator would light.

Moreover, to ensure that the tape is measured at a reasonably stable point along its coating it is automatically wound past the leader tape, regardless of its length, and then onto the tape proper for about a minute when the CCC button is pressed and before the calibration is commenced. After calibration the tape is automatically spooled back to the start, which would be just after the leader tape, at the start of the coating, had the cassette been fully wound on insertion. The calibration is independent of the Dolby switch setting.

Calibration commences with bias for the right channel, which is then used as the reference channel, since this is closer to the middle of the tape than the left channel and is thus free from possible edge aberrations and hence more stable. For each of tape classes I, II and IV the bias is adjusted in 16 steps of 0·5dB (48 steps in all) until the output at 20dB below full drive (full drive is where the distortion is around 2%) is the same at both 333Hz and 7kHz. Class III tape is adjusted on bias within the 16 Class I bias steps.

Left channel bias is then adjusted similarly but with a maximum difference allowance between the left and right channels of three 0·5dB steps (eg 1·5dB).

Next the upper-treble end is measured and the record pre-emphasis adjusted until the output at 17kHz is the same as in the 333Hz/7kHz range so that the overall small-flux frequency response is essentially 'flat' over the entire frequency range. Calibration commences at the lowest treble lift and rises in steps of 0·5dB, there being a total of 16 steps.

To ensure correct Dolby response integrity tape sensitivity is next adjusted, also at 20dB below full drive, at 333Hz over 15 steps each of 0·5dB. What happens is that the recording current is adjusted until the output correlates with the sensitivity reference of the tape. Calibration commences with the highest head current which is then reduced in steps until the best input/output balance is secured.

Finally the distortion output of the tape is measured at 333Hz and the sensitivity of the metering adjusted so that when the distortion is around 2% the meters indicate 0dB. For this calibration there are 30 steps each of 0·5dB. Regardless of tape type (the metering compensates for this, too) or quality, therefore, whenever you are recording you always know that when the metering is deflecting to the 0dB mark the distortion is around 2%. I made tests for this on steady-state 400Hz signal and found, in fact, that the distortion was pretty close to 2%, though sometimes veering closer to 3%, depending on tape type. Clearly, what you must avoid on the 9000 is peaking beyond 0dB on any tape, even metal. Remember that the metering sensitivity is automatically set by the CCC in accordance with the magnetic properties of the tape. Obviously, if you record below 0dB the distortion will be that much less, while if you peak above it will be higher — around 5% between +2 and +5 dB, for example.

Of course, this applies to LF signal but the included HX Professional of the deck makes sure that the bias value is kept constant under dynamic conditions which helps the HF headroom. However, if the programme material is particularly rich in HF energy and high amplitude transients a recording level below 0dB might be more favourable. With Dolby C active the noise floor will be well down, anyway, so you could record at lower levels to enhance the headroom further without attracting undue background hiss.

Now the 9000, in common with the 8002 previously examined, is equipped with a record 'lock' button which works electronically. When a tape that has been recorded to peak to, say, 0dB is played back the deflection of metering will depend on whether the record channel is open or closed. When the button is set for recording a red light shows, it then being necessary to press the recording button proper once to get the meters working (and monitoring from the headphone socket) allowing you to adjust levels and once more to get the tape rolling. When the red light shows the record channel is open but it is still possible to *play* a tape in this mode. It is also possible to play a tape with the record channel closed.

In play mode with the record channel open the metering will indicate 2% distortion when peaking at 0dB. However, with the record channel closed the metering will be different, peaking below or above 0dB depending upon the signal handling capability of the tape. If the tape has a good signal handling capacity the indication will be above 0dB, while if its capacity is poor the indication will be below 0dB. When there is no metering difference between the record channel open and closed modes it means that the tape produces 2% distortion at the flux level corresponding to 0dB on the metering. This makes it possible to see by how many dB above the 0dB magnetic flux datum (+1dB on meter = 250 nwb/m) a cassette can be recorded at LF before the distortion reaches 2% or, conversely, by how many dB below the datum for the same distortion in the case of a poor tape. The difference between the record channel on and off metering indications thus depends on the magnetic quality of a tape.

It is amazing that if you wanted to make all the CCC measurements and subsequent adjustments manually in the lab you'd need a wide range of instruments and up to a day's clear time, yet all the measurements and adjustments are performed by the CCC in about 10 seconds! Moreover, after the CCC adjustments have been made you can find out just what step numbers have been selected. You obtain these data by keying appropriate numbers on the deck's press-button panel, it then being possible to compare different tapes on each of the five parameters and, indeed, the difference in bias requirement between the left and right channels of the same tape! The step numbers are given on the deck's digital display.

The Beocord 9000 is truly a remarkable machine and one which I would like to own if petty cash wasn't so short. Finally, the entire mechanical system was developed by B&O to the last detail and is thus exclusive to B&O, not being used by decks of other make. Despite the use of a single tacho-controlled DC motor it is said that with respect to both specification and reliability the transport is equal to a three-motor system.

As already mentioned in the review, CCC stands for Computer Controlled Calibration.

TECHNIQUES & STANDARDS

CASSETTE DECKS

Ref. level corresponds to 200nWb/m (which approximates Dolby ref. level) at 400Hz.

All MOLs measured with two-tone signal of 300 + 400Hz LF, 4 + 5kHz MF and 10 + 11kHz HF and refer to the output obtained at 3% 3rd-order intermodulation distortion with respect to the reference level.

Noise weighting corresponds to CCIR/ARM

Line and mike S/N ratios taken with record level control set to approximate centre of range or with reference to 500mV line and 5mV mike.

Headroom of line and mike referred to input sensitivity (level control maximum) and expressed in dB above this, ref. 1% distortion.

Headroom of play measured direct from head with flux coupler, result corresponding to dB above standard ref. level obtained for 1% distortion.

Merit evaluated on zero to 5 scale taking account 21 lab measurements and 6 subjective assessments.

Value assessed on zero to 5 scale with respect to 'average' taking account of the price in relation to the features and general quality of construction.

TAPE CHECKS

Ref. level and MOLs as for cassette decks.

Noise weighting corresponds to CCIR/ARM

Sensitivity measured at −20dB and refers to the relative output (over the tape group) at 20dB below ref. level.

Frequency responses measured at 20dB below reference, recorded level set at 400Hz.

Distortion measured at ref. output and 400Hz on a distortion factor basis.

Dolby response integrity measured for each class of tape in parallel with the 'Dolby off' response. How this is likely to differ between tapes can be roughly assessed by comparing sensitivities.

Rank is based on a 1 to 10 scale taking account of all MOLs, distortion and noise. The higher the number, the higher the overall rank.

B&O BEOCORD 9000

THE EVIDENCE

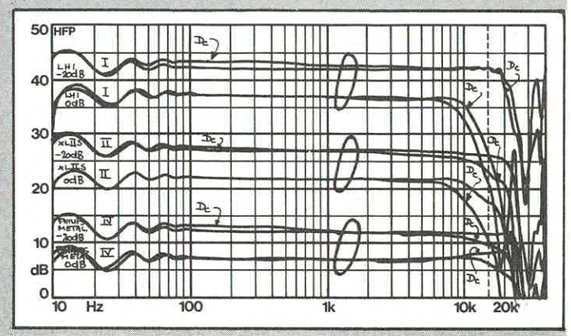
The performance bar graphs reveal that the deck is capable of high LF and MF MOLs and low DL distortion. Metal HF MOL was also high, the net result indicating that the deck can well exploit metal tape after CCC optimisation. Oxide HF MOLs were lower than might have been expected but not too dissimilar from those obtained with the different tapes on the 8002, The HX-Professional was fully examined on twin signals in the July 1981 issue and passed with flying colours, S/N ratios were also good, and both metering and metal performance ranking high merit.

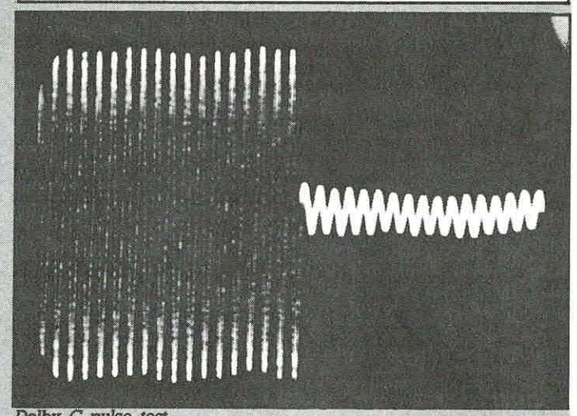
I should mention that the intrisic S/N ratios include a contribution of noise from the headphone op-amp since the headphone socket (for convenience) was used for line (aux) and mike monitoring. All head-rooms were adequate, W&F low and speed error negligible. Metering was barely a dB out on 20ms bursts compared with steady-state deflection, and as you will see the headphone output was capable of high maximum signal swings even across 8ohms.

A special test was made of Dolby C offset on bursts and the result, which is given by the oscillogram, is one of the best that I have obtained at -20dB burst recorded level. There was barely any mutilation and level change was very quick. The undulating peaks are essentially a function of the tape at this low recorded level rather than a Dolby C shortfall.

With metal tape Dolby B gave 9·8dB noise reduction using CCIR/ARM weighting, while Dolby C gave 18·3dB, which is fairly close to that obtained from other decks with correctly engineered Dolby C. Owing to the different noise spectra and the lower intrinsic noise floor of the tapes themselves, the oxides tended to gain a little less in noise reduction.

I have also presented a pen chart in addition to that in the Tape Check section which shows -20 and 0dB frequency responses each with Dolby C on and off for Class I, II and IV tapes. In all cases Dolby C integrity was good over most of the spectrum. The responses also show the extra headroom available at HF with Dolby C active. The Philips metal result is outstanding since the response goes right up to 20kHz at 0dB with Dolby C. In fact, rather than a droop there is a mild rise at 20kHz! Even BASF LHI almost makes 10kHz at 0dB with Dolby C. Although the LF extends right down to 10Hz the bass end was bugged more by undulations than the 8002, which can be put down to the different head design. The overall 'flatness' of all the -20dB responses indicates the efficacy of the CCC on the small flux performance. Noteworthy, too, is the fact that the small-flux responses extend beyond 20kHz on the best tapes.





Dolby C pulse test

TAPE CHECK

A number of different class tapes came with the review sample deck and these, along with a couple of Class I oxides specially selected for their low bias demand, were employed for the Tape Check. Apart from these low-bias Class I oxides all LF MOLs were good, with *Memorex Metal* showing the highest. The metals, too, provided excellent MF and HF MOLs, again with the Memorex Metal scoring highest overall. Best Class I oxide overall was *TDK AD*, but *Fuji FX-1* was not far behind.

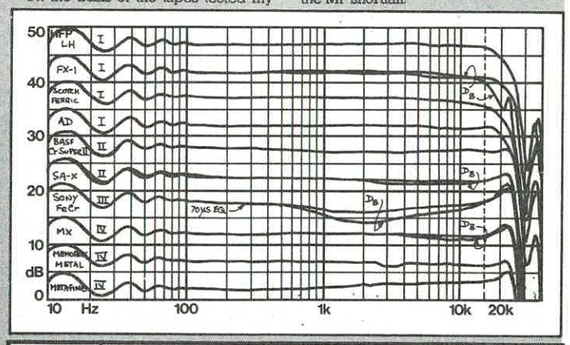
I was also pleased to find that the Class II oxides yielded very acceptabe LF MOLs on CCC, but these showed a little MF shortfall. Worst MF shortfall was from Class II tape, which also showed quite a mid-range dip on the small-flux frequency responses (this despite CCC optimisation); but this tape was good at LF and had a low noise floor. Lowest noise floor, though, went to *BASF Chromdioxid Super II*. Lowest noise of the metals tested was *Scotch Metafine*.

All tape tests were made after CCC processing, and you will see that even the modest low-bias Class I formulations (*BASF LH* and *Scotch Ferric*) were then capable of responses to 20kHz with only minimal roll-off. At the necessary low bias setting, however, the LF performance of these was not good. Also after CCC processing Dolby B integrity was good on all tapes except the Class III Sony at the mid-spectrum dip.

On the basis of the tapes tested my choice would be *TDK AD* Class I, *TDK SA-X* Class II and *Memorex Metal* or *Scotch Metafine* Class IV. I wouldn't bother with Class III myself owing to the MF shortfall.

Tape Type	Class	LF MOL (dB)	MF MOL (dB)	HF MOL (dB)	DL Dist (%)	Sen. (dB)	Noise (dB)	Rank
BASF LH*	1	+0·5	−5	−16	3	−2·8	51	1
Fuji FX-I**	1	+5	−3	−14	0·8	0·5	52·5	6
Scotch Ferric*	1	+1	−5	−16	3	−1	52·5	3
TDK AD**	1	+5·5	−2	−13	0·8	0	52·5	7
BASF Chromdioxid Super II**	2	+6	−5·5	−12	1	+1·1	56	6
TDK SA-X**	2	+5·2	−4	−12·5	0·9	+2·5	53·5	7
Sony FeCr**	3	+6	−7·5	−14	0·7	−0·4	54·5	7
Maxell MX**	4	+6	+1·5	−3	1	+0·8	51·5	7
Memorex Metal	4	+7·2	+2·3	−2·5	0·9	+1·5	51	9
Scotch Metafine**	4	+7	+1·5	−4	1	+1	54	9

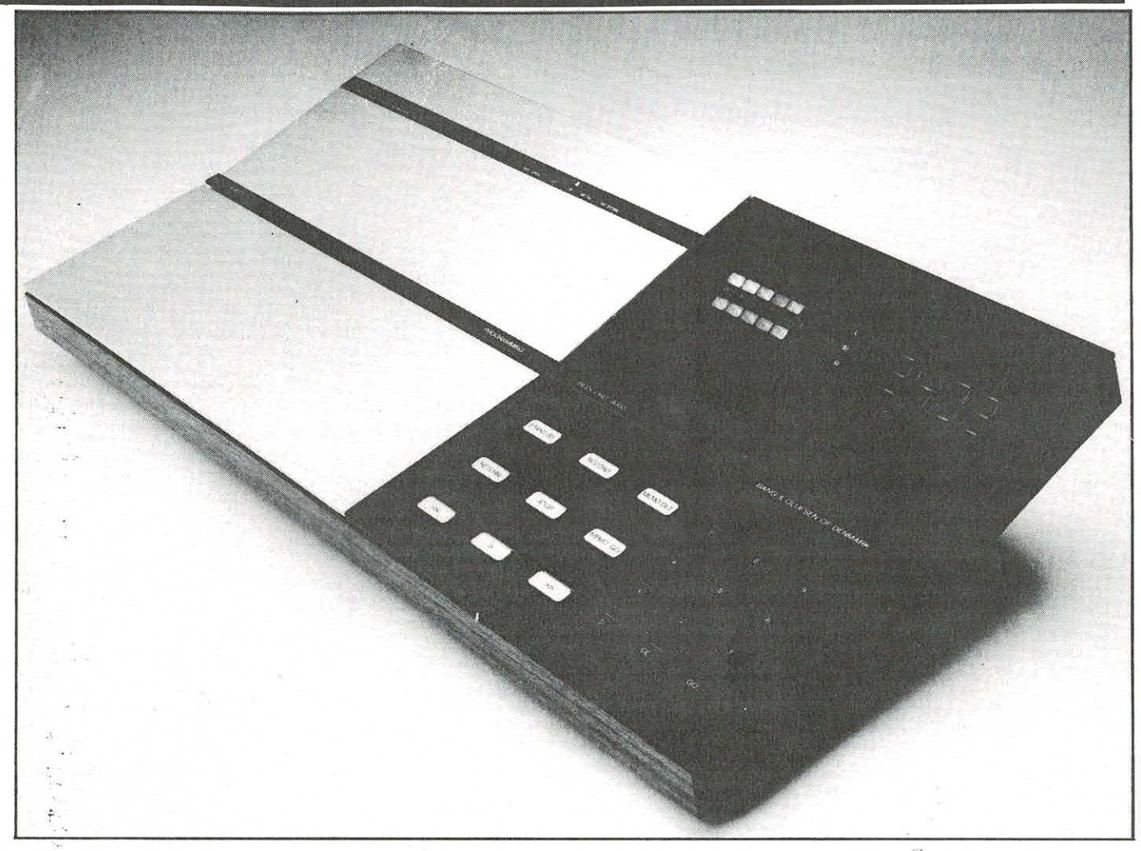
*Chosen deliberately for low bias requirement
** Supplied by B&O for tests
NOTE: All tapes biased by CCC



TECHNICAL DATA & DISTRIBUTOR

S/N ratio imp., Dolby B, av. Class 1/2/3/4: 9·5/9·5/9·3/9·8 dB
S/N ratio imp., Dolby C, av. Class 1/2/3/4: 17/16·7/15·3/18·3 dB
S/N ratio line/mic: 73·5/72·5dB. **Headroom, line/mic/play:** 46/-/≈12 dB
Replay W&F (TDK AC-342 test tape):0·08%. **Speed error:**0%
Meter reading @ Dolby lev.:0dB. **Meter under-read, 20ms bursts:** 1 dB
Dolby C 20ms pulse test: Good at −20dB. **Rewind time, C90:** 99secs.
Output, headphones, 600/200/8 ohms: 8000/6600/1000mV (to clipping)
Distributor: Bang & Olufsen, Eastbrook Road, Gloucester (Tel: 0452-21691).
*Not tested on mic but DIN amp I/P 0·35mV and headroom 46dB.
NOTE: S/N ratio includes headphone op-amp noise.

c.£800 **MERIT** ★★★★★ **VALUE** ★★★☆☆



In a way this is a sequel to my review on the Beocord 8002 which was published in the *July 1981* issue, though is complete within itself. The 9000 is identical in unique looks (also to the Beocord 8000) but is more exciting technically as will be unfolded. It retains the singularly successful Bang & Olufsen patented HX Professional (which was also explained in the above mentioned issue) and is equipped with all the computerised operations of the previous deck.

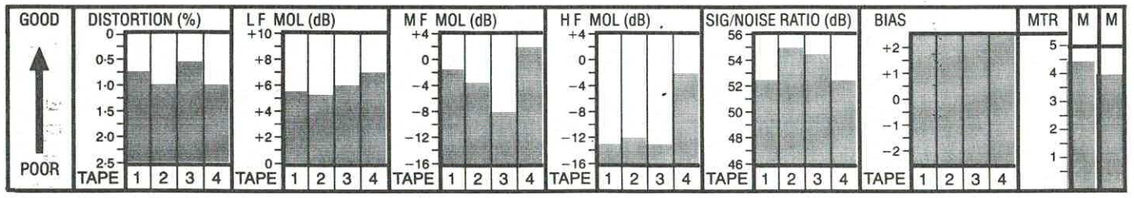
For example, you can program the deck to switch on and off for recording or play by its internal one-event clock which tells real time by large red-glowing digits. The digits also count the running time in seconds and minutes rather than by the ordinary type of arbitrary tape counter. You can key-in any particular point on the tape in terms of seconds and minutes to get the tape to fast-spool to that point for replay. It is also possible to achieve automatic spacing (4 seconds mute) between successive recordings and by the touch of a button get the tape to return to the end of a previous recording, introduce a four-second spacing and put you in position for the next take. This latter function is useful if you make a bad recording and wish to record that section of the tape again.

There are also buttons for finding the end of a tape, which can also define the leader and spool to a stable part of the oxide — especially for the computer-controlled calibration (CCC) circuit (see anon) and for indexing the tape in terms of a 'memory rewind'. The most substantial differences between the 9000 and the preceding models, however, have to do with enhanced exploitation of the tape properties; but the 'tape end time calibration' is new, along with updates to the return, memory and stop functions.

While the earlier models were equipped with Dolby B noise reduction, the 9000 gives you Dolby C in addition to Dolby B. This means that you can now achieve a theoretical 20dB noise reduction (100 times push-down of background noise power) against the 10dB (10 times noise power reduction) of Dolby B.

However, the *pièce de resistance* of the 9000 is its CCC circuit which optimises the deck to almost any quality of cassette tape. As there is quite a lot involved in this I am using my introduction this month to explain it in greater detail than possible within the compass of the review proper. Anyway, for the sake of continuity, the CCC circuit measures and adjusts the bias separately for the left and right channels, recording eq (eg, pre-emphasis), sensitivity and distortion level (*circa* 2% 3rd-harmonic distortion low-frequency referred to metering 0dB). All these things happen in about 10 seconds after pressing a button.

Amplifier interfacing is via DIN sockets, one corresponding to the DIN constant-current recording characteristic and the other labelled aux which is compatible with the record output delivered by most amplifier RCA 'phono' recording sockets. Play



B&O BEOCORD 9000

output from the amplifier socket is adjustable separately on the left and right channels by small presets underneath the deck. The 'aux' DIN socket can also be switched for mike interfacing; but also for mike on this deck you are given a standard ¼in mike jack, which resolves one of the points I brought out in the 8002 review.

Another minor criticism which I made on the earlier deck was definition of metering. I am also pleased to say that this, too, has been resolved. This is now scaled from -20 to +5 dB with ±1dB definition either side of 0dB. Metering is peak-responding and has red illuminated elements above 0dB, with 0dB corresponding to approximately 2% distortion on the replay signal. It is also possible to switch the metering so as to get an impression of the signal handling capacity of the tape in use with respect to the 0dB datum, which is all very commendable (also see my introduction).

Another very interesting feature that I must here bring to your notice is the fact that it is possible to achieve direct digital readouts of how the deck has been set to the tape being used in terms of its steps of the five CCC parameters. It is virtually a 'tape testing' machine although B&O do not like to refer to it as such!

Although it uses three heads (one for erase and a combination head with separate record and play sections), the deck is not engineered for direct off-tape monitoring. There is hardly need of this, anyway, since the distortion is actually monitored on the metering. The separate record and play head sections facilitate the CCC functions. Neither is there 'electronic' monitoring by way of the amplifier DIN socket (this being against the DIN 'laws'). However, it is possible to monitor (but still not off tape) while recording through the headphone socket, which gives plenty of signal across all impedances at a level set by a slider control. Incidentally, the head gap widths and winding impedances are arranged separately for the best results in both record and play modes. The recording section uses a Sendust head with 2·5µm and the play section a ferrite head of 1µm gap width. Azimuth error between the two sections is said to be less than 0·6 degrees, corresponding to a maximum fall of 1dB at 20kHz. The play amplifier employs special low-noise FETs. These ensure that the small signals generated by the ferrite head are lifted to viable levels without the introduction of excessive amplifier noise — essential, too, for getting the best from Dolby C.

Tape operating class is selected automatically by the cassettes themselves; but when they are not fully encoded by their edge cutouts, as is the case with Class III and some Class IV cassettes, there is a switch for manual setting; but regardless of this setting the tape is always optimised in its correct class by the CCC. The tape class indicator then lights to show this. Data from each of Class I, II, III and IV tapes can be stored so that tapes of identical magnetic properties can be used subsequently without the bother of running through the CCC procedure again. If there is something amiss with a tape, a non-store indicator lights.

Recording level is established by two adjacent and vertically disposed slider controls, one for each channel, but it is possible to move the two up or down in almost complete sympathy by using two fingers.

You will no doubt by now appreciate that the Beocord 9000 is really something and I was honoured to be one of the first testing labs to put it through its paces. It is expected to sell for around twice the price of the 8002 and hence in the order of £800.

THE FINDINGS

At the outset I must state that I was favourably impressed by the auditioning. The true quality of the source material was well maintained and not mutilated, and even with Dolby C active the 'plopping' phenomenon that I have sometimes detected on this system owing to IC offset shortfalls were not apparent on the review sample of the 9000. However, very critical listening through headphone at low recorded levels (-20dB and below) with replay amplifier level compensation brought to light very small noise modulation effects.

What it really amounted to was that you could hear the noise floor bouncing up and down triggered by music transients. This was certainly by no means bad and not detectable at normal recorded levels through speakers. Since Dolby uses a sliding band compandor system side effects are reasonably well tamed, and with Dolby C the 20dB of noise reduction (theoretical integrated noise measured with suitable weighting) is certainly worth having.

Best results on nth-degree sonic analysis using high quality master tape material obtained with metal tapes, and the 9000 is a machine that can exploit these. On most music of lesser exactitude Class I and II tapes serve remarkably well after CCC optimisation. The HX-professional was doing its stuff in this respect. As with the 8002, mild irritations were evoked by the dearth of RCA 'phono' interfacing, and to secure correct interfacing to my hi-fi test rig I was obliged to employ both the amplifier and aux DIN sockets with suitable conversions.

The headphone output provided more than adequate volume on the various headphones tried with the deck, and it was good being able to adjust the intensity to the required listening level. The deck adopts a separate mike preamplifier which worked okay on the Audio-Technica test mike. I didn't try the DIN mike interface. If you are bugged with an FM tuner or receiver which lets through a lot of pilot tone or stereo sub-channel rubbish you can switch in an MPX filter to avoid this interfering with Dolby. During my auditioning tests, however, I had no call to use this, so the filter was switched off. It was also switched off for the lab scrutiny.

It was dead easy getting the CCC to work and optimise the deck for the tape in use, and I was surprised to find how tapes sometimes require quite different bias settings between the A and B channels, which is a big point in favour of the separate biasing adjustments. I think it was this left and right channel balancing which led to remarkably faithful stereo imagery (better than the 8002, if I remember rightly) and excellent forward projection on good quality source music.

Although the deck utilises a single-motor and capstan tape transport, wow and flutter was sufficiently low as not to be subjectively apparent; in fact, even in the lab W&F readout was remarkably steady on a TDK play test tape. Overall frequency balance was excellent, with plenty of bass and upper-treble sparkle. Some listeners, though, regarded the bass as a trifle 'heavy' but always acclaimed the treble.

Metering was good to use with its fast attack and slower decay time. At first one tends to get confused over the different indications between record and play modes, depending on whether the tape is played with the recording lock open or closed, but it is certainly very useful having an indication referring to distortion or tape flux capability.

Tape transport and programming logic worked exemplarily, on the former it being possible to change transport modes without passing through stop. The various things that the programming logic can do would call for careful consideration of the instructions — but the review sample was so new that I had to find things out myself — there was no instruction booklet! Nevertheless, I was presented with a typescript of circuit operations, etc., which was useful, and I also had B&O's Mr S.K. Pramanik visit my lab prior to arrival of the deck, along with Gloucester's Peter Aldridge, so I had co-operation of the Danish Product Planning and UK technical liason.

My technical findings are given in the 'evidence' section, but before we get to this just one or two more points. Metering signals are obtained after the eq which means that metering deflection does indicate both slight bass and treble lift, which I don't personally rate as a bad thing. The inbuilt timer could be handy if you are not around at the time of a recording and provided the programme you wish to record does not exceed the running time of one side of a cassette (45 minutes for a C90). The timer can also be used in conjunction with recording from a Beomaster 8000 tuner/amplifier, for example.

THE VERDICT

It was impossible to rank the deck on my prevailing five-star scales used for more modest and significantly less costly machines. However, owing to the unique and useful features and the thought and design which have gone into them I felt that the 9000 warrants a merit ranking approaching five stars, anyway. As my 'value' scale only rises to £600, weighting corresponding to £800 would have resulted in a singularly discouraging outcome, which I felt would have been unfair to the deck. £800 is a high price to pay for any cassette deck, which is a fact; but the 9000 is a machine which would have significant appeal to the true enthusiast and state-of-art devotee. It is also one of the most sophisticated and accurate sounding to boot. Judged in these lights, therefore, my verdict is:

Merit ★★★★★
Value ★★★