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EDITORIAL

Editor:
Carl A Snape

Consultant Editor:
Keith Spencer-Allen

Production Editor & Design:
Ann Horan

Secretary:
Carrie Love

ADVERTISEMENTS

Advertisement Manager:
Adrian Tippin

Production Manager:
Jacky Pearce

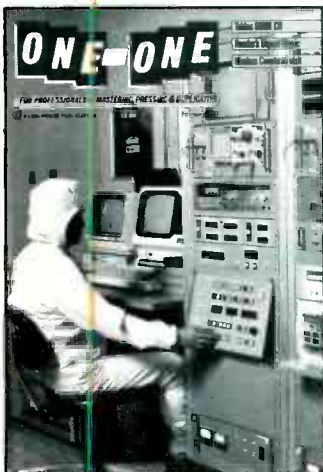
USA Agent:
Joe Statuto, Rt1, Box 40A, Montague,
Tx: 76251. Tel: (871) 894-6923.

Japan and Far East Agent:
Media Sales Japan Inc, Tamuracho Building
3-3-14, Shimbashi, Minato-ku, Tokyo, Japan

Commercial Manager:
Phil Guy

Editorial and advertising offices:
LINK HOUSE, DINGWALL AVENUE,
CROYDON CR9 2TA GREAT BRITAIN
Tel: 01-686 2599
International: +44 1 686 2599
Telex: 947709
Fax: 01-760 0973
E-mail: 78:DGS1071
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Here today, gone tomorrow?

What a year '86 turned out to be and I'm quite sure a large number of people will be glad to see the back of it, unless of course your happen to be involved in CD production. For the CD producers '86 saw the consolidation of the format and the groundwork (certainly in the US) for what is likely to be a year of considerable expansion in '87.

The first real ripple of interest in CD ROM and CDI appeared in '86 and this 'New Media' as the Japanese are calling it may well gain a useful foothold in '87 although to be perfectly honest, at the moment it does look as if it will be something of an uphill struggle initially. The main problem — especially with CDI — is that nobody seems to know what to do with it! It's a bit like giving a primitive man a video camera. Apart from the obvious physical attraction nothing at all will really happen until the chap finds the 'On' button and points the thing in the right direction.

At the moment as far as CD ROM and CDI are concerned we, like the primitive man, are simply 'ooing' and 'aahing', poking our fingers inquisitively at the technology and admiring our reflection in the glass lens. At the end of the day the man (or company) who discovers the CDI 'On' switch will not only make his own tribe rich and powerful — he'll undoubtedly make a lot of other people very rich too.

It's a sad fact of life that when one end of the seesaw is up the other end is down. During '86 vinyl production actually appeared to be valiantly holding on with no major closures, just a consistent chipping away at the edges. Sales are falling but for the time being no one has developed an alternative to the single and despite all the CD publicity, people are still buying vinyl LPs in many places around the world.

Rumours are rife, however, and even as I write there's news from Holland that EMI could be closing its Dutch pressing facilities and one major American lacquer manufacturer is said to be 'pulling out'.

According to Capitol, production has been halted due to over-production. Worldwide demand for lacquers has apparently dropped by around 40% and this is seen as an on-going trend. Current stock levels are sufficient for the remainder of '87 and as I understand it, the situation (to restart production) will be reviewed when the need arises.

The majority of disc cutting engineers appear to be fairly realistic about their future and as far as analogue is concerned those establishments that saw the writing on the wall during '86 used their time profitably to corner the CD pre-mastering market. Now that's what I call turning a potential disaster area into a useful and lucrative future.

Whether pre-mastering of analogue reissues will draw the 'cutting rooms' more and more into that grey area of tidying up old stereo masters or whether the recording studios will fight for the right to control the master will remain to be seen. And if pre-mastering facilities start to invest in more post production equipment where will it end? Perhaps we will see a new kind of specialist re-mix facility for revamping back catalogue with both analogue multitrack and CD pre-mastering equipment.

Will this mean ex-disc cutting engineers flocking to recording studios to act as pre-mastering personnel or will studio budgets tied up in new digital recording equipment pave the way for further expansion of the pre-mastering facility?

It is probably fair to say that during '86 the potential for all-digital tape preparation finally started to become a worldwide reality — rather than just a technical debate. One of the interesting spin-offs of digital pre-mastering — certainly as far as EQ was concerned — was the claimed improvement it gave to black vinyl. Cleaner, more repeatable and more accurate digital EQ provided a smoother cut with less phase shift and hence better and more consistent metalwork.

Whichever way it goes one thing is certain: if you haven't already brushed up on your bits and bytes, now is the time to start.

In ancient times when confusion reigned upon the earth it was epitomised by the Tower of Babel, now it's called video duplicating. Imagine having to cope with all those different standards and formats and then having to do it in real-time. So the impossible is possible after all and you can even make money out of it. Video got a shot in the arm

when the selling price fell to realistic levels in '86 but like all good things something was lurking in the dark corners of R&D lab that may well spoil everyone's fun.

CD Video made its debut in '86 and promptly got up one or two peoples noses — especially in Japan. It would seem that Philips decided to go it alone with the new standard rather than create a new internationally compatible system that like CD audio would be playable on any machine the world over.

Sitting on the middle of the seesaw (metaphorically speaking) are the tape duplicators. In '86 they became the top selling format. Whether this was by design or default could be argued till the cows come home. The trend however looks set to carry on though '87, '88 and '89 — after that it is anyone's guess.

With hindsight the first nail in the coffin of the compact cassette was driven in the day the first digital system was developed. I doubt if anyone in the industry noticed and it is ironic that the very hand that fed the record companies (and ultimately the tape industry) with Walkman's and a vast array of in-car players etc now wants to move on to a new generation of tape players.

Seen from the Japanese point of view they have no choice in the matter and if you read between the lines this was made abundantly clear at the DAT Conference on December 11th in Vancouver. So '86, at least in the record companies eyes, closed with the very foundations of the analogue tape market under threat. How far the repercussions of the Vancouver meeting will affect the duplicating industry remains to be seen. No doubt in '87 we'll find out.

Most reasonable people would probably agree that the wind of change is inevitable — but for the record companies it comes as quite a shock when you feel a cold draught before the fire has had a chance to die down. Equally no one (and that includes the Japanese manufacturers and the record companies) likes to be told how they are going to run their business and in this respect '86 saw some pretty high-handed ultimatums flying around.

With a little diplomacy and understanding both sides could have mutually benefited. Now as things stand it looks as if we could be heading for a trade war in '87 where no one is likely to benefit, least of all the duplicating industry who as always will undoubtedly get caught in the middle of this potential tug-of-war. What a terrible waste when a carefully marketed programme of DAT releases could have created a sensible and orderly progression into the digital era.

So what action should the tape duplicating industry take during '87 to soften the blow?

The first option is do nothing. This is excellent advice for all those companies that haven't been checking the CD production figures recently and still hang on to the notion that, "digital isn't going to be mass market product, it'll never happen to me".

Option Two is get in first, go digital. This is the high risk number. You'll be one your own. You'll be despised, ostracised and no doubt be regarded as foolhardy but if the tide turns in your favour you'll end up top dog when all those around you are floundering. At least that's the theory. Only men with vision need apply for the DAT option.

The third option (and it is only a three to five year holding position as far as I can see) is retaliate. Smarten the place up, make yourself efficient, double check your QC systems, look at ways to up quality, pressure the manufacturers for even better specs. In other words come out fighting. Don't kid yourself that a consumer with a digital cassette recorder isn't going to notice the difference between his tapes and yours, so at least make the difference as small as possible. And don't just give yourself a 'clean room' image: make sure your tapes really do sound better. The worse analogue cassettes are the easier it will be to establish a digital alternative.

Still not convinced? Well consider this: if things get really tough for the Japanese what is there to stop them putting a premium on all types of analogue cassette recorders or phasing out their production altogether? Black vinyl didn't get a second chance, why should analogue tape?

Carl A Snape

Sony DMC-1200 CD master code cutter

Sony have introduced the *DMC-1200* compact master code cutter after spending seven years refining and testing the system. The *SMC-1200* is composed of two components — the main cutting system and a computer system to control all operations.

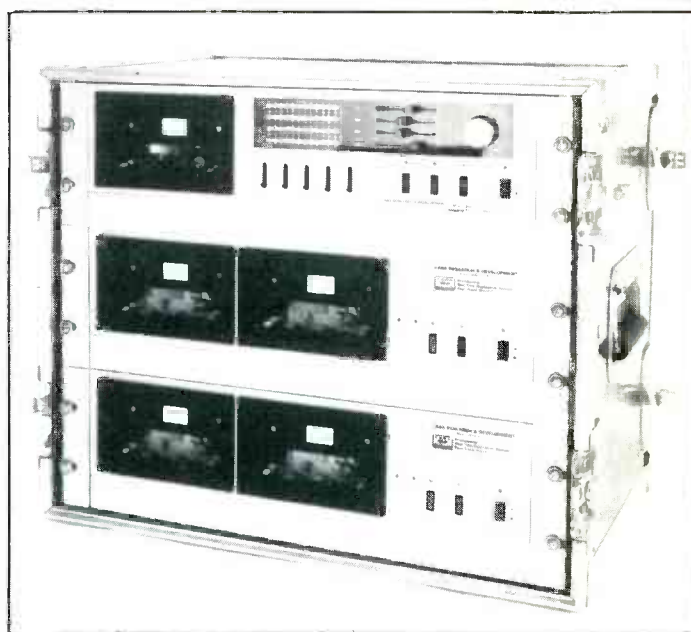
The cutting unit includes a laser optical system, sledding mechanism and turntable mounted on a solid, cast-iron floating bed. The unit is powered by a computer operated control and display system. For highly accurate photo-resist glass master copies the *DMC-1200* is equipped with a helium cadmium laser and employs a mobile laser cutting system to ensure an exact cut. According to Sony this eliminates the problems of distortion and uneven balance which often results when using a mobile turntable system. Master quality is also ensured due to the air suspension system whereby the mobile sections of the system never come into contact with the

guide table which could cause sticking or slipping.

The turntable is highly flexible with rotational speeds variable from 180 to 1000 rpm. A brushless DC motor is used for highly accurate revolutions. Air pressure generated by the motor keeps the turntable floating above the stationary parts of the drive system to prevent it from sticking to the rigid cast-iron bed.

The basic system was designed to require the minimum of operator training. The system is engineered for stability with no adjustments needed even after a year of regular use and the complete operation of the *DMC-1200* from the optical, rotational and sledding systems to playback of the master tape on a separate recorder is computer controlled. An interactive CRT simplifies the entry of cutting instructions.

Sony Corporation of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656, USA.

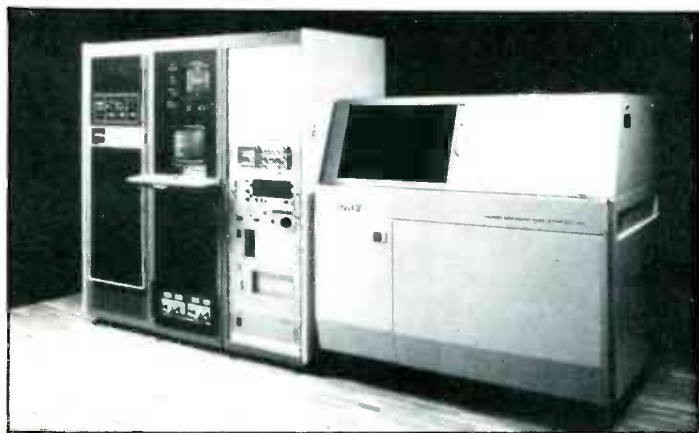


KABA portable duplicator

Kenneth A Bacon Associates has developed a portable realtime (or double speed) duplicating system for professional use. The complete system of three rack mounted units includes one master panel and 2x2 slaves. According to KABA the system is suitable for producing audiophile

cassette copies (frequency response 20 Hz to 20 kHz) and the system will operate directly from digital, reel-to-reel or cassette masters.

Kenneth A Bacon Associates, 24 Commercial Blvd, Suite E, Novato, CA 94947, USA. Tel: (415) 883-5041.



Ampex 467 update

Ampex has introduced two new versions of its 467 digital audio cassette. Designed for digital PCM recording 467 U-matic cassettes are now available in 75 and 30 min lengths (in addition to the original 60 min version). The

new lengths have been designed for CD and single/EP mastering respectively.

Ampex Corporation, Acre Road, Reading, RG2 0QR, UK. Tel: 0734 875200.

Agfa cassette tape improvements

The magnetic tape division of Agfa-Gevaert Inc, Teterboro, New Jersey are now offering an improved formulation of their magnetite bulk audio cassette tape. *Magnetite 62 (PE662 and PE962)* is designed for quality conscious music duplicators. The new formulation features low noise and super high output with extended dynamic range. According to Agfa, physical alterations have made the tape more durable with better overall signal retention especially at high frequencies. Saturation (SOL) and

maximum output level (MOL) have both been improved.

Magnetite 62, due to its excellent slitting characteristics, is also claimed to provide superior duplicator winding, better transport within the shell and consistent phase stability. Pancakes come packed in compact stack hubs for secure shipping and convenient storage. **Agfa-Gevaert Inc, Magnetic Tape Division, 275 North Street, Teterboro, NJ 07608, USA. Tel: (201) 288-4100.**



Howe Audio Model 2300 phase chaser

The Model 2300 phase chaser from Howe Audio is claimed by the manufacturer to have important applications in post-production and the audio and video duplication industry. The automatic operation of the 2300 when connected directly after the master playback machine is claimed to eliminate the problem of channel inversion and azimuth alignment errors in 1/4 and 1 in video machines.

The 2300 has three principle functions 1) to detect and correct time delays up to $\pm 150 \mu s$ between the left and right channels of a stereo signal 2)

detect and correct 180° channel polarity inversion by means of a 30 ms click-free 'soft-fade' and 3) detect and correct up to 3 s of individual channel loss using user presets for drop-out level and mono fill-in start and stop times.

The unit is supplied in a 19 in rack mount chassis with balanced XLR connectors, selectable line voltage, remote control port and error voltage jack for triggering a peripheral device or an external alarm (aural or visual).

Howe Audio Productions Inc, 2300 Central Avenue, Suite E, Boulder, CO 80301, USA. Tel: (303) 444-1693.

High Vacuum CDC-1000 coater

High Vacuum Equipment Corporation of Massachusetts have developed a compact disc coating system manufactured entirely in the United States. The *CDC-1000* is designed to provide maximum output with a simplified low maintenance design. The unit features fully automated operation

with a common load/unload station. Only a limited clean room area is required and the unit has been designed to occupy the minimum amount of floor area. **High Vacuum Equipment Corp, 110 Industrial Park Road, Hingham, MA 02043, USA. Tel: (617) 749-9000**

ICM: the Swiss way in CD.



If one of the world's largest cassette manufacturers gets into the world of CD business, one may rightly expect quite a bit of know-how and feeling. And if that manufacturer is a Swiss company with Swiss precision and quality standards, then you can talk about a lucky chance.

No wonder that ICM has made itself quite a repu-

tation in the CD business since starting production in 1985. And as far as production capacity is concerned: In 1987 not less than 12 million CDs will be manufactured.

Shouldn't you too get some detailed information? Please ask for our documentation.



ICM Diessenhofen Ltd. CH-8253 Diessenhofen Switzerland Telephone 41/53/787 87
Telex 45/896 416 Telefax 41/53/784 41

Telex 6120XLP duplicator

Telex have developed a new cassette duplicator in the 6120 series. The new model (6120XLP) is based on the earlier 6120 high speed duplicator but features a lower duplication ratio (8:1 instead of 16:1) and enhanced audio specifications. According to Telex, distortion, frequency response, speed accuracy and crosstalk have all been appreciably improved.

The 6120XLP uses the newly

developed *XL LIFE* record head which has been designed for extra long life and resistance to excessive oxide build-up. Other features of the XLP include compact size, unlimited expandability, choice of track formats, peak reading LEDs and easy one button operation.

Telex Communications Inc,
9600 Aldrich Avenue So,
Minneapolis, MN 55420,
USA. Tel: (612) 887-5531.

Intelair compressed air products

Intelair have announced the availability of two new compressed air products for the smaller, specialised user who needs compressed air of high quality. The acoustically packaged reciprocating air compressor not only provides compressed air but it also filters and dries the air to a standard far in excess of breathing air standards.

Careful design has allowed the overall dimensions to remain roughly in line with a receiver mounted air compressor even though the new package contains three stage filtration plus an optional heatless desiccant dryer. The unit has an ambient noise level of 65 dBA at 1 m, output of the standard single phase unit is 7

cfm FAD at 130 psig. The compressor operates from a standard 13 A plug point (UK) and is available in several options depending upon customer requirements.

Also new is a small heatless desiccant dryer. The unit will flow up to 10cfm FAD at 100 psig, with a 40°C pressure dewpoint.

Maximum working pressure is 10 bar. The unit is controlled by two multiport-linked solenoid valves with a preset switchover of 15 min. Operation is fully automatic and has a purge rate of 15%. This is set at the factory but can be user adjusted if required.

Intelair Ltd, Unit 18, Orchard Road, Royston, Herts,
UK. Tel: 0763 48811.



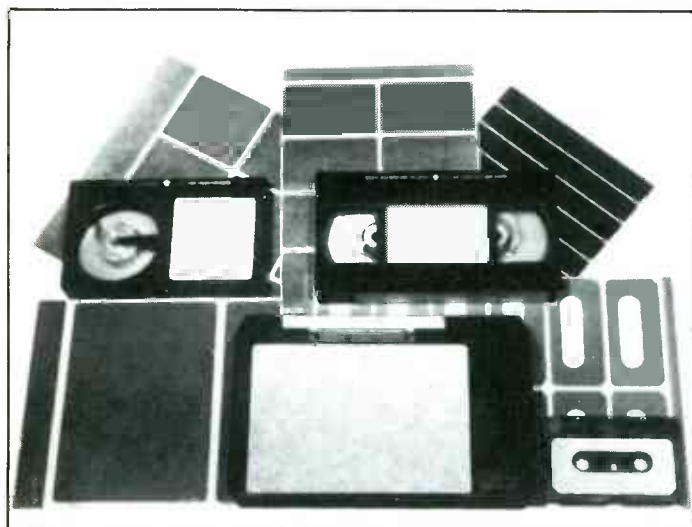
Brady magnetic tape marker

WH Brady Co have developed a new patented clamshell applicator that supplies individual precut BOT/EOT magnetic tape markers one at a time. Markers are applied directly to the media and can be used in both automatic or manual equipment.

The metallised polyester tape markers are supplied on a polyester liner and have carefully controlled dimensions in order to avoid misreadings. Marker sizes are 0.1093 (± 0.015) by 0.1875

(± 0.008) in with a total thickness of 0.00055 in (special BOTs are also available in 0.00033 in thickness). The markers are extremely flexible and designed for easy passage through the tape path. Markers are available in boxes of 10 dispenser packs, with 250 usable markers per package.

WH Brady Co, 727W Glendale Avenue, PO Box 571, Milwaukee, WI 53201,
USA. Tel: (414) 332-8100.



Audico label sheets

Pressure sensitive label sheets for audio cassettes. VHS, Beta and U-matic tapes are available from Audico of Elk Grove, Illinois. New to the range is a set of VHS spine labels which due to their size are also suitable for other uses such as album covers, storage boxes and disc envelopes.

Made from mill-coloured 60 lb matte finish paper, the audio labels are available in nine vivid and unique colours as well as matte, semi-gloss and glossy

white. Video labels are produced in matte white, pewter parchment and sand parchment. All the labels are suitable for printing, typing and copying machines.

The new VHS labels are available in standard packages containing 100 sheets, 12 labels per page. Variety packages are also available.

Audio Inc, 219 Crossen Avenue, Elk Grove, IL 60007,
USA. Tel: (312) 640-1030.

BASF improvements

BASF unveiled a major improvement in its popular LHD ferric audio duplicator tape. The formulation features a new ferric particle that is smaller, thinner, finer and more consistent in size.

According to BASF the new tape provides a 1.5 to 2 dB improvement in high frequency MOL and has greater batch-to-batch consistency.

The tape is available in 8,200, 10,000 and 12,300 ft lengths for

C-60 applications and in 11,500 and 15,000 ft lengths for C-90s.

BASF has also improved their chrome tape with an extra 1 dB more MOL at low and high frequencies and 1 dB less noise and print through. The new chrome tape, *Chrome Extra*, will be shipped in longer standard lengths of 8,200 ft.

BASF Corporation, Crosley Drive, Bedford, MA 01730,
USA.

Fuji M401 MII video tape

Recently introduced in Japan and claimed to be the world's first professional 1/2 in metal video tape, *M401 MII* uses Fuji's super fine *Metallix* powder along with a newly developed binder. The combination is designed to provide exceptionally stable tape transport (and long tape life) during jog, still, shuttle and other editing modes. The new tape also features a newly developed base enabling special calendaring techniques which provide a high

density magnetic layer and mirror-smooth surface.

The *MI* format tape is available in 12, 23, 35, 65 and 90 min lengths and has a coercivity of 1500 Oe and retentivity of 2600 Ga and Drop-outs ($5\mu\text{s}$ -16 dB) are specified on average) as 3 min throughout the reel.

Fuji Photo Film (UK) Ltd,
Fuji Film House, 125 Finchley Road, Swiss Cottage, London, UK. Tel: 01-586 5900.

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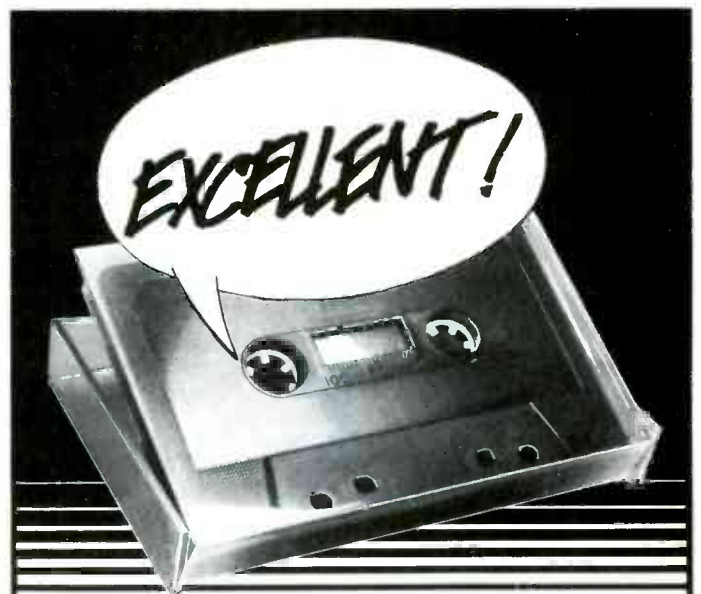
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Growth in spoken word

Spoken word pre-recorded cassette sales in the US will continue to grow at a rapid pace throughout the rest of the decade and most likely to the year 2000 and beyond, because of one important factor — there is no other medium on the horizon to take its place. This is according to Leonard Feldman, chairman of the board and vice-president, operations, Tape Specialty Inc, and a member of the Audio Publishers Association board. Feldman presented his view of the pre-recorded spoken word audio cassette market at the general membership meeting and update seminar of the International Tape/Disc Association (ITA), which was held at the Essex House Hotel in New York.

Pre-recorded spoken word cassettes sales reached \$2 billion in 1985, and sales are expected to total \$3.3 billion in 1986. For the books-on-tape market, the sales projection is for \$865 million.

"Sales of the spoken word cassette are on an upswing," said Feldman, "and have been since 1974 but it is only now that the format is really beginning to catch on in the consumer market. The spoken word market even has its own joke: 'Heard any good books lately?'"

Medical cassettes have been selling millions of units for many years and in the religious community, sales of the cassette version of the Bible have exceeded 1 million units per year since 1980 — at an average price of \$50 per set. Now US politicians are even using the pre-recorded audio cassette in their campaigns to raise funds and explain their platforms to the electorate.

The increased demand for the spoken word cassette has gone hand-in-hand with an upgrade by duplicators in sound quality. There has been a marked quality upgrade in the past five to seven years. Feldman noted, because of the improved sound quality in pre-recorded music cassettes. "Most spoken word duplicators have upgraded their equipment and their quality control to the same criteria as duplicators of music cassettes. You can hear the difference, and that care for quality is appreciated by consumers."

Recently, major US publishing companies have entered the business: "Warner Bros and MCA bought a publisher just to enter the field," Feldman said, "and so has Columbia Pictures. Also, there are now new audio divisions devoted to the pre-recorded spoken word cassette at many book publishers."

Feldman predicted that 1987 will be the largest ever for new users of the medium. "There will be more cassettes purchased by existing users," he said, "but even more from people new to the pre-recorded cassette. It is important to remember that there are 40 million people in the US who can't write or read, so the pre-recorded audio cassette is perfect for them."

"Every class and age group is a potential market. If someone can't afford to buy the cassette tape, it is then possible to rent it. If it is not possible to rent a tape, it can then be borrowed from the local public library."

According to Feldman sales of spoken word cassettes will increase at an even greater pace in the years to come. There are more than 4,000 two and four year colleges in the US that carry spoken word cassettes,

Randy Savicky reports from the USA on current trends

noted Feldman, and the college market is a potential market of 4 million students. Presently, 224,000 doctors, 357,000 real estate brokers and 410,000 attorneys in the US buy books on cassettes. In addition, the library market includes 12,000 libraries that purchase unabridged books on cassette.

"It is important to remember that these figures only include the US market," Feldman said. "The foreign market is still virtually untapped."

EIAJ, IFPI and RIAA fail to agree

An appeal by US and European record companies to support legislation requiring a copyright protection chip in Digital Audio Tape (DAT) recorders has been rejected by the Electronic Industry Association of Japan (EIAJ) at a conference at the Pan Pacific Hotel, Vancouver, Canada held on December 11th, 1986.

Initiated at the request of the IFPI, the international recording industry association and the Recording Industry Association of America (RIAA), the meeting brought together top executives of Japan's electronic industry and leaders of international record companies and trade organisations. The idea was to reconcile the differences on whether to protect copyrighted sound recordings from home taping with DAT equipment.

Both the IFPI and RIAA hoped to secure the support of the EIAJ for legislation that would require technological protection of copyrighted recordings. This legislation would mandate the inclusion of Copy-Code chips in DAT equipment manufactured in or imported into various territories.

"We had hoped for a positive, constructive response," said IFPI president Nesuhi Ertegun. "This response would have been sensitive to the rights and career needs of our artists, songwriters and companies. Instead, we found these concerns unheeded and the makers of DAT will ignore our copyrights. In the long run, consumers and music lovers will suffer."

"We believe that the digital audio recorder, like every other consumer electronic product will be used widely and responsibly by consumers to the benefit of the hardware and recording industries alike," said Shoichi Saba, chairman of EIAJ and chairman of the board of Toshiba Corporation. "We told the recording industry executives that we appreciate their concerns on the subject of commercial piracy or the unauthorised commercial duplication of recordings. However, if they are willing to delineate this issue from the question of consumer home taping, the electronics industry is willing to help."

The copyright protection chip technology — called Copy-Code — was developed by the CBS Technology Centre. In this process, copyrighted recordings would be encoded by recording companies during the mastering stage. The encoding, which would inhibit the unauthorised copying of recordings on equipment with the Copy-Code chip, would not affect sound quality, according to the manufacturer.

The failure of the conference attendees to reach an agreement will now trigger aggressive music industry initiatives in the US Congress and the EEC (European Economic Community) to secure legislation to implement the Copy-Code technology into products.

■ Representing EIAJ were:

Shoichi Saba
Chairman, EIAJ
Chairman, Toshiba Corporation
Akio Morita
Vice Chairman, EIAJ
Chairman, Sony Corporation
Akio Tanii
Vice Chairman, EIAJ
President, Matsushita Electric Industrial Co Ltd
Ichiro Shinji
Chairman, Victor Company of Japan Ltd
Seiji Sudo
President, Hitachi Sales Corporation
Toshio Takai
President, EIAJ
Hiroshi Kosaka
Toshiba Corporation
Naoyuki Agawa
Sony Corporation
Yoshiki Iguchi
Matsushita Electric Industrial Co Ltd
Hiromasa Shimada
Victor Company of Japan Ltd
Takao Negishi
EIAJ
Mamoru Tsukamoto
EIAJ
Mikio Hinata
EIAJ
Robert S Schwartz
Legal Counsellor

■ Representing IFPI were:

Nesuhi Ertegun
IFPI President
Chairman, WEA International
Ian Thomas
IFPI Director General
Bhaskar Menon
Chairman, Capitol Industries — EMI Inc
Robert Summer
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Jan Timmer
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Circulated to over 70 countries to named individuals who are professionally involved in the many areas of mastering, pressing and duplicating. Covering management, operations, engineering and manufacturing.

3 more editions are planned for this year, May 1987 for APRS and ITS Montreux, July 1987 for Sound Broadcast Equipment Show, October AES New York and Inter BEE Japan.

To ensure that your message is seen contact Carl Anthony Snape, Editor; Adrian Tippin, Advertisement Manager or Phil Guy, Commercial Manager by the final dates to be included in this important magazine.

COPY DEADLINES FOR MAY 1987

Editorial copy date: 31st March 1987

Advertising copy date: 20th April 1987

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UK trade deliveries July-Sept 86

The July to September trade deliveries, surveyed by the BPI, follow the general pattern shown in the same quarter of 1985, with singles dropping gently, LPs holding up fairly well, and trade take-up of cassettes and CDs surging ahead.

Just over 12 million LPs were delivered, a 13% increase on last year's figure of 10.7 million (and value was up 12% at £31.9 million). The unit increase should not be seen as having any long term significance. It is simply a reflection of the strength of new release shipments, buying ahead of TV ads and stocking up prior to price increases. Pre-Christmas buying has added to stockholding levels.

The same influences have affected the level of cassette shipments but in this sector there has also been a strong underlying growth rate. All these influences have combined to give a 44% increase — volume was 17.5 units compared with 12.1 million in July-September 1985. Value of

sales was £26.4 million, 35% up on last year's £26.9 million, but the average trade price, for cassettes and LPs, was down: this could indicate strength in the mid-price and budget areas, as compact disc begins to dominate full-price repertoire.

CD deliveries were 1.8 million units in the third quarter and look to be on target for 7.0 million by the year-end. Value of sales was £13 million. Singles sales were down 7% at 16.2 million units, 32.5% of these shipments being 12 in.

Even though the picture for the third quarter represents stock building rather than through-sales, unit deliveries of all long playing items (LP + cassette + CD) were no less than 33% up — 31.4 million against £23.6 million last year.

UK record industry shipments have now passed the £400 million per annum mark, and look set to stand at over £420 million by the year end.

UK trade deliveries July-Sept 1986

	July-Sept 1985	July-Sept 1986	% Change
7 in singles			
Units		10,909m	
Value		£9,634m	
Average trade price		£0.883	
12 in singles			
Units		5,263m	
Value		£8,532m	
Average trade price		£1.621	
Singles (7 in+ 12 in)			
Units	17,337m	16,172m	-6.7
Value	£19,091m	£18,166m	-4.8
Average trade price	£1.101	£1.123	+2.0
LPs			
Units	10,657m	12,028m	+12.9
Value	£28,479m	£31,878m	+11.9
Average trade price	£2.672	£2.650	-0.8
Cassettes			
Units	12,142m	17,533m	+44.4
Value	£26,889m	£36,370m	+35.3
Average trade price	£2.215	£2.074	-6.4
Compact discs			
Units	795m	1,843m	+131.8
Value	£4,626m	£12,972m	+180.4
Average trade price	£5.819*	£7.038	+20.9*
Combined LP/Cassette/CD			
Units	23,594m	31,404m	+33.1
Value	£59,994m	£81,220m	+35.4
Total value	£79,085m	£99,386m	+25.6

* Special factors influenced the value of average CD prices in July-September 1985, and the year-on-year percentage increase should not be regarded as significant.

Source: BPI

New manufacturing facility for Ampex

Towards the end of last summer Ampex Corporation's Magnetic Tape Division unveiled a state-of-the-art, 6 in tape coating line at its Opelika, Alabama production centre. The new addition, Line 9, is specifically designed for the development of new products previously done at Ampex's Redwood City, CA headquarters.

"Line 9 allows us to consolidate all of Ampex's magnetic tape product development engineering in Opelika," explained Donald F Bogue, general manager Magnetic Tape Division. "The physical distance between Redwood City and Opelika caused costly delays in product development. With the opening of this new line we have the experimental capabilities of Line 9 adjacent to the manufacturing facilities. This will help to eliminate problems in new products and get them on the

market quicker than before."

In addition to facilitating current tape production the new line will allow the Opelika facility to develop products in the future to meet digital, video and instrumentation product needs.

"There is a new generation of products expected on the market in the next few years requiring much higher levels of precision in tape development and production than are currently being used," director of research and development, George A Politis, pointed out.

"Line 9 has a highly controlled clean room atmosphere and the precision coating capabilities required for developing those products. With this capability in Opelika we can develop and market new products much faster and remain a top competitor as the magnetic tape industry progresses."



European cassette quality control

A committee has been formed within the Deutscher Bundesverband der Phonographischen Wirtschaft with the aim of further improving the quality of pre-recorded audio cassettes. This new group, which is to be known as MCQC (MusiCassette Quality Committee) will represent the following companies: CBS, EMI, Hardt Cassetten, ICM, Interpress, Miller International, Polygram, Record Services (WEA), Sonopress and Teldec.

The cosmopolitan character of the group is felt to be especially important with its emphasis on international, European co-operation. Liaison with the Technical Committee of the IFPI (International Federation of Phonogram and Videogram Producers) is under consideration.

Members of MCQC are drawn from the following technical fields: development, recording, quality assurance and manufacture. It is intended to hold two meetings a year and the main objectives include measuring methods and manufacturing tolerances, exchanging views on quality and discussing new techniques in the light of growing market requirements.

The first two meetings have already revealed a central problem concerning azimuth alignment of cassettes in different players and the use of standard reference tapes not always producing the desired results with the required accuracy.

The next meeting will be held on February 5th when experts on manufacturing reference tapes will be invited to participate.

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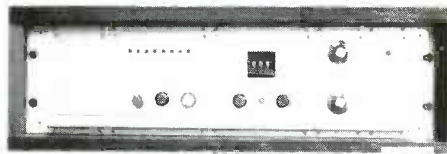
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Counterfeiters caught

The untiring effort of the BPI Anti-Piracy unit brought 1986 to a close with the conviction of another group of audio tape pirates.

At Chelmsford Crown Court on December 19th, three Essex men — Denis Compton of Battlesbridge, Robert Clarke of Hockley and Leslie Halls of Dagenham were convicted of conspiracy to contravene the Copyright Act by manufacturing counterfeit audio cassettes. All received suspended prison sentences and were heavily fined.

A six month investigation by the APU uncovered a pirate factory in Westcliff on Sea, and this was raided by the police, with BPI assistance, in September 1985. High speed tape duplicators, blank and recorded cassettes, inlay cards, a labelling machine and labels were seized.

The quantities of tape on the premises were relatively small — 2,500 counterfeits and 5,000 blank — but in evidence the BPI investigators stressed that the tape pirates' methods of operation have changed recently, in response to pressure of successful investigation and prosecution by police, trading standards officers and the BPI. As a result, the tendency is for counterfeit tapes to be duplicated 'to order', and for very small numbers to be held as stock. The true indication of the level of any counterfeiting ring's activity, the court was told, is the amount of

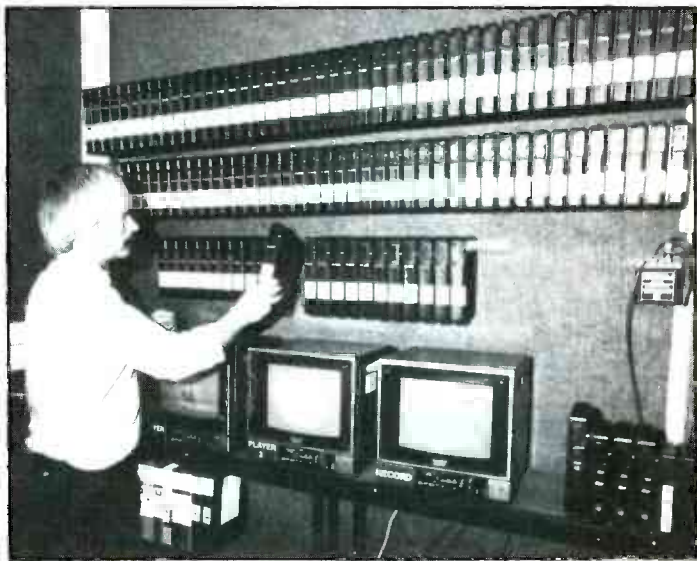
printwork being made and left in readiness. In the Westcliff factory the police and BPI found 50,000 inlay cards, and 100,000 pairs of labels; and a list of over 100 album titles which were available to order.

Halls was sentenced to nine months imprisonment, suspended for two years, fined £1,500 and ordered to pay £850 prosecution costs. Clarke and Compton were each sentenced to six months imprisonment, suspended for two years, fined £1,000 and ordered to pay £850 prosecution costs.

Compton and Clarke said they rented rooms to Halls and an Irishman thinking it was for a finance company. They had no part in any conspiracy to produce or sell pirate tapes. Halls denied renting the premises and said he had only been there because he knew Compton in connection with car sales. He had no connection with any business there.

The recorder, Mr J D Farnworth told the three convicted men, "The making of pirate tapes, is alas, a continued and recognised problem involving cheating all the way through the operation. You cheat the artistes, you cheat the record companies, you cheat the public and on the way, no doubt, the Revenue are also cheated.

"You are all of previous good character and mature men, yet you tried to hoodwink the jury with a tissue of lies."



3M storage system

To provide efficient, secure video cassette storage in edit suites and tape libraries, 3M's Professional Markets Group recently ran a special promotion offering a Box/Bar storage system free to purchasers of 3M Scotch 1/2 and 3/4 in broadcast video cassettes.

The system which consists of U-matic and Betacam cassettes housed in sturdy 'shipper' boxes clips neatly (using an integral hook) onto a special aluminium bar supplied by 3M in 4 ft lengths.

"The benefits of the Box/Bar system are threefold," explained 3M professional markets manager, Joe Clerkin, "first, convenient storage — the Box/

Bar eliminates searching around for video cassettes on work surfaces or shelves. Second, efficiency in identifying the correct programme during busy sessions and third, protection — 3M's shipper box is rugged enough to be mailed as it is."

Customer buying a minimum of 10 U-matic or 20 Betacam cassettes during Nov, Dec and Jan qualified for 10 free Box/Bars.

3M MBR and PB customers were also eligible for an equal number of empty boxes under the scheme to enable conversion of existing video tapes to the new system.

Cinderella won't play ball

3M is to increase the UK price of 1/2 in bulk-packed Scotch cassettes sold to video duplicators by 10%. According to Joe Clerkin, professional markets marketing manager, "There's been a well documented boom in the low price video 'sell-through' market. There are four partners in that success: the programme owners, the distributors, the duplicators — and the blank tape suppliers.

"Frankly the tape manufacturers have played Cinderella so far as this particular

ball is concerned. Blank tape has been under-priced, a fact which has contributed directly to low retail prices and to the market's lift-off. 3M claimed a tape supply share as high as 30% during 1986 in the UK video duplicator market so it is appropriate that we should take the lead in establishing realistic prices."

Effective last month (depending on format and tape length), prices for 3M's Scotch cassettes were increased by 3 to 10%.

Asona news

Avis-Asona are now able to supply a special version of the Revox B77 for recording submasters. It offers an extended frequency range up to 20 kHz at 3 3/4 ips. The machine is adjusted for Agfa PE649 (ferric); Agfa PE612 (pigment) and BASF TP18C7 (chrome). Avis-Asona will also align the equipment for other tape types if requested.

Asona are often asked for video cassette duplication equipment. They have recently started talks with a leading manufacturer in the field. If you are interested give them a call. Avis-Asona, Bahnhofstrasse 60, D-7634 Kippenheim, West Germany. Tel: 07825/1068. Telex: 754325.

1986 IFPI Review

The latest copy of the yearly IFPI Review is now available and contains a full report on the IFPI's activities on issues such as anti-piracy, private copying, rental and video rights. The fully illustrated book includes a detailed statistical section with information on world sales of records and tapes, international levels of piracy and

the turnover of major international recording companies. There is also a directory of IFPI national groups in Europe, Asia and Africa and its affiliated bodies in the Americas. IFPI 86 costs £5.00 and is available from the IFPI Secretariat's London office.

Forward buy Fraser

Fraser Peacock, the Wimbledon-based video duplication facility has been bought by Forward Technology Industries. "Fraser Peacock will continue to operate under its present name," said managing director, David Tuckman, "with its present management and with its commitment to a high level of service within a demanding fast-growing business."

Tuckman remains head of Fraser Peacock, retaining a minority shareholding and at the same time taking a stake in Forward Technology. The Board of Fraser Peacock is to be

strengthened by the addition of the company's present general manager, John Fasnidge and its sales and marketing manager, Mike Carey. Also joining the Fraser Peacock Board are FTI chief executive Ken Cobby, director, Terry Callaghan and Forward Sound & Vision managing director, Peter Robey.

FTI is a public company which includes (among other various technological activities) ultrasonics, record pressing and the largest independent tape duplicators in the UK — Forward Sound & Vision.

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Change of course for Electro Sound

Bob Barone, president of Electro Sound Inc. in a recent announcement broke the news that Electro Sound has decided not to continue marketing its newly developed 480 ips master.

The 4800 system, which was introduced at the March AES show in Switzerland last year, was composed of the 480 ips master and a digitally controlled slave. The slave which is capable of operating with an 8000 master or being added to existing 8000

systems has been well received and will remain in production. The master however was not received as enthusiastically, a fact which was perceived to be, according to Electro Sound, the result of the technological confusion prevalent in the duplicating industry today.

At the present time Electro Sound plans to proceed with its engineering development of tapeless masters in both analogue and digital formats.

Overseas sales for Graff

Overseas interest in Graff copiers is on the increase. Sales in Russia, China, the Middle and Far East and Australia are increasing and Graff noted that a paramount request from overseas users was that the machines would be robust and reliable enough to withstand the varying climatic conditions and

operator misuse.

Graff's latest UK delivery was to the Royal Academy of Dramatic Arts (RADA) for use in creating a small reference library of spoken word 'tuition' cassettes and in stage and radio production training.



Mort Fuji new appointment

Shape Inc has announced the appointment of Mort Fuji, previously president of Cetec



Gauss, as president of Shape International. Located in Southern California, Shape International is an multi-product, multi-technology, international marketing and sales organisation in the computer, video, audio and optical media markets.

Fuji, who joined Shape Inc on October 13th, 1986, will be responsible for the marketing of all Shape equipment and products outside the continental US. During his time with Cetec Gauss the company's share of the duplicating equipment market rose from one-quarter to three-quarters becoming a worldwide leader in high-speed duplicating equipment.

With 35 years in the audio industry Fuji's previous associations include RCA, Ampex, Bell Sound Studio and Electro Sound.

Singapore relapping service

JRF/Magnetic Sciences has joined forces with Precision Products PTE Ltd to establish the first company in Asia (outside Japan) that will sell and service audio magnetic heads. To provide their kind of dedicated service in the growing Southeast Asia market John and Cookie French directors of JRF/Magnetic Sciences have formed a new company with Arthur Ngiam, managing director of Globe Precision Products in Singapore. The new facility is to be known as Globe Magnetic Sciences PTE Ltd.

According to Ngiam, who is currently the Cetec Gauss, King Instrument and Capitol Magnetic Tape distributor in Southeast Asia, he is anxious to open a

relapping facility that, "is as good or equally renowned as any other head polishing centre in the world."

A survey of tape duplicators in Singapore conducted by Ngiam indicated a strong desire on their part for a high quality relapping service.

Manager of the new facility, Jim Meng has already had an intensive training programme at JRF/Magnetic Sciences and it is expected that he will return at regular intervals for further training assistance.

The successful formation of Globe Magnetic Sciences now eliminates the need for heads to be sent to Japan, Europe or the US for a quality technical service.

Precision Laquer order DTC-1

Precision Lacquer of Hollywood, CA has placed Neve's first order at the recent AES show for a DTC-1 (Digital Transfer Console). Larry Emerine and Stephen Marcussen of Precision have spent a lot of time evaluating digital products for their new digital mastering room and according to their findings, "The DTC-1 is the only practical digital console that can be seriously considered. The console

dynamically functions — as we do — in real time. The usual digital limitations are not present in the console.

"Whether we are generating DMM masters, compact disc masters, cassette masters or producers' refs this console gives us what we need without the usual digital trade-offs of previous consoles."

Delivery of the new Neve console is expected in early 1987.

8mm duplicator cassettes

TDK Electronics Corp in the US are now supplying the industry's first specially-designed bulk 8 mm duplicator cassettes. According to national sales and pro-industrial manager, Douglas Booth, TDK are the first manufacturer to make a true 8 mm duplicating cassette available with a white guard panel to differentiate the product from the consumer version.

"The consumer will ultimately

decide if there is a need for the 8 mm format of course." Booth admitted. "but the major pre-recorded movie duplicators have indicated that they have also committed to the equipment necessary to provide 8 mm pre-recorded media."

The new product is available in lengths to meet a variety of industrial applications.

Digital Audio mastering

The Digital Audio Disc Corporation in Terre Haute, Indiana, has recently installed a Sony PCM-1630 digital audio processor and Sony DMR-4000 digital master recorder in their mastering facility.

"With the new 1630 we have unquestionably one of the finest CD maturing facilities in the world," said Jim Frische, executive vice president, DADC. "The new system will significantly improve the bit error correction rate for the audio discs and give us greatly increased audio monitoring capabilities."

Digital Audio Disc Corporation is a wholly owned subsidiary of

Sony Corporation of America and currently produces 2 million audio discs per month. In addition to the Sony PCM-1630, DADC also uses the Sony PCM-3202 DASH reel-to-reel digital recorder enabling the facility to accommodate a variety of tape formats.

In addition to audio compact discs, the company also manufactures CD ROM. Towards the end of last year DADC celebrated the pressing of its 25 millionth disc following recent production expansion and is forecasting that the current manufacturing capacity will double by the end of this year.



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Technology and marketing seminar

The International Tape/Disc Association (ITA) will hold its 17th annual seminar for the audio/video/data industry — Technology And Marketing: Partnership For The '80s' — at the Hyatt Regency Hilton Head, Hilton Head, SC, March 11th to 14th.

According to Henry Brief of the ITA, presentations and panels will be held on a variety of topics, including: The Impact Of Technology Or Marketing Strategies; How Does The Financial Community View The Audio/Video/Data Industry Today?; The Future Of Video Vending Machines; New Packaging Technologies, Formats and Applications; High-Speed Duplication For Video and Digital Audio Tape; 8 mm vs half-Inch Video; War and Peace?: Whither Dolby in the Digital Age;

Analogue Audio Tape: The Hard Place Between CD and DAT.

Also, Compact Discs, Video Compact Discs, Interactive Discs, CD ROMs: What Next?; Video Distribution; When You Get Through Selling Direct, What's Left For Independent Distributors?; Fighting the Piracy Problem and Those Who Would Fight The Fighters; Digital Audio Tape: Will It Produce Feast or Famine for the Industry?; and Blank Tape and Floppy Disks: A Not-For-Profit Industry That Wasn't Designed That Way.

For more information of the seminar, contact the ITA, 10 Columbus Circle, New York, NY 10019. Tel: (212) 956-7110. Telex: 42 15 08. In Europe, contact Arnold Norregaard/ITA, Dorthneavey 71, DK-2400 Copenhagen NV, Denmark. Tel: 01-19-2000 Telex: 22226.

Obituary

Alf Kurzeder, founder and long time owner of Auvis-Asona, died in January 1987, aged 76. He

formed the company in 1970 and in 1980 sold his shares to EMT-Franz GmbH. He remained as a consultant for Auvis-Asona for some years after.

Dick Clark's first compact discs

The first compact discs produced by Dick Clark have been manufactured by Discovery Systems in Columbus, Ohio. The compact discs will be distributed throughout the US in mid January.

The new discs feature a collection of classic recordings of the '50s and '60s performed by famous artists. Titled *Dick Clark's All-Time Hits*, the discs represent a high quality collection of old and revered hits, the hallmark of Dick Clark Productions.

This collection has been digitally remastered by Dick Clark Productions from the best available source tapes of the original master recordings. While

many of the tapes had been electronically re-channelled to simulated stereo, they have now been restored to their original mono or true stereo format and transferred from analogue to a 32-track digital recorder.

The digital tracks of this series were processed using the ERIC (Emotional Responsive Impulsive Computer) system to remove tape hiss and provide an increase in the signal-to-noise ratio. According to Discovery the resulting master tape which was used to manufacture the disc, provides a sound as close as possible to the way it sounded at the original recording session.



Entrepreneurs of the Year Award

The Financial Authority of Maine (FAME) recently awarded the Entrepreneurs of the Year Award to Anthony and Paul Gelardi, the founders of Shape Inc. The presentation was made at the Atrium Inn, Brunswick, Maine at the annual FAME meeting. John Hemingway, chief financial officer of Shape Inc, accepted the award on behalf of the Gelardi's.

Founded in 1972 in Biddeford, Maine Shape Inc has become the largest employer in Southern Maine with approximately 2,400 employees. In all there are 25 manufacturing locations throughout the world with Shape providing a complete design and production capability in addition to fully integrated manufacturing systems for audio, video and the computer market.

So what's their formula for success? "Every day is a new day," says Shape Inc president and CEO, Tony Gelardi. "To be

competitive in world markets and to keep business healthy we have to do the same thing we have been doing for the last 14 years. Work hard, motivate our people and have them believe in our dream of being world class manufacturers — made in the US, by Americans."

Paul Gelardi, president of Shape Optimedia, Shape Video and chief operating officer of Shape Inc attributes the company's success to, "A couple of things that have really taken Shape to where it is today. The primary one being hard work for all our people. Additionally we've invested a great deal of our time and effort in new product development. Not only will we be entering the compact disc market, but we're very proud that the employees of the company have developed that type of technology."

New appointments

Versadyne International have appointed William O Rhoades as national sales director for their recently introduced 1500 series high speed tape duplication systems. The appointment was effective January 15th, 1987.

Versadyne has also appointed

Serge Doubine of SAAV, Paris, France to handle all European sales, service and installations. In the UK, Versadyne will be represented by Tony Costello of The Professional Recording Equipment Co Ltd.

Christmas rush

UK video duplicators, Fraser Peacock spent the pre-Christmas rush working three shifts a day, seven days a week in order to meet the Christmas and sell-through delivery deadlines for clients such as BBC Video, Channel 5, Entertainment in

Video, MGM/UA and Polygram. Production figures for October and November were just a palette or two short of the million mark.

New to the team as of January is Mike Croxall. He joins FPA as services manager.

Gauss promotion for Williams

Jim Williams, executive vice president and assistant general manager at Cetec Gauss has been promoted to vice president and general manager. Williams joined

Cetec Gauss eight years ago and was formerly manager of quality assurance at RCA Records in Indianapolis.

Sony promotions following digital success

A double increase in sales of professional audio equipment has prompted a wave of promotions at Sony Broadcast's Basingstoke headquarters. Last year, in Europe alone, a total of 47 digital multitrack recorders, 58 DAE-1100 digital editors and 138 PCM-1630 processors were sold.

Osamu Tamura, pro audio general manager will now, in

addition to his current responsibilities, co-ordinate the marketing services programme in support of the entire Sony Broadcast product range. Chris Hollebome becomes senior manager Pro Audio Sales and John Frazer now takes the newly-created position of UK sales manager.

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S T A R T I N G



F R O M . . .

On the move

■ HHB Hire & Sales moved into new premises during November and are now at 73-75 Scrubs Lane, London NW10 6QU, UK. Tel: 01-960 2144. Telex (923393) and E-mail (78:DGS1351)

numbers remain unchanged. ■ JRF/Magnetic Sciences Inc are now situated in larger premises at Kennedy Road, PO Box 121, Greendell, NJ 07839, USA. Tel: (201) 579-5773.

DIY CD plant to order

Discovery Systems in Columbus, Ohio, are pioneering a unique Facilities Management plan designed to enable the recording industry to take advantage of Discovery's technological resources.

The service provides planning, design, construction and operation of an independent modular unit connected to the Discovery Systems main manufacturing facility. As the module becomes fully functional, the technical staff is recruited, trained and supervised.

"Compact disc manufacturing is a highly complex process with little similarity to record pressing or tape recording," explains company president, Jeffrey M Wilkins. "Our Facilities Management plan allows recording companies to move easily into the technology by relying on experienced personnel."

The system is claimed to provide other advantages. In addition to ensuring production control the Facilities Management plan gives access to capacity more quickly and provides the ability to adjust production according to actual demand.

A complete CD manufacturing module (approximately 20,000 ft²) will contain moulding bays, metallising, coating and printing. Access to the Discovery Systems main facility mastering shift is also included if required. Packaging can be supplied as a

separate service.

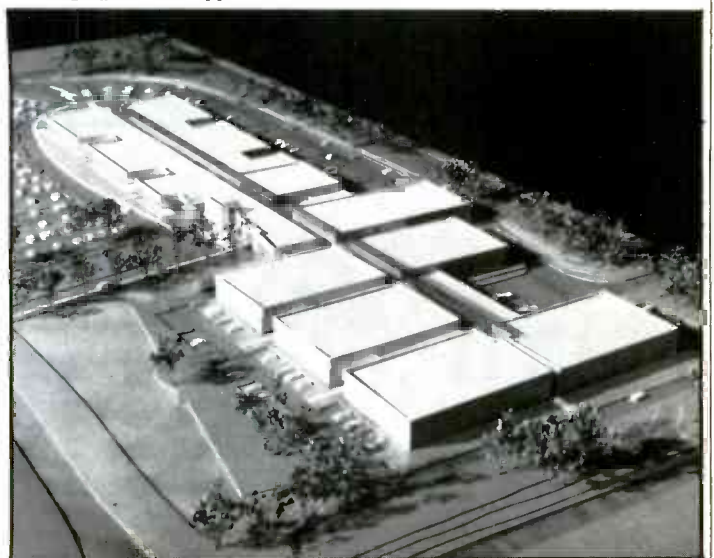
The typical module will employ about 100 people and have an annual volume of 10 million CDs. Expected term of agreement is five years with a per disc annual minimum fee for management.

Discovery Systems has planned for this highly specialised service by setting its initial mastering capacity at 36 million CDs — well above its own production needs. The new scheme therefore offers substantial production capacity to those record companies with volume CD needs that want to become operational very quickly.

"The phenomenal demand for compact discs worldwide has caused a crucial need for skilled manufacturing operations. With the rapid advances in compact disc technology offering video and text capabilities as well as audio, the manufacture of optical discs is clearly an exciting opportunity."

The main Discovery Systems officially came on stream back in July last year and provides custom manufacturing of audio CDs, CD ROM and 12 in video discs; mastering; volume replication and complete finishing (printing, packaging and fulfilment) in addition to the Facilities Management scheme. CDIs are scheduled for production early in '87.

More information of the Facilities Management plan is available from Daniel Korda on (614) 761-2000.



Dolby SR for digital mastering

Dolby Laboratories report an unexpected application for their new spectral recording process — Dolby SR. JVC's videodisc mastering facilities in Tokyo (Video-Tech) are routinely using Dolby SR when preparing digital masters for videodisc production.

Soundtracks for transfer are received on JVC DAS900 and Sony 3324 digital formats which have to be edited together in assembling the programme. In many cases, rather than edit in

the digital domain Video-Tech find it easier, faster and more economical to copy the digital tapes to 1/4 in SR-encoded analogue tape, edit conventionally by cutting and splicing, then copy the edited tape back to digital for the master.

Chief engineer of Video-Tech's Technical Editing Department, Toshifumi Mori, commented that Dolby SR, "... makes the extra generation involved completely transparent".

Arista join chrome 'family'

Arista Records in Los Angeles, California, have joined the BASF chrome duplication 'family' and according to national sales manager, Terry O'Kelly, Arista will be using the BASF logo on its packaging.

Arista produces such popular artists as Aretha Franklin,

Whitney Houston, Billy Ocean and Germaine Stewart and groups that include GTR and Krokus. Other US companies within the chrome 'family' include A&M, Windham Hill, American Gramophone, CBS, RCA Red Seal and Time-Life.

Blue Cross/Blue Shield sign with ORC

Optical Recording Corporation (ORC) of Toronto, have announced the signing of a technology marketing agreement with LifeCard International of Towson, Maryland, a subsidiary of Blue Cross/Blue Shield of Maryland.

ORC develop prototype optical card drives and media for digital optical storage applications and the licensing of this technology to electronics and media manufactures worldwide. This technology is of substantial interest to LifeCard International because the technology will support the storage of digitised images in addition to text.

The optical card, of credit card size, will carry 50 to 200 Mbyte of user application data on one side, and the card drive is designed for a data transfer rate of over 1 Mbit/s in both the read and write functions.

According to ORC this represents capacity and performance 100 times greater than that of the *LaserCard* as trademarked by Drexler Technology Corporation and over 1,000 time that of the microchip-embedded *Smart Cards*.

As a non-exclusive worldwide distributor, LifeCard International

has agreed to promote ORC's optical card technology and include it in their LifeCard licensing program worldwide. Commercial prototypes are slated for public demonstration in the second quarter of 1987.

John Adamson, president of Optical Recording Corporation, noted that several potential licensees have expressed concern that ORC's technology could infringe the exclusive patent rights apparently claimed by Drexler Technology Corporation for the optical card. However, Mr Adamson stated that ORC's technology does not infringe the patent rights of any company and further, there is considerable support for the view that ORC hold fundamental proprietary rights across all forms of digital optical data storage.

ORC's technology licensing programme is based on a patent portfolio from research begun by James T Russell at the Battelle Memorial Institute in 1965. Mr Russell is Chief of Research at ORC.

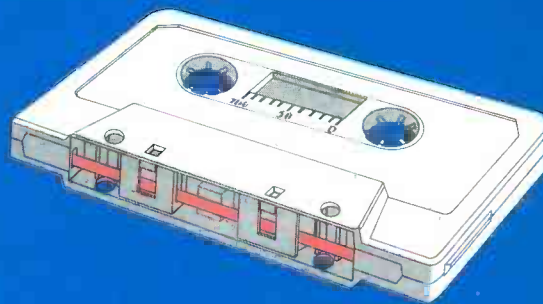
Further information is available from Optical Recording Corporation, 141 John Street, Toronto, Ontario M5V 2E4, Canada. Tel: (416) 596-6862.

Videoprint choose Q.Lock

London-based video duplicators, Videoprint Ltd has recently installed an Audio Kinetics *Q.Lock 4.10-2A* synchroniser in order to enable them to lock a video master to a digital audio/visual

machine slave combination. Videoprint is currently one of only two UK companies able to achieve digital audio duplication in this way.

N O W



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Digital Options

There is no doubt that 1986 saw digital recording 'come of age', in the 2-track field at least. Only the most shortsighted studio has by now failed to acquire at least an *F1* (unless, of course, their rates have been so low as to make re-investment impossible) and I don't know of any cassette manufacturing plant which is not now equipped to receive *F1* tapes.

For the disc mastering facilities to survive, the purchase of a *1610/30*, with suitable digital delay line, has been mandatory. Here at Tape One, around 55% of all tapes received are in the *1610* format and this percentage looks to be on the increase — at least in the short term.

Regular readers will know that I am no great lover of the *F1* system — or for that matter any cassette-based format which is not specifically designed for the digital recording medium. But, before writing off the poor old *F1*, perhaps it would be wise to explore the alternatives and consider the operational difficulties which other formats might present.

The fundamental problem with the current in-cassette systems is their lack of a read-after-write facility, at a sensible price anyway. However, once data integrity has been confirmed, the benefits of having the tape stored safely in a plastic shell began to outweigh the drawbacks. Lack of any real operational experience with either the DASH or PD formats prevents hard analysis but I fear that careless handling of the 1 mil tape will do nothing to improve its sonic performance. Also, let's be honest, its much cheaper to ship those little Betas around.

Thanks in great part to Sony's marketing skill, helped by their involvement in the manufacture of compact disc mastering equipment, the *1610* format has become a de-facto worldwide 'standard'. Whatever digital system a facility may prefer they must still possess at least one *1610* or *1630*. Sony, along with their competitors, is continuing to develop new systems (DASH in Sony's case) but they insist that the *1610* format will continue to be available for the foreseeable future. As far as the *F1* is concerned, the lack of any device for detecting and logging data errors, coupled with the inability to perform music edits, precludes its use for serious professional applications such as CD master preparation.

So, with Betas and U-matics we run the risk of undetected drop-outs and with reel-to-reel digital tape, handling could be a problem. What alternatives are left? We could take another look at analogue and the more up-to-date noise reduction systems now available. Telcom *c4A* and Dolby *SR* spring instantly to

Bill Foster explores the options for the current and future exchange of digital audio master tapes

mind. But analogue is analogue, and whatever the noise reduction people quote in their publicity, all the noise floor in the world will not eliminate the effects of incorrect bias adjustment, azimuth errors or speed variations due to badly aligned tape machines.

Could we have a saviour in R-DAT? We might if the system performs as the makers say it will. So far, my only contact with R-DAT has been a glass-encased sample shown at a couple of trade shows — and I know of no one who has actually tested a machine within a recording studio. (To be honest, until the AES show last November, I suspected R-DAT was something Barry Fox had dreamed up as a gigantic April Fool's joke!)

With its 2 hr running time, powerful error correction and fast access to any point R-DAT has a lot going for it, on paper at least but how will the tape stand up to the rough handling it will certainly get under 'studio'

conditions? The Japanese seem totally unaware of our operating practices in the western world, leading me to suspect that our friend Murphy has no relatives in the Far East. From comments made recently by Sony, the industrial version of R-DAT is still some way off — so don't throw away your *F1* yet.

A little further into the future a potentially bright star is shining: optical disc. We already have WORM (Write Once, Read Many) optical discs which, although impractical at present due to cost, offer error-free storage of over 1 hr of stereo. 'Write Many' discs are running in the laboratory so it's only a matter of time before they become commercially available and then probably three years or so before they're economic to use. When that time comes it should be possible not only to create duplicate discs at speed, but even load a selection of different title sequences and edit instructions on to each copy. Different release formats such as CD, cassette and vinyl could then be serviced from one disc.

The idea of popping a copy disc into a mailer carton with virtually no risk of damage appeals to me and, were I a gambling man, my money would be on optical storage. As I'm not, the purchase orders will, for the time being at least, continue to go out for *1630s*, *701s*, DASH, PD and, most likely, R-DAT. Isn't progress a wonderful thing.



Bill Foster (right) visits Randy Kling at Disc Mastering Inc, Nashville

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Teldec Direct Mastering for

If you were asked to name a high technology product of the 80s the compact disc would surely qualify. It undoubtedly has the right image with its highly complex manufacturing techniques. At the Los Angeles AES in November 1986, however, German record company Teldec announced a new CD mastering technology that could revolutionise the manufacturing of compact discs. *One to One* went to Berlin to find out more about what has been described as 'mechanical micro lithography' or DMM-CD. Report by Carl A Snape.



Prototype DMM-CD lathe. Above. Overall view of lathe, embossing head and carriage (master embossing recorder). The black tube (centre foreground) is the air supply to the bearings. Below. Detail of embossing head and copper master. To the left of the picture is the laser pickup for the depth control in its fully retracted position.

First of all they were astonished. They wouldn't believe it until they had seen it," so spoke Horst Redlich, technical director at Teldec during my tour of the research and mastering facilities in Berlin. He was referring to DMM-CD, Teldec's revolutionary CD mastering process.

As everyone knows absolute cleanliness and unnervingly precise accuracy are two of the essential foundations for mastering compact discs yet there we were, standing in front of a mechanical lathe, in a normal room with a conventional door and window to the outside world — making CD masters with a diamond stylus!

Direct Metal Compact Disc

It takes a little while to sink in but the ramifications of this development could have enormous repercussions for the CD industry. We'll return to this later but first the system itself.

The basic idea of DMM-CD (Direct Metal Mastering-Compact Disc) finds its roots in two important Teldec developments — analogue DMM and the TED (Telefunken/Teldec) 'Bildplatte' videodisc. This latter system differed from the Philips optical videodisc in that the information was not

stored in the form of pits but as an analogue groove. This groove, however, had a bandwidth of several MHz and was cut using a diamond stylus and a piezoelectric cutting head. Among other things this provided Teldec with the technology to cut very small modulations, accurately. This, however, was only part of the key to developing the DMM-CD process, the other important element was the ability to cut directly into metal.

Analogue DMM is, of course, being used currently for the production of back vinyl

records. Briefly, for those unfamiliar with the process, the existing analogue DMM system cuts the metal positive (ie the mother from which stampers can be galvanically produced) directly into a copper master. This eliminates the conventional lacquer, the subsequent chemical silvering (needed to make the lacquer electrically conductive) and the need to galvanically produce a nickel father (negative). Coupled with other technical advantages analogue DMM reduces the time from cutting to finished record and, by removing a number of processing steps, significantly reduces degradation of the groove wall itself.

So with a direct metal mastering technique and a cutting system that worked at extremely high frequencies, what if the 'video' head could be adapted to cut a series of pits instead of a groove into copper?

In December 1983 Horst Redlich and consultant, Günter Joschko decided to find out and have spent the last three years developing and perfecting the process. Most people would not have considered it worthwhile — or even possible! — to use a mechanical cutting process to create a CD master, after all in the conventional CD process mastering is an extremely complex operation requiring a super clean environment, extensive computer control, photo sensitive glass master, precise location and exposure by laser, critical etching and so on.

Embossing system

The prototype lathe (master embossing recorder) is quite small (at a guess, about 1/2 to 1/3 the size of a standard Neumann VMS 82). The most immediately obvious differences are the cutter head, the compressed air supply (for the turntable's air bearings) and the servo-driven laser reading unit which sits over the embossed surface half a revolution round from the cutting stylus.

In addition to the master embossing recorder two medium sized 19 in racks of equipment were in evidence. The first rack containing the basic tape replay and signal conversion equipment and the second, the DMM-CD electronics.

The basic operating system is straightforward. A PQ-encoded U-matic



Sony equipment and prototype electronics for the DMM-CD

help in azimuth

CORRUGATED LINER: TWO DIFFERENT ELASTIC FLEXIBILITY OF WAVES



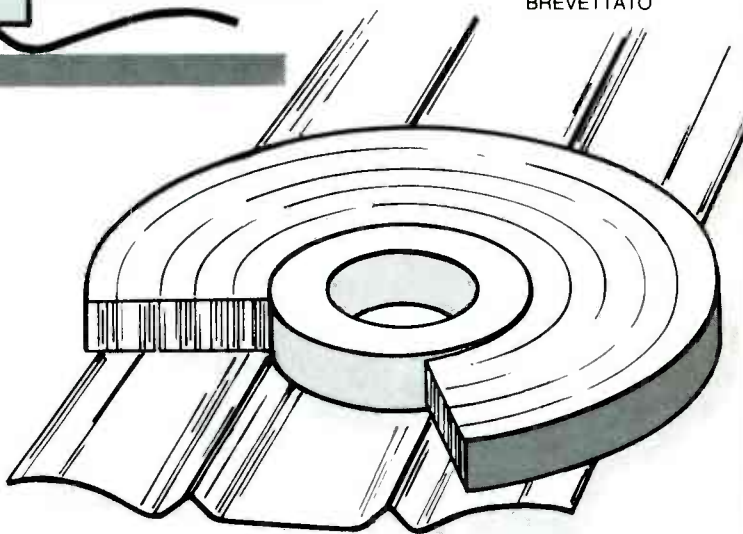
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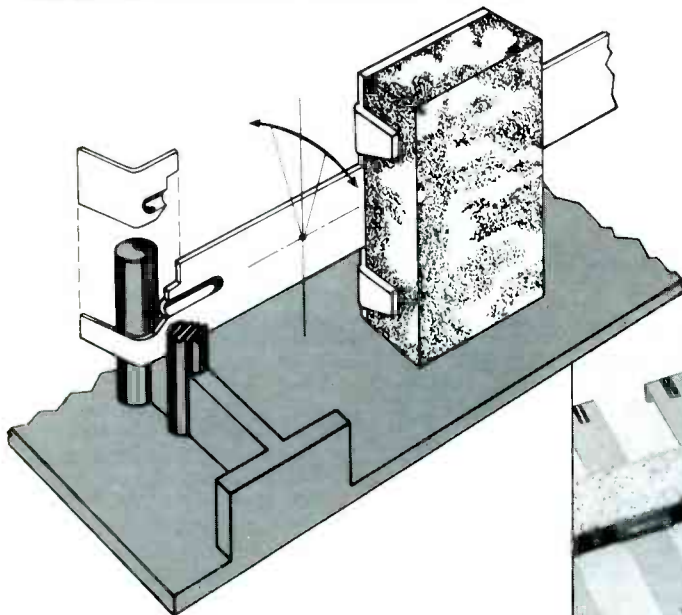
Outer wave: high flexibility

- loop by loop parallel tape alignment
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- minimum additional friction torque
- possible to omit graphite coating.



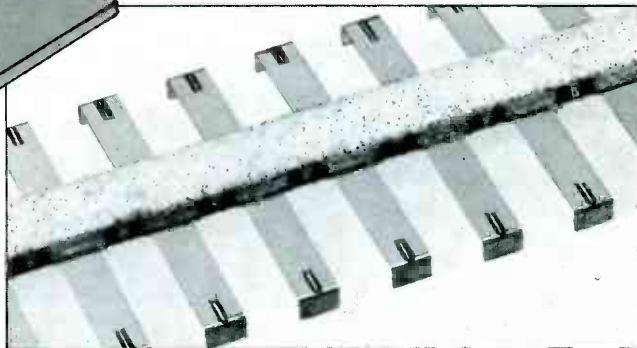
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The Technical sessions will present the latest audio information with over 60 papers — seminars and workshops will cover practical topics — both enabling the engineer to update his knowledge. More than 150 companies will be displaying the latest in audio technology through five floors of exhibition and many will be demonstrating their products in individual rooms.

Technical tours, a wide range of social activities and an Awards Banquet will run in parallel giving the opportunity for meeting old friends and making new ones.

Plan now to attend the 82nd AES Convention.

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CD TECHNOLOGY

digital master tape is loaded into the Sony player in rack one. The output is fed to a Sony 1610 processor below and then to the Sony EFM bit-stream encoder at the bottom of the rack. This provides the data stream for the embossing stylus. All this is conventional, well proven standard CD mastering technology.

The second rack contains the various power supplies and servo systems for the master embossing recorder. Also in the second rack is the variable embossing depth electronics.

Provided you use a laser with a short enough wavelength (ie blue laser) you can reproduce the 'CD' during the embossing process. This replay technique, however, is still under development at Teldec as current semiconductor lasers have too high a wavelength to be suitable. When blue lasers become commercially available the problem should be resolved.

The prototype master embossing recorder is, however, fitted with a (red) laser pickup device. This is not to reproduce the audio programme but forms part of the closed-loop feedback system for maintaining the correct embossing depth (typically 200 nm). Once again the principle is deceptively simple.

As the stylus starts to emboss the copper the reading laser is focused on the pit. The

percentage of reflected light returning to pickup device is fed into the electronics which in turn work out the depth of the pit. Any adjustment is automatically fed to the embossing head if correction (up or down) is required. According to Teldec, the system creates a very even embossing depth right across the disc.

Embossing head and stylus

The actual embossing head is small and compact. Under the outer cover are a few electronic components, the piezoelectric transducer and the 'floating' stylus assembly. The embossing stylus is diamond and is a major technical achievement in itself.

Almost invisible to the naked eye, only pure natural diamonds have been found to work satisfactorily. Sourcing is difficult as only very tiny diamonds are needed. This makes alignment and the polishing of the correct profile (similar to the bow of a boat) an extremely difficult operation as the profile has to be very accurately located on the diamond's precise crystallographic axes. All the selection, polishing and mounting of the styli is done by Teldec in Berlin.

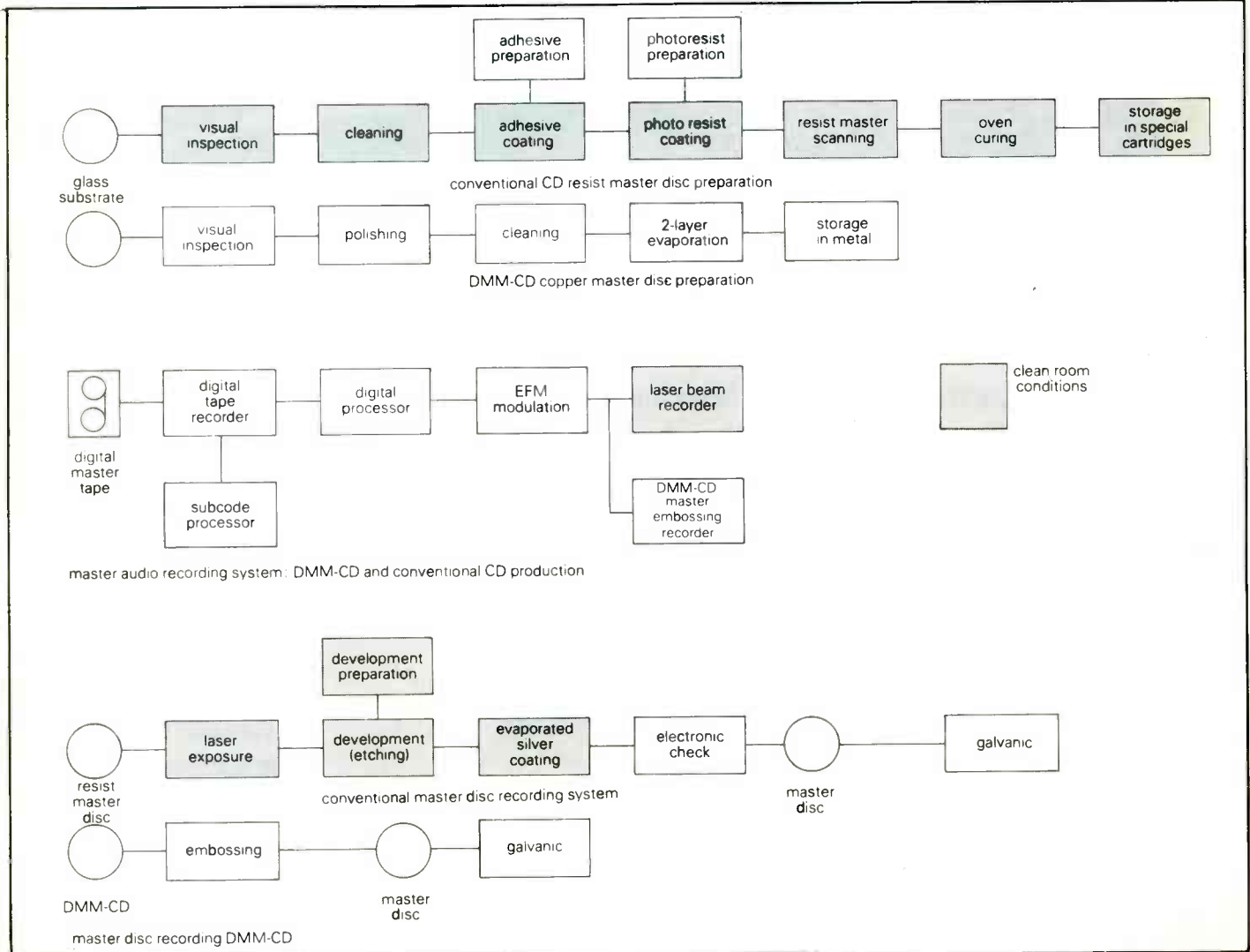
The construction of the whole embossing stylus assembly is also quite involved. The diamond itself is held in a special adhesive (considerably larger than the diamond) which

is then contained within a damping ring and a supporting collar. This unit then fits into the triangular polymeta-acrylate 'floating' suspension to provide the complete embossing stylus assembly.

Embossing is done in real-time and according to Teldec the diamond has a usable working life of between 20 to 30 hours. Replacement, literally, takes a few seconds and new styli (which includes the 'floating'



Stylus and suspension mounting



Comparison of DMM-CD and conventional CD mastering

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CD TECHNOLOGY

suspension) will be available, as with analogue DMM, on an exchange basis.

Glass masters

Teldec start with a normal glass substrate which is slightly thicker than the normal CD glass master (8mm rather than 6mm) and marginally smaller in diameter (180mm as against the current 200mm standard). It is flat to within a few micrometers and obtained from a conventional glass manufacturer. The finish, however, is nowhere near good enough for CD applications and the glass needs further polishing in order to obtain the desired blemish-free surface with the necessary high degree of flatness. Once again all this work is carried out by Teldec themselves.

The second stage in the process is to produce a 'centre hole' in the glass substrate. Technically a hole right through the glass is not entirely necessary, the 'hole' only serving to locate and centralise the glass blank during the embossing process.

Due to the problems a hole would create during the finishing process Teldec very neatly sidestep the problem by drilling the desired hole in a separate, roughly 1 in square, piece of glass which they then accurately locate and glue to the centre of the underside of the glass substrate.

After polishing, 'centring' and cleaning the next stage is the evaporation of the 300 nm copper layer which will provide the embossing surface. A combination evaporation process is used which provides a separate metallic separation layer directly in contact with the glass surface (this provides sufficient adhesion to the glass substrate during the embossing process, yet can be easily separated during the later galvanic stage) and then on top of this comes the pure copper layer itself.

Cleanliness of the substrate during this process is of the utmost importance. Dust and other particles will easily protrude into the finished surface and may cause the embossing diamond to 'jump' (airborne dust which falls on the surface during embossing is no problem at all). Very small holes in the copper surface do not present such a serious threat. With the evaporation completed the blanks are stored in individual metal containers ready for embossing.

There is apparently no great urgency to process the copper master immediately following the embossing process. Unlike analogue DMM copper blanks the CD variety

are made from extremely pure copper and therefore do not need special ingredients for long life behaviour. In any event a mild passivation process at the galvanic plant will easily remove any slight oxidation that may occur on the copper surface. Currently Teldec do not use any passivation process on DMM-CD masters cut, say in Berlin in the morning, and sent to their Nordorf factory (near Hamburg) for processing the following day.

Galvanic process

The galvanic process provides the finished metalwork for the conventional CD pressing process. The first stage is to clean the embossed copper master which is then followed by the galvanic deposition of gold, 3 to 5 µm thick. Nickel is then deposited on to the gold to provide the bulk of the metal part.

The master now consists of the glass substrate, separation layer, copper embossed layer, gold deposit and nickel backing and it is at this point that the metal sandwich (as Teldec call it) can be separated from the glass substrate. The beauty of this technique, of course, is that the embossed surface and the surface of the metal negative (father) are both locked inside the 'sandwich' protected from dirt, dust and accidental damage. This makes transportation (if the galvanic stage is being done outside the pressing plant) or long-term storage relatively easy. Yet another advantage is the possibility of grinding the rear of the nickel deposit (in preparation for pressing) whilst the face of the father remains protected from

dust and contamination.

In order to turn the metal sandwich into a usable metal part it is necessary to remove the metallic separation layer and the copper. Chemical etching is used but unlike the conventional CD photo etching process, the DMM technique is not time or temperature critical. This is because the gold layer is unaffected by the etching solutions thus making it a relatively easy and less critical process to completely remove the copper in order to reveal the father.

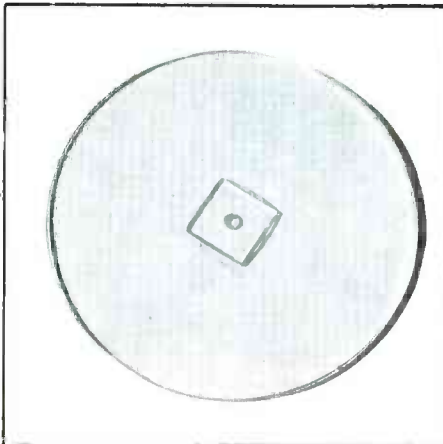
Another advantage of this technique is the fact there is ultimately no mechanical separation of the parts so there is no fear of damaging the protruding 'pits' when separating the father from the original embossed surface.

Depending on the number of CDs to be produced — or the urgency of the order — two options are available after the copper blank has been embossed. For a fast turnaround, limited production run or quantities up to 15,000 CDs, a rhodium-plated nickel father can be created and used directly as a stamper. Alternatively a gold-plated nickel father can be produced and used to create a mother (metal positive) and then a series of stampers.

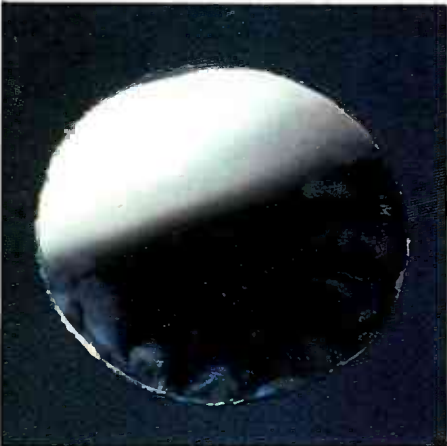
Typically injection moulded stampers can produce 10,000 CDs but according to Teldec if the matrix in the galvanic processing is done carefully as many as 15,000 CDs can be produced from one stamper (this compares with about 3,000 LPs from a high quality vinyl stamper and around 3 to 5,000 for an average CD run). The system can be used to produce original masters (ie using the father as a stamper) by linking three lathes together (only one set of rack and control electronics being needed). This will immediately provide a capacity of 45,000 CDs without further galvanic processing (ie creating mother-stamper). This makes the process easier, safer and quicker: from embossing to the father/stamper only takes two hours.

Pit structure

According to Teldec, the shape of the embossed pits is easier to press than the conventional laser produced pit. In fact there have been many patents filed with solutions to the problem of making the edge of the photo etched pit smoother. The reason is to avoid problems caused during the pressing and the mechanical separation stage of the conventional process. A major part of the



Glass substrate before evaporation



Metal 'sandwich' . . .



. . . partially etched . . .

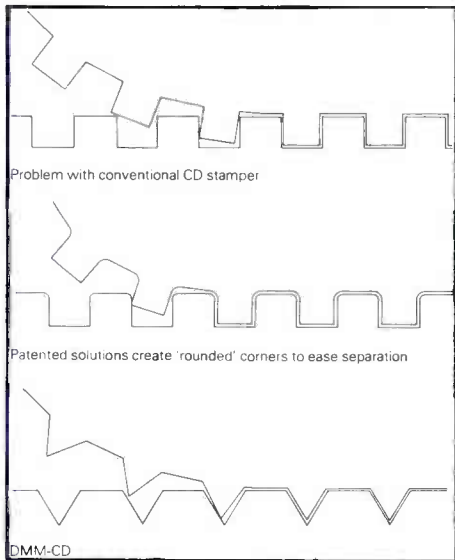


. . . to reveal gold positive

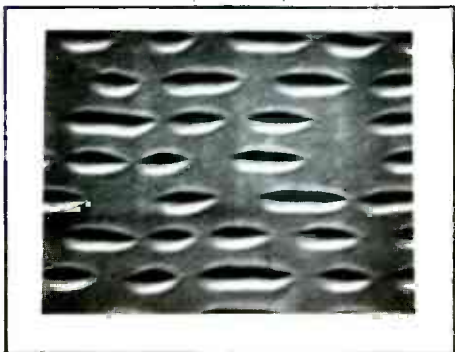
problem when separating the metalwork in the conventional process is the fact that the etched walls of the pits are at 90° to the surface. The DMM-CD overcomes this problem rather neatly in that each pit is V-shaped and the walls are therefore not at 90° to the surface.

Surprisingly, the V-shaped pit doesn't apparently cause any problems during playback. Teldec have compared the pits under an electron microscope using a filter to match the wavelength of the laser (in fact, they set up the same experiment so I could see for myself and indeed both the conventional pits and the DMM-CD pits looked identical under 'laser light'). Of course, under normal light the physical differences are obvious but you would need an electron microscope to appreciate the fact — a conventional CD and a DMM-CD both look the same to the naked eye.

Naturally as DMM-CD is an embossing process there is no chip (swarf) to dispose of during 'cutting'. The system does, however, create horns — the material moved from the pit area has to go somewhere! — these slight bumps either side of the pit are apparently of no consequence, however. When the CD is pressed the slight hollow either side of each pit (the stamper having a negative impression) is bridged by the flow characteristics and the surface tension of the polycarbonate to effectively create flat 'land' around the pit edges resulting in a clean, well defined edge to the pit. This phenomenon also makes the mould release much easier during the injection moulding process.



Overcoming the separation problem



Side lit DMM pits ($\times 10^4$)

During early experimental work, Teldec attempted to suppress the horn effect during the embossing process. As soon as they started to press test CDs, however, they realised (examining the CD surface under an electron beam microscope) that the edge characteristics were superior to those of conventional CDs when the embossed masters had horns!

It would appear from Teldec's observations that the basic shape of the pit doesn't present problems during replay because the laser is not good enough to detect the shape of the pit. If you like, it detects a 'hole' or it doesn't — the shape of the 'hole' is basically irrelevant as long as the laser sees a basic side-to-side dimension that is acceptable and the length of the pit corresponds correctly with the incoming data stream.

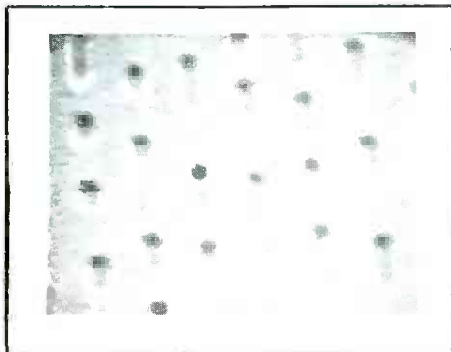
The future?

Frankly, having seen the system and heard a sample DMM-CD disc actually playing it is hard not to be impressed. This is a brilliant innovation and it seems I'm not the only person who thinks so. The Berlin Government recently awarded Teldec with their 1986 Innovation Prize of Berlin for the DMM-CD technology.

The capital investment is low and so are the running costs and if pressing costs were to be reduced because of this it may well herald lots of new CD opportunities. It may mean for example that the CD single could be an economic reality. And not only that, the CD single could also be released at the same time as the vinyl 45 and/or 12 in. With cheaper mastering costs and a faster turnaround the DMM-CD could even be used as the production master for the vinyl and/or tape release.

At the moment no one is quite clear where this breakthrough could lead. For the mastering engineer (with the development of a programme replay laser) it would mean the producer could approve the CD before it leaves for the pressing plant. For the recording studio there's even the real possibility of direct-to-CD recording or the 'tapeless' digital master via the digital multitrack/digital desk/direct to CD route.

The potential for the data industry is enormous, particularly for short runs or regularly up-dated discs (maps, directories, even magazines!). Perhaps we will see a return to the 'old' cutting room/pressing plant situation if a number of DMM-CD mastering facilities spring up looking for pressing only facilities. At least the cost of setting up a 'pressing only' plant would require less capital



Diffuse lit laser pits ($\times 10^4$)

outlay and fewer skilled technical operators. As exciting as all this is, these are still early days and this can't be stressed enough. Two remaining important questions still to be answered are of course, "When will DMM-CD be available and how much will it cost?"

Price and availability

As far as Teldec are concerned there is still work to be done developing the finished commercial system. The prototype has proven successful: so much so that Teldec were due to start pressing commercial DMM-CD releases for themselves at the end of January (1987) using the prototype system.

The current strategy of introducing DMM-CD into the marketplace will be closely monitored, as Horst Redlich explained, "We have learnt with the analogue DMM process that there are many things to consider and so the introduction of the DMM-CD will be done methodically and carefully."

Ideally, in the first instance (around the middle of this year) they would like to involve a major international record company, after which the system would be available to current analogue DMM users and finally the rest of the industry. That, at least, is the general plan.

Price is still to be fixed but to provide some indication, the whole system (including all the equipment, licence, start-up assistance, etc) is expected to be in the region of DM 1.5 million (depending on the exchange rate, just over £500,000). This price is expected to include the Sony U-matic and processors.

The licensing package provides the know-how for the cutting process and also for the galvanic treatment, much of the galvanic processing however (apart from the initial process) follows standard galvanic techniques and is easily implemented in existing plants. The gold layer for example is done in the same galvanic way that Teldec use to produce their 'Top Twenty' gold discs.

When it comes to supplying blanks, styli and other bits and pieces the general feeling is to produce much the same situation that it used for the current analogue DMM process.

Neumann is to manufacture the lathe and associated electronics and although the aim is to have produced a complete commercial system by the middle of '87, there is still a lot of work to do. Even though Neumann have been involved for the last 1½ to 2 years in the prototype equipment used by Redlich and Joschko, it is still a big step to convert all this work into a finished commercial product.

The lathe will be completely new although some of the design features from the current range will be incorporated. Even so, the turntable, bearings, computer systems and high voltage circuits (2 to 2.5 kV for the piezoelectric transducer) are all completely new systems and although many parts of the new lathe may look similar to existing Neumann components they will in fact be different on the new lathe.

Horst Redlich and Günter Joscho have done what would seem to many to be an impossible task. Their excitement and enthusiasm for the technology is obvious yet is tempered with natural modesty. I trust their faith in the system over the past three years will be justly rewarded, for their success will undoubtedly be a success story for the whole of the CD industry.

ITD Duplicating

The cassette duplicating industry has for many years suffered a position akin to that of the poor relation of the industry. Compact cassette as a format for the 'record buying public' has had a long slow toil to reach its position of relative strength today. The UK has been one of the slower markets to pick up on it. For example, it has been by far the most popular medium in countries such as Sweden for the past eight years, although how much of that may be attributed to limited vinyl production capacity is open to speculation.

Duplicating technology has progressed in leaps and bounds since its initial conception. The introduction of mechanical packaging eight years ago along with direct to cassette shell printing of labels speed the process up considerably. Microprocessor technology and automation have recently come to the loading machinery improving quality, accuracy and speed (and cutting manpower and therefore cost with the increased efficiency) are all contributing to make the industry currently thrive.

ITD (Independent Tape Duplicators Ltd) in Aylesbury were one of the first UK high speed duplicators to set up independent of a record label, and have recently celebrated their 10th anniversary. The directors Roy Jackson-Moore, Michael McLoughlin and (non-executive director) B Lambden started out in small premises in September 1976 in Little Chalfont. As Jackson-Moore puts it: "In the beginning it was just Michael, myself and one boy, so we weren't exactly making a great impact in the first months!"

Initial capacity was around 10,000 units per week. Today the best figure (depending on the programme) would be nearer ¼ million per week. For full length music cassettes capacity would be something like 200,000 units per week. Their clients bring varied work ranging from the music record companies (such as K-Tel and Mute) which represents around ⅓rd of production; spoken word accounts for another ⅓rd for clients such as the Oxford and Cambridge University Presses and publishers of children's stories, language cassettes, teaching cassettes, etc. The final ⅓rd comes from the business world — advertising agencies, sales promos, medical training, reps information tapes, money magazines, insurance companies and so the list goes on.

Predictably business is seasonal and ITD produce more cassettes in the last quarter of the year than they do in the preceding eight months put together, although the third category of work tends to remain fairly constant through the year.

ITD strives to be totally self-contained to ensure optimum production and quality. By keeping engineers and spares on site and implementing routine preventative maintenance downtime is kept to a minimum. The only part of the process they are unable to carry out in-house is the printing of inlay cards.

The first requirement is to transfer the

Audio cassettes, floppy disks and data cassettes are all in a day's work for UK duplicators, ITD. In their 10th anniversary Janet Angus visits the plant that has expanded from a modest 1,000 ft² workshop to a 20,000 ft² ultra modern facility

master tape on to the requisite 1 in master the only part of the process which is done in realtime. The main mastering room has a small selection of processing equipment in order to optimise the quality of tapes coming in, which can be very variable depending on the client's expertise in the field. These include an MXR graphic equaliser, Klark-Teknik graphic equaliser, Audio+Design de-esser, dbx 150 and two channels of Dolby B noise reduction.

The Studer 8-track multitrack is served by two Otari 5050 stereo machines and a Sony PCM-701. The sound is mixed through a small Trident Fleximix console and monitored on Tannoy SRM12X and Auratone studio and reference monitors. A second, standby mastering room houses an Alice 828S mixer,



Main duplication area — general view of two jins and slaves



King 790 computer controlled cassette loading machinery

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Tanno *Little Red* and Auratone monitors, Otari *MX7800* 8-track and Teac *AN-180*, dbx *150* and Dolby *B* noise reduction. There is seldom need, however, for the second mastering facility.

If the incoming tape is a fully produced master the only requirement will be for the relevant noise reduction to be applied. If on the other hand they receive an amateur Nagra recording of a church choir, for example, quite a lot of preparation work will be needed in order to make it acceptable. Spoken word tapes present sibilance problems; predominant mains hum is eradicated with graphic equalisation. One of the greatest difficulties is presented by recordings of church organs where the huge dynamic range needs to be compressed before duplicating can take place. "Here we are simply aiming to make a cassette which is virtually indistinguishable from the master," explained Jackson-Moore.

"Generally speaking we have a very good relationship with our customers. We appreciate their problems and they appreciate ours. A lot of customers present extremely well produced tapes and with customers we know also what to expect, so that if something is a bit suspect we can ring them up and ask them if they realise there is a problem. The problems start with a customer you don't know, who might well think his tape

is wonderful when in fact it is awful!"

The lifetime of masters is variable and depends a lot on the content and also the type of use to which it is put. A master which is used to continuously duplicate will last longer than one is used for several short runs. Rough figures are at the 10,000 copies/master mark: with speech tapes you will get a few more, music a few less.

"If you need to produce 25,000 speech cassettes you might well get away which using only two masters. We check them after 5,000 with an A/B test and if there is any difference we will go onto a new master."

Next stage in the production is carried out on Otari *600* system loopbins which run at $\times 32$ speed. ITD has three systems with 12, 10 and four slaves respectively. Two of the systems are housed in one room, the third being utilised for computer program cassette duplicating which has its own department.

"We use mainly BASF tape because we find it is very good, very reliable and our customers like it. It doesn't shed and it's consistent."

The quality control which takes place at this stage is carried out by one or two operators on Otari *1610* reel-to-reel machines (two of the three machines being in service whilst the third is taken out of commission for recalibrating, a process carried out at the rate of one per week). The

last piece of each tape is monitored — any deterioration being more obvious at the end.

"We try to keep a day in hand here just in case anything should go wrong; we do have our own generator, etc, and it is unlikely that we should have problems but it is as well to keep ahead."

ITD are the proud owners of eight King *790s*. "These are reckoned to be the most sophisticated winders you can get. We got the first four years ago and have had a full complement of eight for two years. Two people can produce as much on these as you could get from the old machines with an operator on each; you don't get programme chops because they are so accurate. They are the nearest thing to perfection you can get and the quality of the splice is superb."

The first cassette in a batch is listened to check the programme as well as preliminary check that the cassette is ok; should there be any noticeable problem quality control is immediately called in. Every 25th cassette is checked for deterioration. If the problem is very bad it may be necessary to go back to the original master, although this seldom happens. "We prefer to keep quality control up with production so that you are not producing rubbish."

These machines also have a facility for numbering cassettes which is especially useful for computer tapes where such vast numbers are produced that you need to quickly identify where a problem has started to occur in amongst a run of hundreds. (Each pancake will produce 30 to 35 music or 250 computer cassettes). The Kings receive half an hour preventative maintenance daily.

In order to cope with small runs and odd numbers of cassettes on a particular order, ITD has three old Otari *6755s*. ICM C-0s are used and a choice of colour is available.

In the computer department identical equipment is used with a separate quality control involving every conceivable personal computer for verifying cassettes. The ITD Data Division duplicates floppy disks on an American Formaster duplicator whose capacity depends on disk type and content — fastest being approximately 3,000 disks per hr. Quality control here is relatively simple since the duplicator verifies the disk as it duplicates.

The central factory area is devoted to labelling and packaging. Once again American technology is used this time in the shape of two Apex printers which have an output capacity in the region of 5-6000 units per hr, printing labels direct onto the cassette shell. "Yes you can have paper labels if you wish; if you want to be old fashioned."

Fashion, however, is not the only criterion here. Multibox cassettes require matching labels which are easier to guarantee with paper labels. Alternatively several different coloured labels may be required for identification purposes and once again this is best achieved on paper.

Direct printing is nevertheless much more cost effective; printing plates which will suffice for up to 1 million cassettes will typically cost £25, a figure which would probably only buy 1,000 paper labels. Storage of plates is easier than storing paper labels which can deteriorate with time.

Another disadvantage with paper labels according to Jackson-Moore, is that if you keep cassettes in the car in the winter, in the



Quality control of duplicated pancakes



Roy Jackson-Moore and Michael McLoughlin



Apex cassette on-body printing

UK especially, the labels tend to bubble up.

If, against all these odds, you want paper labels, they are put on by a Tapematic 1000 with a capacity of 2,500 units per hr.

From labelling, the cassettes go to an Ilsemann KZM3 which inserts the cassettes into library cases and puts them into the boxes; then on to either the Marsden Edwards fold wrapper or Meurer shrink wrapper.

Packaging is potentially one of the biggest headaches of the entire process. "Special packaging can sometimes demand as many as five people which is very expensive and it is an area which is therefore very difficult to control. This is possibly the weak link in the chain."

ITD devote all their energies to high-speed duplication. McLoughlin: "We are not in the business of realtime copying at all. Studios are the only real case for that type of thing. It would be fair to say, that you suffer a very slight deterioration in high-speed duplication but the work we have doesn't really call for realtime quality. There is no appreciable loss if it is done properly."

By controlling quality and having engineers on site, they aim to maintain standards sufficiently high to circumvent the realtime vs high-speed dilemma.

"We specialise in high-speed volume production and we reckon we are among the best along with EMI, CBS and Polygram. In the UK there are about 10 professional duplicators and something in the region of 400 not so professional outfits."

Being independent, production levels must of necessity be high. Jackson-Moore: "We need to do 4 to 5 million cassettes per year to justify the cost of the equipment. We have to run 24hrs a day for at least half the year and to this end the staff work in three shifts (8 to 5, 5 to 10 and 10 to 8). Obviously during the overtime hours we have a skeletal staff; you wouldn't for instance, pack on double time."

"We must have first class engineers and be totally self sufficient. We don't even rely on equipment manufacturers; if you have a breakdown you have to be able to fix it straightaway — you can't afford to wait for a service engineer to find his way out here."

Customer budgets are responsible for the fact that they tend, on the whole to be unadventurous, going for cost effectiveness over and above type of product. For example Mute Records is the only company which regularly spends out that little bit extra for chrome tape.

McLoughlin: "It is a little more expensive, approximately 20%, but that's enough to put most customers off. We do some chrome duplicating for other duplicators who do not have machines which are adjustable in the way that ours are. The extra cost comes not only from the tape itself, the additional time required for resetting the machines also has to be paid for. The results are worth it though, if the master deserves it."

ITD are not feeling the effect of CD yet, speculating that it is being felt more in the vinyl market. Two thirds of their business wouldn't be affected anyway, since CD only presents competition in the music market. McLoughlin predicts that eventually CD will cause over-production in the cassette market which will then probably affect them along with everyone else.

Similarly Video 8 and all the other formats

which are being talked and fought about will eventually pose a threat because logically, unless it were better than the cassette there would be no point in introducing it in the first place. None of this is likely to be felt in the immediate future, however, since there are a lot of machines in the domestic market now. Of the various types under discussion McLoughlin theorised generally about the possibility of diversifying into DAT.

In the meantime cassette quality continues to improve with chrome tape and digital masters being the most dramatic improvements over the last five years. Over 50% of ITD's customers supply a digital master.

McLoughlin: "Quality control can be done much more accurately on cassette than on vinyl where the only way of checking properly is to listen to every single disc. Tape doesn't vary much nowadays so by listening to odd cassettes we can monitor and avoid mistakes; we can listen to the end and be

fairly sure that the job is OK."

At the end of the day it is the public and the record companies which really frustrate by accepting too low a standard, blames McLoughlin.

"Although the situation is improving slowly, it doesn't give you much satisfaction if you and the customer know that it is not very good, but it will do because it sells."

"If because of financial constraints, all the companies produce mediocre product it is very difficult to get quality that stands up. A lot of duplicators are happy to put out low standard, low price work and ultimately they are the people we have to compete with for work."

Jackson-Moore: "A record company has a budget to work to which may be, say 29p and that's it — they want the best quality they can get for that price. The rest is down to salesmanship I suppose. There are a lot of people in the middle who make their fortunes, but 1p difference is a lot to us."



Floppy disk duplication. Computer cassette duplication bin and slaves in the background



View of the main warehouse

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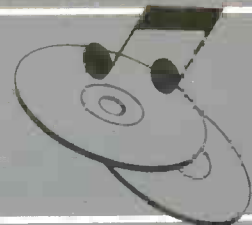
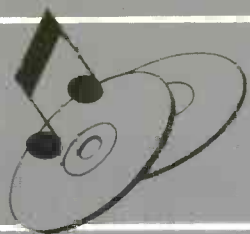
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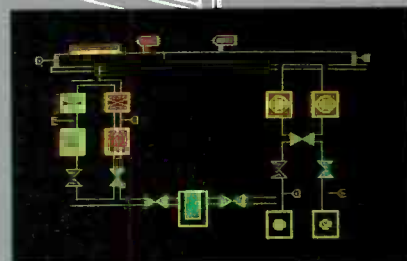
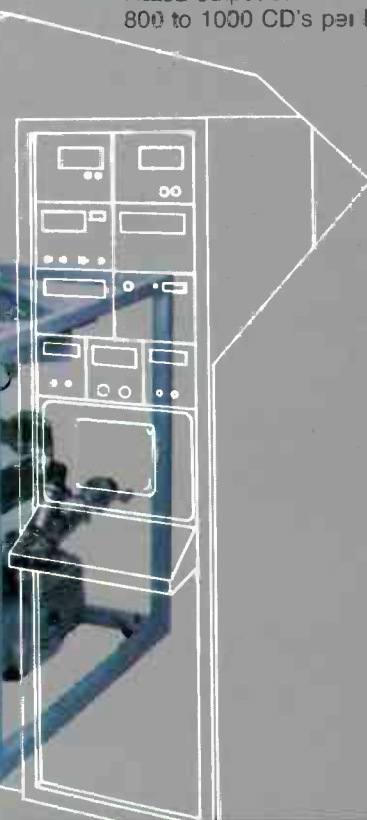
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Kiss-print in Loopbin Duplicating

Conventional print-through, with which everyone is familiar, is the creation of pre- and post-echoes in an analogue magnetic recording; it is heard where there is transfer of magnetism from highly magnetised layers (loud passages) on a reel into layers with a low-level of magnetisation (quiet passages). Print-through in a cassette duplicating master can be minimised by appropriate choice of tape and backing thickness, storage at low temperatures, avoidance of stray magnetic fields, etc. (ie good housekeeping) and the use of noise reduction or digital recording.

'Kiss-print' does not normally occur with reel-to-reel recording but is potentially a problem in the loopbin masters used for cassette duplication. In the past it has also occurred with magnetic film loops used in sound post-production for the cinema.

Kiss-printing occurs when two oxide coated tape surfaces touch as the tape loops back and forth in the loopbin, and to a lesser extent when two backing layers touch. A weak print of the recording is transferred from one tape surface to the other. When oxide surfaces touch, the effect is potentially more noticeable than print-through in reel-to-reel recording, since there is no backing material to separate the oxide surfaces. Printing may also take place at shorter wavelengths than in print-through, since in the latter case the shorter wavelengths fail to penetrate the backing material and rear of the coating sufficiently to print from one layer to the other.

There are two possible effects in kiss-printing: firstly, a series of discrete images of a strong recorded pattern; secondly, a gradual build-up of random noise on the loopbin master, as a succession of prints are made at each point and at slightly different points along the tape. Both forms of printing could be objectionable if audible above the residual noise of cassette copies. As noise levels come down, the problem may become more noticeable.

A phenomenon observed in magnetic film sound recording is that loud print also sounds distorted. This is because there is no bias in the 'recording' process. A normal recording uses a high level high frequency bias signal to optimise signal transfer and reduce distortion but the printed recording has no bias and relies entirely on the strength of the original magnetic recording to transfer the copy — hence the distortion of the echo.

To minimise kiss-print, where it is a problem, it may be useful to examine what is known about printing from one tape layer to another and adapt the lessons of that problem.

Causes of print-through

The phenomenon of printing from one layer of a recording to another has been recognised

As cassette duplicators and parts of the record industry become more keenly aware of the enormous potential of the recorded cassette and the need for higher quality, kiss-print has emerged as one area of concern.

Not everyone knows what 'kiss-print' is. Nor is there agreement among those who do on just how serious a problem it is. So far, little published research is available. John Fisher investigates the problem.

almost as long as magnetic tape recording has been in existence.^{1,2,3}

In their analysis of print-through Ampex researchers Selsted and McKnight⁷ suggested that it occurs because some oxide particles have lower coercivity than average and are easily magnetised; for the same reason they are easily demagnetised by low level fields.

More detailed analyses of the print-through mechanism have been given by Daniel & Axon⁴ and in a Philips Research Report of 1953;⁹ these may be worth closer study by anyone interested in the physics of kiss-print. Another useful source is an AES pre-print of May 1976,⁸ by Ampex engineers Bertram, Stafford and Mills.

An early BBC Research Department paper¹ by Daniel and Axon dealt with their classic investigation of 'conventional' printing. They wound a short strip of recorded tape into a reel of blank tape and measured the level of the signal printed on successive layers, using tapes of various coercivities.

Daniel and Axon observed that the longer the interval between the printed tape coming out of contact with the printing tape and subsequent replay, the lower the print; the longer the tapes remained in contact, the higher the initial printed level (gradually reaching a limit) and the less appreciable was the subsequent fall-off of the print.

Significantly, their investigations showed that at the signal levels involved in print-through, die-away was much more rapid for signals

recorded *without* bias (ie printed signals) than those recorded conventionally, which were much more stable.

Daniel and Axon found a relatively linear relationship between original recording level and printed signal, for a given tape; reducing recording level resulted in a fairly constant signal/print ratio but a worsened signal-to-noise ratio, which could mask print-through. They found that print increased with coating thickness, for a constant coating material and tape thickness, with a much smaller increase in conventionally recorded output.

Daniel and Axon also examined the effect of temperature rise on print, and found a rise of approximately 7 dB in the level of printing for a rise of 20°C.

The effect on print-through of an externally applied magnetic field was also investigated. Using a calibrated 50 Hz field, they found a significant rise in printing for fields above 5 Oe (approximately 0.6 dB rise per Oe in their tape samples).

Reducing print-through

In seeking ways of reducing print, Daniel and Axon experimented with selective erasure. Applying low erase currents to the erase head of a tape recorder, they found that the unbiased printed signal was more easily erased than the normal biased recording. With low coercivity tape, print at 1 kHz was reduced by 10 dB against a loss of only 2 dB in output from the recording. High coercivity tape was better, with negligible loss from the recording for a 10 dB drop in print.

They also found that high frequencies were more easily erased than lower frequencies; however, at 30 ips a 6 dB reduction in print at middle frequencies could be achieved without perceptible degradation of a wanted 10 kHz signal. There was less erasure of (wanted) high frequencies if the tape was erased from the rear or, better still, by passing it through an air-cored solenoid (coil) through which an alternating current was passing, to carry out the partial erasure.

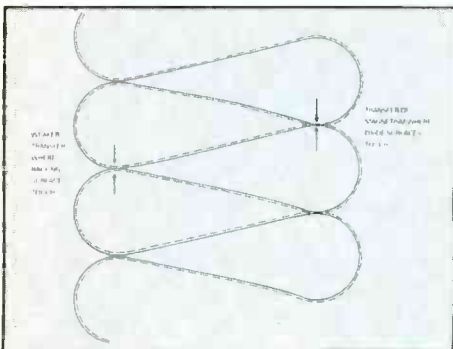
The relative ease with which print could be erased was the basis of a patent application by R Herr of 3M. In a paper,⁹ he and another colleague from that company, Robert von Behren, described the reduction of print by 6 to 8 dB without perceptible degradation of the signal; using a wide-gapped erase head was preferable to a relatively short-gapped record head in applying the low level high frequency erasure as the record head tended to reduce the high frequencies more. They too found that running the tape through a coil gave less deterioration of the wanted high frequency signals, though it was cumbersome to arrange.

While printing would immediately restart after the erasure, Herr and von Behren found that repeated rewinding tended to interrupt the process. Importantly for use of their

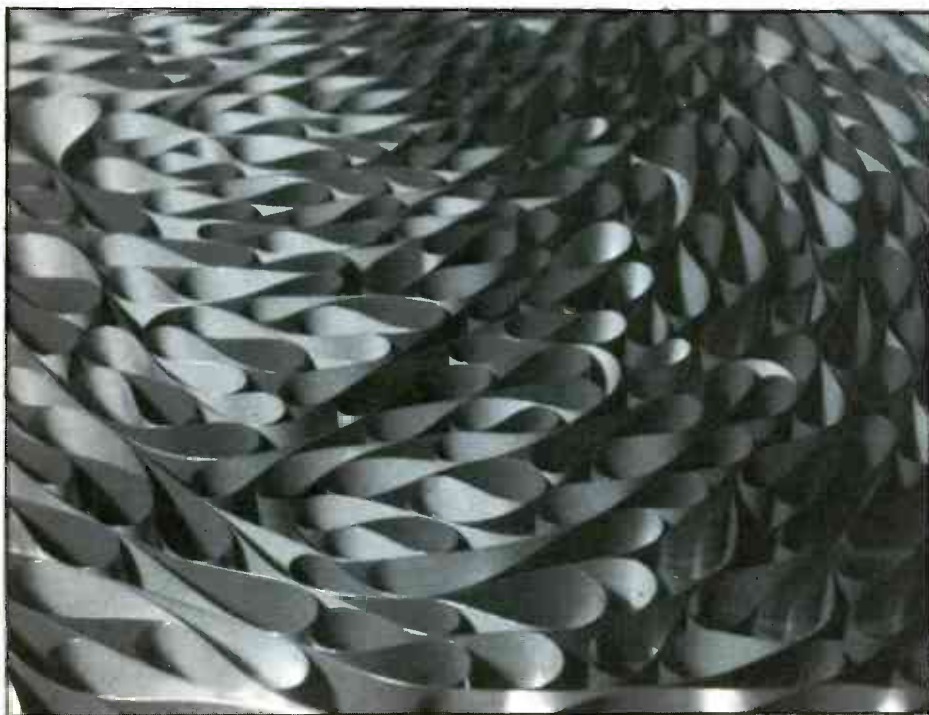
selective erasure technique, they found that any degradation of the wanted signal that did occur was not compounded in subsequent passes over the erase head or through the coil. The process could be repeated any number of times without any additional change in the programme material. This enabled routine use of the process to avoid print build-up; it was suggested that an erase current about 20 dB below the normal erase level could be fed to the erase head during playback. A limitation in usefulness of the process was found, however, in that with some oxides it was only possible to erase print for a relatively short time after the initial recording. Tapes which had been stored for some time were difficult to 'erase' in this way.

A similar process was described by Lyman J Wiggan, chief engineer of Reeves Sound Studios, for use on Fairchild *Pic-Sync* 1/4 in tape recorders.⁶

Wiggan, too, found that a low level 69 kHz current through an erase head, sufficient to reduce print by 6 to 7 dB on a variety of tapes, produced a once-for-all loss of about 0.6 dB at 12 kHz (15 ips), regardless of how many times the treatment was repeated, with no adverse effect on IM distortion, linearity or background noise. Since the slight HF loss could easily be compensated or ignored,



Miss-print contact



Tape contact in the loopbin

Wiggan felt, "the print-through problem ... appears to be solved" and the system was adopted at Reeves Sound Studios.

No widespread use seems to have been made of deliberate low level erasure, however. An Ampex research report of 1957⁷ by Selsted and McKnight comments that though these principles had been known for at least five years, no manufacturer had ever offered the feature on a machine. The technique is known to have been used occasionally at Pye. More recently, Studer has mentioned 'skimming' (preset low level erase) as an option on the *A820* but it has not been implemented in software.

Selsted and McKnight carried out their own confirmatory tests at 7 1/2 ips. They showed approximately 9 dB erasure of a 500 Hz print signal (or 15 dB erasure of an artificial print signal, created by recording at 40 to 65 dB below operating level *without* bias) for less than 0.5 dB erasure of a 12 kHz signal; a 500 Hz signal recorded (with bias) at a comparable level to the print remained unaffected. Using a tape loop, the effect of repeated erasure on a wanted 12 kHz signal was examined; after the 0.5 dB drop at 12 kHz on the initial pass, no further measurable degradation was found, indicating that the process could be used routinely to prevent build-up of print.

One possible snag which was highlighted, however, was the need to adjust erase current to suit the tape being replayed: a 3 dB variation in erase current for the same effect on HF response and print was found between two of the samples tested.

A later addendum to the Ampex report also highlighted the need to apply the erase signal only during replay; doing so during fast wind would record a whistle on the tape that would be audible when replayed at normal speed. This has important implications for loopbin masters, since the frequency of the erasing current would have to be similar to that used in the bias oscillator of the slave cassette duplicators when running at high speed —

and indeed would have to be identical with slave bias frequency to avoid beats.

A practical observation by later Ampex researchers Bertram, Stafford and Mills⁸ is that print acquired during storage may be reduced by up to 5 dB if the tape is "exercised" by being repeatedly passed across the replay head. They also draw attention to the earlier work of Daniel and Axon, and others, on reducing print by means of low level erasure. In addition they recommend storage of tapes at below 20°C to ensure minimum printing, since the final level of print will typically increase by approximately 1 dB per 7°C rise in temperature, with a greater increase in some materials.

Tape particles themselves influence susceptibility to printing. Bertram, Stafford and Mills point out that emphasis on low noise, high output tape characteristics has necessitated smaller oxide particles because of their improved noise properties; they highlight the need to narrow the range of switching fields for such particles, to avoid increased printing, and stress the benefits associated with high coercivity ferric oxides. These are more resistant to magnetisation (deliberate or accidental) and are generally small in particle size, giving lower biased tape noise.

Bertram, Stafford and Mills also point out dangers in using cobalt-doped high coercivity tape. There is greater temperature dependence of particle coercivity in cobalt-doped ferric oxides, accentuating the observed effect of temperature on print. Cobalt-doped iron oxide also has lower switching energy barriers in relation to its coercivity than does conventional iron oxides, and a broader distribution of switching fields. These offset the apparent advantage of higher coercivity and make the material more susceptible to print than undoped oxide.

Bertram, Stafford and Mills also observe that print may be more apparent with high output tapes, simply because it is above the lower noise floor.

Conclusions

This article cannot judge whether or not kiss-print is really a major problem. However, it is something that is alarming a number of duplicators and it can do no harm to be aware of possible dangers. Nor is it possible to offer an instant cure: burying the print in tape noise would surely be a retrograde step, yet it seems the only total remedy! However, a number of pointers emerge.

1 The longer that loops are left in contact with one another, the worse the print is likely to be: this is only likely to pose problems if loops are left in bins overnight or over a weekend. For most of the time tape faces are only in contact very briefly, and research on print-through suggests that printing will be weaker and more easily destroyed under these conditions.

2 Removing loops and storing the tapes on reels when not in use may simply cause conventional print-through.

3 Passing the tape several times across the reproduce head *before* duplication commences should reduce *all* print by up to 5 dB. Folklore from the film industry says that running the loop around a fairly sharp 'knife-edge' guide may break up the printed

CASSETTE DUPLICATION

magnetic pattern without necessarily destroying the coating or recording on the master. Experiment first!

4 Avoid elevated temperatures in the loopbin and in storing loopbin masters. Most good duplicators use air conditioning to keep the duplicating room cool, and have airflow through the bin; airflow may need to be maintained while motors, etc, cool down after a duplicating run.

5 Avoid stray magnetic fields in the vicinity of the loopbin (and wherever tape is stored).

6 Choose chrome or high coercivity ferric tapes for the loopbin master; be cautious with cobalt-doped high coercivity tapes, which may print badly.

7 On the plus side, tape loops are unlikely to touch in exactly the same spot each time: a particular spot on the tape is more likely to touch many points along the loopbin master. A build-up of noise rather than discrete prints seems a more likely general problem — and there may be some cancellation effects.

8 Build-up of noise and to some degree discrete prints will be reduced at mid/high frequencies by the Dolby B-type noise reduction employed with the majority of well duplicated cassettes. Print or noise is introduced within the encode/decode chain and unwanted 'noises' will be reduced along with cassette background noise.

9 Although kiss-print level is potentially higher than print-through because of oxide-to-oxide contact, the problem is likely to be less than one would expect. This is because of air-film separation of the layers in the bin and also to slight curvature of the tape across its width, which will tend to restrict contact to the centre or edges of the tape. Unlike print-through, there is no tape tension holding the layers together. In some newer, vertical bins the weight of the tape will tend to squash the layers together, whereas in horizontal bins contact will be determined by the springiness of the tape.

10 If kiss-print is a real problem for the duplicator, one is left with the well documented (but I suspect nerve-racking) suggestion of running the master-tape across an erase head with a reduced field. This could be carried out for one pass at the beginning of each shift, or whenever a new loop is loaded, or routinely on every cycle. It would probably require considerable skill in selling the idea to the client and management! It would also need careful checks to ensure the erase current was correct for the tape in use.

11 The research cited used recordings made at 30, 15 and 7½ ips. For the newer duplicators running loopbin masters recorded at 7½ ips, it would appear that 'skimming' would be acceptable in terms of correctable HF loss. However, many loopbin masters are still originated at 3¾ ips. Since the effect of 'skimming' on both wanted HF and unwanted print will be wavelength related, further investigation would be needed to confirm that a worthwhile reduction in print could be obtained for an insignificant HF loss on loopbin masters made at the lower speed.

12 Before 'skimming' a tape suffering from print (of any kind), it would be a natural reaction to take a safety copy in case of accidents. Remember, however, that the copy contains a *biased* recording of the print on the original. That print as recorded on the copy *cannot* be reduced without also wiping the wanted recording. Only the original can

be 'skimmed' successfully — but a safety copy is probably good insurance!

Not many people seem to have used 'skimming', or low-level erasing, even for conventional print-through reduction despite documented evidence in favour of doing so. Is this just nerves? Does anyone out there have any first-hand experience of using the technique regularly under recording or duplicating conditions? It would be interesting to hear more.

References

- (1) I. Lippert. Der Kopiereffekt der Magnetophonbänder. Elektrotechnik, July & August 1947.
- (2) B Vinzelberg. Über den Kopiereffekt der Magnetophon-Filmbänder. Funk und Ton, December 1948.

- (3) S W Johnson. Factors Affecting Spurious Print-through in Magnetic Tapes. JSMP'E, June 1949.

- (4) E D Daniel & P E Axon. Accidental Printing in Magnetic Recording. BBC Research Department Quarterly, 1951.

- (5) R Herr & R A von Behren (3M). Selective Erasure of Magnetic Tape Cross-Talk. Electronics, August 1952.

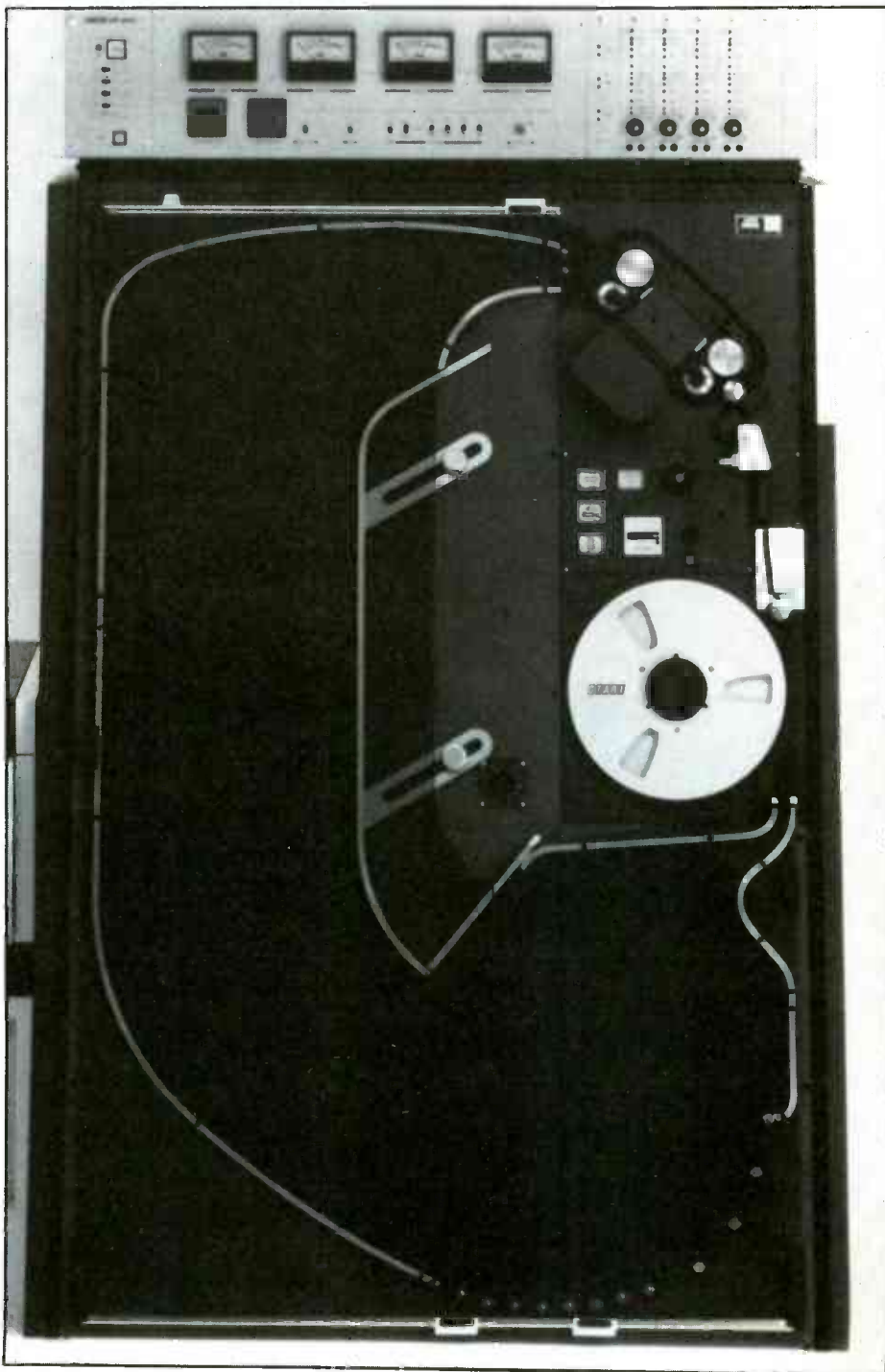
- (6) L J Wiggin. Magnetic Print-Through — Its Measurement and Reduction. J.SMP'E, May 1952.

- (7) W D Selsted & J G McKnight. Tape Print-Thru Reduction. Ampex Research Report 1957.

- (8) N Bertram, M Stafford, D Mills (Ampex). The Print-Through Phenomenon and its Practical Consequences. AES Preprint, May 1976.

- (9) W K Westmijze. Studies on Magnetic Recording, Part VI. Philips Research Reports 8, October 1953.

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Vertical loopbin



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Commitment to CD

One of the most impressive aspects of the growth of the Nimbus operation over the years has been the way the company has accomplished everything it has set out to do, no matter how complex or ambitious. Which is why its plans for the future, especially the American venture discussed later, are worth noting.

Certainly, the progress made recently at the company's second CD pressing facility, at Cwmbran in South Wales, is mightily impressive: from being but a news story in the *Financial Times* of March 4th, a visit to the plant nine months later found one wing of the plant completed and four presses operational. Two more presses were expected on stream by the end of December 1986. Back in the days of LP manufacture, production director, Mike Lee, learnt that working with groups of six presses could still offer employees that vital incentive of being part of a small, self-motivating team, while making the most efficient use of resources. The lesson has been carried forward into the CD era.

The empty shell of a building which Nimbus took over in April was more-or-less ideally (if unintentionally) designed for that production philosophy. The 24,000 sq ft single-storey building on Cwmbran's Llantarnam 'high-tech' industrial park is H-shaped enabling the setting up of two lines of presses in the outer wings with administration, storage, power supplies and staff facilities located in the central span. On a practical note, the structure conveniently allows the necessary clean room conditions to be rigorously maintained in the 'producing' wing while building work continues in the other.

"It isn't easy keeping out the dust with the builders in," says the plant's general manager, Martin Thorne, but evidence of his success can be seen from the fact that the output of just the four Cwmbran presses operational last autumn was better than that from the original six presses installed in the first Nimbus CD facility at Wyastone Leys.

Cwmbran's second six-strong production line should be up-and-running during January '87 and fully functional by June, giving Nimbus a total annual CD production of 26 million discs. It is unlikely, of course, that they will have any difficulty filling that capacity with orders: indeed, it took a fair bit of soul-searching to come to one decision about the allocation of facilities in Cwmbran's second wing. Such is the current pace of development in CD manufacturing techniques, it has been decided to devote at least one of the new presses to research into materials and applications. Although it will make a dent in the production potential, the need for this kind of research demands the sacrifice, something conceded even by the man responsible for production, Mike Lee. And it isn't only in the pressing stage that new ideas have to be explored, he adds, but in metallising, lacquering and printing, too.

It is all part of what makes CD manufacture

There were those who questioned Nimbus' wholehearted commitment to compact disc back in the early 80s. A premature move, was the opinion of more cautious elements in the recording industry. Now, however, statistics alone have amply justified that bold decision and, given Nimbus' enviable head start over every other UK record producer, there must be more than a few who wish they had possessed similar vision, not to say conviction.
Report by Peter Herring

an expensive exercise, although there have been a few raised eyebrows at Nimbus when hearing of some of the vast sums apparently being lavished on other new plants around the world. What is it being spent on, and how on earth do they expect to recoup the outlay, is

the opinion of the wise men of Monmouth!

Not that Cwmbran has come cheap: some £8 million invested, of which £1.4 million has come in the form of a grant from the Welsh Development Authority, no doubt delighted to see some 500 new jobs created in an area of grim unemployment. In a part of Britain rooted in the traditional industries of coal and steel, you could be forgiven for thinking that a labour force capable of working in high technology clean room conditions would be difficult to come by. Not so, say Nimbus: there is no shortage of the right kind of skills, and employees have readily adjusted to the stringent demands of CD manufacture. Many already possessed experience in electronics, and some are ex-employees of Immos, the state financed microchip company.

Indeed, such has been the progress at Cwmbran that the plant is soon to be equipped with eight plating baths which will enable it to 'grow' its own stampers. Although mastering will still be done exclusively at Wyastone Leys, this will cut out a good deal of the time consuming travel between the two locations (they're about 45 mins apart by road).

However, by far the greatest time saving has been coming from a gradual but significant reduction in the disc pressing cycle — from some 16 to 18 seconds just six months ago to an average of around 9.5 seconds. And there is every likelihood of it being lessened still further, a prediction confirmed by the production staff, and the technical side, in the shape of Dr Jonathan Halliday.

At the outset, Nimbus opted for injection-moulding presses rather than the compression-moulding system used elsewhere and that faith has been fully warranted. Injection-moulding has an



Netstal presses at Cwmbran

inherent time advantage over its rival and as pressing techniques have been refined, it has been possible to capitalise further on this. The presses are a Swiss-built Netstal design, described by Mike Lee as 'the Rolls-Royce of injection moulding machines'. The all-important moulds, however, are from The Netherlands, from Nagron-Gim.

For the next stage of production — metallising — Nimbus have decided to stay with the chamber method employed at Wyastone Leys and not install the increasingly popular in-line system. Whatever the gains from in-line working, they feel one basic advantage of chamber metallisers is all-important. If there is a fault on the in-line metalliser, all production stops; if one of their four Leybold (Germany) chamber metallisers should go down, the other three continue turning out the product. It's as simple as that.

Great strides, say Nimbus, are being made in the final stages of CD manufacture, with their own lacquering and printing technology being closely-guarded secrets. Proprietary lacquering devices could not meet the standards required, so Nimbus developed their own lacquering machines which are either built in-house or to exact specification by outside contractors.

On the printing side, graphic artists

frustrated by the lack of scope available from silk-screen printing of CD labels will be pleased to learn that Nimbus are installing Dek pad printers at Cwmbran, which bring with them the potential for 2-and 4-colour workings. Some loss of definition and registration will be evident in comparison to silk screen and if those qualities are uppermost, designers would obviously be best off sticking with the older method despite its limitations.

It was interesting to learn from Martin Thorne of the label designs which cause the most problem during printing: that apparently innocuous black outer circle on EMI classical issues is a prime instance.

Were there also problems at the other end of the production line, in the mastering for example? On the custom pressing side, Mike Lee was in no doubt that the quality of the masters they were receiving, particularly from UK labels, had improved enormously, with three or four London studios now very adept at appreciating the requirements of CD and producing tapes of the standard required. Those from abroad, however, including the US, were more variable.

On the metalwork side, technical director, Gerald Reynolds emphasised the difficulty of establishing that the quality of the master was up to standard — something rather more

sophisticated was required than the LP equivalent of listening to the lacquer:

"The biggest problem with CD is that you don't know what you've got unless you either play a disc and look at the output electronically, or physically cut up a bit and study it under an electron microscope, which needs 24 hours to get a result. The scale is so much smaller than LP. For example, it took us a good few months to discover one fundamental problem of CD plating, something which I think everyone has experienced in varying degrees."

Was there a similar parallel between the quality of the LP vinyl mix and the chemistry of CD's polycarbonate. Yes, Mike Lee assured, the stuff varies just like vinyl. They were currently using two types of polycarbonate, one a European-made GE formulation, the other Japanese, and there was a general preference for the latter.

Regardless of such production quirks, and with Cwmbran only half-operative, Nimbus have now been able to cut the turn-round time on CD orders from the three-to-four months of just a year or so ago to between four-to-six weeks from receipt of parts. By the spring of 1987, they should be able to offer their 34 CD custom-pressing clients the kind of service they have probably become reliant upon in LP pressing — a capacity for quick, short-run orders to meet sudden, unexpected demands. The only difference is that small labels will not enjoy the facility for the kind of short runs obtainable on vinyl. With CD, the minimum order will out of sheer practicality have to remain at 2,000.

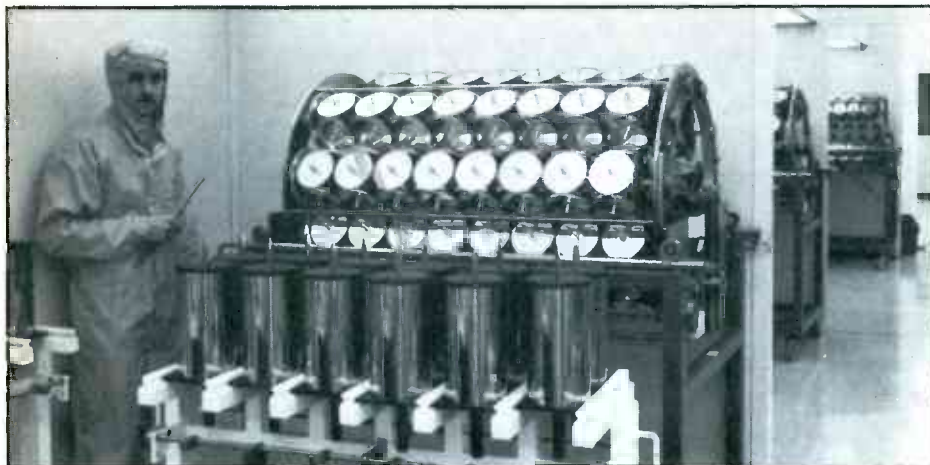
On the plus side, though, there is a daily delivery service to London and, at the 'front-end' of the operation, there are now three CD mastering suites at Wyastone Leys. Attention is currently focused on the increasing automation of the mastering system, with the eventual aim being total computer control according to its designer, Dr Halliday.

But the prime reason for the company's existence remains its own recording label, now with some 60 titles and able to show a quadrupling of sales in the past twelve months. It was the feeling that the label should have its own manufacturing base that brought Nimbus into record production and now their own releases account for no less than 25% of the CD production of Cwmbran and Wyastone Leys.

Much of the sales growth has been in the US, where critical enthusiasm for Nimbus releases runs a deal higher than in the UK where the company's radical recording philosophy has never earned wholehearted 'establishment' approval.

It is perhaps one of the underlying reasons why the next big stage in Nimbus' development is going to be in the countryside of Greene Country, Virginia, USA. The project is a mixture of ambition, vision and plain pragmatism.

Currently, some 70% of Nimbus's CD production goes for export, and half of that finds its way to the States. There is no doubting the demand for CD in America, where in some ways it is still a 'new product', probably as a result of the lack of any direct US involvement in the system's development. Add to that the possibility of import tariffs eventually being imposed by the Americans on 'high-tech' products, and as far



Discs after metallisation



Detail of press and control panel

CD MANUFACTURING

as Nimbus are concerned, the argument for a US-based manufacturing facility becomes irrefutable.

However, much more than a CD manufacturing plant is envisaged for the 25 acre greenfield site near Charlottesville, part of 265-acre farm which Nimbus have bought (and of which the remaining 240 acres will remain agricultural land).

Nimbus' desire to be in this kind of rural environment will come as no surprise to anyone familiar with the glorious Wye Valley setting enjoyed by the current UK operation. Like Wyastone Leys, the American facility will be a self-contained recording and manufacturing base, but on a much more ambitious scale. Where in Britain, Nimbus use a converted country house ballroom as a studio, in Virginia they intend to establish a studio-cum-concert hall large enough to stage — and film — full scale opera productions. For Nimbus co-founder, Numa Libin, the future of the company, and of recording in general, lies as much with the visual as the aural. And he also feels the future lies very much across the Atlantic, in the shape of Nimbus Communications, and with possibly a presence in broadcasting as well as audio and video recording.

Importantly, there is no suggestion of cutting back the UK operation to further the American one. Rather, it is hoped they will be complementary with key staff based in both locations. However, there is no doubting Nimbus' enthusiasm for their new hosts. Once the agreement of the local people had been obtained, there was the fullest possible co-operation from the county authorities and, unlike the British experience, the minimum of red tape. The employment of 500 people in a community where 75% of the working population has to travel to a job was naturally a prime incentive but what has impressed the Nimbus staff has been the way the Americans not only want to work, but want to be successful at what they do as well.

But whether you're making CDs in Europe or the Americas (or the Far East), there are common factors that cannot be ignored: retail price and DAT are but two of the major ones.

On the subject of price, Nimbus echo many in the record industry by saying that, although the average CD price is too high, the public have to some extent been spoiled — in relative terms — by the low cost of LPs. Put against the rate of inflation these past 20 years, all LPs are bargains.

Mike Lee would like to see the shop price of CDs down to around £8 or £9 but believes retailers as well as manufacturers should contribute to achieving that target. He is convinced a price cut would be in the best long term interests on the industry as a whole.

On the subject of DAT, the general feeling at Nimbus is that it is commercially a non-starter. Despite some ill-informed press comment which has excited an unjustified public interest, DAT will finally emerge as too expensive a medium for general use — if, indeed, it emerges at all. At Wyastone Leys, they are typically much more enthusiastic about Jonathan Halliday's work on an 18-bit solid state storage system, although the Teldec/Neumann DMM CD mastering system has also aroused interest.

Construction of the new American plant was due to begin in mid-December. It is

hoped to be in production by August or September: a tight schedule but by Nimbus' standards a wholly attainable one. This 'small specialist record company' as some still persist in calling it despite evidence to the contrary — as a recording producer they are second only to Thorn-EMI in the UK — hasn't yet failed to fulfil any of its plans.

Many were disappointed when, after a decade or so of offering the very highest standards in mastering and pressing, Nimbus Records elected to close their LP manufacturing facility in April last year and concentrate their efforts on CD production. Such regrets, however, were not shared by those responsible. When asked if they missed those LP days, Gerald Reynolds (with many years cutting experience) and production chief Mike Lee gave an unequivocal, "No!"

Gerald Reynolds spelt it out: "The situation with lacquers was becoming so bad, so frustrating; a nightmare, in fact. We still have boxes of lacquers we couldn't use."

"For cutting classical discs, on average each batch gave us one good lacquer out of four, and the yield from those we actually cut was in some cases only 50%. In that respect CD simply has to be an improvement, providing you can get a supply of high quality glass master blanks and you have control of the master preparation and coating process. With that control, we actually get a better yield on CD. Yes, lacquers were far and away the major problem."

The processes for cleaning the lacquer, silvering and subsequent plating were sufficiently well understood he felt, provided those doing it were conscientious and dependable. "Even the good lacquers you were using were marginal and you could only reject a lacquer where a fault could be seen on the surface before it was cut. After cutting, if there was a 'rock' in the lacquer, it would have become stuck to the cutting stylus, been dragged along the groove wall and produced score lines."

"Things like that had to be taken through the whole plating process before we knew if the result was going to be acceptable or not."

In that case, were there faults that could not be spotted until the pressing cycle had commenced? No, replied Reynolds, they were always noticeable at the positive stage, adding that, paradoxically, they now obtain as many CD stampers per positive, and of the highest quality, as they did LP ones, despite the greater demands of the system.

Did the chemistry of the plating process ever give them cause for grief?

"Not really, but it was essential to monitor the chemicals of the plating baths daily, checking for pH, specific gravity and other vital statistics of a plating solution."

"With plating, you can usually see the quality of what you've done from experience and careful examination of the finished matrix. However, if the quality had deteriorated, it was not always obvious or easy to find out what had gone wrong."

Of course, Nimbus did make things yet more difficult for themselves by setting out to cut extremely long sides, without any

Such is the almost tangible air of confidence and enthusiasm around the place. I certainly wouldn't bet against Nimbus meeting that deadline, or indeed bringing to fruition all their other proposals for Virginia's green and pleasant land. A remarkable company, the product of some equally remarkable people.

loss of dynamic range or level. At 33 $\frac{1}{3}$ rpm, they could achieve 40 minutes of music and 45 rpm sides that offered in excess of 20 or even 25 minutes.

Dynamic range, Gerald Reynolds concedes, was a major problem, but he adds: "Ironically, you could guarantee that if you were manufacturing something that was consistently loud — pop, for example — it would go through the entire process without a hitch. The perceived surface quality would be very much better than on a classical disc."

All the pop and rock discs pressed at Nimbus were for outside customers prompting a question on any problems that arose from processing and pressing other studios' lacquers. The biggest client in this respect was the BBC's Transcription Service. Mike Lee reckons they received more lacquers from the BBC than they generated themselves. There was the full output from two BBC cutting studios to deal with: "We had no more trouble with their cuts than we had with our own."

Gerald Reynolds continued: "The fact that they were mostly half-processed meant that many faults which would become apparent if you were going through the entire process were not serious. With half process, any slight score lines or roughnesses in the groove do not produce a problem in the pressing. If you then grow later stages of metalwork, however, any roughness tends to tear the walls of the groove so it gets worse with each extra stage."

So, at the end of the day just what did put Nimbus a 'cut' above the rest?

"I don't think there was any mystery about it," argues Lee. "It was care. Care, and a very close feedback amongst everybody involved. Having the master cutting, plating and pressing under one roof helped — no one could pass the buck to anyone else!"

"For instance, we always glued our stampers to the mould which, of course, meant we couldn't reuse them. It enabled us to get over the problem of mechanical roar, and without glue you can easily get mould release damage. Not only that, there's a greater chance of dirt getting on the underside of the stamper and poking through to form a 'sink' in the LP pressing. We took great pains to get a perfect release from the mould: an imperfect release and damage was soon evident in those familiar 'stitching' marks on the disc surface."

"I suppose one of the reasons our custom pressing service was of such a high standard was that possibly even greater demands were being made by our own recordings, in terms of dynamic range and side length."

"Overall," both Mike Lee and Gerald Reynolds concluded, "we're rather relieved to be out of LP manufacture!"

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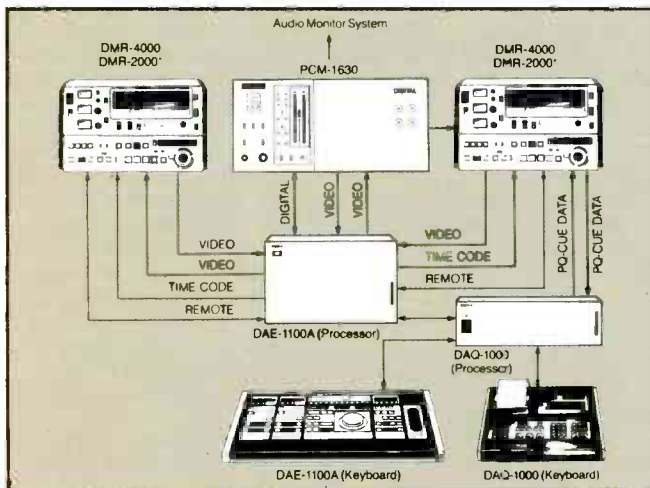
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Alternative CD Formats

With CD pressing plants now charging around £2 per disc, the record companies wholesaling them at between £7 and £8 and the retail trade obliged to add VAT and profit, there is still no sign of a return to the £9.99 level which many people believe to be the magic threshold for impulse purchase. The heavy capital investment needed to press compact discs, the know-how, the steep learning curve and the complex production technology involved will continue to keep the price high until so many people have jumped on the pressing bandwagon that supply outstrips demand and cut-throat competition sets in. There is still room on the bandwagon, because the consumer hardware industry has locked itself into an absurd downwards spiral of price cutting.

On the face of things it seems equally absurd for the industry to be thinking already about alternative uses of CD, when pressing capacity for conventional music discs is already overstretched. In reality there is method in this madness. The cost of pressing a CD, and the wholesale and retail prices, only look high in comparison with vinyl or musicassette releases or identical programme material. If the same 12 cm disc is used to carry text, data, computer programs, graphics, pictures or moving video, then the price of the carrier becomes insignificant compared to the value of what it carries.

CD ROM and CDI

There is a clear lesson to be learned here from the computer industry, which routinely charges tens or hundreds of pounds for programs which offer sophisticated word processing or database management. These are delivered to the customer on a single floppy disc, costing less than £1 to manufacture and replicate by simple hardware copying.

Already Grolier in the US sells a single CD disc for \$200. The disc is a CD ROM (Read Only Memory) and it stores digits representing all the text from Grolier's 20 volume paper encyclopaedia. When the disc is used with a computer, search software lets the user hunt out a passage of text within seconds by entering key words — like looking up page references in a printed index.

The \$200 disc now suddenly starts looking very cheap, especially to someone who is more interested in saving shelf space than proving to the neighbours that they own an encyclopaedia. In short, the cost of pressing

Will 1987 become the 'year of the CD' or will the latest CD formats create uncertainty and confusion? Barry Fox takes a long, hard look at the various types of CD and the problems it could create

and packaging the discs becomes almost irrelevant. Why, you may ask, hasn't CD ROM taken the world by storm? There are several good reasons.

Not all encyclopaedia publishers are willing to risk obsoleting their warehouses full of printed paper. Also, although the Grolier disc costs just \$200, it can only be used on a personal computer, with CD ROM drive, which together cost several thousand dollars. Most important of all, the computer industry has, in its usual fashion, failed to agree on a single standard for storage and readout which would make all CD ROM discs usable on all CD ROM equipment.

There already exists in the computer industry a crazy confusion of incompatibility between different machines, disk drives, coding standards, operating systems and control programs. Add to this the lack of a common standard for ordering CD ROM data on a disc, and lack of agreement on the search software and hardware interfaces needed to put the CD ROM player under control of a computer, and the result is chaos.

The CD ROM standard is deliberately loose so that every designer can adopt the particular compromises which they think are best. These compromises are necessary because the CD format was designed to carry music, not data. A computer industry group, called the High Sierra Group (named after the hotel in America where they met to try to bring order out of the CD ROM chaos) has arrived at what looks like being a useful standard approach for CD ROM. But it may be too late and there cannot be genuine commonality between all CD ROM discs and computers until the computer market shakes down to a de facto single standard approach. This may never happen.

As soon as the video industry looked like shaking down to single standard VHS, along came 8 mm and now the promise of 4 mm

DAT cassettes being used for video camcorders. Just as the computer industry looked like shaking down to a single standard based on the IBM PC, there is a talk of a new approach from IBM. This is why Philips and Sony, co-developers of the CD system, have come up with a third format, CDI (CD Interactive).

CDI deliberately cuts through the confusion of CD ROM by rigidly defining the hardware needed to play the disc. This can contain a wide mix of material, including many hours of music and speech, of quality depending on duration, computer programs, encyclopaedic text, crude graphic pictures, and high quality video stills. When the format is launched any CDI disc will play on any CDI player.

CD development

The standard for CD audio was laid down in the so-called 'red book' which is available only to firms which have paid \$25,000 for a licence to manufacture CD players or discs. The specification for CD ROM is outlined in the 'yellow book' and the CDI standard is defined in the 'green book'.

All these books were published jointly by Philips and Sony, co-developers of the CD system. The most recent development was demonstrated by Philips alone, and in private, to record industry chiefs in the US towards the end of 1986. The new format — called CD Video or CDV — takes compact disc back to where it all began, in the early 70s.

All compact disc technology has grown out of Philips' original work on a 30 cm optical video disc and now the Philips' plan is to use the standard 12 cm CD format to carry video in addition to digital audio. The go-it-alone decision by Philips is unpopular with Sony and also with Pioneer (which is heavily committed to videodisc technology) because CD Video will re-introduce standards barriers. Whereas CD Audio, CD ROM and CDI are all digital formats which are independent of TV formats, CD Video is an analogue format which is tailored to PAL/SECAM TV for Europe and NTSC TV for the US and Japan.

To understand how all these different formats fit together and why the professional computing and data processing industries are following a completely separate train of development, it pays to look back to those early days of videodisc.

Twenty years ago electronics laboratories all round the world were trying to record colour TV pictures and sound on a gramophone record. That was of course

before the advent of video cassette. Philips in Holland pursued the optical approach, with a spiral of pits on a reflective disc representing a sliced analogue wave form.

The first optical disc demonstrated by Philips, in late 1972, rotated at a constant speed (1,800 rpm for the USA and 1,500 rpm in Europe) to match the television frame rate (30 Hz in America and 25 Hz in Europe). This constant speed or CAV (constant angular velocity) technique is wasteful of playing time because the turns of the spiral are smaller in diameter at the centre of the disc than at the outer edges. To record successfully near the centre, the disc is left with spare capacity towards the outer edges. Put another way, when there is constant rotational speed of the disc, the tracking velocity of the laser is much higher at the outside of the disc than towards the centre. If it is to be adequate at the centre it must be excessive at the outside.

Several companies, Philips, Sony, Teac and Mitsubishi, tried recording digital audio instead of analogue video on a 30 cm CAV videodisc. It was too large for use in cars, portable players or small domestic systems, and stored far too many hours of music per side. So in the mid '70s Philips tried recording on a mini disc, which later went through a series of development stages to become the 12 cm compact disc as we now know it.

The CD audio disc relies on a technique called CLV (constant linear velocity) which Philips had already developed to double the playing time of 30 cm videodisc from half an hour per side to one hour per side.

Instead of rotating at constant speed a CLV long playing video disc rotates at a speed which continually varies to keep the tracking velocity constant. All optical videodisc players can cope with both types of disc, switching automatically between CAV and CLV operation.

To be specific, a CLV videodisc starts rotating at 1,500 rpm (for Europe) and slows down to 570 rpm as the laser moves from the inside to the outside. Scanning speed remains constant at 9.3 m/s. Scanning speed for a CAV disc, which rotates at a constant 1,500 RPM (Europe), ranges from 8.6 m/s at the centre to 22.8 m/s at the outside.

A CD player keeps the scanning speed constant at 1.25 m/s as the disc rotational speed decreases from 500 rpm to 200 rpm while the laser tracks out from the centre. This is how a 12 cm CD can, in theory at least, hold up to 75 min of 16 bit/44.1 kHz digital stereo on a single side.

The penalty for CLV is loss of still frame and special effects on videodisc, and relatively slow access to a selected point on the disc. To understand why this is so, you need to think about how the recorded signal are stored on CLV and CAV discs.

Like half hour videodiscs, conventional vinyl gramophone records and magnetic computer discs work on the CAV principle. Because the disc rotates at constant speed, the recorded signal adopts a regular pattern over the disc area. On a CAV videodisc you can see the picture sync pulses in radial lines. The data stored on a computer disc is divided up by similar lines (although invisible) into pie-shaped sectors. This is how a computer can very rapidly search out data from a floppy or hard magnetic disc — it always knows exactly where to look for labelled sectors.

On a CLV disc the speed is continually



Philips CD ROM will hold around 250,000 A4 pages of text



Hitachi's CDR-2500 CD-ROM built in to IBM XT

changing so there can be no such orderly layout. In theory the laser reading a CLV videodisc or compact disc should have to start at the beginning and track all the way through to the end, when looking for a selected passage. In practice the laser skips across the surface looking coarsely at first and then homing in more accurately. This can take around a second, which is very slow by computer standards.

This is why the professional data processing industry has adopted the CAV principle for optical storage. It uses a variety of disc sizes and formats but they all rotate at constant speeds. Most of the discs are of WORM (write once read many times) type. WORM discs are coated with a thin layer of metal into which pits are burned by a laser in the data recorder. In the future the data processing industry may replicate pre-recorded discs, in a manner similar to CD and



Japanese CD ROM telephone directory

videodisc replication. But they will be in sizes quite different from CD (30 cm, 20 cm, 13 cm and 9 cm) so it is unlikely that the CD pressing industry will become involved. What matters to the CD industry is optical publishing on 12 cm CD format. As far as

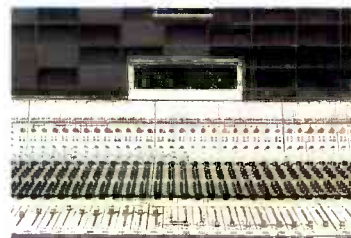
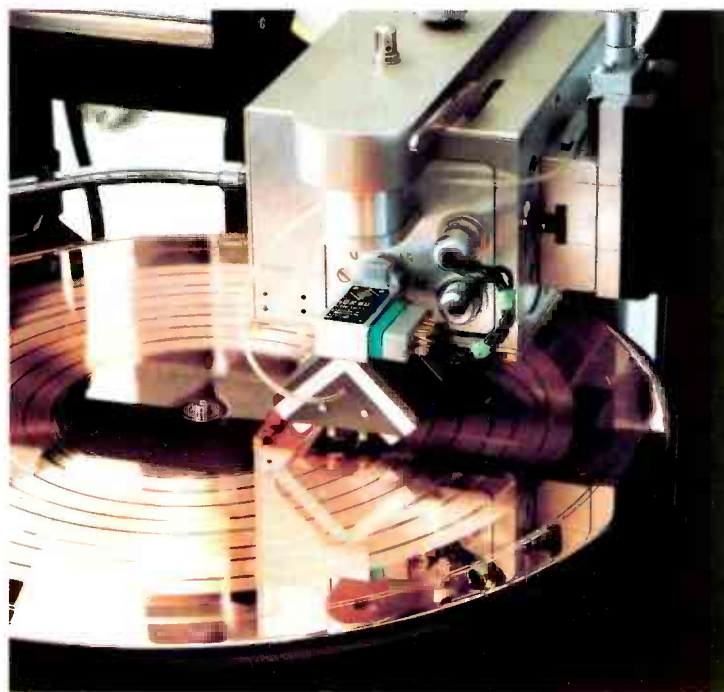
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CD TECHNOLOGY

pressing is concerned it does not matter what signals the 12 cm disc contains. But it helps to know what these signals will be . . .

CD standards

The CD ROM standard defines broadly how the information must be stored and indexed. The individual blocks (each containing 2,048, 8 bit bytes of information) are each identified with a header. When used with a computer, the search software tells the CD ROM player what headers to look for. The search is made easier if the data is laid out on the disc with forethought, for instance with all related material close together to minimise search time. This is why the CD ROM standard is loose.

The CDI standard also defines 2,048 byte blocks of data but specifies how these must be labelled for searching by a CDI player containing a Motorola 68000 microprocessor running under the OS-9 operating system. A CDI disc can store around 70 min of digital stereo in PCM code, or 2.5 hrs, 5 hrs or 10 hrs of progressively 'lower fi' stereo using different grades of adaptive delta pulse code modulation. Playing times are doubled again if the signal is in mono. Similarly, a CDI disc can store up to 600 million text characters equivalent to around 0.3 million typed pages, equivalent to 1,000 floppy disks; or 7,000 video still pictures; or around 10 times that number of cruder graphics; or a mixture of some or all of these alternatives as well as a computer program to search through the data, and manipulate statistics, graphics and text.

CD ROM and CDI will require specialist mastering, with extra redundancy bits built into the data stream, for use with extra layers of error correction in the player. But none of this need bother the pressing plant. Likewise it is unlikely that the processing plant will need to distinguish between digital 12 cm discs (CD Audio, CD ROM and CDI) and the proposed CD Video format which has part analogue content.

CD Video

CD Video has to work with analogue signals because the CD format cannot deliver a stream of digital pulses fast enough to convey full motion pictures. In fact the disc even has difficulty coping with analogue signals of a frequency high enough to deliver moving video. The figures speak for themselves.

For conventional optical video discs, the laser is scanning at a minimum speed of 8.6 m/s; for CD the scanning speed is a constant 1.25 m/s.

Philips has come up with two tricks to overcome this problem. Firstly, the compact disc is rotated faster when reproducing motion video than when reproducing digital audio, to increase the laser scanning speed for the video sequences. Furthermore, only between 5 and 10 min of moving analogue video are recorded, and these are stored as near the outer edge of the disc as possible. In this region tracking speed is at the maximum possible for any given rotational speed. The rest of the disc stores around 30 min of digital audio.

The root of discontent between Philips and Sony is that whereas all CDs to date have been world compatible, CD Video as

demonstrated by Philips is not. A CDV disc produced for sale in Japan or the US, where TV relies on 60 pictures a second each of 525 lines, will not play in Europe where TV pictures are of 625 lines, 50 Hz standard.

It is believed that Sony wanted to record the video and disc as raw red, green and blue, or component, signals and leave it to each player to convert the signals from disc into whatever type of TV signal best matches the local standard. The commercially far less successful JVC VHD video system already works in this way. Although there is some compromise necessary, because of the missing or extra 100 picture lines, the effect on screen can be made surprisingly unobtrusive by automatically modifying the picture size to compensate for the line discrepancy.

Philips seems to be regarding CD Video as a way of re-launching the original *LaserVision* optical video disc. LV came too late to compete with video cassette on the domestic market. There is even a plan to ditch the name *LaserVision*, and call everything CD

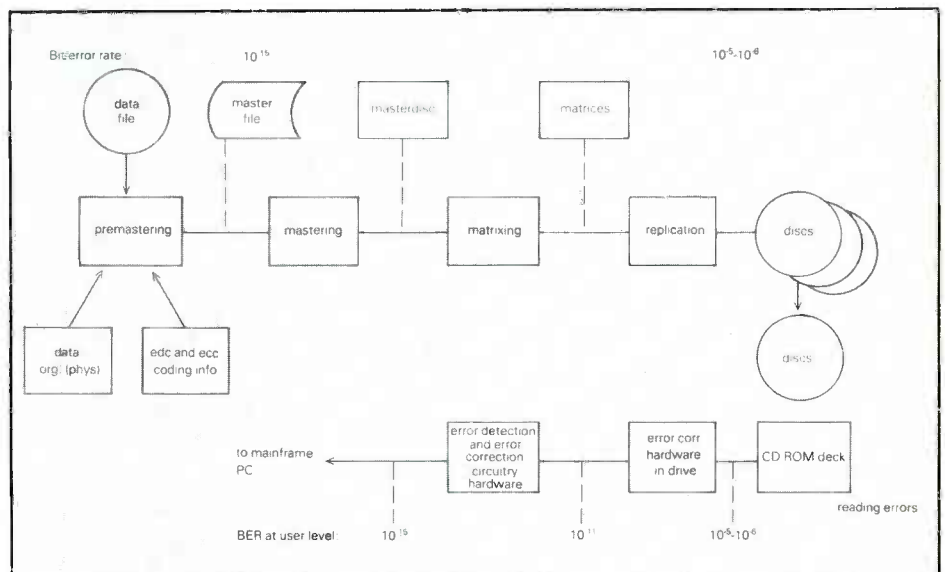
Video, even full size 30 cm video discs. Not surprisingly the industry is talking about Philips re-inventing its own wheel. Although CD Video would be an obvious winner for video juke boxes, there is considerable scepticism over whether — as Philips appears to hope — kids of the future will skateboard down the street watching pop music videos on a portable CDV boom box.

So when can we expect CD ROM, CDI and CD Video? The best bet for CDI and CDV is that they will be launched in Europe at the Berlin Radio Show early in the Autumn. CD ROM is here already in low key and looks likely to move up market and become a business tool.

CDI offers the standard approach which could have given CD ROM wider appeal. But interestingly businesses, libraries and firms which want to publish large quantities of data, may welcome the lack of standards in the CD ROM world. It helps ensure that only those who are entitled to access the data on a ROM disc will have the hardware/software package to do so.



Sony CD ROM system



The data integrity loop

US Digital vs Analogue

Being that we are in a very accelerated transition towards all-digital recording I originally collated this information to see what proportion of digital vs analogue masters were being used in the American record industry. I hope it will serve as a useful point of reference for the future.

In the November 8th, *Billboard* 'Top LP's and Tapes' chart our facility accounted for 42 of the top 200 items. Based on that sample, pop artists and producers are still favouring analogue stereo masters over digital masters by 69% to 31%.

Specifically, again based on recordings that actually made it to the *Billboard* chart, the formats are divided thus:

- 55% — 1/2 in tapes at 30 ips (no noise reduction)
- 19% — Sony digital formats (split 75% 1630, 25% 1610)
- 12% — Mitsubishi X-80
- 7% — 1/2 in 15 ips (one Dolby, two no noise reduction)
- 7% — 1/4 in (one Dolby, two no noise reduction)

All the analogue masters were recorded using analogue multitracks as were all but five of the digital recordings which used either Sony or Mitsubishi multitracks. Historians note that there were no DASH stereo masters on the charts as of this date, nor was there a single record mastered or recorded on a digital desk.

Two months later on January 17th *Billboard* chart we increased our representation to 44 recordings and this time digital gained slightly: analogue was 66% and digital was now 34%.

- This was broken down as follows:
- 54% — 1/2 in 30 ips (no noise reduction)
 - 23% — Sony (80% 1630, 20% 1610)
 - 11% — Mitsubishi X-80
 - 7% — 1/4 in 15 ips (no noise reduction)
 - 5% — 1/2 in 15 ips (no noise reduction)

I have frankly not kept perfect track but it is interesting to note that it is possible that this month marks the first time in my engineering career that there is not a single project I mastered on the charts with Dolby noise reduction, or any noise reduction system for that matter.

I rang-up Ted Jensen at Sterling Sound and asked him to take a survey as well. His figures were quite close to ours although he reported several chart records being done from *F-1* sources. They seemed to be doing a slightly higher percentage of digital albums than we are but still it was a very similar pattern.

Our studio masters a great deal of classical music for various labels. While some of the records we master are licensed material of older product and are still analogue, nearly 100% of newly recorded classical music is digital. Here the digital format reigns supreme. While I don't have specific figures for this, my guess is that over 3/4s of the masters are on Sony 1610/1630 and the rest is divided between JVC and Mitsubishi with *F-1* type EIAJ machines and Soundstream making a solid showing.

Some 90% of the 'New Age' music we do is digital and Mitsubishi seems to be a strong favourite in the USA for some reason.

Jazz is mostly digital or 1/2 in 30 ips, no noise reduction.

To crystallise my thoughts on all the above, I believe that with music such as classical, and to a large extent jazz, where one wants to reproduce as accurately as possible a performance that already exists — digital is clearly the format of choice. Pop music, which today almost never exists in realtime in the studio, can use any technique available to create the final sound (it used to be called musique concrète). If digital works best, use it, if analogue works best (at any speed or width) use

How popular is digital and just how many digital tapes are used for mastering the American charts? Bob Ludwig provides a personal, yet revealing look at the current trend at Masterdisk

it. Use a combination of both . . . whatever!

Once the recording comes off the mastering console (after the final creative steps have been accomplished) then I believe any further replication of that desired sound should be done in digital only. I must say I have never come across any producer or artist that didn't agree with that dictum. For now, even with pop, no matter how one arrived at the sound, now that you have it, digital will preserve it better than analogue. Indeed the old 1/4 in Dolby EQ'd production copy has given way to 1630 masters (this is true for all the major companies we work with except RCA who uses EQ copies made in the identical format of the master). All cassette masters are either 1630 or *F-1* EIAJ and all CD masters we make are 1630.

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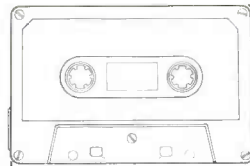
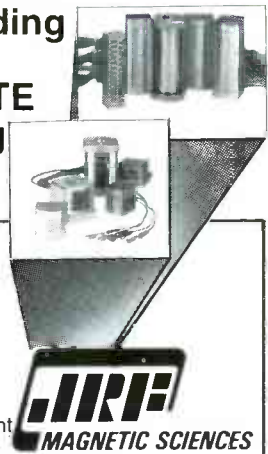
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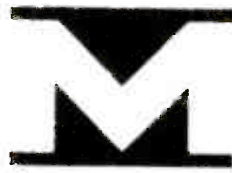
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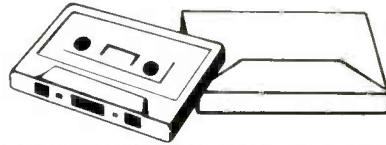
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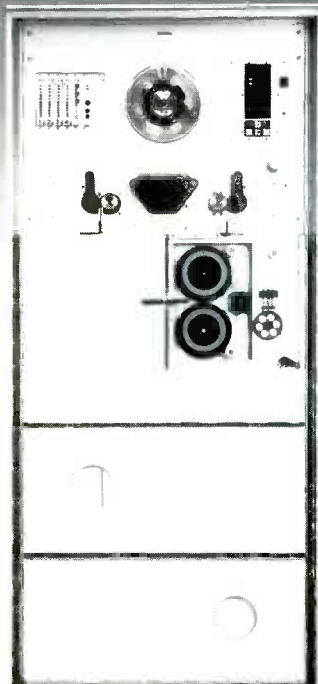


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Reader's Digest Music: Investing in Quality

Collections in the Reader's Digest Music range from light classical and easy listening through MOR and country to vintage pop and dance band music. These are typically boxed sets of eight to 10 LP records, also available as three or four double length cassettes, at around £30 to £37. Some releases are based on American editions but most are compiled specifically for the UK market.

Once the repertoire department has chosen the tracks for a collection it is up to product co-ordinator Bill MacLeod and his colleagues to acquire the necessary copy master tapes for compilation. For releases such as *Down Memory Lane — A salute to the 40s*, *Golden Greats of the 50s and 60s* or *The Number 1 Collection* the object is to get the sound of the original hit single. Bill MacLeod has found that this is not always as easy as it might be:

"It can be a problem, especially if you're sourcing very early material. When we send out the contractual paperwork we try to put as much information on the tape order as we can — catalogue numbers from the exact performance that we want and so on — which does help the record companies.

Unfortunately the originals do go astray and the so-called master that the record company hold may really have been dubbed off a disc or off metalwork or 78s."

Some of the 60s hits were issued in different versions for album and single. The single might be shorter than the album track and was often subjected to hefty EQ to overcome the ravages of AM radio and record players with tiny tinny speakers.

"You can have numerous masters of one track but quite often there was never a 7in master as such — I think it was done 'on the day' when they cut it. Of course the master we'll be supplied with doesn't sound like the original single if it was literally tweaked as they went along. That can be fun. We do go to quite a lot of trouble to put out what we believe is the original version of the song and I think we do succeed in the end. It's a struggle at times."

When each selected master arrives, a cassette copy is taken so the repertoire department can check that it is indeed the track they had in mind. Then Paddy Marchant, responsible for quality control in compilation, takes the huge collection of analogue and digital tapes off to a recording studio which is block booked for the assembly of compilation masters with any necessary EQ and level adjustment. As there is a very strong emphasis on technical quality it is perhaps surprising that the disc masters are usually still analogue.

Bill MacLeod: "We have certain cutting

Each year the British edition of Reader's Digest publishes half a dozen compilations of existing recordings by mail order. Tim Leigh Smith talks to Bill MacLeod product co-ordinator at Reader's Digest Music

engineers that we're happy using and they don't cut from digital at the moment so we're still compiling analogue production masters for the records. I know for a fact that if we went to a new cutting suite we would have problems. There is a working relationship that evolves over the years. When they do work for you more or less all the time they're aware of what you want. You rely on them to do the odd bit of tweaking that isn't on the tape for instance because you know they're into the music and you know the job is going to be how you want it to be.

"If we use a European supplier then we're sometimes able to make up a digital master and they cut flat from that. In fact the cassette interims are made up now on digital and loopbins are made straight from the digital, so we're doing a bit of both. Hopefully one day we can go straight on to digital for the whole lot."

Progress of the compiled material is monitored at each stage. Bill MacLeod's office has a 2-track Revox *PR99* with a pair of Dolby A, Sony *PCM-701* and *PCM-F1*, CD player, turntable and two cassette machines all linked via an Alice *828* stereo mixer to a pair of Tannoy *Little Red* monitors.

Before the final bulk production runs there is a marketing 'wet test'. A short run of the product supports a test mailing (British law requires that the product be available for dispatch before orders are invited). The response to the mailing decides the size of the bulk runs which range from about 30,000 to over 70,000 sets of records and cassettes.

Although Bill MacLeod is a 'discophile' he is pleased to report a very noticeable trend towards cassettes: "I think we could be up in the 75% bias to cassette now. It does depend on the package. The pop packages are less cassette dominated but again they're about 50:50 record and cassette. With the MOR, easy listening and light classical, which are more the sort of releases we get into, we have quite a nice high cassette bias. 'Nice'

insofar as it's easier for us to manufacture cassettes. In fact it has a lot of advantages over making records so we're quite happy that it's swinging that way. I think the age group which is probably buying the pop compilations that we do — hits of the 60s and that sort of thing — are still very much into vinyl discs and that's why we're still selling compilations in the format.

"We've been using some DMM cutting lately and we've got lovely results with that. I think it's come too late to save the vinyl record but it certainly gives you a very nice cut and a nice looking disc."

In the course of 15 years in the business — five years with Reader's Digest, five years with World Record Club and five in retailing — Bill MacLeod has seen the effect of the changing fortunes of the media. It seems the vinyl disc has not fared well:

"Unfortunately standards tend to drop over the years. People try to make things as cheaply as possible. And when you think about it the pressing of a record is a very antiquated system of reproducing music. I think the sad thing is if records had been treated like CDs — with clean rooms and everything else — we'd have ended up with the perfect 12 in disc. But I'm quite amazed at the quality that plants do get, given the conditions that some are working under.

"We have a good relationship with the suppliers that we use, although I think we are a little bit of a pain in terms of quality. Noticeably if we do go to a new supplier they don't really quite believe some of the stuff that we reject and send back to them. But we have to be very careful, we're in a direct mail market which is a funny market. If a customer finds the slightest thing wrong with a pack it's very easy to send the whole pack back and we lose the sale. I think in retail people will more easily accept an album which is not particularly well pressed. It's a very different thing.

"There are all sorts of aspects of quality: label colour consistency for instance. If you're in the market with an eight or 10 record boxed set the discs have to look good and they have to look similar. On the whole the quality that we get is good. It could be better but at the end of the day you get what you pay for. I suppose there are very few suppliers anywhere now that are into doing top quality vinyl — Nimbus has gone — but on the whole it's all right.

"The quality of cassettes has improved dramatically. Every year they seem to get better and better. The technology has obviously improved and I think people are taking more care making cassettes than they did. They were treated very much as a throw-away item. Now they've become such

RECORD COMPANY VIEWPOINT



New packaging for first CD release



Wide repertoire among box sets

an important part of anybody's business that they've won themselves a place."

In addition to quality control by the various suppliers there is a quality assessment department at the company warehouse in Swindon. A 10% check is carried out on each batch before any incoming delivery is accepted. This is a time consuming process with the number of discs or cassettes in each set but Reader's Digest Music products are guaranteed against manufacturing faults for 12 months after purchase.

Components of sets are delivered separately for collating, boxing and packing at the Swindon warehouse. Thus company staff handle the final stages of preparation prior to posting which adds a further level of quality control and means that a fault on any one item does not break up a set assembled by suppliers. It also allows more flexible response to customer demand.

By the nature of the operation it is usually possible to plan production up to a year ahead. This means the company is often able to adjust schedules to take advantage of slack times at suppliers, provided warehouse space is available. The tendency is to place a product with a particular manufacturer and leave it there for any future runs.

Bill MacLeod notes that the amount of incoming material returned as being below standard has reduced over the years: "I think it's a matter of getting into a relationship with the suppliers that you use, and they being aware of your standards. As long as you agree standards at the outset and they're capable of manufacturing to them — they've got their price right and everything else — then there shouldn't be a problem."

A quality manual lays down specifications for cassettes and discs. Surprisingly the vexed question of vinyl virginity is left open. The manual merely mentions that 'virgin compound is preferred' and advises that additions of reclaim or scrap material 'must not adversely effect signal-to-noise performance'. This seems to achieve the desired result.

"Disc complaints from customers are more often on a visual thing like warping than problems with surface noise. I think we've still got people out there using autochangers. If you get a dished or warped record on one of those it's murder. They're few and far between nowadays but there are still a few of them out there.

"One problem is the automatic bagging of discs. The plants that are still bagging by hand have got much better quality control because they actually view the discs. They're only going to pick up the obvious visual faults but you'd be amazed at some of the faults we do get. Labels bursting and that sort of thing can slip through on an automatic press. It looks terrible if you send a record out with a label halfway across the playing surface, and we do get them from time to time.

"On the cassette side we have very few complaints on the quality of deliveries coming in to us. The most common customer complaints are tapes tangling or tapes jamming and the majority of the time you can tell that it's dirty heads or a dirty pinchroller — something on their machine. We very tactfully explain that they need to clean the machine every now and again.

"We used to run tapes up to a C-102 length using C-90 thickness tape which can give problems because you really are cramming it into the C-0. Now we've dropped down to the C-92 bracket and we seem to have alleviated a lot of the problems."

Cassette sets are sold in 4-colour printed laminated board boxes, usually with a little booklet giving details of the tracks and some history of the artists. Each cassette has a standard library case with 4-colour inlay card so people can take individual cassettes from the set for in car use or personal stereos.

The company recently examined the possibilities of a video-style box with vacuum formed inner, only requiring a slip sheet in the front to identify the package. This is partly because the library cases and inlays are quite costly. Also the 4-colour laminated boxes can take about six weeks lead time for manufacture and this creates problems on the odd occasion when demand exceeds supply and a fast turnaround is required.

There is always a need to balance the quality of presentation against its cost effectiveness. Record sets once included a 4-colour sleeve on every disc but now have only standard grey-lined bags of high quality heavyweight paper. Sleeve notes are incorporated into a very glossy 4-colour booklet. On the other hand sets are issued in boxes with gold leaf embossed artwork which is quite difficult to produce and dramatically increases the lead times. James Last is one artist to receive this expensive and impressive decoration.

A collection of *Quiet Music for Quiet Listening* being prepared for a test mailing in May is the first to include CD alongside record and cassette. A CD set will probably have to sell at about £45 to £49 to make the same margin as the equivalent record or cassette set selling for £32. If the response is favourable bulk mailing will follow in November. Planning this operation in the second half of 1986 Bill MacLeod found no problem with manufacturing.

"A year ago you couldn't get CDs for love nor money but now I'm being quoted between six and eight weeks, so it shows that capacity is easing. I think that will be of benefit to us in the long run. When there's a bit more competition out there we'll maybe find manufacturing prices dropping a little anyway."

The first release will consist of six CDs plus a special bonus CD. It will be issued in two double-hinged jewel boxes, each holding three CDs with room for a fourth, and a standard single jewel box for the bonus CD. The company has been looking at alternative CD packaging. Possibilities include a video-style box with vacuum formed inner to hold the CDs, and a small board box or a clear acrylic box with the CDs held in plastic pouches (a bit like an overgrown credit card wallet).

Bill MacLeod favours a development of the present 4-CD jewel box with an extra centre section, triple hinged to hold six CDs: "If we can get the price right I think that's probably what we'll do. It would be nice to conform to what everybody else is doing out in the market place and it looks as if CD is staying with this standard packaging. It's sturdy enough, it protects the discs and it looks good. If you put CDs into board boxes you're going to save a fortune but they don't last as long and they don't look as nice.

"We're putting out a quality product so we may as well spend a little extra on the presentation of it — get it right. One of the things I like about working at Reader's Digest is its 'quality consciousness'. We do really strive to put out the best records and the best cassettes that we can get — within limits. We're in business like anybody else and price is obviously all-important. It's like a balancing act, you can go and pay 50 pence a disc but are you going to be in business next year?"

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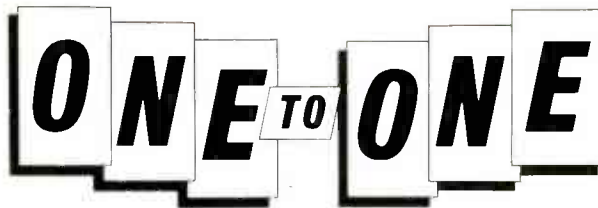
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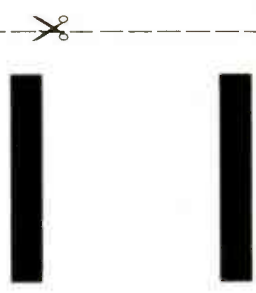


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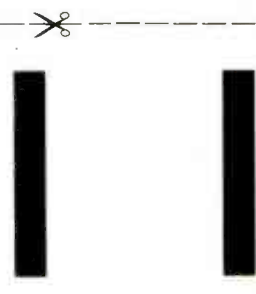
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Analogue to Digital Conversion

The initials CD lend themselves rather well to a number of acronyms. Compact Discs, Christmas Day, Consumer Demand, Crafty Devils, Complete Desperation, and so on. You can even link them together: 'I responded to Consumer Demand and bought a Compact Disc for Christmas Day. When I got home I found that some Crafty Devil had Conned me, Damn it!' What in fact I had bought was a very poor quality transfer of some old analogue master of indeterminate origin. For that I had paid double the price compared with the album or cassette. To make matters worse, the running time was less than 38 minutes, the grotty liner notes gave a credit to the vinyl disc cutting engineer but gave no clue as to the type of recording used. There was no three letter code.

The same day I bought a classical recording for several pounds less, that was a superb quality all-digital recording. It was clearly identified as such and had a running time of more than 60 minutes. The first disc was from a major multi-national company, the second from a small independent. Like thousands of other people every day, I had just been ripped off.

Tough luck, you might say. You should have listened to it first. If I had and had decided that the music was great but the quality poor, what could I do. Either buy it and be conned, or save my money and deprive myself of the music and the record company the sale. Hardly a fair choice for a consumer.

Who cares? Well, certainly not the major record label. I believe the consumer is beginning to care and certainly all those involved in the production of CD masters care. The record producers care and many of the artists care. Sadly most of them are benefiting rather little from the sales of compact discs, their share of the more costly medium is just the same. It's the record company which gets the bulk of the profit, which in some cases could be as much as the total cost of an LP.

Those of you who attended last year's Digital Information Exchange in London will have heard Nick Hopewell-Smith's explanation of these statistics. You would have also heard the blast directed at the record labels by record producer Alan Parsons. This followed similar comments from Rupert Hine and Pip Williams the year before. What is certain is that record companies did not hear it because for the second year running, they ignored the event as they did both the APRS seminars in previous years. Complete Desperation is the best summary of the way the organisers of these events feel.

The situation in the UK is probably the best example in the world. We have one of the largest price gaps between analogue media and CDs. This provides the clue to what is going on. Like many things here in the UK at the moment, most marketing strategies are for short term gain only: let's get a quick profit and never mind the consequences. Profit is being made from CD sales and it's increasing all the time with

Last year the sales of CDs more than doubled compared with the previous year. Sales of CD hardware more than doubled as well, as did sales of professional digital recording equipment yet the total numbers are still small by comparison to analogue systems. Chris Hollebhone comments.

every price rise. The costs of CD production are not increasing and it's very likely, with increased competition, that they will reduce.

The disturbing fact is that, throughout the industry, digital is being used to cover up basic analogue problems. Record and cassette prices have been allowed to slip way behind the rate of inflation for years. As buyers switched away from singles to albums, singles prices increased and albums remained static, as cassette sales increased, prices eased slightly. Profits started to suffer. Then CDs arrived and demand exceeded supply, the opportunity to restore profit margins was too good to miss. Now supply is catching up and still the analogue prices are low. Surely now is a good time to increase analogue and decrease digital to speed up the transfer to CD. Curiously this has not happened.

DAT is almost with us and the panic has started. Why the panic, if CD were being encouraged to grow at a faster rate by a smarter pricing strategy. Instead the industry is trying to slow down the introduction of DAT because of the fear of piracy. Piracy is an analogue problem that has been with us for years but because it has not been solved, DAT gets the hammering.

In case you think I am attacking only major record labels I will now turn my attention to the studios. They have also allowed their rates to slip behind inflation, despite having to spend increasingly large sums on the latest equipment. Much of this equipment is digital. Those studios who have bought digital multitrack machines, wanting to recover their investment, have put a substantial hourly

surcharge on digital recording. You may not be surprised to learn that the record companies won't pay. Instead, if the artist is big enough, they prefer to rent the machine by the day, week or month and keep the hourly rate the same. Result: the studio multitrack lies idle thereby reducing the studios profitability. Once again digital was seen by some to be a way to recoup past years' lost profits. Once again digital is being blamed for an analogue problem.

Have you spotted the vicious circle? If the difference in cost between digital and analogue were reduced, record companies might make more use of digital. The machines would earn their keep and the consumer would get better quality CDs. If the improved quality was used as a marketing tool as it is in the classical world, sales of CDs would increase contributing more profits to be spent on more digital recordings.

Obviously, I have a considerable vested interest in the growth of digital recording but as somebody who had been involved in the recording industry for the last 17 years, I personally believe that digital technology is a significant improvement and should be used. As a consumer, I do not enjoy paying premium prices for second rate merchandise.

The fact is that digital hardware sales in 1986 were more than double the previous year, both multitrack and mastering systems. That's all very well until you start to compare the figures with the analogue equivalents, then you start to realise how slowly the professional side is responding to Consumer Demand for Compact Disc 'Digital Audio' as it says on every CD. It does not say anything about analogue so it seems only honest to mention analogue when its being used. However, rather than admit it, the three letter code is often omitted or, saddest of all, it is often incorrect almost always in analogue's favour. The ultimate example of negative marketing or sheer ignorance, depending on which way you look at it.

There is no doubt this year will see a continued rapid growth of both digital recording and CD. But will it be as rapid as it should be? I rather think not.

A Utopian 1987 would see some of the following things happen.

- Better communication between the studios and the label managers and A & R staff.
- The retail price of LPs and cassettes be increased by at least £1.
- The retail price of CDs to reduce gradually to the £10 mark.
- The various software organisations agree on a workable levy to compensate for all piracy not just DAT. They also drop any idea of spoilers or any other useless and unenforceable solutions.
- Record companies take more trouble in the planning and preparation of CDs. They should consult the producers and artists and work more closely with their CD preparation engineers.
- Record companies to make some effort to find out what digital recording is, even if they can't afford to attend the Digital Information Exchange (DIE) each year.

Chris Hollebhone is senior manager, audio sales at Sony Broadcast. Although based in the UK, Sony Broadcast are responsible for the sales and marketing of professional audio equipment to all of Europe, Africa and the Middle East. The views expressed in this article are purely personal and do not in any way reflect the policy and opinions of the Sony Corporation.

Back Catalogue: Who Cares?

This is a true story: an order came in for a new set of master lacquers for a well known double album by a major band. Four NAB reels of 1/4 in tape accompanied the order; my first reaction was surprise that the tape boxes had American labels as the group was British. Obviously these were not the original masters but as the parent company of the record label was American perhaps the originals were kept in the States. I phoned the company to ask for a set of the existing pressings so as to be able to match the previous cut (which would have probably been the first and maybe attended by the producer, etc). No, it was very difficult to get a set out of the sales stock — the paperwork, etc — so I went out and bought a set from my local record shop and duly set up an A/B test against the American copy tapes. This couldn't be true, after checking that I wasn't playing the tape off the back and that the tones did line up I tried to get the tapes to sound like the original British cut. A moderate match took 6 dB of boost at 12 kHz and 9 dB at 15 kHz to get the tape to sound like the disc. Phone record company office: "OK, we'll telex the States." (This man's being a nuisance.) Back comes the reply: "That's a one to one dub from what we've got." As I knew the group I traced the original 1/4 in masters to the home safe in one of the musician's houses. They A/B'd with the disc perfectly. Tell record company that I'm going to make new copies for USA, as well as new ones for UK production lacquers, etc. Record company clearly irritated by all this time and money being spent or in their eyes wasted.

I don't believe this is an isolated case, in fact I've heard similar horror stories from friends all around the business. The point is, why should a purchaser have to accept an inferior product just because it was released some years or even months back? For that matter why should the artist/producer/engineer have their efforts mangled because it's not this month's release?

First, was it always so? And second are all companies equally guilty? The answer is no to both questions. To answer the first we have to go rather a long way back to the days of 78's on wax. In those days all recording was done direct on to the master wax in the record company's own studio. The wax then went to the same record company's own factory whence a test pressing winged its way back to the studios and artistic departments for approval. Once approved, the master plates would be grown for appropriate production and these would be

Wrong mix, different EQ, missing tapes — everyone suffers when the record company supplies poor quality or inappropriate masters. UK cutting engineer, Sean Davies, takes a look at the problems it can create for all concerned. Here's his story, sad but true

used as long as the disc was in the catalogue. Only if a chain of disasters destroyed all metal masters would a second generation dub have to be made from a carefully preserved original pressing or from a spare positive, and this would be undertaken at the same studio, possibly by the same engineer who did the original recording. So, on the engineering side the buck had very clear stopping places, and not too many of these either. On the artistic side the producers were generally in-house members of the company's staff and would not want to upset their artists by allowing poor quality on to the market. They would be in a good position to check any of the company's products at any time.

Compare this idyllic scene with today's production sequence: a multitrack master tape (analogue, digital, 24- or 32-track), having travelled many miles between studios, been passed many times over many different machines eventually gets mixed down on to 'something' (eg 1/4 in analogue, 1/2 in analogue, Dolby A, telcom C4, Dolby SR, F1 Betamax NTSC or PAL, 1630 U-matic, Mitsubishi 1/4 in digital, etc). The producer will then take this distillation of his dreams to his favourite mastering room, where the diligent engineer (last defenders of quality in this crumbling world!) produces the best possible set of lacquers and perfectly matched copy tapes (for format see above) for distribution all over the world. The aforementioned lacquers are speedily sent by

A moderate match took 6 dB of boost at 12 kHz and 9 dB at 15 kHz to get the tape to sound like the disc

refrigerated transport to the pressing plant (which may or may not have ties, close or otherwise with the record company issuing the product), who will sometimes produce a test pressing. The test pressing may find its way to someone in the A&R dept of the record company who will be able to play it on his office hi-fi and make a careful comparison against the cassette which he received when the mix was done (but before the final decisions were taken in the mastering room).

A similar test pressing might find its way to the producer's home. He's already had to fly off to LA but he did leave instruction for the TP to be sent to the cutting engineer, who may even get it and having found that some nasty things happened in the plating bath he telephones the record company to tell them that a recut must be done. Unfortunately, the release date is three days away, so . . . (see paragraph 1)!

I'm not saying we should all go back to direct on to 78s, obviously the enormous creative possibilities we have today could only occur in the freedom of independent producers, engineers and studios. But compared with the old style quality control, the record which hits the shops nowadays often has the technical parentage of a gang bang in a darkened room.

Oh, yes, we're talking about new product and this article is supposed to be about back catalogue. Well, the A&R man referred to above is far too busy to be concerned with checking back catalogue, so that task falls to the production manager, a very able person who last year doubled the output of the detergent factory for whom he worked before joining the record company. He is paid to ensure that product is available to distributors. He leaves QC to the QC department at the factory, who will check for pressing faults, warps, eccentricity, etc, but not sound quality as they have no reference to work to.

Enter the librarian, in charge of all master tapes. She (we've blamed the men up to now and we mustn't be accused of bias) has an excellent card index system or perhaps a computer in which all titles and artists are cross-indexed against catalogue and matrix numbers.

Let's take a fictitious album from the early 70s *John Doe Live at Holiday Inn*. The album number was AB 456 and a hit single from it was SP80, cut from a separate mix. In 1978 three tracks from the album were included in *John Doe's Greatest Hits*, catalogue No GH 100, including the single, but a copy tape was made from the AB 456 master for all tracks, including the single.

The latest entry in the index for the three titles now shows the number GH 100. In 1983 John Doe succumbed to the inevitable effects of certain substances causing, among other things, a memorial album *We Remember John Doe*, catalogue MA 201. Tapes for this number were ordered by the A&R dept from the library who supplied the first number available, yes GH 100. And so to 1986 when *The Legendary John Doe* appeared on all formats including CD. Yes, you've guessed, the three titles from the live album were dubbed, on to digital of course, from the analogue copies of MA 201. Since the UK master AB 456 was already a 2nd generation copy from USA we now have a fourth generation analogue master being used, plus they still didn't notice that the single was from the album mix.

This fable is based on a true story but truth beats fiction: when in the real case the British office telexed USA with the original matrix numbers from the original issues the American librarian asked "What numbering system is this?"

The tidy minded librarian may well decide to replace the rather scruffy label on the master tape box with a nice clean new one. It covers up all those jottings someone made on the old one, or perhaps the old one can be peeled off and thrown away. Those jottings? Those were the notes regarding EQ settings, level changes and other vital information put there by the cutting/mastering engineer with the agreement of the producer.

Coming to the second question "Are all

The tidy minded librarian may well decide to replace the rather scruffy label on the master tape box with a nice clean new one

companies equally guilty?" the depressing scenario is least likely to happen in those companies which have evolved from the early days. In Britain EMI, CBS and Decca are good examples. Each have internal organisations that cover all stages and the appropriate QC to control every step of production. Indeed, it was difficult to get these companies to accept lacquers cut outside their own cutting rooms until long after the advent of independent cutting facilities. Part of the reasoning was that if an urgent recut was needed, it could take ages to find who had the master tape and to book a recut with the original cutting engineer. Hence the 2nd generation Production Master tape and off we go down the path of losses.

Now it's not just that all the great guys work for the old majors and all the idiots for everybody else but the old studios have one thing lacking in the newer companies: a continuity of freely available technical information. Many executives in record companies have large gaps in their knowledge of the processes of record (inc tape and CD) production. Being in a position of authority they are not inclined to ask subordinates for help of information and without a studio team

to refer to they just have to pick it up as they go along (or until promoted).

Obviously, the first requirement is a course structured for those involved in decisions affecting production. The APRS course at Surrey University is probably too long and too technical but a scaled down version might be the answer. The next problem is to get people to come for the information they need: recent courses in digital techniques have drawn a disappointingly small attendance from the producer/record executive areas. There seems to be a feeling in many record company offices that there is no connection between product quality and sales charts and anybody who tries to push quality is going to cost the company money to no good effect. So why are people buying CD players?

I have heard it said that CD is showing up a lot of faults in tapes that didn't appear on vinyl but I don't agree entirely. The difference is that with CD there is no chance for the production department to vaguely distribute the blame for bad sound around mastering, plating, pressing, etc. With CDs it's 'own up' time: what you get on the disc is what you sent out on your tape and hurt denials will no longer suffice.

A shining example of how back catalogue should be treated is the Roxy Music compilation *Street Life* (Polydor 829 136-2) where a combination of enlightened management and diligent recording (Rhett Davies, no relation!) has allowed all 20 tracks from 1972 onwards to sound their best. ■

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US Mastering Houses meet the Challenge

This decade has become an era of evolution for US mastering facilities. Direct Metal Mastering (DMM) for black vinyl disc and now CD, a growing trend toward keeping projects entirely in the digital domain, and an even greater awareness of the importance of sound quality are part of that evolutionary process, according to a survey of mastering house engineers and personnel in the major US recording centres of New York, Los Angeles, CA, and Nashville, TN.

Mastering houses that for years have concentrated on work for the black vinyl LP format have been forced to face two dramatic events that have changed the complexion of the business in recent years. First, the pre-recorded audio cassette has surpassed the LP in terms of total number of units sold, and more recently, the CD has taken an increasingly larger share of these same shrinking LP sales figures. Yet, despite these two simultaneous evolutionary changes, and the uncertainty over the status of Digital Audio Tape (DAT), major US mastering facilities reported a strong but changing business last year.

"Over the last year, business held steady, but I've seen a definite shift in what record labels are ordering," said Glenn Meadows of Masterfonics in Nashville, TN. "The record labels are heading even more toward the CD. For example, we've recently finished 20 CDs for MCA, and we're averaging 10 to 12 a month.

"At the same time, we've seen a significant drop in the amount of work for the black vinyl disc. I've always been sceptical about the

"I've always been sceptical about the black disc and, from my perspective as a mastering engineer, I now see only 12 to 18 months remaining for it to be a viable medium . . ."

black disc and, from my perspective as a mastering engineer, I now see only 12 to 18 months remaining for it to be a viable medium. DMM is capable of pressing a better LP but after 10 or 15 plays consumers can't hear the difference in sound quality."

Masterfonics has had both disc mastering rooms redone, and Meadows notes that he is adding a Tom Hidley designed mix room that

Over the years the role of the disc cutting engineer has changed substantially. Now, with the arrival of digital, the mastering engineer is adapting to an even more fundamental change. Randy Savicky reports on changes affecting US facilities

will contain a 64-input Solid State Logic *SL 4000* console and one of the first Otari *DIR-900* 32-track digital PD (ProDigital) format tape recorders.

Also in Nashville, at Disc Mastering, Randy Kling noted that the vinyl business had dropped 50% since last year. "We saw business move toward the CD and the cassette, which both did really well for us," he said. "I no longer do that much work in the black vinyl LP format."

Kling is in the planning stages of an expansion program and is awaiting delivery of one of the first of the new Neve Digital Transfer Consoles (*DTC-1*), as is Bob Ludwig of Masterdisk in New York.

Ludwig reported that Masterdisk has been very busy with a number of projects over the past year, most notably the Bruce Springsteen five LP (three CDs) live set. "We've had record months, month after month," said Ludwig. "We've recently expanded by adding DMM: it's almost like opening up a new room. Almost all our major projects are done DMM."

"From my perspective, the life of the LP will be influenced by DAT. If no record companies want DAT, records will continue to sell. Also, the LP will remain viable because of the long turnaround time for CD pressings. It's impossible to get quick promo copies to radio stations unless they're black vinyl. That may ease if all the scheduled new CD pressing plants come on-line."

DMM has also been in great demand at Sterling Sound in New York. "We have seen a great interest in DMM," said Jack Skinner of Sterling Sound. "People are asking for it. It's the state-of-the-art in black disc record manufacturing. From Sterling, we can supply

any plant that is registered for DMM so it's possible to have excellent plating from the first. DMM in itself costs more but its use cuts down the number of steps in the plating process. The total cost is comparable."

Skinner felt that the black vinyl LP will remain a viable format. "The LP will always be around because of catalogue reasons if nothing else," said Skinner. "That's one of the reasons we recently put in our second DMM lathe. People are well-educated about the importance of sound quality and DMM gives it to the black vinyl format."

Tom Coyne, at Frankford/Wayne in New York, added that the CD will exist hand-in-hand with the LP. "I believe that the LP will be around for a long time. There is simply too large a 12 and 7 in singles market that will never respond to the CD format. Also, there are a lot of independent labels that sell a lot of records, but do not have the finances or the ability to get pressing time at CD plants. The growth of CD will continue but I see it reaching a certain point where it will balance LP sales: I believe cassettes will remain at approximately the same percentage as they are now.

"I don't think this trend will hurt the mastering facilities as much as some people believe. The producer still wants to be involved, and the last step is mastering. We also perform necessary jobs, like cleaning up tapes so that the product is acceptable to the market."

In Los Angeles, CA, Steve Hall at Future Disc reported that the facility is running 24 hours a day, seven days a week. "Business has been extremely good," said Hall. "We

"CD is the future but the black vinyl LP will be around for a long time, particularly if the manufacturing time for CDs remains like it is . . ."

recently broke ground to put in another room that will include an extremely custom Neumann Class A cutting system and a Sony *PCM-1630*.

"The CD is the future but the black vinyl LP will be around for a long time, particularly if the manufacturing time for CDs remains like it is. Also, there are so many LP's and turntables in existence, and there are people who have never heard of the CD. Our business is evolving because the mastering formats are changing."

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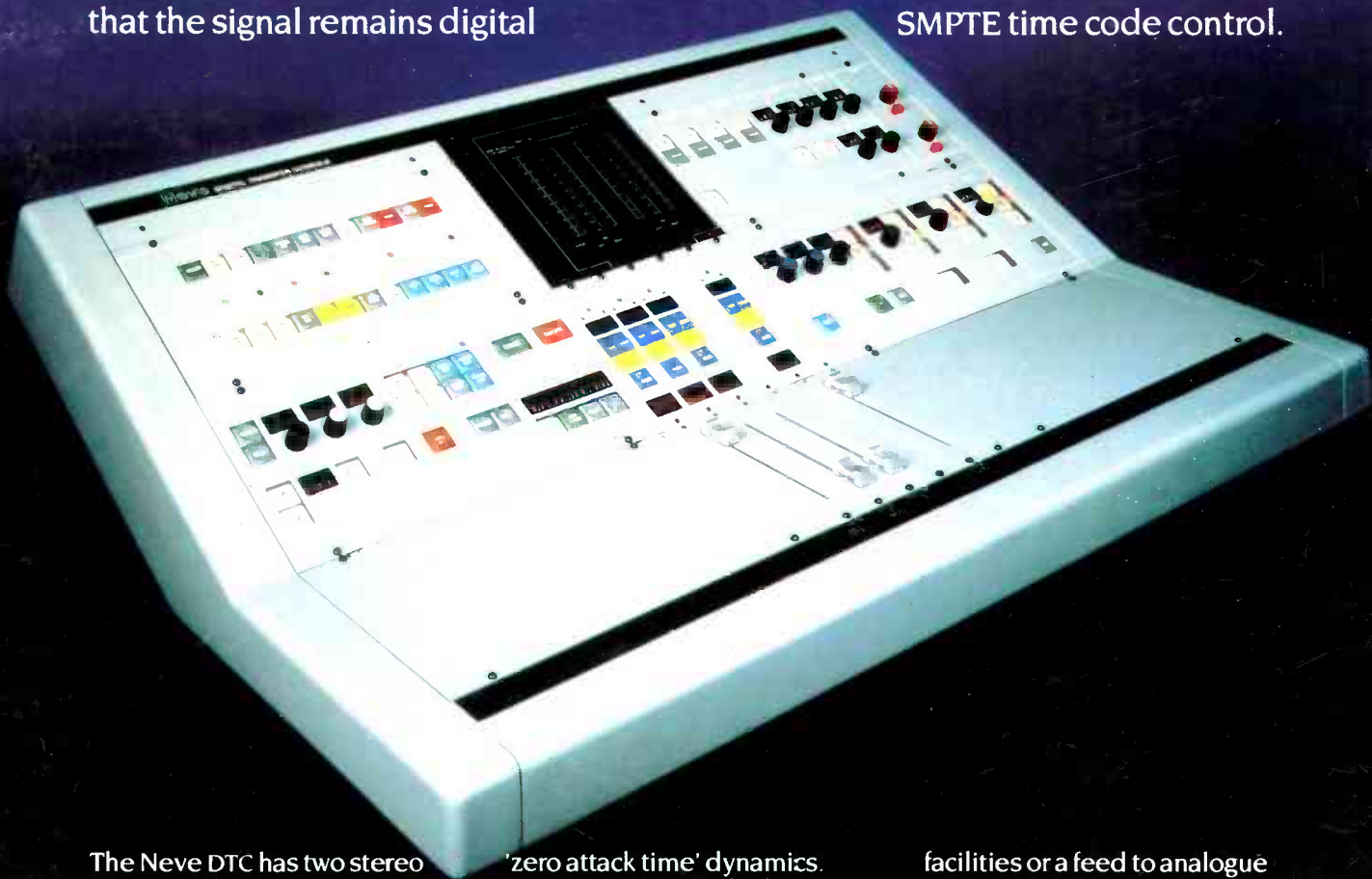
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