

# Tape

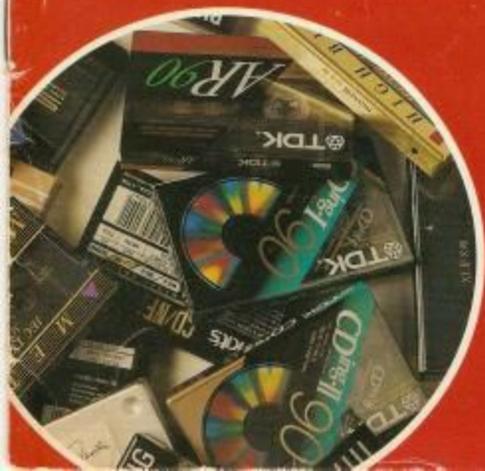
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# On test: blank audio cassette tapes



*Paul Miller has been hard at work testing no fewer than 38 new blank tapes in his laboratory and listening room, so if you've got anything between 50p and £14 to spend on a cassette read on.*

**D**igital compact cassette, MiniDisc and Digital Audio Tape are all modern, high-tech examples of magnetic recording. Yet DCC, MD and DAT have had about as much impact on good old analogue cassette tape as a kamikaze bluebottle on the M25. Long term protagonists, including Sony, Maxell, BASF, Memorex, Fuji and TDK are still going strong, holding a variety of reformulated or repackaged tapes in an increasingly competitive market.

This year we've returned to check-out the popular budget ferrics like Scotch BX, Memorex dB, TDK D, Sony HF, Maxell UR, That's RX, Fuji JP-Is and Philips FS while casting an ear over newcomers from BASF and BBC. At the other end of the scale, we've a smattering of exotic metal tapes to titillate your tape deck, including the first review of Sony's outrageous *Super Metal Master*.

There are Recommendations a plenty but less than a handful of high value Best Buys to lead the way into the 1994 season. And with tapes costing from 50p to £14 a throw, the tests prove that, in the broadest context, that you really do get what you pay for.



# How a tape is made

All tapes are most certainly not created equal. Today, there's a choice of three broad tape categories made up of ferrics (Type I), chromes/pseudochromes (Type II) and metals (Type IV).

Ferrics use a magnetic iron oxide pigment, chromes use either chromium dioxide or an enriched ferric formulation while metals employ either a pure metal or alloy pigment. Type III or ferrichrome no longer exists.

These different tape Types each have their own specific pros and cons. Metals, for example, generally sustain higher recording levels than Type IIs which, in turn, offer a wider dynamic range than ferrics. But there are broad overlaps in performance and it's not unknown for a premium ferric to surpass the technical specification of a budget chrome tape.

Meanwhile, a typical chrome Type II suffers less hiss than an equivalent pseudochrome Type II, a benefit redressed by the latter's improved output levels (headroom). Chromes are especially shy of brilliant treble detail. So while a chrome will reveal minute twists and turns within the music, it's just as likely to sound muted or compressed if bludgeoned with a raw sax solo or bright female

vocalist. Metal tapes, and even some premium ferrics, are better suited to the brighter end of the musical spectrum.

## Tape bias and equalisation:

The three tape Types are distinguished by equalisation (the amount of treble boost applied on recording) and the amount of bias required to optimise their performance. Bias takes the form of an inaudible signal (around 100kHz) that agitates the magnetic particles into accepting the musical signal that rides alongside. Without this bias signal, magnetic recording would be impossible.

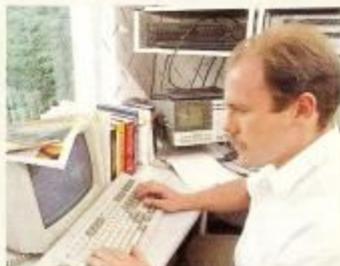
Normally your deck will apply a fixed level of bias and equalisation depending on your selection of ferric, chrome or metal tape. Versatile machines offer a variable bias control, a facility that will vastly increase the range of tapes that can be optimally accommodated.

Increasing the applied bias reduces the tape's sensitivity to treble but also reduces distortion in the bass. A natural treble boost can be brought into line by cranking up the bias slightly, but you'll also lose a little treble headroom. This is given by the SAT10k figure in our test results. Similarly, a dim-sounding tape may be brightened up by backing off the bias even though hiss may be more audible.

# How the tapes were tested:

However advanced the technology of magnetic pigments, binders and surface treatments, the technical prowess of the average blank audio tape still remains relatively crude. As a consequence, the correlation between the sound of a tape recording and its maximum output, its hiss and treble level is very good indeed. So our Best Buys and Recommendations are supported by hard-and-fast values, not just subjective opinion.

It's also worth knowing that our test procedures conform to strict IEC94 guidelines. First-generation IEC Primary Reference and Calibration tapes (including the new Type IV Reference) are used, together with a pre-calibrated Nakamichi Dragon cassette deck. All dB values refer to the nominal IEC 0dB point of 250nWb/m which is a fixed measure of magnetic flux.



## What the measurements mean:

**Sensitivity:** this is a measure of the tape's output compared with the appropriate IEC Reference at -20dB. The closer this figure is to 0dB the more compatible the tape.

**Treble level:** this is an indication of the tape's relative sensitivity, or how the tape's response deviates from the IEC Reference between 400Hz and 10kHz. Positive figures suggest a bright sound and negative figures a dull sound while any deviation from 0dB may upset the correct operation of Dolby NR.

**MOL315Hz:** this represents the Maximum Output Level of the tape at mid-bass frequencies (315Hz). The recording bias is adjusted to yield a MOL of +3dB with IEC Type I and II and +4dB with the IEC Type IV Primary Reference Tapes. The higher the figure the further it may be pushed into the red.

**SAT10kHz:** likewise this represents the maximum output or saturation point of the tape at high treble frequencies (10kHz). Most tapes will accept less treble level than at mid-bass frequencies, so SAT10k is usually lower than its MOL315Hz.

**Hiss:** the residual hiss or bias noise is measured with respect to the IEC 0dB value. Obviously, the lower the value (higher negative number) the better.

**Dynamic range:** this is the tape's window of opportunity, the usable range that extends from a carpet of hiss at one end to its Maximum Output at the other. The higher the figure, the wider the dynamic range.

**Modulation noise:** an indication of the grunge that lies directly alongside any recorded signal. Tapes with advanced mechanisms, a back-coating or a smooth surface polish will all exhibit a low modulation noise.

**Consistency:** the variation of all performance parameters between five samples of the tape under test. A 100 per cent consistency is the clear goal of every tape manufacturer.



## Best Buys and Recommendeds

Products that make the grade are awarded *Hi-Fi Choice's* unique Best Buy or Recommended accolades. This sets them apart as being capable of a higher standard of fidelity than average at a particular price.

A product carrying the Best Buy swing tag is significantly better than the alternatives in its price band. It is of excellent quality and very good value for money.

Watch out for this logo. It is your guarantee of quality.

Recommended products are also very good, but not quite in the same league as Best Buys. Despite being runners up, they are definitely worth considering, as





## BASF Sound Level I

BASF has long been perplexed by the UK market where both its audio and video cassettes have failed to garner the reputation enjoyed in Germany. Our artificially depressed retail prices are part of the problem but misjudged marketing is most certainly another.

Hence, *Sound Level I*, a basic ferric designed solely for tight-fisted UK pockets. Although the tinted transparent shell and simplified packaging look new, the tape inside is really no different from the old Ferric *Extra I*. There is the same compatible mugginess but still a hint of that fuzzy and slightly sat-upon sound to its recordings.

On the other hand, BASF has engineered a faint boost to the treble of *SLI*, reducing any feathery loss of crispness to percussion and brassy jazz. Unfortunately, the very average dynamic range and not inconsiderable price of *SLI* ensures it comes unstuck when compared with the leading budget ferrics from Sony, Maxell and TDK.

If more thought were applied to its basic chemistry rather than the style of its packaging, then BASF would have a winning ferric on its books.

Type and formulation	Type I, ferric
Sensitivity	-0.1dB
Treble level	+0.4dB
MOL315Hz	+3.1dB
SAT10kHz	-2.1dB
Hiss	-51.2dB
Dynamic range	54.3dB
Modulation noise	-39.5dB
Consistency	73%
Price (C90)	£2.49 (3 pack)

### VERDICT

#### BASF SOUND LEVEL I

- Tailor-made for optimum use of Dolby noise reduction.
- Lags the technical and sound performance of its peers.

▶ £2.49 (C90 3 pack)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## BASF Sound Level II

Enter *Sound Level II*, another repackaged version of an existing and very durable tape. In this instance, BASF appears to have pressed a variation of the original *Chrome Extra II* tape into service, housing it in a trendy *Sound Level* shell.

Incidentally, this single-layer chrome tape also forms the backbone of BASF's professional duplication business, avoiding the quirky but occasionally brilliant performance of its dual-layer *Chrome Super* and *Chrome Maxima* formulations.

Either way, the advantage of a true chrome usually lies in its very small particle size and high surface polish, properties that contribute to its equally low hiss. Unfortunately, in practice *SLII* is about 1dB more hissy than the average chrome while still suffering a frustrating intolerance of strong treble.

So if you're into bright-sounding pop or jazz then *SLII* will not be suitable. Otherwise, it still betrays a hint of the subtlety, the silky-smooth detailing and neutral balance of its dual-layer brethren.

However, it still bruises very easily indeed; the slightest error with record level resulting in flat and softened recordings.

Type and formulation	Type II, Chrome
Sensitivity	-0.9dB
Treble level	-0.3dB
MOL315Hz	+3.1dB
SAT10kHz	-6.2dB
Hiss	-58.6dB
Dynamic range	61.7dB
Modulation noise	-40.6dB
Consistency	85%
Price (C90)	£2.99 (3 pack)

### VERDICT

#### BASF SOUND LEVEL II

- Wide dynamic range at a very tolerable price.
- Avoid strong treble detail like the plague.

▶ £2.99 (C90 3 pack)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## BASF Reference Maxima TP II

The chances of BASF ever launching a pseudochrome was about as likely as the Conservative Party being elected for a fourth term. Oh, so they were. And so has BASF. The upshot is a thoroughly new top-of-the-range Type II called *Reference Maxima Top Precision*, or *TPII*.

*TPII* is a tripartite assault on the variable azimuth of conventional shells, deploying short but very close-mounted guide pins between the two halves of its welded shell. Overkill? Hardly, the variation in treble output between sides A and B of a cheap shell is often far greater than that caused by a head-azimuth error in the deck itself. Here, at least, BASF has the problem all but licked.

The sound of *TPII* is equally robust and sure-footed. Picking its way through fierce rock and pop material with all the confidence displayed by TDK *SA* or Maxell *XLII* but with a tinge of brightness. A modicum of extra bias soothes the sting in its tail, leaving BASF with a firm Recommendation.

BASF PLC, 151 Wembley Park Drive, Wembley, Middlesex HA9 8HQ. ☎ 081-908 3188

Type and formulation	Type II, doped-ferric
Sensitivity	+0.3dB
Treble level	+1.2dB
MOL315Hz	+3.9dB
SAT10kHz	-2.7dB
Hiss	-58.3dB
Dynamic range	62.2dB
Modulation noise	-44.3dB
Consistency	95%
Price (C90)	£2.29

### VERDICT

#### BASF REFERENCE MAXIMA TPII

- Advanced shell design. A rugged all-rounder with a beefy sound to match.
- Dynamic range exceeded by BASF's top chromes.

▶ £2.29 (single C90)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## BBC FX

Lending your good name to an alien product is a dicey business yet, in an effort to fill its coffers, the BBC feels this is clearly a risk worth taking. In this instance, Strand Europe has been licenced to use the BBC logo on one video and two blank audio tapes, each sourced from Korea under the watchful eye of all concerned.

Fortunately, the *FX* ferric turns out to be a very compatible and lively sounding performer. In many respects, its healthy dynamic range and love for great dollops of bass begs comparison with Philips' premium *FSX Ferro*, a tape whose specifications it matches point-for-point.

Unfortunately, the basic but trendy shell design also contributes to 2dB variations in treble output between sides. As a consequence one side might sound beefy and fizzy while the other, though beefy, is a little muted. On the whole, however, *FX* turns in a very creditable performance, one that's a little soft about the edges but always warm and exuberant.

Recommended especially for upmarket portables.

Strand Europe Ltd, Galway Rd, Blackbush Business Park, Yateley, Camberley, Surrey GU17 7GE. ☎ (0252) 861000

Type and formulation	Type I, ferric
Sensitivity	-0.2dB
Treble level	+0.6dB
MOL315Hz	+4.2dB
SAT10kHz	-1.3dB
Hiss	-51.9dB
Dynamic range	56.1dB
Modulation noise	-39.2dB
Consistency	89%
Price (C90)	£1.30

### VERDICT

#### BBC FX

- A good choice for bass-rich orchestral and rock music.
- Neither as transparent or sharp as the best ferrics.

▶ £1.30 (single C90)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## BBC CDS

Although the performance of BBC's FX ferric might have brought sighs of relief all round, Auntie Beeb has not been so lucky with CDS. Both its wide-windowed shell and budget pseudochrome formulation in fact bear a striking resemblance to the CRS-X from Memorex.

Unfortunately the shabby mechanism introduces a severe 500Hz shell flutter (caused by tape friction) which, in turn, contributes both to modulation noise (recorded grunge) and +0.8/-2dB variations in treble output. Adding insult to injury, CDS is only marginally less hissy than CRS-X, itself the noisiest pseudochrome currently on the market.

The good news is that at least CDS is both very compatible and Dolby friendly, even if its recordings lack the punch, sparkle and brilliance of the original. Furthermore, its high hiss tends to manifest itself as a fuzzy bloom rather than an aggressive fizz, ensuring that its music sounds comfortable if colourless.

New methods of generating revenue are obviously welcomed by the BBC management, but with CDS as ambassador for 'BBC approved standards', it's not really doing much for the corporate image.

Type and formulation	Type II, doped-ferric
Sensitivity	-0.2dB
Treble level	-0.3dB
MOL315Hz	+2.6dB
SAT10kHz	-4.2dB
Hiss	-56.2dB
Dynamic range	58.8dB
Modulation noise	-38.5dB
Consistency	90%
Price (C90)	£1.65

### VERDICT

BBC CDS

- ⊕ Compatible: never sounds hard or grills.
- ⊖ Limited dynamic range; Lacklustre sound; poor specs.

▶ **£1.65 (single C90)**

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Boots FI

It's something of an open secret that Boots' own-brand of audio tape is sourced from those helpful chaps at Maxell. Either way, the tinted 'oval window' cassette shell gives us a firm clue to its origins, as does my spec sheet which reads like a sample of Maxell ULR from six to eight months back.

Since its launch, FI has witnessed steady improvements in line with Maxell's own tapes. The latest version benefits from a brighter-sounding formulation thanks to its greater sensitivity at high (treble) frequencies. This subtle lift tends to offset the naturally feathery quality that plagues most no frills ferrics, cutting through its treble with a firm grip on percussion, brass and the like.

Sure enough, FI lacks the technical finesse of favourites like TDK D, Fuji JP-Is and the latest UR but it does provide a foil to beat off competition from Sony's HF. Furthermore, FI is also very much more compatible than other cheap but decidedly unconventional ferrics like Scotch BX.

And it does come in a rounded, trouser-friendly cassette case ideally suited to portable-users with tight pockets. But it's questionable whether this justifies an extra 10p over Maxell's ULR.

Type and formulation	Type I, ferric
Sensitivity	-0.4dB
Treble level	+1.4dB
MOL315Hz	+2.3dB
SAT10kHz	-3.2dB
Hiss	-52.3dB
Dynamic range	54.6dB
Modulation noise	-38.4dB
Consistency	90%
Price (C90)	£1.19

### VERDICT

Boots FI

- ⊕ Very natural and surprisingly detailed sound; a solid ferric.
- ⊖ Price mitigates against a formal recommendation.

▶ **£1.19 (single C90)**

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Boots CDII

'Ideal for CD systems' boasts the black and gold packaging of Boots' top Type II formulation. Yet, in reality, CDII is no more CD-ready than any other mid-performance pseudochrome. Its dynamic range is exceeded by the likes of TDK SA, Maxell XLIJ and BASF CSII to name but a few.

Unfortunately, CDII is saddled with a premium price, a blow to its value that's not entirely softened by one of Maxell's old-style High Resonance Proof shells.

On the other hand, Boots has specified a slight improvement in the tape's Maximum Output (MOL) and dynamic range but there's a more significant decline in its ability to soak-up the brightest of treble. As a result, CDII lies midway between older versions of SXII and XLIJ from Maxell, emerging as a somewhat softer-sounding alternative to TDK's CDing-II pseudochrome.

Nothing wrong with that, of course, but by playing a safe and unadventurous course CDII loses the sparkle and pizzazz enjoyed by its peers at a similar cost.

**The Boots Company, The Frontage, Nottingham NG2 3AA. ☎ (0602) 494161**  
**And at stores across the nation.**

Type and formulation	Type II, doped-ferric
Sensitivity	-0.2dB
Treble level	-0.7dB
MOL315Hz	+2.7dB
SAT10kHz	-4.4dB
Hiss	-59.1dB
Dynamic range	61.8dB
Modulation noise	-41.5dB
Consistency	77%
Price (C100)	£1.99

### VERDICT

Boots CDII

- ⊕ Generally very faithful and natural in balance.
- ⊖ Loss of bite and attack with rock and pop; Dull.

▶ **£1.99 (single C100)**

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Fuji JP-Is Extraslim

If the white heat of brassy jazz or the scorched lungs of a fierce female vocalist are your cup of tea then look no further than Fuji's low-priced JP-Is. No budget ferric will match its ability to blot-up those searing highs. Only Maxell's XLI-S and TDK's AR-X are man enough for the job, offering an additional boost in dynamic range at lower frequencies to boot.

Yet JP-Is throws an uncommonly bright spotlight on all musical events. It'll certainly breath new life into the dullest of portables or over-biased hi-fi decks. For faithful recordings, though you'll need a deck equipped with tape-tuning facilities.

This is an unusual requirement for such a cheap tape but otherwise JP-Is can sound too thin and bright. Sure enough, a strong bass line will still sound clear and up-beat but there's no impact to counter the forwardness of percussion.

This quirky behaviour comes courtesy of Fuji's dual-layer Beroxid formulation, placing fine particles on top of a coarser pigment to maximise output at both low and high frequencies. A clever ruse that sacrifices compatibility.

Type and formulation	Type I, doped-ferric
Sensitivity	+0.7dB
Treble level	+1.7dB
MOL315Hz	+3.0dB
SAT10kHz	+0.2dB
Hiss	-53.7dB
Dynamic range	56.7dB
Modulation noise	-39.2dB
Consistency	95%
Price (C90)	£1.15

### VERDICT

Fuji JP-Is EXTRASLIM

- ⊕ Bright, clear and arresting sound quality.
- ⊖ Needs extra tape loss to bring its enthusiastic treble.

▶ **£1.15 (single C90)**

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Fuji JP-IIx Extraslim

This, to all intents and purposes, is the Type II cousin of Fuji's JP-Is. Both employ a sandwich of doped-ferric Beridox particles but just as JP-Is is under-biased in the Type I slot, JP-IIx, by contrast, is slightly over-biased in the nominal Type II setting. Both tapes could do with a bias position somewhere between Type I and II.

In practice this is impossible, so most users will find recordings on JP-IIx sound slightly fuller and richer than the original. Ironically, this version runs out of steam some 6dB below JP-Is in the red-hot treble stakes. Yet its massive dynamic range ensures the rauciest of bass guitars, drum lines and male vocals are handled with ease. Incidentally, you'd have to shell out for the likes of Maxell XLI-S, TDK SA-X or Sony's Metal Master to exceed the dynamic potential of JP-IIx.

Unfortunately, the cheaper JP-IIx is very much more restrained than these lively alternatives, its recordings snatching at the heels of any spritely-sounding instrument. But stick to the elegant pace of a ballad or classical quartet and the true depth and detail of its bass will be revealed.

Type and formulation	Type II, doped-ferric
Sensitivity	+0.9dB
Treble level	-0.8dB
MOL315Hz	+3.7dB
SAT10kHz	-5.5dB
Hiss	-59.2dB
Dynamic range	62.9dB
Modulation noise	-39.2dB
Consistency	88%
Price (C90)	£1.89

**VERDICT**

Fuji JP-IIx EXTRASLIM

- ▶ Very powerful, rich-sounding bass; Slimline tape case.
- ▶ Can sound slightly reserved or slow with pop and jazz.

▶ **£1.60 (single C90)**

**SOUND QUALITY**

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**VALUE FOR MONEY**

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## Fuji ZII Extraslim

Spectacular packaging and a stylish matt-black 'extraslim' storage case collide in Fuji's brand new ZII 'master quality' pseudochrome. Once again Fuji is deploying its two-layer pigment to optimise the recording of low frequencies on a thick base coat and higher frequencies on a very fine top-layer.

In fact, this surface layer uses the same Beridox particles found in Fuji's S-VHS videotape, the minute particle size contributing to the lowest hiss of any available pseudochrome. Only true chromes like BASF CMII, Scotch XSL-S and Philips UCX are quieter.

In both the lab and listening room ZII behaves like an affordable version of Fuji's JP-IIx: Pro, squeezing a slightly lighter but equally entertaining sound into a more modest dynamic range.

In practice, any treble lift is sufficiently subtle to render tape tuning quite unnecessary, leaving a beautifully poised and exceptionally detailed copy in its wake.

Fuji Photofilm UK Ltd, 125 Finchley Road, London NW3 6JH. ☎ 071-586 5900

Type and formulation	Type II, doped-ferric
Sensitivity	-0.2dB
Treble level	+1.0dB
MOL315Hz	+2.9dB
SAT10kHz	-3.6dB
Hiss	-59.4dB
Dynamic range	62.3dB
Modulation noise	-40.7dB
Consistency	80%
Price (C90)	£2.39

**VERDICT**

Fuji ZII EXTRASLIM

- ▶ Recordings retain much of the detail and authority of the original.
- ▶ Despite Fuji's claims, JP-Is Pro retains a wider dynamic range.

▶ **£2.20 (single C90)**

**SOUND QUALITY**

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**VALUE FOR MONEY**

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## Maxell UR

Unlike Sony, which seems content to churn out the same old cooking-ferric formulation year after year, Maxell's first rung on the tape ladder gets slightly higher every season.

This is Maxell UR, still resplendent in the red-and-white packaging and see-through shell design that is the uniform of all budget ferrics. No change here then.

But listen a little closer and the improved stereo focus, the crisper sound of percussion and clearer diction of tricky female vocalists all start to make themselves felt.

This improvement lies with Maxell's Pure Crystal formulation which has received a 0.5dB boost in MOL coupled with a huge 2.5dB leap in treble headroom over last year's version. Its balance is slightly brighter too but, despite a marginal increase in hiss, its useable dynamic range has widened.

Just as important is the generous £1.10 price-tag, left untouched while TDK, in particular, has inflated the price of its leading D ferric. This places UR in a very strong position, despite lying between Sony HF and TDK D in terms of performance. A Best Buy, then, tailor-made for dreary-sounding portables and uninspiring in-car systems.

Type and formulation	Type I, ferric
Sensitivity	-0.2dB
Treble level	+1.5dB
MOL315Hz	+3.1dB
SAT10kHz	-0.9dB
Hiss	-51.9dB
Dynamic range	55.0dB
Modulation noise	-40.3dB
Consistency	90%
Price (C90)	£1.10

**VERDICT**

MAXELL UR

- ▶ A bright and youthful sounding tape at an attractive price.
- ▶ Not quite on speaking terms with Dolby noise reduction.

▶ **£1.30 (single C90)**

**SOUND QUALITY**

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**VALUE FOR MONEY**

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## Maxell XLI-S

A year ago we marvelled at the prowess of Maxell's budget SXI ferric, a tape that combines the advanced Cobalt-Sigma particles of XLI-S with UR's budget HR mechanism.

This year the packaging, if not the formulation, of XLI-S itself has been revised. Out has gone the old Super-Silent Phase Accuracy (SS-PA) mechanism in favour of a new high resonance-damping and heat resistant shell struck from an altogether more rigid new polymer.

Fortunately, the infamous brightness of the old XLI-S has been tamed in this latest iteration.

Nevertheless, the new XLI-S is still far from neutral, demanding you plunge those recording meters firmly into the red if its massive dynamic range is to be exploited. In this respect, XLI-S is second only to TDK AR and AR-X, the latter sharing a very similar blend of high treble headroom as well as high treble sensitivity.

As I've indicated, an extra dose of tape bias will soothe what remains of its savage high frequencies. But treat it with care and you'll discover XLI-S is a natural for recording anything from a heated jazz session to synth-dominated rock or full orchestra.

Type and formulation	Type I, doped-ferric
Sensitivity	+0.6dB
Treble level	+2.2dB
MOL315Hz	+4.4dB
SAT10kHz	+0.2dB
Hiss	-53.2dB
Dynamic range	57.6dB
Modulation noise	-44.5dB
Consistency	85%
Price (C90)	£1.79

**VERDICT**

MAXELL XLI-S

- ▶ Bright but slightly focused and very dynamic sound.
- ▶ Really needs a dock with tape-linking; Dolby-phantom.

▶ **£1.79 (single C90)**

**SOUND QUALITY**

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**VALUE FOR MONEY**

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## Maxell XLIH

No sooner had the ink dried on our 1993 Blank Tape Supplement than Maxell secretly re-formulated its XLIH storm trooper to achieve a far closer match with the IEC Reference. Maxell then held back until August before officially relaunching XLIH in a new matt grey Energy Efficient and Anti-Resonance mechanism. In fact, XLIH had already been carrying its revised Black Magnetite tape formulation for many months, albeit in the original HR shell design.

Either way, this new-found compatibility has been achieved at the expense of slightly lower output levels. Fortunately, its lower hiss means the overall dynamic range has only been squeezed by 0.5dB or so, putting new XLIH on a par with TDK's popular SA pseudochrome. Indeed, the similarity between XLIH and SA is quite uncanny – just compare the specifications.

Recordings on XLIH are similarly faithful. Vocals suffer little or no additional sibilance, percussion sounds crisp and clear while saxophone sounds bright and brassy without the undue emphasis of something like the XLIH-S. In short, XLIH provides everything offered by TDK SA. Everything, that is, except the high price.

Type and formulation	Type II, doped-ferric
Sensitivity	-0.2dB
Treble level	+0.2dB
MOL315Hz	+3.6dB
SAT10kHz	-4.1dB
Hiss	-59.1dB
Dynamic range	62.7dB
Modulation noise	-40.1dB
Consistency	82%
Price (C90)	£1.99

### VERDICT MAXELL XLIH

- ⬆️ Historically neutral and transparent recordings without tuning.
- ⬇️ All this plus? Stop whinging.
- 👉 £1.99 (single C90)

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Maxell XLIH-S

After the intrigue surrounding new XLIH the story behind new XLIH-S is really quite boring. Put simply, Maxell switched to its flavour-of-the-season HRD mechanism while also boosting its Hi-Output Black Magnetite pigment.

Accordingly, I'm delighted to announce that both the MOL and dynamic range of XLIH-S are up by a massive +1.2dB, very nearly toppling TDK SA-X from its precarious perch. But then Maxell knew this all along.

Sadly, its bright treble has just got brighter. This ensures the rendition of rim-shots, metal-strung guitars or flaming saxophone solos are all exposed with an ear-piercing sharpness.

You could simply wind-up the tape bias and squash its rising treble. However, this also reduces its high frequency headroom by a similar degree. And an XLIH-S with a flat response looks little different from Maxell's standard XLIH.

Naturally, Maxell's latest heat-resistant mechanism, with its return to a very small tape viewing window, provides a degree of stability that has been lost to the XLIH. But in the vast majority of cases this will pass unnoticed. So do yourself a favour and opt for the cheaper XLIH instead.

Type and formulation	Type II, doped-ferric
Sensitivity	0.0dB
Treble level	+2.6dB
MOL315Hz	+4.6dB
SAT10kHz	-2.7dB
Hiss	-58.3dB
Dynamic range	62.9dB
Modulation noise	-44.2dB
Consistency	86%
Price (C90)	£2.49

### VERDICT MAXELL XLIH-S

- ⬆️ All up-beat performance with energy to spare.
- ⬇️ Recordings can sound too etched or levee for contrast.
- 👉 £2.49 (single C90)

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Maxell MX-S

Every few years the various IEC Primary Reference tapes are updated to reflect the tide of change in each of the Type I, II and IV categories.

Thus the latest Type IV standard (called M1507A) kicks the likes of TDK MA-X, Sony Metal Master and Maxell MX-S firmly into touch.

As a result, Maxell's new MX-S looks a lot more compatible than its predecessor. Hammer this MX-S with everything your deck can muster and you'll be rewarded with an impressively solid, tactile and confident sound.

There's little to touch MX-S in the bass department but the finest of tape machines may still reveal a faint vagueness in its upper treble, a gentle softening that dulls the edge of the sharpest percussive transients.

Importantly, Maxell's advanced HRD mechanism does offer a great improvement in azimuth stability over the older SS-PA shell, reducing variations in output between sides from 1-2dB to less than 0.4dB. Even the huge 63dB dynamic range is retained, so it's a pity MX-S remains compromised by a dodgy treble.

Maxell UK Ltd, 3a High Street, Rickmansworth, Herts, WD3 1HR. ☎ (0923) 777171

Type and formulation	Type IV, Metal Alloy
Sensitivity	+0.3dB
Treble level	+0.7dB
MOL315Hz	+5.4dB
SAT10kHz	+0.5dB
Hiss	-57.6dB
Dynamic range	63.0dB
Modulation noise	-43.9dB
Consistency	79%
Price (C90)	£3.99

### VERDICT MAXELL MX-S

- ⬆️ Widest dynamic range of all save the Super Metals.
- ⬇️ Loss of life and attack at high treble frequencies.
- 👉 £3.99 (single C90)

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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## Memorex dB

With Memorex in the process of being sold off by the colossal Tandy empire, changes are inevitably afoot. For now, however, Memtek Products will continue to distribute the substantial Memorex range through Tandy's network of dealer outlets.

The Memorex range includes a series of some six ferrics, two pseudochromes and a lone metal which, to the best of my knowledge, has never seen the light of a retail environment.

The aptly entitled dB is its entry-level ferric, a bargain-basement formulation whose opaque shell is a throwback to the prehistory of tape design. Well, the eighties anyway. Yet to give dB credit, it does offer a lower hiss than budget favourites like Sony HF, TDK D and Maxell UR.

Sadly, its poor MOL reduces the available dynamic range to just 53.8dB, suggesting dB is better suited to simple folk and solo material than the punishing demands of orchestral or rock music.

As long as you don't expect too much, dB won't prove too disappointing. After all, it's a cheap ferric and has an archetypal soft and feathery 'cheap ferric sound' to match.

If only it were not so convincingly trounced by that other cheap ferric – Scotch BX.

Type and formulation	Type I, ferric
Sensitivity	-1.2dB
Treble level	+0.5dB
MOL315Hz	+1.0dB
SAT10kHz	-3.3dB
Hiss	-52.8dB
Dynamic range	53.8dB
Modulation noise	-35.6dB
Consistency	85%
Price (C90)	£0.95

### VERDICT MEMOREX dB

- ⬆️ A fairly neutral sound with no aggressive tendencies.
- ⬇️ Say goodbye to the bite of percussion and impact of bass.
- 👉 £0.95 (single C90)

**SOUND QUALITY**  
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**VALUE FOR MONEY**  
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# MAXELL'S NEW RANGE



# WILL BLOW YOUR MIND



**maxell**



## Memorex dBSI

The exceedingly loud packaging of Memorex's dBSI is sadly deceptive, for this budget ferric is really no more capable than its dB relative. It will tolerate a whiff of extra treble but with a proportionately higher level of hiss. The overall dynamic range remains unchanged.

Yet by changing the transparent shell design, Memorex has succeeded in reducing the scrape flutter and modulation noise that plagued its forebear. As a result, these newer dBSIs sound cleaner, clearer and somewhat brighter than the original trendy version of this longstanding ferric.

New dBSI is also more consistent, though with MOL down by 1.3dB and SAT by 0.8dB this insensitive Type I could yet upset the operation of Dolby NR. More importantly, where the old dBSI (Jan '92 supplement) took a nosedive at high frequencies, this iteration has received a 3dB boost - to sustain the shimmer if not the crisp attack of cymbals. Don't get too excited, dBSI is just a lighter-sounding alternative to Memorex dB.

Intertan UK Ltd, Leamore Lane, Walsall, West Midlands WS2 7PS. ☎ (0922) 710000

Type and formulation	Type I, ferric
Sensitivity	-1.2dB
Treble level	+1.6dB
MOL315Hz	+1.2dB
SAT10kHz	-2.0dB
Hiss	-52.5dB
Dynamic range	53.7dB
Modulation noise	-38.6dB
Consistency	78%
Price (C90)	£1.19



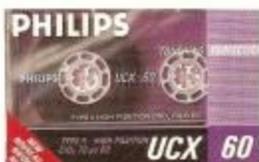
## Philips FS Ferro

Philips was a trifle reluctant to release samples of its blank tape on this occasion. And with hindsight I can appreciate its apprehension. Take the 'Economy Plus' FS Ferro by way of example. Now this cooking ferric has enjoyed a number of cosmetic revamps but the current version is really no different from those of yesteryear.

In fact, both the tinted shell design and rather ordinary ferric pigment bear a startling resemblance to Fuji's older DR-1x. But where DR-1x has been improved with a brighter sound (see '92 tape supplement), Philips FX remains hidebound to its low sensitivity formulation. Sure enough, its useable dynamic range is no worse than, say, Maxell's UR but its sound is distinctly flatter and less interesting. Above all, this is one of those ferrics that seems unable to avoid the feathery treble quality that once characterised the breed.

Meanwhile, although its 'average' treble level looks a very accurate and compatible +0.1dB, in practice it varies from +2dB to -2dB courtesy of shell azimuth errors from side to side, sample to sample. Not, as they say, too clever.

Type and formulation	Type I, ferric
Sensitivity	-1.1dB
Treble level	+0.1dB
MOL315Hz	+2.3dB
SAT10kHz	-2.6dB
Hiss	-52.6dB
Dynamic range	54.9dB
Modulation noise	-39.9dB
Consistency	88%
Price (C90)	£1.29



## Philips UCX Ultra

Something very strange has happened to Philips UCX Ultra. Our samples lacked the new marbled packaging and Super Precision shell boasted of by the literature for the 1993-1994 season. Apparently, today's UCX should look just like the latest Metal Plus. Our sample had the older packaging.

Furthermore the recent increase in MOL and dynamic range but substantial drop in SAT suggests Philips has abandoned the pseudochrome formulation used between 1991-93 for its far earlier dual-layer UCX chrome pigment.

This is confirmed by the very low chrome-like hiss level of just -59.6dB but particularly weak and droopy treble (the pseudochrome UCX had a bright treble balance). So you'll need to avoid all treble-dominated music and back-off on those recording levels to squeeze the best from UCX. Pushed too hard, UCX will quickly begin to saturate, its treble becoming increasingly dull and softened as the meters trip into the red. Treated with kid gloves UCX can sound both delicate and detailed, but Scotch's XSI-S does the same job so much more effectively.

Type and formulation	Type II, doped-ferric
Sensitivity	-2.0dB
Treble level	-1.5dB
MOL315Hz	+2.0dB
SAT10kHz	-7.6dB
Hiss	-59.6dB
Dynamic range	61.6dB
Modulation noise	-42.5dB
Consistency	95%
Price (C90)	£1.89



## Philips Metal Plus

Okay, so neither FX or UCX are anything to write home about. All of which puts plenty of pressure on Metal Plus to come up with the goods. Fortunately for Philips, it does. And then some. Like other premium metals, MP laps-up bass like it's going out of fashion.

Improvements in MOL and hiss have stretched MP's dynamic range to 62.5dB, bringing Metal Plus into line with the likes of Maxell MX. Metal Plus also offers a comparable dynamic range with TDK's MA but, once again, offers a degree of compatibility that's lost to its up-beat cousin.

However, rather than ply MP with Dolby NR, your best bet is to crank those recording controls hard into the red and bury any suggestion of hiss in an assault of dynamic, hard-hitting music. Compared with the super metals from Sony and Maxell (Verter), MP can sound just a little vague or diffuse at times, but this is a feature of other Philips tapes and not simply a peculiarity of MP.

Philips Electronics, City House, 420-430 London Road, Croydon, Surrey CR9 3QR. ☎ 081-689 2166

Type and formulation	Type IV, Metal
Sensitivity	0.0dB
Treble level	-0.2dB
MOL315Hz	+5.0dB
SAT10kHz	+0.3dB
Hiss	-57.5dB
Dynamic range	62.5dB
Modulation noise	-41.0dB
Consistency	80%
Price (C90)	£4.19

### VERDICT

#### MEMOREX dBSI

Memorex has cured many of dBSI's longstanding problems.

So now it sounds pretty average rather than pretty awful.

▶ **£1.19 (single C90)**

#### SOUND QUALITY

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#### VALUE FOR MONEY

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### VERDICT

#### PHILIPS FS FERRO

A modest performer with no real spark to suit its performance.

Sadly, it often seems to knock the wind from its music.

▶ **£1.29 (single C90)**

#### SOUND QUALITY

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#### VALUE FOR MONEY

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### VERDICT

#### PHILIPS UCX ULTRA

Enjoy the low hiss and modulation noise of a true chrome.

This version sounds muffled and lifeless.

▶ **£1.89 (single C90)**

#### SOUND QUALITY

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#### VALUE FOR MONEY

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### VERDICT

#### PHILIPS METAL PLUS

Pretty of headroom to capture powerful bass dynamics.

SBI sounds just a little too soft or reserved.

▶ **£3.99 (single C90)**

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## Scotch BX

Cheap, certainly, but Scotch's renowned BX is anything but conventional. Its principal claim to fame lies in the ability to absorb more punishing bass than virtually any other ferric on the planet.

All that is, save TDK's premium AR which retains its title with a 1dB margin. The previous contenders, including Maxell XLI-S and That's CD-II, have now been pushed into lesser positions.

Anyway, BX remains an absolute natural when it comes to recording the brooding menace of an organ recital or the traditional strength, say, of an XTC bass line.

But not all is rosy. Its ability to withstand white hot shards of treble is greatly diminished, even by the standards of Sony HF or TDK D.

I'd suggest you back-off on the bias during recording to counter its droopy treble, but as the world of BX revolves around portables this is unlikely to be a realistic proposition. Instead, you're better off strapping yourself in and slugging BX firmly into the red on the level meters with bass-orientated rock and pop.

Just enjoy those rip-roaring bass riffs and to hell with treble compression. Recommended for the heaven sent rock and rollers among you.

Type and formulation	Type I, ferric
Sensitivity	+1.2dB
Treble level	-1.1dB
MOL315Hz	+5.0dB
SAT10kHz	-3.5dB
Hiss	-51.0dB
Dynamic range	56.0dB
Modulation noise	-38.5dB
Consistency	86%
Price (C90)	£4.49 (5 pack)

### VERDICT SCOTCH BX

▲ Huge dynamic range through bass and midsrange.

▼ Far less headroom available for bright jazz or percussion.

▶ £4.49 (C90 5 pack)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## Scotch XSII-S

Unlike many Type II pseudochromes which are glibly described as 'chromes', Scotch XSII-S is the genuine article. It's been repackaged in a brighter pinky-coloured wrapper but the basic formulation still bears more than a passing resemblance to BASF's dual-layer CSII chrome tape. Still, Scotch has succeeded in stretching its headroom at both bass and treble frequencies, ensuring XSII-S is a beefy, bright-sounding chrome tape.

Nevertheless, XSII-S is still a chrome at heart, so beware of loud or sustained treble notes before launching into a recording. If jazzy sounds are your bag then forget XSII-S and opt for a more rugged pseudochrome instead. But gentle acoustic selections play directly into the subtle and cautious hands of XSII-S.

Hiss is low so there's no need to slam those meters into the red. Just treat the tape with kid gloves and it will reward you with some exceptionally refined recordings, sustaining the sort of fragile detail that's routinely buried by much of its pseudochrome competition. One for the specialist.

3M UK PLC, PO Box 1, Market Place, Bracknell, Berks RG12 1JU. ☎ (0344) 858000

Type and formulation	Type II, Chrome
Sensitivity	-0.7dB
Treble level	+1.0dB
MOL315Hz	+3.1dB
SAT10kHz	-5.2dB
Hiss	-59.6dB
Dynamic range	62.7dB
Modulation noise	-39.5dB
Consistency	85%
Price (C90)	£4.49 (3 pack)

### VERDICT SCOTCH XSII-S

▲ Capable of very gentle but intricately detailed recordings.

▼ Avoid hectic dynamics and veer by-bow to Dolby NR.

▶ £4.49 (C90 3 pack)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## Sony HF

Judging by this entry-level ferric, all's been very quiet on the Eastern Front over the last year. Basically, these samples of Sony HF betray very little difference with those featured in the '93 supplement.

Unfortunately for Sony, its competitors have not spent the intervening time resting on their corporate laurels. They have been busy squeezing their tape for all its worth.

So HF still offers rather lighter, brighter and distinctly hissier versions of the original. Sadly, HF is one of those ferrics whose 'hiss spectrum' is concentrated in an area that's particularly audible.

As a result its hiss comes as an annoying fizz rather than the softer haze of TDK D even though the latter might have a worse figure for A-wtd hiss in the measurement table.

Female vocalists can sound more sibilant and percussion less crisp as a consequence, despite the overall feel of its music being very energetic and up-beat.

This is one instance where Dolby noise reduction actually works to patch-up recording quality while also suppressing hiss, snapping the variable performance of HF into a more coherent whole. Remember this and HF will live to fight another day.

Type and formulation	Type I, ferric
Sensitivity	-0.5dB
Treble level	+0.9dB
MOL315Hz	+2.8dB
SAT10kHz	-1.5dB
Hiss	-52.3dB
Dynamic range	55.1dB
Modulation noise	-38.6dB
Consistency	87%
Price (C90)	£2.29 (twin pack)

### VERDICT SONY HF

▲ An unexpacted reward with Dolby B noise reduction.

▼ Will sound hokey on portables without Dolby.

▶ £2.29 (C90 twin pack)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## Sony UX-S

Sometime last year, Sony sent out a mixture of UX-S samples for test, a number having an 'X' printed in the middle of their batch code (the code on its spine).

These X-rated samples all enjoyed a worthwhile boost in output level, a feature reflected in the +3.1dB MOL of these most recent UX-S tapes. And yes, they too have an 'X' in their batch code.

So what, you say? UX-S still has one of the lowest hiss levels of any pseudochrome (only beaten this year by Fuji's JP-II), while its dynamic range has edged up into line with Fuji XLI but not TDK SA or Maxell XLI, its principal rivals in the Type II market. The end result is recordings that are tinged with just a hint of extra brightness, the exaggerated glint of cymbals countered by vocals that can sound slightly recessed or flattened.

Sony really can't win, for the quality of its Superfine magnetic coating only serves to highlight the muddling caused by scrape flutter in its hi-tech but compromised 'anti-vibration mechanism'.

Still, Sony has promised genuine improvements to UX-S in the very near future. And if that's the case, you'll read about them first in Hi-Fi Choice.

Type and formulation	Type II, doped-ferric
Sensitivity	-0.6dB
Treble level	+1.1dB
MOL315Hz	+3.1dB
SAT10kHz	-4.8dB
Hiss	-59.3dB
Dynamic range	62.4dB
Modulation noise	-40.2dB
Consistency	92%
Price (C90)	£3.99 (twin pack)

### VERDICT SONY UX-S

▲ Best with punchy rock rather than baroque vocals or jazz.

▼ Once a not favourite, UX-S has not evolved greatly.

▶ £3.99 (C90 twin pack)

#### SOUND QUALITY

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#### VALUE FOR MONEY

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## Sony Metal-XR

Even if *LUX-5* looks set for a revamp, the arrival of this pepped-up *Metal-XR* will cut through Sony's cloud of despondency like a welcome ray of sunshine. Recordings on *Metal-XR* are remarkably faithful to the original, capturing the power of an orchestral tympani as effectively as the thrill of massed strings or breathy presence of a solo vocalist.

It's not perfect, of course, but only the most advanced of tape decks will reveal a hint of thinness through the midrange and lower treble. Otherwise, it'll prove the perfect partner for 99 per cent of IEC-aligned metal-equipped decks, sapping the record heads dry before the tape itself gives up the ghost.

All this comes courtesy of a huge improvement in MOL with no deterioration in hiss, ensuring *Metal-XR* has the widest dynamic range of all save the very costly Super Metals. Furthermore, this boost has been achieved without disturbing *XR*'s near-ideal compatibility. If any metal was optimised for Dolby noise reduction then this, quite frankly, is it. A cracker.

Sony UK Ltd, South Street, Staines, Middlesex TW18 4PF. ☎ (0784) 467000

Type and formulation	Type IV, Metal
Sensitivity	+0.3dB
Treble level	-0.1dB
MOL315Hz	+4.9dB
SAT10kHz	-0.4dB
Hiss	-57.7dB
Dynamic range	62.6dB
Modulation noise	-39.9dB
Consistency	85%
Price (C90)	£5.99 (twin pack)

### VERDICT

SONY METAL-XR

PROS: Firm, dynamic but never less than natural sounding.

CONS: Price has crept up substantially in the last 12 months.

▶ £5.99 (C90 twin pack)

#### SOUND QUALITY



#### VALUE FOR MONEY



## Sony Super Metal Master

How much? Yep, you too could become the proud owner of the World's most advanced C90. But at a price. Somewhere in the region of £14 buys you the highest in tape high technology. The first two-layer metal tape engineered to combine the lowest hiss, the highest headroom and, naturally, the widest dynamic range achieved by any cassette.

In many respects, *SMM* is an evolution of the 'basic' *Metal Master*, beefing-up its ability with sustain the trickiest transients, reducing modulation noise with a super-smooth back-coating and knocking dead vibrations with a composite ceramic shell. *SMM* is even more compatible than the original *MM* though Dolby will rarely, if ever, be used in anger.

No. Just bang those meters into the end-stops and pray the record heads don't saturate before *SMM* has had its fill. Top flight decks from the likes of Nakamichi, Revox and Sony will realise its potential. And yield recordings that sound more dynamic, detailed, transparent and, well, simply more realistic than any to date. *Metal Master* is the ultimate tape for the deep of pocket.

Type and formulation	Type IV, Metal
Sensitivity	+0.6dB
Treble level	+0.2dB
MOL315Hz	+5.7dB
SAT10kHz	+0.4dB
Hiss	-58.5dB
Dynamic range	64.2dB
Modulation noise	-44.3dB
Consistency	80%
Price (C90)	£14

### VERDICT

SONY SUPER METAL MASTER

PROS: The state-of-the-art in current tape technology.

CONS: Quality that comes with a prohibitive price tag.

▶ £14 (projected price for C90)

#### SOUND QUALITY



#### VALUE FOR MONEY



## TDK D

Since time immemorial TDK *D* has been the budget ferric to beat, a benchmark hotly pursued by the likes of Sony *HF* and Maxell *UR*.

Nothing has changed, leaving the *D* of today almost indistinguishable from the *D* of three years ago. Its clear, bright and fuzz-free sound keep it just a whisker ahead of both *UR* and *HF*.

Nevertheless, the price of a single C90 has risen by nearly 30p, lifting TDK *D* clear of the budget market and pitching it into competition with Fuji *IP-Is*, BBC *FX*, Boots *SFI* and Maxell *SMX* to name but four.

And judged against this company TDK *D* fails to shine quite so brightly. Its wide dynamic range and decent treble headroom is rendered commonplace, rather than exceptional.

Yet the sheer fact that *D* is able to hold its own against such competition pays tribute to its blend of qualities. Few budget ferrics will match its effortless sound, a surprisingly natural and transparent account of the original that's blessed with the most innocuous hiss.

However, *D* is hanging on by its fingertips, so TDK must look to genuine improvements in the very near future if it intends to stay in the running.

Type and formulation	Type I, ferric
Sensitivity	0.0dB
Treble level	+1.6dB
MOL315Hz	+3.8dB
SAT10kHz	-1.7dB
Hiss	-51.9dB
Dynamic range	55.7dB
Modulation noise	-40.7dB
Consistency	93%
Price (C90)	£1.39

### VERDICT

TDK D

PROS: Likely but very engaging and detailed sound.

CONS: Price rise are eroding the value of a budget favourite.

▶ £1.39 (single C90)

#### SOUND QUALITY



#### VALUE FOR MONEY



## TDK CDing-I

'Designed', says TDK, 'to deliver a sound similar to your CDs'. These *CDing* tapes are the most blatant two-fingers ever waved at the BPI and its chums at the Performing Rights Society. Heaven forbid that anyone should encourage us to copy from CD. I mean' there's even a CD splashed across its decorative packaging. What can they mean?

Nevertheless, the idea that *CDing-I* should be any more capable of recording from CD than any other mid-priced ferric is, quite frankly, cobbler's. In reality, *CDing-I* looks suspiciously like a sample of TDK *AD* in a new transparent shell and slimline, trouser-friendly protective case.

It sounds that way too. Like *AD* (and Sony's older *HF-S*), *CDing-I* has a very robust but unmistakably louder, brighter and harder balance than the original. Rather like the earliest 16-bit CD players, in fact.

Anyway, though it will absorb a fair shock of treble without distress, I'd advise you tiddle with the fine bias control before committing anything bright to *CDing-I*.

It's a clear advance on TDK *D* but is rather less compatible with either Dolby noise reduction or your average portable or personal stereo.

Type and formulation	Type I, doped-ferric
Sensitivity	+0.6dB
Treble level	+2.1dB
MOL315Hz	+4.1dB
SAT10kHz	-0.1dB
Hiss	-53.5dB
Dynamic range	57.6dB
Modulation noise	-38.2dB
Consistency	90%
Price (C90)	£3.99 (3 pack)

### VERDICT

TDK CDING-I

PROS: Very tactile and self-assured; plenty of treble headroom.

CONS: Sounds steeply and bright without tape-tuning.

▶ £3.99 (C90 3 pack)

#### SOUND QUALITY



#### VALUE FOR MONEY





## TDK AR

No existing Type I can match the vast dynamic range offered by TDK AR, the one tape that continues to confound the best efforts of major producers like Sony, Maxell and Fuji.

Being more specific, AR will absorb more bass energy than any other tape on the planet, and this includes Sony's outrageously expensive *Super Metal Master*. Nevertheless, most metals and a number of super-ferrics (like AR-X, Maxell SXI, XLI-S and Sony HF-S) will sustain fiercer bolts of high frequency energy.

AR is a thoroughly unique proposition, a blend of cobalt-doped Avilyn particles housed in the now-familiar SPR shell design. Recordings sound beefy and rugged, combining the earth-rumbling bass of a costly metal with the lively and engaging treble of good pseudochrome.

It's particularly successful with grand orchestral works which can exploit its deep and tactile bass, with nary a suggestion of the vague, fuzzy treble quality once associated with ferrics as a breed.

In practice, AR is just one of a number of pseudochromes engineered to operate at the lower ferric bias. But where its competitors are fickle, AR is simply fantastic.



## TDK CDing-II

The marketing hype continues with TDK's Type II entrant into the 'let's encourage people to pirate from CDs' stakes. Once again, the reference to CDs is about as relevant as 'Digital Ready' amplifiers or loudspeakers. But what the heck, that's exactly why people buy them, so why beat about the bush pretending they are for recording-bird song.

Perhaps TDK is referring to the dynamic range of *CDing-II*, rather like BASF in its earlier '99.9 per cent noise-free' campaign directed at CD users. In this case, it's as well to appreciate that *CDing-II* is less accomplished than the budget TDK SF formulation.

You'll find it provides a slightly brighter balance but is less able to sustain the loudest of notes through bass, mid or treble. Hence the reason why a three-pack of *CDing-II* is actually cheaper than its *CDing-I* partner.

Still, *CDing-II* promises a very consistent performance with very little azimuth error between sides. Here, at least, TDK shows that trendy transparent shells need not go hand-in-hand with a below par level of performance.

Otherwise *CDing-II* proves very compatible, even if it's nothing to get excited about.



## TDK SA

TDK is about to learn the hard way that no tape manufacturer – and particularly the acknowledged leader of the pack – can afford to rest easy on its laurels.

The last principal revision saw SA equipped with a new binder, allowing a denser but more uniform distribution of its fine Super Avilyn particles. The upshot was a slight reduction in hiss, coupled with the ability to withstand fractionally higher levels. And that, broadly speaking, still holds true today.

Make no mistake, SA still makes damn fine recordings, copies that are both neutral, detailed and almost perfectly responsive to Dolby noise reduction. There's no exaggeration of transient detail, no spotlighting of percussion or slurring of vocals, and almost no loss of the emotive power lying behind any style of music you'd care to mention.

Drawbacks? Compared with the finest metals, SA does introduce a hint of softness, especially through its bass which can seem ever-so-slightly warmer than the original.

Otherwise SA's greatest drawback is Maxell's XLI, a near-indistinguishable pseudochrome available at a saving of 20p.



## TDK SA-X

The creeping stagnation witnessed with TDK SA is also snatching at the heels of its premium pseudochrome, SA-X.

Not so long ago, TDK claimed that SA-X was 'the quietest tape in the world', a sad epitaph for a premium formulation that – by today's standards – is actually noisier than the majority of premium pseudochromes. Even its overall dynamic range has been squeezed, allowing Fuji *IP-IIx Pro*, BASF *Chrome Maxima II* and Sony *Super Metal Master* room to overtake.

Once again, Maxell is providing the strongest challenge, its latest XLI-S formulation offering a cheaper but brighter-sounding alternative to the confident pizzazz of SA-X. In contrast with the sober neutrality of SA, SA-X remains as charismatic, as lively and colourful as ever.

Its recordings often sound more open and exuberant than the original, thanks to its expansive but mercifully clean treble. As always, SA-X could never be described as faithful. Punchy, dynamic and great fun but never faithful.

All of which leaves us with a costly party tape, purpose-built for rock 'n' roll and guaranteed to blow cobwebs from the dustiest of systems.

Type and formulation	Type I, doped-ferric
Sensitivity	+1.2dB
Treble level	+0.8dB
MOL315Hz	+6.1dB
SAT10kHz	-1.5dB
Hiss	-53.3dB
Dynamic range	59.4dB
Modulation noise	-37.5dB
Consistency	95%
Price (C90)	£1.47

Type and formulation	Type II, doped-ferric
Sensitivity	0.0dB
Treble level	+0.6dB
MOL315Hz	+2.6dB
SAT10kHz	-4.5dB
Hiss	-58.9dB
Dynamic range	61.5dB
Modulation noise	-38.7dB
Consistency	94%
Price (C90)	£3.79 (3 pack)

Type and formulation	Type II, doped-ferric
Sensitivity	+0.3dB
Treble level	+0.4dB
MOL315Hz	+3.6dB
SAT10kHz	-4.1dB
Hiss	-58.1dB
Dynamic range	62.7dB
Modulation noise	-39.8dB
Consistency	85%
Price (C90)	£2.29

Type and formulation	Type II, doped-ferric
Sensitivity	+1.3dB
Treble level	+0.9dB
MOL315Hz	+4.4dB
SAT10kHz	-2.7dB
Hiss	-58.6dB
Dynamic range	63.0dB
Modulation noise	-41.2dB
Consistency	96%
Price (C90)	£2.99

**VERDICT**  
TDK AR

**PROS:** Big and bisterous — the most accomplished ferric ever devised.

**CONS:** Over-sensitive compared to the EC Reference.

▶ **£1.47 (single C90)**

**SOUND QUALITY**  
■■■■■

**VALUE FOR MONEY**  
■■■■■

**VERDICT**  
TDK CDing-II

**PROS:** An attractively priced tape for critical applications.

**CONS:** Can sound a little thin; acts abnormally to vocals.

▶ **£3.79 (C90 3 pack)**

**SOUND QUALITY**  
■■■■□

**VALUE FOR MONEY**  
■■■■□

**VERDICT**  
TDK SA

**PROS:** Faithful recordings without the need for tape-tuning games.

**CONS:** Undercut by the sounds like XLI from Maxell.

▶ **£2.29 (single C90)**

**SOUND QUALITY**  
■■■■■

**VALUE FOR MONEY**  
■■■■■

**VERDICT**  
TDK SA-X

**PROS:** Very animated and engaging sound that's full of life and energy.

**CONS:** Looks less competitive in a costly evolving market.

▶ **£2.99 (single C90)**

**SOUND QUALITY**  
■■■■□

**VALUE FOR MONEY**  
■■■■□



## TDK MA

The story continues with this year's *MA* demonstrating little or no significant change in performance while labouring under a substantial 49p boost in price. So where does this leave TDK's entry-level metal?

Fortunately, *MA* was never a slouch and its ability to laugh in the face of awesome recording levels remains as impressive as ever. In fact, *MA* will withstand more direct treble energy than all save TDK *MA-X*, surpassing treble blotters like *AR-X*, Maxell *MX-S* and Sony *SM* along the way.

For once, TDK has retained its edge. Even though its dynamic range lags Maxell's *MX-S* by 0.5dB or so, this is not reflected in the bold contrasts of its recordings. Musical dynamics remain as strong as ever while the glint of sax or percussion possesses a pristine clarity missing with the softer *MX-S*.

Nevertheless, even with the introduction of a new and more sensitive IEC Type IV Reference tape, *MA* is still less compatible than metals like Philips *MP* and Maxell *MX*. Persevere, plunge deep into the red and pray that *MA* takes its fill before your deck begins to smoulder.

TDK UK Ltd, TDK House, 5/7 Queensway, Redhill, Surrey RH1 1YB. ☎ (0737) 773773

Type and formulation	Type IV, Metal
Sensitivity	+0.5dB
Treble level	+0.9dB
MOL315Hz	+5.3dB
SAT10kHz	+0.9dB
Hiss	-57.2dB
Dynamic range	62.5dB
Modulation noise	-41.8dB
Consistency	88%
Price (C90)	£3.29



## That's RX

Take a lingering look at That's tapes, because following Richer Sounds wholesale absorption of the brand, this could well be its swansong.

Taiyo Yuden (the Japanese company behind That's) is abandoning the tape scene in favour of more lucrative pursuits elsewhere. Richer Sounds, always on the look out for a bargain, has taken the opportunity to mop-up all remaining stocks from That's distributors in the UK and mainland Europe.

Prices have tumbled right across the range, reducing a single *RX90* from £1.19 to just 59p a throw. Sadly, these latest samples of *RX* are the magnetic equivalent of a sick parrot. There's been a 1.2dB drop in headroom while azimuth errors in That's 'Clear Line' shell contribute to huge +2dB/-7dB variations in treble level between A and B sides.

Even the marginal reduction in hiss cannot help the 1.2dB compression in dynamic range. In fact, *RX* has the weakest dynamic range (by a good 1dB) of any tape currently available, and this includes the budget ferrics from Tandy and Memorex. Without labouring the point, *RX* sounds decidedly wishy-washy. It's cheap but I'd hesitate to recommend *RX* at any price.

Type and formulation	Type I, ferric
Sensitivity	-1.9dB
Treble level	-1.9dB
MOL315Hz	+0.6dB
SAT10kHz	-3.8dB
Hiss	-51.6dB
Dynamic range	52.2dB
Modulation noise	-37.1dB
Consistency	65%
Price (C90)	£0.59

**VERDICT**  
THAT'S RX

Variable speed quality test failed to sample rock and pop.

A very plain vanilla formulation.

**£0.59 (single C90)**

**SOUND QUALITY**  
■■■■□□

**VALUE FOR MONEY**  
■■■■□□



## That's VX

Rock bottom performance at a rock bottom price, *VX* shares the same Clear Line mechanism as *RX* and *MG-X* but features a proprietary 'Sub-micro Cobalt Gamma' formulation.

This is marketing baloney for a bargain-basement doped-ferric pigment. A magnetic layer with the lowest Maximum Output (MOL) of any existing Type II. In fact, only the entry-level ferrics from Memorex and That's itself offer a lower MOL than *VX*.

In practice, the sad and insubstantial performance of *VX* is very similar indeed to both That's *AS/II* and That's *CD/II*. This is worth knowing because you might as well spend 89p on *VX* than 99p on *AS/II*. Unfortunately, the recent deterioration in *VX*'s treble headroom means it's about as welcoming of bright treble detail as, say, TDK *CDing-II*. Which translates to not very welcoming at all.

Still, *VX* will tolerate female vocals or the raw blast of a saxophone more successfully than true chromes like Philips *UCX Ultra* or BASF *Sound Level II*, even if it lacks their resolution of subtle detail. *VX* isn't bad but its recordings do lack the weight, the solidity and conviction of the original. Another false economy.

Type and formulation	Type II, doped-ferric
Sensitivity	-1.0dB
Treble level	+1.5dB
MOL315Hz	+1.2dB
SAT10kHz	-4.2dB
Hiss	-58.9dB
Dynamic range	60.1dB
Modulation noise	-41.0dB
Consistency	80%
Price (C100)	£0.89

**VERDICT**  
THAT'S VX

Fairly fresh and lively recording quality.

Any warmth or passion is strangely diluted.

**£0.89 (single C90)**

**SOUND QUALITY**  
■■■■□□

**VALUE FOR MONEY**  
■■■■□□



## That's MG-X

At last! That's popular budget metal hits the nail right on the head, providing an unassailable blend of performance and value. The last 12 months has seen *MG-X* become very much more compatible, its treble output flattened in line with the latest IEC Type IV Reference.

As a result, Dolby NR works like a dream, knocking out *MG-X*'s rather conspicuous hiss to reveal a remarkably bold and earthy copy of the original.

Moreover there's been a huge +1.5dB boost in its Maximum Output (MOL) matched by an equivalent fall off in SAT. So, even a slight increase in hiss does nothing to dent the worthwhile 1dB boost in dynamic range. Which takes *MG-X* past Fuji *JP-Metal* and to within a whisker of Maxell *MX*, TDK *MA* or Sony *Metal-XX*.

It's sensible not to ply *MG-X* with white-hot treble for it shies away from the brightest of jazz or pop material. Instead, *MG-X* is better suited to the momentous occasion of a classical symphony, the rumble of timpani and rich resonance of tuba or double bass playing directly into its hands. Not to mention Metallica.

And with C100s reduced from £2.79 to just £1.49, this is one piece of audio folklore you cannot afford to miss.

Type and formulation	Type IV, Metal
Sensitivity	-0.1dB
Treble level	+0.2dB
MOL315Hz	+4.7dB
SAT10kHz	-1.4dB
Hiss	-57.3dB
Dynamic range	62.0dB
Modulation noise	-39.5dB
Consistency	72%
Price (C100)	£1.49

**VERDICT**  
THAT'S MG-X

Richly detailed, firm and powerful sound. Dolby-friendly.

Will not sustain the treble level of cooler metals.

**£1.49 (single C100)**

**SOUND QUALITY**  
■■■■□□

**VALUE FOR MONEY**  
■■■■□□



## That's CD/IVF

Peel the 'Butterfly Design' shell from a sample of That's AS-IV then slap the tape into a costlier Suono mechanism and, broadly speaking, you've got yourself an instant CD/IVF.

In fact, there's very little worthwhile difference between either MG-X, AS-IV or CD/IVF despite That's claim to be using 'Crystal Metal', 'Prestside Type IV' and 'Super Prestside Type IV' formulations respectively. Perhaps they should have spelt it properly.

In common with MG-X and compared to the latest Type IV Reference, CD/IVF emerges as a very compatible metal, its earlier +1.4dB treble peak brought firmly into line with no increase in bias upon recording. Once again, Dolby NR works like a dream. Otherwise, there's been no change in overall MOL, hiss or dynamic range, yielding recordings that are every bit as convincing as those from the excellent MG-X.

The only real advantage offered by CD/IVF hinges on the improved azimuth stability, and therefore the consistency of treble output between A and B sides, provided by its secure Suono Format shell design. Sure, you might squeeze a hint of extra treble detail from CD/IVF but it's hardly a giant improvement on MG-X.

Type and formulation	Type IV, Metal
Sensitivity	-0.2dB
Treble level	-0.3dB
MOL315Hz	+4.3dB
SAT10kHz	-0.1dB
Hiss	-57.9dB
Dynamic range	62.2dB
Modulation noise	-40.6dB
Consistency	90%
Price (C90)	£1.99



## That's Suono

Remember the adage about fooling some of the journalists most of the time? The elaborate marketing campaign that launched That's Suono certainly had our European colleagues waxing lyrical.

That's engineers even explained in how they arrived at the 'optimum concavity' for Suono's domed shell. Then they announced that the thickness of the ideal shell caused it to stick in some commercial players. The 'Nano Dynamic' Tactoid metal formulation is just the icing on a farcical cake.

Now the bubble has finally burst it's really no great secret that this particular Type IV behaves like selected CD/IVF mounted in a heavyweight rubber/plastic Suono shell. It is fractionally brighter than CD/IVF but, once again, still very compatible when judged against the latest IEC Type IV Primary Reference.

Recordings sound a mite cleaner and crisper than with either AS-IV or CD/IVF, avoiding the restrained treble of Maxell MX-S but still failing to engender the solidity of TDK MA. Only now, however, is it pitched at a realistic price.

Hi-Fi Direct Ltd, 202 Long Lane, London SE1 4QB.  
☎ 071-827 9827

Type and formulation	Type IV, Metal
Sensitivity	-0.2dB
Treble level	+0.4dB
MOL315Hz	+4.7dB
SAT10kHz	+0.2dB
Hiss	-57.7dB
Dynamic range	62.4dB
Modulation noise	-40.9dB
Consistency	89%
Price (C90)	£3.99

# Conclusions, Best Buys and Recommendations

**T**his comprehensive survey bring us bang up to date with what's new, unchanged or sadly stagnant in the world of blank tape. Unfortunately, it's also something of an obituary for the That's brand, dropped by Taiyo Yuden before being vacuumed from the face of Europe by Richer Sounds. Expect to see some crazy price reductions in Richer stores and through its mail order scheme before That's tape finally vanishes.

Nevertheless, the most startling trend to emerge concerns the increasing dominance of Maxell in the premium tape categories. At a time when both Sony and TDK seem content to sit back, Maxell is making substantial gains with continual revisions to its Type I and II, formulations.

Attention is focused most keenly on the Type II sector where Maxell's latest XLII (now equipped with a Black Magnetite pigment) usurps Sony's UX-S while matching TDK's SA point for point. Moreover, XLII has a significant price advantage which transforms TDK's well-earned Recommendation into a coveted Best Buy for Maxell. So who will be the first manufacturer to respond, TDK or Sony?

The melting pot is further aggravated by various new kids on the block. BASF has finally bitten the bullet and produced a premium pseudochrome called TPII, for example, while Fuji has a new top-of-the-range ZII. Even the ferric scene has received a jolt from BBC's FX and TDK's oddly-titled CDing-I, both launched at a time when That's RX has hit an all-time low.

Yet it's in the metal arena where most of the audiophile bargains are to be had, top-performance numbers that stretch from That's MG-X at a crazy £1.50 to Sony's state-of-the-art Super Metal Master at an equally crazy £14 plus. With no less than seven of our eight Type IVs being Recommended, now's the time to treat your tape deck to a taste of the high life.

**VERDICT**  
THAT'S CD/IVF

A slightly lighter and bolder version of MG-X.

Then again the differences are barely worth the extra 50p.

▶ **£1.99 (single C90)**

**SOUND QUALITY**  
■■■■■□

**VALUE FOR MONEY**  
■■■■■□

**VERDICT**  
THAT'S SUONO

Everything a good metal should be, plus oodles of treble.

Happas in, don't believe this.

▶ **£3.99 (single C90)**

**SOUND QUALITY**  
■■■■■□

**VALUE FOR MONEY**  
■■■■■□

**Best Buys and Recommendations:**

Type I or ferric category:	Type II or chrome/pseudo chrome category:	Type IV or metal category:
<b>Recommended:</b> BBC FX Fuji JP-Is Extralim Maxell XLI-S Scotch BX Sony HF TDK D TDK CDing-I	<b>Recommended:</b> BASF Reference Maxima TPII Fuji ZII Extralim TDK SA	<b>Recommended:</b> Philips Metal Plus Sony Metal-XR Sony Super Metal Master TDK MA That's CD/IVF That's Suono
<b>Best Buys:</b> Maxell UR TDK AR	<b>Best Buys:</b> Maxell XLII	<b>Best Buys:</b> That's MG-X

# BLANK TAPE (AUDIO/VIDEO-CAM) BAZAAR

## TDK AUDIO CASSETTES

TYPE I FERRO-NORMAL	55.50
10 x C-60 (105')	51
10 x C-90 (150')	55.50
10 x C-120 (210')	61
10 x C-150 (210')	65.50
10 x C-180 (210')	69.50
10 x C-210 (210')	73.50
10 x C-240 (210')	77.50
10 x C-270 (210')	81.50
10 x C-300 (210')	85.50
10 x C-330 (210')	89.50
10 x C-360 (210')	93.50
10 x C-390 (210')	97.50
10 x C-420 (210')	101.50
10 x C-450 (210')	105.50
10 x C-480 (210')	109.50
10 x C-510 (210')	113.50
10 x C-540 (210')	117.50
10 x C-570 (210')	121.50
10 x C-600 (210')	125.50
10 x C-630 (210')	129.50
10 x C-660 (210')	133.50
10 x C-690 (210')	137.50
10 x C-720 (210')	141.50
10 x C-750 (210')	145.50
10 x C-780 (210')	149.50
10 x C-810 (210')	153.50
10 x C-840 (210')	157.50
10 x C-870 (210')	161.50
10 x C-900 (210')	165.50
10 x C-930 (210')	169.50
10 x C-960 (210')	173.50
10 x C-990 (210')	177.50
10 x C-1020 (210')	181.50
10 x C-1050 (210')	185.50
10 x C-1080 (210')	189.50
10 x C-1110 (210')	193.50
10 x C-1140 (210')	197.50
10 x C-1170 (210')	201.50
10 x C-1200 (210')	205.50
10 x C-1230 (210')	209.50
10 x C-1260 (210')	213.50
10 x C-1290 (210')	217.50
10 x C-1320 (210')	221.50
10 x C-1350 (210')	225.50
10 x C-1380 (210')	229.50
10 x C-1410 (210')	233.50
10 x C-1440 (210')	237.50
10 x C-1470 (210')	241.50
10 x C-1500 (210')	245.50
10 x C-1530 (210')	249.50
10 x C-1560 (210')	253.50
10 x C-1590 (210')	257.50
10 x C-1620 (210')	261.50
10 x C-1650 (210')	265.50
10 x C-1680 (210')	269.50
10 x C-1710 (210')	273.50
10 x C-1740 (210')	277.50
10 x C-1770 (210')	281.50
10 x C-1800 (210')	285.50
10 x C-1830 (210')	289.50
10 x C-1860 (210')	293.50
10 x C-1890 (210')	297.50
10 x C-1920 (210')	301.50
10 x C-1950 (210')	305.50
10 x C-1980 (210')	309.50
10 x C-2010 (210')	313.50
10 x C-2040 (210')	317.50
10 x C-2070 (210')	321.50
10 x C-2100 (210')	325.50
10 x C-2130 (210')	329.50
10 x C-2160 (210')	333.50
10 x C-2190 (210')	337.50
10 x C-2220 (210')	341.50
10 x C-2250 (210')	345.50
10 x C-2280 (210')	349.50
10 x C-2310 (210')	353.50
10 x C-2340 (210')	357.50
10 x C-2370 (210')	361.50
10 x C-2400 (210')	365.50
10 x C-2430 (210')	369.50
10 x C-2460 (210')	373.50
10 x C-2490 (210')	377.50
10 x C-2520 (210')	381.50
10 x C-2550 (210')	385.50
10 x C-2580 (210')	389.50
10 x C-2610 (210')	393.50
10 x C-2640 (210')	397.50
10 x C-2670 (210')	401.50
10 x C-2700 (210')	405.50
10 x C-2730 (210')	409.50
10 x C-2760 (210')	413.50
10 x C-2790 (210')	417.50
10 x C-2820 (210')	421.50
10 x C-2850 (210')	425.50
10 x C-2880 (210')	429.50
10 x C-2910 (210')	433.50
10 x C-2940 (210')	437.50
10 x C-2970 (210')	441.50
10 x C-3000 (210')	445.50
10 x C-3030 (210')	449.50
10 x C-3060 (210')	453.50
10 x C-3090 (210')	457.50
10 x C-3120 (210')	461.50
10 x C-3150 (210')	465.50
10 x C-3180 (210')	469.50
10 x C-3210 (210')	473.50
10 x C-3240 (210')	477.50
10 x C-3270 (210')	481.50
10 x C-3300 (210')	485.50
10 x C-3330 (210')	489.50
10 x C-3360 (210')	493.50
10 x C-3390 (210')	497.50
10 x C-3420 (210')	501.50
10 x C-3450 (210')	505.50
10 x C-3480 (210')	509.50
10 x C-3510 (210')	513.50
10 x C-3540 (210')	517.50
10 x C-3570 (210')	521.50
10 x C-3600 (210')	525.50
10 x C-3630 (210')	529.50
10 x C-3660 (210')	533.50
10 x C-3690 (210')	537.50
10 x C-3720 (210')	541.50
10 x C-3750 (210')	545.50
10 x C-3780 (210')	549.50
10 x C-3810 (210')	553.50
10 x C-3840 (210')	557.50
10 x C-3870 (210')	561.50
10 x C-3900 (210')	565.50
10 x C-3930 (210')	569.50
10 x C-3960 (210')	573.50
10 x C-3990 (210')	577.50
10 x C-4020 (210')	581.50
10 x C-4050 (210')	585.50
10 x C-4080 (210')	589.50
10 x C-4110 (210')	593.50
10 x C-4140 (210')	597.50
10 x C-4170 (210')	601.50
10 x C-4200 (210')	605.50
10 x C-4230 (210')	609.50
10 x C-4260 (210')	613.50
10 x C-4290 (210')	617.50
10 x C-4320 (210')	621.50
10 x C-4350 (210')	625.50
10 x C-4380 (210')	629.50
10 x C-4410 (210')	633.50
10 x C-4440 (210')	637.50
10 x C-4470 (210')	641.50
10 x C-4500 (210')	645.50
10 x C-4530 (210')	649.50
10 x C-4560 (210')	653.50
10 x C-4590 (210')	657.50
10 x C-4620 (210')	661.50
10 x C-4650 (210')	665.50
10 x C-4680 (210')	669.50
10 x C-4710 (210')	673.50
10 x C-4740 (210')	677.50
10 x C-4770 (210')	681.50
10 x C-4800 (210')	685.50
10 x C-4830 (210')	689.50
10 x C-4860 (210')	693.50
10 x C-4890 (210')	697.50
10 x C-4920 (210')	701.50
10 x C-4950 (210')	705.50
10 x C-4980 (210')	709.50
10 x C-5010 (210')	713.50
10 x C-5040 (210')	717.50
10 x C-5070 (210')	721.50
10 x C-5100 (210')	725.50
10 x C-5130 (210')	729.50
10 x C-5160 (210')	733.50
10 x C-5190 (210')	737.50
10 x C-5220 (210')	741.50
10 x C-5250 (210')	745.50
10 x C-5280 (210')	749.50
10 x C-5310 (210')	753.50
10 x C-5340 (210')	757.50
10 x C-5370 (210')	761.50
10 x C-5400 (210')	765.50
10 x C-5430 (210')	769.50
10 x C-5460 (210')	773.50
10 x C-5490 (210')	777.50
10 x C-5520 (210')	781.50
10 x C-5550 (210')	785.50
10 x C-5580 (210')	789.50
10 x C-5610 (210')	793.50
10 x C-5640 (210')	797.50
10 x C-5670 (210')	801.50
10 x C-5700 (210')	805.50
10 x C-5730 (210')	809.50
10 x C-5760 (210')	813.50
10 x C-5790 (210')	817.50
10 x C-5820 (210')	821.50
10 x C-5850 (210')	825.50
10 x C-5880 (210')	829.50
10 x C-5910 (210')	833.50
10 x C-5940 (210')	837.50
10 x C-5970 (210')	841.50
10 x C-6000 (210')	845.50
10 x C-6030 (210')	849.50
10 x C-6060 (210')	853.50
10 x C-6090 (210')	857.50
10 x C-6120 (210')	861.50
10 x C-6150 (210')	865.50
10 x C-6180 (210')	869.50
10 x C-6210 (210')	873.50
10 x C-6240 (210')	877.50
10 x C-6270 (210')	881.50
10 x C-6300 (210')	885.50
10 x C-6330 (210')	889.50
10 x C-6360 (210')	893.50
10 x C-6390 (210')	897.50
10 x C-6420 (210')	901.50
10 x C-6450 (210')	905.50
10 x C-6480 (210')	909.50
10 x C-6510 (210')	913.50
10 x C-6540 (210')	917.50
10 x C-6570 (210')	921.50
10 x C-6600 (210')	925.50
10 x C-6630 (210')	929.50
10 x C-6660 (210')	933.50
10 x C-6690 (210')	937.50
10 x C-6720 (210')	941.50
10 x C-6750 (210')	945.50
10 x C-6780 (210')	949.50
10 x C-6810 (210')	953.50
10 x C-6840 (210')	957.50
10 x C-6870 (210')	961.50
10 x C-6900 (210')	965.50
10 x C-6930 (210')	969.50
10 x C-6960 (210')	973.50
10 x C-6990 (210')	977.50
10 x C-7020 (210')	981.50
10 x C-7050 (210')	985.50
10 x C-7080 (210')	989.50
10 x C-7110 (210')	993.50
10 x C-7140 (210')	997.50
10 x C-7170 (210')	1001.50
10 x C-7200 (210')	1005.50
10 x C-7230 (210')	1009.50
10 x C-7260 (210')	1013.50
10 x C-7290 (210')	1017.50
10 x C-7320 (210')	1021.50
10 x C-7350 (210')	1025.50
10 x C-7380 (210')	1029.50
10 x C-7410 (210')	1033.50
10 x C-7440 (210')	1037.50
10 x C-7470 (210')	1041.50
10 x C-7500 (210')	1045.50
10 x C-7530 (210')	1049.50
10 x C-7560 (210')	1053.50
10 x C-7590 (210')	1057.50
10 x C-7620 (210')	1061.50
10 x C-7650 (210')	1065.50
10 x C-7680 (210')	1069.50
10 x C-7710 (210')	1073.50
10 x C-7740 (210')	1077.50
10 x C-7770 (210')	1081.50
10 x C-7800 (210')	1085.50
10 x C-7830 (210')	1089.50
10 x C-7860 (210')	1093.50
10 x C-7890 (210')	1097.50
10 x C-7920 (210')	1101.50
10 x C-7950 (210')	1105.50
10 x C-7980 (210')	1109.50
10 x C-8010 (210')	1113.50
10 x C-8040 (210')	1117.50
10 x C-8070 (210')	1121.50
10 x C-8100 (210')	1125.50
10 x C-8130 (210')	1129.50
10 x C-8160 (210')	1133.50
10 x C-8190 (210')	1137.50
10 x C-8220 (210')	1141.50
10 x C-8250 (210')	1145.50
10 x C-8280 (210')	1149.50
10 x C-8310 (210')	1153.50
10 x C-8340 (210')	1157.50
10 x C-8370 (210')	1161.50
10 x C-8400 (210')	1165.50
10 x C-8430 (210')	1169.50
10 x C-8460 (210')	1173.50
10 x C-8490 (210')	1177.50
10 x C-8520 (210')	1181.50
10 x C-8550 (210')	1185.50
10 x C-8580 (210')	1189.50
10 x C-8610 (210')	1193.50
10 x C-8640 (210')	1197.50
10 x C-8670 (210')	1201.50
10 x C-8700 (210')	1205.50
10 x C-8730 (210')	1209.50
10 x C-8760 (210')	1213.50
10 x C-8790 (210')	1217.50
10 x C-8820 (210')	1221.50
10 x C-8850 (210')	1225.50
10 x C-8880 (210')	1229.50
10 x C-8910 (210')	1233.50
10 x C-8940 (210')	1237.50
10 x C-8970 (210')	1241.50
10 x C-9000 (210')	1245.50
10 x C-9030 (210')	1249.50
10 x C-9060 (210')	1253.50
10 x C-9090 (210')	1257.50
10 x C-9120 (210')	1261.50
10 x C-9150 (210')	1265.50
10 x C-9180 (210')	1269.50
10 x C-9210 (210')	1273.50
10 x C-9240 (210')	1277.50
10 x C-9270 (210')	1281.50
10 x C-9300 (210')	1285.50
10 x C-9330 (210')	1289.50
10 x C-9360 (210')	1293.50
10 x C-9390 (210')	1297.50
10 x C-9420 (210')	1301.50
10 x C-9450 (210')	1305.50
10 x C-9480 (210')	1309.50
10 x C-9510 (210')	1313.50
10 x C-9540 (210')	1317.50
10 x C-9570 (210')	1321.50
10 x C-9600 (210')	1325.50
10 x C-9630 (210')	1329.50
10 x C-9660 (210')	1333.