

ONE TO ONE

Duplicating techniques

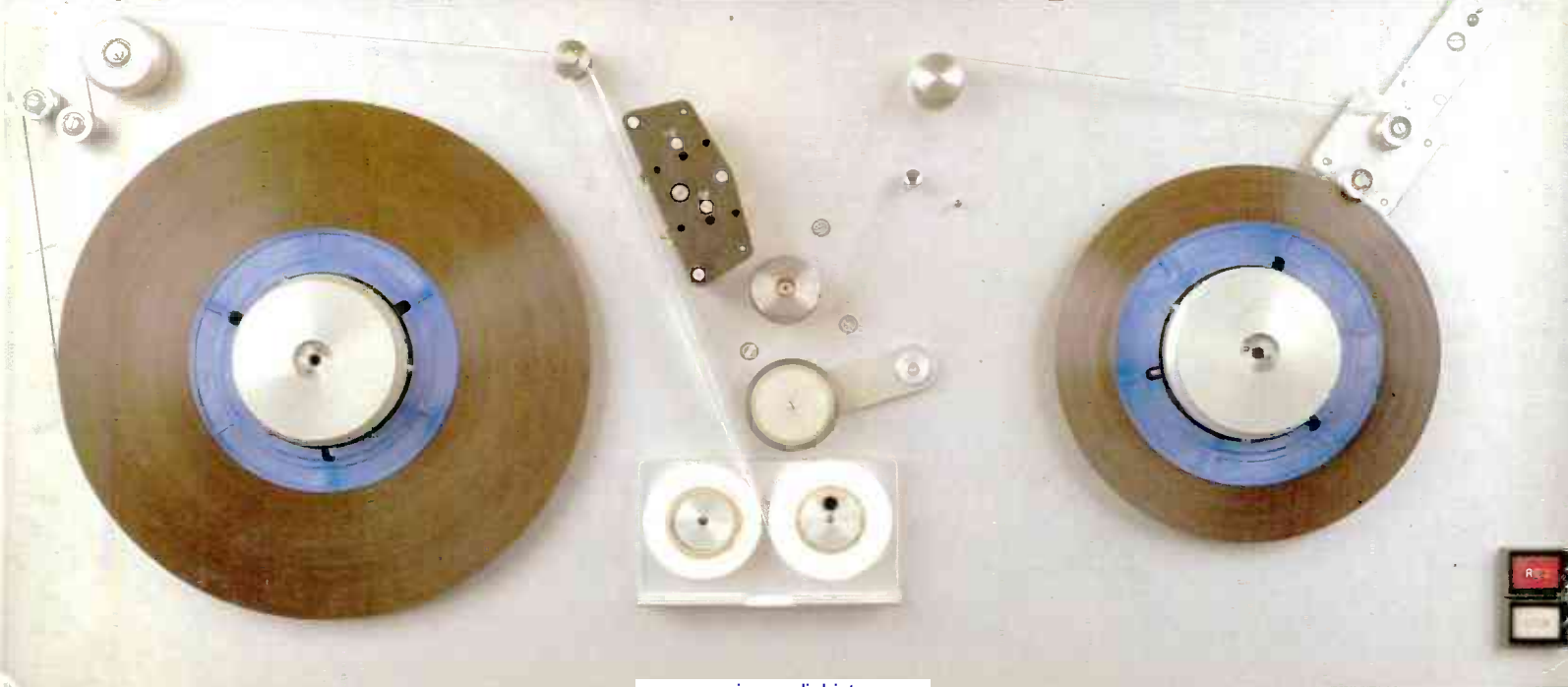
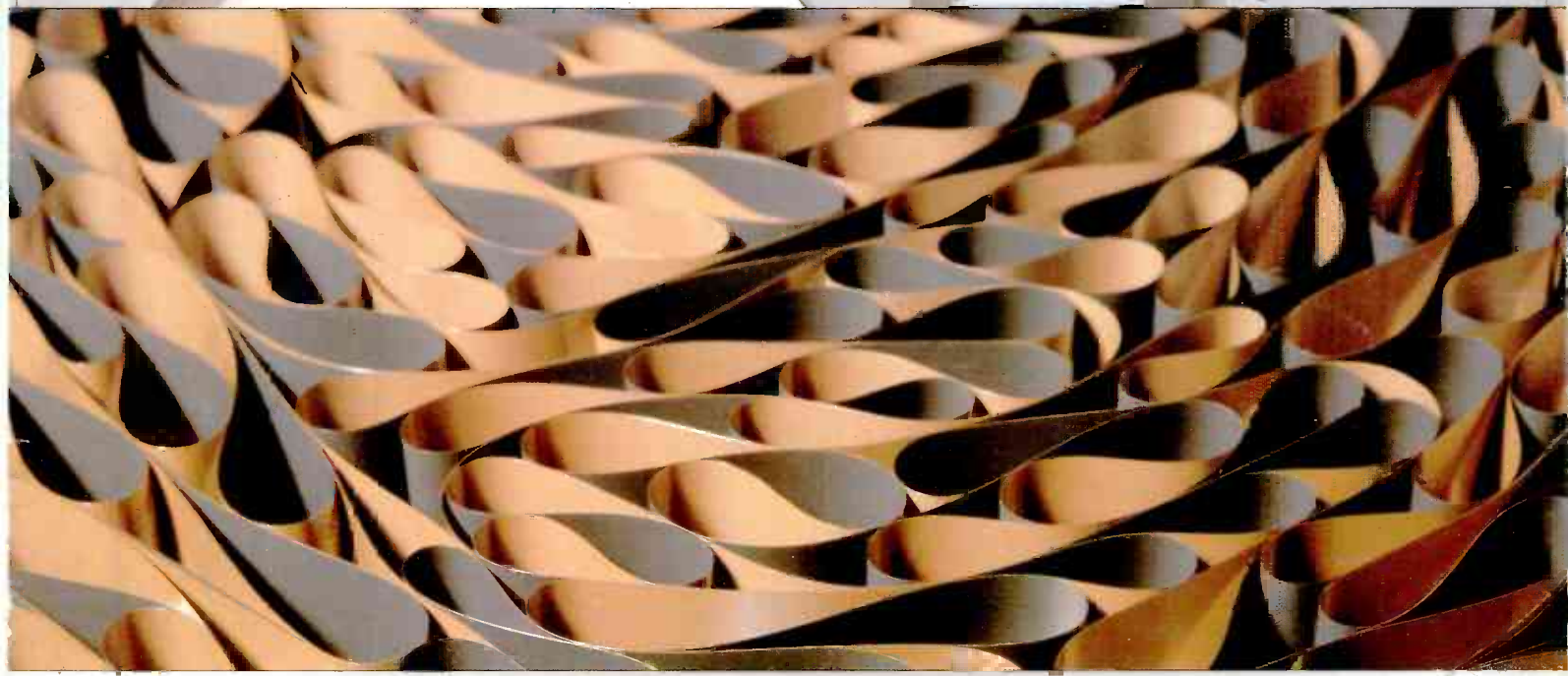
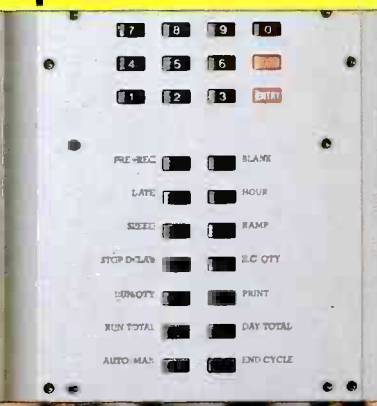
CD in Swindon

Vinyl: Producer's viewpoint

FOR PROFESSIONALS IN MASTERING, PRESSING & DUPLICATING

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October 1986



MASTERS

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ONE TO ONE

FOR PROFESSIONALS IN MASTERING, PRESSING & DUPLICATING

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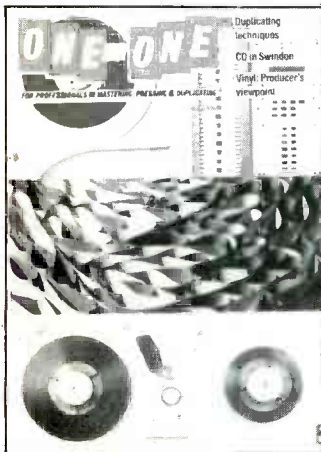
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Photo by Roger Phillips.

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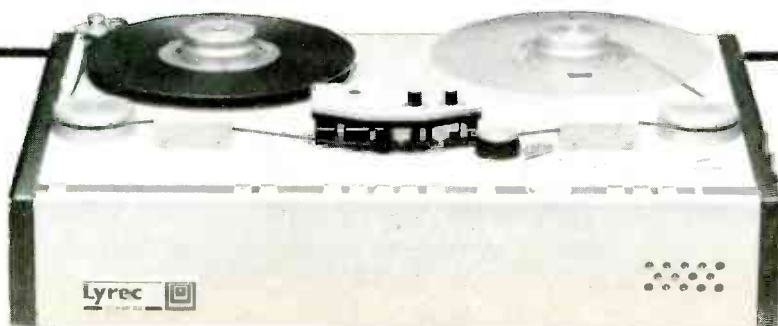


Duplicating at Frazer Peacock (Video)



The TR 55-QC allows you to Q.C. your pancakes faster with no wastage of programme material*

- Bi-directional
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Profit or loss

Anyone who keeps up with computer technology, and in particular the area of artificial intelligence, will probably be aware of developments in 'fuzzy' logic. 'Fuzzy' logic may be new to the computer industry but many of those people who control the record industry have been practising it for years. To sit back and look at the digital audio tape controversy that has raged over the summer, one could easily come to the conclusion that the record industry has gone mad. In a moment of provocation we have been treated to a revealing look at how the top decision makers in the record companies think. This fleeting glimpse is no doubt just the tip of the iceberg, however. The way boardroom moguls have treated the manufacturing industry and the consumer over recent years has been shameful. For these same people to get on their high horse about people's rights (whatever the morality of the situation) really does take the biscuit.

Historically, of course, it was the major record companies that provided the finance and enthusiasm to encourage and develop the record manufacturing industry in the first place. In the earlier days the majority of them were actually hardware manufacturers too. All the great names spring to mind—EMI, CBS, RCA, Philips, Decca, Pye, Capitol, WEA, Teldec and so on. Over the years some have fallen by the wayside, others have closed ranks and, with the exception of just one or two shining examples, all have virtually stopped developing innovative new technology.

The saddest thing of all, however, is that despite valiant efforts from some record and tape plants in trying to maintain quality, the powers that be it would seem have had other plans. Cutting costs to the bone they have squeezed golden eggs from the manufacturing goose for years, and when that wasn't enough they wrung its neck as well. With the investment in manufacturing getting less and less, the eggs get smaller . . . and smaller.

Inevitably, under pressure to make up for lost profits, even more cutbacks have been demanded from the manufacturing side. Everything has to last longer (even if worn out). Everything has to be made more quickly (less time to check it or go back and get it right) and everything has to be made even more cheaply.

The quality slips, the consumer becomes agitated, the returns go up, the profits go down. You don't need artificial intelligence to work that out.

Of course, if you rely on 'fuzzy' logic for most of your decisions you react by saying, 'Profits are down, costs must be cut, returns won't be acceptable, and if that doesn't work we'll close the factories as well!'

Things don't get better, of course: they get worse. In fact, they get pretty desperate for while the record industry moguls have forced the manufacturing side of things to the lowest common denominator, the quality of consumer hardware has improved—dramatically. In fact it has improved so much that many people start wondering just what it is the record companies are up to. Back at the ivory tower the lawyers and accountants pour over contracts and accounts oblivious to the needs of the average consumer. A penny saved is a penny earned.

Wise after the event the idea that CD could actually make money caught the industry's imagination. Yet, no sooner had some record companies got themselves a slice of modern technology than the 'goose-killers' are up to their old tricks, dreaming up new ways to save money. Out with the jewel case, in with cardboard. Justifiable perhaps for a budget one-off but as the record companies discovered, precisely the way to get your fingers burnt when you tamper with the public's conception of value for money.

The average consumer, of course, has long since woken up to the sort of deal the record companies are providing so he votes with his C-60. By the time the news gets to the ivory tower half the world is taping everything in sight. It is extremely difficult to fight back with one hand while the other clings desperately to the edge of a financial precipice.

As things turned out the record companies did pretty well. With a neatly timed blow they managed to encourage a White Paper to be introduced into Parliament. 'If the public carry on taping our records, they'll have to pay for the privilege.' The strategy was excellent. Wheel in the artist and composer whose rights we'll defend to the death and demand their interests are protected. Of course, record companies rarely mention the lower CD royalties many artists get whilst the industry recoups its investment in CD. (I wonder if the tape manufacturers have a legitimate claim for a lower levy whilst developing their new technology?)

So suddenly the record companies are championing the artist against home taping when silently almost out of the blue comes DAT. It couldn't have come at a worse time and the news causes total panic in some quarters.

Even without a machine in sight there are EEC Commissions and deputations to Washington, The Patent & Trademark Office, the Bureau of Economic Affairs, the Berne Convention is cited and God knows what else. The (over) reaction has been incredible which is perhaps a little understandable when the record companies who fought so hard to win a tape levy (and are very near to succeeding) have just given the public a 'right-to-record' charter.

What more does DAT need to succeed when the record company accountants and lawyers have provided the main reason for needing DAT, provided the best publicity send-off a new format could wish for and to cap it all thrown in a recording 'licence' to boot? Gentlemen, I take my hat off to you, you certainly don't do things by halves.

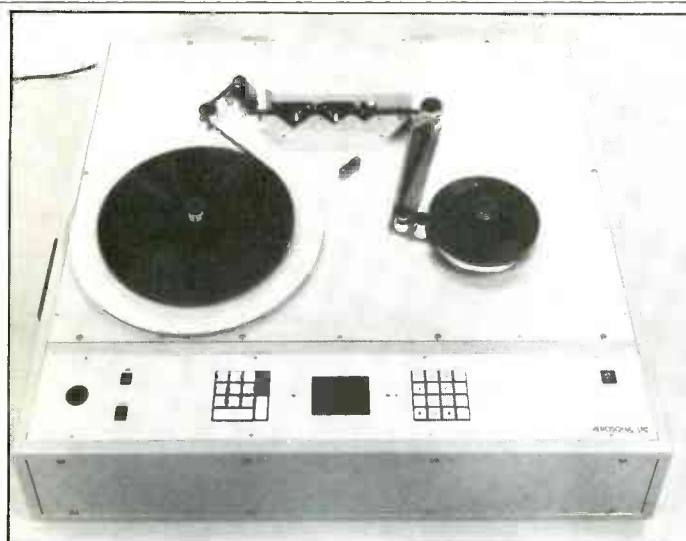
DAT does threaten the record industry but only because of the way the powers that be have decided to structure the industry to be totally vulnerable to new technology. New and innovative developments won't go away simply because the record industry moguls say so. If the price and quality is right the consumer demand will follow. And DAT certainly won't be the end of the road as far as digital is concerned. The development of the wheel didn't stop with the ox cart. It won't be long before the consumer could well expect all new things to be digital and the list may well include televisions, radios, videos, amplifiers, in-car units and personal stereos. Are we to be pioneers or should we re-introduce the wax cylinder in order to save even more money?

It is time the decision makers started doing some hard, clear thinking about where they are taking us. We no longer live in the Dark Ages. Isn't it time the record industry went out and found out what the *consumer* wants. It's time to quit the ivory tower and stop trying to block progress at each and every opportunity. Promote quality in all formats. Invest in all manufacturing opportunities. There's still the chance but it won't be there for long.

You're too vulnerable with just one tiny golden egg in a CD basket. The only way to determine the future of DAT (and digital in general for that matter) is to have a controlling or at least a vested interest in it. Stamping your feet and throwing a fit does nothing but show how vulnerable you are. And in the meantime the real profits will go elsewhere.

In the words of that immortal accountant in the sky (definitely not employed by a record company), qui non proficit, deficit—he who does not advance loses ground.

Carl A Snape



Aerasonic 8 mm pancake tester

Aerasonic has produced an 8 mm version of its VHS reel-to-reel evaluation transport thus allowing 8 mm pancakes on standard NAB hubs (or cassette spools) to be tested under precise controlled conditions without the need to load tape into cassettes. For production testing this removes the need to generate short lengths loaded into cassettes.

The unit features a precision pack arm arrangement and the transport is computer controlled with keyboard programmable tension during spooling and 'play'.

Automatic test sequencing is provided with a remote control option via a serial or IEEE interface.

The unit uses a standard Sony video/audio transport mechanism mounted so access for servicing is optimised. All standard inputs/outputs from the cassette deck are provided along with buffered outputs from the video/audio processing stages. Servicing is via a network of agents worldwide.

Aerasonic Ltd, Unit 9, St Giles Technology Park, Pool Road, Newtown, Powys SY16 3AJ, Wales, UK. Tel: 0686 27355.

Kopex Cable-jacket anchor

Kopex International has introduced a new method of terminating cablejacket ends which is resistant to almost all chemical agents, fuel lubricants, hydraulic fluids, solvents, many acids, salts and alkalis. Supplied in a choice of three grades to suit different temperature environments, Kopex Cablejackets are available in widths from 3 to 40 mm.

The new Cablejacket anchor which is manufactured from 100% nylon provides a quick, simple and efficient means of securing Cablejacket ends. Available in a range of metric sizes the anchor ring is simply inserted into the Cablejacket end and the ring pulled into place.

Kopex International Ltd, 189 Bath Road, Slough, Berkshire SL1 4AR, UK. Tel: 0753 34931.



Asona 2015 winder

The Asona 2015 winder features a rotating splicer head for high-efficiency audio cassette production. The splicer, which enables most of the reciprocating parts of the conventional splicer to be eliminated, requires no maintenance or adjustment.

The action is similar to a turnstile with the tape being conveyed smoothly to the cutting and stamping area. Time losses due to braking and direction changing are thus absent from the duty cycle. Gentle tape handling during acceleration and braking is controlled by specially designed control electronics. The 2015 is self contained and operates on standard mains power. No

compressed air or external vacuum systems are required.

Approximate production rates per hour are C-30 300; C-60 180; C-90 130 and C-120 110. Minimum cassette loading lengths are 10 min per side with no minimum for blank tape. A 1 s cue tone (4 to 7 Hz at 1 1/8 ips) is required and cue tone cutting accuracy is claimed to be ±1 ft with adjustable cue-stop point Cue Delay control. Counter accuracy is 50 cm (20 in) and the unit can be used with either 14 in reels or pancakes, NAB hub or spindle.

Avis-Asona GmbH & Co KG, Bahnhofstrasse 60, D-7634 Kippenheim, West Germany. Tel: 7825/1068.



Tascam 112R cassette recorder

Tascam has introduced an auto reverse stereo cassette deck suitable for realtime duplicating. Designed for heavy duty use, the 112R is designed for rack mounting and features Dolby B, C and HX-Pro headroom expansion. The unit has front and rear inputs, and a large, clear cassette door for easy cassette viewing.

Of interest to realtime duplicators is the remote control socket which provides 'tally out' information to drive further machines. The

112R can be arranged to control several machines either to play continually all day or to act in a slave/master configuration for duplication use. According to the manufacturer, using this new remote system, sophisticated computer controlled tape system can be created for a broad range of applications. A studio mastering version—the 112—is also available. **Harman (Audio) UK Ltd, Mill Street, Slough, Berks SL2 5DD, UK. Tel: 0753 76911.**

Thermax micro labels

UK company Thermographic Measurements has introduced a range of temperature sensitive labels suitable for a wide range of applications. The Micro label range measures 10×3 mm yet contains four discrete temperature elements. Accuracy is claimed to be ±1°C to 100°C and ±1% thereafter. Response time to temperature change is 1 s and results in an irreversible contrast change on the temperature strip.

Micro labels can be used on

electronic components or production equipment and are impervious to oil, water and steam. The range extends from 40°C to 224°C in nine standard temperature groups. Labels are available ex-stock and special configurations can be made to customers' requirements.

Thermographic Measurement Ltd, Bank House, Neston Road, Burton, South Wirral L64 5TA, UK. Tel: 051 336 5676.

Digital Mastering Rentals.

HHB are pleased to announce that they've re-equipped their digital rental service with the new Sony PCM 1630 processor and the purpose-built DMR 2000 recorders.

The PCM 1630 is the successor to the PCM 1610 and maintains the CD format compatibility which has made Sony the undisputed digital masters.

The PCM 1630 employs a superior 'oversampling' technique, resulting in even greater sonic accuracy, and the metering has been improved now giving essential 'over' and 'peak-hold' indication.

The DMR 2000 is the first U-matic recorder specifically designed for digital audio. Among other advantages of this machine are an integral fast-reading time-code generator/reader, which allows assembly of a continuous stripe, and self-cleaning heads.



Another new service – often free of charge – is the use of Sony's tape analyser DTA 2000. This employs the status port of the PCM 1630 to provide a print-out of errors vs. time, thereby removing one of

the uncertainties of the older systems.

These new machines, with the DAE 1100, form the heart of the digital mastering service that has made HHB leaders in the field.

Economic access to all this is afforded by a variety of interfaces that allow two-way digital communication between



the 1630 and the lower-cost PCM F1 and 701ES, thus significantly reducing post-production costs.

Not only do we supply and install mastering and editing systems where you want them, but we also provide full editing and copy facilities in-house, with skilled operators if required. Of course, this is backed up by HHB's trusted support service, with experienced Sony-trained engineers on 24 hour call-out.

By the way, it is not just our rental service that has expanded – we are now authorised Sony Broadcast dealers, handling their full range of digital and analogue products, as well as the lower cost processors.

And don't forget that we can also supply full studio installations, multitracks, consoles, video systems, signal processors, amplifiers, monitors..... in fact anything you need

For digital rentals, contact Richard Kershaw on 01-961 3295.

SONY[®]

FROM



Adrenalin buy Linguaphone plant

Adrenalin Records Ltd has successfully purchased the record manufacturing division of the Linguaphone Institute, the UK language course specialists.

Adrenalin Records has been formed by former Magnum Music Group MD and current Nightflite Records Ltd MD, Adrian Owlett, and music and recording personality Len Hawkes of the '60's hitmaking group The Tremeloes.

According to Hawkes, "In January this year I was fortunate enough to learn that this commercially very interesting record manufacturing plant might be available as a result of the Linguaphone management buy-out team rationalising their scope of operation in order to concentrate on making cassettes which are now the standard carrier for language courses. I approached Adrian Owlett, a music industry 'veteran' who I later learned had himself been seeking a suitable plant for acquisition. Linguaphone seemed ideal because of its convenient location in Slough coupled with an excellent customer base from which to expand."

With the not inconsiderable help of the Berkshire Enterprise Agency, Hawkes

and Owlett set about a detailed feasibility study which culminated in the final purchase in June.

"I have been making records from the other side of the desk for quite a while now," notes Owlett, "and can see great potential in aggressively marketing the almost unequalled facilities available at the Linguaphone plant. So much record pressing has been placed with Continental plants over the last three or four years it's about time someone began to redress the balance and snatch the work back—and keep it in the UK. That's what we intend to do and we can only do it by offering a better, faster service than that currently on offer."

The new Adrenalin plant in Slough—currently manufacturing up to 100,000 12 in and 125,000 7 in records weekly—will maintain its current staffing levels for the time being but plan to employ more staff later in the year to cater for the planned increase in production. The plant will be offering a full tape-to-disc service in all formats—7 in, 10 in and 12 in—in black or coloured vinyl, picture discs and shaped discs, together with a full sleeve/label production service to customer requirements.



Koch CD plant on stream

Earlier this year Koch Records, an Austro-West German enterprise, announced its successful entry into CD production and manufacturing. Franz Koch, the proprietor, founded Koch Digitaldisc GmbH in 1983. The plant which is based in Elbigenalp in the Tirol began the first test runs towards the end of 1985. This was followed by a six month pilot programme which is now completed.

The company can offer a complete in-house service including CD pre-mastering, pressing, labelling and packing. Koch Digitaldisc currently operates four moulding presses and the

output for 1986 is estimated to be in the order of 2 million pieces. In 1987 production is expected to be increased to around 3.5 million. The company plan further expansion and already run a three shift, 24 hr operation.

Capacity is currently divided between in-house CD releases (Koch Records International) and outside clients, the latter accounting for some 80% of the total production.

For further information contact Haakon Drenner, International Manager, Koch Records International GmbH, Elbigenalp 91/Tirol, Austria 6652. Tel: 05634/6444(5). Telex: 5581.

Digital Information Exchange '86

The Digital Information Exchange seminar is to be repeated in November 1986 with an even more ambitious programme than last year. The seminar which is to be held at the Private Members' Suite at London Zoo on November 25th, 26th and 27th, will include such topics as R-DAT, AMS's *Audiophile*, Digital VTR, the all-digital studio and some wider applications of compact disc. There will also be updates on the international progress of CD and news from the digital recording scene in the USA. On all three days the opportunities for 'hands-on' sessions with a wide range of new equipment is also scheduled. The series is sponsored jointly by Sony Broadcast and HHB Hire & Sales in association with *Studio Sound* and *Pro-Sound News*.

While sharing a common theme of digital processing,

the three days are aimed at managers and engineers working in three different—but related—disciplines. Day One (Nov 25) deals mainly with digital audio in a broadcast environment, with special emphasis on the use of digital audio with video. Day Two (Nov 26) is aimed squarely at recording studio engineers and record company production managers, while Day Three (Nov 27) concerns itself with the applications of digital audio in scientific research and data storage.

Charges for attending the Digital Information Exchange have been geared to cover the cost of staging the event and providing a buffet lunch and refreshments on each day. The cost of each daily session is £50.00 plus VAT, although a special rate of £120 plus VAT has been fixed for those wishing to attend all three days.

DMM processing at PR Records

On June 26th, PR Records in Wimbledon signed a contract with Teldec for DMM metal processing and mastering. At the signing were Phil Race, MD of PR Records; Rolf Kossak of Teldec; Ray Young, works director PR Records

and Werner Wahl of FWO Bauch, Teldec's DMM representatives in the UK. This is the second pressing plant in the UK to handle DMM masters, EMI of course being the first.

Asona news

Details of the new semi-automated 2015 winder has now been finalised and orders for the new unit (and the new 301 twin slave unit) are being accepted. A preliminary leaflet is now available and the price list has been extended to include additional items that can be ordered as accessories. The special offer scheme will no longer be available after September 30th, 1986.

The original 105 ft lengths of slicing tape for winders is no longer available. New

splicing tape is available (for 2005 and 2015 winders) in 150 and 250 ft lengths.

Some customers have complained that the use of trichlorethylene in the Asona labelling device causes certain types of shells (depending on the plastic) to bulge. Asona continues to recommend the use of Unital-Fe which they distribute. Perchloroethylene, which is used in the dry-cleaning industry, can also be used without causing damage.

Anti-piracy in the UK

Many of the pop music cassettes sold by street and market traders are very far from what they appear to be according to the BPI. They are counterfeits, carefully got up to look enough like the real thing to satisfy passing customers, who are chiefly attracted by prices less than half that they would pay in a shop. These fakes—usually of very poor quality—are the work of illegal tape counterfeiting rings, and the counterfeiters are committing a serious offence.

The seriousness is underlined by the trend towards criminal prosecution of makers and suppliers of counterfeit cassettes; and by the increasing severity of penalties imposed. In June the first case involving criminal charges of conspiracy (to make, distribute and apply a false description to counterfeit tapes) was heard at Southwark Crown Court, and resulted in a two year jail sentence for an Islington man. In August the first such case to be committed to the Old Bailey was tried. The defendants, all from Essex, are Anthony Robinson of Rainham, Frederick Cockburn of Dagenham, and Mark Stevens of Chadwell Heath. The charges cover conspiracy to make counterfeit tapes, to sell them, to induce the public to accept them as genuine, and

to supply goods with false trade descriptions (brought under the Forgery and Counterfeiting Act, the Copyright Act and the Trade Descriptions Act).

The trial opened on Monday August 4th, and because of lack of space at the Old Bailey (due to closure for refurbishment) the unusual step was taken of hearing a criminal case at the Royal Courts of Justice (High Court) in the Strand.

The UK record industry has for more than a decade maintained its own full-time Anti Piracy Unit, as part of the BPI, to investigate the activities of cassette pirates and take civil action against them under the Copyright Act. An amendment to that Act in 1983, coinciding with a tendency for cassette pirates to be additionally involved in other types of serious crime (forgery, for example) has encouraged police prosecutions, and the BPI's Anti Piracy Unit regularly works in close co-operation with the police and with Trading Standards Officers all over the country.

It is as a result of the BPI Anti Piracy Unit's efforts that the level of commercial tape piracy in the UK is one of the lowest in the world—while in some other countries counterfeiters have all but destroyed the local legitimate music industry.

Do they know something we don't?



Realtime at loopbin costs

A new realtime duplicating operation has been formed in the UK which claims to offer realtime tape duplicating at loopbin prices. Clone which has recently opened a new factory in County Durham is using, according to MD DW Lawrence, "... banks upon banks of specially calibrated, modified and scrupulously maintained Nakamichi 300s."

Initial capacity is 20,000 cassettes per week and Clone is claiming to set totally new standards in audio quality

and packaging. The sampling of every cassette is standard procedure.

After an analysis of all aspects of conventional cassette product Clone reached the conclusion that software no longer realises the potential of even the new budget cassette decks or in-car units.

Clone, Unit 13, Furnace Pit Industrial Estate, Shildon, Co Durham DL4 1QB, UK. Tel: 0388 772904/773110. Telex: 58500.

Studio 301 suspends custom pressing

EMI's Studio 301 in Australia has suspended their custom pressing operation. The suspension of the custom record division, which has been responsible for a large number of pressings for individual artists and small labels over the past seven years comes as a result of a shortfall in manufacturing capacity at the EMI Homebush plant.

Studio manager, Martin Bengel stressed that the suspension was only temporary and he hopes to reinstate the custom record division at a later time. "Custom records have been an important adjunct to our

operation as a full service studio and has been responsible for launching the careers of many Australian artists who either made their first record, formed a small label or were signed to indies who pressed their product through us.

"We want to make sure this tradition continues but at the same time we have to offer a standard of service that equals the standards we maintain within the studio complex. All our custom disc cutting and tape mastering, however, will continue including direct metal, digital and XDR cassette mastering."

KPM go DMM

KPM Music, one of the world's major recorded music libraries, is to introduce DMM pressings for all future releases. In spite of the fact that KPM claims to be the first library to release material on CD (back in November 1984), the vast majority of library music is still nevertheless sourced from vinyl pressings. With the high recording quality offered by digital, KPM felt it important to retain the highest level of quality right up to the final transfer.

KPM Music director Peter

Cox explains, "The move to DMM is a natural development of our policy to offer users of KPM library material the very highest quality on vinyl in parallel with our programme of compact disc releases. We are confident that users of our music will notice the difference immediately. We are also considering re-releasing some of our earlier material on DMM."

KPM's DMM discs are cut at Abbey Road Studios and pressed at the EMI plant in Hayes, Middlesex.

Burlington distribute IPS

The New York manufacturer and distributor of mastering and duplicating supplies, Burlington Audio/Video Tapes, is to distribute IPS audio cassette shells. IPS shells are stocked in both five screw and sonic weld types and all colours will be available with either tabs in

or out. A smokey transparent version with gold discs is also available.

Burlington will target loaders and duplicators whose requirements are below 15,000 shells per order. For a free catalogue call (516) 678-4414 or 1-(800) 331-3191 (Toll Free).

Early this year eleven scientists from the UK, the Netherlands and the USA who have made outstanding contributions to the science of opto-electronics were awarded three joint prizes totalling £115,000 by the Rank Prize Funds.

Among the prize winners were three research scientists from Philips Electronics in Eindhoven—Dr Pieter Kramer, Dr Klaas Compaan and Mr Gijs Bouwhuis, who pioneered the work on optics which resulted in Philips' invention of the 12 in Laservision video disc and subsequently the compact disc. Philips had to develop brand new technology with no direct precedents in order to create the wear-free discs.

In his speech of thanks Dr Kramer stated, "Ideas like an optical disc need a proper environment to grow: a large multi-disciplinary research organisation, expertise in a number of technological areas and a spirit of entrepreneurship, both technical and commercial. One needs also perseverance and some luck, because gambling is unavoidable. We did not need so much perseverance, because it was a nice, friendly and converging subject. And we

Awards for Philips CD scientists

had some luck."

At the end of the sixties a small group of scientists at the Philips Research Laboratories in Eindhoven opened up a new field of study. The basic intention was to record image and sound signals on a disc in such a way that the information could be read without contact using laser light. The award-winners invented the techniques required for this. This entailed devising both the complete opto-electronic system and the reproduction techniques for the discs.

Ultimately this work led to the development of three areas of application.

In the first instance research was devoted to the recording and reading of video images. As early as 1972 the first public demonstration in the world was given with a video disc, which was to become known as LaserVision. Further research and product development led to the introduction of LaserVision in the United States in 1978 and in Europe in 1982. In that period the optical disc system had to face strong competition

from video-tape recording, as a result of which consumer use of the optical disc was initially rather limited. The early eighties saw the start of a revival of the system as a consequence of interactive professional applications.

In the mid-seventies the importance of the opto-electronic system for a new audio medium emerged. Using the same technology it was possible to record 60 minutes of music on a small disc and due to the use of digital coding the resultant sound was of a very high quality. Since 1983 this Philips invention, under the name of Compact Disc, has taken off in a dramatic way.

A third application, which has arisen from the research into opto-electronics, is the recording of digital data for the electronic office. Digital optical recording offers spectacular possibilities for data and document registration. On the basis of this the Megadoc system has been designed for the large-scale filing of information. Research of recent years concerns the writing of data and the subsequent erasure of information at will. Philips research is currently studying various materials for this.



Owners Fiona Horman and Martin Pullan with technical director Brian Horman

Eldorelt acquires cassette duplicator

On June 3rd 1986 Eldorelt Pty Ltd, Melbourne, Australia, announced that negotiations have been finalised with Regent Traders Pty Ltd for the purchase of Regency Recordings cassette duplicating business.

Regency Recordings have been providing a cassette duplicating service for three years and customers currently include Mattel toys; National Broadcasting Commission of Papua, New Guinea; Bill Armstrong Organisation and EON-FM.

A wide range of services will be offered from large quantity high speed loopbin, cassette-to-cassette and realtime duplicating to manufacture of special length wound blank cassettes. The Otari duplicators will be retained and Agfa-Gevaert equipment will be added. Two extra slaves will be added to the current loopbin master/five slave system enabling daily output to be increased from 1,000 to 1,500 C-60s. It is also intended to add a labelling machine.

Disc cutting courses

Tam Studio is offering two types of disc cutting courses to interested parties. The *Introduction to Disc Cutting* course is basically designed for studio engineers, producers and plating and pressing personnel who may not necessarily have any previous knowledge of disc cutting. The course includes simple theory, hands on experience together with practical information relating to the particular needs of each participant.

The two-day courses start at 10 am and finish at 4 pm and include lunch, general notes and two practice

lacquers.

Cutting—Theory and Practice is for would-be cutting engineers requiring more theoretical knowledge and information than they would otherwise necessarily get from on-the-job training. Setting up and general maintenance are covered including information on equipment possibly unfamiliar to participants.

The courses last three days and include lunches and photocopies of relevant manuals where applicable. **Tam Studio, 13A Hamilton Way, London N3 1AN, UK. Tel: 01-346 0033.**

Electro Sound to distribute TTL

Electro Sound Inc has become the sole sales agent for TTL USA. ESI manufactures audio tape duplicating equipment and will represent TTL's automatic cassette loader, tape twist detector and cassette stacker stamper.

"We feel TTL's cassette

loader and accessories are a natural adjunct to our duplications systems," says Mark Nevejans, ESI's sales vice president, "and will find wide acceptance within our growing customer base."

There are currently plans to include the video loader.



The Choice of Quality Duplicators



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The Gauss 2400.

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A combined master and loop bin in a single unit. A system designed from the ground up to operate reliably for tape speeds of up to 480 ips.

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Distance Teaching

Thailand's Sukhothai Thammathirat Open University (STOU) and Electro Sound Inc, manufacturer of audio duplicating equipment, have effected an equipment and knowledge exchange which benefits more than 200,000 Thai students in an innovative programme: Distance Teaching.

The Bangkok based university uses printed texts, radio, television, and video and audio cassette tapes to reach its students and will manufacture on campus more than 1.2 million audio cassette tapes each year using ESI duplicating systems.

The university's A/V centre director, Saroj Nildam, and technical director, Wiriya Wonglaohakul, received hands-on instruction at Electro Sound's California headquarters. They were joined by Wandee Khunchornyakong, general manager of Datron Thai Co Ltd, and Vidya Suvanich, Bangkok's Electro Sound technician for the week long course. A tour of a fully integrated tape duplicating plant concluded the formal sessions.

Thailand, racing to reach educational par with more technically advanced nations, has developed this Distance Teaching method. There are no conventional classrooms or lectures but professors are available for tutorial help and examination tests and individual evaluation of students' performances are given. This approach encourages higher education degrees despite the work schedules and time conflicts which the students have.

Bob Barone, president of Electro Sound said, "We've been trying for years to

expand the use of tape duplicating in education and now we're really making progress, especially in Asia. In the past couple of years we've sold duplicating systems to universities in China, India and Thailand. I hope universities in America will also recognise the effectiveness of educational audio cassettes and adopt them as an integral part of their teaching programmes."

Professors Nildam and Wonglaohakul stressed budget benefits using the Distance Teaching approach. Eliminated are lecture halls, classroom furniture, faculty instructors to teach each class daily, and support services costs. Gained are students across the nation with a curriculum designed to raise literacy and education for this catch-up generation and succeeding ones. Media reproduction represents the largest budget outlay for STOU cost projection analysts. The use of Electro Sound 8000 high speed pancake duplicators and 1850 cassette loaders has enabled the production facility to generate large audio tape cassette runs on short deadlines at a low unit cost. STOU also manufactures audio cassettes for several smaller universities in Thailand.

The audio cassette direction is not limited to strictly Asiatic nations, notes Wichit Srisa-an, STOU rector, who said, "The cost of audio cassettes has fallen dramatically and they now offer a real alternative to the printed word. Australia has been quick to recognise this and use it: no fewer than 70% of their programmes now use audio cassettes."

Stanley distributes Transco

Transco Products Corp, manufacturers of master recording blanks has appointed Stanley Productions as distributors of its products in the UK. Situated in the centre of the London recording industry, Stanley Productions will be offering a same day service on the full range of 7, 12 and 14 in lacquers.

In addition to Transco products Stanley Productions

carry a complete range of products for the recording industry including the JVC digital mastering system, Ampex, Agfa and BASF tape, audio cassettes, spools, boxes, editing equipment, splicing tape and accessories.

Catalogue and price lists are available from John Rooke, Stanley Productions Ltd, 147 Wardour Street, London W1. Tel: 01-439 0311.

Shape Optimedia moves CD production

Shape Optimedia is to relocate its compact disc manufacturing plant during the third quarter of this year. The former ComputerVision facility, located in the South Sanford Industrial Park in Sanford, Maine, is four years old and has a total of 100,000 ft² of space. Shape is leasing the facility from ComputerVision with an option to buy. The new facility sits on a 23 acre site which provides for future expansion. Architectural and engineering work commenced earlier this summer.

The new factory will enable Shape Optimedia to reach its production targets of 20 million discs per year by the end of 1987 and 40 million discs per year in 1988. The

facility will also allow the company to expand the range of services it offers with new mastering and packaging facilities. Several hundred employment opportunities will be created by the end of 1987, according to Shape.

Since it was founded in November 1985 the Shape pilot CD facility has been located in the research and development building in Kennebunk and in May this year the company shipped its first commercial order, *Ancient Beauty* by Do'a for Rounder Records of Cambridge, MA.

William Peck, division manager expects a smooth transition during the move without a break in production.



Shape Video expansion

Shape Video, the largest independent manufacturer of VHS video cassettes in the US, officially begins construction of its expanded video manufacturing facility at Meadows Lane in Kennebunk, Maine. The 83,000 ft² addition to the existing 70,000 ft² will double production capacity to 70 million units per year. It is currently estimated that the new facility will be completed by the end of November and that production will begin by December 15th.

"The expansion of Shape Video will enable us to upgrade and consolidate our video operation making it faster, more efficient and more cost effective," says Paul Gelardi, chief operating officer and former president of Shape Video. "The manufacturing equipment in the new facility will have a more sophisticated level of integration than the current facility." Approximately 125 additional employees will be

hired for manufacturing and technical positions in the new facility.

Shape Inc, the parent company of Shape Video, manufactures video and audio cassettes on an OEM and contract basis using fully automated processes which include injection moulding, assembly, loading and packaging of the cassettes. All the injection moulds, assembly automation, tape winders and material handling systems are also designed and developed by Shape Inc.

Shape Video also manufactures and sells private label video cassettes and the private label programme enables the company name to be imprinted on the sleeve of the Gold and Silver Standard VHS tapes. The company began manufacturing video cassettes in 1980 and production capacity has doubled every year since then.



Philips Sony CD-I specifications

Philips and Sony have published the provisional CD-Interactive media system specifications. The provisional 'Green Book' provides a complete format for the interactive use of CD-ROM and follows the 'Yellow Book' of physical format specifications released in May 1985. The 'Yellow Book' laid the groundwork for storing character and graphic information on optical discs.

With the 'Yellow Book' specification a CD-ROM drive can act as a computer peripheral for business use. Information stored on the CD-ROM disc can be retrieved by personal

computer. The CD-I system does not require the support of a floppy disk. The CD-I player, which contains its own intelligence, will be a stand alone unit suitable for audio and video as well as text and data applications.

CD-I specifies how various types of information on a compact disc are identified, how each type of information is encoded and how tracks, files and records are laid out on the disc.

To avoid confusion in the marketplace caused by non-compatible systems Philips and Sony participated in the High Sierra Group with 12 other corporations active in

CD-ROM development. In harmonising the file system of CD-ROM and CD-I Philips and Sony have completed a CD-I specification which

incorporated the joint efforts of the High Sierra Group and the CD-I Group to ensure that a CD-ROM disc will be playable on a CD-I player.

MJA launch Monitor By Mail service

Mike Jones Associates has developed an interesting method of assessing and aligning analogue and digital recording systems, which form the basis of two economical high-tech support services now available to the recording and duplicating industry.

The first involves the use of microprocessor-controlled test instruments, in conjunction with normal or proprietary calibration tapes, to align analogue or digital recording and duplicating systems to international standards—in a fraction of the time taken with conventional methods.

The second—for all sectors of the industry—is a unique 'monitoring by mail' service enabling recording systems, including high-speed duplication systems, to be regularly, accurately and economically checked to

maintain optimum quality output.

From specially prepared master tapes supplied by MJA, copies and duplicates made on the system under test are returned to the consultants' laboratories. Sophisticated instrumentation is used to measure the copies against the original master and results (in abridged or detailed form as required) are swiftly returned to the client.

Because it is not necessary for MJA personnel to be present each time a system is tested, the service is claimed to be an extremely cost effective option for essential monitoring on a regular basis.

**MJA, 500 Chesham House,
150 Regent St, London
W1R 5FA, UK.
Tel: 01-439 6288.**

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simplicity. And Master Transports capable of driving up to ten slaves 24 hours a day under minimum supervision from unskilled operators.

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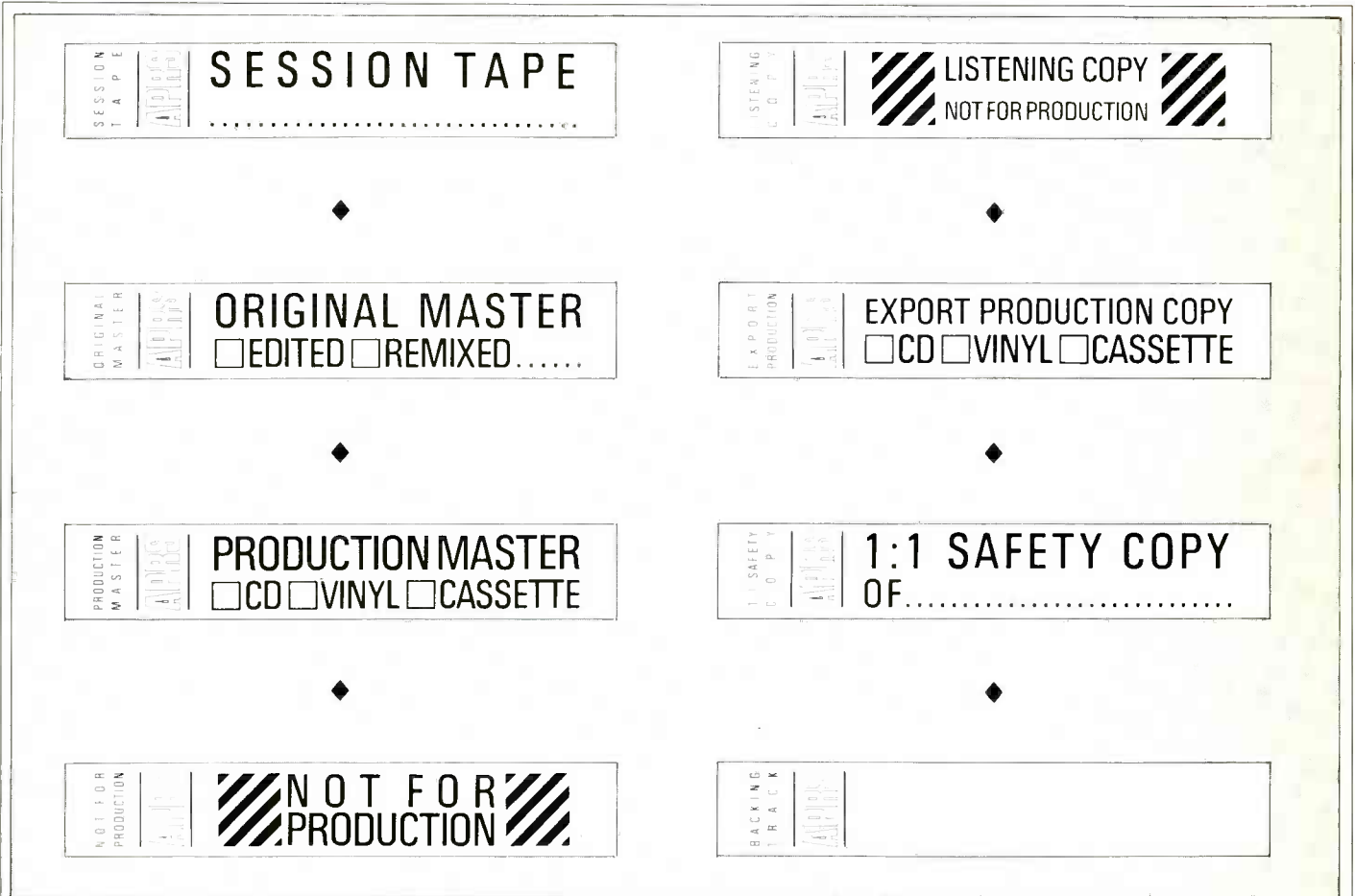
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PRE-EMPHASIS



Work in the UK on the design of a colour-coded standard set of labels for tape boxes—for use in studios and post-production/facilities houses—has been completed, after consultation between the APRS Technical Sub-Committee and the Producers' Guild. Plans are being made to print quantities of the gummed labels and place them in appropriate dispensers. It is hoped that the system will not only end confusion over the status of tapes (production master for vinyl/cassette/CD, export production copy, safety copy, etc) in the UK but may be adopted as an internationally recognised standard for identifying tapes.

At the APRS Executive meeting in July it was pointed out that changes in tape box design, or certain types of cardboard finishes on particular makes of box, might affect either the label's suitability for placing on a box spine, or even its ability to stick to the box at all. Bill Foster, Technical Sub-Committee chairman, undertook to liaise with tape manufacturers on this matter.

New APRS labels

After various proposals the APRS Executive and the Producers' Guild have agreed on seven specific label designs to cover the most frequently used terms. There will also be a blank label for special requirements such as backing tapes.

The following explains the specific purpose of each label.

- **Session Tape:** For either the original multitrack or 2-channel recording.
- **Original Master** (Edited/Remixed...): Mixdown from session tape, or a first generation copy when such a copy is modified by editing so as to be a Master in its own right. The space after the words Remixed can be used to indicate *12 in//or USA/ Date/DJ Vers, etc.*
- **Production Master** (CD/vinyl/cassette): Indicates that the tape is to be used for making production parts or export copies. If the Production Master is *EQ'd* for vinyl and cassette manufacture only, then only those boxes would be ticked.

- **Not For Production And Listening Copy:** These labels will be bright yellow, in the style of a car park barrier and are intended to show very clearly that the recording(s) are *not suitable for production*. (It is hoped two labels will counteract such a problem as that experienced recently by a member of the Producers' Guild who found one of his productions on the market made from a 7½ ips listening copy.)

- **Export Production Copy** (CD/vinyl/cassette): Indicates tape is a copy for overseas distribution only. Should be marked as per the Production Master.
- **1:1 Safety Copy of...:** An exact copy of the source tape—which should be detailed on the label.
- **Blank Label:** For all applications where none of the above are appropriate.

The labels will measure 3 in × ½ in and, in addition to the bold wording on each, the text will be duplicated at the

left-hand end. By sticking each successive label slightly to the right rather than directly over its predecessor this enables the 'history' of a tape to be built up. An 'Original Master' which has been approved for transfer 'flat' would therefore become a Production Master simply by re-labelling. However, by leaving the Original Master legend exposed the client would know that only one tape existed if, for example, they wanted to use the Original Master at a later date.

The Technical Sub-Committee realises that there are two different requirements from the studio membership—those of recording studios and those of post-production, or facilities, houses. To this end a set of six labels will be prepared for each sector. The studio package will contain **SESSION TAPE, ORIGINAL MASTER, PRODUCTION MASTER, 1:1 COPY, NOT FOR PRODUCTION** and **BLANK**. The second package will omit Session Tape and Original Master, offering in their place **LISTENING COPY** and **EXPORT PRODUCTION COPY**.

CD Masters



The Sony CD mastering system comprises a range of independent, yet fully compatible products to give you total financial control during your integration into the world of digital sound. Just clip the coupon and we will send you a copy of 'CD Masters' that will tell you how to build, from a simple digital recording system to a complete CD Master post production suite.

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US Report

Sax appointed to advisory board

Douglas Sax, owner of The Mastering Lab/Sheffield Lab and one of the most outspoken mastering engineers in professional audio, has been appointed one of the members of the first advisory board for the UCLA Extension professional designation in recording engineering in Los Angeles, California. The UCLA programme is a sequence of seven required and two elective courses that upon completion signifies a professional level of knowledge in the field. Nine other audio professionals were also appointed to the board.

"We see the formation of this advisory board as part of the process of refining our professional designation programme," said Van Webster, the board's chairman and co-ordinator and owner of Digital Sound Recording Studio. "These experts are committed to making a contribution to this educational process, and we want to insure that our programme fully meets the needs of the music community.

Other members of the board include: Larry Boden, product specialist, professional division, JVC; Michael Braunstein, independent engineer; Gaetano Costa, vice president and general manager, Motown/Hitsville Studio; John Eargle, senior director, product development and applications, JBL Inc.; Keith Johnson, Reference Recordings; George Massenburg, president, GML Inc.; Theo Mayer III, president, Motavicion Corp.; Martin Polon, eastern vice president, Audio Engineering Society; and Ned Shankman, Shankman/De Blasio.

For more information about the professional designation in recording engineering, contact: UCLA Extension, P.O. Box 24901, Los Angeles, CA 90024, USA. Tel: (213) 825-9064.

DAT technology group proposed

In an attempt to establish a dialogue on digital audio tape (DAT) between hardware and software manufacturers, representatives from more than a dozen companies met here recently to promote an interchange of information on DAT and its potential on the future impact of the home entertainment and professional sound production industry.

"We want to establish a dialogue," said Chris Byrne, vice president of sales and marketing for Akai America Ltd., the organiser of the meeting. "Software companies should be more aware of the

technology inherent in DAT. We're hoping to establish some type of group like the Compact Disc Group—which included both compact disc hardware and software manufacturers—and did so well for that format."

Companies that participated in the meeting included A&M Records, Akai America, Arista Records, Capitol Records, Denon America, GRP Records, Maxell, MCA Records, Onkyo USA Corp., PolyGram, Sanyo Consumer Electronics, Sony Corp of America, Telarc Records, and Technics.

Attendees recognised the present and future impact of digital technology in all areas of the home entertainment area and agreed to continue discussions on DAT in the future.

According to Byrne, DAT represents a major step in the continuing evolution of digital technology in recorded sound. The format has the potential for advances over today's analogue cassettes, including compact disc quality sound. A recording time of up to four hours is possible.

CBS to manufacture CDs

CBS Records has announced that it will establish a Compact Disc (CD) manufacturing facility at its existing record pressing plant in Pitman, New Jersey. Commercial production of CDs will begin in 1988, and when the new operation is fully on-line in 1990, it will have an annual capacity of 20 million discs and will employ 300 people. Additional space is also available for further expansion.

At present, CBS has a supply contract with the Digital Audio Disc Corporation in Terre Haute, Indiana, to meet the company's CD needs. CBS plans to consolidate all its 7 and 12 in record production at its Carrollton, Georgia, facility as all record production is scheduled to be phased out of the Pitman facility by the end of the year.

According to a company spokesman, the decision to manufacture compact discs at the former record pressing facility is based on strong consumer acceptance of the new configuration and is designed to insure the company's ability to continue to meet its customers' service needs with the highest quality discs at a competitive price.

CBS Records and Columbia House will continue to maintain warehousing and distribution centres in Pitman.

Neve releases DTC-1

Rupert Neve Inc has been working closely with three mastering facilities

on the development of the new Digital Transfer Console for the preparation of master tapes for compact disc. Tony Langley of Neve, Brad Johnson of Sterling Sound in New York City, Bob Ludwig of Masterdisk also in New York, and Randy Kling of Disc Mastering Inc in Nashville have contributed to the DTC's development. Based on a 2-channel digital console built for Tape One Studios in London, England, the new Neve DTC has three stereo channels, two digital and one analogue allowing realtime crossfading, and is compatible with both *PCM-1610* or AES/EBU standards, sampling at a rate of either 44.1 kHz or 48 kHz.

The DTC has a special 4-band digital equalisation section utilising a system of curves ideal for disc mastering needs. In addition, features of the console include dynamic controls, limiter/compressor/noise gate/expander, which allow vocal stressing or de-essing and stepped trim controls for accurate adjustment of source level. All of this is done without leaving the digital domain. Neve *Instant Reset*, a snapshot memory linked to SMPTE timecode with storage on floppy diskettes, allows master tapes to be transported to any mastering facility in the world with a Neve DTC and have all the exact settings instantly restored for mastering or enhancement. The DTC is a compact, transportable console with all electronics stored in a separate rack housing which can be located in a central machine room.

Sterling Sound, Disc Mastering Inc, and Masterdisk have already placed orders for the new console and the first delivery is expected early this Autumn.

New CD plant in Dallas

Electrosound and Mitsubishi have announced the signing of a shareholders' agreement to construct and operate a CD manufacturing plant in the US. The venture—to be called Memory-Tech Inc—will utilise Mitsubishi's technical know-how in the design and construction of CD plants (Mitsubishi has just completed a plant in Japan) and Electrosound's marketing and management experience in the music industry.

Construction of the plant has already been scheduled for a site in Dallas, Texas, and it is expected that the plant will be operational by next summer. Initial production capacity is expected to be 12 million audio CDs per year and additional capacity for CD-I and CD-ROM has also been included in the production plan.

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Duplicating in the 80s

When Mort Fujii was asked during the AES in Montreux earlier this year, if Gauss had any plans to introduce a 480 ips bin his brief and characteristic reply was, "We're working on it." And working on it they certainly were, for one of the most interesting products to be shown at this year's APRS exhibition was the new loopbin from Gauss.

There is nothing new in bins running at this speed, Otari were the first company to develop a 480 ips bin and they were followed by Tapematic, Concept Design and Electro Sound, the development is significant, however, because Gauss have such a large customer base throughout the world, and especially in Europe.

With the introduction of the Gauss bin there is no reason why the majority of duplicators could not avail themselves of the superior performance that the 480 ips bin offers. Used in conjunction with Dolby *HX Pro*, high performance tapes, precision shells and Dolby *C*, the modern duplicated cassette can easily compete with the CD. Indeed, at current prices, in terms of value for money the CD does not compete.

The technology exists by which we can significantly improve the quality of the pre-recorded cassettes and from what I have been told, engineers on both sides of the Atlantic are keen to make use of this technology so that they can compete with CD on a more even basis.

In the meantime they will produce the best product they are able to, given the limitations of their duplicating equipment and the quality of the raw materials they are given to work with. Raw materials whose quality is more often determined by price than available performance or consistency.

It would be easy at this stage for me to tell our commercial colleagues that when it comes to buying raw materials they should only buy the best quality. But while some savings can be achieved from improved consistency and yields, it is exceedingly difficult to prove that a recording made on high performance tape and loaded into a precision shell would sell more copies than a standard product. Likewise would the quality of the sound contribute to the overall success of the recording? I would like to think it would, but if I'm honest I would have to admit that in the short term situation, I could not be certain.

The long term buying habits of the consumer are built on past experience and external stimuli. For example, very few of us will eat food we do not like the taste of and so we tend to buy those foods we enjoy eating. Likewise the consumer has quickly learnt that CDs do not have any of the problems associated with black vinyl and because of this the traditional LP buyer is becoming a regular purchaser of CD.

How can duplicating standards be improved? Who's to blame for poor quality? What of R-DAT and how good are domestic cassette decks when you really get down to measuring them? Mike Jones takes a look at these vital issues.

And the main reason he hasn't switched over to CD completely, is due to supply problems and lack of choice.

As the consumer's exposure to compact disc becomes greater so do his expectations of quality. He is not prepared to accept the tape hiss and poor dynamic range he associates with commercially recorded cassettes and to avoid this he records his own realtime copies at home. Little realising that perhaps one of the reasons why pre-recorded cassettes sound so bad on his player is because the player itself is in need of adjustment.

The sensible way of dealing with this particular problem is for the replay azimuth of the player to be correctly

adjusted in the first place. In collaboration with BADA, the British Audio Dealers' Association I have been looking at practical ways in which retailers can check the alignment of cassette decks before they are sold. In the long term of course, it is the manufacturers of these decks who must address the problem but in the meantime the retailers can and are prepared to help a great deal.

Calibration tapes are another area of concern and it is absolutely essential that the manufacturers of these tapes work together in order to ensure compatibility. Wilhelm Andriessen of BASF (Germany) has done a tremendous amount of work on this subject and has achieved a great deal but there is still room for improvement, especially with regard to azimuth.

In the meantime the commercial dilemma carries on: should the duplicator invest in 480 ips bins and the latest technology? Should they use the latest tapes loaded into precision shells and by doing so increase their production costs? In the long term the answer to both questions has got to be yes, otherwise the consumer will turn to an alternative medium like CD or R-DAT for example.

For the consumer both of these two media offer many advantages, not least of which is quality, compatibility and ease of use. Unlike the cassette, the consumer will not have to read the instructions on the label to ensure that they are using the correct EQ and noise reduction. Another advantage of digital is the fast search facility which is 200× normal speed on R-DAT and takes just a few seconds on CD. Dynamic range is in excess of 90 dB with a guaranteed flat frequency response of 20 Hz to 20 kHz. Neither of the formats suffer from azimuth problems or variations in pitch and wow and flutter is a thing of the past. The only current problem with digital is that there are insufficient CDs to meet current demand and R-DAT is not available yet.

One of the reasons for this is that unless the R-DAT cassette is going to be copied at realtime—the video duplicators are well used to this procedure—it will not be possible to produce the software. Sony in Japan and Dupont in America are both developing contact printers which could be available later this year, depending on when the format itself is released.

There can be no doubt that both CD and R-DAT represent a tremendous challenge to the analogue cassette format and the future of duplicating as we know it today. It seems to me that the only sensible option available to the duplicating industry is to accept the challenge and do something about it.

This means the industry is going to have to produce the best possible pre-recorded cassettes and in doing so will

Author's note

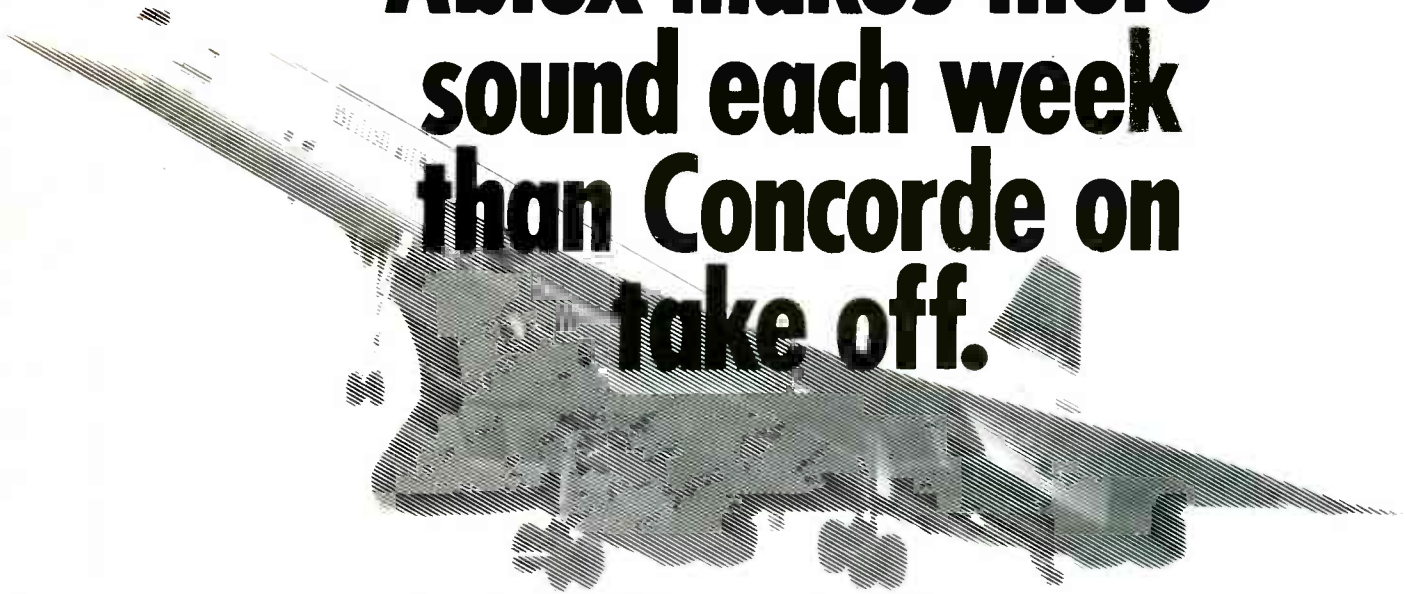
I am setting up a new association which is primarily concerned with the quality of music and the spoken word and will be funded on both sides of the Atlantic by the consumers themselves.

Unlike other associations of this type The International Audio and Music Association will achieve its aims by working within the industry it seeks to support while encouraging improvements. For the association to be successful, I need to be able to talk to people on a confidential basis and for this reason I have decided to stop all my journalistic activities and will no longer, unfortunately, be associated with *One to One*.

Being involved in the birth of a new magazine has been a superb experience and one that I have enjoyed immensely. I hope that *One to One* will continue to enjoy your support and your contributions. As for me, watch this space, for of one thing I can assure you—you will be hearing from the association.

Mike Jones

In a quiet way, Ablex makes more sound each week than Concorde on take off.



1969

First Decca Audio Cassette Duplicated in U.K.

1970

1 Million Cassettes Duplicated in One Year.

1972

First Introduction of Dolby 'B' Noise Reduction Technique into Europe.

1973

250,000 Cassettes Duplicated in One Month.

1979

First Computer Program Cassette.

1981

First Pre-Recorded Cassette Duplicated on Chrome Dioxide Tape in U.K.

1982

1" Mastering from Digital Masters.

1983

First Sinclair ZX Spectrum Microdrive Cartridges Manufactured and Duplicated.
1 1/4 Million Cassettes Duplicated in One Month.
Over 6 Million Cassettes Duplicated in One Year.

1984

First High Speed Duplication of 3", 3 1/2" & 5 1/4" Diskettes.
500,000 Cassettes Duplicated in One Week.
Over 1 1/2 Million Sinclair ZX/QL Microdrive Cartridges Manufactured and
Duplicated in One Year. 10 Million Cassettes Duplicated in One Year.

1985

650,000 Disks Duplicated in One Year.
Over 13 Million Tapes in all formats Produced in One Year.
Over 650,000 Cassettes Duplicated in One Week.

1986

Dolby 'C' and Dolby HX PRO Available. 15 Million Tapes? 2 1/2 Million Disks?

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CASSETTE DUPLICATION

Test procedures

The object of the survey is to assess the playback performance of consumer cassette decks, including portable players, when they are used to playback tapes which have been pre-recorded by the record industry. The tests have been kept simple to enable a large sample of decks to be assessed. No attempt was made to measure overall record/replay response.

- 1** The following tests were carried out in conjunction with assistance from BADA on a wide variety of new cassette decks and players that were located at normal retail outlets. No adjustments were carried out prior to test and because of this the majority of decks were in ex-works condition.
- 2** Reference level. Europe 250 nWb/m (DIN-IEC), USA 160 nWb/m (ANSI). Reference tapes. Group I calibration tape and a 3.0 kHz or 3.15 kHz wow and flutter tape.
- 3** Reference playback level for both channels is measured in mV and the difference between the two channels in decibels. Maximum tolerance 0.5 dB.
- 4** Meter indication for reference level is noted in decibels.
- 5** Relative sensitivity (-20 dB) is measured between 315 Hz and 10 kHz with the difference being showed in dB. Maximum tolerance 3.0 dB.
- 6** The phase angle is measured at 10 kHz with any errors being noted in degrees. Maximum tolerance $\pm 60^\circ$.
- 7** Speed variation is measured using a 3.00 kHz (USA) or 3.15 kHz (Europe) wow and flutter tape with any deviation being noted as a percentage of the reference frequency. Maximum deviation 1.0%.
- 8** The same tape used for speed variation is used to measure wow and flutter with the results being measured to the DIN (IEC) standard. Maximum tolerance 0.10%.
- 9** Noise, when measured, is checked with bulk erased tape to IEC (CCIR 468-2) or CCIR/ARM standards. Maximum noise level is 60 dB below 250 nWb/m (IEC) or 54 dB below 160 nWb/m (ANSI).

Variations in specifications of 52 brand new consumer cassette decks

Group 1

Ref	Output Left	(mV) Right	Diff	Meter	315Hz to Left	10kHz Right	Phase Degrees	Noise CCIR	Drift %	W&F % DIN	Notes
Maximum tolerances			0.50		-3.00	-3.00	60		1.0%	0.10	
Sample 1	679	718	0.50	+5.0	+0.10	-0.10	- 37	-49.6	-0.44	0.080	OK
Sample 2	698	679	0.4	+5.0	-2.60	-4.30	180	-48.30	+1.40	0.080	Az, 10 kHz & speed
Sample 3	744	704	0.50	+3/6	-3.70	-3.50	-132	-49.8	-0.44	0.052	Az, 10 k, meter
Sample 4	598	601	0.10	+3.0	-2.0	-1.8	+ 7	-49.7	+0.05	0.054	OK
Sample 5	604	624	0.10	+3.0	-7.80	-2.40	- 17	-49.9	+0.79	0.057	10 kHz sen
Sample 6	691	698	0.10	+3/6	-1.70	-2.50	+ 30	-48.5	-2.09	0.050	Speed, meters
Sample 7	691	698	0.1	+3.0	-6.00	-8.00	15	Cassette deck failed at this time			
Sample 8	711	698	0.1	+3.0	-1.90	-3.00	- 35	-48.4	-0.93	0.050	OK
Sample 9	470	467	0.1	+3.0	-0.60	-0.70	- 71	-47.3	+1.57	0.052	Speed is high
Sample 10(F)	477	444	0.60	0/+5	-3.30	-2.70	180	-44.6	+0.38	0.074	Az, 10 kHz, levels
Sample 10(R)	532	532	0	+5.0	-0.20	0	154	-44.6	+0.13	0.077	
Sample 11(A)	526	519	0.10	+3.0	-0.20	-0.30	+ 79	-47.7	+2.60	0.067	Speed
Sample 11(B)	523	503	0.40	+3.0	-1.90	-1.10	+146	-44.80	+0.91	0.11	Wow & flutter
Sample 12	634	617	0.20	+3.0	-1.00	-1.40	+152	-44.60	+0.66	0.00	Az, noise, W&F
Sample 13(F)	493	487	0.10	—	-4.50	-4.60	-120	-48.5	+1.24	0.046	Az, 10 kHz, speed
Sample 13(R)	496	500	0	—	-7.00	-5.30	- 5	-47.50	+1.30	0.049	10 kHz, speed, hum
Sample 14	953	946	0.20	+3.0	-1.50	-1.40	-100	-47.0	+0.05	0.072	Azimuth
Sample 14	After adjustment				-0.70	-0.40	+ 33	-47.0	+0.05	0.072	OK
Sample 15	854	770	0.70	0/+1.0	+0.50	+0.30	+ 20	-44.9	+0.66	0.035	Noise
Sample 16	822	763	0.50	+1.0	-0.70	ot-0.60	+ 62	-46.3	+0.46	0.11	Wow & flutter
Pass	14					10	7		11	14	Total 4
Fail	2					6	9		5	2	Total 14
Percentage Pass	87.5					62.5	43.7		68.7	87.5	25.0

Notes (1) Ref number suffix, A & B indicates twin transports, F & R indicates deck with forward & reverse.
 (2) Deck numbers 7 and 16 were returned to the manufacturers.

have to use the latest technology and the highest quality raw materials. Record companies will need to consider producing product encoded with Dolby C and the industry as a whole should look at automatic selection of noise reduction in addition to equalisation.

At the end of the day it is the customer, ie the record companies, who dictates quality by the price they are prepared to pay. But as difficult as it may seem the record companies are the

people we have to convince that the cassette is a viable alternative to digital. In short the duplicating industry needs to market a premium product.

Fortunately, help is on its way from the artistic and creative side of the record industry. Today, for the first time, the cassette is more important to the success of a band than the LP and because of this many artists and producers are taking a great deal of

interest in quality. Some of the established groups have negotiated a deal with the record company that ensures their albums are only released on the highest quality cassettes and this is written into their recording contract. Many producers have also shown a keen interest in the quality of the final product. We in the duplicating industry should welcome this kind of involvement with open arms as it can only help to secure our future.

Group 2

	Output (mV)		Meter	315Hz to 10kHz		Phase Degrees	Drift %	W&F % DIN	Notes	
	Left	Right		Diff	Left					Right
Maximum tolerances			0.50	-3.00	-3.00	60	1.0%	0.10		
Sample 17	510	575	0.50	0	-2.20	-3.70	+163	+0.13	0.90	Az & 10 kHz right ch
Sample 18	627	601	0.40	+2.0	-0.90	-2.20	-63	-0.91	0.90	Azimuth
Sample 19	621	669	0.60	+2.0	-0.90	+0.40	-60	+0.83	0.079	Level
Sample 20	565	552	0.20	0	-0.30	-0.80	-75	+0.70	+0.62	Azimuth
Sample 21	634	621	0.20	+3.0	-1.30	+0.10	+20	+0.62	0.11	Wow & flutter
Sample 22	627	621	0.10	+3.0	-0.90	-0.90	-120	+1.36	0.097	Azimuth & speed
Sample 22	607	604	0.10	+3.0	-5.70	-4.40	-75	+0.91	0.072	10 kHz sensitivity low
Sample 23	607	594	0.20	+3/4	-0.40	-0.30	+45	+0.54	0.12	Wow & flutter
Sample 23	750	594	2.10	+3/8	-0.00	-3.00	-90	+0.46	0.30	Azimuth, wow & flutter
Sample 24	562	568	0.10	+1.0	-7.80	-2.70	180	+1.77	0.065	Azimuth & 10 kHz sen
Sample 25	503	536	0.80	+1.0	-5.10	-3.70	+147	+0.50	0.077	Azimuth & 10 kHz sen
Sample 25	—	—	—	+1.0	-1.00	-0.20	-35	+0.29	0.077	
Sample 26	581	572	0.3	0	+1.40	+0.50	-60	+0.79	0.110	Wow & flutter
Sample 26	572	578	0.20	0	-5.90	-6.90	+140	+0.99	0.140	Azimuth, 10 kHz sen, W&F
Sample 27	604	575	0.5	+1.0	-1.40	-3.0	+79	+0.70	0.048	Azimuth, 10 kHz sen
Sample 27	526	549	0.20	+1.0	-0.10	-1.30	+106	+0.42	0.048	Azimuth
Sample 28	666	669	0.1	+1.0	-5.70	-5.80	+75	+0.50	0.070	Azimuth & 10 kHz sen
Sample 29	604	591	0.10	0	-3.00	-2.60	+120	+0.09	0.120	Azimuth & WF
Sample 30	861	809	0.6	+2.0	-2.00	-1.90	180	+0.83	0.057	Level & Azimuth
Sample 31	829	803	0.20	+1.0	+0.70	+0.80	+60	+1.61	0.063	Speed. Re-set to -0.2%
Sample 32	822	835	0.20	+1/0	-0.70	-0.90	-120	+0.50	0.078	Azimuth
Sample 33	509	549	0.50	+6.0	-2.40	-2.90	+18	+0.54	0.067	OK
Sample 34	565	558	0.10	+6.0	-3.10	-1.60	180	+1.16	0.100	Azimuth, 10 kHz & speed
Sample 34	545	549	0.10	+6.0	-1.70	-1.90	-90	+0.54	0.120	Azimuth
Sample 35	676	683	0.10	+4.0	+0.20	+0.0	+30	+0.70	0.050	OK
Sample 36	1340	1350	0.20	+3.0	+0.90	+0.70	+70	+0.42	0.050	Azimuth
Sample 37	656	630	0.30	+5.0	-2.00	-2.50	+169	+0.05	0.080	Azimuth
Pass			17			14	5	14	15	Total 2
Fail			4			7	16	5	6	Total 19
Percentage Pass			80.9			66.6	23.8	66.6	71.4	9.5

Note (1) Ref number suffix, A & B indicate twin transports, F & R indicates deck with Forward and Reverse.

Group 3

	Output (mV)		Meter	315Hz to 10kHz		Phase Degrees	Noise CCIR	Drift %	W&F % DIN	Notes	
	Left	Right		Diff	Left						Right
Maximum tolerances			0.50	-3.00	-3.00	60		1.0%	0.10		
Sample 38	966	1020	0.50	+1.0	+0.10	-0.70	-121	-44.8	+1.12	0.072	Az, hum, speed
Sample 39	1020	1040	0.20	+1/3	+0.20	+0.30	-154	-45.9	+0.75	0.072	Azimuth, hum
Sample 40	992	966	0.30	+1.0	-1.70	-1.50	+154	-46.7	+0.50	0.050	Azimuth, hum
Sample 41	953	979	0.20	+1.0	0	-0.40	-120	-46.5	+0.62	0.072	Azimuth, hum
Sample 42	954	953	0.10	+1.0	+0.10	+0.10	-34	-46.1	+0.75	0.045	OK
Sample 43	920	913	0.10	+1.0	-3.50	-5.20	180	-47.9	+0.81	0.062	Az, & 10 kHz
Sample 44	933	907	0.30	+1.0	-1.70	-1.50	-152	-47.4	+0.17	0.067	Azimuth
Sample 45	946	920	0.30	+1.0	-2.60	-2.20	120	-47.6	+0.17	0.072	Azimuth
Sample 46	985	966	0.10	0	-2.90	-4.20	180	-46.5	+0.38	0.90	Azimuth, 10 kHz
Sample 47	946	953	0.10	0/+3	-1.70	-1.70	-60	-47.0	0	0.90	OK
Sample 48	985	925	0.30	0	-3.20	-3.40	+60	-45.7	+1.49	0.082	10 kHz sen, speed
Sample 49	953	992	0.30	0/+3	-2.80	-3.20	-60	-44.8	+1.32	0.083	10 kHz sen, speed
Sample 50	985	946	0.50	0	-2.50	-3.00	-149	-44.8	+1.15	0.065	Az, 10 kHz, speed
Sample 51	946	953	0.10	0	-2.40	-2.40	40	-45.5	+1.24	0.056	Speed
Sample 52	913	926	0.10	0	-5.40	-5.40	180	-45.4	+1.45	0.063	Az, 10 kHz, speed
Pass			16			11	4	5	16	2	
Fail			0			5	12	11		14	
Percentage Pass			100			69	25	31		13	

CD Production at EMI

Earlier this year Thorn-EMI started CD production in Swindon. Although production is still low, around 6 million discs a year, it's an impressive facility which is geared to expansion.

Thorn-EMI already had a factory ideally suited to CD production. This is because, in April 1980, the company signed with JVC to back the VHD/AHD (video high density/audio high density) disc system instead of optical Laservision. This was largely because Thorn had previously opted for JVC's VHS video system.

In June 1981 Thorn-EMI started work on a factory at Swindon, to press VHD discs. There were two others, in Germany and California. Swindon was ready in 1982 but in November 1982 JVC and Thorn mothballed the VHD project. Swindon came out of mothballs in January 1984. Since then, the mastering facility and four VHD presses have been turning out videodiscs for industrial disco and jukebox use.

The German and British factories cost £22 million; around £16 million went on Swindon because it included a VHD mastering facility. A high proportion of the money was spent on building the factory on rock and concrete foundations, to prevent vibration of the laser mastering equipment, and on the clean room facility needed for mastering and pressing high density discs. As soon as EMI started selling CDs, pressed under contract by other companies like Polygram and Nimbus, it was a foregone conclusion that Swindon would be partly converted to CD production. This has now happened.

EMI's new CD plant in Swindon marks yet another stage in the growth of CD. Barry Fox reports on this interesting new facility

Manufacturing manager Richard Green toured the world looking at CD plants, deciding on the best technology to use. He and Thorn management ended up buying mastering equipment from Philips and production equipment from Japan. Most of the Japanese hardware comes through Toshiba, which already has a joint CD manufacturing venture with EMI.

The first equipment was installed in January 1986. Swindon was pressing test runs by early April and the factory officially opened on May 15th. The first disc pressed was a pop and classical sampler, given out only to EMI music managers. The first real run was Pink Floyd's *Dark Side of the Moon*; followed by Floyd's gloomy *Final Cut*.

There are six CD presses. All are made by Toshiba. Swindon buys the raw polycarbonate plastic from Japanese firm Teijin; Polygram buys from Bayer. Unlike the Polygram presses in West Germany, the Japanese equipment works by injection. Hot liquid polycarbonate plastic is squirted into the mould, against the CD stamper. It spreads over the stamper and is cooled to form a 'pressed' disc. The Polygram presses work by compression; after the hot plastic has been injected, the mould closes up to spread the plastic.

Pure injection lengthens stamper life. The technology is simpler with compression but any contaminant in the hot plastic will scratch the delicate surface as it is pushed across it. Swindon is already getting over 10,000 discs from a stamper, 10 times the Polygram stamper life.

The pressing cycle is also faster for injection-only moulding. Thorn-EMI began at around 15 s. In Japan Toshiba is down to around 11 s with the same presses. Polygram, with compression injection, has been having difficulty in getting below 20 s. This is the penalty Polygram pays for being first into CD production. Inevitably some of the German technology is now starting to look old.

Swindon works with much smaller evaporation chambers than Polygram. There are two machines, made by Japanese firm Tokuda, which handle 90 discs at a time; the Polygram machines handle 700 at a time. The snag is that it takes nearly ½ hr to pump the air out of the large Polygram chambers, evaporate the aluminium metal and coat the discs. The small Swindon chambers have a total cycle time of just 9 min. But it's swings and roundabouts. At only 90 a time it's still a bottleneck for Swindon. The two machines in use can just cope with the output of discs from the six presses. As more presses are installed, Swindon will need more evaporation chambers.

Already Polygram is moving over towards direct in-line evaporation; instead of loading the discs in batches into a chamber they pass on a conveyor through a series of vacuum bulkheads. Swiss firm Balzer is now supplying similar equipment to Swindon.



Toshiba injection moulding presses



Hand collation

Lacquering at Swindon is done with an automatic machine, made by Toshiba. It spins the discs fast as they are doused with liquid lacquer. The pressing, evaporation and lacquering is all done in a clean room with a workforce in clothing which covers all but their eyes. Ionised air is blown through all the machines to capture dust. None of the discs is touched by human hand until after it has been lacquered. The presses eject discs on to spindles which are then moved by robots to the evaporation chambers and from there to the lacquering machine. The labels are printed direct on to the top side of the disc by an automatic machine from Germany. Like Polygram's machines it uses large pads of silicone rubber which pick up ink from an etched plate and press it down on to the disc.

Post production quality control is by a machine from Toshiba which scans four discs at a time under laser light. This senses any visual defect, like a scratch or blemish on the surface. The public won't put up with visible faults even though they may not affect reproduction. Invisible faults can be more serious. These are checked with a Sony analyser. Samples from the beginning of each run and then one every 300 discs, are checked for block error rate. Production samples are also tried on a wide range of domestic players. As player prices spiral



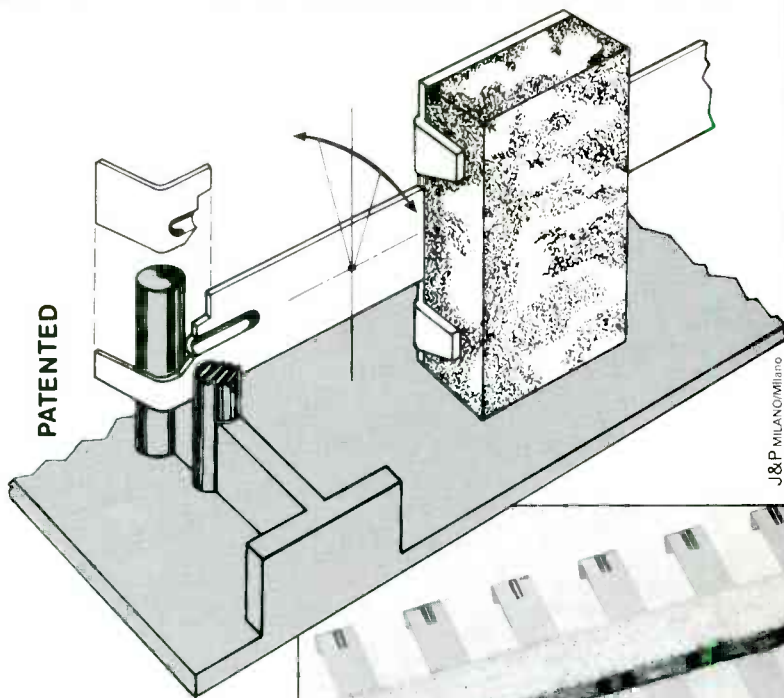
Unloading metallised discs

downwards, so does the error correction capability particularly of budget players.

Theoretical production from Swindon, from the six presses so far installed, is 6 million discs a year (1 million per year per machine). Additional investment is around £5 million. More presses are on order.

The Swindon factory sells to EMI Music at around the normal going rate for CDs of £2 a disc, including packaging. Clearly it can nowhere near meet EMI's demand, which now stands at around nearly 20 million a year. EMI still has to buy in CDs. EMI Capitol in America is building another plant at Jacksonville, Illinois.

help in azimuth



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F1 - Digital Bliss, Mastering Headache?

As an economical music carrier the Sony *PCM-F1* is undoubtedly a remarkable device. Achievement of a 16-bit digital recording system of a standard sufficient for record, cassette and CD production at under £2,000 is no mean feat but, with certain limitations, that is exactly what the manufacturers have done. Whilst not in any way detracting from the advantages this remarkable little unit offers, it is the certain limitations of the system that are perhaps worth exploring a little further.

When the *F1* was developed (I use 'F1' as a generic term to cover all the various compatible models) converter technology was not as advanced as it is today. Also, it must not be forgotten that the *F1* was developed by the domestic division of Sony and aimed at the Japanese home markets and, as a result, certain short cuts were taken, one of these being the use of the digital to analogue converter from the *CDP 101* compact disc player. This is a single 16-bit linear device which processes left and right channels alternately—resulting in a delay of 11 μ s to the right hand channel or, in plain English, a drop of 3 dB at 20 kHz when left and right are paralleled for mono.

To get round this problem a delay was introduced into the left hand analogue to digital converter (these being discrete components) in order to correct the output. So, all was now well—until someone came along with the bright idea of using *F1* in the studio and then making direct digital transfers to its big brother, the *1610*.

Because of the aforementioned input delay, the digital signal of the *F1* is not 'time-coincident'. The left hand channel is 11 μ s behind the right so *F1* signals transferred digitally to *1610* are no longer truly mono compatible, the *1610* having two discrete D/A converters.

Enter Audio+Design, who developed a cunning little device which not only adapted the input/output level of the *F1* (about 0.5 V on phono plugs!) to line level but also solved the time coincidence problem—at least it did in theory. A+D's box contained a switchable 11 μ s delay in the right-hand input channel, thus counteracting Sony's left hand channel delay and thereby returning the digital-domain signal to time-coincidence ready for

In most studios nowadays you will find the *F1*—or one of its successors such as *701* or *501*. Bill Foster, of London post-production house, Tape One, looks at the *F1* system and raises a few questions about its suitability for professional audio applications

transfer to *1610*. At the same time the left-hand replay circuit was similarly compensated to facilitate monitoring and stickers were provided to indicate tapes treated in this way.

All was now well—except for one small problem: due to a misunderstanding somewhere along the line the first batch of modified *PCM-701* units produced by A+D (where their device was built in) placed the delay in the wrong leg. As a result, rather than restoring time coincidence, signals were being recorded 22 μ s out of step! A+D were quick to remedy this situation—even producing another little gadget which would restore the 22 μ s—but for some, it was too late, their recordings had been made and mastered with a 6 dB loss of HF in mono.

Most mastering houses use an oscilloscope to check phase as this clearly shows any time coincidence error, however, problems of this nature do reinforce the need to record a 10/12 kHz tone at the head of *F1* recordings in addition to the usual 1kHz. Although even 1 kHz will show up phase or timing errors on a 'scope, an HF tone will make any error more apparent on a phase meter and even detectable by switching the monitoring



Sony PCM-F1 and PCM-701ES

to mono. If the replay device is fitted with time correction a quick flick of the switch will instantly determine how the tape was recorded.

One of the severest limitations of the *F1* system from the studio's point of view is its inability to perform music edits. Admittedly, there are a couple of add-on units available which permit assembly to frame accuracy ($1/25$ s in PAL/SECAM) but while suitable for TV work, they do not compare with the 343 μ s accuracy of the 1610 compatible DAE 1100 editor. Also, an edit or 'drop-in' on an *F1* will usually replay with an annoying click.

Even more aggravating, from a disc mastering point of view at least, is the disturbance to the digital signal at the drop-in point, which will usually result in momentary pre-emphasis, switching on devices such as the Studer DAD-16 delay unit. An American company has just perfected a de-glitch unit which on initial evaluation appears to have solved this problem—but at a cost almost equal to a complete PCM-701 system.

Where the *F1* has undoubtedly scored is in the area of cassette intermasters and safety copies where the low cost of the Beta cassette and long storage time is the prime benefit and the lack of editing capability almost irrelevant. There is hardly a cassette plant in Europe now that cannot handle *F1* tapes and there's no doubt that the introduction of this digital device has

gone a long way towards improving cassette quality.

Perhaps the biggest drawback of a low cost digital system is that it has introduced these new techniques to those who are least equipped to cope. In the old analogue days, a copy made off-azimuth, or with the Dolbies incorrectly lined up, could be corrected to a degree at the next stage. Once in the digital domain, however, these corrections cannot be made and so greater discipline is required from the start.

Many's the time when my own company has been obliged to dub a digital copy tape back to analogue in order to iron out transfer mistakes—which rather defeats the whole object of the original exercise!

Drop-outs

So far I've avoided what must be the biggest bug-bear of the whole system, or in fact any video cassette based digital format—drop-outs. There is nothing worse for an engineer than to be 29 min into a 30 min piece when, suddenly, there's silence for two seconds. With the development of analogue tape over the past 10 years or so, most studios had forgotten all about drop-outs—until the advent of 1610/*F1* *et al.* Because of the 'read after write' capability of professional analogue machines, a copy tape with a drop-out is almost inexcusable and will usually result in

the offending engineer getting a swift kick up the dioides. But how can any engineer be held responsible when he can't monitor the recording? Either a studio must now check every digital tape after transfer or risk it being returned. And then, who pays?

In the case of cassette manufacturers at least, a 'gentlemen's agreement' seems to work where the studio despatches a replacement and the plant re-masters—each bearing their own costs. But really, why should either party lose money because, effectively, the system is inadequate for the purpose for which it is being used. In the case of *F1*, of course, Sony will always come back to their original argument: that it is a *domestic* system and was not designed for professional use.

The new 1630 and its companion DMR 4000 does offer read after write—but at almost £30,000, compared with £2,000 for a PCM-701 system, how many of us can afford it? Maybe R-DAT will be the answer. There will be a professional version in due course and hopefully this will offer a read after write facility.

Meanwhile, take care with analogue to digital transfers, keep your video heads clean, use only the very best available Beta cassettes (L-500 max length) and keeping hoping that someone, somewhere will soon find the perfect solution—maybe they'll even invent another format!

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Tape Saturation and Improving Raw Materials

One of the changes perceived with many recent recordings for CD has been the greater 'impact' and peak high-frequency levels. In part this has been due to the transient performance of the digital medium. It has also been the result of much closer miking, on classical and acoustic recordings in particular, in order to avoid deterioration of the signal/noise ratio. Transfer tapes are now frequently digital video cassette copies of the original recording, avoiding one or more generation losses of high-frequencies in analogue dubbing. By eliminating the generation loss, these digital transfer tapes can give a considerable improvement in duplicated cassette quality.

Recording techniques that used microphones a significant distance away from the subject had a built-in attenuation of extreme high frequency harmonics; recordings made using a very close microphone technique may have a slightly unnatural amount of high level high frequency content, both because the microphone is closer and because the microphone may be at a different angle to the instrument, picking up a different balance of harmonics. It may be questionable whether this 'enhanced' harmonic content, coupled with less real reverberation and necessarily more reliance on synthetic reverberation, is really more realistic in the sense of being closer to what is heard in the concert hall or in live performance; or whether some gentle filtering of the harmonics could not help towards producing a more 'natural' sound. That is another argument that does not really belong here; the arguments for and against close miking were raging well back in the vinyl LP era.

What is relevant here is the high levels of high frequencies found in many recent recordings, which undoubtedly contribute to the 'impact' and 'immediacy' of the sound. More popular music is also being recorded using synthesizers and electronic instruments that have a high harmonic output.

The increased high-frequency content is indeed impressive when reproduced via a digital CD system; but when the same recordings are mastered for both vinyl records and cassette duplication it poses potential problems of high frequency overload, even where the extra high frequencies are felt to be musically desirable.

The high level, high frequency performance of pre-recorded cassettes has been enhanced considerably by the

Recording techniques have changed over the years. John Fisher looks at the problems this can create.

adoption of Dolby *HX Pro* headroom extension (which provides constant effective biasing regardless of signal content) on both the duplicator slaves and the recorder for the loopbin master; also by chrome duplicating stock and chrome loopbin masters; and more recently by the introduction of cassettes recorded using the Dolby *C*-type noise reduction system.

In addition to providing more noise reduction over a wider frequency range, Dolby *C*-type NR incorporates a high frequency anti-saturation network (similar in operation to that found in the new Dolby *SR* system for studio mastering). The effect is to improve considerably the accuracy of high frequency recording on cassette. In conjunction with *HX Pro*, the overall improvement can be dramatic by comparison with standard Dolby *B*-type encoded bulk duplicated cassettes.

Mastering

Despite the considerable improvements possible in HF output from cassettes using these newer techniques, it is still necessary to beware of excessive HF levels that can cause HF saturation. Even if the saturation were in itself to go unnoticed, the significant effect of high frequency saturation during recording can be to cause some mistracking of any complementary noise reduction system used.

When high frequency saturation does occur, the replayed high frequency output is less than that of the corresponding high frequency input. Indeed, it is often overlooked that

While the widely-used Dolby *B*-type noise reduction systems was designed to be tolerant of normal operational frequency response and level errors, saturation of high frequencies may take the system outside the safety operation area

beyond the point of maximum output (saturation) at a particular frequency, the level recorded on the tape actually falls with increasing record current (Fig 1). Some of the high frequency energy that should have been present in the noise reduction circuitry's control signal is therefore missing, and the decoder interprets this as though a different signal had been recorded. Complementary operation is thus disrupted. With sliding band high frequency noise reduction systems (such as the Dolby *B*- and *C*-types) the effect may be to reduce on replay the level of frequencies immediately below those that have been saturated during recording, and consequently to upset momentarily the frequency response of the system.

While the widely-used Dolby *B*-type noise reduction system was designed to be tolerant of normal operational frequency response and level errors, saturation of high frequencies may take the system outside the safe operating area. One of the advantages of employing the Dolby *C*-type NR system is that (again like the professional Dolby *SR* system) it incorporates a 'spectral skewing' technique that desensitises the processing to such frequency response errors at the highest frequencies; even so, if an attempt is made to put excessive levels of high and upper-mid frequencies on to the tape, similar problems could occur.

Like the vinyl disc, the audio cassette has physical limitations on its ability to store high levels of high frequencies. In preparing the cutting master for vinyl records, the high frequency levels are normally modified by skillful adjustment. In a similar way, it is normally essential that a separate, tailor-made master be made specifically for cassette duplication by someone who knows the limitations of the tape stock to be used—preferably the duplicator. But often this requirement is ignored. Either a copy of a vinyl disc master, with compression and other processing that may be wholly inappropriate, or an *n*th generation copy of the original recording, may too frequently be used instead.

The loopbin master should indeed be recorded from early generation material but modified to avoid completely any saturation in the loopbin master and to ensure that any high frequency tape saturation in the duplicates is insufficient to cause audible mistracking. Such modification to the signal must be carried out *before* noise reduction encoding for the loopbin master: the tape used for that master

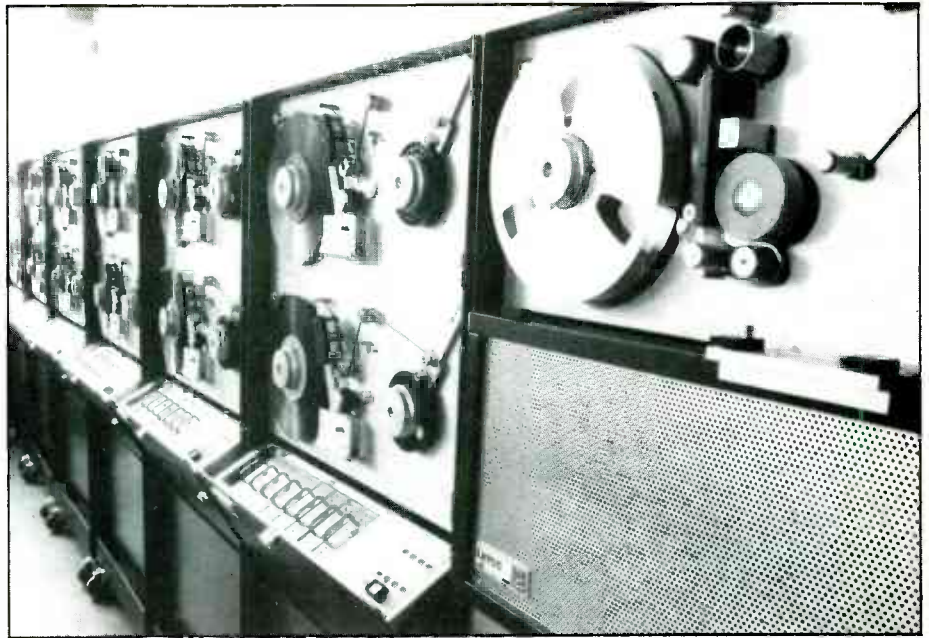
should not be used to provide soft limiting, otherwise the complementarity of the noise reduction process will be spoilt. This requires skilled and artistic control, and is at least as important as the preparation of a good cutting master for vinyl disc.

Too wide a bandwidth?

Improvements in duplicating technology, which include better heads, mastering and cassette tapes, transport accuracy and C-0s, mean that it is possible to extend duplicated bandwidth to over 20 kHz when measured at low levels. While in some degree this offers an improvement in fidelity of reproduction, it also means that there is a greater susceptibility to high frequency saturation and consequent high frequency response errors. At high recording levels, the frequency range over which the signal is linearly recorded will be restricted compared with the range attainable at lower recording levels (Fig 2). The mastering engineer therefore needs to control manually the frequency range being recorded, according to the signal level and spectral content, to cope with this constraint; such control is obviously more subtle than a simple filter, which would remove the higher frequencies at all levels.

In the same way that mistracking of the noise reduction system may be caused by high frequency saturation, it may also be caused by frequency response errors where the system bandwidth has been extended. Where an extended bandwidth signal is to be used, therefore, flatness of the high frequency response and accuracy of azimuth in both the loopbin master recorder, loopbin replay machine and duplicator slave become even more important—and with them the need for better cassette shells to ensure stability of replay performance.

None of the duplicating stages should themselves modify significantly the level or frequency response of the noise reduction encoded signal; any modification to the level or response needs to be controlled and to take place ahead of the noise reduction encoder. It is therefore essential to keep the signal to be recorded within the safe bounds that the chain can both record and reproduce.



Consistency and reliability of the duplication stock are perhaps even more important than achieving the ultimate in electro-magnetic performance

To do this, the 1 dB squash point of the complete system, loopbin master and cassette tape need to be measured to determine the weakest link in the chain and the safe operating area of the whole system. The loopbin master should then be recorded so that the peak level at any frequency fits within this safe operating area. Signals may usefully be monitored either using a 2-channel spectrum analyser, or with a peak programme meter having a frequency response that is the mirror image of the safe operating limits of the system, within which levels and frequencies are recorded linearly and without saturation. If the stock used for the loopbin master is changed, the effect on these limits must be checked. Likewise, if a variety of tape stocks is used to meet varying customer requirements, plots of the safe area of operation for each type need to be kept and the parameters adhered to in

preparing the loopbin master.

If the use of a nominally superior duplication stock fails to improve the overall 1 dB squash point levels, the loopbin master may well prove to be the limiting factor; using Dolby *HX Pro* in the master recorder, a chrome or higher output loopbin master tape stock, lower Dolby reference level on the loopbin master, or 7½ ips masters in one of the new 480 ips loopbin machines, are all ways in which the performance can be improved and full advantage taken of better duplicating stocks.

With this care being taken in recording the loopbin master, it is clearly essential to have one or more identical back-up masters in case of accident. These may be made simultaneously if more than one mastering recorder is available; alternatively a 16-bit PCM digital cassette copy may be made in parallel with the original loopbin master and may subsequently be used to generate identical copies. A fixed transfer level must be used, so that the reference level on the original is identical with that on copies.

Good quality tapes and shells

The need for good quality tape stock for duplicating, good C-0 shells and also good loopbin master tapes is frequently mentioned; yet in many instances the industry is only just beginning to appreciate fully just how important these factors are—both in achieving and maintaining quality, and in reducing down time and rejects.

Consistency and reliability of the duplicating stock are perhaps even more important than achieving the ultimate in electromagnetic performance: unless tape is consistent within pancakes, within batches and from batch to batch, there will be a serious compromise between quality and down time. Automated or memory alignment of parameters such as bias,

FIG. 1 RECORDED LEVEL (OUTPUT) VERSUS INPUT LEVEL (INPUT) AT CONSTANT HIGH FREQUENCY SHOWING FALL IN RECORDED FLUX ABOVE SATURATION LEVEL

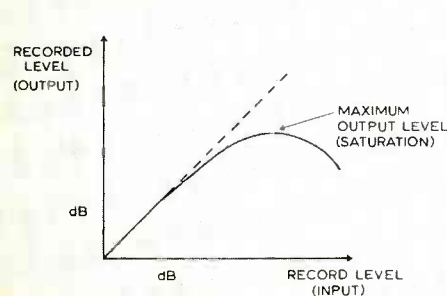
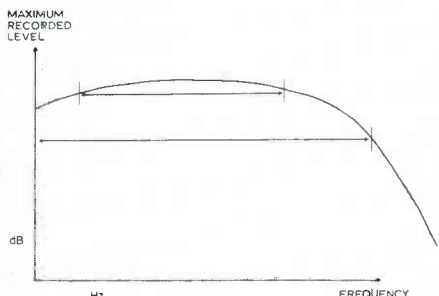


FIG. 2 TYPICAL PLOT OF MAXIMUM OUTPUT LEVEL VERSUS FREQUENCY FOR CASSETTE TAPE, SHOWING VARIATION IN USEFUL (LINEAR) FREQUENCY RANGE WITH LEVEL



CASSETTE DUPLICATION

equalisation, level and tension may help speed up the alignment process but this is only effective if there is consistency throughout the tape used. Minimal oxide shed is important in maintaining high frequency response from one end of the pancake to the other, while accuracy of slitting is important for correct azimuth and the avoidance of jamming in the end product.

The choice of a good C-0 has also been appreciated but not always rationally undertaken. In essence the C-0 is an extension of the play tape transport, and should introduce as few errors as possible even after considerable handling. The shells need to be very rigid, accurately dimensioned, well within specified tolerances, and need to maintain these parameters under fluctuating temperature and mechanical conditions. Plastic rollers need to be highly concentric with their metal pins and to be correctly flanged to introduce the minimum of weave. Hubs need to be truly round, without a bump where the leader is attached. All guides need to be precisely at right-angles to the shell, and liners need to facilitate

A well made sonically welded shell can offer a very rigid and consistent construction

smooth handling of the tape within the shell and must not introduce flutter.

Pressure pads need to be wider than the tape and to be smooth, without friction or stiction problems: some fibre pads contain coarse fibres that stick into the tape, while foam pads may result in stiction or mechanical oscillation of the tape. The pad spring, usually phosphor-bronze, needs to be non-magnetic and of a consistent springiness. The metal shields behind the pressure pad need to provide good magnetic as well as electrostatic shielding for the head. Some have been known to be more decorative than practical!

Perhaps the greatest confusion has arisen as to what kind of shell—welded or screwed—represents the best value and mechanical design. Welded cassettes have been liked for cheapness, screwed types because they allowed damaged cassettes to be repaired and were seemingly more rigid. Often the choice seems to be a matter of vogue and cost—there are even welded cassettes with purely cosmetic screw heads moulded in! The answer to what constitutes the best type to use, however, is that what is needed is a good shell, of whatever kind. A well-made sonically-welded shell can offer a very rigid and consistent construction; a shell using five screws can provide an even, unstressed fit: what really matters is the care with which they are made and assembled. It is essential for the duplicator to try out a number of shells with a good reputation and to use



the type which performs best with the chosen tape stock when tried both on quality control and typical domestic machines.

Quality monitoring

In addition to monitoring using peak reading meters and possibly spectrum analysers, it is essential that careful aural quality assessment is carried out at each stage, under studio quality listening conditions. Headphone monitoring in a duplicating room environment is totally inadequate.

The loopbin master recording must be compared with the original source tape using a good loudspeaker/amplifier system. In addition to any noise reduction decoding for the source master tape, noise reduction encoders and decoders are required for quality monitoring and A/B comparison with the loopbin masters; this is the most satisfactory way of ensuring that the loopbin master is free from audible high frequency saturation effects.

A check on potential high frequency



saturation problems in the cassette tape itself may be carried out using a 3-head cassette recorder in parallel with the recorder used to prepare the loopbin master, using duplicating stock loaded into C-0s, with bias and equalisation adjusted for a flat response and MOL/ frequency characteristic similar to that with the duplication system. The output of the cassette machine may then be compared directly with the output of the mastering recorder and the source tape, and provides an additional check to verify material which might be prone to mistracking problems due to high frequency saturation. (If necessary, this realtime duplicated cassette may be used as a convenient standard for quality control purposes: otherwise checked samples should be taken from the first batch, when the system has just been correctly set up, and used as a standard against which to assess subsequent copies.)

In addition the loopbin master should be checked against the source tape, under similarly quiet conditions, to ensure that no perceptible noise has been added in the mastering process. As a final check on the suitability of the master, it may initially be duplicated on

The loopbin master recording must be compared with the original source tape using a good loudspeaker/ amplifier system

a single slave and the pancake checked in the listening room on a quality control recorder, in synchronism with, and directly against, the source master. Any difference should be almost imperceptible; if there is any doubt, it will normally be more cost effective to remaster than to risk rejection of duplicated cassettes.

Conclusion

More than half of all recordings sold in the UK and USA are, on average, on cassette and an ever decreasing proportion on vinyl. Yet it is ironical that while the cutting engineer's name frequently appears on the sleeve of the vinyl record and the producer and artist may attend the preparation of the cutting master to agree any artistic compromises necessary to accommodate the programme material, it is relatively rare for the same attention to be accorded to the cassette. Many duplicators are now capable of producing cassettes to extremely high standards but the pressure for them to do so and a willingness to invest a little more in quality, must obviously come from their customers—the record companies and their artists. It would be an excellent thing for all to see more interest and concern from both producers and artists in ensuring the optimum transfer of recordings to what has become, after all, the industry's most popular medium.

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Frazer Peacock In Depth Video

Although video cassette duplication and audio cassette duplication would appear to have a lot in common, the methods employed and the technology available for the two practices are in fact quite different. High speed audio cassette duplication is a well established technique and relatively simple to execute. There is as yet no equivalent technique for video. The process is more complex, involving picture and sound and, although research is currently underway, the advent of high speed video cassette duplication in the UK is still considered to be a few years away.

In the United States, however, things have progressed a little further and both Sony and Dupont are working on high speed duplication machinery. But this is not news that will make the UK factories leap up and down in anticipation because even when the R&D is complete it will only work for NTSC—the American standard. Much more research will be necessary in order to convert the technique to cope with the UK standard PAL.

The Sony system, designated *The Sprinter*, requires a mirror image master machine which represents a very large investment for a factory. The mirror image is contact printed at a speed which, averaged out taking into account rewind time, represents a little over 80 times realtime speed.

The problem is not NTSC and PAL themselves but hi-fi audio with NTSC and PAL. The NTSC format is made up by laying the picture and sound together side by side (picture/sound/picture/sound and so on). PAL tapes are recorded at different levels within the oxide with the picture recorded on the surface and the sound underneath. Thus the two formats are totally different. With contact printing you cannot record at different depths and the high speed machines will, therefore, require a great deal more R&D before they can be applied to PAL.

Frazer Peacock Associates (Video) is the second largest UK duplication plant with 1500 machines and a capacity for up to 4 million video cassettes/year. In order to adopt the high speed system it would be necessary to acquire at least 50 machines—a huge investment.

Managing director David Tuckman explained that at the moment the equipment is only suitable for small volume copying because either thousands of copies will take a long time on one machine or else you need a large number of units. "If you have 100 real time duplicators and one of them breaks down then you can still do 99

How different is video duplicating from its audio counterpart? Janet Angus visits Frazer Peacock Associates (Video), Britain's second largest video duplicator to find out what goes on

copies; if your one high speed duplicator breaks down you are out of business. So the costs involved are much higher."

With such a small marketplace for the equipment it is unlikely that the costs would decrease in any significant way—once a factory had bought its five or so machines it will not require any more for at least five years.

Video cassette duplication is currently therefore executed in real time, making it a very costly and labour intensive process. At the end of a duplication run, someone has to rush down the banks of machines taking the finished cassettes out and putting new blanks ones in. FPA's main factory floor

consists of banks of industrial printing (duplicating) machines which include the JVC BR-7000ER giving hi-fi and 'normal' audio (referred to in the video world as analogue). The conventional machines run at roughly half the speed of an audio cassette, David explains and therefore the frequency response is pretty awful. Prior to the introduction of hi-fi video, a fixed head was used but now with hi-fi, the audio is recorded as an FM signal thus giving as good a response as on an audio cassette.

There are also Sony 8 mm 8-bit PCM-EV1000 printers which were custom built for duplicating 8 mm and will record both PCM and standard sound.

"We can do VHS in hi-fi stereo, Betamax in hi-fi stereo, 8 mm hi-fi mono and PCM digital stereo and U-matic. We also have facilities to convert to and from the American NTSC format to PAL."

The control room is equivalent to a transmitter, hard wired to the machines on the factory floor. It is a control base as opposed to a creative workshop. Master 1 in machines are Sony BVH-1180PS 3 hr machines (few films are longer than 3 hr)—these are master machines for both picture and sound, although the audio is not priority. For productions with higher quality audio a Studer 15 ips machine is available



Central control room

which is then synced up to the master and the audio is laid separately. Hence the term separate sound.

The digital audio track for the 8 mm has not yet developed any standard equipment and therefore FPA has not yet committed itself. They have, however, experimented with the JVC DAS900 and the Sony PCM-1610. "We need somebody to standardise it; we need more than one customer to say that it is standard, that that is the one they want."

The control desk monitors all the printing machines as they duplicate. It is capable of selecting any machine and routing to any other and thus enables complete control of several processes simultaneously, as well as random checks, as it flicks through the machines during operation.

Although it is not an edit suite and there is usually no need for any changes to be made to the tapes at all, a small amount of equipment is kept in reserve for when these things are necessary. Occasionally industrial training videos will have poor quality audio which needs a bit of cleaning up. To this end there is an Alice 828 mixer and equalisers and limiters by UREI and Audio+Design. Other operations occasionally called for include adding copyright warnings and trailers.

Everything is in stereo in the factory but 90% of reproduction in the marketplace will be mono, so it is very important that the signal is in phase. An Eela Audio phase meter is therefore employed as a constant check and, yes, they do occasionally get masters in which are out of phase.

Picture noise reduction is by a Pye digital noise reducer, designed in conjunction with the BBC ("It does

make the picture a little better.") and audio NR is by Dolby A and B.

A timecode generator is employed for films which require certification. Unlike film which is sprocketed, there is no way of locating specific points in a video unless it is inscribed with timecode and it is far quicker to gain certification if the certifiers can point out specific spots they want removed.

Once duplication is finished, in spite of the fact that the machinery in the control room has been constantly flicking through the machines checking what is going on, the tapes are then transferred to a checking room where the beginning, middle and end of every single cassette is checked for tracking errors, decoding the security information which has been laid on in the control room, and of course making sure that it is the right film. There are 60 playback machines here with more people putting tapes in and removing them and extracting the rejects.

Quality control is the most time consuming labour consuming and crucial element of such a facility and it starts from the minute the blank tapes enter the premises. There is a full time staff member whose sole responsibility is checking tapes in (as far as masters are concerned this is of critical importance for security reasons). FPA uses four types of proprietary branded tape: Sony, Maxell, JVC and 3M.

"Our relationship with the Japanese and 3M is one of joint co-operation. There is a lot of information exchange. We see so many tapes here in a day that we can report very fast on it. The tape is normally very good and it is very rarely that we have a problem, and then it will be picked up on goods coming in. Everybody has their

problems sometimes but as a rule the quality is very good.

"With reference to VHS tapes, we buy those that we are used to and that we know. We don't use non-branded or non-licensed (from JVC) tape. At one time only manufacturers could get this licence but recently a number of small operators have been buying machines from Japan and elsewhere that are not approved. They buy tape which probably is approved and they get themselves some winders, but most of them don't have clean air and other facilities that the big companies have invested in to avoid damaging the tape, and I am afraid it is not doing the industry any good. It is a professional job for professional people."

Maintenance plays a major role in the day to day functioning of the factory and to this end there are three engineers. It takes two hours to clean, realign and change the video heads on a single machine.

"We follow a servicing and tape checking routine. The whole thing revolves around key people taking an interest in their work and caring about the end product."

Video is unlike many consumer products in that a three year old child can see if it is not very good. You don't need complicated measuring equipment to tell you when a video is poor quality. Sound is more difficult and consumers will tolerate quite a lot more before they complain.

"With video if the picture is distorted then it is no good to anyone. With audio you can hear it wow and yet people will still put up with it to a certain extent.

"We maintain to specific standards for both the head end and the main slaves. It is a major part of our work and is continuous—it is like painting the Forth Bridge. A lot of the picture and FM sound information is electronic information which is measurable; we can store it on computer and compare it with information which we know is acceptable and thus determine when something is becoming unacceptable. The result is that we are detecting tapes before they become unacceptable and we can pull out machines and service them before they go wrong. It is inefficient to wait for the machines to go wrong. We have now developed this technique almost to the stage where we can use it all the time."

Strict quality control means that returns are less than 0.5%, at least half of which are due to customer damage—things FPA know they could not physically have done.

"If a tape is screwed up in the middle we know we could not possibly do it because each one is checked at the beginning, middle and end. If a film contains some off air recording and it is returned saying it had the wrong film on it, we do not have any means of bringing in off air information so we could not possibly have done that. With our spot checks we will not detect if the picture is damaged elsewhere on the tape than front middle or end. We



David Tuckman managing director

VIDEO DUPLICATION

cannot check every single tape all the way through, although we do run one whole film from each batch to make sure that it is all there."

Security at a plant such as this is absolutely vital. Video piracy is rife and in order to try to improve security measures the Federation Against Copyright Theft was set up some two years ago. This coincided with an Act of Parliament which deemed that video piracy become a criminal offence. FPA are members of FACT and are subject to strict vetting and spot checks. The premises are under 24-hour guard and hidden cameras record everything that takes place with the date and time.

The computer in the control room records everything that is done to every machine 24-hours a day. The date, time and job number is encoded and recorded on every tape and from this information in conjunction with that on the computer it is possible to determine precisely which video printer was used for each individual tape.

As a further measure against piracy, Macrovision is being introduced this Autumn (by FPA and Rank). This is a method used in America to prevent back-to-back copying. By encoding information on to the tape which enables playback of that individual cassette but which scrambles the video when you try to copy it. This has so far been over 75% effective in the States.

FPA have special cassettes manufactured for them with a tamper-proof screw to prevent switching of spools; it is also two tone to differentiate it from those on sale to the consumer in shops, thus making it rather obvious should the tape be switched.

"You wouldn't believe the things some people get up to!"

Duplication of the different types of tape does not call for any different sort of treatment. Duplicating is duplicating. And as for comparing it with audio cassette duplication the technology is different but the processes are similar in many ways, particularly in factory management and tape handling.

With the introduction of high speed duplicating being somewhat distant, FPA, along with Rank, have been looking at other areas with Tape Automation. Tape Automation has been developing a pancake copier which will carry out 14 hours recording in realtime. FPA will be testing it out in January.

"It will allow us to leave a machine going all the time. With the 1 in machines connected up 'rock and rolling' (the first master runs until it reaches a cue tone which switches the other machine on while the first one rolls back to await its next turn). Rock and rolling is done anyway, the pancake is ready; it is just a case of putting it all together. In the end it comes down to cost effectiveness."

This method could be used for all types of video tapes but initially they are concentrating on VHS. The demand



High security duplicating area

for Beta is diminishing rapidly. The numbers of tapes being bought are not even as high as they were three years ago which is rather illogical since the machines are still out in the marketplace.

"It is a chicken and egg situation probably. I dare say the consumers would say they can't buy the tapes anywhere. You can't rent Beta and you probably can't buy them in many places and so we are not asked to make any more."

With so many different formats floating around at the moment—the introduction last year of 8 mm video, the increasing popularity of CD, the diehard vinyl LP and compact cassette and standard VHS and Betamax quite apart from the different formats available within those categories all fighting for their places, the future is far from certain for any of them.

David Tuckman believes that the immediate future is related to the introduction of the budget ('paperback') video which retails at around £10, as opposed to earlier prices in the region of £60 ('hardback'). This is turning the market on its head because the consumer is now able to buy films which they were previously only able to hire and sales are now on the increase.

"The business has changed into a high volume one in the last six months because tapes are being purchased rather than just hired. You think the

factory is labour intensive and you haven't even seen the packing department! We are looking at robot arms to put the cassettes into the cases. We do automated labelling of the cassettes at present but the rest of the operation is manual. Now the market is increasing we will be looking at increasing the automation because there will be less need to think about using the cases for other product should the demand on this one fall."

Technology wise, as far as the video cassette is concerned, it may very well go the way of *Video 8* and *Walkman* players and car players reproducing the audio and domestic video machines the complete video. A *Video 8* cassette will give 18 hr of digital audio or three hours picture with digital audio.

"That's the attraction of 8 mm. But if R-DAT comes out, it is not going to help this is it?"

Satellite developments are almost certain to have a profound effect on video but like everything else it is going to take time. As far as Fraser Peacock are concerned, David Tuckman feels that the next five years are pretty safe. After all, the compact audio cassette was around for 10 years before it finally established its slot in the market place. Nothing is an overnight success, and everything will depend on how the market reacts to the various formats which one will eventually win through.



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R-DAT

Further Background

DAT was scheduled for launch last October at the Tokyo Audio Fair but put on hold for 12 months. The retail trade worried, quite reasonably, that the launch of a completely new consumer gadget so soon after compact disc and 8 mm video, would confuse the public. The risk of confusion still exists and there has been pressure on the Japanese electronics industry to shelve DAT for another year.

The record companies in particular worry about DAT because it makes high quality home taping too easy. Plans exist for a technical block on copying compact discs to DAT. Domestic DAT recorders will refuse to record code sampled at 44.1 kHz, thus making a direct digital dub from a compact disc player impossible. If the hardware and software industries both co-operate over the adoption of an anti-copy system, like the CBS Copycode technique, DAT recorders could refuse to record any music containing an identifying notch in the frequency spectrum.

But the plans for making DAT a non-copy system seem sure to founder. Although the hardware industry has been making conciliatory noises to the record industry, the record companies look likely now to win their fight for a tax or levy on blank tape. If so it is hardly likely that the hardware manufacturers will build circuitry into their DAT recorders which prevents the machine doing what the levy allows!

All the signs are that CD and DAT will co-exist, like the LP and conventional audio cassette

Earlier this year the popular press carried scare stories that the DAT launch in October this year would make CD obsolete. Confuse the market, yes—but make obsolete, no. In the future, when tape and hardware companies have learned to mass-produce the tricky technology of DAT, when the prices of DAT hardware have fallen to something approaching the absurdly low levels of compact disc players, and when the reliable contact-printing of 4 mm DAT tapes is available at under the cost of CD pressing, the record companies may well change their minds over releasing software on DAT. The format will then start to rival CD as a music carrier—just as the boom in pre-recorded music cassettes has slowed LP sales.

But this is a long way off. Even if DAT is launched this year in Japan, domestic players are unlikely to find

By the time these words appear in print we should know the answer to a burning question—will the Japanese launch DAT, digital audio tape, this year or not?

By Barry Fox

their way into Western shops for the best part of a year. The price of DAT players will initially be high; figures of up to £1,000 have been quoted. Even at half the price this will still make DAT five times more expensive than a CD player. Some sectors of the trade expect a £99 CD player price tag by the end of the year. Because DAT relies on chips and high precision mechanics, instead of chips and solid state optics, it will probably always be 50% more expensive than CD. The tape, with 1500 Oe coercivity, is tricky to make. Sandwich printing is no mean feat because the mother must have a coercivity of around three times the blank.

The high initial price of DAT will of course not worry broadcasters and professionals, who see the rapid-access tape format as the ideal tool for high quality location recording and studio mastering, and perfect for CD mastering because of the 2 or 3 hr playing time.

All the signs are that CD and DAT will co-exist, like the LP and conventional audio cassette. They are complementary rather than competitive.

The extent to which DAT eats into CD sales as a music carrier will depend not just on the price of DAT hardware and availability of software but on the ability of manufacturers to make a CD machine which is genuinely portable—at the moment CD players are small but they cannot withstand knocks. In industry parlance they are not yet 'joggable'. But the CD system servo technology has headroom for improvement.

The balance between CD and DAT, at the end of this decade and during the next decade, will also depend on the price structure of the CD pressing market. No-one disputes that current CD prices, of around £2 a packaged disc ex-works, are too high. The retail price of £11, £12 or £13 is also too high. The reasons are understandable. Although it takes only a few pennyworth of

plastic and aluminium to make a compact disc, the technology is daunting. So is the capital investment in plant and know-how. Pressing factories want to claw back this investment as soon as possible—before the dozens of factories currently being built around the world come on stream, iron out the bugs and start producing enough discs to push supply above demand.

The retail trade has a vested interest in keeping the price of compact discs as high as possible, for as long as possible. It is a seller's market. For too long now retailers have been selling black vinyl LPs to a buyer's market, on absurdly low margins set by the cut throat market which the retail trade has inflicted on itself.

It can be argued, persuasively, that CD is the ideal carrier for high value data and text. The cost of pressing a CD ROM is the same as a music CD and small beer compared with the copyright value of all the Ordnance Survey maps for an entire country or the full text for a 21 volume encyclopaedia.

Philips estimates that in 1983, 340,000 CD players were sold worldwide. In 1984 the figure was 0.9 million; in 1985 around 5 million CD players were sold and this year the number should top 10 million. Polygram predicts 60 million players around the world by 1990, with

In 1985 around 5 million CD players were sold and this year the number should top 10 million

factories producing around 700 million discs a year. So CD has quite a head start on DAT and the record companies are not about to throw away their investment in CD pressing by undercutting the price of music CDs with equivalent DAT releases.

Take Thorn-EMI for example. EMI has no plans to release music on DAT. Jan Timmer, president of Polygram International has already gone on record as saying he will not licence software for DAT release and small wonder EMI has no plans to release pre-recorded software on DAT either. The only thing preventing the British record companies from organising an industry embargo on DAT, is the fear that this might fall foul of Common Market law. But there is nothing the Brussels bureaucrats can do to stop all the companies 'happening' to come to the same conclusion.

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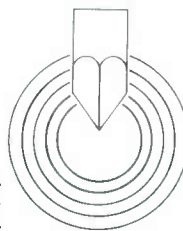
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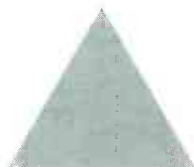


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Polygram International Quality Control

In software manufacturing, maintaining uniform quality is very tough, especially when your production plants are spread all around the world. All references, conditions and tolerable deviations must be defined within close tolerances and these must be identical for each plant. Polygram, working worldwide, has developed such a system.

Directly under the authority of Polygram's International Management is a division called Industrial Support and Liaison. This division has two branches, Engineering and Corporate Quality and Standardisation (CQS), the latter being the subject of this report. CQS is involved with both defining quality standards and co-ordinating quality control.

Quality control starts with the incoming raw materials and semi-manufactured products like PVC, PVA, cassette tape, cassette foil, etc. For the initial acceptance of a new product, extensive tests are performed. New products can be considered for various reasons like pricing, performance, availability, etc, and if a product fails the test a number of decisions can be made depending on the reason why the new material is being considered. When Polygram is very keen on improving a standard, such as switching from ferric to chromium dioxide tape a few years ago, CQS will ask engineering to help the manufacturer to evaluate and solve specific problems. In other cases the product will simply be rejected.

If a product passes the test it gets a CQS clearance, which means all plants are told the product is within Polygram specifications. Normally this leads to a special deal with the supplier for all Polygram plants, however, it does not mean that all the plants must use it. If a local supplier can meet or exceed the specifications with better conditions, the local management may decide to use the local product. Each plant has its own Local Quality Department (LQD) that reports to local management.

These LQDs are responsible for monitoring quality on a local level. In some cases they may ask CQS to perform tests for them although this will only be done if some form of general interest is served.

Both CQS and LQD are responsible for quality control but can farm out several tests to other departments. The Local Quality Department reports to local management and CQS weekly, monthly and quarterly. All reports to CQS include samples. At CQS these samples are compared with the

The problems of maintaining quality standards when you are an international company require special consideration. Hans Beekhuizen talked to Hanns-Diether Sommer, head of quality control, about how Polygram has tackled the problem

corresponding reports (we will come back to this later) and CQS feeds these figures to a computer for analysis and to provide statistics. Plants that produce deviating figures (both positive and

negative) will be detected at short notice and reported to International Management through the standard report system.

This does not necessarily mean a penalty or reward. The figures have to be weighed against local circumstances. For instance in some closed markets the import of raw materials or semi-manufactured products may be difficult or expensive and local products have to be used. To remain competitive in a particular market these raw materials are accepted.

Naturally records and cassettes from the competition have to be evaluated too. For local markets this is done by the Local Quality Departments but international repertoire is checked out by CQS, Baarn, just as sub-contractors are. Depending on the quality they can offer, these sub-contractors may be able to deliver quality group I, II or III.

Group I comprises classical music and special releases, group II low budget classical music and popular music and group III low budget popular music.



There are only slight differences in the three quality groups and a lower quality index figure than six is never allowed for any of the quality tests. The main difference lies with the number of sixes that are allowed. This has to do with the time pressure which is greater with pop releases. In addition pop music is often less sensitive to hiss, clicks, etc. Again, this does not apply to the sound quality but to production faults.

Obviously this implies that there must be a quality index figure that has the same value at all Polygram plants. To achieve this, CQS started with recommending a standard replay system comprising a specified listening room, Philips Motional Feedback loudspeakers, the complementary control amp, a turntable that meets certain specifications and is fitted with a Philips GP-400 cartridge and a good quality cassette deck that meets the standardised specifications. All the equipment is domestic equipment in order to replicate the same conditions that the average consumer uses, although the equipment is carefully adjusted for optimum azimuth, level and so forth. When listening to loudspeakers is not possible or convenient Beyer headphones are used. An important part of the QC procedure was to devise a 'tuning method' in order that all the equipment is used at the same SPL and has the same frequency

response. Both a record and a cassette were made to calibrate the overall performance of both media. For the calibration of a loudspeaker-based system a simple SPL meter was sufficient but for headphone-based systems a special calibration unit was developed that holds and measures the headset.

All production faults are indexed, each fault being scaled from 1 to 10. Where possible, examples were made of the different ratings. This led to the Audible Yardstick Record and Cassette that contain faults at quality indexes 2, 4, 6 and 8 (8 is just audible on the reference set). It should be pointed out that there is no use in making a reference yardstick for CD since production faults on CDs can be easily and objectively measured and counted by testing equipment like the Gold CD analyser. CQS is therefore mainly involved with the standardisation of CD production.

The Yardstick Record contains the following items, all in four gradations:

- Individual tick
- Repeating ticks
- Spatters
- Rough groove
- Run-in roar
- Separation fault noise
- Spattery hiss
- Swishes
- Plops

- Wow
- Distortion
- Cutting hiss
- Hiss
- Echoes
- Rumble

For Musicassette checks a box with 11 cassettes is used, one cassette for each fault and one test cassette for calibrating the playback system. The items covered by the first 10 cassettes are:

- Hiss
- Modulation hiss
- Dropouts
- Distortion
- Echoes
- Channel unbalance
- Lack of high frequencies
- Lack of low frequencies
- Emphasised high frequencies
- Emphasised low frequencies

Some faults are missing, because these appeared not to be practical, for example wow and flutter with cassettes. In most cases wow and flutter of the domestic replay unit far exceeds that of the cassette. Special limited versions of the test record and tapes are made for sub-contractors. These contain, however, only those quality indexes that are needed to fulfil any contractual obligations.

Other tests have to be made during the production chain from master to



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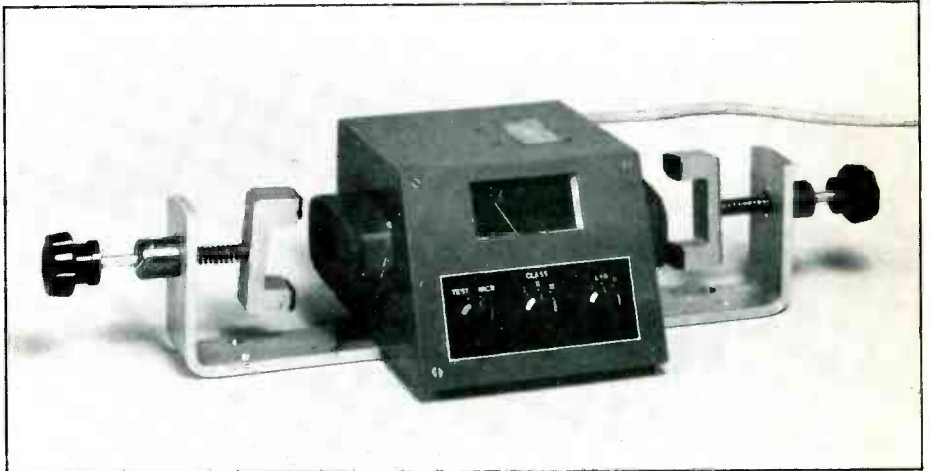
QUALITY CONTROL

finished product. This process can be divided into three main sections: (1) from the rough recording to the approved production tape (2) production of the records/cassettes (3) evaluation of the (semi-) final products.

The first stage is the same for records, CDs and cassettes but is by nature different for classical music and popular music. With classical music the producer and artist produce the original and have full responsibility for the overall quality of the original master tape. Next a production tape is made which often involves editing. This tape is checked against the score by CQS people (the Musical Approval team). If the production tape passes the test, recommendation of levels, etc. are made by the same team and it is passed on to the mastering department. There will be no deliberate change of the programme after Musical Approval, the master will be a one to one copy. With popular music the producer and artist produce an edited original which is not subject to musical approval.

From this point both classical and popular music are handled the same way but depending on the status of the production the tolerated quality index may vary. There is a difference though between records and cassettes. The production tape for cassettes is transferred to a $\frac{1}{2}$ in, 4-track, 19 cm/s mother tape. If with popular music, the production tape is not ideally balanced (too much HF, dynamic range, etc) some adjustments may be made. During the transfer, quality control is carried out by the operator by monitoring off tape. If no errors occur the mother tape is loaded in the bin and duplication at 32x speed is started. Samples are taken from the pancake and compared with the mother tape by the production department. Passing this test, some tape is loaded into C-0s and checked again but this time by the Local Quality Department (against the mother tape) and by the Musical Approval team (against the production master). Then the production really starts and both the pancakes and the cassettes are tested at random for technical faults by the production department. If a fault occurs, the whole batch up to the last good sample is rejected. Finished product, including labels, inlay cards, etc. are tested at random by the Local Quality Department which reports to CQS, Baarn, as mentioned before.

With records the quality control is much simpler. The production tape is cut and again classical music is untouched whereas popular music may need some adjustment for technical reasons (out of phase LF, high level HF, etc). Then, after the stamper is produced, a test pressing is made. This pressing is checked out by the production department (on press-technical quality), the Local Quality Department, (100% versus the production tape on both press-technical and sound-technical qualities) and the Musical Approval team (on sound-



Headphone calibration unit



Vinyl quality control

technical qualities). If no problems are found the presses are set to work and during the production every one in 30 records is checked visually. If a fault is suspected, that record is evaluated audibly. One out of 500 is tested on a special device known as ATREM, Automatic Tick Registration Machine. This machine identifies ticks on records and provides a printout which includes the location of the ticks against the cm diameter.

The chief inspector also checks samples from all presses in a random sequence that is generated by computer. The last check is performed by the Local Quality Department on the different batches and this result is compared with that of the chief inspector. Again, the Local Quality Department reports to both the local management and the CQS in Baarn.

With all these checks, the same quality indexes are used for comparison against the yardstick. On the production floor isolated booths are installed for listening tests. The use of the standard quality index provides reliable information for international management to base policy on. If a plant regularly produces products with

more rumble than normal (as for example an Italian plant some years ago) the testing conditions are checked out. With the (now sold) Italian plant the move of the quality control room to a new location close to a highway was the reason. The highway noise masked the rumble on the recording.

The Polygram Quality and Standardisation system is well guarded. The four bands of information are not freely available but can be bought. Sub-contractors only get half the story, just enough to perform their tasks correctly.

Hanns-Diether Sommer, head of the quality branch of CQS, stresses that the quality control is to monitor a rather good production process. "One can not improve the quality by testing, it can only tell you what quality level you are working at at that moment. Another important thing is the maintenance of the measuring equipment. Not only do the Yardstick cassettes and records have to be replaced from time to time but also devices like the headphone calibration unit has to be calibrated. Quality control is not the task of a few enthusiasts but an integrated part of everybody's job."

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Production Options - Part One In Praise of Vinyl

Three years into the 'CD era', how much more difficult has life become for the LP producer, especially the smaller, specialist label which relies on outside suppliers for each and every stage from disc mastering to final pressing and packaging? CRD Records, with a varied and enterprising catalogue of approximately 150 classical titles, is one such label, and indeed for managing director, Graham Pauncefort, important decisions on a future commitment to the LP must soon be faced, even though he is more than pleased with the current standard of his 'black discs'. But then, these are questions he feels the whole industry is going to have to find answers for sooner or later.

It would not be the first time Pauncefort has had to face the realities of the business of making records since he founded the CRD label on the back of a successful record importing enterprise—Continental Record Distributors—in 1973. Prior to that, he had learned the ropes during six years with Deutsche Grammophon, becoming sales manager by the age of 24.

After four years, the CRD operation was doing well enough to attract the attention of a Swiss-based investment outfit, operating on behalf of a French record company. They took an 80% stake, a move which Pauncefort describes as, "the biggest mistake I ever made." The reason for the admission was that within 18 months the new majority shareholders had elected to put CRD into voluntary liquidation, and even though he still occupied the MD's chair, there was nothing Graham Pauncefort could do.

"I've never to this day found out why that action was taken," he ruminates.

Although the CRD label itself was not included in the closure, it still cost Pauncefort dear, not just financially but in terms of reputation.

"People tended to blame me, even though I didn't control the company. Certain people had to be paid off before they would undertake any further work for CRD Records. I lost all ways."

However, the label quickly regained any lost prestige, and to date has continued to make consistently high quality classical recordings, concentrating mainly on the Renaissance, Baroque and chamber music fields, and having carved

While the majors fight over CD capacity, what has been happening to the vinyl LP? Peter Herring, in the first of a three part series, looks at a classical record label and its attitudes to the vinyl LP



Graham Pauncefort, MD of CRD Records

'DMM is expensive—almost as expensive as CD mastering—but we're very happy with the results.'

something of a niche for itself in the repertoire of 19th and early 20th century French music.

Since the demise of the distribution side of CRD (which naturally undertook that task for the CRD label), this aspect of the operation has presented some difficulties. The Decca offshoot, Selecta, did a good job until its closure following that label's takeover by PolyGram, then came a spell with Unicorn—until its distribution network was similarly wound down—and Lugtons. In recent years, PRT has had the responsibility and, with all 150 titles always available, "are doing a good job for us," confirms Pauncefort.

However, he adds that the disc mastering side has been, "Another nightmare which has cost me money down the drain over the years.

"When we started the label in 1973, it was 'boom time', and cutting and pressing capacity was at a premium. Initially, we went to C-Disc (French Philips), then in 1975 switched to Phonodisc at Walthamstow.

"All went well until—quite suddenly—they told us to quit, with one month's notice. We went to Decca but of course, they were unable to use the Phonodisc metalwork—everything had to be recut. Around that time, we also started using Nimbus, eventually going over to them completely with the closure of the Decca facility.

"I actually have records in the catalogue that have been mastered three times! A terrible waste of money."

With the announcement that Nimbus was quitting LP production and concentrating exclusively on CD, a depressing sense of *déjà vu* not surprisingly descended on Graham Pauncefort, so he was delighted to hear that Phil Race's PR Records' presses were compatible with the existing Nimbus metalwork.

Mastering is now done by EMI, using the DMM process (so far, some 20 of the current catalogue have been cut on this system).

"The transition from Nimbus hasn't been too drastic; PR are very, very good, and now that they can do DMM mastering as well, we have yet another option. What's more, they tell me that titles not DMM mastered can still be pressed on DMM presses, and gain in quality into the bargain."

Not that Pauncefort has any complaints about the current standard of his pressings. He always takes a LP at random from each batch that comes in, and has yet to find a bad one.

"This business of faulty records puzzles me; we just don't get surface noise on our records."

He also added that, as far as CRD was concerned, the current quality of both the vinyl mix and lacquers used was fine, with no problems arising in either area. Certainly, there was no decline in quality standards in those aspects of production, post-CD.

Would he be exploiting the longer playing times made available by DMM mastering to make LP issues that much more appealing?

"We've always offered very long sides," he countered, "so DMM won't make any difference in that respect."

Regarding the disc cutting itself, Graham Pauncefort is full of praise for what the EMI engineers have done with the CRD masters they've so far tackled:

"It's very good indeed. We're very happy with the things done at Abbey Road. DMM is expensive—almost as expensive as CD mastering—but we're very happy with the results.

"We could have put the whole job with EMI but I don't think they're ready for the small runs a label like ours sometimes needs. We often press 'up-to-sleeve', which can mean just 250 or 300 copies. That's occurred with some 12 titles lately but doesn't worry PR."

But what if PR follows Nimbus' example and phases out its LP facility once the new CD plant comes on stream?

Graham Pauncefort could draw but one conclusion from this: "If they did, it would have to mean the LP's days were pretty much over, though there would still be EMI, of course, and that would have to be our contingency plan.

'My personal view—and it could change—is that we needed a new format like a hole in the head.'

"It's a problem now continuing with the LP and I guess by the end of the year the situation will have clarified somewhat.

"We are still planning all our new releases—10 or 12 a year—for issue in three formats—LP, cassette and CD. It's a pain because I don't think we're necessarily going to sell more pieces in the long run, yet there's separate origination—'tooling up'—for all three. Even the sleeve artwork, even though it's basically the same design, has to be done three times.

"Where we go, I don't know. For the moment, we'll continue with all three and see what happens. I would imagine by the beginning of next year we might have a few more pointers."

Pauncefort was intrigued by the description of the Filial laser-optical LP player from the States in a recent edition of *Hi-Fi News*:

"At first, I thought it was a spoof. Apparently, like CD, you get no surface noise. If it can be successfully mass-produced, it could change the future of the LP." He added that 'blind' listening comparisons undertaken by himself and his highly respected producer, Simon

'True, it's still a seller's market as far as CD goes,' concedes Graham Pauncefort, 'But it could be very different next year.'

Lawman, were revealing little significant difference in sound quality between their current LP, CD and Ablex-sourced chrome cassette products, so perhaps the funeral rites for the LP are a little premature.

"Whatever the format, we want to ensure a high quality product. That's why we've stuck with our distinctive gatefold LP sleeves. They cost three times as much as the normal sleeve but I aim to project a top quality image. Excellent presentation is essential in our market."

So with that kind of commitment to LP, how did he view the coming of Compact Disc?

"My personal view—and it could change—is that we needed a new format like a hole in the head, especially as we do find the differences between the formats are often imperceptible.

"I felt initially that CD might be the saviour of the industry. I don't mean the industry was dead but it had been in some decline and needed—from the public's point of view—some new interest. But the honeymoon hasn't lasted very long: it seems to be almost over and we're back to selling music. Now, just because you can offer CDs doesn't mean they're automatically going to sell. We've been offered enough capacity to put our whole catalogue on CD within a year but the investment is colossal."

Given that, and his obvious satisfaction with the current state of CRD's LP product, would he like to see the 'black disc' continue to thrive?

"Put it this way: I would prefer to see fewer formats. Quite simply, it's more profitable that way. It's hard enough to make a profit anyway, especially with the high costs of recording. We have to have a world market, and there's a lot of competition, especially from the majors putting stuff out at mid-price. I cannot believe that they make any money out of their classics: they throw money at artists, venues, engineers and that makes life hard for us. They still talk in telephone numbers, and we can't compete with that."

It's a problem CRD, along with other specialist labels, have successfully overcome by encouraging new and up-and-coming performers, generally with excellent returns. Graham Pauncefort adds, however, that the current commitment to three formats is forcing a slightly more conservative approach to repertoire—a pity when the lover of music outside the classical 'mainstream' has come to rely upon labels such as CRD to sustain that enthusiasm.

"True, it's still a seller's market as far as CD goes," concedes Graham Pauncefort, "But it could be very different next year." He is keeping his options open and, given the standards of mastering and pressing he is able to obtain consistently, those options include the LP. As far as CRD is concerned, the black disc hasn't yet acquired dodo status.

CRD, still a strong commitment to vinyl



Everything had to be Delivered Yesterday

The technical problems inherent in the manufacture of CDs have been discussed in previous issues (and will no doubt continue to be discussed for a long time) but the day-to-day or month-to-month problems of planning/scheduling and educating clients into new working methods haven't been entirely free of problems either.

Mayking Records has been in existence since 1980, and was born, in part, and fuelled by the explosive requirements of the independent record market in tandem with the rapidly growing TV record merchandising sector. Our association with MPO exempted us from the physical difficulties of producing a disc (or cassette) but at the same time we had the difficulties and responsibilities of catering for a rapidly evolving and fast growing market whose needs and requirements could not easily be met at that time by current custom pressing facilities.

What evolved at Mayking was a rather unique service that offered a full production service to its growing list of clients; an excellent quality product with all the benefits of high volume business at relatively low volume runs. A necessary part of this business at times required accepting production parts that didn't really deserve the name, along with some rather bizarre ideas on distribution/marketing (and, dare I say, payment). As time progressed and companies became more efficient the emphasis never changed—everything had to be delivered yesterday—bikes here and there, hand couriered parts to the plant, recuts appearing the day before delivery, etc. It's almost as if there wouldn't be any fun involved if everybody either had the time needed to supply what they had to or they finally got the right cuts, correct label copy, camera-ready artwork all with the same catalogue number at least two days before they required the product.

Compact discs have kind of changed this—for a while! The expression on one

... was met with a shrug of the shoulders and a finger pointed in the direction of that reputable company just off Tottenham Court Road . . .

Brian Bonner of Mayking Records looks at the production schedules for compact discs and wonders when the record companies are going to adapt to the new conventions

poor chap's face—when he walked into my office with 10½ in analogue master tapes four days after our production deadline, and in the middle of telling me which tracks he wanted from which tapes (three 'B' sides to follow tomorrow) was met only with a shrug of the shoulders and a finger pointed in the direction of that reputable company just off Tottenham Court Road—had to be seen to be believed. The easy-going, sometimes casual approach to vinyl manufacture had gone. Suddenly it all had to be right. From the off I decided that we would not become actively involved in CD pre-mastering on behalf of our clients—too much was at stake and ultimately it was much too subjective. To date, we do not supply CD tests; although problems can occur at the pre-mastering stage (they are invariably picked up when the tape is checked prior to glass-mastering) and very occasionally from the pressing (contrary to popular belief, pressing problems have not disappeared) the onus is now on the client to supply materials that are up to the specifications required and ensure that they are correct.

By far the biggest change the customer has had to cope with (apart from the price) is the different lead times involved between ordering and supply. It was also strange for Mayking, as we were moving from a position where the customer invariably received a 'yes' to his request whether it be for four or 40,000 units (by tomorrow), whereas with CD it could be between two and four months! What has recently made it a more complicated issue for the client is whether he will still be able to sell it in three months. The recent action by some American companies on parallel CD imports

combined with a more selective marketplace and a still rather low percentage UK sales has meant to some extent a greater risk on forward ordering.

Clients have not found it easy to conform to either the allocation system or the lead times involved. In a situation where there is still a drastic shortage of supply we still have to phone customers for their orders and remind them of the deadlines for the next month's production. There is still a very poor perception by record labels at large of the process conditions and levels of technology let alone how critical some of the tolerances are when it comes to CD manufacture. The enormous problems we had at the beginning of this year when expanding our facility—namely the compatibility of various clean-air environments—resulted in a cut in product at times of over 50% and was totally lost on some of our clients. It thus makes it difficult

There is still a very poor perception by record labels at large of the process conditions and levels of technology let alone how critical some of the tolerances are

to explain with some economy why they can't have the product at 2 o'clock on Tuesday the following week—even if it is their sales meet!

When it comes to manufacturing all things should be possible and I suppose the decline of the record market over the last 10 years and resultant over-capacity have left a hard legacy to live up to. The popularisation of CD technology has led in some cases to an over-simplification of the procedures involved, thereby creating the illusion that CD manufacturers are able to operate under the same conditions as vinyl manufacturers. As the size of CD plants become larger, and as the market (hopefully) becomes more dominated by CD, plants will have to be able to react more readily to upsurges in demand and thus much shorter lead times. Having said that I have a feeling that for a long time there will be strong emphasis on a more formalised production plan than has hitherto been the case in vinyl and cassette production.



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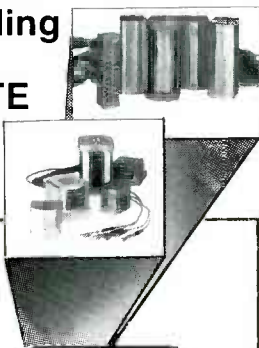
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A New Boom for CD?

Recordings issued for sale fall from copyright protection 50 years after the original release date. Today, many thousands of such gramophone records, mostly in the 78 RPM format, those at around 80 RPM and the cylinder type, are available to any record company. When great numbers of recordings fell from copyright protection, roughly covering the mass produced releases from the early 1900s to 1925, not too much interest was created, mainly because until 1926, commercial releases were of the acoustic non-electrical type of recording. Caruso was picked up by one or two firms, along with some banjo and jazz material but in general there was no mad rush to re-release acoustic recordings.

The situation was rather different with recordings from 1926 onwards, with record companies who at the time still retained their own copyright over the early electrical material, re-releasing a great variety of selected records on album compilations. This became really big business in certain areas of music, with enthusiasts always demanding more than could be reasonably fitted into a re-release programme, allowing for the fact that these major firms had their current schedules of new material to issue.

Gradually, as the early electrical recordings have fallen from the end of the 50 year copyright restrictions, more and more specialist record companies have started up with the sole intention of re-releasing this material in album form, the microgroove long playing format of an album being ideal for compilations of this nature. It can be noted that it is not uncommon to find the major record companies—borrowing such material from each other!

What of the future? It is now accepted that the conventional long playing microgroove album will be swept away in the next few years by the compact disc. The quality of CD sound reproduction is ideal for carrying the near perfect sound of digital recording. Given this new clean sound system

Stan White, ex-managing director of Concert Recording looks at an expanding future for re-issues on CD

what will happen regarding the re-issue of scratchy old 78 RPM material?

When the microgroove album came on to the market, the main selling features were the extended playing time, which was considerable compared to a 78 RPM record, plus the much improved sound reproduction. Hi-fi followed by stereo, became household words, such was the impact of the new medium. Nevertheless, albums made up of compilations of sounds from the past, continued to grow in popularity. Perhaps mention should be made of a specific example. Decca had a series of albums called *The World Of...* which made a feature of a specific artist, usually from contemporary recordings or the 78 RPM era but not as a rule going back too far.

In 1969 Kevin Daly and Geoff Milne of Decca, made up a master tape featuring Reginald Dixon at the Wurlitzer organ of The Tower Ballroom, Blackpool, from old Rex label masters and pressings dating from 1935 to 1938. This was an interesting compilation done at the request of enthusiasts and intended for a vintage re-issue label. Sir Edward Lewis, after hearing part of this master tape, suggested that it should go on a 'World Of...' issue, which was accepted without argument.

Many compilations of 78 RPM records have been made, with varying degrees of success or failure as regards efforts to remove the old 'frying noises'

There was a problem and a note on the album and cassette made an apology for the surface noise from the old 78s, which ran behind the music. That album, issued at a time when the record buyers were very conscious of 'hi-fi' and 'stereo', climbed quite high into the best selling album charts.

Since then, many compilations of 78 RPM records have been made, with varying degrees of success or failure as regards efforts to remove the old 78 RPM 'frying' noises. When Australian Robert Parker put together a series of radio programmes for the ABC and BBC called, *Jazz Classics In Stereo*, he used original 78 RPM shellac pressings which were fed through a noise suppressor, an equaliser, then the mono signal was split and fed into a synthesiser which comb filtered the sound to give a pseudo stereo spread, the aforementioned suppressor had already removed some of the 78 RPM hiss and clicks, while the equaliser had compensated for deficiencies in the original recording by balancing the sound and generally bringing it forward with quite staggering results. However, he did have to strike a balance regarding surface noise. To filter out too much would have led also to filtering out some of the recorded music, consequently some surface noise remained.

The pattern is plain to see (and hear!)—there is a powerful section of the record buying public who really do enjoy listening to compilations in album form, taken from 78 RPM pressings from the distant past. In fact, these compilations have led to a tremendous following for the dance bands, jazz bands, vocalists, cinema organs, etc, who were popular at a time when many of today's listeners were not even born.

With so much material free of the 50 year copyright restriction, which is now running straight into the period of the great dance and swing bands, the famous record and film stars including the Hollywood Musicals, the field is wide open for a vintage re-issue programme by companies already in

operation and others yet to be formed which will leave past work in this field in the shade.

All this activity is good for small record companies, who by entering this field are fulfilling a need, providing work for their own staff, for distribution companies, raw materials suppliers, etc, not to mention the tremendous boost to the income of the musical copyright owners, who are collecting royalties all over again, on tracks which they first dealt with 50 or more years ago. The musical copyright does not follow the same pattern as copyright on the sound recordings. (Music copyright exists for 50 years after the death of the composer so much of the copyright on the music is still in operation.)

Compact discs will carry the best recorded sound the world has ever known and is so good that it has probably now reached a limit beyond which to go further would be pointless as the human ear would be unable to hear it. Having said that, there is no doubt that CD plants will become very busy pressing re-issues for a variety of record companies. These will include all sorts of compilations of vintage sounds, from master tapes made up by specialist studios who concentrate on dubbing from 78s to tape masters whether analogue or digital.

Listeners to albums of old recordings of this sort, know very well that there are limits to what can be done to

Efforts to improve the sound quality are appreciated, except where filtering has been overdone and rendered the sound almost lifeless

improve the sound quality and reduce the background noise. It is the original sounds recorded by a band or singer, which they wish to hear, therefore, they will accept the sound quality of the era in which it was recorded.

Efforts to improve the sound quality has been overdone and rendered the sound almost lifeless. In the past added reverberation has also caused problems, so that anything which is likely to change the character of the original recording, must be used with caution and preferably not at all when there is doubt.

Many masters of vintage material already exist which have been used for microgroove albums, most of these will

There is no doubt that CD plants will become very busy pressing re-issues for a variety of record companies

be quite suitable for CD use, either as they are or perhaps brightened up when being copied to a digital master. None of this is a great problem. No original masters now exist for many 78s, so the best possible pressing available has to be used when compiling a collection for issue, the public are tolerant of this situation. It has been said many times by enthusiasts of old dance bands, etc, that the records don't sound right without some background noise, because that is how they were first heard!

Laser and digital technology is the way for the record industry from now on and an increasing slice of the sound market is going to be taken up with nostalgic and vintage re-issues of sounds covering much more subject matter than has ever been attempted before. From the millions of recordings going back to the beginning of the century, perhaps someone will even compile an interesting album of pre-1900 material, some worthwhile sounds of historical interest certainly exist.

Once CD manufacturing plants are established with enough capacity to handle all production demands, they will find a lot of their work coming from firms set up to specialise in reissued material, with Al Bowlly and the other vocalists and bands from the 1920s, 30s and 40s gaining even more popularity through the CD market.



The first 3 editions of **ONE TO ONE** (as shown) proved to be extremely well received by readers and advertisers alike.

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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 new magazine.

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Letter from New York

During a recent transatlantic conversation via our electronic mailbox Bob Ludwig of Masterdisk, the well known New York disc cutting facility, had a few interesting things to say about the current state of the industry. One of the most interesting questions for the cutting engineer, of course, is how quickly digital is taking over and how the situation is affecting analogue.

"From my hot-seat behind the console at Masterdisk I have the good fortune of being involved in many state-of-the-art, money no object projects. The digital revolution has been going on long enough now that finally one can begin to get perspective on what is happening. As the ratio of projects recorded digitally versus analogue continues to swing towards the digital medium it now seems clear that those who thought it was simply a matter of time before *all* recording would be done digitally are incorrect. Analogue is alive and well.

"There was a time when, given the choice between a good analogue recording and a good digital recording, I would always choose the digital. This remains so, for me, with classical and jazz recordings, or any recording where the intent is to reproduce as accurately as possible a live performance that actually existed. With pop recordings, which are usually a montage of electronically manipulated live recordings mixed with pure electronic sounds, the analogue tape recorder may become another valuable tool for the creation of the desired sound. I have worked on many projects which were recorded both analogue and digitally and so far, there seems to be no rule of thumb as to which recording medium is best. Some projects, like the recent Journey album sounded best analogue.

Bob Ludwig takes time out to provide a few observations on Masterdisk's growing involvement with digital mastering.

The recent Lou Reed album, however, sounded very much better in digital!

"I suggest that producers and artists do trial mixes both ways and decide just how much the analogue machine will be used as a sound tool—an extremely expensive and usually very musical compressor! Some day we will have digital software that will simulate various degrees of time saturation, but today it is much cheaper to use an analogue machine. Digital multitrack machines have a long way to go before they are as flexible as present-day analogue multitracks.

"Everyday activities such as recording backwards, highly varispeeding, playing off sync heads for triggering sampling machines is still difficult or impossible for digital machines to do. As with stereo machines, if the music calls for a certain sound and it can't be achieved on a digital machine, artists will still demand analogue."

Masterdisk is of course one of the American facilities waiting for its new digital Neve mastering console. Any comments?

"We have one of the new Neve CD mastering consoles due for delivery soon. It should be very nice. It is state-of-the-art and yet it is also crude in its flexibility compared to our analogue desk that is a result of a whole life-time

of disc cutting and mastering evolutions. Don't get me wrong, we are delighted about being among the first to contribute to its evolution! The digital desk will, someday, offer options we can only dream about now."

Finally the thing everyone is talking about—R-DAT. What did Bob feel about the new technology that is creating such divided opinions at the moment?

"I am excited (unlike Philips!) about the introduction this spring of the digital consumer cassette. I am a big fan of CDs and will always continue to buy them. The quality and ease of operation of the R-DAT tape should be almost as good and as fast as the CD but I'm sure normal tape problems (wear and eventual dropouts) will make the CD the medium of performance. However, I see the digital cassette being the method of less permanent recordings: the few thousand promotional copies that we make for radio stations will be done on them. It isn't cheap now, and probably won't be for long while, to make 500 to 1,000 CDs. Turn-around time will still be a problem for a while. The R-DAT cassette will fill this need. We are currently making promotional discs on analogue records for music the radio station can play from a CD! This is strange. I think also that the average small rock group that distributes their work at clubs via cassette will use this new digital format. Obviously the big bucks will be made by the high-speed duplicators doing commercial recordings but my point is that I think there is an actual need and advantage to R-DAT cassettes and I believe that they will be immediately accepted much to the dismay of record companies worried about tape pirates (justifiably I might add!)."

BPI NEWS

UK record industry back to steady growth

According to the BPI after a relatively flat first quarter this year, the UK record industry moved forward again in the second—which was notable for the recovery in singles sales figures, and the fact that music cassettes unit sales were so far ahead of LP sales that for first time they had a higher value, despite their lower average trade price.

In the April-June quarter deliveries to trade were up 17% in value on the same quarter of 1985—£82.1 million compared with £70 million. This is a return to the general level of growth experienced during the past two years.

Unit sales of singles, at 17.1 million showed a 3% improvement on this

quarter of 1985; a particularly good result in view of the 17% year-on-year drop during the first quarter of this year.

In the cassette sector of the market average trade price fell by 1% but another very large increase in unit sales put tapes so far ahead of LPs—12.6 million compared with 9.7 million—that for the first time cassettes earned more revenue—£27.8 million compared with £25.3 million.

Compact disc remains on target for 6 million sales in the UK this year. Deliveries to trade in the second quarter were close on 1.5 million units, an increase of 164% on last year.

Average trade price is up by 8% compared with a year ago. In that 12 month period CD contributed 5.6% of the industry's total revenue, but in the first half of this year alone more than 11% of all turnover has come from CD.

Vinyl LPs, in contrast, continue their steady decline. Unit deliveries were down 6% on the second quarter of 1985 (value, at £25.3 million, was down 4%, showing a small average price increase).

Total revenue from all formats in the second quarter of this year was £82.1 million and in the first half of 1986 was £154 million, a 10.4% increase on the first half of 1985.

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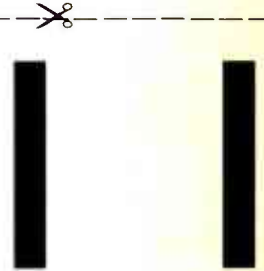


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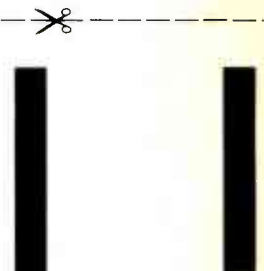
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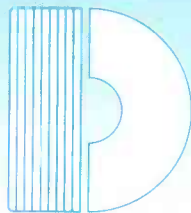
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