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Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE
FOR RECORDING, POSTPRODUCTION AND BROADCAST



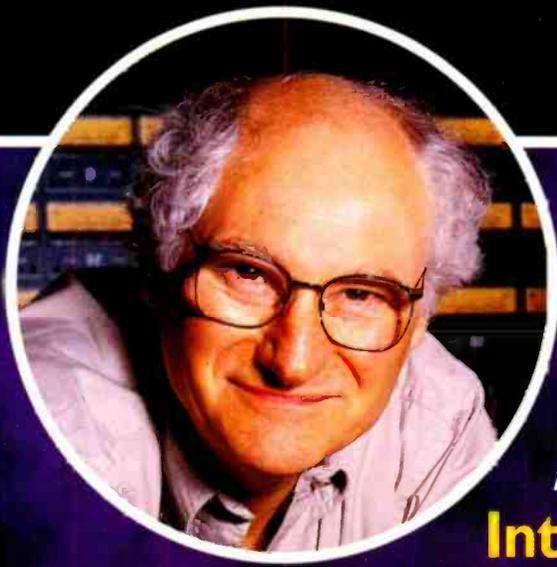
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The
**MALCOLM
ADDEY**
Interview

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THE MIRACLE OF DISCOVERY
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UK

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 Broadcast Film & Video Services, *Bristol*
 dB Post, *London*
 De Lane Lea, *London*
 GDO, *London*
 Pinewood Studios, *Iver*
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Europe

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 Europa Studios, *Sweden*
 Exa, *Spain*
 Filmtel, *Spain*
 GLPIPA, *France*
 The Icelandic Film Corporation
 Jackson Studios, *France*
 Nordisk Film, *Denmark*
 Sonodi, *France*
 Soundtrack, *Spain*
 Studio Hamburg, *Germany*
 Tremens Film, *Austria*

India

Gaurav Digital, *India*



Warner Bros, Burbank – Stage 3



Warner Bros, Burbank – Stage 4

First



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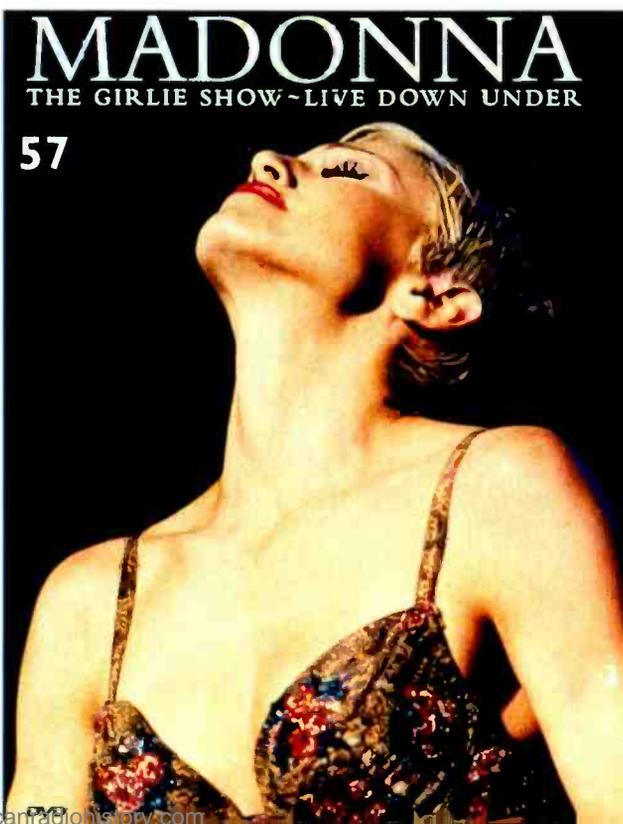
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Anybody out there? Apparently, yes

IT IS A SAD FACT OF LIFE that we all need to receive feedback for our work in order to carry on. You can mix in isolation, cut and edit in solitude, or take and retake in loneliness; but it is the single unsolicited morsel of praise, the silent nod of agreement, or the rare slap on the back that makes it all worthwhile. Everybody needs recognition.

I have to thank you, as a valued reader of this magazine for responding so positively to the voting of *Studio Sound's* Audio Industry Recognition Awards, and for providing such invaluable input into what I am sure will become the most coveted product accolade in our industry. You have recognised the importance of what we have created and supported us by volunteering your opinions. I know there are none better qualified to pass judgement.

I am sure some of the manufacturers would also like to thank you for recognising their efforts. Given that we spend so much time off-mic belly-aching about what is wrong, it has been a refreshing experience to be party to a process that is geared in its entirety to that which is right.

Given the rate of change, or lack of it, in certain areas, perhaps we should contemplate the effect that positive feedback might have on the makers and creators. The SSAIRAs winners and commendeds have all received resounding recognition for getting things right from the people that really matter. Together we can make things happen.

Zenon Schoepe, executive editor

Design for life

QUITE APART from the tragedy of being counted among the Unibomber's victims, there is an irony that David Gelernter should have been one. Singled out for his high profile in computer and software development, Gelernter is critical of much of modern technology—if in a more moderate and dramatically more constructive way than his antagonist. Where Theodore Kaczynski lived simply and acted criminally, author and Yale scientist Gelernter worked his way through an education in art, literature and computer science and has turned his skills on what he calls 'featuritis'.

The explosive parcel received by Gelernter left him with a damaged hand and eye, but has not halted his work on a completely new concept for the computer desktop. Nor has it tamed his campaign to reassess the predominant design ethic that sees manufacturers from various disciplines and nations adding ever more features to static design concepts. Called Lifestreams, the new desktop dispenses with the rigours of file naming and organisation necessary to operate today's computers—just one example of featuritis. Gelernter regards other developers efforts as lazy, using advances in technology and the falling cost of memory as an excuse to turn out increasingly feature-packed, but less efficient systems in lieu of anything genuinely innovative. Perhaps it is his artistic insights that enable him to see what other software authors cannot—certainly, the title of his new book *The Aesthetics of Computing (Machine Beauty: Elegance and the Heart of Technology in the US)* suggests that this is the case.

But where Gelernter regards the computer industry generally to have betrayed the higher ideals of R&D, I suspect he would find much of what goes on in pro-audio development reassuring. His icons of classic design, such as the Hoover Dam and Henry Dreyfuss' 1930 steam locomotive, demonstrate many of the same qualities found in classic and modern studio equipment. Economy of design has endured in much of our kit; it enables not only efficient signal paths, but simple and speedy operation—all qualities that benefit its users. Obviously, the resurgence of interest in older equipment has played its part here.

What Gelernter can directly offer us is a word of warning: that as we move progressively into software, the failings that afflict mainstream software authors will increasingly tempt our own. **Tim Goodyer, editor**

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Incorporating Broadcast Engineering
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June 1998 **Studio Sound**

Made for Mixing

A digital multi-track console so straightforward,
it could be analogue!

Solid State Logic's new Axiom-MT provides up to 96 fully configured channels with standard SSL in-line ergonomics. Every control is dynamically automated - including surround panning on the small fader!

Axiom-MT supports all mixing formats via 48 multi-track buses and 12 main mix buses, and SSL's innovative EFX matrix provides access to 60 effects sends from each of the 192 automated inputs in mixdown.

Combining a familiar control surface layout with outstanding digital processing, Axiom-MT offers the many thousands of highly experienced SSL mixing engineers worldwide a seamless transition to the digital domain.



Solid State Logic

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▲ **UK:** Renowned composer David Dundas has re-equipped his London studio with a 96-input Otari Status console some 10 years after its original construction. Common to both events is the involvement of Stirling Audio who handled the first installation, and the refit. Quoted as valuing the recallability of the Status as a major factor in its selection, and pictured with engineer Pete Dennis, Stirling's Gary Robson and his wife, Dundas has achieved success with his advertising work as well as scores for films such as *Withnail and I*, *Sleepers* and *How to Get Ahead*

Show-time in Amsterdam...

The Netherlands: Attracting some 8,600 visitors to its almost 300 exhibitors, this year's European AES Convention took place in Amsterdam's RAI Centre—as it did four years ago. The venue remains popular with all and may catch the 'floating vote' of those unlikely to attend the Convention in a less entertaining location.

Commanding the first manufacturers' press call of the show—and consistent attention following it—was the launch of SSL's Axiom-MT digital console (see *Studio Sound*, May 1998). Representing a full 360° turn in thinking on operation, the desk employs a thoroughly analogue-style surface in the belief that it

is not only tried, tested and understood, but eliminates clients' potential uncertainty over booking a digital studio room. Elsewhere on the show floor, the hot topics of wide-and-fast digital audio standards and multichannel delivery ensured a high profile for manufacturers of digital systems and loudspeakers alike.

When compared to the likes of the IBC, which also favours the RAI with its presence each year, the AES was undeniably small, but this offers more of a comment on the current fortunes of professional audio than support for the show. And, once there, it made the AES a far more enjoyable experience than larger

SPARS changes

US: American industry body the Society of Professional Recording Studios has announced that Lee Murphy is to relinquish the position of president. Citing 'personal reasons' for his move, the owner of New York's Briggs Bakery studio is to be succeeded by present vice president and owner of Dallas' Omega Productions, Paul Christensen, for the remainder of his office term. New to the SPARS board are Avatar Studios' Zoe Thrall and Sound on Sound studios'

David Amlen. **SPARS,** tel: +1 561 641 6648.

▼ **US:** Top-rated talk programme *The Tonight Show* with Jay Leno is now using a Euphonix I04 fader CS3000B for live-to-tape and on-air broadcast work NBC's Burbank studios. The Euphonix digital control broadcast system replaces a 10-year-old large-format analogue console and includes 56 channels of dynamics and features Hyper-Surround for 5.1 surround sound mixing. For the inaugural show on 20th April, the desk was operated by NBC chief engineer Bob Whyley.



More awards

UK: Awards fever continues to spread through the pro-audio industry with the announcement of the CEDAR Awards for sound restoration, and the recent Welsh Radio Awards. Devised to acknowledge the achievements of those active in sound restoration, the CEDAR Awards comprise categories for CD Remastering from a Modern Recording (post 1949); CD Remastering from a Vintage Recording (pre 1950); Remastering from a Film Soundtrack; Audio Restoration for Broadcast Use; Audio Restoration for Forensic Use; and a CEDAR dealer award. Nominations for the five main categories are invited from all 'interested parties' including prospective candidates to CEDAR (Tel: +44 1223 414117 or www.cedar-audio.com/cedar-audio) before 14th August 1998.

Held during May in Aberystwyth, the TDK-sponsored third Focwys Welsh Radio Awards continues to build on the territory's pride in its broadcast standards and achievements. Of the 10 main awards, the Best Response to a News Event was won by Patrick Hannan and Guto Harri for coverage of the referendum on BBC Radio Wales while Best Production went to Owain Williams for Celebrating 21 Years of Radio Cymru—both reflecting the strength of the Welsh radio scene. A further special award for Services to Welsh Radio Broadcasting was made to Ian Skidmore whose career dates back to the Berlin airlift.



▲ **UK:** London's Metropolis is gearing up for the anticipated demand for DVD and Super Audio CD mastering with new rooms for mixing and mastering to wide-and-fast, and surround formats. The recently completed 5.1 mixing room contains an SSL j-series console, Genex MO recorder and PMC monitoring. The Genex GX8000 is one of six to go into the new studio complex offering a wide variety of services from music scoring to surround mastering.

▼ **Worldwide:** The current Spice Girls tour, readying to leave Europe bound for the US, and set to take in all 'corners' of the planet, is to do it with desks from Amek and Yamaha. The FOH console is a 74-input Amek Recall console featuring RN input modules—the first to do so—running with two Yamaha 03D digital desks. The RN modules' mic amps and EQ are, as their name suggests, the work of Rupert Neve and have been chosen by FOH engineer Mike Dolling (below) following his experiences with the outboard 9098 series. The 03Ds, meanwhile, handle submixes for percussion and keyboards and are controlled by MIDI scene change commands originated by the Recall. The Amek also sends MIDI control information to a bank of Yamaha SPX1000 outboard processors. Further Yamaha digital desks, 02Rs this time, are assigned to monitoring and recording duties, in the latter case working as part of a 32-channel setup with ProMix 01s and DMP7s.



... and in Shanghai

China: The first Light & Sound Shanghai convention put on by PLASA and P&O Events is being hailed a success by participating companies. Taking place from 14th to 16th April against a backdrop of economic uncertainty, the exhibition was something of an exercise in testing the waters of this market which, despite current difficulties affecting the rest of Asia, has become increasingly important to sound and lighting contractors.

However the show, which was supported by 48 international manufacturers-distributors and 37 local companies, exceeded the organisers' expectations by attracting almost 5,000 visitors over the three days.

Among international sound companies exhibiting were BSS Audio, Martin Audio, Tannoy, Technica Engineering, EVI Audio, Deco Leisure and BOSE. All left the show convinced of its importance in the burgeoning Chinese market. Derek West, marketing director at Tannoy, sums up the feelings of many by saying, 'We honestly didn't know what to expect, but it's been a really good experience for us. The visitors have been really serious and

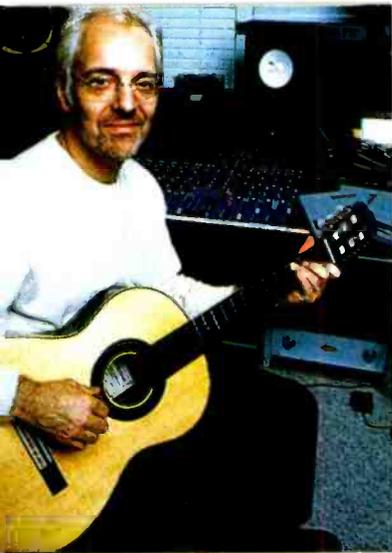
we've made some good contacts.'

Martin Audio MD David Bissett-Powell, who has been exhibiting in China for 20 years, praised the show for its professionalism: 'The actual appearance of the show is far more conducive to selling quality product and a better representation of our industry than we've had in other Chinese shows,' he says. 'All other shows in China need to be looking at this as the standard to aim for.'

Sponsored by the DTI, the show was one of the largest trade missions of UK companies to Shanghai. British Consul-General Warren Townsend comments, 'I am delighted that so many UK firms exhibited at the show with support from the British Department of Trade and Industry. Without exception, all those I spoke to were enthusiastic about the exhibition.'

The DTI also sponsored the nine sessions of seminars which attracted 810 visitors. DTI sponsorship continues for two more years, and PLASA and P&O Events are confident that the success of the inaugural Light & Sound Shanghai will lead to a doubling in size in 1999.

Caroline Moss



◀ **US:** British rock icon Peter Frampton has recently completed work on his Nashville-based Nuages Recording studio project. Built around a 56-channel Amek Angela console, Studer A827 multitrack recorder and large amounts of outboard, Nuages demonstrates Frampton's commitment to his emergent career as a producer, and his faith in analogue equipment and practices. Citing the experience of all his own albums, the guitarist is using Quantegy tape throughout and is currently working with guitarist Eric Stuart.

Sharc sighting

The Netherlands: During the recent European AES Convention, talks were concluded between the Harman Professional Group and Analog Devices making the two companies partners in developing Harman's 'high performance products portfolio'.

The arrangement allows Harman's Pro Group to make the most of a range of AD's 32-bit Sharc DSPs in its digital equipment. The arrangement is partic-

ularly enabling to the Harman Group as its range of activities make diverse demands on DSP processors. 'Analog Devices delivered on all counts,' commented Harman Technical Director John Oakley, 'offering us the greatest variety of price structure and technological integration without compromising efficiency, flexibility or functionality.' Sharc processing is currently used in the Group's Studer D950 digital console.

■ Russia's uptake of Orban's Audicy workstation has blossomed recently with sales to broadcasters including Terra TV and Radio, Radio Assol, Radio Stolitsa, Radio Donetskaya Volna, Zodiac TV and Radio, EPM Radio and ABA Radio. Russian opera theatre, Novaya Opera, meanwhile, is to install an AMS Neve VX recording console in its studio in Moscow. Although the youngest of the city's opera companies, Novaya is noted for its varied work which includes a variety of concert styles and theatre productions. The VX will see heavy use in classical recording.

ProRadio, Russia.

Tel: +7 095 974 1278.

Orban, US. Tel: +1 510 351 3500.

AMS Neve, UK.

Tel: +44 1282 457011.

■ Florida dealer Sales Force & Associates appointment as a Summit dealer has resulted in the company's own recording facility, Who Brought the Dog Studios, being the first customer for its new line. Co-owner Frank Woolf is also using Summit's TLA-100A with Magda Hiller at north Miami's Tapeworm Studios.

Summit, US. Tel: +1 408 464 2448.

■ Television New Zealand has taken six Micron 500-series radio microphone systems for use on-air and 'to fulfil the many and varied needs of a highly professional broadcaster'.

Audio Engineering, UK.

Tel: +44 171 254 5475.

■ London has a new post house, as Silverglade Associates has opened a Avid AudioVision-based 'one-stop editing facility'. The studio also features a Yamaha O2R desk and DA-98 MDM and is targeting TV programming and has been designed by Doug Robinson. Elsewhere in London, Videolondon has placed a 64-channel SSL Avant digital film console at the centre of a major refurbishment. Overseen by Munro Associates, the rework of Studio 4 is intended to target surround-orientated projects for TV and the cinema. Recent work includes the drama series *Sharpe* and *Soldier Soldier*, and documentary and foreign language dubs. SSL itself has installed a pair of DynaudioAcoustics BM16 active monitors in its new demonstration room.

Silverglade, UK.

Tel: +44 171 827 9510.

Videolondon, UK.

Tel: +44 171 734 4811.

SSL, UK. Tel: +44 1865 842300.

■ LA-based King Sound & Pictures has added a Flying Faders automation system to its vintage API Model 3208 console. Providing music recording and remix facilities to the LA scene and offers a Studer A827 analogue multitrack, custom 3M M79 1/2-inch mastering machine and a selection of classic outboard. The console served the likes of Sly & the Family Stone and Frank Zappa, and subsequently belonged to Randy Jackson in 24-channel form before receiving 8 further channels and additional aux sends. Chicago's Gravity Studios, meanwhile, has opted to install 33 channels of Flying Faders on its Neve console.

King Sound & Pictures, US.

Tel: +1 213 931 3099.

Gravity Studios, US.

Tel: +1 312 733 9760.

Uptown Automation, US.

Tel: +1 410 381 7970.

■ Brussels-based VRT Radio has placed an order for its fifth Amek DMS digital console, making it the world's leading DMS user. Although consistent in its choice of console, the

consoles have been assigned different areas of VRT's operation including on-air transmission and postproduction work. The latest order is for a 64-input DMS destined for on-air use.

VRT, Belgium.

Tel: +32 2 741 5061.

Amek, UK. Tel: +44 161 834 6747.

■ Peter Gabriel's Real World has added a SoundField SP5422 microphone to its cupboard.

Real World, UK.

Tel: +44 1225 743188.

SoundField, UK.

Tel: +44 1924 201089.

■ The first rental take-up of Sony's PCM-3348HR 24-bit digital multitrack has come from UK-based FX Rentals. The two new HR machines bring FX's commitment to DASH to a total of five. Underground Sound, working out of Nashville, is now offering Rane Paqrat 24-bit DA-88/ADAT converters and Otaris' UFC24 Universal Format Converter as part of its expansion of business in the American south-east. French rental operation, Dispatch is the first European hire company to offer Soundcraft's Series Five FOH console as well as the Series Five monitor desk. First use of the 48-channel FOH desk is a European outing for Jean Jacques Goldman, while the monitor desk is seeing action on a variety of TV shows.

FX Rentals, UK.

Tel: +44 181 746 2121.

Underground Sound, US.

Tel: +1 615 242 2242.

Dispatch, France.

Tel: +33 148 632202.

■ Brazilian interest in DAR's workstations has been kindled for the first time following contracts with Record TV in São Paulo and Studio 43. The two SoundStation Gold systems and two OMR8 recorders for Record TV, and the Sigma and Sabre Plus systems for Studio 43 give DAR its first presence in major post and dubbing facilities with Studio 43's music recording work adding further to the profile.

DAR, UK. Tel: +44 1372 742848.

■ UK-based Sega Europe has set up a new music studio. Demonstrating the increasing value placed on audio by the computer games companies, the new installation comprises an 80-channel Mackie desk, 48-channel Pro Tools 24 system and three DynaudioAcoustics M2 cabinets for LCR monitoring, with existing M1.5s for the surround pair, all powered by DCA650 amplifiers.

Sega, Europe. Tel: +44 181 995 3399.

■ LA-based Bernie Grundman Mastering is among a number of facilities recently to install Pacific Microsonics HDCD processors. Others include LA's Future Disc, San Francisco's Redwood Digital, NY's DB Plus, Nashville's MasterMix, Tokyo's Toy's Factory Studio, and the UK's Sound Recording Technology and Linn Records. Pacific Microsonics, US.

Net: www.hdcd.com

■ London's Whitfield Street studios has completed refurbishment of its Rooftop mixing suite under the guidance of Harris Grant Associates. The studio now boasts a 72-input SSL 9000J console and Boxer T5 monitors and makes much of the inclusion of a new diffractal rear wall. The involvement of HGA's Neil Grant sustains a history begun over ten years ago and continued through the facility's ownership by Sony.

Whitfield Street, UK.

Tel: +44 171 636 3434.

HGA, UK. Tel: +44 1753 631022.

June

2-5

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Email: message@symposia.ch
Net: www.montreux.ch/symposia

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Net: www.mecon.de

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26-29

105th AES Convention
Moscone Convention Centre,
San Francisco, California, US.
Tel: +1 415 558 0200.
Fax: +1 415 558 0144.
Email: 105th-chairman@aes.org
Net: www.aes.org

October 12

-November 6 ITU Plenipotentiary Conference
Minneapolis, Minnesota, US.
Tel: +41 22 730 5969.

October

20-24

Tele-, Kino-, Radio Technologies
Exhibition Centre, Sokolnik,
Moscow, Russia.
Contact: Ekaterina Zotova
Email: main@admt.ru

November

4-5

22nd Sound Broadcasting Equipment Show (SBES)
Hall 7 National Exhibition
Centre, Birmingham, UK.
Tel: +44 1491 838575.
Fax: +44 1491 832575.
Email: dmcv@pointproms.co.uk
Net: www.i-way.co.uk/~dmcv/
sbes.htm

4-8

News World 98
Fira Palace Hotel,
Barcelona, Spain.
Contact: News World Ltd
Tel: +44 171 491 0880.
Fax: +44 171 491 0990.
Net: www.newsworld.co.uk

17-9

Digital Media World 98
Wembley Exhibition and
Conference Complex,
London, UK.
Contact: Digital Media
International
Tel: +44 181 995 3632.
Email: digmecia@atlas.co.uk

December

9-1

5th Broadcast Cable & Satellite India 98 6th Comms India 98
Pragati Maidan, New Delhi,
India.
Contact: The Federation of the
Electronics Industry
Tel: +44 171 331 2000.
Fax: +44 171 331 2040.
Email: feedback@fei.org.uk
Net: www.exhibitionsindia.com

9-11

Cable & Satellite Asia 98
Singapore International
Convention & Exhibition
Centre, Level 4, Suntec City,
Singapore.
Contact: Reed Exhibitions
Tel: +65 434 3675.
Fax: +65 334 4119.
Email:
chuilan.chia@reedexpo.com.sg

June 99

10-15

21st Montreux International Television Symposium and Technical Exhibition
Montreux, Switzerland.
Contact: Ms Patricia Savioz.
Tel: +41 21 963 32 20.
Fax: +41 21 963 88 51.
Email: message@symposia.ch
Net: www.montreux.ch/symposia

October 99

8-17

Telecom 99
Palexpo, Geneva, Switzerland.
Tel: +41 22 730 5969.

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Call waiting

Thank-you for John Watkinson's very fine technical article about the telephone, in the February 1998 issue of *Studio Sound*. One correction your readers should know. It is well documented that the Italian inventor, Antonio Meucci, invented the telephone before Alexander Graham Bell was born. The series of events that led to Mr Bell's patent award is as follows:

Each year for over ten years Mr Meucci renewed a 'prepatent' registration with the US Patent Office. The fee was \$10 per year. And the documents precisely describing the telephone were registered in the prepatent documents. While in the hospital, suffering grave injuries from an accident, Mr Meucci was not able to renew the prepatent registration. Alexander Graham Bell's father-in-law (who was working in the US Patent Office at the time) knew Meucci's registration had lapsed and gave Meucci's documentation for the telephone to his son-in-law. Bell claimed the invention as his own and immediately patented Meucci's invention.

Antonio Meucci invented the telephone. Alexander Bell was awarded the patent for the telephone. Meucci died a pauper.

**Robert Marino, Athena Records,
Staten Island, NY 10314**

Relocation recording

Neil Hillman's interesting article in your March 1998 issue on how 'MiniDisc is the latest format to be adapted for field recording' reminded me of my letter on the same subject which also appeared in the March issue in 1993.

This month's article was accompanied by an anachronistic illustration (among others) of the first Sony portable MD recorder, which was extolled in my letter five years back. As a brief update to my comments at that time, I can report that I have continued to use MiniDisc as a mainstay of my classical music location recording business, and the quality and reliability of the machines I have

used has improved enormously, with the format more than living up to its early promise. Echoing the comments made in your review of the Tascam MD 501, I have found domestic machines to be perfectly adequate, for my purposes at least; this includes a Sony mid-sized machine which travels several times a week unprotected in one end of a soft holdall without complaint.

My chief criticism of the first Sony portable concerned its subjectively poor signal-to-noise ratio. Times have changed. Yesterday I recorded a major recital in the sublime acoustic of London's Wigmore Hall using as backup a microscopic £299 Sharp MiniDisc machine (which is scarcely larger than the disc itself), fed from a £2,000 Sennheiser microphone system. The tiny machine seems quite unembarrassed in such company. Indeed, before the rehearsal I gave it the ultimate accolade of thinking that it was not recording properly, until after much unplugging and reconnecting of leads, I realised the lack of sound was indeed a faithful reproduction of the lack of sound in the empty hall.

And what was the main machine? A DV format camcorder—why just record 16-bit, 48kHz to DAT when DV gives you the same plus pictures? We live in changing times...

**Peter Nicholls, Acoustic Music
Recording, London**

Chris 'n' tell

Cheers, kudos and thumbs way up to Chris Kimsey for devoting the majority of his interview space to exposure of the common, nowadays practice of hijacking finished record productions from their creators. I found him to be brave and not 'politically correct' in discussing the bane of modern recording engineers-producers who are left to suffer this indignity in a mostly powerless position. Besides being anti-creative and disrespectful, it all reminds me of an old entertainment adage: 'There is never enough money to do it right the

first time, but there is always enough money to do it over again!'

Thanks a lot Chris and if you are ever in LA, let me buy you a beer.

**Barry Rudolph,
<http://home.att.net/~brudolph>**

Perfunctory Pearl

Your microphone review is perfunctory. Mr. Foister states: '...the paper performance is borne out by the use of the microphone.' Use how? Did he stick it in front of a female vocalist? Did he perchance (one could only wish!) use a pair to record a classical orchestra or ensemble? We produce live radio broadcasts of classical music, once per week. Send us an occasional mic, we'll put it through its paces!

**Bill Vestal, Executive Producer,
Sundays at Four, City of Los Angeles
Cultural Affairs Dept. 433 S Spring
Street Los Angeles, CA 90013**

I am sorry Mr Vestal found my CC 22 review (*Studio Sound*, February 1998) less than helpful. I try to avoid the kind of review that turns into a list of things I tried it on, for two reasons: first that they are rather dull, and second that they encourage the kind of blinkered thinking that links certain microphones irrevocably with certain instruments. I would have thought it far more useful to attempt to put across the flavour of a particular microphone, so that people can make their own minds up as to where and when its use might be appropriate.

For Mr Vestal's information, according to my notes I used the CC 22 on female voice (classical and jazz), trumpet, sax, cello, snare drum and bass clarinet, to name but a few, in the course of a typical week of half a dozen concerts and recitals and half a dozen sessions. My description of its character is distilled from all this experience with it, all of which showed it to be a competent and likable performer. Much as I would have liked to put up a stereo pair I was only provided with one microphone—it is strange how few manufacturers appreciate the added value of trying a stereo array, particularly when, as in this case, the microphone is so physically suited to it.

Dave Foister



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Studio Sound audio industry recognition awards results

The first SSAIRAs produced some surprises and some predictable placings courtesy of the readership of *Studio Sound*.

The 104th AES Convention in Amsterdam saw the introduction of the results from *Studio Sound's* Audio Industry Recognition Awards—the SSAIRAs—at an exclusive presentation dinner held at The Grand Hotel. The SSAIRAs were instigated after numerous requests for *Studio Sound* to place its weight and integrity behind an independent awards scheme that would be judged by the magazine's qualified readership.

The SSAIRAs are a celebration of the unique relationship between *Studio Sound* and its readership—a relationship that now spans 40 years. To recap on the selection process, nominations were invited at the beginning of the year for 13 categories and everyone was free to nominate a product providing it shipped for the first time after the European AES in Munich last year and before the Amsterdam AES this year. Products that failed to ship within the allotted timescale may be renominated for next year's SSAIRAs.

Following the nominations, we progressed to the voting stage of the exercise with only readers, not manufacturer-associated personnel, qualifying to cast actual votes. To vote, readers had to quote their unique reader identification number from the label on their personal copy of the magazine. Because *Studio Sound* has a fully audited circulation, it was possible to weed out manufacturing-base 'infiltrators' attempting to influence the results. Nonqualifying votes, votes without unique reader registration numbers and duplicates were binned. Readers voted by fax, mail, or via an interactive form on the *Studio Sound* web site at prostudio.com.

In each of the 13 categories, we have announced a winner and commended product—both judged by the *Studio Sound* readership, its editorial team and its contributors to be worthy of special recognition. Only winners received official SSAIRAs certificates, but commended and winning manufacturers will receive SSAIRAs logo artwork that they will be free to use on their letterheads and promotional material. There will be no official recognition of products that have been nominated because of the nature of the nomination process.

These are exclusive awards that aim to give praise only where praise is due.

The SSAIRAs logo represents official recognition by the world's leading audio title. By definition this readership is sophisticated and knowledgeable and judged purely as a market research exercise, the results of the SSAIRAs are as strong an indication as you can get of the type of products that end users want. Winners and commendeds are all judged to be doing something right.

The annual SSAIRAs presentation dinner is to be held each year during the European AES.

Large scale console



Winner Soundtrac's DPCI

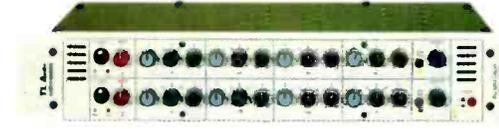


Commended AMS Neve DFC

Outboard equaliser

Winner
AMS Neve 1081C

Commended
TL Audio EQ5013



Medium-small console



Winner Tascam TM-D8000



Commended Audic Developments AD149

Outboard dynamics



Winner Amek 9098 compression limiter



Commended Drawmer MX30

Outboard reverb



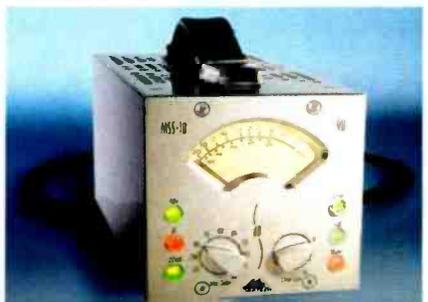
Winner tc electronic FireworX

Outboard preamp



Winner DACS MicAmp

Commended
Martech MSS10



Combined outboard device

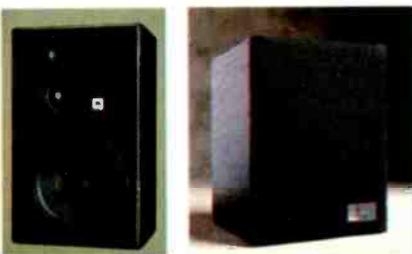


Winner Jünger Vamp 1



Commended Cedar CRX

Monitors



Winner
JBL LSR32

Commended
Meyer HM15

Convertors



Winner Apogee



Commended DCS

Audio editor



Winner Creamware



Commended Pro Tools

Microphones



Winner Brauer VM1

Commended
AKG Solid tube



Audio recorder



Winner Otari DX5050



Commended Tascam MMR8

Special category



Winner
Dolby Surround Tools

Commended
Microtech Gefell



Tascam's
M Takahashi



JBL's David Kim



Dirk Brauer



Dolby's Bill Jasper



Soundtrac's
Todd Wells



Apogee's Paul Rice



Amek's
Rupert Neve



Otari's
Harald Viering



tc electronic's Mads Lubeck and Studio
Sound publisher Steve Haysom



Jünger's Peter Pörs



Creamware's
Wolf Roth

Otari PD-20-A

Extending its family of digital recorders, Otari has delivered a speedy MO-based 4-track machine, that is big on compatibility. **Rob James** meets a family friend

OTARI'S PD-20-A digital recorder is the third member of a triumvirate of digital recorders, alongside the PD-80, and DX-5050. Of these, the PD-20-A most closely resembles the PD-80, but all have a great deal in common both in physical appearance and human interface, not to mention build quality that is solid and reassuring.

The recorder comes in two sections, a 2U-high rackmounting unit, the PD-20-A and a neat little controller, the CB-170, which is supplied as standard. A VGA monitor (not supplied) is used for display. The PD-20-A may be used without remote or VGA where basic recording, replay and editing are all that is required. Like its siblings the PD-20-A uses an 'overwrite' 3 1/2-inch magneto-optical drive as the primary storage

The rear panel has XLRs for the two channels of analogue I-O, AES-EBU I-O and time code I-O. Word clock and video sync I-O are on BNCs. The SCSI connector is Centronics.

The onboard converters are 20-bit 64x sigma-delta oversampling A-D and 20-bit 8x oversampling D-A devices. D-connectors take care of GPI-O, serial and the connections to the controller and VGA monitor, while GPI-O enables external equipment to control transport functions and provides tally outputs for indicator lamps and a 'message' output when using Project Program Play.

Controller connections are via a 15-pin D-connector to the mainframe, a standard IBM PS-2 mini DIN for connection of a computer keyboard and a phones jack and pot. The controller

lastly a Handle that contains information such as the number of Sound Handles, fades, and so on.

To use the PD-20-A at its most basic level requires only the mainframe. Turning on the power gets you to a startup screen where discs may be formatted, sync reference and input set and a new Project created or an existing one opened. This takes a mere 10s, very fast for this type of machine. Once a recordable Project is open, pressing REC arms the machine for recording and, as I found out the hard way, switches the monitoring e-to-e. Ouch. Pressing the PLAY button commences recording, STOP ends recording and positions the Cue ready for immediate playback, if required. The Cue is auto-numbered. Subsequent recordings are simply a



medium using the same disc format as the PD-80. Projects can be moved and edited from a PD-80 provided only Tracks 1-4 are used. The PD-80 can also use PD-20-A projects. Capacity is 640Mb per single-sided disc giving a total of around 120 track-minutes at a sampling rate of 44.1kHz. Recording is to 16-bit resolution with sampling rates of 32kHz, 44.056kHz, 44.1kHz, 47.952kHz or 48kHz.

The PD-20-A front panel is neat and uncluttered offering just a mains switch, a headphone socket with its volume pot, a slot for the MO disc and the analogue input gain pots for calibrated operation at SRL (Standard Recording Level), with +4dBu corresponding to -15dBFS. Pressing the knobs activates the manual analogue gain controls and the knobs emerge from their usual position almost flush with the panel to allow adjustment. The rest of the front panel is occupied by an LCD and horizontal level meters at the top with a row of transport and Menu-edit CANCEL and ENTER-locate keys at the bottom.

is well laid out with two bright bar-graph meters, and a chunky jog-shuttle wheel. Standard, illuminated, tape transport keys are in the bottom left-hand corner with locates above followed by record readies and monitor mode keys for the four disc-tracks. Tracks 1 and 2 cycle through Input, Disk and Mute, 3 and 4 are limited to Disc and Mute. Since there are only two physical outputs, Tracks 3 and 4 are mixed with 1 and 2 respectively for playback. The rest of the keys are full size with a good use of colour to highlight certain functions. If required, the remote can be made to bleep on each key press and on errors.

Otari uses a Project model to organise work, each recorded sound is called a Cue, a collection of Cues is a library and a Cue placed in a Project is termed an Event. Events are sets of instructions determining how a cue is to be played. A Cue actually has three logical parts—a Sound Page that contains the actual audio, a Sound Handle that indicates the order of sound pages and can control around 600 Sound Pages and

repeat of the above and the resultant Cues are sequentially numbered. Front panel editing is limited to deleting, renumbering and splitting or merging events all with a single level of undo-redo. It is also possible to Flush deleted events from the disc to regain space. That is about it. Otari has kept local operations as simple as it is possible to get. Projects created and edited in remote mode, or, on a PD-80, are playable in local mode, but cannot be edited or added to. I think this is a useful safety feature.

Using the CB-170 remote the menu system is virtually identical to the PD-80 (*Studio Sound*, July 1997), so I will keep the description brief. The most obvious difference is the PD-80 is an 8-track machine and the PD-20-A is principally a stereo machine; although there are actually four tracks to play with. The common interface is a considerable advantage in installations where both machines are in use. On power up the opening screen menus are accessed using the function and or yellow cursor

keys to select an item and the green ENTER PLAY key to confirm the choice. The housekeeping covers the likes of physical and logical formatting of discs, verifying, and copying. Backup RAM defaults are altered under the General menu, while Project and Library menus deal with the creation, opening and management of projects and libraries. As on the PD-80 the Project Program Play and Cue Quick Play modes are selected under the Utility menu, for some reason I never did understand. The Power menu enables the screen saver.

The main working area is the Project window. This is fairly busy; all the information you need is displayed and there is intelligent use of colour to convey status. Above this is either the Library list associated with the project or the Event list. There are several pages of function key assignments, accessed using the Function key. The 2ND and 3RD keys act like shift keys to modify the action of other controls. The ZOOM IN and OUT buttons change display resolution from less than 2s to over 27 minutes in 11 stages. The minimum step size changes in proportion from 0.1 frames to 1s. Waveform display is toggled by the WAVE button. The usual edit functions are complemented by a plethora of audition modes. Most editing is done by marking a Region with the large yellow A and B buttons. There are up to 16 levels of undo. The very useful Gate function chops up an event into separate events by cutting out silence. The Gate operates at thresholds of -60dB, -52dB, -45dB or -38dB. Punch-in and punch-out recording can be either manual or automatic. The auto in-out times can be programmed with the AB markers or numerically. The locator allows location of the start and end of a project, individual Events or Sync points. There are five numbered locator memories on keys and a total of 100 memories. The first five locations can be locked.

DSP gives functions for time compression and expansion, pitch shift and reverse. These are off-line; although sections can be auditioned in real time before committing. Varispeed in play or record covers $\pm 12.5\%$ range. Machine control is versatile with a good selection of frame rates and modes for time-code master and slave operation.

In addition to the normal mode of operation there are two others, Cue Quick Play and Project Program Play. Cue Quick Play lets you 'load' the numeric pad buttons with Cues selected from any library for instant ployout when the relevant key is pressed. Four pages of assignments can be saved and recalled for a total of 48 sounds. The maximum number of simultaneous playback tracks is limited to two. Project Program Play enables a completed Project(s) to be replayed at predetermined times of day (triggered from the

internal clock) or external time code. The playback can also be started manually. You can have up to 18 Projects per page and there are four pages for a total of 72 possible Projects. Each Project can contain five locked locate points each of which will send a GPI-O trigger to operate external devices.

This is a well thought out and versatile machine. The noise and dynamic range figures are better than usual for a 16-bit system. As a stereo editor it has plenty of power with a chunky hardware interface. But it is as a stand-alone stereo recorder, used without the remote, that the PD-20-A really shines. It is possibly the simplest disc-based acquisition tool I

have yet to encounter. This simplicity also makes the unit ideal for use as a ployout machine by unskilled personnel.

The Project Programme Play mode, would allow it to be used as an automated ployout unit for radio commercials or any application that requires ployout of various sequences at specific times. The GPI triggers make it a good bet for AV use. Another obvious application is in a multiple-machine environment. PD-80s where multitrack is required, and PD-20-As to acquire material with no headaches about file compatibility and only one interface to learn. Otari should be pleased with itself. ■

Contact

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Apogee AD-8000

Taking a popular A-D convertor, a proprietary digital optimisation process and an 8-channel package gave Apogee the AD-8000. **Dave Foister** joins the converted



EVER SINCE it became apparent that not all digital equipment sounded the same, attention has centred on the processes of conversion between the analogue and digital domains. Not many would contest the view that numbers are numbers, and unless the numbers change then what they represent does not change either. The only factors affecting the sound of a digital recorder are the accuracy with which the analogue waveform is translated into numbers, and the accuracy with which the numbers are translated back into the analogue waveform. This makes the converters as important as tape was to an analogue recorder, and about the same number of companies have made their name with the quality of what they produce.

One of the earliest successes was Apogee, whose digital filters became the standard upgrade for serious digital recordists, and whose digital expertise now includes both types of converters, the UV22 system for increasing the perceived resolution of a 16-bit medium, and digital recording media of various kinds.

Never ones to hide behind an elitist laboratory facade, Apogee's designers have responded to the current direction of digital recording with the AD-8000, eight channels of 24-bit analogue to digital conversion with a wealth of options enabling it to interface with virtually any digital format around.

Switching the unit on reveals one of



the most outrageous power-up displays I've ever seen, before settling into an operating state that reveals the presence of a vast number of LEDs and illuminating labels. At once it becomes apparent that this is more than just a rack of converters, but just how much more is something of a surprise.

In its basic state the 2U-high box, finished in subtle Apogee mauve, delivers four pairs of AES-EBU signals via rear panel XLRs, derived from eight balanced line-level (+1 or -10) analogue inputs. The input circuitry incorporates screwdriver gain adjustment and Apogee's proprietary Soft Limit feature, also user adjustable, but hidden under the top cover. A special calibration mode on the meters allows precise setting of nominal levels to a chosen ref-

erence point, and an onboard oscillator can deliver tone at all digital outputs at this level. The meters have a wide dynamic range and several combinations of peak and average metering and peak holds, and are accompanied by user-definable Over indicators. To help avoid exercising them the Soft Limit function adds unobtrusive limiting, making it very difficult indeed to overdrive the converters. The limiters can be used as a simple safety precaution or can be driven harder to produce an analogue-like density, but without distortion.

Individual or global muting is also provided. These functions can be applied to individual channels by selecting the relevant function button and then pressing the button at the bot-

tom of the required channel: the function can be applied to the whole lot by holding its button in for a second or two. This makes the basics of setting the unit up very straightforward, even if the complexities to come demand a few moments furtive perusal of the manual.

Conversion to digits generates 24-bit words, and Apogee's proprietary UV22 processing is selectable on individual channels to reduce the word length in a civilised manner to 20 or 16 bits. Two levels of processing (normal and low) are provided, to be chosen according to whether UV22 is to be used again on the signal in the future, and this is one of several options set on rear-panel DIP switches.



The quality of these convertors is everything one would hope for from the Apogee badge: quiet, smooth and musical, benefiting greatly from UV22 when going to DAT, which trades a trace of broad hiss for the granular effects of truncation and does it

The quality of these convertors is everything one would hope for from the Apogee badge: quiet, smooth and musical, benefiting greatly from UV22 when going to DAT, which trades a trace of broad hiss for the granular effects of truncation

with class. The AD-8000 would be highly desirable if that were all there was to it; as it is, this is only the beginning of what is a phenomenally versatile piece of equipment.

The clue is in the number of channels, eight tracks being the standard unit of multitrack recording in a wide variety of formats. The AD-8000 has in its back-panel space for four plug-in cards, known as AMBus interface cards. These fit much like a card in a PC slot, and can produce a choice of 8-channel digital outputs. Current options cover ADAT, TDIF and Digidesign's proprietary Digi 8 format, all with the appropriate connectors and ready to plug in. There is also a Fiber DX option, using a format similar to ADAT, but using real glass fibre to give a range of 5 kilometres, and >

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< a card offering eight channels of AES-EBU input to complement the eight output channels. Herein lies the second clue; all the AMBus cards carry digital inputs in the relevant format as well as the outputs. This means that an AD-8000 fitted with one or more of the cards can carry out format conversion as well as feeding more than one format of machine at a time.

This is achieved simply from the front panel by selecting digital inputs for the required channels. Flexibility is maintained by the facility to select adjacent pairs of channels to be fed from the chosen digital source while others still carry the signal converted from the analogue inputs. The current setup is shown on a matrix of orange LEDs on the front panel, that shows the sources feeding each output channel. At the moment only one digital input source can be used at a time, but apparently future versions will allow some channels to carry signals from an ADAT input while others have a TDIF source on them, others still converting from analogue. The source is chosen with a stepping push-button

A major hidden bonus is the built-in Apogee Bitsplitting facility (ABS), allowing high-bit recordings to be made on 16-bit ADAT and TDIF machines by splitting the words across tracks. The format used is compatible with the Rane PaqRat system

near the matrix, and choosing the channels to use it is done in the same way as selecting Mute, Soft Limit and UV22. The system is smart enough to know what card slots are occupied and only to offer those, showing them with an illuminated LED. It neither knows nor cares what's in them, as format conversion is done on the cards themselves and as far as the main box is concerned they

are just another set of outputs; all cards' outputs are live all the time and all formats can be delivered simultaneously with no user intervention. The only exception is the sensible precaution of not allowing a card's inputs to be fed straight back to its outputs, which could cause a nasty surprise if the connected tape machine was in input monitor mode. There are LEDs to show the bit-rate of the incoming digital signal; although curiously this remained stubbornly at 16 even when fed from the Alessis XT20 playing a 20-bit tape.

A major hidden bonus is the built-in Apogee Bitsplitting facility (ABS), allowing high-bit recordings to be made on 16-bit ADAT and TDIF machines by splitting the words across tracks. The format used is compatible with the Rane PaqRat system and comes in two flavours: 6/24 records six channels at 24-bit resolution while 4/24 goes all the way to 24 bits with just four channels on an 8-track machine. Selection of these modes is carried out on the AMBus cards themselves, and the AD-8000 can obviously replay the ABS tapes and con-

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vert them back to straightforward high-bit AES-EBU outputs.

Synchronisation facilities are extensive, allowing the unit to slave to any of its active inputs or to a separate word clock. An optional video card will pull the sync up or down as appropriate by 0.1%, and the system is able to distinguish between, say, 48kHz and 47.952kHz. The system attempts to be clever when deciding what to synchronise to, but can always be over-ruled if it gets it wrong. An optional sample-rate converter puts the finishing touches to a powerful and comprehensive interface capability.

Stereo monitoring is possible via headphones in a front-panel socket, fed by a high quality converter and a more than adequate amplifier. The source to be monitored is selectable independently of any other routing, and can include any pair of tracks from a connected machine as well as the AD-8000's internal signals. The volume control, sometimes the only rotary control in a sea of push-buttons, is in this case a centre-biased nonlatching toggle switch with a digital read-out and a resolution of 255 steps.

As standard this headphone socket is the only analogue output on the unit, but another option slot on the back can accept one of two analogue output cards. One provides a stereo 24-bit converter fed from the source selected with the headphone monitor controls, while the other gives a full eight channels of 24-bit conversion with balanced analogue outputs presented on a 25-pin D-connector, with screwdriver output level adjustments. These eight channels carry the

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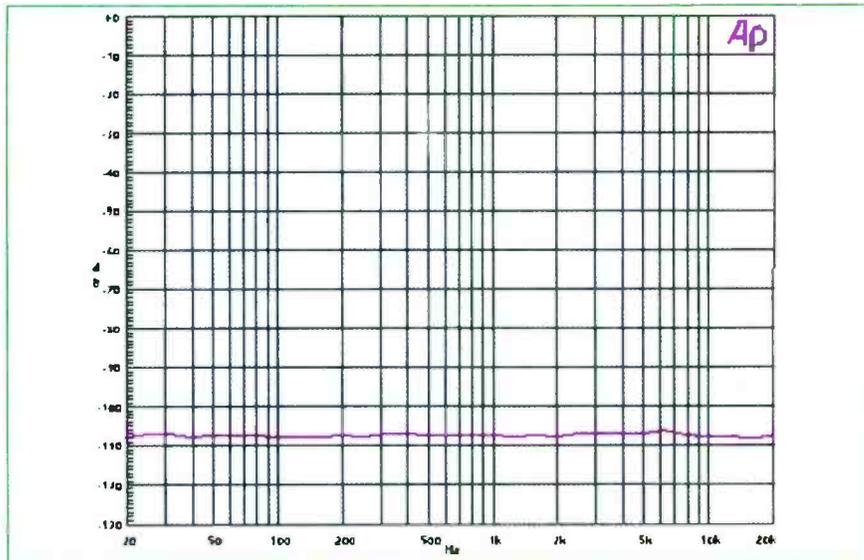
same signals as those on the main AES-EBU outputs.

One of the 9-pins and some hidden front-panel labels indicate the planned

addition of remote controlled microphone preamps to go with the AD-8000, with full adjustment of gain, phantom, phase and high-pass filtering controlled from the existing front panel. This would constitute a formidable front end for any recorder.

It is, frankly, hard to think of anything you would want to do in the way of routing and managing digital signals that the AD-8000 cannot do. There is a lot to get to grips with, but in fact the extensive facilities are presented very well on what is a tightly-packed front panel. A set of eight 24-bit Apogee converters would grace most facilities, but the potential for problem solving and easy transfers makes this a complete digital toolkit which could quickly find itself the hub of a digital system for high-quality recording, flexible dubbing and multiformat transfers. ■

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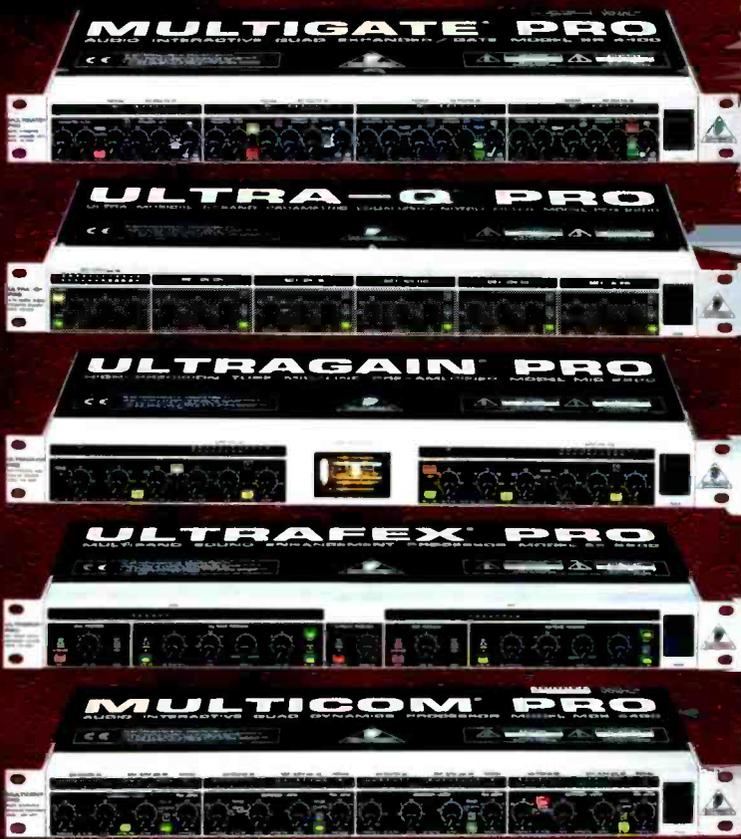
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Akai DPS12

The revolution begun by Tascam's Portastudio has since assumed the significance of those of the Hoover, the Biro and the Tannoy ADAT. **Rob James** does not adjust his mind-set

AKAI IS ENJOYING a busy time of late. Not only is it installing DD-8 digital dubbers by the van load, but alongside a new range of samplers, it has recently unveiled the DPS-12 Digital Personal Studio.

The DPS-12 follows in the ubiquitous portable personal multitracker mould set by Tascam donkey's years ago. As such it combines a digital recorder-editor with a mixer and, with an optional board, digital effects.

The first thing that marks it out from the competition is the adoption of an omega 1Gb Jaz drive as the primary audio storage medium. This has the immediate advantage that the storage capacity is only limited by the depth of your wallet to buy the disks which are, of course, somewhat cheaper than fixed disks. The next thing to catch the attention is that this is a 16-bit, 12-track machine with no data compression whatsoever. Aesthetically, the DPS12 is a little anaemic in appearance—or, perhaps I should say, 'restful on the eyes'. There are no bright colours and it is predominantly furnished in shades of grey. Considering the feature count the number of physical controls is kept well within bounds resulting in a clean and open feel.

The six analogue mic-line inputs are on balanced 1/4-inch jacks at top left of the front panel. Unbalanced or balanced sources may be used. Each socket has an associated gain pot that varies the input sensitivity from -46dBu to +4dBu. I would have liked a little more gain for low-level mics. The converters are 18-bit, 64x oversampling sigma-delta types. An adjacent red LED warns of clipping. Each of the 12 identical channel strips has a light blue RECORD SELECT key at the top with an associated red LED. These keys double as solo select when the SOLO key is pressed and also as edit select when in Edit mode. This is very similar to the big brother DL-1500 way of doing things. Below these are white CHANNEL SELECT keys, pan pots and the faders. Between these and the transport controls is the master output fader. Above the transport buttons is a block of 12 keys used when editing and to select modes and system functions. In prominent position above are the four Cursor keys used to navigate the menu displays. This is up to the usual Akai standard, back lit and blue with six 'soft' function keys. It also does a remarkable job of conveying information including a moving track, fixed cursor

display. The bottom row of the display indicates the current function key assignments. The dual-concentric jog-shuttle wheel looks flimsy, but the feel is excellent and would not disgrace vastly more expensive equipment. A button and green indicator LED allow selection of jog and shuttle with audio payout. When this mode is selected, the display changes to a waveform of the selected track. Very neat. The waveform takes a little while to rewrite when you move beyond the area in the display. The waveform and track displays can be zoomed in the display - in both vertical and horizontal planes for the waveform and horizontally for the track display. The final two keys are SOLO and NUMBER NAME, both with green LED indicators. When the NUMBER NAME key is pressed alphanumeric characters can be entered using the small keys on the console. The characters associated with the keys are marked in green.

The Jaz drive slot is in the vertical front panel with the headphone socket and volume control; I would have welcomed more level from this. A 1Gb disk gives over three track-hours of recording at either 48kHz or 44.1kHz sampling rates or four and a half hours at 32kHz.

The rear panel carries the analogue master output and A&B Aux sends on phons at -10dBu. The Auxes are software selectable as a stereo pair or two mono sends. Digital I-O is optical SPDIF so a convertor will be needed if you only have co-ax. Two DIN sockets

enable MIDI In and Out-Thru connections to be made, while a 50-pin mini D-connector allows external SCSI storage to be added. A footswitch jack and mains connector and switch complete the picture. There is no separate audio monitor output so you must either use the headphone jack or make other arrangements to externally monitor.

I inadvertently tested the ruggedness of the machine by dropping it from a height of about two feet onto its faders. It is not a test I usually employ and it was onto thick carpet, but I really don't recommend trying this at home. The DPS-12, however, emerged unscathed and working perfectly.

The DPS-12 uses the project model to handle data. All the audio, mixer data and locator information are held under the Project title. In Record mode, 8 simultaneous tracks are allowed. To take advantage of this you will need some means of using the optical input, otherwise the limit is defined by the six analogue inputs. Recording is simplicity itself. Arm the track or tracks and hit record. Manual and automatic punch-ins are possible; although I did get the occasional click. A varipitch function can be used when recording or replaying.

Projects may be backed up to DAT and later reloaded with all their parameters for further work; this is a simple and cost effective method.

Editing is also quite simple. Word-processor-style Copy or Cut and Paste, Insert or move are supplemented by >





< Insert Silence. Most edit operations require selection of in and out points for source and destination and choosing the type of editing operation to be undertaken. Some edit functions simply require definition of source in and out. The Paste operation will occur at the Now time—the current cursor position. Hitting the soft function key marked DO-IT at this point completes the edit. Editing can be performed on any or all of the 12 tracks together.

Up to 100 locator points can be set, and if you are wondering how on earth to keep track of that many points the DPS-12 has a neat new trick—you can name them. Up to 12 points can be assigned to the 'quick locate' keys - the channel select keys in alternative mode. Any of the 250 virtual tracks may be freely swapped back and forth to physical tracks that will help to build up complete tracks using various bits from different takes.

The mixer looks deceptively sparse. In fact at mixdown it is possible to control all 12 internal tracks plus an additional 8 Thru Mix channels from the physical inputs. This is ideal for use with sequenced keyboards or samplers and will make quite complex mixes feasible.

EQ is, in effect, a pool of assignable processing. At 44.1kHz you can have a maximum of 12 2-band EQs or 8 3-band EQs. At 48kHz this is reduced to 10 and 6. These may be assigned to track or thru channels. The EQ parameters are altered using the jog wheel and cursor keys in much the same way as a Yamaha 03D mixer, slightly fiddly at first, but second nature and fast after a while. The EQ sounds good with well-chosen curves and adjustable Q on the mid band.

The optional EB2M effects board brings two effects processors to the party. The effects are divided into two categories, Global and Insert. Global effects are various reverbs, delays, cho-

rus, flangers and panners. Insert effects include, phasers, dynamics, panners, rotary speaker and wah-wah. The effects outputs may either be routed internally to appear instead of analogue Inputs 3-6 or on thru mix channels if you need the external inputs. The global effects are used to affect several or all tracks and the inserts for individual tracks. The effects are good, and all the effects have a useful number of adjustable parameters.

The mix parameter settings are saved as a scene memory snapshot. Annoyingly, scene memories can only be recalled when the transport is stationary. Dynamic automation is achieved by the use of an external MIDI sequencer recording control change messages. So far as I could tell this is limited to controlling track and thru channel levels, aux send levels and panning. It is also advisable to output a scene change to set things up before the mix starts. MIDI Time Code (MTC) is supported.

Akai is aiming fairly and squarely at the 'home multitracker' market with this one. Notwithstanding this some pro facilities are taking more than a second glance. At a recent show I overheard one film facility person saying, 'Put biphasic on it and I'll have six and save myself a few grand'. This should not be taken too seriously, but it is an indication of just how closely semipro kit is snapping at the heels of the heavyweights.

The bottom line is that the DPS-12 offers a hell of a lot for the money. Twelve full tracks of 16-bit linear recording plus 18 channels at mixdown and decent effects. There is, of course, a price to pay. In this case it is the trade-off of power and features against a fairly steep learning curve. To get the best from the machine you need to use ingenuity. This is in the best traditions of multitrackers and will reward the effort. ■

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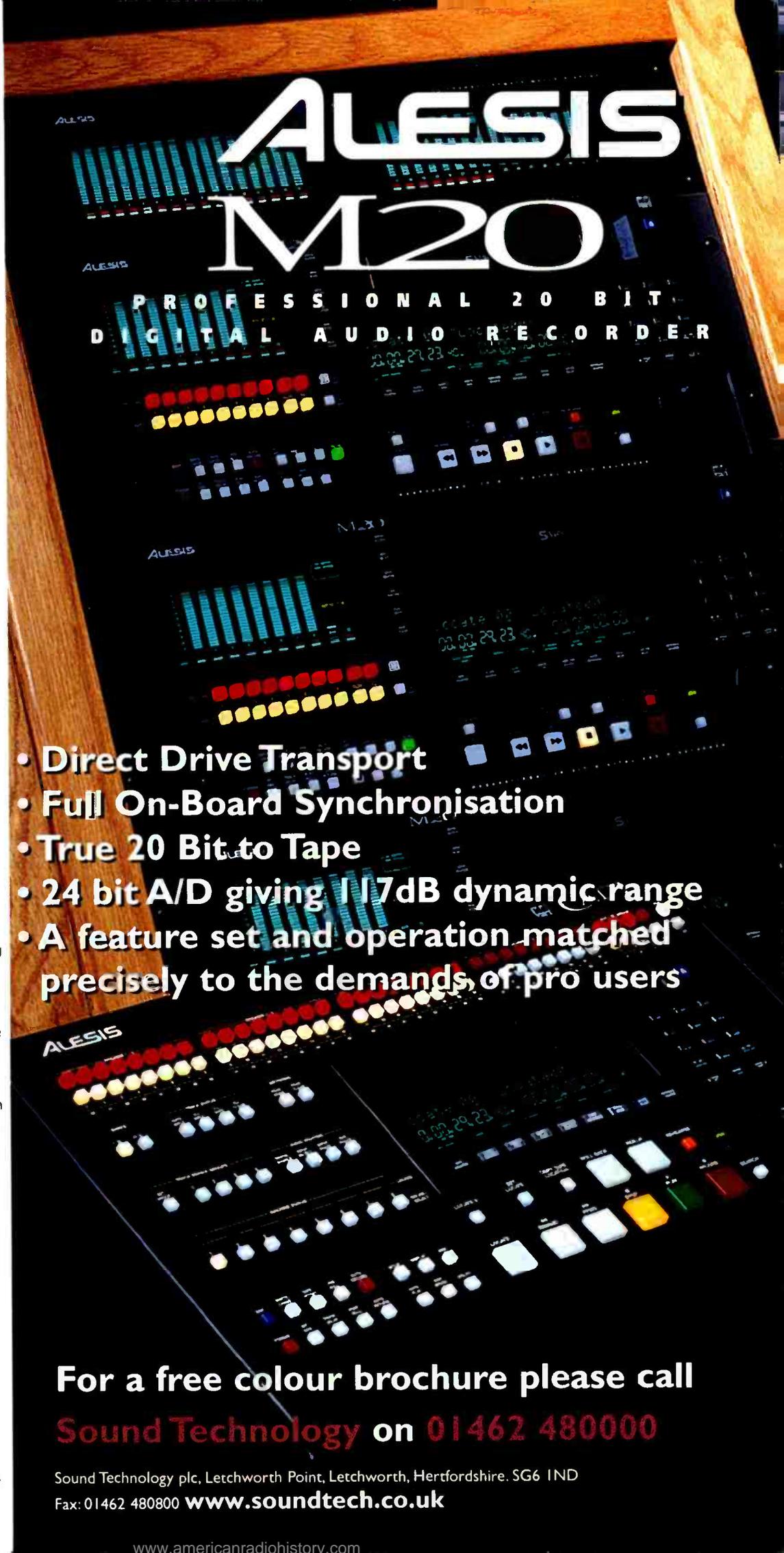
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Meyer HM-1S

Studio Sound's 'bench test' loudspeaker reviews continue with the HM-1S. **Keith Holland** reports

THE MEYER HM-1S is a 2-way active loudspeaker comprising a 7-inch (178mm) graphite cone woofer and a concentrically-mounted 1-inch (25mm) soft dome tweeter that is loaded by a 100 constant directivity horn. The amplifier and electronic crossover package is built into the cabinet, but the 48V power supply is separate. The ported cabinet is relatively small, measuring 8.9 inches (226mm) wide by 9.7 inches (246mm) deep by 11.5 inches (292mm) high, and weighs 5kg. The drive-units are both magnetically shielded. The review system was supplied with an optional subwoofer that

The response is seen to lie within ± 3 dB limits between 90Hz and 20kHz except for a shallow dip at 250Hz and some raggedness between 3kHz and 10kHz; these being within ± 4.5 dB. Addition of the optional subwoofer does, however, give rise to a severe dip in response at 80Hz, which is presumably the crossover frequency between the satellite loudspeaker and the subwoofer. As per the manufacturer's instructions, the subwoofer was mounted beneath the satellite and connection between the two was made using the supplied connecting lead, ruling out incorrect connection. The dip in response suggests a crossover phase problem that could, and should, be correctable. Experimentation revealed that mounting the subwoofer further from the microphone corrected the response dip. The low frequency harmonic distortion performance is not particularly good with peaks in 2nd and 3rd harmonics to -25dB (5.6%), but the levels are below -40dB (1%) from 100Hz to 10kHz except for a peak in 3rd harmonic to -32dB (2.5%) at 700Hz. The off-axis response measurements (Fig.2) show very wide dispersion at high frequencies evident from the similarities between the on-axis, 15 and 30 measurements. There are no significant peaks or dips in any of the off-axis response curves indicating a freedom from side-lobes in the polar pattern; although a narrowing of the directivity of the woofer can be seen at the high frequency end of its range between 1kHz and 3kHz. As the loudspeaker is a dual-concentric design, the directivity is the same in the vertical plane as it is in the horizontal plane.

The step response (Fig.3) shows excellent time-alignment and crossover design with a sharp rise and steady decay; although, as con-

firmed by the acoustic centre result (Fig.4), there is a delay of some 1-ms in the low frequency energy, corresponding to a shift in acoustic centre of more than 4m behind the loudspeaker at low frequencies. The group delay is seen to increase markedly when the subwoofer is used, which may again point to phase problems in the crossover between the satellite loudspeaker and the subwoofer. The power cepstrum (Fig.5) shows evidence of an echo at 400ms, the broadness of which suggests reflection of a fairly narrow band of frequencies; this echo is probably responsible for the frequency response irregularities between 4kHz and 10kHz. The overall power response for the HM-1S plus subwoofer is shown in

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Overall, the Meyer HM-1S is a mixture of strengths and weaknesses. The high frequency directivity is very wide and controlled, which, coupled with the dual-concentric drive-unit layout and accurate time-alignment and crossover design, suggests that the timbre of reproduced sounds will be preserved over a wide listening area. This performance is let down somewhat by the narrowing of the directivity in the mid-frequency range, which is probably a consequence of the use of a rigid graphite cone; such cones tend to move as pure pistons to higher frequencies than those made from conventional materials; a property that may often be considered desirable. The low frequency harmonic distortion performance is disappointing; although this must be offset against the high output capability of the system given its small size. ■

comprises a 10-inch (250mm) driver (not shielded).

The electronic crossover is specified as having complex roll-off shapes with a crossover frequency of 3kHz and the internal power amplifiers are rated at 200W each into 4 Ω giving a claimed maximum sound pressure level of 116dB at 1m (120dB with subwoofer) with a pink noise or music input.

The loudspeaker is constructed to a high standard and finished in black wood veneer (natural oak optional), and is small and light enough to mount on most monitor bridges.

Fig.1 shows the on-axis frequency response for the Meyer HM-1S with and without the optional subwoofer.



Fig.6. The plot shows the dip in response at 80Hz and the narrowing of the directivity of the woofer in the upper mid-frequency-range.

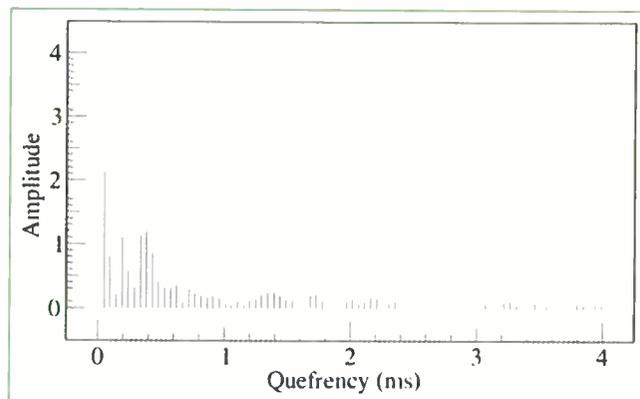


Fig.5: Power cepstrum

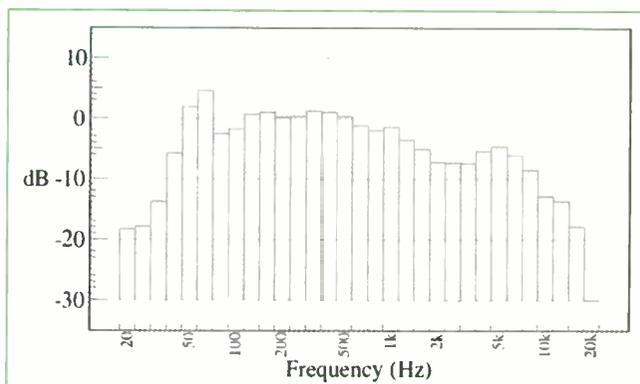


Fig.6: Power response

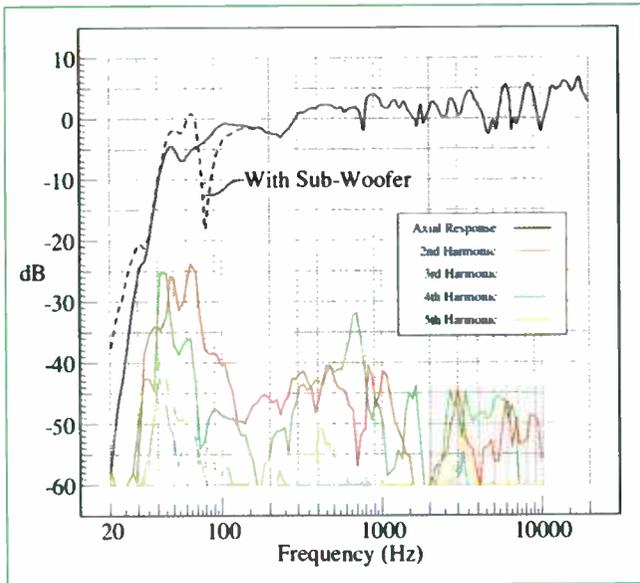


Fig. 1: On-axis response and distortion

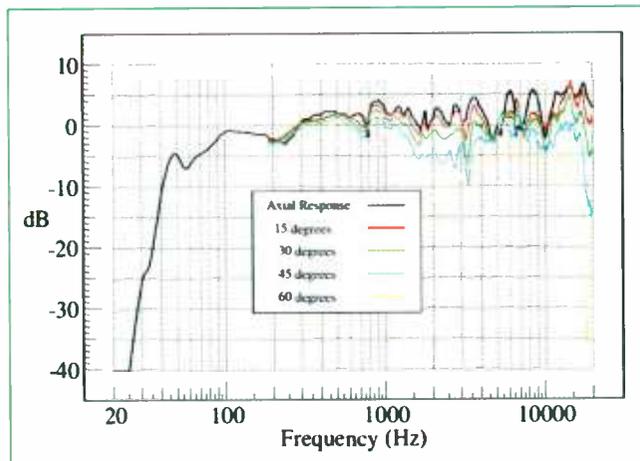


Fig. 2: Off-axis response

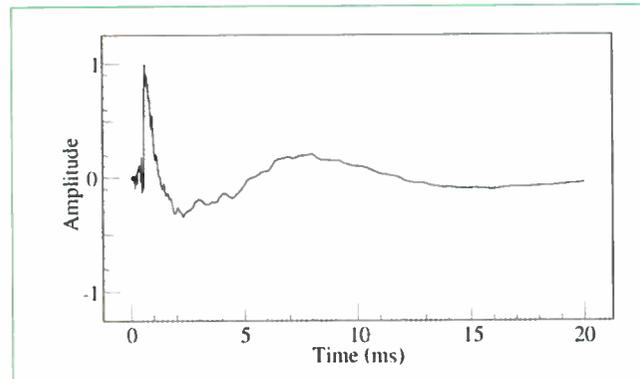


Fig. 3: Step response

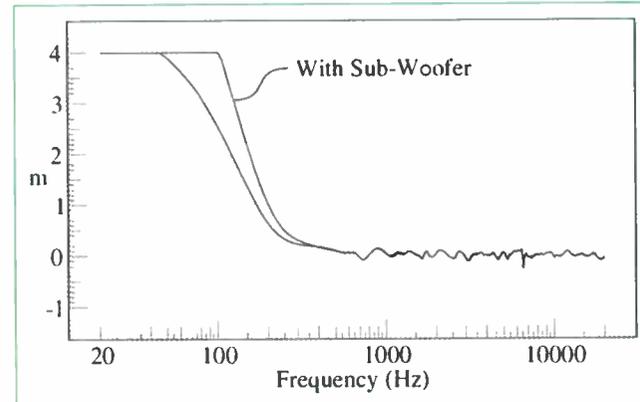
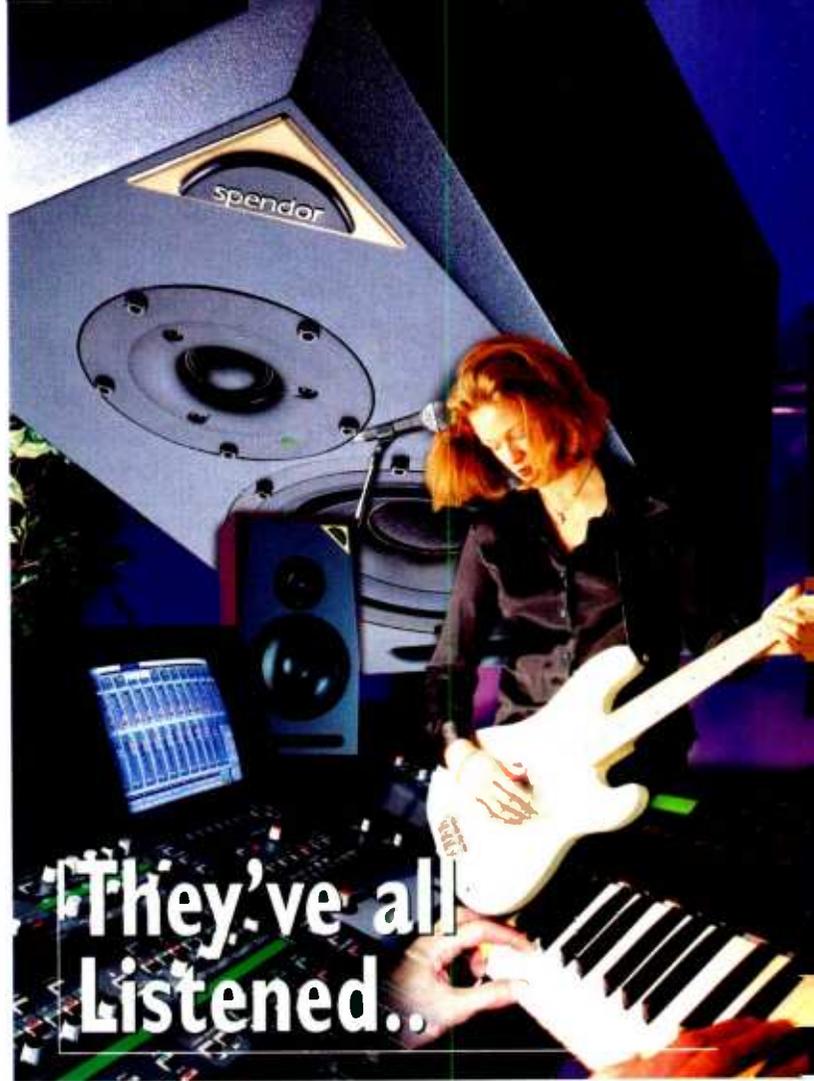


Fig 4: Acoustic centre

Studio Sound June 1998



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STUDIO MAGAZINE. SA300

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Focusrite Platinum

Focusrite has introduced the cost-effective Platinum range of processing units including the Voicemaster (Platinum 1) and Tonefactory (Platinum FF2). The Voicemaster vocal recording path incorporates a class-A discrete transistor preamp, high-pass filter, expander, vocal saturator (creates tape-valve style saturation and adds compressed harmonic related second-order artefacts to produce a valve mic sound), opto compressor, enhancer (adds natural voice-related harmonics), voice-optimised EQ, and opto de-esser. Tonefactory is intended for recording guitar, voice or synth and features a class-A discrete transistor preamp, and offers three mode filter operation. Gate and compressor are included along with four tone controls laid out like a guitar preamp with bass, middle and two treble modes. The EQ design is based around a classic wire-wound inductor circuit found in vintage 1960s equipment. Also included is an overdrive circuit and a further 2-band parametric equaliser.

Focusrite, UK. Tel: +44 1494 462246

Nicral enhances radio control

Nicral has debuted the Nica X Digital Audio Codec and the ARC Akcess PC user-interface for the company's ARC Multi-Master ISDN control system for radio broadcasters. The Nica X is a multifunction codec system configurable by the user and provides X21 and S Bus interfaces. The codec



is also designed for ISDN-only applications, and is available with apt-X100 or G.722/MPEG Layer II coding. ARC Akcess is suited to system configuration and setup tasks as well as on-air operation, and is available in single- and multi-user versions to run on new or existing PC networks.

Nicral, UK. Tel: +44 1672 515727

Oxford adds surround

The functionality of Sony's Oxford console has been expanded with the arrival of Version 1.2 system software which adds multi-format surround sound mixing. The desk is also available in a compact 24 variant with 24 channel faders and a master control section, but still offering the same 120 input channel capability.

Sony, Europe. Tel: +44 1256 355011

Genelec's centre channel monitor

Genelec has introduced a centre-channel monitor. The 1038AC is a 3-way, triamplified monitor designed to complement the company's 1038As in multichannel operations. It has been designed with minimal dimensions so it can be horizontally >

Studio Sound June 1998

Like its other new units, BSS' Opals continue to add value to traditional duties. **Zenon Schoepe** revisits gating and dynamic EQ

HAVING WON SO MANY HEARTS with the rather special DPR422 compressor-limiter and DPR522 gate, BSS has extended the Opal family with a box that sort of combines the facets of both, but actually introduces a couple of new elements of its own. The DPR944 is effectively a box of two halves and these halves are totally independent—two channels of gating and two channels of so-called parametric compression. I shall explain the latter in a short while but it is worth pointing out that the manufacturer has deliberately turned its back on the urge to produce a dual-channel unit that combines the features of gating and compression in favour of a 4-channel device. This is reflected in the rear panel balanced connectors which are separate for each of the four signal paths and while you can stereo link the two gate and two compressor channels, the only way you can cascade the processing types is to run a lead between the separate blocks. Gate channels have key inserts TRS sockets.

It is a novel idea some may think strange. The parametric compressor features draw, at least in part, from the ideas introduced origi-

status. Bypass is activated by the now characteristic illuminated wine-gum switches.

The 'progressive knee' compressor is an altogether more interesting proposition by virtue of the inclusion of the parametric section. There are WIDTH and FREQUENCY pots, with side-chain listen, switchable fast and auto release constants, and fully variable threshold, ratio and ± 20 dB gain make-up. Metering is excellent with multicoloured LEDs showing below and above threshold levels.

The results are remarkably smooth because the gain reduction is only applied to the frequencies that the section is tuned for and only when they exceed threshold. The general dynamic of a signal thus remains largely intact and this process remains one of the smartest means of recompressing an already compressed track without any of the artefacts that can occur when applying broad-band compression from one box on top of the broad-band compression of another. If you want to optimise the loudness of a commercial voice-over then track down a DPR902 or alternatively try the DPR944 as the results are quite unlike that of an ordinary compressor. How-



nally on the DPR901 'dynamic equaliser'. This realised the smart idea of compressing or expanding (true expansion, that is boosting, as opposed to the now popular interpretation of the word in the context of downwards expansion for gating purposes) of tuned frequencies appearing above a user-set threshold with fully variable ratio control.

What the DPR944 does is work with a THRESHOLD pot, and WIDTH and FREQUENCY pots to selectively compress frequencies that poke out above the set Threshold level. Alternatively you can bypass the 'parametric' nature of the compression completely and render it broad band and thus traditional in its gain reduction behaviour.

The original DPR901 dynamic equaliser remains subtle for some because, until you understand what it is doing, you could too easily judge it as a lacklustre equaliser, or an ineffective compressor. However, understand the principles involved and it becomes a potent mastering dynamics controller and one of the best ways to reshape vocals with the very finest of strokes.

Gate-wise the DPR944 gives two stereo-linkable channels of pretty rudimentary control—this is no DPR522, for example—with pots for Threshold and Release-Hold, fast and slow Attack constants and a KEY FILTER pot likened to a NARROW-BROAD filter switch (0.5–3 octaves) and a key-listen circuit. Depth can be switched between -80 dB and -20 dB and separate LEDs indicate gate open and closed

ever, the DPR944 does lack the expansion facility that really can make the difference when dealing with truly tricky signals.

So how does it perform? The gate is adequate by modern stripped-down gate standards, and for the majority of tasks is all you will need. The Key Filter section is surprisingly accurate for such simple control and can easily tune into a full drum kit and pull out a single skin. The Compressor sections are superb for the reasons mentioned, but also work well in traditional broad-band mode by widening out the width control. I was particularly impressed by the two Release settings which are intelligent enough to cover all the ground with at least consistent results. The parametric aspect is not a gimmick and if you work with it long enough it changes your attitude to miking. After a lot of fiddling with mic position the acoustic guitar sounds great apart from stridency on the open chording: the temptation would be to reach for the EQ and remove it, but instead tune the DPR422 into the offending region and watch it jump on those frequencies only when they arise. The result is more natural and more sophisticated. It works on everything and is great at adding consistent low-end power on stereo programme.

Like the other Opals, this unit offers a refreshing approach to traditional duties. The box will appeal to those concerned with processing density. A great unit. Dynamic equalisation is addictive. ■

Contact

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GML DNF

Turning attention from creative to corrective filtering is what GML's latest is all about. **Dave Foister** investigates

GEORGE MASSENBERG does not mess about. If he needs a bit of kit to do a job for him we all get to benefit, and the results, particularly his automation and EQ, tend to become benchmarks, with the confidence that comes from good design and a real understanding of the needs. Quite what prompted the design of the DNF we may never know, but clearly even Massenberg has to deal with noisy signals from time to time and decided to sort out his own way of dealing with them.

DNF stands for Digital Noise Filter, and the two-box system comprises a 1U box (the Brain) containing 64 narrow-band dynamic filters and a remote controller (the Head) with eight faders for adjusting them. The filter frequencies are spread linearly over the frequency range, giving the system increased



selectivity at the troublesome high frequencies, and for convenience they are bundled into eight groups with a fader for each. Note that there are not eight filters per fader; lower frequencies have fewer bands and higher frequencies more.

Audio in and out is digital only, and all three standard formats are supported. The DNF operates only in stereo with the processing locked precisely together across the two channels. The only other connectors on the Brain are 9-pin Ds, one for the link to the Head and one marked **DETECT** that is best left alone.

Operation is simple. Each fader sets a Threshold level for the group of filters it controls, and if the signal in any one filter falls below the threshold that band alone is attenuated. LEDs above the faders glow yellow when any band within the group is attenuating, and red when they all are. Note that, although clusters of filters have their threshold, adjusted together they still operate independently, so that it is possible for only a tiny notch to be attenuated while the bands around it remain unchanged.

There are three configurations for the system, two of them involving a Macintosh for a clearer idea of what is happening and for additional control. One of these replaces the Head with a Macintosh control program, with an on-

screen display of signal levels in the various frequency bands, a line to show the curve of the thresholds, and colour coding to show filter activity. The other configuration takes this a stage further by retaining the Head, but putting the Mac in the middle, giving real fader operation with full on-screen display. The Mac also allows the frequency groups to be redefined under the faders, and for complete setups to be stored for future use.

With the Mac in place a further subtlety is introduced in the form of a choice of how adjacent bands' behaviour is linked; the thresholds can jump stepwise from one group to the next or can follow a curve (GML calls it a Spline) which smooths the response across the spectrum. Each has its uses—a smooth curve may work better for broadband noise while specific frequency problems benefit from careful allocation of the filter bands and minimum interaction of the threshold settings.

The screen display allows individual groups of filters to have a kind of solo function applied, this does not mute the other bands, but effectively puts them in bypass so you can hear exactly what your chosen group is doing, to check you are on the right lines. There is also a facility for offsetting the entire curve with a single mouse drag.

Faced with some typical problems of various types of noise, hiss and hum, it soon became clear that setting the DNF up to do the basic job was very straightforward, and the on-screen display showing how the threshold curve relates to the signal levels across the spectrum helped further still. It was also soon apparent that over-doing the processing was similarly easy, and the results less than pleasant. The manual freely acknowledges that if pushed too far the unit sounds like a cellphone under water, and that's not overstating the case. Even at more conservative settings, however, it does not take much filter activity to introduce audible side-effects resembling shifting notch filters—which is, after all, what it is. The secret, as with many such devices, is not to ask too much of it: do not expect all the noise to disappear, but expect to reduce it to a more tolerable level.

GML makes it clear that the DNF system is designed for applications where speed is critical, citing 'dubbing, dailies transfers, video transfers, and some broadcast or simple dialogue repairs'. I think this is fair; it is a 'quick and dirty, get out of trouble' tool that could easily save the day in many circumstances, but not for critical remastering use. In its stand-alone form without the aid of a Macintosh it would be simple enough to get a result out of; if a Mac is available then the screen display helps a lot.

In motor racing DNF stands for Did Not Finish; GML's DNF may not be first past the chequered flag but it will certainly be a consistent points scorer on the right tracks. ■

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GML 1155 N. LaBrea
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Hollywood, CA 90038.
Tel: +1 213 845 1155.
Fax: +44 181 962 5000.

NEW TECHNOLOGIES

< mounted where space is tight and is fully magnetically shielded. The monitor uses the same DCW, mid and high frequency drivers as the 1038A, but the bass frequencies feature dual 10-inch woofers. The monitor is powered by a separate amplifier unit with a total power output of 640W.

Genelec, Finland. Tel: +358 17 813311

Cadac adds to J-type

Cadac has introduced two programmable modules for its J-type live production console designed to offer enhanced automation. Following the introduction of a Programmable dual input channel module for the J-type last year, the latest additions are a Programmable-Recallable Matrix module and a Programmable-Recallable Stereo Input module. Users can programme and recall switch and routing settings to match the facilities of Cadac's flagship Concert board. Designed for use alongside existing J-type modules, the new modules use nulling LEDs for manual reset and all pot settings, together with their associated EQ and selected switch settings, which can be stored and recalled cue by cue. In addition, the new modules incorporate Cadac's 4-band EQ and filters, as introduced for the F-type.

Cadac, UK. Tel: +44 1582 404202

Albrecht optical

Albrecht's LLK3 Optical Sound Laser Camera claims substantial improvements in quality in optical sound recording through the application of laser technology. Albrecht lists the main advantages of the LLK3 as high reliability, long-term stability, easy setting



of operating parameters, substantially improved frequency response, low wow and flutter, insensitivity to overdriving, and an almost inaudible ground noise reduction system. Film exposure is carried out by means of a scanned He-Ne laser beam which is deflected via acousto-optical modulators and the camera uses a Motorola DSP56002 for audio processing and laser beam control. During recording, the audio signal derived from the laser beam via a photo-diode enables acoustic audio monitoring through headphones or a monitor loudspeaker, while the signal is also displayed on a vu meter.

Albrecht, Germany. Tel: +49 30 623 6039

Steinberg launches Nuendo post for SGI

Steinberg's Nuendo is audio postproduction software for the Silicon Graphics computing platform and combines native audio processing with EQ, real-time effects, VST-compatible plug-in architecture and up to 256 tracks of digital audio plus MIDI >

June 1998 **Studio Sound**

The Full Monty.



DS201 Dual Noise Gate



DS404 Quad Noise Gate



DL241 Auto Compressor



DL251 Spectral Compressor



DL441 Quad Auto Compressor / Limiter



DA6 Balanced Distribution Amplifier



LA12 Line Distribution Amplifier



DF320 Universal Noise Filter



1960 Vacuum Tube Compressor / Mic Pre-Amp



1961 Vacuum Tube Equaliser



1962 24 Bit A/D Digital Vacuum Tube Pre-Amp

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Neumann TLM103

Lesser-known mic manufacturers covet Neumann's crown, but the king proves it can compete on all levels. **Dave Foister** reports

THE SPREAD OF the microphone market has made a lot of people happy, but perhaps not the people who face increased competition. It is an oversimplification to say if you can't beat 'em, join 'em, but the response from some of the original players has been interesting. Faced with blatant imitations of their classics at give-away prices, several have introduced new entry-level models in an attempt to win back the middle ground. Neumann did it a while back with the TLM193, resembling a scaled down U87, and flushed with its success now bring us the TLM103, sharing many aspects of the 193's approach.

Faced with the challenge of reducing a microphone's price a manufacturer can compromise its quality, cut back on its features, or a bit of both. For those whose microphones have no switches or gizmos on them to begin with the second possibility is not an option, while for those whose reputation is founded primarily on distinctive sound characteristics the first cannot be countenanced. Neumann falls unquestionably in the latter camp; everyone knows what to expect from a Neumann, and a budget microphone that did not deliver it would be doomed to failure. On the other hand, Neumann models tend to have a full complement of switches for polar patterns, pads and filters, giving scope for cutting back without losing the innate sound.

This is what the TLM193 did, and the 103 repeats the formula, this time basing its overall impression on the TLM170. Thus we have a short, wide, almost squat body which seems to consist mostly of the basket surrounding the capsule. At its base is the expected XLR with a threaded ring around it for attaching the stand mount. The standard fitting as supplied is a plastic ring which screws on to the base, cleverly tightening a clutch as it goes. This allows it to be slackened off a little in order to rotate the microphone on its axis and locks down securely again afterwards. It's slightly fiddly, but commendably simple and effective, and the swivel supports the weight of the not insubstantial body well. As usual, other mounts are available as options, including a typically elaborate car's cradle. There is room in the splendid wooden box (no skimping here) for the microphone and the swivel mount.

The microphone's size makes rigging a

stereo pair as awkward as it is with 170s or 87s unless you have a special over-and-under rigging arrangement, but careful use of the simple swivel means that, although a pair can never be as coincident as one would like, the angle is easily adjusted. My preference in crossed-pair applications is for 90° figure-of-eights, but setting the cardioid 103s at about 120° in the Barbican Hall, albeit on a conventional stereo bar leaving an inch and a half between diaphragm centres, gave a remarkable stereo picture of the string ensemble on stage, with imaging sharp and natural.

The only protrusion on the body itself is the red Neumann badge indicating the front of the microphone. The 103's facilities are cut back as far as they could possibly be; the polar pattern is cardioid only, and there are no bass cut filters or pads. Someone should conduct a survey to see what percentage of microphone usage sees even the most sophisticated models set exactly like this—for a large proportion of jobs the 103's configuration is precisely what is required, and it's sometimes good not to have the option of clambering through a forest of musicians and music stands to change from cardioid to hypercardioid.

This partly explains the bargain price; the other major factor is the K103 capsule itself, which while modelled on that in the U87 is considerably simpler by virtue of only having one diaphragm. The overall size is the same, the backplate and diaphragm are the same, and therefore the essential sound is as close as it could be, but the construction and the associated electronics are much less complex. The TLM designation gives away the absence of an output transformer, and the 103 shows the microphone's preamp to be part of the fet 100 series. The resulting sonic characteristics include an extended low end—the instructions warn of heightened sensitivity to structural and wind noises—and a broad gentle boost of around 4dB above 5kHz. The top end rolls off in the familiar region for a 1-inch capsule, just above 15kHz, and is 5dB down at 20kHz.

What this means, of course, is that the TLM103 has all the sonic hallmarks of the familiar top-end Neumanns, achieving the objective of delivering the sound in a simplified package. On everything from vocals to percussion to brass to the aforementioned string ensemble concert they delivered as I would have hoped, with the only compromise being the odd occasion where a pad would have been appreciated. There's no question about the sound; this is unmistakably a 'big' Neumann in the best traditions, and for 90% of jobs will constitute an excellent substitute for one of the expensive workhorses. If you thought you couldn't afford a Neumann, think again. ■

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NEW TECHNOLOGIES

< recording and editing. Audio can be recorded, processed and played back at 44.1kHz, 48kHz, 88.2kHz and 96kHz sample rates and 16-bit, 20-bit and 24-bit resolution. SGI's Octane and Onyx2 workstations come with eight channels of 24-bit ADAT optical I-O as standard, expandable with additional cards. Audio processing can be run off-line or in real-time using VST plug-in architecture. Several Nuendo front-ends can be run on various machines hooked into a central server, allowing separate dialogue editing, sound fx and music alignments sessions to run simultaneously. Nuendo supports Studio Central, an open framework for media asset management that allows creating, searching, editing and archiving of media data to be fully organised.

Steinberg, Germany. Tel: +49 40 210330

Otari RADAR II

Otari has released RADAR II as an enhanced version of its random access digital multitrack. Features added include 24-bit resolution, built-in backup and storage, a single 9Gb drive, new digital and analogue I-O and a new remote with 48-track arming.

Otari, Germany. Tel: +49 2159 50861

Neutrik's audio analyser

Neutrik has introduced the RT-2X Audio Analyser which features analogue and ISDN inputs and outputs. The remote-controlled instrument was designed for the simultaneous acquisition of level, distortion, noise, phase and crosstalk plots vs frequency. Three versions of new BNC connectors—non-locking budget, bayonet with easily



accessible locking, and push-pull—all feature a new cable clamping system and an absolute constant wave propagation resistance (60Ω or 75Ω) is guaranteed. They are compatible with existing BNCs.

Neutrik, Lichtenstein. Tel: +41 75 237 2424

Akai upgrades to 24-bit

Akai has announced the Kit-DD8, an upgrade path for its DD8 Digital Dubber which allows 20-bit and 24-bit recording at sample rates of up to 96kHz. An upgraded DD8 will be able to mix 16-bit, 20-bit and 24-bit media in a single Project, and will also be able to play back disks from all earlier DD and DR systems. Significantly the DD1500 will be able to playback and edit 24-bit media, courtesy of a 'split bit' 24-bit recording mode on the DD8. Akai is enhancing the file compatibility of its DD8 and DD1500 with other digital audio workstations. New software allows the use of a Mac-formatted disk as the native hard drive and to record in AIFF or SDII formats. The same software also allows the machines to receive and work with some file types recorded >

June 1998 **Studio Sound**

Unleash your creative power

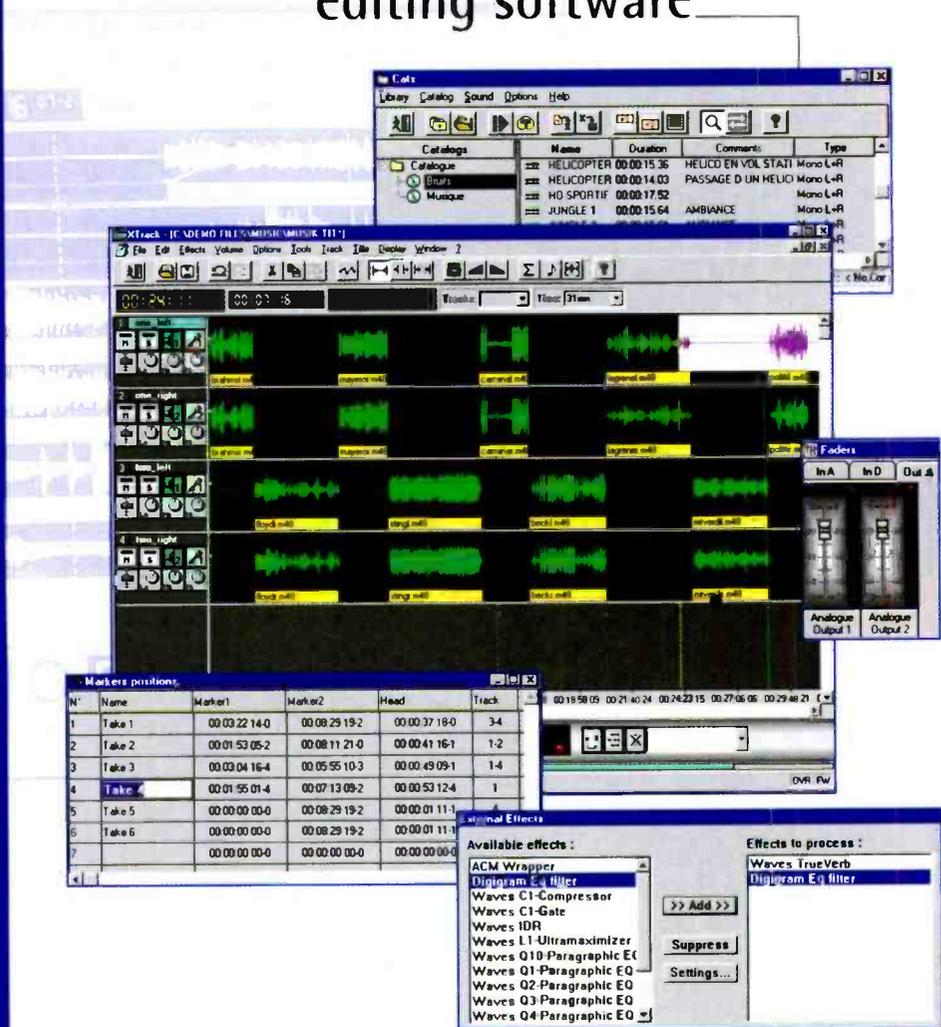
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Powered

CEDAR Debuzz

Extending its sphere of restoration, CEDAR's latest process addresses a variety of problems. **Dave Foister** gets the buzz

CEDAR'S DEDICATION to removing the bits of audio signals that should not be there is matched only by its determination to identify more of those bits and deal with them ever more effectively. From its perceived beginnings as a system for salvaging old archive material, particularly associated with the restoration of cylinder recordings and 78 discs, its range of processing has grown to encompass most of the nasties that plague even the best of us from time to time. Thus in addition to the archetypal CEDAR processes for removing hiss and scratches, we long ago were presented with crackle removal and inter-channel time correction, and increasing sophistication in dealing with the original problems.

A surprising accomplishment of the de-crackle process was its ability to deal with several elements besides the target area of LP surface noise and similar problems. It is also amazingly good at removing thyristor buzz and even some types of distortion—I have used it myself to get rid of the cracks of a couple of overs on a source tape I was having to remaster. This is, perhaps, the icing on the cake, however, and de-crackling alone cannot be relied on to deal with all forms of hum and buzz, some of which can be irritatingly complex in nature and too steady for de-crackling to even notice.



So long comes Debuzz. This is a totally new process in concept and operation, and for the time being forms part of the CEDAR for Windows collection, running on a PC with the CEDAR ProDSP hardware installed to provide the powerful processing capabilities it needs.

Debuzz addresses the specific problems of hum and buzz introduced by mains interference, power supplies and cameras, and whereas the other processes have widespread uses centred largely on mastering and remastering, Debuzz has particular applications in audio for picture work, dealing with common difficulties encountered with location sound. Its parameters and method of operation are clearly focused on this one task, with CEDAR's usual thorough understanding of the problems it is dealing with. The aim is to eliminate all the components of a hum or buzz from its fundamental through all its harmonics, and to do this without affecting the wanted signal. Obviously the usual methods of tackling this with notches and comb filters will leave their pawprints all over the remaining sound, so the approach here makes no use of such techniques.

Its appearance on screen follows the estab-

lished pattern. A small window presents a pale blue front panel with six labelled green knobs, numeric read-outs for them all, and an illuminated toggle switch. As is the case with most of the CEDAR processes, since this is doing something not available elsewhere the control functions are not always intuitively obvious, but once the principle has been understood are perfectly clear and logical.

The most critical control is that for identifying the fundamental frequency of the problem. A button next to its display indicates the presence of a drop-down menu where CEDAR has thoughtfully provided a list of commonly encountered frequencies, although the value is fully adjustable for special cases, including shifted playback speed. Like the user-input controls on other CEDAR algorithms, it is better to imagine this as giving information to the process to help it identify problems rather than a direct control as such. Debuzz itself is then able to pinpoint each component of the problem and remove it, with further controls to determine the degree of reduction and tolerance to variations.

The important one is **WIDTH**, which can be imagined as adjusting the width of the notches in an analogous filtering setup. At its narrowest it is so precise as to make no allowance for even tiny variations in the frequency of the buzz—fine in a tightly locked digital situation, but inappropriate when the source has any speed variations at all, or even if the mains that caused the buzz varied in frequency, as it is prone to do. Increasing the **width** parameter allows for such fluctuations, and, although it is difficult to make it introduce unwanted effects, it is best to keep it as low as possible.

Having established the nature of the problem in this way it is still up to the user to decide the amount of attenuation to apply, and even here there's surprising subtlety as the function is split into three frequency bands with independent control of the attenuation in each.

CEDAR's demo material has never sounded as though it was designed to give the gear an easy time of it, and so it was with Debuzz, which was able to deal with some really unpleasant problems. Apparently irretrievable hum-ridden disasters were completely salvaged, to the extent that you'd never know there had been anything wrong, with the same strain to the credulity often induced by CEDAR restoration. As usual, the wanted signal appeared to be completely unmarred.

Debuzz is a very powerful addition to the problem-solving armoury, and, although its target may be different from the rest of the suite, no self-respecting mastering house, or possibly post house, will want to be without it for long. ■

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Cambridge CB1 4BN UK
Tel: +44 1223 414117
Fax: +44 1223 414118
Cedar Audio
Tel: +1 207 828 0024
Fax: +1 207 773 2422

NEW TECHNOLOGIES

< on Mac disks without the use of OMF.

Akai, UK. Tel: +44 181 897 6388

Analog Devices' fastest SHARC

Analog Devices' newest SHARC 32-bit DSP, the ADSP-21065L, is priced at US\$10 per unit and is claimed to be twice as fast as any 32-bit DSP available and more than three times faster than any DSP in its price range. The ADSP-21065L processes 180 million floating-point operations per second and 180 million fixed-point operations per second, and features I-O throughput up to 240 megabits per second. The chip supports eight data channels for consumer audio-video applications. Analog Devices is developing a static superscalar SHARC DSP capable of 5 billion operations per second on a single chip for high-performance signal processing applications.

Analog Devices, US. Tel: +1 781 461 3885

Pro Tools gets control

Digidesign's ProControl control surface for Pro Tools is modular with expansion to 32 channels of tactile control of virtually every function in Pro Tools. It employs touch-sensitive moving faders and a dedicated switch group for dynamic and snapshot automation for parameters capable of automation in Pro Tools TDM. ProControl provides direct access to recording, mixing, editing and routing functions of Pro Tools, and includes 25 8-character LCD scribble strips.

Digidesign. Tel: +1 415 688 0600

AKG updates C1000S

AKG has updated the 11-year-old C1000S. The new version still has a Polar Pattern convertor, but adds a Presence Boost Adaptor. In cardioid mode this provides a 5dB peak between 5kHz and 9kHz. Cosmetically, the new model has a satin-silver finish and an improved battery compartment.

AKG, Austria.
Tel: +43 1 86 654280.

Fidelipac digital cart

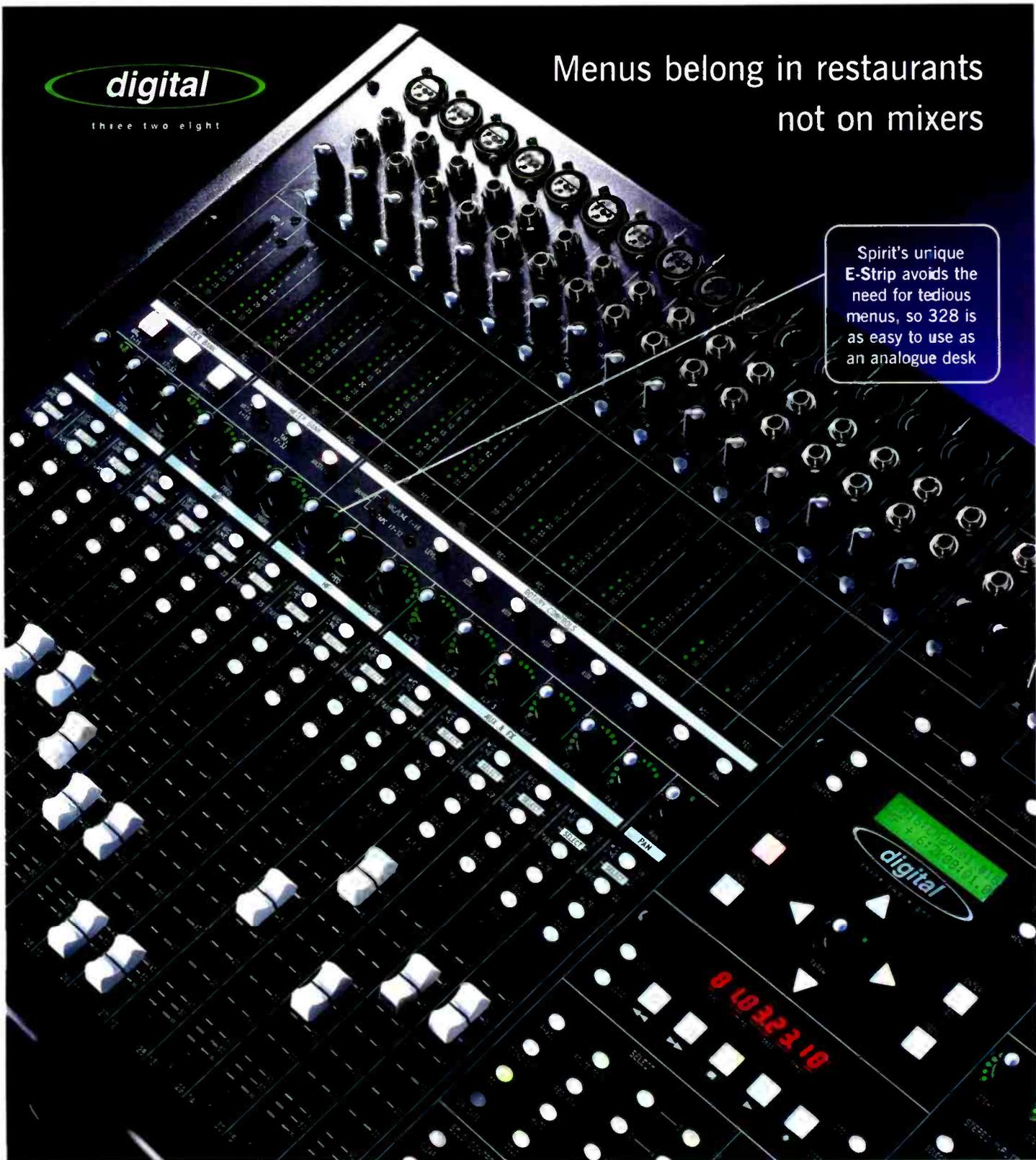
Fidelipac's Dynamax DCR 10 digital cart machine replaces the DCR 1000 and is equipped with a 2Mb drive operating at a 32kHz, while Zip or MO drives can be used for high-capacity requirements. Units with these drives can be configured for linear uncompressed operation. The DCR 10 can be upgraded to AES-EBU I-O at 44/48kHz. With the Zip or MO drive option, the DCR 10 allows 99 cuts to be recorded and cuts can be cued up using a front panel search knob or an optional PC keyboard. The optional Q50 Instant Access keyboard allows push-button access to 50 cuts on any Zip or MO disc. The small custom keyboard also permits chains, rotations or loops of any of >



digital
three two eight

Menus belong in restaurants
not on mixers

Spirit's unique
E-Strip avoids the
need for tedious
menus, so 328 is
as easy to use as
an analogue desk



42 Channel
Digital Mixer
with the
Human
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MAIN FEATURES: Up to 42 Inputs at Mixdown
8 Bus 16 MicLine Inputs with Inserts and HPFs
16 Digital Tape Returns with 2 x ADAT Optical and 2
x Tascam TDIF connectors as standard. All inputs
have access to 3-Band Parametric EQ, 4 external
Auxes, 2 Lexicon Effects Sends and Pan via the E-Strip
5 pairs of Stereo Inputs and 2 Internal FX Returns
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throughout. Moving 100mm Faders Throughout. 2 x Lexicon
Dual Programmable Effects Units. 2 x Assignable Mono/Stereo
Dynamics Processors with Compressors, Limiters, Gates &
Duckers. Snapshot Automation with recalling of all main console
parameters for up to 100 'scenes'. Dynamic Automation capability
Undo/Redo, Copy & Paste functions. Solo-in-Place. AFL & PFL Solos. Full Metering
and Monitoring of all Inputs, Processors, Auxes and Masters. Full Machine Control
capability with large Timecode display. 2 Consoles cascadable for 84 inputs at
mixdown and 32-track recording. Third ADAT Optical Output for Groups or
Aux Masters - 1 x AES/EBU and 1 x SPDIF gives 28 Digital Outs and
20 Digital Ins. **OPTIONS:** TDIF 8 Channel Analogue I/O Interface. TDIF Mic
Preamp Interface. 8 Mic Preamps with Insert, Gain, HPF and Direct Out
TDIF AES/EBU Interface - 4 pairs AES/EBU I/Os for Hard Disk production systems

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Steinberg VST plug-ins

VST MIDI+Audio sequencers can draw on a growing number of effects plug-ins. **Simon Trask** continues to sound out the range...

THIS MONTH'S SELECTION of VST software effects plug-ins reflects the variety of VST-based real-time audio processing capabilities available on the market at present. All are Rack Xpander effects, which means that their parameters are edited within a graphical window that pops up when you click on the front-panel EDIT button of the virtual rack-mount unit. Three are from Prosoniq (currently Mac only), available

from Steinberg dealers; the rest are from Steinberg. For this review, I've used Cubase VST 3.5 running on a G3 PowerMac.

The effects can be plugged into Cubase VST's Mixer and/or Master effects racks. It's worth noting that the new VST 3.55 for Windows and forthcoming VST-24 4.0 for Mac both introduce Insert effects capability.



The DeNoiser is straightforward to use, with just three slider controls—Level, Reduction, and Ambience—plus a real-time graphical representation of the input waveform, with graph-

ical lines to indicate the noise floor and the level setting. Also provided are two user memories. The ambience parameter allows you to balance noise suppression against ambience reduction where necessary. In practice, the DeNoiser proves effective at its designated task of removing background noise.

The DeClicker is similarly straightforward in operation yet flexible in use. You can adjust the click threshold, remove any low-frequency 'plops' caused by click removal, and select between three frequency ranges. An LED meter shows input signal level, while the signal waveform and the click waveforms are scrolled visually in two windows: an Audition option lets you hear only the clicks that are being removed from the signal. Like the DeNoiser, it handles its task effectively.

Magneto sets out to simulate the sonic effect of analogue tape saturation and overdrive. You can set input level, tape speed (15ips-30 ips), drive amount, HF-adjust, and output level parameters in the plug-in's retro-styled graphical display window. This plug-in produces very satisfying results, on individual instruments and mixes.

Red Velvet has been designed to simulate a tube amp and speaker. You have control over input level, bass-mid-treble EQ, gain, mix, >

NEW TECHNOLOGIES

< the cuts on the disk.

Fidelipac, US. Tel: +1 215 464 2000

Audio F monitor

Audio F has released the active Reference Monitor System FO and the digital F3 monitor. The FO includes a separate 19-inch amplifier-crossover unit, a 12-inch woofer, a 5-inch mid-range and a 25mm dome tweeter. The balanced input stage has adjustable sensitivity from -10dB to +12dB, with an equaliser and high-pass filter. The F3 has AES-EBU and analogue inputs in a vented design with two power

amplifiers, a crossover network and a 20-bit D-A converter. Components are a 5-inch magnetically shielded woofer with a mineral filled polycone for the bass, a 25mm soft dome tweeter and a crossover section



consisting of a fourth-order Linkwitz-Riley filter at 3100Hz.

Audio F, Netherlands. Tel: +31 35 621 6714

Onyx on the table

Onyx has a range of professional location MiniDisc recorders. The MobiDisc is built around an unmodified Sony MZ-R30 MD fitted into a metal chassis. Featuring a mono

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NEUTRIK CORTEX INSTRUMENTS

AUDIO ANALYZERS+PSYCHOACOUSTICS

NEW TECHNOLOGIES

XLR balanced mic-line input with phantom power, it also offers a mono balanced line output, a built-in monitor loudspeaker and



a 1/4-inch jack headphone socket. A recording level control with LED PPM and a monitor volume control are located on the front panel. It is powered by internal Ni-MH rechargeable batteries. The Carrier is a simpler and cheaper version of the MobiDisc and is similarly built around an MZ-R30 machine. It features a mono (or stereo) XLR mic input, a stereo cinch line output and a 1/4-inch stereo jack headphone output.

Onyx, Switzerland. Tel: +41 21 965 3110.

Lexicon PCM processors

Lexicon has introduced the PCM 81 Digital Effects Processor and the PCM 91 Digital Reverberator, which follow in the footsteps of the PCM 80 and PCM 90. The PCM 81 adds more onboard effects, more effects algorithms, more delay, AES-EBU I-O and comes with 300 presets. Other features include 24-bit internal processing, >

< output level, combo-stack, and gate on-off parameters, plus a gate calibration facility (the gate works on the simulated hum and buzz). This is a versatile and reasonably satisfying plug-in, complete with 12 presets covering a variety of amps and guitar applications.

The function of the Loudness Maximiser (which is useable on an individual channel and/or the full mix) is to raise the perceived loudness of the audio signal, and it performs this task well. The plug-in is straightforward in presentation and use: you can set gain and density values, switch boost on-off, change the perceived softness-hardness of the signal, and store settings in two memories. Several graphical LED meters provide handy visual feedback.

The Spectraliser is an enhancer effect, useable on an individual channel and/or the full mix, which adds second and third harmonics to the frequencies of the input signal above a user-selectable frequency: you can set the amplitude of each harmonic, and adjust the envelope of both, plus set input level, gain, and mix ratio, plus kick (presence) on-off. A Solo function lets you hear only the added harmonics. This plug-in is useful if you need to 'reintroduce' or otherwise boost high frequency components in a signal. I found it particularly good for adding punch and bite to drum tracks.

Prosoniq's Ambisone is a versatile 3D spatialiser effect, useable on a full mix and for individual sound placement. You can set

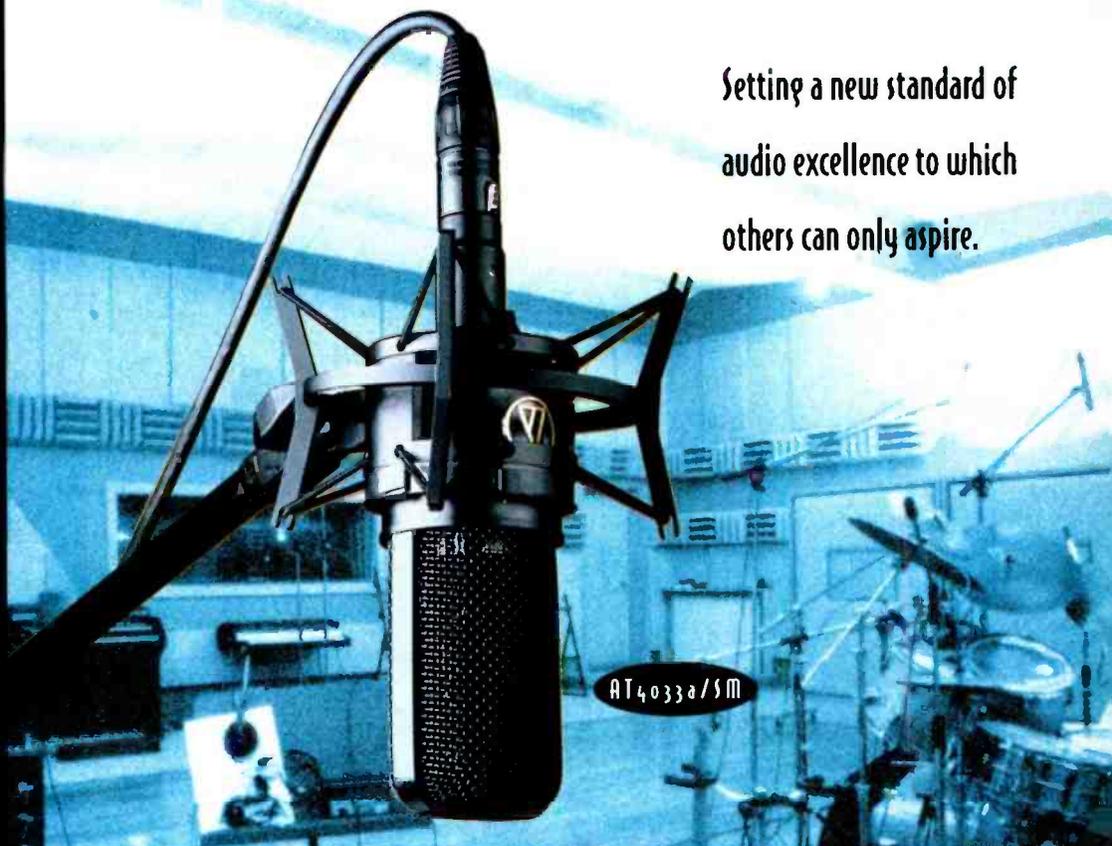
azimuth, elevation and distance values, with also depth and speed for the elevation and depth, speed and waveform for the azimuth in order to create dynamic effects. Other parameters are open-enclosed stereo field, high-low quality, and pattern (reflection character of the environment). The plug-in works well, and makes a useful addition to the (re)mixer's arsenal.

Prosoniq's Roomulator package provides five reverbs: medium and small rooms, two halls, and plate. All five share the same striking graphical interface, including virtual sliders for Room Size, Diffusion and Predelay, and an x-y graphical display for absorption characteristics, with the Warm-Cold balance presented on the x axis and White-Coloured on the y axis. These plug-ins don't have the smoothness and density of the best hardware reverb units; however, all of them are fairly satisfying, and pleasantly versatile—the ability to change room characteristics is particularly effective. Ideally I'd want better reverbs for vocals.

Prosoniq's VoxCiter is the most feature-rich of all the plug-ins, with a densely packed but clearly organised graphical control panel providing parameters for In, Gate, EQ1, Compressor (including De-esser), EQ2, Drive, Refresh, and Output sections. Although intended for vocal use, and effective in that role, it's actually much more versatile and creative than that. I found it particularly effective as a way of changing the sound of drum and percussion tracks. All in all a rewarding plug-in. ■

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Hamburg Germany
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OnStage Audio Interface

With more audio being manipulated in software, the need for computer audio interfacing grows daily. **Rob James** evaluates a card for the PC.

THE OUTFIT BEHIND On Stage is the San Diego-based Applied Magic Inc, a company perhaps better known as a specialist in the nonlinear video editing and multimedia fields. The introduction of the OnStage interface card, however, brings it squarely into the audio field. Once I had managed to install NT4 to dual boot with Windows 95 on my recalcitrant computer, installation of the card and software proved to be reasonably straightforward. The good news for those of us not routinely using NT4 is Win95 drivers should be available by the time you read this.

Since the card is 1/2 length, it will be easier to fit into machines equipped with the current ATX format motherboards although, unlike several of the opposition, it has a cut-out to accommodate protruding memory



modules (SIMMS) on AT format boards. My machine is built with hardware testing in mind and therefore plugging in the card took only a couple of minutes.

The driver and OnStage mixer software comes on one diskette. Installation is simply a matter of running the Setup program. This walks you through the installation and it is all familiar stuff. The card itself is a PCI bus type. There were three 'kludge' wires on my example—usually a sign of last minute revisions—but I am assured there are none on the production board. There are a couple of jumper blocks, one of which is for in-house firmware upgrades and programming, the other for a future upgrade promised by the end of summer. This will permit ganging of up to four boards fully synced.

There are only two connectors on the rear panel. A 25-pin D-connector covers the audio and a further 15-pin D-connector deals with time code, MIDI and Video. The breakout cable looms supplied are a generous 1.8m long. They are made up in Belden cable and terminate in XLR 3s for the four analogue and single stereo digital AES-EBU I-O connections. I would have liked to see the option of a second AES-EBU connection.

MIDI connections are on the usual DIN sockets and LTC (Linear Time Code) and Video I-O are all on BNCs. The A-D and D-A converters provide 20-bit performance. This is reflected in the signal to noise figure of 110dB. The dynamic range is quoted as 99dB and the Total Harmonic Distortion and noise as -90dB. These figures, in the absence of any means of verification, appear

conservative. The subjective audio quality is extremely high. Analogue levels are nominal +4dBu. Digital I-O format is selectable between AES-EBU and IEC 958 (SPDIF). An adaptor is required to convert between the XLRs provided and phonos for the latter option. The card can cope with sample rates from 4kHz to 50kHz and an internal oscillator is provided or the card may be set to sync to incoming digital audio or to derive a clock from incoming video.

The OnStage mixer software supplied is designed to sit between the card and audio applications. It also provides a means of accessing the onboard mixing and hardware gain controls. For the review I used Sonic Foundry's Sound Forge version 4.0d simply because it is the only NT4 audio application I have lying around.

The mixer consists of three windows. The record mixer patches each of the four physical inputs to any of four stereo destination devices. The devices in are logical rather than physical and could be a multichannel software package or up to four stereo ones.

Four on-screen faders adjust the line-in gain that is indicated by four virtual LED ladder-type meters, four further pairs of 'faders' adjust the send level to the four devices. Eight buttons on each strip determine which line input is sent to the left and right inputs of the logical device and two LED ladder meters indicate the send levels. Each strip also has a MUTE button.

The playback mixer is similar to the record. Each virtual device has its own strip with twin faders and eight assignment buttons to route to the four line outputs. These line outputs have faders and meters in the same style as the record page. The meters are prefader, so actual send levels must be determined on the external device.

Multiple destinations are allowed in both record and replay. The sliders can be locked together to facilitate simple trimming of stereo material or unlocked to permit offsets.

The final page is termed Adaptor and it is here the setup choices are made. Apart from clock source and digital format there is also a time-code generator. This will generate code from any value set in a position box when the GENERATE button is pressed. Frame-rate selection offers a choice of 30fps, 29.97fps, 25fps, 24fps, Video In or LTC In. When Video In or LTC in are selected, the output code will be at the same rate as the input unless the rate is selected first, then the control source. Drop frame is selected with another prominent button. A further undocumented option is to burn in (superimpose) time code on a video signal. OnStage

will appeal to anyone looking for a high-quality, one-card solution to audio. MIDI and time-code interfacing to PCs and will be of particular interest to system integrators in the non-linear video editing field. ■

Contact

Applied Magic
Tel: +1 760 931 6417.
Fax: +1 760 931-6440.

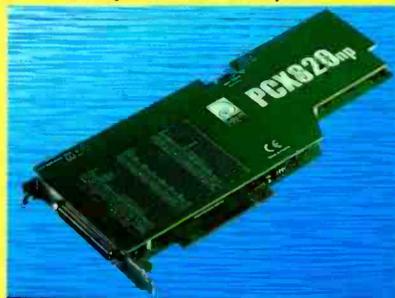
NEW TECHNOLOGIES

< true stereo signal path, balanced analogue I-O, and the ability to mix analogue and digital inputs and outputs. Presets are editable, with access in Pro mode to as many as 100 parameters. The PCM 91 includes all features of the PCM 90 and adds Dual Reverb algorithms together with dynamic spatialisation effects for 2-channel or surround sound applications. Like the PCM 81, it has AES-EBU I-O and the ability to output AES-EBU and SPDIF simultaneously. The PCM 91's dual-processor architecture features two of Lexicon's proprietary Lexichips. Its 450 presets derive their heritage from Lexicon's top-of-the-line 480L and Model 300 studio processors.

Lexicon, US. Tel: +1 617 280 0300.

Digigram adds PCXnp cards

Digigram has added two stereo record-playback cards to its multichannel PCX800np range. The PCX820np and PCX821np are designed to complement the PCX800np and 801np, which were launched last year. The PCX820np is an analogue record-playback PC sound card for PCI buses, with four balanced analogue stereo or eight mono outputs and one stereo input that can be configured as a balanced analogue or AES-EBU connection. The PCX821np is a digital record-playback PC sound card with four stereo AES-EBU outputs and one stereo AES-EBU input. All PCX800np series cards



use a 32-bit driver. The PCXnp driver features better multitasking and multiple application management. Multiple audio streams, in linear PCM or MPEG compressed formats, can be mixed into each hardware output. Digigram has also introduced the LCM range of professional PCI sound cards. The first in the series are the LCM440, giving duplex operation with any combination of up to four active mono inputs and outputs, and the LCM220, a full-duplex card that can mix three stereo files to its stereo output. This last product is available in two versions. Tel: one with unbalanced I-Os (LCM220A), the other with balanced I-Os (LCM220B).

Digigram, France. Tel: +33 4 7652 4747

Digital amp

TACT has what it claims is the world's first true digital audio power amplifier. The TACT Millennium is not a conventional combination of D-A convertor and analogue amplification, but employs a PWM amplification stage. Among the benefits claimed are efficiency approaching 90% and constant dynamic range regardless of >

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The new **System 600A** Active Nearfield Monitor from Tannoy offers the revelatory experience of full bandwidth phase coherent wavefront reproduction that is a unique property of Tannoy's Dual Concentric driver technology. In the System 600A this exceptional ability to produce such untainted sound quality is coupled with 150 watts a side of fully linear, transparent power amplification (each speaker features 2 x 75 watt integrated power amplifiers, providing up to 117dB SPL at mix position). Not only does this classic Tannoy design offer an exceptionally affordable means of obtaining uncompromising standards of studio monitoring but ensures that monitors and amplification comprise a fully matched, high performance system. Such confidence in the accuracy of what you are listening to cannot be purchased at this price with any other monitor.

inspired
TASCAM

dbx Blue 786

Chasing the proliferation of microphones is that of preamps
Dave Foister tests the latest from the Blue range

HOPE WE HAVE NOT REACHED the stage where the value of a piece of equipment is judged by the brightness of its colour. Freed from the constraints of black and grey panels, outboard is starting to look like rainbow-hued variants on the same theme, rather like Adidas-clad schoolkids on a non-uniform day. The new Blue range from dbx follows this pattern, hoping to distinguish itself from the standard black and white of its less-expensive stablemates. A case in point is the 786 dual precision microphone preamplifier, which if it was red and had round vus would look very much like somebody else's.

Thus the eye is caught by a thick sculpted front panel in a fetching shade of electric blue, adorned with prominent aluminium knobs and buttons, recessed illuminated vu meters and bright multicoloured indicator LEDs. Inspection of the content rather than the style reveals some unusual features for a unit of this type, with particularly interesting ranges of values.

The 786 comprises two preamplifiers with clear aspirations to the higher end of the market. The emphasis throughout is on the highest sonic performance, and the extra bits are just that—value-added facilities which can be

dispensed with altogether. The input stage has a wide range of gain available, with coarse selection in 5dB increments on a very large rotary switch. This is not the expected network of resistors mounted on a big clumsy wafer switch, but controls the gain by means of relay switching, making it particularly light yet positive in operation. Fine gain up to 5dB either way is on a smaller pot, which has no centre detent, although it gives high resolution 1dB increments, and there is a 20dB pad with LED. The resulting output level is shown on the meters with associated peak LEDs, without the complication of output level controls—what you set is what you get, at nominal +4dBm only. Conventional features are completed by switchable phantom power and polarity inversion, and the line of four buttons also includes a switch marked SUPER LOW Z, matching the preamp to microphones with impedances in the order of 20Ω, such as some ribbon models. The only thing missing from the normal set is a low-frequency filter, perhaps a surprising omission. What takes the 786 slightly outside the usual run of preamps is its HF EQ section. There is no attempt here to provide a complete equaliser—no bass controls, never mind mid—but instead a very subtle high-frequency adjustment that according to the manual is designed to affect the 'air' or 'space' in the signal. Its gain control is conventional enough, calibrated ±16dB, but its frequency control defies the pragmatists by offering a 3dB point as high as 40kHz. Even a third of the way down the setting is 28kHz, and its lowest possible value is 5kHz. Add to this the facts that the slope is 3dB per octave and the quoted frequencies are the 3dB up or down points with the gain at its extremes, and clearly this is no ordinary equaliser. Its slope can be switched to 12dB per octave, and then its effect is much more audible, but at its subtlest it is the kind of thing to provoke arguments. Few microphones, even good ones, reach 20kHz with any linearity, and there really is not much to be gained by raising 40kHz by 3dB. But then NightPro's Air Band does similar things to wide acclaim, and it has to be said that when set at 28kHz the dbx does appear to open up the top end and help it breathe. The good news for those who find all this rather pointless is that the EQ goes low enough to do genuinely audible and pleasant things, and that it can be switched out altogether.

What is left is a truly high performance mic preamp, capable of holding its own with similarly priced (and more expensive) specialists. It is extremely quiet, and its pristine cleanliness was only marred once during my time with it by what appeared to be a poor switch contact that introduced distortion until I poked it in and out a couple of times. Otherwise it behaved impeccably, with exactly the kind of neutrality and openness that leads us to seek outboard preamps in the first place. The aim

surely should be to pass on the best the microphone can deliver with nothing added and nothing taken away, and that is what the 786 tries successfully to do. Its gain switching arrangements give not only good repeatability but apparently precise stereo matching, no doubt within the tolerances of most microphone pairs, even those that have been specially selected.

The EQ arrangements will be seen as a bonus to a greater or lesser degree according to how important you regard the octave above conventional audibility to be, and I would have liked to see it matched by some form of low frequency corrective control. All of this remains icing that other cakes don't have at all, on top of a pair of preamps worth exploring at the price in their own right. ■

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 Fax: +1 801 568 7662
 Net: www.dbxpro.com
UK Arbiter Group
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 Fax: +44 181 202 7076



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Conventional features are completed by switchable phantom power and polarity inversion, and the line of four buttons also includes a switch marked SUPER LOW Z, matching the preamp to microphones with impedances in the order of 20Ω, such as some ribbon models. The only thing missing from the normal set is a low-frequency filter, perhaps a surprising omission.

What takes the 786 slightly outside the usual run of preamps is its HF EQ section. There is no attempt here to provide a complete equaliser—no bass controls, never mind

NEW TECHNOLOGIES

< volume control setting. The Millennium is the result of a joint research project between Danish Tocatta Technology and NAD Electronics, UK. The amplifier circuit is based on proprietary PCM-to-PWM EQUIBIT™ technology. EQUIBIT™ simplifies the signal path from the digital signal source to the speakers. A processor-circuit controls the power output devices directly using digital pulses.

Tact, Denmark. Tel: +45 9672 1000

Westlake sub

Westlake Audio has introduced the BB-10SWP Subwoofer designed as a partner to the BBSM-10 3-way monitor. The



system's dual-tuned port enclosure is coupled with a 55lb crossover and can be powered by a single stereo amplifier or passive bi or triamped. It uses an 18-inch driver unit with an 8Ω impedance and claimed sensitivity of 96.5dB at one meter.

Westlake, US. Tel: +1 805 499 3686

Dynaudio BABES

Dynaudio Acoustics has introduced the BX30 subwoofer specifically targeted at 5.1 surround. Known as BABES, the BX30 is a development of Dynaudio's ABES subwoofer, but is more compact and less expensive than ABES. It incorporates crossover electronics and a 140W amplifier in a design that combines reflex tuning with electronic protection enabling the acoustic power output of the BX30 to be increased while lowering the frequency response down to 22Hz (-3dB).

Dynaudio Acoustics, UK.

Tel: +1 171 403 3808

Roister monitors

Roister's monitor line now includes five models and all models are active. The HNF6 is a cost effective nearfield with 6½-inch polycone woofer and a 1-inch dome tweeter. The HNF8 is a more powerful upgrade with two 6½-inch polycone woofers and the same tweeter. The SNF6 is a small high-end nearfield with a long throw 6½-inch woofer while the tweeter is 1-inch fabric dome. The SNF8 is the near-to-mid field alternative to the SNF6, featuring two of the same 6½-inch kevlar composite woofers and a Revelator 1-inch fabric dome tweeter. Top of the range is the SMF 3-way mid field monitor with two 6½-inch kevlar composite long throw woofers, a 3-inch fabric mid-range dome and a 1-inch fabric >

June 1998 Studio Sound

I N T R O D U C I N G ...

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VST

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Steinberg
www.steinberg.net

Lawo mc² and DSN

The German digital desk manufacturer surprised everyone at AES with the announcement of its ATM plans. **Zenon Schoepe** explains

THE AMSTERDAM AES Convention, true to current form, concentrated minds on software upgrades of existing products and demonstrations of sector commitment with new product announcements. However, true technological innovations remained predictably sparse with German broadcast digital desk manufacturer Lawo clinching the show prize by announcing that it would be able to deliver linear real-time audio over ATM by Spring 1999 as part of a new direction and drive for the company.

Lawo will be known to many as a particularly strong broadcast supplier in its native country with its mc50, mc80 and mc82 digital

faces connect to new Lawo stageboxes that break into the system and the control information is also included in the MADI stream.

Several switches may be assembled to yield additional DSP capacity or routing and all resources in the system can be accessed by any connected user. It is interesting to note that Lawo will be offering two ATM-based solutions—a complete system with the DNS and control via mc² digital desk front ends and the DSN in isolation for instances where existing other-brand digital desks are already owned and need to be interfaced to the switch.

The mc² series digital desk control surfaces are identical to the existing mc80 and mc82 models, but differ in that their processing no longer needs to be located locally. Features of the mc² complete system include 192 paths for digital signal processing, 14+ summing buses, extremely short signal pass time is claimed with automatic signal pass compensation.

Additionally, power consumption is said to be half that of a conventional system and weight is down to 75% making the boards prime candidates for OB vans. Each stagebox has its own power supply and a programmable MADI selector and supports mic and line; AES-EBU at 48kHz, 48kHz and 96kHz; MADI with 48 channels and varispeed; and TDIF.

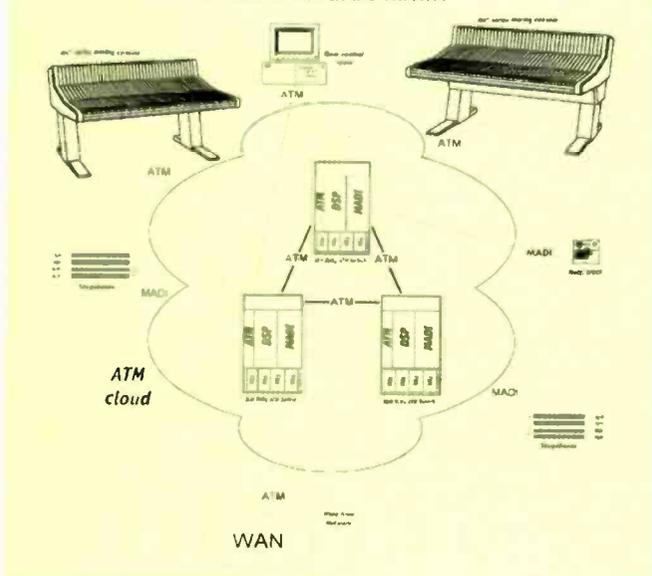
In a maximum-size system with signal processing paths and main outputs, routing of up to 4,000 signals simultaneously is possible and a theoretically unlimited number of switches may be connected within a distributed network. Synchronisation frequencies can be reconstructed from the receiver and all in-house connections can be maintained allowing the creation of a worldwide network of linked studios. The system can also use wide-band ISDN.

Price is said to be 'considerably less expensive than previously available systems' according to the company. Lawo's confidence in its ability to deliver the system to the timescales it has announced bodes well. Although the technology in the first instance is likely in this particular incarnation to appeal exclusively to the broadcast fraternity, the principles behind it have far reaching implications that are likely to touch everyone. Indeed the fact that Lawo has set up its stall so obviously would suggest that other manufacturers must now be thinking along similar lines. The promise of ATM, a veritable pro-audio buzz word of a few years ago, would seem to be a lot closer. Hats off to Lawo. Certainly one to monitor carefully. ■

Contact:

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(Ottersdorf), Germany
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Fax: + 49 7222 1002 24

Real time linear audio via ATM



console variants, but it has now created a conceptual network model built around a new mc² mixing console series and the Distributed Studio Network (DSN). This will realise real-time audio via ATM that at its most basic will allow remote control and audio access between geographically separated sites and equipment that will permit national broadcasters, for example, with a main multistudio complex, and many regional remote studios, to function as one large distributed studio network.

It is said to be the result of co-operation with IBM that has made the hardware and software of its ATM distribution Nways ATM Switch 8265-17 available to Lawo which has installed its own technology in to it. The switch allows routing of 4,000 mono channels at a data transfer rate of 25Gbit/s. It includes power supply and power management and will support application-specific plug-in boards directly into the backplane of the ATM switch.

Lawo says it has developed interface boards for broadcast-specific data formats, particularly MADI, and boards for the digital signal processing for the switch. The MADI inter-

NEW TECHNOLOGIES

< dome tweeter. All models are available in digitally corrected versions with Roister's Acoustics Compensator 20 digital room correction processor which has preset correction filters for every active Roister monitor and may also be used for room acoustics correction.

Roister, Greece. Tel: +31 591 651165

Pink and Violet monitors

Emes has expanded its range of nearfield monitors with the Pink TV and Violet HR. Both are 2-way bass reflex in passive and active versions with moulded wave guiding elements for the tweeter. Pink TV uses a 14cm polypropylene bass driver and a 25mm textile dome. All chassis are shielded. The active version uses a digital power supply design featuring Emes quick delivery circuitry. On the Pink identical amplifiers (80W LF/80W HF) are used for the woofer and the tweeter while dip-switches control input sensitivity, bass and HF level. The Violet HR features an 18cm carbon-paper woofer and a 28mm ultra light textile dome tweeter.

Emes, Germany. Tel: +49 8224 2877

tc Gold

tc Electronic's Gold Channel 2-channel digitally enhanced microphone preamp, features 24-bit, 96kHz A-D conversion with equalisation and dynamics processing. Features include an expander-gate, Softlimiter compressor-limiter, equaliser and additional processing tools, all accessible through a channel strip interface with high resolution metering. AES-EBU, Tos Link SPDIF, and ADAT I-Os are provided in addition to standard mic and line inputs and wordclock in. It has 200 user presets.

tc electronic, Denmark. Tel: +45 8621 7599

LA Audio's DigEQ

LA Audio's DigEQ programmable EQ features simultaneous graphic and parametric equalisation, sweepable high and low-pass



filters, shelving EQ, compressor-limiter and noise gate. Options include dual channel slave units, a choice of wired or wireless remotes, RTA, digital delay and digital I-O.

LA Audio, UK. Tel: +44 171 923 7447

K&H nearfields

Klein and Hummel's O198 is identically proportioned to the company's O 98 studio monitor and can be rackmounted or freestanding. The 3-way system has been designed to achieve best results in voice reproduction. A new baffle material is used so all three drivers could be placed closer together deeper inside the cabinet. Waveguides have been integrated for high and mid range drivers. The O198 has a tuned 8½-inch cone woofer with a long voice-coil, a 3-inch midrange and a 1-inch alloy dome tweeter.

K&H, Germany. Tel: +49 711 45 8930

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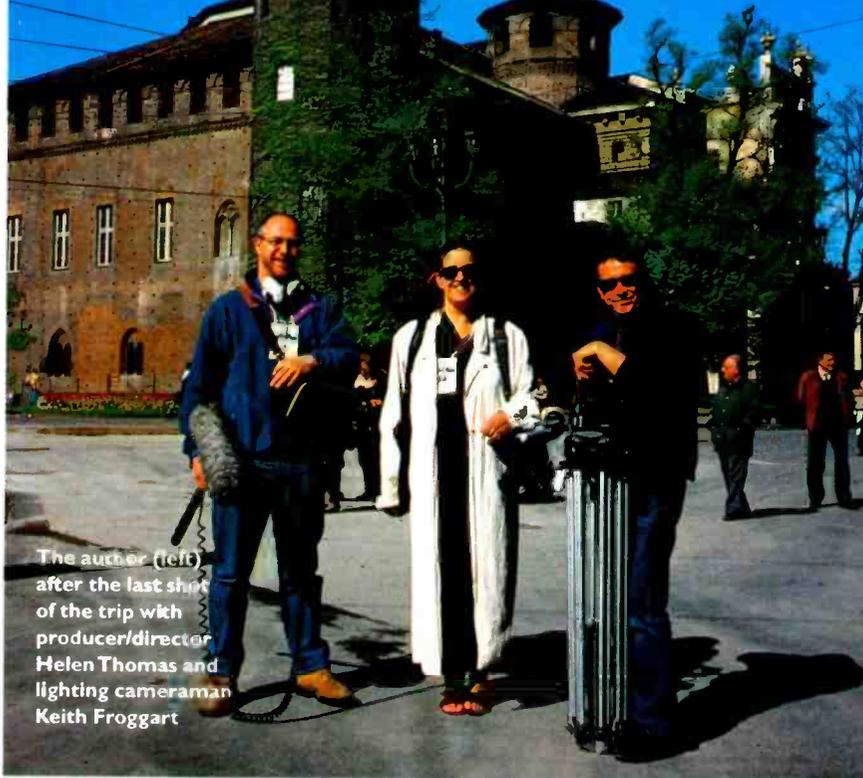
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Miracles do happen



The author (left) after the last shot of the trip with producer/director Helen Thomas and lighting cameraman Keith Froggatt

Dispatched across the globe to capture the sound for a documentary on the miraculous, **Neil Hillman** faces the three noble crises of sanity, faith and technique

THERE ARE several qualities that are well known to be beneficial to the freelance location recordist. These include the ability to reach a destination at no cost and in no time, offer all the latest kit for within the daily rate, not be bound by the human hindrances such as requiring food and drink at some point during any sequential 10-hour period. But the greatest of these gifts is unlimited contactability, and bookings that almost always originate on the mobile phone.

One recent call brought an enquiry about my availability for a two-week documentary shoot in the US and Italy. The programme, *Miracles*, was to be made for showing on The Discovery Channel and as a BBC special, and while its centrepiece is the Turin Shroud, other similar miraculous phenomena like weeping Madonnas and liquefying Saints' blood would also be investi-

gated. Would I like to be involved? Well a week in each of those places would suit me just fine, especially during a February when I am in a cold, damp and dark Birmingham; I am fascinated by this stuff after all, even if I do start further left-field than Doubting Thomas. Indeed the more I think about it, the more appealing the prospect of cheating the British climate with early April sun becomes.

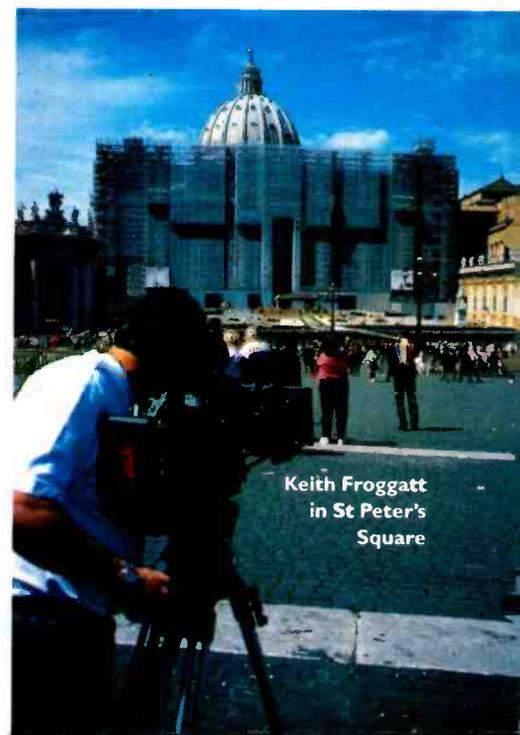
However, some weeks later when the postman crunches down the drive and a deep-pan-thick itinerary thuds on to the front doormat concussing the slumbering spaniel, my doubts arise earlier than expected; how will it be possible to fit all that is planned into these two weeks? Take the first week for instance; the crew—producer-director Helen Thomas, lighting cameraman Keith Froggatt, researcher Lindsay Keith and myself as sound recordist—are sched-

uled to make two transatlantic and seven interstate flights, some 13,000 miles in all, and record nine interviews backed up by filmed experiments to illustrate a particular contributor's stand point. The second week starts in Naples with other 'miracles' and will culminate in filming the shroud itself as it is shown to an adoring public in Turin for the first time in two decades.

The logistics of this trip, nightmarish enough due to the limited time availability of interviewees, are further complicated by the equipment we have to carry and check for each flight. Forget the lightweight revolution, we still need to carry a dozen sizable flightcases weighing in at around 250 kilos; and tight turnarounds, connecting flights and carnet clearance for customs all pile on the possibility of missed connections.

That is why at 5.30am on a Saturday morning at Heathrow airport I was slightly apprehensive.

We are on the first flight of the day for New York's JFK and need to make a connection for Los Angeles, with just 1½ hours to pass through immigration, reclaim the kit and clear customs, change terminals and check-in again for our flight to LA. There is no room for error in baggage handling with time this tight, so the inability of the Heathrow computer to produce sensible luggage labels after three attempts leaves us bidding farewell to our flightcases and me feeling that I have just dispatched several close friends to an untimely end along a crematorial conveyor. You might hear differently, but nothing anyone may say can really prepare you for the aggression, hostility and rudeness of an Italian-American New York immigration official who decides to take exception to an entry form bearing my country of birth as 'England'—apparently England is a county of Britain—and while debating the full scope of Her Britannic Majesty's kingdom could become the next Olympic sport (America gave us synchronised swimming remember) it is not getting me closer to the kit or our



Keith Froggatt in St Peter's Square



connecting flight. I can, in fact, only pass through immigration after agreeing with Franco's (or was it Carlo's?) assertion that I am the president and CEO of Neil Hillman Associates—not bad for a company with a permanent workforce of one. And while Bill Gates might not feel threatened by this Moseley magnate, I certainly like the idea of world sound dominance: 'what do you want to record today?'. It might make sense on paper for Toni or Mario here, but I am left feeling frustrated and saddened by the confirmation that we can be two nations divided by a common language.

With the joy, but, of course, not the closeness to my brother man, that Quentin Crisp felt on becoming an American legal alien, we hurriedly handcart the hardware to the neighbouring terminal like fleeing refugees and perspire, fluster and curse our way to the LA gate. Not until I am outside a Mr & Mrs T's Bloody Mary Mix, the best kept American secret, that the sights of Lake Michigan, a sparkling, deep azure blue viewed from 35,000 feet and later the magnificence of the Grand Canyon thrown into heavy relief by the modelling of the spring sunshine, cause my depleted spirits to rise.

By mid-afternoon it is raining when we arrive in LA—so much for the escape from grey skies—and the airport baggage reclaim is pandemonium. Incredibly all our pieces of luggage arrive. Some 23½ hours after rising, we check into our hotel on the Santa Monica Boulevard; but tonight it is Steve Miller on MiniDisc rather than Sheryl Crow that perform for the lullaby shift.

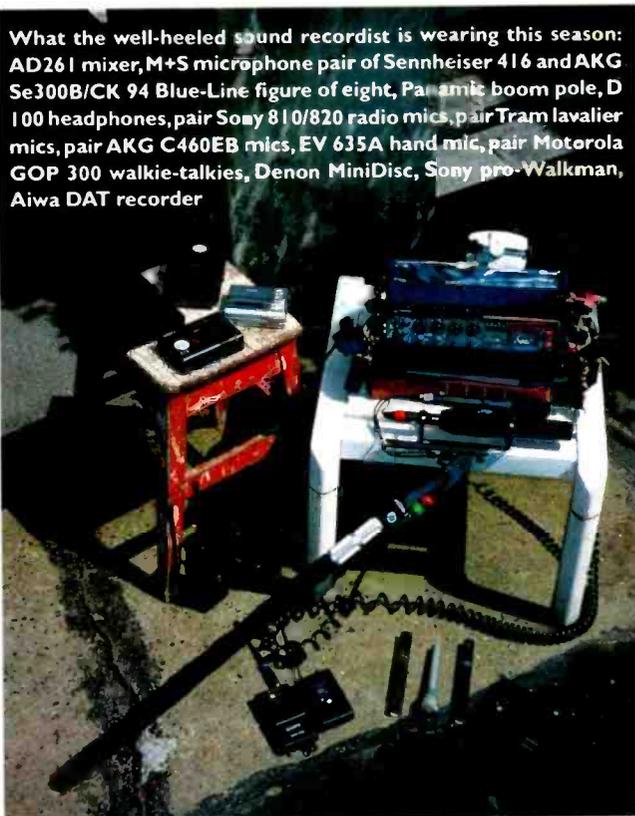
My body clock cannot keep me in bed longer than 5am, and so the next morning I quickly throw back the bed covers, don my sports kit and hurry to the hotel gym for a taxing, but endorphin-fuelled work-out. I am, of course, lying, because at 5am I am fighting for breath as Super Mario, the New York-Italian immigration official, has secretly entered my room and is strangling me. As the last of my life-force ebbs away I realise I am returning from a bizarre dream, and that the headphone cord of the MiniDisc is responsible for my

near-asphyxiation. I arise leaden-headed, fix a first coffee and fire-up all the gear to ensure that there is no transit damage; praise be for 'aluminium'. Over the course of the first week we are treated to a unique insight into the riddle-ridden world of the shroud, and how hotly disputed and passionately felt the various professional, or otherwise, viewpoints have been held since samples

were first taken for analysis in 1978—the last time the shroud was viewed in public. Is this really the burial shroud of Jesus Christ, wrapped around his body by Joseph of Arimathea after the crucifixion in his tomb near Golgotha or a 14th century forgery? Is the image, found to be a 'negative' in 1898 by photographer Seconda Pia, the face of the suffering saviour or the work of an artist painting a reverse image 500 years before photography was discovered? What about the human DNA said to be found on the shroud, the blood-

group typed as AB—where is that from? And how about the testimony of a leading forensic scientist who is happy to say that the life-size photographic evidence over the whole body length—front and back—are consistent with the alleged treatment received by that of Christ before and during his crucifixion?

Accurate painting that would need to be for sure, but the theory of a painted image does get around the sticky problem of the distortion that occurs when you wrap a flat sheet around a curved surface—when laid flat, the facial features spread across the material; or could the Carbon dating, carried out by three independent laboratories and all pointing to the middle of the 14th >

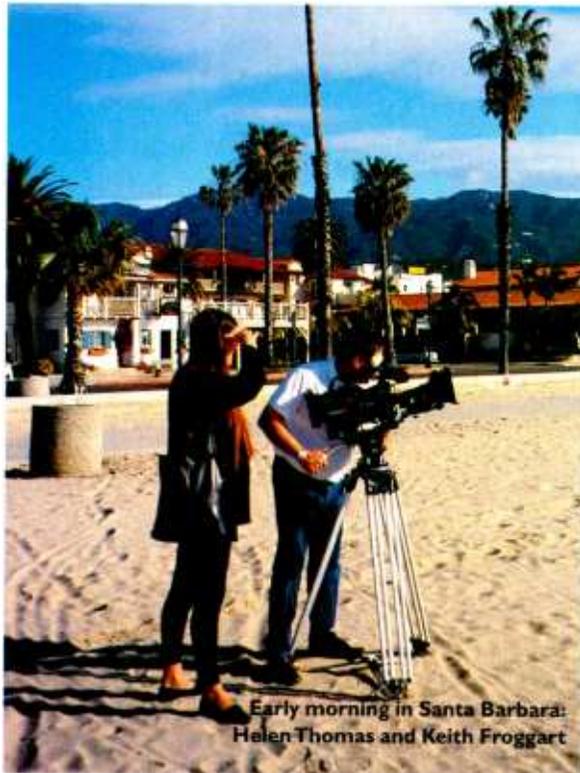


What the well-heeled sound recordist is wearing this season: AD261 mixer, M+S microphone pair of Sennheiser 416 and AKG Se300B/CK 94 Blue-Line figure of eight, Paramic boom pole, D 100 headphones, pair Sony 810/820 radio mics, pair Tram lavalier mics, pair AKG C460EB mics, EV 635A hand mic, pair Motorola GOP 300 walkie-talkies, Denon MiniDisc, Sony pro-Walkman, Aiwa DAT recorder



< century, for some reason be grossly inaccurate? Or could the Vatican, for reasons too obscure to fathom, have deliberately given the analysts samples of the wrong cloth? I do not know, so I am content to be responsible for the quality of the sound and not what it conveys; but I can tell you that in our attempts to make sense of this conundrum and to put those questions into perspective we go to great lengths, quite a few thousand lengths actually, by travelling to LA, Santa Barbara, Austin, San Antonio, Chicago, Buffalo and Newark and during all that time I never once feel as if I am in the same time-zone as everyone else. Virtual reality is not all it is cracked up to be, let me tell you. It manifests itself as a vague headache with waves of crushing tiredness by mid-afternoon. Early flights, late meals and one-night-stand hotels are only survivable. I have disappointingly determined—painfully but empirically—by an almost total abstinence from alcohol. Right now it appears that my body could throw televisions from balconies into swimming pools, drive a Rolls-Royce through reception or even trash a room.

The sound requirements are basic for this interview-based assignment with actuality sound and location atmospheres recorded in M+S stereo and fed

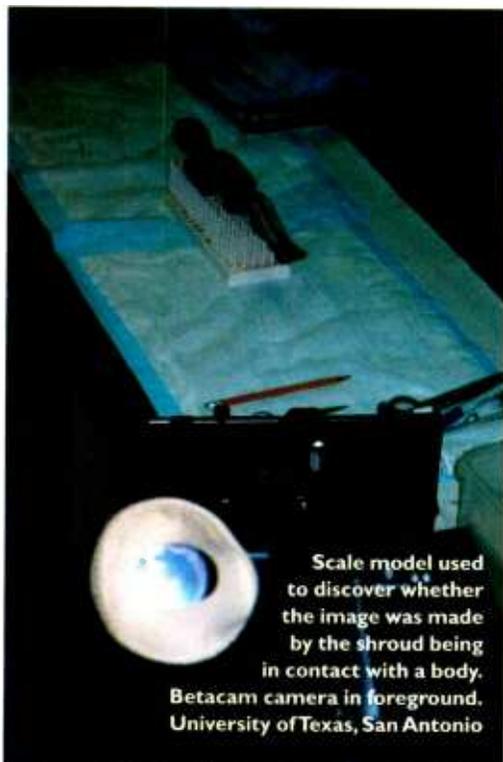


Early morning in Santa Barbara:
Heleen Thomas and Keith Froggart

straight on to the Betacam camcorder from my Audio Developments AD261 mixer, with a Pro-Walkman running for transcription cassettes. I am a great believer, perhaps even evangelical, about M+S as a location standard and I have yet to be convinced of a better or more flexible way of supplying a dubbing mixer with material that does not have them backed into a corner before a byte of audio has been auditioned; and I do perceive the stereo imaging to be superior to either an AB or XY location setup.

My home-brewed pairing of a Sennheiser 416 piggy-backed with an AKG Blue-Line figure-of-eight works well for what is in essence an unholy marriage and enables quick changes between mono and stereo recording by the flick of a pan-pot on the ever-trusty AD 261; but whenever possible for interviews that will need to have other pictures cut over the original sound, I always put in a pair of AKG C460Bs, one each for the questions and answers. The quality of these mics with their forgiving cardioid pattern are so superior to that of any lavalier mics I might have in my box; and whereas the 416 has a distinctive sound, these babies are transparent—well certainly for speech anyway.

IT FEELS LIKE coming home to fly back to Europe and Italy with its smaller time difference and lesser language barrier, and while all roads might lead to Rome, after landing we drive straight to Naples to investi- >



Scale model used to discover whether the image was made by the shroud being in contact with a body. Betacam camera in foreground. University of Texas, San Antonio



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London - At the world famous Abbey Road Studios, "Our GX8000s move between the studios and on location for use on a wide range of projects." Neil Aldridge, Chief Engineer.



Nashville - Mastering the new George Strait album at Georgetown Masters. "Everyone was astounded when they heard it at 88.2kHz compared to 44.1kHz. Its reliability has also been amazing." Denny Purcell.



Montreal - Major multinational TV production company CINAR uses 15 GX8000s in a variety of applications. "By recording at the maximum possible dynamic range, we're preparing for new formats as they become available." Francois Deschamps, VP of Studios.



London - Digital Audio Technology supplied its 44 track Genex system for 20-bit location recording at the Glyndebourne Opera Festival. "The ability to access remote drives made the continuous recording of a two and half hour performance possible. It couldn't have been done with tape." Ian Silvester, Owner.



Hollywood - Recording the new 20th Century Fox fanfare at the Newman Scoring Stage. "We liked the sound of the live mix so much that we didn't remix it at all." John Kurlander, Grammy award winning Scoring Mixer.

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< gate the miracle of Saint Gennaro's blood which has the ability of being able to congeal and re-liquefy on a regular basis—properties not achievable by normal human blood. Captured in a glass phial after his beheading and martyrdom in the third century and housed in a silver monstrance since, a twice-yearly ceremony is conducted in Naples cathedral; the only time in living memory that the congealed blood did not reliquify by the end of the service was in 1990 when a two-fold disaster struck. Massive earthquakes devastated the region and Italy, the host nation for the football World Cup, were knocked-out of the competition in the opening stages. I still do not know if the blood liquified this year, but within a week of our return to Britain, mud slides have claimed the lives of 100 locals in the area surrounding Naples and three people are shot dead inside the Vatican.

Meanwhile, our quest is drawing to its zenith in Turin itself. The press are assembled in force for the grand unveiling in the city cathedral that normally housed the shroud away from prying eyes, and, as is the way with these events, all is calm and ordered until one nanosecond after the doors open to the unwashed news crews of the world. Ever seen the wildlife films where massed herds of wildebeest stampede across African plains? If you have then you will have a picture of the scene that met the quietly contemplative church volunteers who foolishly imagined they would steward the hordes of tripod-toting cameramen invading the sanctity of their sanctuary.

I say cameramen as I am the only sound recordist here. In fairness, we are the only documentary crew here, the others being pure hard news, but where is that professional camaraderie, that sense of common purpose that distinguishes our chosen path from that of the mere paparazzi? My sense of purpose is ensuring that an Italian news cameraman and I don't come to blows over my wish to remain connected to Keith's camera while recording the event and hence prevent matey-boy getting another metre closer to the shroud. I have no doubt at all that since my entry to New York I am a marked man and this cameraman is obviously the brother-in-law of the immigration official. Mind you his command of English seems much more developed, even if his wish for me to go forth and multiply seems a touch insensitive in such pious surroundings.

So that, hermetically sealed in an inert gas, is the shroud and the finale to our trip; but what is the truth of the Turin shroud? With so much evidence for and against its authenticity, individuals must draw their own deeply personal and thoughtful conclusion. My truth? It was two weeks work. ■

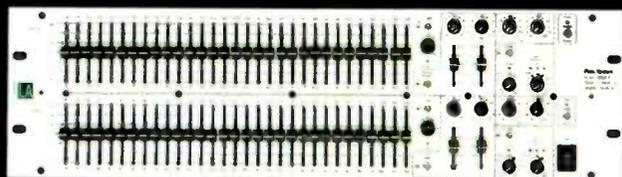
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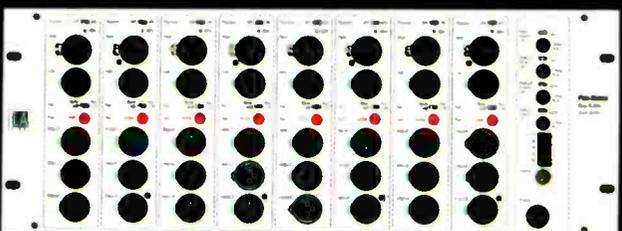
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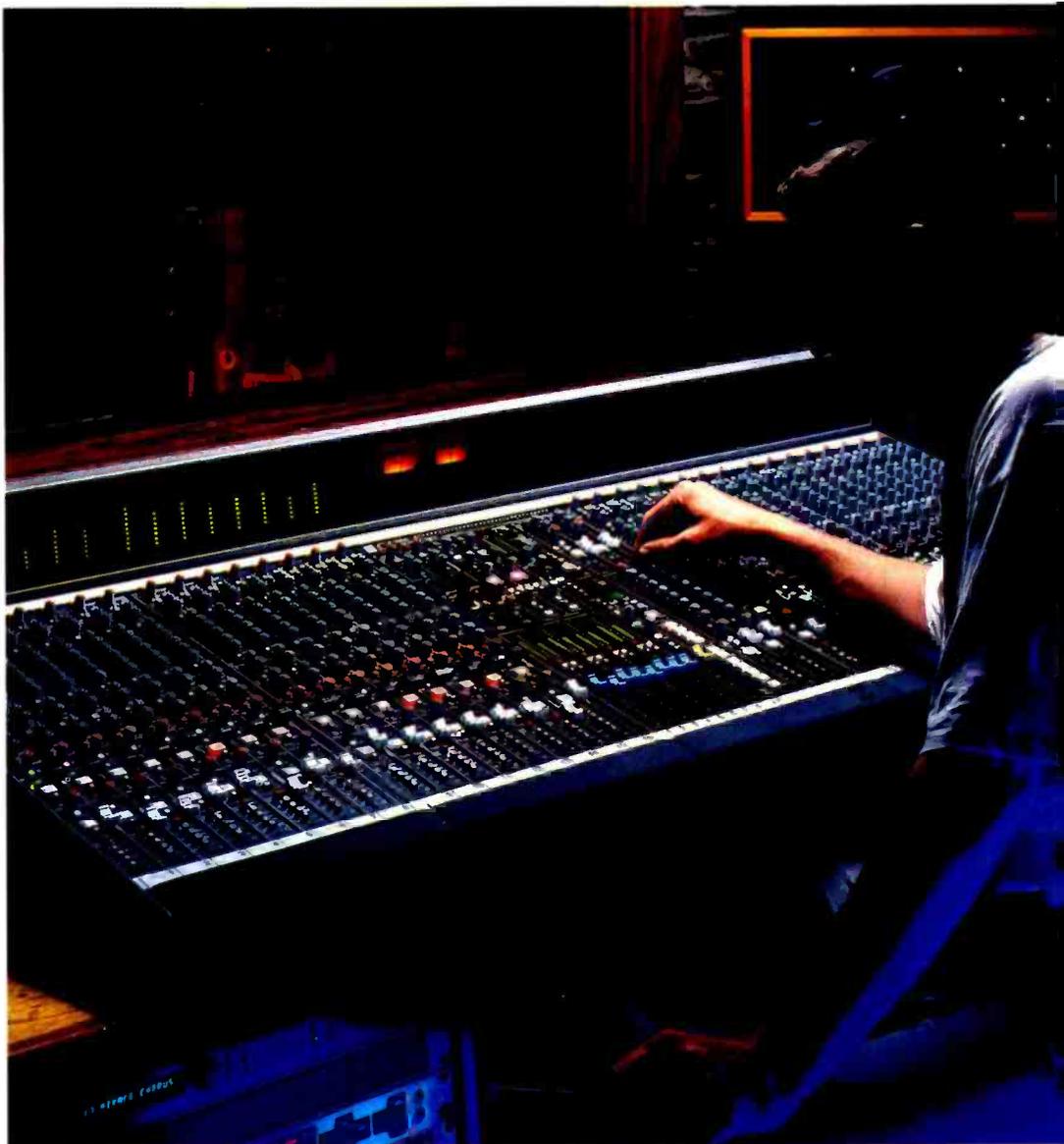
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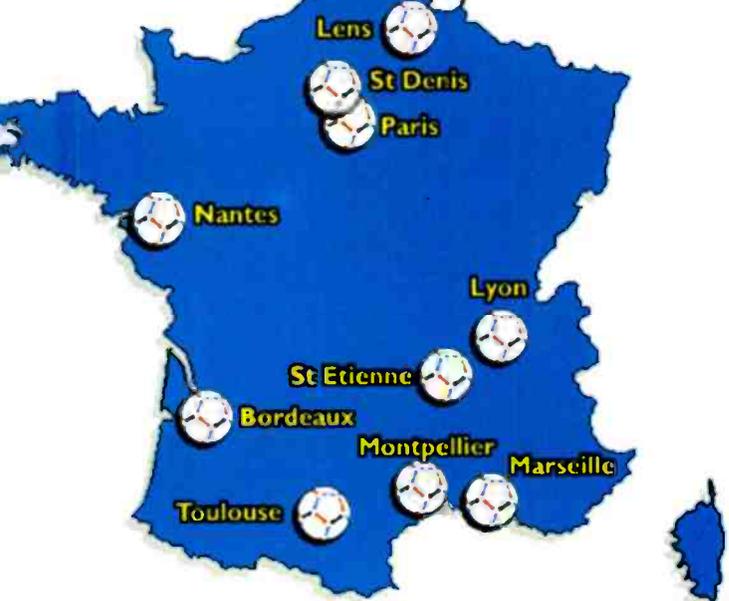
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Football fever



SPORT IS big business for broadcasters. With the proliferation of channels and the ever increasing demand for programming, major sporting events are seen as a sure way to attract audiences and advertisers. Such is the growth in sporting TV and radio, viewers and listeners—fans and nonbelievers—are often convinced that there is nothing else going on in the world. The planet will stop again from 10th June as, for just over a month, the focus will be on France, where 32 national teams will compete in the 1998 World Cup football finals.

structure is the best possible. The 1994 tournament was held in America, a lesser soccer nation certainly, but one that likes to pile on the show biz pizzazz—and it did not skimp for USA 94, despite football's low priority rating in its sporting hierarchy. This time projected television viewing figures are put at 37bn globally and the French organising committee is set to top USA 94, with a quirky mascot called Footix (a close relative of Asterix) and a prefinal extravaganza under the Eiffel Tower with well-known football followers the Three Tenors.

The organisers of successive events are locked in battle with their predecessors to go one better each time, staging progressively more lavish opening ceremonies and making sure that the infra-

This concert is being built up as the biggest single world TV event prior to the Millennium. The overall coverage of the World Cup itself is not far behind. With 64 scheduled matches in 10 French cities, beginning >

When the 1998 World Cup kicks off, the eyes and ears of the world will be on France. **Kevin Hilton** weighs up the broadcast provision for an event to rival the Millennium

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◀ with unlucky Scotland taking on current world champions Brazil at the Stade de France, this is a huge undertaking for any broadcaster. Which is why the project, like so many other massive sporting events, is being handled by a consortium host broadcaster, providing the pool feeds that can be tailored for the needs of each TV and radio station covering the event.

Television and Radio Services (TVRS) 1998 has to provide feeds and facilities for over 180 television broadcast organisations, in excess of 130 radio stations and more than 4,500 accredited rights-holding broadcasters. The company was established in May 1995 by the French Broadcasters Group of the EBU and comprises seven shareholders, who read like a catalogue of France's leading TV and radio companies. In underwriting the host broadcast of this World



Cup, France 2, France 3, Radio France, Radio France International, TF1, Canal+ and TDF have created a huge resource pool, both financial and human.

The mission statement proclaims: 'As Host Broadcaster of the 1998 Football

World Cup, TVRS 98 will produce, direct and transmit the international radio and television signal of the World Cup, providing radio and television broadcast companies from over 180 countries with the fullest international coverage of the 64 matches contested in France in 1998'. In addition, there are the rights-holding broadcasters, which will customise the pool material to produce specific programming for their domestic audiences.

To accommodate such needs, TVRS 98 is providing full production, transmission and commentary facilities, both at the central International Broadcast Centre (IBC) in Paris and at the ten stadiums around the country. This is the first time in world cup broadcasting history that the production of the international signals will be totally digital, accompanied by full stereo audio. To achieve flawless connection, an absolute priority on such a global scale, TVRS 98 is working in partnership with France Telecom, official supplier of television transmission services, data and video communications, cellular phone links and conventional telephone landlines for the World Cup.

All material from the stadia and associated reporting locations will be relayed back to the IBC over France Telecom's digital network using fibre-optics. International feeds will be carried on this same fibre-optic network with a satellite back-up for full redundancy. For maximum efficiency TVRS and France Telecom have centralised booking procedures, with a joint rights-holders office for the ordering of all radio, television, fixed telephone and wireless equipment and services.

THE ORGANISATION OF host broadcasters for large-scale sporting events has now reached a level, with the majority being established on similar lines. TVRS 98 is headed by Philippe Levrier as president, Jean-Claude Morin as vice-president and Francis Tellier as managing director. It is Tellier who is responsible for directing seven distinct departments: Production, Venue Operations, the IBC and Telecommunications, External Relations, Booking, Logistics, and Finance and Administration. The first of these departments handles all the design and implementation of TVRS' production plan for radio and television, while Venue Operations deals with the planning, crewing and technical-engineering facilities at the ten stadiums. These comprise broadcast compounds, Host Broadcaster camera trucks, control rooms and the unilateral services and facilities to be made available to rights-holding broadcasters.

IBC and Telecommunications was established with full responsibility for the design, construction, setup, operation and, eventually, dismantling of the International Broadcast Centre, housed

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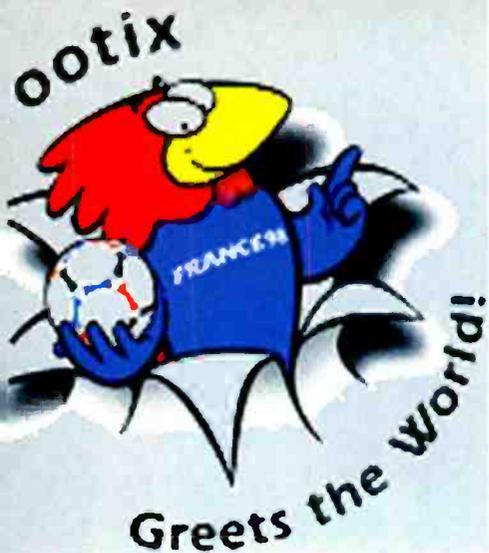
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in two halls of the Paris Expo exhibition site in the south-western Porte de Versailles district of the capital. This department has installed Host Broadcaster technical areas that it will manage, in addition to working with France Telecom to oversee telecommunication connections.

The total amount of hardware and facilities managed by these three departments is staggeringly impressive. At the stadia there will be ten digital production mobiles for each venue: 170 cameras; 40 slow-motion units; 45,000m of camera cable; 1,275 commentary booths; 7,000kW of electrical power and 25,000m² of technical areas. The IBC covers 19,000m² of floor space, containing 3,000 monitors, 4,000 technical units (all interconnected), with 200kms of cabling linking this together and connecting it to the 28 simultaneous video circuits that will exist between the Paris HQ and the stadia.

Each match will be televised using 17 cameras and 8 VTRs (for recording and those all important replays); overall the international feed will be produced by six directors, 100 camera operators, 40 slo-mo technicians and designers using 20 graphics workstations. Overall there will be 1,500 operational personnel working for TVRS 98 during the tournament (800 of whom will be right at the front, at the matches), with 150 radio and TV companies represented in the IBC. Worldwide broadcast coverage will be provided by 4,000 radio and television technicians and a flock of 12,000 journalists and photographers, representing newspapers, agencies and radio and TV stations.

Naturally each of the represented broadcasters have their own requirements and styles. TVRS 98 has laid down a set of production guidelines, stating: 'Match coverage will be clear and objective, and produced along accepted international standards. The aim is not to innovate but to maintain a high production standard throughout. Coverage will be unbiased, objective and homogeneous from the first to the final match with no distinction made between better-known and lesser-known teams'.

Equipment has been provided to give wide and medium angle views of both

teams, plus the start of shots and the subsequent trajectory of the ball, combined with close-ups of individual skill and player-player confrontations. The full atmosphere will be recreated through the use of crowd shots and ambient sound; although the sound production will be organised so that fan response will not smother the sound of leather on leather, or badinage between players and officials. On the graphics side, visuals have been designed to appeal to a universal audience; although all text will be in French, short words and pictograms will be employed to communicate to all.

An event of this size needs as much help as it can get. For France 98 this comes from its sponsors—including Philips, Canon and JVC—and suppliers, among whom are EDS, Sysbase and Hewlett-Packard, as well as France Tele-

com. Sysbase is the official software supplier for the event and H-P is providing a range of hardware for integrated solutions. Texas-based EDS is the official information technology provider. In this capacity the company has designed INFO FRANCE 98sm, an interconnected system for the International Media Centre in Paris and the press offices of the ten host cities, and the first ever official World Cup Web page.

All of this will make it possible for this orgy of football to reach a bigger audience than before. The only thing technology has to address now is how to ensure that this onslaught is contained, something that is vital if families are to continue in some kind of harmony and those who do not worship the round ball are able to walk into bars for a quiet drink without incessant choruses of a particular World Cup song. ■

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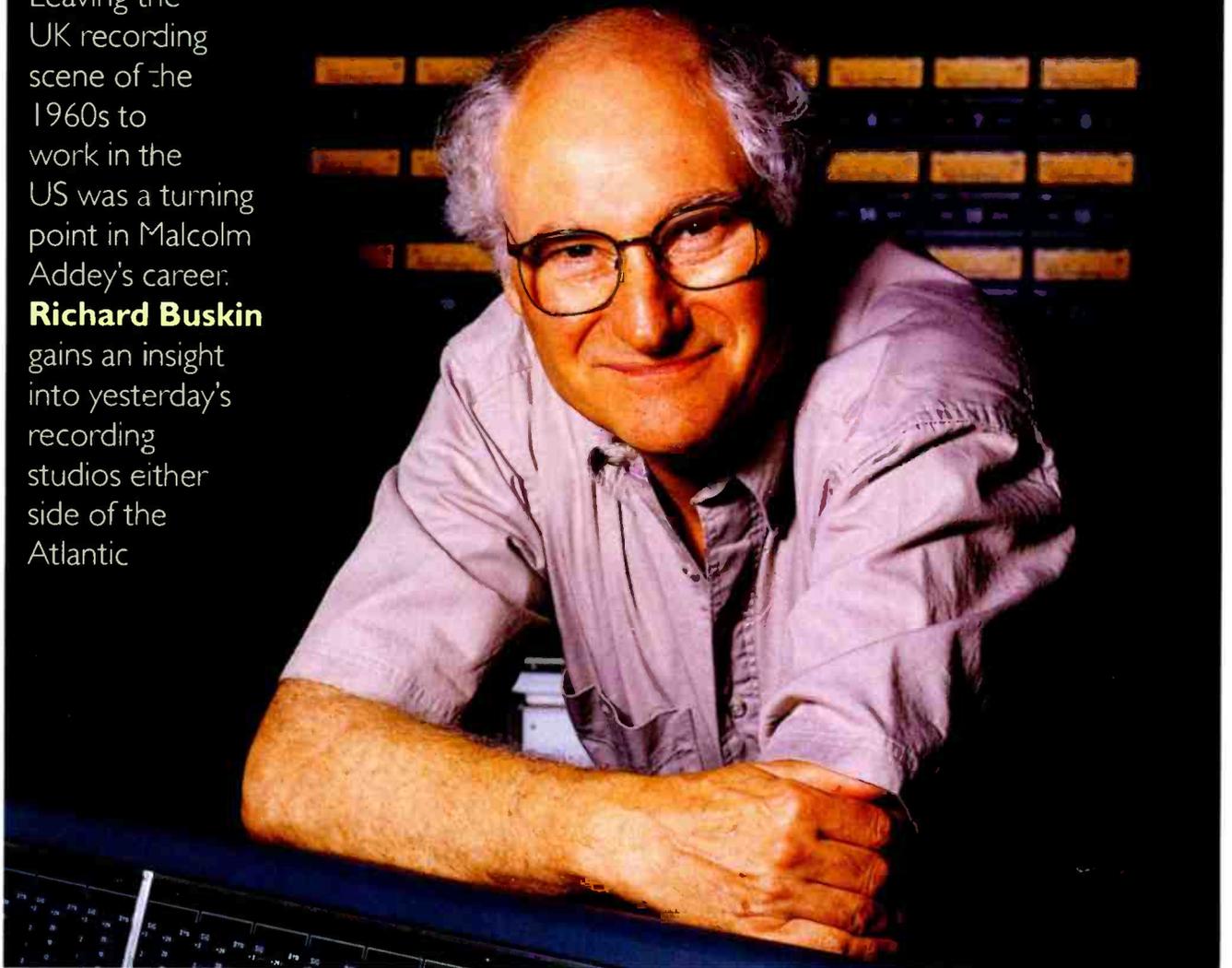
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Trading places

Leaving the UK recording scene of the 1960s to work in the US was a turning point in Malcolm Addey's career.

Richard Buskin gains an insight into yesterday's recording studios either side of the Atlantic



WITH ALL DUE respect to our British friends, there's more musical ability in the little fingers of most American pop singers than in the whole body of most of their British counterparts. In the US everyone is so disciplined, so professional and so competitive. I was very much in awe of the musical standards when I first arrived here, and nothing much has changed in that respect.

Typically frank, the opinion is that of New York-based producer Malcolm Addey. Although British born, Addey opted to move to NY 30 years ago after a decade of engineering at the EMI Studios in Abbey Road and growing 'really, really bored with what I was doing there'. This is ironic when you consider some of the major names who were regularly passing through the facility's

doors during the second half of the 1960s, but in Addey's case he was largely working with middle-of-the-road acts such as Paul Anka and Ken Dodd, and accordingly uniform recording requirements.

'Almost all of the sessions that I was involved with were the same,' he says. 'Forty-piece orchestras with 10 violins and four cellos, piano, bass, drums, the same arrangements, the same arrangers. It was like a sausage factory. At that point I was really jaded with the musical side of being in England, and I thought, there had to be more to it.'

There was: in 1968 Addey accepted a job offer from Bell Sound Studios in New York and soon found himself dealing with a far greater variety of assignments than he had previously been used to—records, commercials and films, not

to mention the jazz music that he loves to this day. Furthermore, he found the work ethic considerably different to that at Abbey Road.

'When I first came over here it was very strange,' he recalls. 'I thought, wow, they really work here. I'd take long lunch breaks in England, I'd take the day off, but here everybody seemed to be working. You'd be doing a commercial in the morning, a recording date in the afternoon, a mixing date in the evening. In fact, I got off the plane from England at 1 o'clock and I was on a session at 2:30.'

However, while I could do four sessions a day at EMI because everything was set up for me, here I was dealing with new equipment and there was no mollycoddling. At first I had no idea what I was doing. When I did my first mobile work I had to rent the truck myself, and

I hadn't even driven here yet.'

He quickly found his way around, though, spending a few years at Bell Sound and subsequently moving on to Phil Ramone's A&R Studios. At both facilities he cut lucrative freelance deals whereby he was paid as a contractor who would work in-house but also elsewhere if need be, and in the mid-70s Adley then severed all ties and became totally independent. In the meantime, he had been investing in his own mixing and editing equipment, and he currently owns DDA and Behringer 24-input consoles, an 02R, Studer tape machines which he uses with Dolby SR, a DASH machine, a Sound Maestro digital editor, vintage gear such as Ampex 351 8-track, 4-track and 3-track machines, DAT and CD-R machines, and a host of outboard toys, as well as an extensive collection of vintage mics.

Today the bulk of Adley's work comprises remastering for labels such as Mosaic and EMI-Capitol, as well as assignments for radio and several other small jazz and classical entities, and much of this reminds him of an era when the standard routine was to record four songs in three hours.

'The kind of jazz music that I do today is very much like that,' he says. 'That's why I absolutely love what I'm doing.'

IN MARCH 1958 Adley became an assistant at EMI, 'earning a fantastic salary of £11 a week', and just three months later he was working on the first recording session of a curled-lip kid who would soon be Britain's teen-sensation answer to Elvis: Harry Webb aka Cliff Richard.

'There were about 10 engineers working at EMI at that time,' Adley recalls, 'and two of them were specifically doing pop: Peter Bown and Stuart Eltham. They were my mentors. It was getting too busy in the pop department and they needed a third person, so they looked around and pointed to me.'

Peter Bown was in fact scheduled to record Cliff on that first night, but, being a huge fan of classical music, he opted instead to go to the opera. Adley therefore landed the gig.

'Peter was there for about the first five minutes,' Adley recalls. 'Then he said, "Okay, Malcolm, you're doing fine" and off he went. The first song that we did was "Schoolboy Crush", which was originally intended to be the A-side of Cliff's debut single. Then we got around to recording "Move It" and things started to get very interesting as far as I was concerned. Ian Samwell wrote the song, and he literally wrote the lyrics right there on the floor of Studio 2. It was probably the first in-session pop song-writing that ever took place in England. Now that song's regarded as the first true all-British rock 'n' roll record, while back then, having been associated with such a hit, I wasn't an assistant or a junior

any more. All of a sudden I was a full engineer and everybody wanted to use me. That kind of rise was absolutely unprecedented, and I feel sort of good about it.'

Adley is equally proud of how he and producer Norrie Paramor managed to capture the excitement that Cliff generated in the studio as he sneered, shook, swivelled his hips and generally gave everybody the full works. 'I actually don't like the sound of his records today,' he says. 'I think we got a better vocal sound for him back then: a big, fat sound. He's always had a good voice.'

'In Studio 2 we had a little 8-input console—the Mk I—set in a very heavy steel box, with four faders on each side and a big main control knob in the middle. It also had full EQ, the Capitol Records EQ which was really Pultec EQ and which all of the consoles in America had at that time. We had copied that and it had a peak at 5k with a low end of 100Hz. Believe it or not you could do an amazing amount of things with just those two frequencies. If we wanted a lower frequency we had 2.7k available on an outboard box which we used to put on this huge rack—each mic amp required a full 3¹/₂-inch rack mounting—and we also had 10k available on outboard. That was nice if we were using something like a ribbon mic on overheads, which we did quite frequently in order to get a fat sound out of the snare drum; the "American Sound", as we used to call it. The beautiful thing about that kind of EQ is that it builds up and then it comes down again, whereas the EQ that they were using on the classical side—shelving—used to go on *ad infinitum* to the point where the bats and dogs could hear it, and that was no good to us of course.'

Vintage gear: Adley and John Burgess (foreground) put an 8 input mono console through its paces

'We copied a lot of

things from Capitol, and having that affiliation with them in the States perhaps gave us a little bit of an edge over some of the other companies. I know that some of the sounds coming out of Decca's London studio, for instance, were absolutely appalling on the pop side. They didn't have a clue how to make a pop record. So, we did have that edge and we also did a lot of experimental work. Stuart [Eltham], Peter [Bown] and I spent a lot of time working on our echo chambers and it was amusing to read about Geoff Emerick trying to rebuild one of them. He wasn't there [at EMI on Abbey Road] when any of those chambers were created, of course, and so he didn't have a clue.'

Adley worked with Cliff Richard from 1958 until 1966, and during that time he also enjoyed a lot of chart success with The Shadows, Adam Faith, John Barry, Shirley Bassey, Helen Shapiro, Johnny Kidd & The Pirates and PJ Proby, not to mention cast albums of a number of stage shows. It was for work such as this, in addition to the classical orchestral sessions, that the EMI Studios in London's St John's Wood had become a virtual institution. An institution with strictly enforced rules and regulations about how the in-house equipment could be used. After all, push the gear too far and there could be untold consequences.

'During my early years there the studio manager was Chick Fowler,' Adley recalls. 'Actually, his name was Edward Fowler; no one ever called him Chick to his face. He was a very imposing-looking white-haired gentleman, and very nice too, especially as he was responsible for me being hired in the first place. His predecessor had been WS Barrell, an old Victorian type who had a big book of rules and regulations. One, apparently, had been told never to put a ribbon microphone in the horizontal position, because the ribbon will pop out of the pole pieces. >



◀ Completely ridiculous; you can just imagine the ribbon sagging.

Anyway, one day I wanted to try something different from the established guidelines. It was for Helen Shapiro's first session, 'Don't Treat Me Like A Child'. This had been scheduled in a hurry so it was in the big, echoey Studio 1, but I grouped all of the musicians tight together and put screens around them, and then I decided to experiment; I wanted to limit the voice. You see, Eltham, Bown and I were very, very good listeners. We used to get piles of American records sent to us from EMI's head office in Manchester Square—mainly on independent 45 labels, as opposed to Capitol's records which sounded great but weren't that innovative—and we'd spend whole mornings analysing them, how certain sounds had been achieved, and so on. Now, I didn't agree with Eltham and Bown about everything—I was the young kid, so I kept quiet—but I could tell that on a lot of those records the vocals were definitely limited on the sessions. Well, there was a golden rule at EMI, and that was to never limit on the session. This came from Capitol, strangely enough. Peter Bown had visited the Capitol Tower in 1956 or 1957 to study their work methods, and when he'd returned he'd said, "Capitol definitely does not limit on sessions, they do it only on the mastering". Okay, so much for Capitol. It was silly.

"The only limiter we had in those days was an old EMI one. We hadn't got the Fairchild's yet and the EMI limiter was a dog. It comprised pairs and pairs of push-pull circuits, each one had to be balanced, and by the time you'd balanced one then another at the other end had to be balanced. The maintenance people just hated it but I wanted it; I can even remember it was called the RS114, RS standing for Recording Studio. Back then at EMI, the maintenance engineers did the setup in the studio—a hang-over from the days when that new-fangled device, electricity, came in—and on this particular day Jimmy Johnson was the maintenance guy. Well, when he heard that I wanted to use the RS114 he came running up to me—it was about 6.30 in the evening, half an hour before the session was due to start—and said, "Malcolm, I cannot possibly put a limiter

on this session", I said, "Why not?" "Because there's a memo, dated such-and-such, which states that under no circumstances shall limiters be used on recording sessions."

"Barry Waite was the assistant manager, so I rushed up to his office with Jimmy alongside and I said, "Mr Waite, I want to use a limiter on Helen Shapiro's vocals, but Mr Johnson has told me that this isn't allowed". Puffs of smoke were coming out of Waite's ears and he turned to Jimmy and said, "Well, there may well be this memo, but when a balance engineer wants to use any piece of equipment on a recording session there's absolutely nothing we can do. He must be allowed to do so." At that point Jimmy hurrumphed his way out of the studio, I got to use the limiter and, even though I could never have foreseen it, that record went on to be an absolute smash-hit for Helen. Of course, after that it was a case of "don't knock the rock". I'd obviously displayed a streak of genius.

"The way that I looked at it was that there's a brick wall. Obviously the loudest thing on the record is going to be the vocal, so you make the vocal hit the wall and you build the rest around it.



Don't knock the rock: Addey, far left, with Norrie Paramor and Helen Shapiro, in 1961

Don't forget, in those days a great deal of store was put into what one could do "upstairs"—the mastering room. I did not adhere to that as much as some people did. Some producers thought it was the panacea—leave it to the mastering—whereas the mastering could ruin it of course. In fact, the mastering wasn't all that good in our place; we were struggling greatly. Malcolm Davies had a big job of copying all of those American records without the proper equipment. After all, those guys were using 1kW amplifiers and stuff like that to get the level with no distortion. And do you know what amplifiers we had with our lathes... 12 Watt Leak amplifiers! Our design engineers would say they were "adequate". Well, we weren't looking for adequate. We were looking for knock-your-socks-off at the juke boxes."

Meanwhile, aside from experimenting with limiting the vocals, Addey also made

forays into other largely unexplored areas during the early 1960s. Namely, multiple-miking and close-miking.

"In those days, when people were recording drums they usually just employed overheads," he recalls, "but I would also place mics on the bass and snare. I was not necessarily the very first person to do this, but I'd experiment with close-miking all of the time. I remember on some of the early Shadows sessions, as well as those with John Barry and Adam Faith, I'd record four violins on either side with a figure-8 mic.

"Now, I know that in some of the EMI documentation that's still around I have been accredited as the one who broke several of the rules, but I don't know quite what they meant by that. I really didn't. It was just that whereas most people would cautiously go to +2 on the EQ I might go to +8 because I thought it sounded good, and I also made the meter go over into the red a lot more than some people did, but none of that was exactly illegal or a capital offence."

EMI'S PRECONCEPTIONS aside, during the late-fifties an advance as considerable as stereo was considered to be little more than a gimmick by many industry professionals in the UK. Then, when it became clear that it was perhaps more worthy than that, mono still remained top dog in terms of pop recordings as, until the mid-60s, stereo playback equipment was yet to find its way into the majority of British homes. Nevertheless, at the start of the decade EMI Studios already housed two 4-track machines.

"The first one that we had was this monstrous Telefunken which we'd somehow inherited from Electrola in West Germany," recalls Addey. "It was a b-wind machine and the monitoring came off the record pots. When you increased the level onto the tape it decreased the level to the monitors, so there was this sort of equilibrium. Very strange. It was experimental for quite a while and it was stuck in the back of Studio 2 doing nothing most of the time. However, contrary to what has previously been written, Cliff Richard was not the first artist to use it; [producer] Wally Ridley used it in about 1959 for overdubbing another artist who I can't now recall.

"In those days overdubbing was strictly illegal when union musicians were involved—You couldn't overdub musicians or vocalists or run a track of any kind, unless, for instance, you made special arrangements with the MU because the singer had lost his or her voice. As a result, you'd get the occasional musician who was a real lefty and who would come nosing around to see what machines were rolling. Well, we could have had a machine rolling in the back room for all they knew, but believe me, our little console was not rigged

for doing split mixes. You were lucky to get one mix out of that thing.

'So, this was a wonderful opportunity for Wally to do some surreptitious tracking. I mean, we didn't even have a vocal booth in any of our studios, so there would always be a little leakage if we were recording a loud voice. We'd just put screens up and say, "Sing a little quieter..." With regard to Wally and the 4-track, it was a doubling session. It wasn't the real thing, but a backup.'

Early stereo pop recordings at EMI employed dual mic setups, with the stereo engineer sitting in the 'stereo room' next to Studio 2 and picking up the results from the microphones that he had placed as doubles of those which had been positioned for the routine mono recordings.

There are several photos of Cliff Richard with two U47s placed right in front of him, and that's exactly what they were for,' explains Addey. 'Well, later on this produced a very strange phenomenon. The record that was originally issued was the mono version; that was the one that the public became familiar with. However, for the CD reissues years later they've often used the stereo versions and they are appalling. The original producers are no longer around and neither, unfortunately, is much of the documentation.'

Of course, the working practice of the



entire recording industry has changed drastically during the past few decades. Nevertheless, while it's fun to look back on the much-maligned rules and regulations of those early years, Addey wishes to set the record straight about one particular source of amusement: those fabled white coats which the EMI technical staff used to walk around in, prompting Sir Winston Churchill to once comment that, on entering the Abbey Road facility, he thought he was walking into a hospital.

'I have to say that when I first went to Abbey Road for my interview I thought exactly the same,' Addey admits. 'I looked down this long corridor and it was really intimidating. It did look like a hospital, with that drab 50s decor, everything painted a pale green, cream and brown, and all of these people walking around in white coats. I thought, this is very weird. Now, we recording engineers never wore white coats. We did wear suits—and as a concession on Saturdays we were allowed to wear sports jackets and trousers—and the same rules applied to the maintenance guys. However, in their case they also wore white coats to protect their clothing, and I think that was perfectly reasonable.'

'Don't forget, all of this dated back to the days when recording engineers were not musical in the sense that we are today. They were literally lathe operators who had come out of the factories. Many of those old guys were still at Abbey Road when I first arrived there: people like Bob Beckett and Dougie Larter. They were nearing retirement, but it was wonderful to be around them, to hear their stories about "recording with a pack on the back, walking through the jungles of Africa". Originally they'd all had musical backgrounds, but now, operating lathes with all that oil, they were like engine drivers, so of course they wore white coats.' ■

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Sounding off on DVD

How much will consumers benefit from improved audio on DVD releases?

Richard Buskin

discovers that the film industry is placing more emphasis on sound than expected, even if the technology is still chasing the promises

WHEN IT BECAME clear that DVD was more than a flash in the pan, I, for one, suspected that the major Hollywood studios would view the new medium as just another opportunity to exploit their back catalogue. I was wrong. Instead, encouraged by the filmmakers themselves, the movie companies are often going back to the original audio source material in order to provide all of the elements that are required for producing true 5.1 surround.

To learn why, we need to look no further than the fact that one disc can serve multiple functions—foreign-language and edited versions, letter-box format, you name it. This means that said companies are able to issue a single-inventory release instead of several different DVDs for the various markets. To that end, they are intent on having 5.1 audio as per the versions released to cinemas, and things don't stop there. 'They also want 5.1 for older movies that are being released on DVD,' says Ted Hall, a rerecording engineer at Santa Monica-based post facility POP. Among the many films that Hall has remastered for DVD are *Twister*, *Golden Eye*, *Mission Impossible* and *Top Gun*, as well as music videos by artists ranging from Michael Jackson to Alanis Morissette. 'I do a lot of restoration work on older films,' he says, 'and this means going back to the original elements, remixing the score in 5.1, and so on.'

'Of course, it all depends on the bud-



get—there's also a lower-end market for DVD in terms of industrial and training films, and in that case I'm not even sure that they care about having stereo—but the film companies are very concerned about the sound. Fortunately, so are the music companies, because they're aware that in the near future high-def and 5.1 are going to be broadcast over the air, and so all of the music videos on MTV and V1-1 will have the potential to be 5.1 as well... The current battle between DTS and AC-3 and the debate over which sounds better is a reflection of how seriously the audio is being taken.'

When creating a 5.1 soundtrack for an old movie the difficulty of the task quite literally depends on the era in which the film originated. Prior to the advent of mag film during the late fifties there would be the recording of 'angles' on the scoring stage; separate miking for different sections of the orchestra and the assorted vocals, and these would go direct to optical via their own film recorders, providing a fair degree of control over the various parts which would then be mixed together and balanced for the mono soundtrack. In the sixties companies such as MGM and Paramount transferred all of this material to 1/4-inch, and, fortunately for the likes of Ted Hall, much of this still exists.

'Back then they kept everything,' he says. 'Every take, every cue. Through the sixties people kept copious notes and cue sheets, so what I'm supplied

with usually provides a pretty clear map of the takes and the tracks that they used. You know, the vocalist's Take 10 with the orchestra's Take 2, and so on. Well, I take those multiple angles and sync them up—varispeeding them if I have to—and I get a stereo recording. I mean, you get the multiple image of the room, and that's never been released for those films before.'

'There was a system that was around for a few years where they'd produce a pseudo-stereo by way of EQing the channels differently and putting them left and right. It wasn't really stereo and also if you decoded it with something like Dolby then it sounded really weird. It would get all phasey. So, in the past a lot of stuff was released in mono. *Rocky* was mono in the theatres, but I got hold of the original 16-track music record- >



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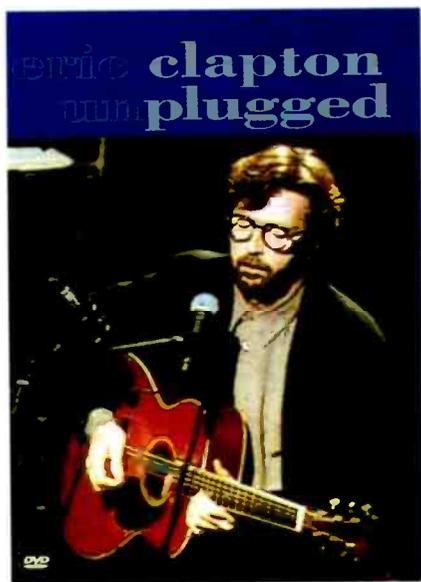
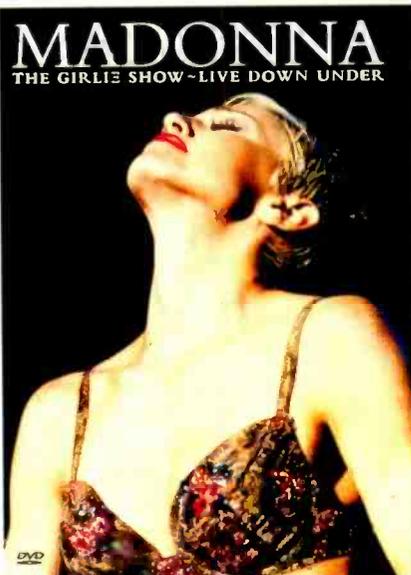
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ing from the stage, edited it together, did a 5.1 with the horns wrapped around, and took the original mono effects stem and moved things around on joysticks, even creating loops, but never adding new stuff. That enabled me to really open things up. In fact, I'm working on an older film right now—which I can't name—where I've created a full 5.1 by taking the original audio and making zillions of loops; stretching it, doubling it up, pitching it and doing all sorts of stuff to create a whole 5.1 ambient surround without breaking out CDs and getting new sound effects. I don't think that kind of thing would be fair for restoration."

NOT ALL OLD films have a welter of different elements for Hall and his colleagues to play around with; in these cases they have to make the best of current day technology. The point is, one way or another the DVD customer is evidently getting what the Americans refer to as 'bang for the buck'; namely, value for money in the form of a product that boasts audio that is considerably better than that of its predecessors. Hall does not author from the D1 masters that were previously used for VHS; instead he'll normally go straight back to the original elements and, even when there aren't enough to produce a stereo image, he'll at least No-Noise the soundtrack with Sonic Solutions.

"If I'm dealing with a stereo mix from the late seventies when they started doing that, then 4-track elements probably exist somewhere," he says. "If they do exist I'll probably be asked to redo the sound, and that will mean I'll have full-bandwidth surround and be able to make a 5.1 that will definitely be better than just listening to a Pro Logic decoded stereo mix. That usually gets thrown out if I go back to the original elements, in which case I'll make a completely new mix.

"There again, if they don't have those

elements then I will take the stereo and spread it out, extracting a left-centre-right and creating a surround by way of a whole gamut of tricks. For example, something like the Monterey Pop Festival, there's a new release of Otis Redding that is absolutely incredible. All that they had of that night was a pretty funky [ropey] stereo mix, and so that's what they gave me for the laser disc and the DVD. I then used an AGMTSS1, which is a left-right extracting device, together with lots of EQ and a little phase, and I gave it a very live sound with some ambiences while also making sure that it was all compatible for people who don't have 5.1. That's generally how I work when I'm just supplied with straight stereo material.

"In terms of films, what's on Laserdisc is the stereo print master, which is what everyone heard in the theatre. For the longest time that's all that was on there, and before 5.1 became viable for the home we would go back to the 70mm print or the 6-track master and remake that 2-track. The 2-tracks that existed on early discs up until about 1990 were the print masters, and those print masters were limited dynamically so that they could fit on the film without affecting the picture. Well, that wasn't really the best 2-channel audio version that they could get for disc, so if there was an LCR stem or a 6-track stem they would go back to that and make an LT-RT.

"Seventy millimetre was the only multichannel format that existed before digital, and that in itself is a whole other issue. The 70mm theatres had five channels across the front together with surround channels and the earlier films had left, left-centre, centre, right-centre, right and surround, so when Ben Hur walked across the screen you would hear him go through the five speakers. The 70mm people, therefore, tried to figure out other ways to generate the sound, using those left-centre and right-centre tracks for, say, boom tracks. On some of the Bond films they used >



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< boom only on those tracks, and then later on David Gray of Dolby came up with a box where he actually created 5.1 on a 70mm print, putting the subwoofer with left surround and subwoofer right surround in those left-centre and right-centre speakers. A sophisticated filtering system would decode this on the stage and produce a 6-track mix, and films such as *Top Gun*, *The Hunt for Red October* and *Patriot Games* were all done that way. If you listen to the disc they've been decoded properly and they are true 5.1 mixes even though digital formats did not exist at the time. Consequently, for people who only have Pro Logic at home you can make an even better 2-channel mix that is full-range CD quality and will just blow their socks off."

NEVERTHELESS, Hall has his work cut out when trying to achieve that effect with an older movie where the production values were less than high-end. Sample the low-budget 1980 sexploitation picture, *American Gigolo*, starring Richard Gere, which Hall is remastering for DVD at the time of our interview. "The tracks are really noisy and the dialogue is horrendous," he says. "I've had to fix that with zillions of edits, and for the music we're going back to the original Giorgio Moroder productions—the Blondie song [Call Me] and so on—and I'm having to remix it from the 24-track analogue. The problem, however, is that those tapes have shedded, the acetate is coming off, so we have to bake all of them in a sort of big pizza oven in order to at least play them. If I get one pass, I'll transfer the material to digital and then start the remix. A lot of the restoration work that I'm involved with is like that; the original elements are in pretty bad shape."

One of the big sales points of DVD is the fact that the viewer can obtain certain films with previously unreleased out-takes and extra footage. However,

where does the accompanying audio come from? Were the deleted scenes already postproduced?

"It all depends," comes Ted Hall's reply. "A lot of that stuff is not posted. Often we just get the production sound from when they shot the stuff, the Nagra recordings, and it's also down to how sophisticated the film companies want to get for these outtakes. We might go back and take the music and effects track or the music stem and just add music underneath so that it flows along. That's as opposed to the director's cut, where they actually have footage that they want to cut into the film. On *The Abyss* there was something like 20 minutes of extra footage that [James] Cameron had, but he didn't have any audio. All that he had was a 2-channel temp mix that they had done for screening purposes before the film was originally released, so he gave me that while the rest of the movie was 70mm with a full surround mix, and said, 'Okay, let's make this 5.1'. In that case I had to steal audio from other scenes—like underwater ambience and stuff—loop it in the computer and create seamless joins between the added footage and the existing footage."

Most of the encoding for these DVD projects is done on-site at POP, MPEG having now been dropped altogether in favour of AC-3. Meanwhile, on the music side, Hall is certainly aware that 24-bit, 96kHz DVDs are currently being touted as the way to go, but he himself is not too sure about the viability of the return on investment in terms of the equipment required.

"The difference between 96k 24-bit and 48k 24-bit is marginal," he says. "You can hear a little bit of a difference, but the problem is that if we go 96k then we'll have to change all of the digital consoles around town. For instance, the Logic 2 that I work on is 48k 24-bit, so to go to 96k we'd have to rebuild the console and that would be quite a hassle. I mean, if people are making stereo recordings, board mixes or whatever >



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◀ on-site then 96k 24-bit sounds great, but for doing full-blown digital mixes that's a problem.'

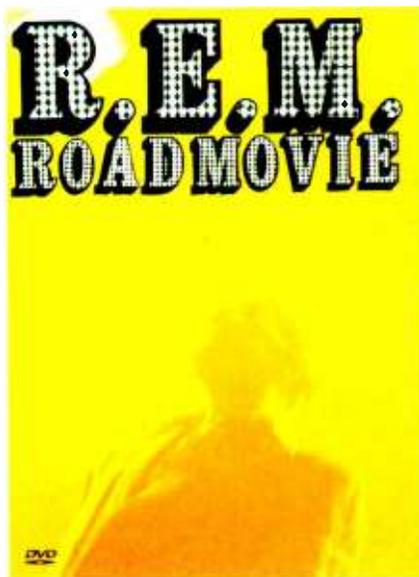
Hall is not the only one to be reserving judgement with regard to 96k 24-bit recordings, especially as far as DVD is concerned. Tim Handly of Audio Edit in the UK has worked with 96k, but just for high-density audio-only projects aimed at CD: 'Once you're dealing with picture there isn't enough room,' he explains. 'In a way the limitation is not just the amount of data storage on the disc, but everything else with it. If you've got a lot of very flashy pictures with loads of flash shots then you're gobbling up disc space, and, from what I understand, the AC-3 encoder is not even working at 20-bit, and that's a bit of a drag. I recently mastered the sound for a Swan Lake DVD being released by Warners, but this was 48k—the picture knocked 96k on the head.

I've worked on a number of classical CDs for Decca in the 96k format, and for these I used Sonic Solutions as the editing platform and, in terms of the convertor, the dCS. The recordings were fairly old—[Sir George] Solti operas dating back to the sixties—and they had been released years ago on CD in the traditional way. This time we transferred the material from the original analogue 2-track masters via the dCS convertors over to the Genex, and it's interesting to compare those transfers to the earlier ones which were 16-bit 44.1, same machine, same cables. The only way to describe the difference is that the sound is more holographic; it's got a little more dimension to it, especially at the bass end. Certainly the top end is much, much cleaner, but I don't think that's what grabs the attention so much.'

STEPHAN BOCH of Mastering Studio Muenchen (MSM) in Germany concurs, having recently experimented with 24-bit, 96kHz audio. In his case the results are laced with more confusion.

'Among the testing that we've done is to compare classical music masters at 96k and 48k with half-inch tape,' he says. 'In these cases there has been an enormous difference. Mainly, the sound is much more exact in terms of imaging and definition, and, surprisingly, the bottom end is much more stable. Now, while the sound between 96k and 48k was very different, that was also because there were two different convertors involved—the dCS and a Stage Tech, which is manufactured in Berlin and has an internal resolution of 27-bit; they've shifted the bit-range dynamically in order to achieve more than you'd normally get with 24-bit resolution, and they claim that their convertor sounds as good as any 96k convertor. As a result it's been very difficult to draw any definite conclusions.

'We were experimenting with a vio-



lin recording, and quite honestly it sounded like a different violin. So, we now have to find out if this difference was related to the convertor or to an accident while recording. To me there's much more difference than there should be. From our experience with 44.1-24 we already know that every company makes a different-sounding convertor, and 96k recordings are just at the beginning, so I think that in future the 96k convertors will get even better.'

As to how noticeable the results will ultimately be to the people who really matter—the consumers—the jury is still out.

'In the case of the CDs that I've worked on, what the consumers will buy will still be 16-bit 44.1,' says Tim Handly. 'Now of course we're going to try to make the higher resolution translate all the way down the chain when we do the crunching, but at this stage it's difficult to say exactly what the benefit to the consumer is going to be until he himself can actually hear the product in 96k 24-bit. There are three or four high-density audio formats kicking around at the moment, but who knows which one—if any—is going to come out on top. We're still in the early stages, preparing stuff for whichever format takes the lead, whether it's DVD or HDS or PolyGram's own high-density CD.

'Where DVD is going to take off is the surround-sound capability. That's what I think really matters to the consumer. Once we get to the situation where you can have, say, 96k at the front and 48k at the back, all working at 24-bit—which is where it will go—then that's when there'll be something really worth having. That's not very far away. High-resolution surround is already beginning to happen, and it'll definitely take off with feature films, and so while there's still a question at this early stage as to which way it will go there's undoubtedly a movement towards it from the studios and everyone recognises the need.' ■



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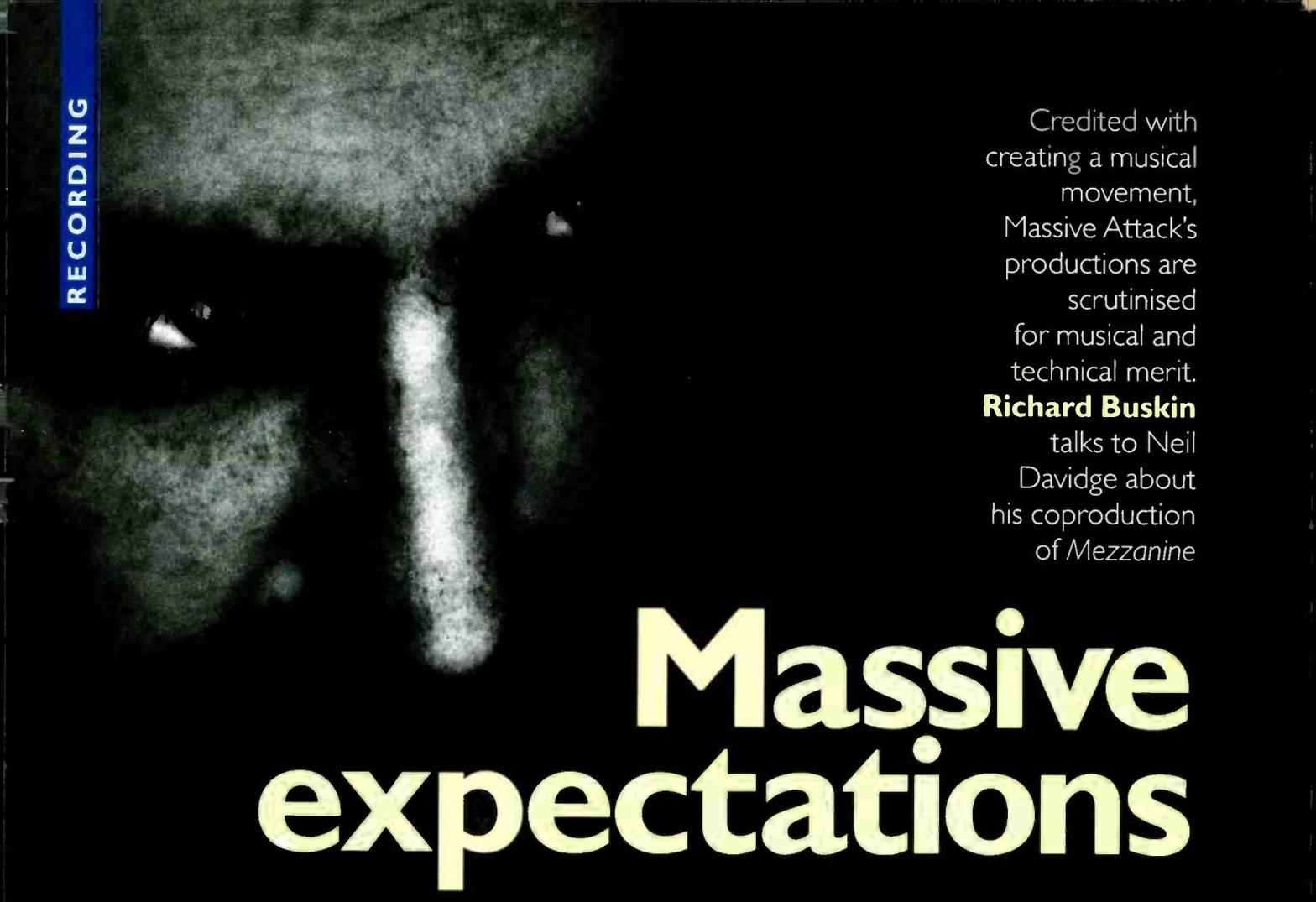
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Massive expectations

Credited with creating a musical movement, Massive Attack's productions are scrutinised for musical and technical merit. **Richard Buskin** talks to Neil Davidge about his coproduction of *Mezzanine*

CALL IT TRIP HOP or just the 'Bristol sound': either way this nineties musical genre has been credited to English band Massive Attack, whose first two albums, *Blue Lines* in 1991 and 1994's *Protection*, paved the way for a whole slew of contemporary dance acts. Driving, repetitive rhythms and a cacophony of unconventional sounds—ranging from the distorted to the plain indecipherable—characterise the Massive output, and for those who want more of the soundtrack-type sensibilities there now comes the group's third opus, *Mezzanine*, boasting a less polished and slightly more 'punk' feel as encouraged by Grant Marshall.

As it happens, *Mezzanine* has arrived in installments, having been made available over the internet by Virgin Records several weeks in advance of its official 12th May release to the retail outlets. The marketing process began with a 45s clip of the first single, 'Teardrop', on 20th March, and this was followed by several other sound and video bites over the next few days, before the entire album and 'Teardrop' video were premiered on 30th March.

So, what did the web surfers get to hear? Well, for one there are the guest vocals by former Cocteau Twin Liz Fraser, previous contributor Horace Andy and Sara Jay, as well as a new emphasis on guitar parts and the input of Neil Davidge, who has stepped into

the production shoes vacated by Johnny Dollar (*Blue Lines*) and Nellee Hooper (*Protection*) while also playing a notable—if uncredited—part in the whole compositional process.

'This is the first album in which the band members have been properly involved in the production,' Davidge points out, 'and while that gave them more control I've been there to help steer them through it. In a lot of cases that did include me contributing to the writing process, and the band recognised that in reality I should be credited as a co-composer on many of the tracks, but you've got to understand that Massive Attack do use samples on the album. Samples mean publishing, and in addition they have various guest singers who take publishing for the parts that they've written, and so you start getting into quite a messy situation in terms of the publishing, and it's one that still hasn't been fully resolved. They're still arguing over several tracks with regard to the publishing, and I decided that I wasn't going to get involved with that and I would get points on the album to cover me for the loss. At this stage publishing is not really what I'm into. I'm after production credits and points on the album that I produce, and so I'm quite happy to do my part and call that a producer's role.'

Davidge himself has a background as a singer-songwriter who learned to

find his way around the studio by way of his own small home setup in Bristol. This is based around an 8-track machine, Commodore 64 with Cubase, and various samplers, indicating that the music is of greater concern than commercial considerations, and it was his venturing into more offbeat fields that first attracted the attention of Massive Attack members Grant Marshall (Daddy Gee), Robert del Naja (3D) and Andrew Vowles (Mushroom). The first collaboration featured singer Tracey Thorn for the *Batman Forever* album, and, in addition to another recorded for a charity compilation album in aid of Bosnia, this laid the way for the working method for the *Mezzanine* project at the start of 1996.

'They'd been out touring, playing at a lot of festivals, and they put together a proper band,' Davidge recalls. 'That was a departure because they'd been going out with a couple of record decks and microphones. Now there were guitars, drums, bass, keyboards and several vocalists, and they wanted to represent that progression on their next album. When we worked on the Euro '96 track, we got in the guitarist Angelo Bruschini, and he put loads of stuff down onto DA-88—this was prior to us having any direct-to-disc recording system. He fired all of this stuff down onto tape and I just ended up going through hours' worth of guitar noises

and abstract parts, and looping and overlaying things—basically doing a cut-and-paste job. That really created quite a distinctive sound, and it sort of set the tone for everything else that we did in terms of piecing together the arrangements.

'We wanted to work in an abstract way; so that people could mess around with a particular idea and try anything that came to mind. I convinced them to invest in a Pro Tools setup. We would have maybe a couple of basic loops that were perhaps sampled from a record, or a drum pattern, bass line or keyboard, and then we would loop sections for up to 30 minutes. We'd record everything that was done, and we'd do that with guitars, drums, bass, keyboards, everything aside from vocals.'

THE MAJORITY of the parts that ended up on the album were played by the Bristol-based musicians and their associates rather than sampled, and the procedure for doing this varied from track to track.

'We would record everything that they did,' says Davidge, 'and I would then sit down for sometimes days and pick out all of the good bits. Quite often, I would also actually focus on things that were almost like mistakes, where they would mess up and then have to dig their way out of a hole musically. Those became the areas of interest and we

would use a lot of those parts and loop them. I would arrange them all in Pro Tools and start piecing together a track, and then maybe D would come in and I would play him the basic arrangement that I'd come up with. He would want to change certain parts of that arrangement and between us we would take things a stage further, and then he'd take away a tape and write a lyric for it. In most cases that was the starting point for the songs. It was a freeform, quite abstract way of working.'

In many cases, a sample provided a song's inspiration rather than an embellishment—melody is not the strongest feature of Massive Attack's work, and so the starting point might also come in the form of a drumbeat, a percussive line or a rhythm part that didn't revolve around a specific chord structure.

'There weren't any samples that influenced the melodic structure of a song,' asserts Davidge. 'It really was just a rhythmic starting point. In fact, on 'Rising Son' there's a sample of 'I Found a Reason' by The Velvet Underground and that was put on afterwards. The original inspiration for that song was just a drumbeat over which we laid some keyboard ideas, a bass line and

various guitar parts, recorded through a Mutator and then sampled and messed around with. That became the basis for the track, and with us using samples as a rhythmic starting point anything melodic was usually an extra after we'd put most of the song together.

'As for the second bass line that comes in, that started out with a guy who we got in from London playing a load of Indian instruments; tablas, sitars and so on. He'd sit down and jam over the tracks. I took one note from a sitar part that he played and put it into my Roland S750 sampler and I started filtering the note and detuned it loads, and

we ended up with this really quite mad sound. Excited by this, D jumped on the keyboard and started playing this bass line, and we then took that to Olympic where Spike [mix engineer Mark Stent]—with his boxes of tricks, loads of old pedals and stuff—just started distorting the thing to the point where the original sound wasn't there anymore. That's how the bass line was created. I mean, we never walked into the studio and said, "What we want to do is drop into a really distorted bass >

'We wanted to work in an abstract way; so that people could mess around with a particular idea and try anything that came to mind'



MASSIVE ATTACK
MEZZANINE

< line here"; it just developed that way. It's like the Hammond sound on 'Teardrop'; Michael Timothy, who's part of the live setup, just slipped and fell on the keyboard and that became the Hammond stab."

A sample used twice and to quite different effect on the *Mezzanine* album is that of Isaac Hayes performing 'Our Day Will Come'. Its first use is on a track titled 'Exchange', which largely consists of a single melody line being repeated over and over again by different instruments in turn for about four minutes; its second use is on the closing track, this time named '(Exchange)', which is more diverse in structure than its predecessor, and which therefore takes on the nature of an alternate version rather than a reprise. Now, the reason I mention this is because the juxtaposition of these two tracks in terms of really just the title and the aforementioned sample serves as a good illustration of the unrestricted manner in which Massive Attack like to work.

"We were working on the mix of the first 'Exchange' and Horace Andy was in the studio," Davidge recalls. "We were just sort of chatting and hanging about and listening to the mix as it was progressing, and he started to sing this old song of his, 'See Man's Face', over the track. We thought, "Wow. This sounds really, really good". So, we literally threw down a quick guide mix of that



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track onto 2-inch, put up a mic, he sang twice over the top of it and that was it. After that it got to the stage where some people liked the instrumental and others really liked the vocal version, and so in the end we decided to put both on. It was never intended as a track that would appear twice on the album, but it just happened as a moment of inspiration.

(Exchange)—and, for that matter, the album—ends with several seconds of a sample of a vinyl record crackling. Not the most conventional of fade-outs—at least intentionally, since the advent of CDs—but then this was a contribution by one Marius De Vries which met with general approval. The consensus of opinion was that it tied in nicely with the old-style reggae feel of the track. Such was the way of thinking when people were often just jamming around in the studio.

‘WHEN WE were working on ‘Angel’ there was this Sex Gang Children sample that 3D had found and which was being looped,’ says Davidge by way of example. ‘I played these two notes on my Moog Prodigy as a bass line, and then I fed the Sex Gang Children break back into the filter trigger on the Moog and it created this thumping, distorted rhythm that you hear. I recorded a pass of it onto tape messing around with all

of the filters, taking the filters up and down, and eventually we got rid of the Sex Gang Children break, and what we ended up with became the basis for ‘Angel’.

In fact, ‘Angel’ itself was originally going to be a cover version of ‘Straight To Hell’ by The Clash, and we wanted Horace [Andy] to sing on the track. Well, we got him into the studio when we were mixing at Olympic and he learned the lyrics and started singing them, but it didn’t quite work the way we’d hoped it would. Out of desperation we said, ‘Horace, have you got any ideas?’ and he started singing, ‘You are my angel’, over the top of it. It was one of his old tunes from his Studio One days, and so the guys sat down with him and re-wrote the lyrics.

‘We were there to mix that track and finish it, but we ended up putting a new vocal on it, changing all of the drums, adding loads of keyboards and guitars, and it became a completely new track. So, again, we went into the studio with one idea and it came out as something completely different.’

Not every experiment worked to everybody’s satisfaction, as Davidge is happy to concede—the uncomfortable

vocal on ‘Dissolved Girl’ for example.

‘It’s not an album about what we think is perfect, with the perfect arrangement and the perfect mix for these songs,’ he agrees. ‘It’s like “two years in the life of...”, and that track was a part of the puzzle in the progression of making the album. We decided that we would include it, even though I don’t think any of us were that happy with it. I was never quite that convinced by either the song or her vocal, and there will always be a black mark against that song.’

In the final analysis, the guys just wanted to make an interesting album that surprised them and excited them, and it was D who really had the fire in his gut. At times Mushroom and Gee just had to sit back and let him get on with it, let him find his feet and something that he liked. They’d put more of themselves and their R’n’B sensibilities into the first couple of albums, and in the process they’d sort of exhausted their own creative little thing. ‘I’m sure they’ll get more involved in future albums, but this one was very much D’s and I think it succeeds.’ ■

‘It’s not an album about what we think is perfect, with the perfect arrangement and the perfect mix for these songs’

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A year to remember

Have you ordered the lifeboats in readiness for the Millennium Bug, or do you believe it could never happen? **Martin Polon** assesses the implications for professional audio users



IN NOT MUCH more than 500 days' time, the world's calendars will change from 1999 to 2000 and most of the world's computers will change over 99 to 00. When this happens, the world as we know it could grind to a catastrophic halt or, possibly, it could go on much as before. Or the net result could be somewhere in between.

The problem of Year 2000 compliance (or Y2k as enthusiasts tend to call it) is

a conundrum brought about by the lack of either a hard and fast fix or any guarantee that a disaster really is in the offing. Warnings are being taken by many users as 'crying wolf'. They may be wrong, but this is their perception and their perception is after all what drives people to action. It is estimated that only about 40% of all vulnerable users in all fields will either make the necessary fixes themselves, hire pro-

fessionals to do the work or buy new software that has been corrected for the Y2k problem.

In the recording studio and audio-related fields, the problem may be even more dangerous than in other areas since there is a perception that nothing could really go wrong in a way that would jeopardise either people or things. As one studio owner said over a pint of American Budweiser beer >

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< in a London pub recently, 'the world is a changing and all of this is just part of that change. Even if it does happen, it's not like I'm in banking, health care or have my finger on the trigger at one of those American missile silos in North or is that West Dakota. How could my little digital room matter even if it does happen?'

Let's begin at the beginning, which essentially takes us back to World War II to the teams from the US Army, Air Force, Navy and various universities that helped to design the early vacuum-tube computers. Those massive digital computational machines were essentially supposed to replace existing analogue computers which used gears, arms and motors to solve complex problems of aircraft and ship design by mathematical emulation. Slow and extraordinarily complicated to 'program', these analogue units had to be replaced with something better and the vast amounts of money poured into war-time efforts paid dividends—mostly after the end of World War II.

Curiously, these two-storey-building-sized vacuum-tube computers were not heavily used in the American Manhattan Project development of the atomic bomb. To reduce the involvement of anyone new who might share the nuclear secret and due to the rudimentary status of these early computers during the war, Manhattan Project Czar General Leslie Groves preferred teams of mathematicians using mechanical adding machines already working for him, to 'crunch' the project's numbers.

After the War, the commercial sector joined in development, notably Tom Watson's International Business Machines (IBM) and Sperry-Rand. They developed hybrid machines which used punched-paper cards to store information, with entry from relatively smart (for the time) typewriters. The entered information could then be acted upon by vacuum tube systems and the output stored either on paper or on punch cards.

The early Eniac, Brainiac and later the Univac all made use of the keyboard, punched cards and physical patch cords to input and program, but the key to functionality was memory storage and that was in limited supply. As these computers became truly digital, that is they pioneered the use of zeros and ones to store information—zero being off and one being on—each storage and oper-



ating point required a vacuum tube acting as a digital switch. Think of these tubes as a kind of RAM (Random Access Memory) base for the computer. But any other storage had to revert to paper cards, punched paper tape or printed output—so-called hard copy.

The lack of available memory similarly confounded the brilliant British computer developer Alan Turing, whose 'Bombes' built for the ultra-secret British GC&CS (Government Code and Cypher School) broke the Nazi's Enigma system of encryption in World War II and helped to win the war. But we can only guess at how much more could have been accomplished if they had been able to use sophisticated memory instead of punched paper tape, electromagnetic relays and telephone central office-type stepping relays.

Early programmers, such as the formidable mathematician Dr Grace Hopper, who was commissioned from her academic position as a professor of mathematics directly to the US Navy (and eventually rose to the rank of Rear Admiral with numerous Presidential citations), had to deal with the shortage of adequate memory. As the principal author of Cobol (COmmon Business-Oriented Language), the pioneering software that

ultimately enabled the rise of the post-war computing industry, Hopper had to face the problem of storage.

THE ANSWER she and other program developers seized on was to delimit the amount of information that had to be carried by each line of or group of lines of program code. How simple it would be if the first two digits of the year could be dropped, since they would always read '19'—or at least so it seemed at that time 50 or more years ago. The amount of space that could be saved by using a 2-digit shorthand for the year was really quite significant, especially when you considered that 4,000 (4k) bytes was a large amount of memory in the world of vacuum tube computing.

As computers and the programs to run on them progressed, memory devices and capacity did not necessarily keep pace. Tubes were replaced by transistors and transistors by semiconductors—some, like the tubes in early computers, needing to be water cooled. All served as zero or one/on or off switches. Computational capacity depended on

'It's not like I've my finger on the trigger at a missile silo. How could my little digital room matter even if it does happen?'

the number of switching points offered, which in today's computers numbers in the many millions.

Memory capacity remained both small and expensive. Transitional devices such as memory cathode-ray tubes, moving magnetic drums with read-write heads (sort of early hard drives), crude and large memory stacks and high speed streaming tape drives the size and bulk of a commercial refrigerator, were the norm and continued the necessity of using the year as a 2-digit shorthand as we progressed through the fifties, sixties and seventies.

There was simply not enough memory available, to justify the use of a full date structure in programs or in databases. It was estimated that going to a 4-digit date structure in the sixties and seventies, would have cost computer users (and they were all corporate at that time), half of their yearly information systems' budget just to make the switch. In fact, such conversion was still not practical at most sites, since the additional storage space needed for such a common and reiterative piece of information as the first two digits of

the year could 'cost' users 20% of their total storage capacity or more.

With the advent of the personal computer from IBM in the early eighties and the establishment of the digital operating system (DOS) from what later became Microsoft, the memory problem still had not been solved in a major way. RAM chips had replaced most other memory components in early PCs, but larger main-frame systems, many still in use, depended upon expensive and large components that effectively limited total memory capacity. Interestingly, early PCs had no hard drives; although they did come with 5-inch disk drives. Ram capacity was initially 16k with 64k available in later models in the mid-eighties.

There was simply not enough memory available, to justify the use of a full date structure in programs or in databases

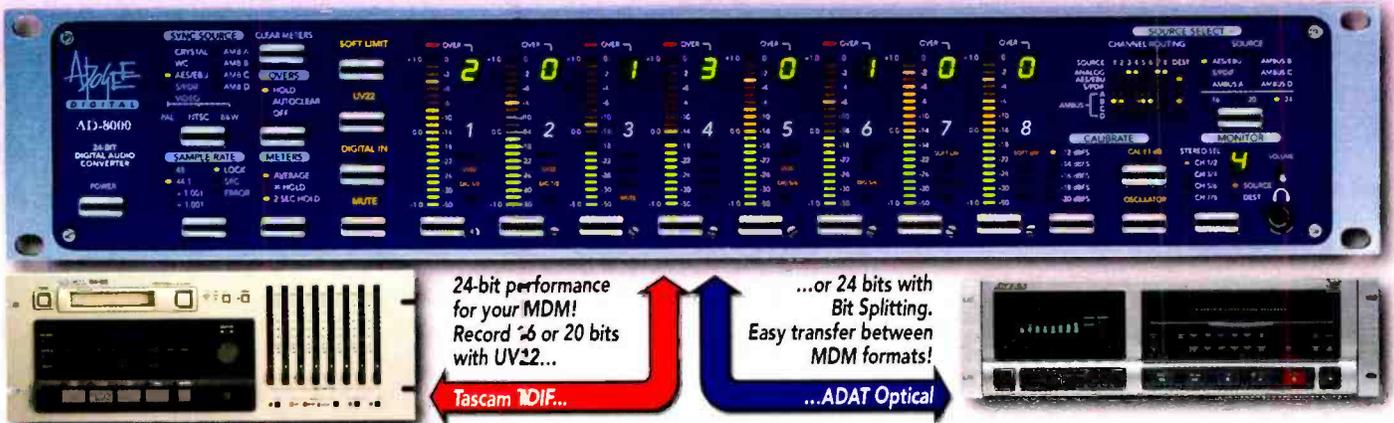
threat is that they will treat the new year as the year 1900, not the year 2000. If the final two digits are read as the year 1900, which in effect would repeat the beginning of the 20th century again (which computers would not be able to recognise having never been there), the fear is that they would crash, could not be rebooted and possibly corrupt some or all of their stored data. Otherwise, one of two other things can happen. The computers in question may just stop running and not execute commands at all or they will run the calculations on the year 1900 and come up with all the wrong answers, in which case you have a serious problem of a massive data processing breakdown.

Enormous amounts of data and information would then be at risk. This could include stored audio data, ISDN settings and actual session digital records in a recording studio setting. The larger the studio or studio complex and the greater its dependence upon computers for a broad range of functions—the greater the potential risk.

In the wider world, areas at risk range from records used for banking infor- >

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◀ mation, stock and pension accounts to telecommunications, utility grids and air traffic control systems. Such a crash could stop the processing of such vital cheques, freeze police access to drivers licences and criminal records, stop automatic teller machines dead in their tracks and even disable pre-paid fare cards for long distance telephone use as well as on subways and commuter rail systems worldwide.

Such problems are already beginning to appear. Credit cards with a programmed expiry date in 2000 or beyond have caused computerised cash register systems in retail stores to crash, and advanced appointment systems in legal and medical offices have shut down their connected network and computers with

appointments made after 1999.

The shortfall now is not in memory, which in the form of hard drives and RAM chips is abundantly available and at incredibly low prices. The shortfall is in programmers who can fix the problem, especially in software that is functionally old and uses archaic code. Yet the actual act of fixing the Y2k problem is heavily dependent on efforts that expand the available space in software where dates are stored from two digits (98, 99) to four digits (1998, 1999).

Many in the computer industry feel that the easiest way to fix the problem on large systems is not to fix it

—rather to use a fix that does not change the actual 2-digit date code, but instead ‘fools’ the system into accepting new date codes without going to four digits.

This could be Dr Computer’s Magic Bullet, eliminating the need for a massive fix of programming, stored information and, in some cases, hardware to add a full four digits—even though memory itself is readily available. And such a fix would last until the following Millennium in the year 3000, allowing computer programmers adequate time to fix the problem properly without a deadline.

Despite the attention of conspiracy theorists who accuse the Cobol Cowboys of leaving over half of all of the world’s computers vulnerable to the Y2k problem, veteran Cobol programmers are reaping the financial whirlwind of finding a fix (and being rewarded by \$100,000 to \$250,000 salaries). Today’s colleges and universities do not even teach Cobol anymore.

Older programmers say that no one involved in computing in the fifties, sixties and seventies thought that the hard-



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Veteran Cobol programmers are reaping the financial whirlwind of finding a fix. Today's colleges and universities do not even teach Cobol anymore

ware and software they were working on would still be around now. According to rumour, programmers returning to fight the Y2k problem have commissioned tee-shirts emblazoned ‘The Dinosaurs are Back’ on the front and ‘They are Angry’ on the back.

TWO Y2K PROBLEMS face audio users. One is internal and the other is external. Internally, the relatively recent introduction of digital recording on PCs and stand-alone workstations should minimise the likelihood of major computer haemorrhaging on the morning of 1st January, 2000. But that is essentially conventional wisdom. Consider instead the following precautions.

You might thoroughly test every computer you use and every program on these computers. Testing programs can be downloaded free from several Internet sites, easily found with today’s search engines looking for either ‘Y2k’ or ‘Year 2000 Problem’. Computer stores sell both commercial software

Attempt to identify if indeed your bank has fixed its Y2k problem. In addition, keep a set of your financial records as hard copy in a safe place, covering the last six months of all account relationships

Attempt to identify if indeed your bank has fixed its Y2k problem. In addition to that measure, keep a set of your financial records as hard copy in a safe place, covering the last six months of all account relationships with any and all financial institutions that support you and your studio business. The records will serve to prove the existence of your financial resources if necessary. Include insurance policies and the cancelled checks that paid for them.

Some experts advise keeping more cash on hand than normal. That is a personal judgment call, but if the banks lose their records and their ATM networks crash, it just might make sense.

Be sure that all your business and per-

sonal credit cards do not all expire in the year 2000. Call your credit card purveyors and ask for the date to be extended forwards to 2001 and have no trepidation explaining why. The credit card companies know Y2k is coming as well as you do.

The bottom line here is that we are approaching a truly unfathomable experience in a relatively short time. All of this may be yet another case of Chicken Licken and the sky may indeed not fall. Y2k problems may prove to be relatively minor and life will go on. Yet, who is to say what will really happen. You just might find your recording studio running with client's bringing in chickens and potatoes to pay for their sessions. Bon Appetit. ■



to search and fix PCs, and books to allow you to do it yourself. Most PCs made after 1995-6 are supposed to be Y2k-problem free, but you won't know for absolutely sure until you use test software.

All Apple Macintoshes will accept the 1st January, 2000 date change and in general are essentially design-free of Y2k problems, in fact more so than any other computer system in use today. That does not mean that there may not be an odd piece of software that is vulnerable or that Mac's networked into a mainframe or a Windows net might not fall victim to some mischief or other, but there should be less likelihood of sustained permanent damage, dysfunction or data loss.

If you use Amiga computers, stand-alone workstations or other low volume systems, you will have to contact the appropriate manufacturer or user group for support. In many cases, independent or enthusiast authors have written some of the software in use on these systems and the answer to the Y2k question may not be all that clear.

If you have any questions at all, call the software or hardware manufacturer and request hard answers. Rumours abound on the whole Y2k problem and the reliability of all Y2k fixes to the Windows 95 and 98 environment as well as

to Windows NT 4.0 and 5.0 should be verified directly from the veritable horse's mouth —Microsoft.

Externally, the recording studios or audio activity that exists in complete isolation to the outside world are few and far between. Consider the following points to protect yourself from a temporarily dys-

functional business interface as of 12:01 am on 1,1,2000.





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Hit Formula

A new surround-equipped, fully-digital music studio makes a statement on the technology within it and the market expected to support it. **Tim Goodyer** takes an exclusive look inside The Hit Factory's Studio 5

WHEN THE HIT FACTORY opened the doors on its new Studio 5, it did so on two seminal issues in recording studio philosophy. The days of discussing studio control rooms in terms of whose desk and whose monitors are over—or at least in abeyance—as are the days of arguing digital against analogue or horn drivers against direct radiators. Today's issues are neatly summed up in Studio 5's claims to being 'fully digital' and 'surround equipped'. And it is targeted squarely at music recording.

In old parlance, then, Studio 5 is equipped with a Sony OXF-R3 console and horn-loaded custom Augspurger main stereo monitors. In current terms, it offers a 24-bit, 48kHz digital signal path from desk to target recorder and

5.1-channel Genelec monitoring with a Miller and Kreisel MX5000 subwoofer. Recording can be to Sony PCM9000 via a PCM3348HR DASH recorder and/or a Pro Tools 24 system, supporting 24 bits throughout with just a few compromises in the otherwise fully-digital outboard rack. The studio is also comprehensively tied to the facility's other rooms and ready to offer a digital path from a remote recording area to Control Room 5 as soon as the relevant issues are addressed by the industry.

'The objective of this room is to explore the digital alternatives to analogue working,' states Hit Factory executive VP Troy Germano. 'I don't think that the way other people have built digital rooms is the wrong way, but we didn't want to install a digital console

the way digital consoles have been historically installed in recording studios; we didn't feel the need to put a digital console in a familiar analogue environment. We had decided that when we were ready to make the step, we were going to build a completely digital room: continuous 24-bit digital all the way through. We felt that, if people really want to get the benefit of digital—in terms of transparency and accuracy, in terms of the console, the recorders, hardware outboard and virtual outboard—we should start the room off as a completely digital room.

With the way things are changing in the music business and with the multi-channel capabilities of the console, we felt the room should be capable of 5.1 or even 7.1 surround, so people can >



◀ go in there and do a great stereo music mix or, if they want to go to 5.1 or 7.1, the room is already set up for it. We feel a lot of records are going to head in the direction of surround mixes, the question is "How soon?" and whatever the answer, we're ready.'

Studio 5 had been designed as a general-purpose stereo monitoring room by Neil Grant of Harris Grant Associates who were responsible for the existing four studios. As such, while the isolation and basic acoustic treatment were already there, no appropriate consideration had been given to an equipment room, access, facilities or general ergonomic and architectural details. The job of addressing these and the specific technical requirements fell to White Mark.

'We chose White Mark because David Bell knows the building and the installation inside out and he also knows the requirements of the Oxford console having worked on Peter Gabriel's at Real World,' Germano comments. 'He did a really great job and was helpful in making many of the design decisions as well as being instrumental in the fabrication of furniture and general ideas that have become part of the room.'

'The room has been laid out to feel as large as possible,' Bell begins. 'In terms of the console, it allows three people to work side-by-side with a separate position for the Pro Tools operator, but to allow that operator to be one of the three people at the console, and to allow a large analogue patchbay because even though the room is principally digital there is a likelihood that analogue outboard will also be used.'

'In terms of the monitoring, the requirement was for it to be a 5.1 surround room. The difficulty of achieving that was eased by the fact that full-frequency stereo listening was a separate issue. If you're not going to build soffit-mounted monitoring as we did at the Strongroom, then putting in a Genelec system with a subwoofer is being taken as something of a standard. The problem you've got to get away from is that if you don't soffit-mount



main monitors in the room, you've got to position them very carefully to minimise room boundary effects. You've also got to try to ensure they're all an equal distance from you so there's no discrepancy in coloration brought about by the difference in ratio between the direct field and the reverberant field. Additionally, a certain amount of flexibility is necessary because there's a variation in world acceptance about where the rear channels should be—there's a standard in which the speakers should be 65 either side of the symmetry line which puts them behind your shoulders and there's another belief that they should be to the rear. Then there's the issue of whether they're going to be used as direct radiators as part of a music mix or generators of a reverberant field which is to be reproduced by dipoles. So in a commercial studio environment you've got to allow a certain amount of freedom to move them about. This is consistent with the criteria that have been adopted for all other technical aspects of the room, which are that a client can configure everything as they wish.'

The solution to most of the monitoring problems took the form of a track system on which five Genelec 1031AP monitors are mounted. As well as guaranteeing consistent placement of the speakers around the listening position, this allows all five to be positioned for

differing requirements within useful limits and even for an alternative choice of monitor to be substituted while retaining the optimal positioning of the house system. It also addresses the conflicting requirements of the stereo and LR surround pairs in allowing the Genelecs to be moved aside when the stereo monitors are in use. But the issues raised in Studio 5 are far reaching...

'What needs to be discussed with all involved parties is how critical they perceive each of the various issues to be,' Bell asserts. 'How many people need to be included in the listening field: the producer, the artist, the engineer, the film editor, the film producer, the conductor, the soloists? How big can a room to be? Are people happy with a smaller, near circular array of smaller speakers for placement and a big pair for QC? The whole issue of how engineers wish to work is under development, and I think that while designers can point out the technical issues and the merits of the basic science involved, it's down to the engineers and how they see the relationship between the rooms they're working in and the results they're getting. It's a loop and designers need to be included in that loop so that we can hear the results, make assessments and feed those into the next iteration.'

'There aren't many rooms that people can work in, so there are a lot of opinions around at the moment and not a lot of results to check them against but our current feeling is for three areas around the room of a predominantly soft front and diffusing back wall, with soft rear soffits sharing the same design criteria as for the front is the way forward if you're going to do a full-frequency, full-level surround soffit-mounted system. Because the targets are still the same—the aspirations for the character of the room are the same and the rules for directionality and perception are the same regardless of there being more channels: you want even decay time regardless of frequency, minimal conflicting reflection from whichever direction, and as diffuse as possible a reverberation tail to give a neutral environment in which to work. There needs to be an amount of diffusion to achieve that and if you have to reduce the rear diffusion to give reflection-free sources at the rear, then you've got to put it somewhere else. And I believe that if you're introducing sound from the rear of the room, the walls opposite become terribly important in terms of diffusion.'

With a total commitment to digital working come the inevitable questions of fidelity and standards. Presently both are being contested in terms of sampling rates, but Germano claims that the performance of the 24-bit, 48kHz Studio 5 is being well received.

'As people get used to the HR machines, they seem to be very happy



The exclusively digital o/b rack

with them. As people reading this will know, there is a big difference between 16-bit and 24-bit, that's why we made the commitment—to have this room without an HR machine doesn't make sense. Why would you hook up a 16-bit machine when most of the equipment, except one or two bits of outboard, is 24-bit?

'On the issue of sampling rates, time will tell. We'll see how the technology progresses and revisit it at a later date. As a 2-track format, a mixing format, it could happen sooner rather than later, but we'll watch new products as they come out and make decisions at the appropriate time. I wouldn't say that we don't care about 96kHz but for the technology that's available at the moment, I think that's the best room we could have built. We want to offer our clients the purest sound recording equipment that's available, so as new things appear we will revisit the question.'

Aside from technical performance, digital systems readily offer operational performance beyond that associated with analogue or hybrid systems.

'In The Hit Factory, it allows an entirely digital room to be configured that not only maintains the quality of the HR tape machines, but also gives a completely resettable technical environment,' David Bell suggests. 'All the outboard is MIDI controlled and normalised to various locations in the console such that with the resettable of the console and the reconfigurability and resettable of the Pro Tools system, and the HR machines' ability to bring things in from other rooms in the complex, someone can come in, work for a certain length of time, record the status of the studio on a disk, and then come back another day and continue. So it opened for The Hit Factory not only the concept of a studio with the perceived fidelity and control you can get with digital technology, but a whole new way to selling studio time. This allows them to think about different ways of booking the time out.'

'We had one engineer who did about eight mixes while the producer was away,' says Germano, by way of illus-

tration. 'When the producer came back, he made a few tweaks and within an hour-and-a-half, those eight mixes were printed to PCM-9000. And it is not as if all sorts of compromises had to be made; absolutely not. You can't do that on an analogue console.'

But where what can be done on

an analogue console is well-known, mention of a digital console sometimes invokes fears of unfamiliar and unfathomable operator interfaces

'I don't really think that the Oxford is perceived as a difficult console to operate,' Germano counters. 'There are other consoles out there that are perceived as difficult to operate and that's one of the reasons we made the choice to go with the Oxford. The news that it isn't difficult is the news that's spreading. Once you get behind the console, it speaks for itself.'

'The in-house expertise on the Oxford is developing well,' he continues, 'but I think the greatest asset of the console is how easy it is to learn. You can sit behind it and in 30 to 60 minutes you have a very good idea of how it works. I'm not saying you've mastered it, but you can feel very comfortable and if you have an assistant in the room that understands the console, there's no problem at all. Analogue will not go away—we have analogue rooms that we will remain very fond of—but it is 1998 and the world is going digital. Ultimately I think we'll be looking to put digital consoles into other rooms.'

Alongside some 64 plug-ins for the Pro Tools system, the outboard rack is stacked with digital boxes such as Lexicon's PCM80 and PCM90, te electronics' M2000 and M5000, the Daniel Weiss EQ1 and Sony DPS V77 as well as a Dolby DP562 surround decoder. Above the rack is a patchbay allowing, among other facilities, that of patching analogue outboard into the signal chain. More patching can be found in the machine room where on top of the necessary tape machine and synchronisation considerations are those for digital patching between studios.

'A huge amount of patching is allowed in serial and parallel control,' Bell explains, 'AES patching; analogue patching; distribution of MADI—as soon as the issues of long-distance MADI usage and wordclock locking are sorted, this room is ready to be MADI-linked to everywhere else.

'All the MADI links come out onto the patchbay ready for the solution of that problem. And then in theory you could have access to all the acoustic spaces and make use of a central resource of machines—which is getting back to the old way the BBC used to work with a recording channel and central machines. That's a radical step away, but the system is ready to allow any of these options to be considered without taking the room apart.'

'Another issue with the console is that you can provide a digital I-O in Studio 1, which is three floors away, to use the acoustic space there and record digitally here—but the same issues of synchronisation apply.'

To date, Studio 5 has received some impressive endorsements, including bookings from Paul Simon working on a 'cast' album of his *Capeman* Broadway show, Stephen Schwartz' *Children of Eden* Broadway show and a forthcoming hip hop album from Nas. All of the above are conspicuously musical.

'The focus remains on music,' Germano confirms, 'and initially on straightforward stereo mixing, but there have already been enquiries from people who have recorded albums here about coming back to remix them in 5.1 surround. And that's going to happen more and more. The industry is focusing on 5.1 for DVD release and we're ready—it's going to be slow initially, but it's going to happen and until then we'll be doing conventional stereo mixing.'

'Studio 5 is set up to handle all genres of music, which is what we do here and what makes The Hit Factory unique. Most studios focus on one type, or a few types of music, but we try to accommodate all types from pop, rock, hip hop, rap, R&B, jazz, film scores, Broadway cast albums, crossover classical... All these things can be accommodated in this room.'

'I think everyone's going to do what they feel confident with,' comments VP Danielle Germano, 'and as more people become familiar with a digital room, they're going to want to book it. I don't think it will appeal to any particular genre of music, but to anyone who wants to do something new.'

On rates, Germano concedes that Studio 5 costs a little more than a comparable analogue or hybrid room but is eager to point out that this includes the 3348HR machine and Pro Tools system that are integral to its operation. Add to this the logistical efficiency of working in a readily resettable environment and the package starts to look like a bargain. And

for other studios looking to do 'something new' involving digital recording and surround listening, they are going to have to follow in The Hit Factory's slipstream. ■

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Lundgaard



AS A GENERAL RULE, you can expect studio owners to fall into a number of categories. There is the failed musician; the technician who has come off the road and made something for himself; there is the engineer or producer who got sucked in to studio ownership through a conspiracy of circumstances; and there are those who simply got into a recording habit at an early age and have never really been able to get out of it since. It is rare for a businessman, and yet rarer for a successful businessman to turn his attention to studio ownership. However, rarest of all studio owners is the supermarket tycoon.

Henning Tobiasen is not your usual studio owner having risen to prominence as the co-owner of a chain of eight supermarkets in Denmark's Jutland region. Nowadays he has stepped back from the business, and, while looking for something to occupy him, hit upon the idea of opening a recording studio—Lundgaard Studios to be precise.

'You're going to ask me why when I have a successful business like that and when I understand the principles of cash flow I should turn to a business that only costs me money,' he laughs. 'It was a novel idea for me. I love running a studio, it's an exciting world; although I can't pretend that it was

something I always wanted to do,' continues Tobiasen. 'It started with a band that I was sponsoring and we were recording a CD in a studio in Jutland and I found it fascinating. It's where my interest started some eight years ago. Eventually I bought that studio and then I bought the farm here and moved everything here five years ago.'

The buildings needed total renovation and Tobiasen owns the 7 acres of land on which the old-style Danish long-house farm buildings, that now serve as the recording facilities, at Lundgaard stand. The location is beautiful even on a blustery, late winter's day with views of sweeping countryside in all directions. The buildings are dotted about, creating courtyard areas with each block roughly dedicated to the function of offices, accommodation, and the recording studios. There is plenty of space—enough for a football pitch—and lots of interesting areas to relax or eat in when the good weather arrives. Lundgaard has three studios—the flagship Studio 1 with a Euphonix, Studio 2 with the original Amek M2500; and a

small programming and dance mix room based around a Yamaha 02R; and MIDI sequencing suite.

The Danish recording market has all the trappings of a scaled-down equivalent of any larger market and is subject to the same universal pressures and economics, so it could be deemed an unfortunate time in which to be opening a studio. The market is not particularly buoyant at present in Denmark, and Tobiasen will tell you that these are hard times with prices low, too low for

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some studios to continue to stay in business. However, he qualifies these observations with the claim that there is rarely a best time in which to break into a new market, and that if you have the financial resources, and he says that he has, you can ride the storm, survive, become truly established and come through on the other side in a

position of strength.

His analysis is unusually free of the clichés often encountered when interrogating a studio owner operating in a market that is under siege. 'I would hope that studio rates in Denmark will go up, but you have to be prepared to

live with the fact that it doesn't look as if it's going to happen in the near future,' he says.

Tobiasen identifies one of the biggest problems as balancing a studio's aptitude and skill against a willingness to handle a variety of different work types. Thus the programming requirements of dance music can be absorbed by Studio 3 without tying up the large open recording space that could be required by rock band in Studio 1.

'You have to be adaptable because in a market the size of Denmark it would be difficult for any studio to survive purely on one type of musical style. You have to be prepared to do it all if you want to be successful. What I've learned from the studio business already is that things take time, you have to prove yourself.'

Studio design for the complex was performed by Aarhus in Jutland-based company AV Studio Design with the actual installation performed by the studio's own maintenance personnel. These are headed by maintenance engineer Poul Meyer, and it was pointed out to me by one of Lundgaard's clients that it is unusual to work in a studio where the maintenance engineer actually lives in the premises.

The design objective from the outset was to create a very large control room with a very large recording area supplemented by a smaller additional studio with its own live area employing the equipment inherited from the original studio, including the Amek M2500. Monitoring in the Euphonix equipped Studio 1 is of the SLT variety whose enormous woofer systems were originally seen in PUK studios, also on Jutland in Denmark. But then SLT is a Danish company and the Lundgaard Sirius system incorporates 18-inch, 15-inch and 10-inch drivers and ribbons. Despite their intimidating main monitor size, Lundgaard has also seen fit to install a pair of Genelec 1038As in the walls to act as a 'mid' system. The same Genelecs are installed as the main system in the smaller Studio 2, while 1031As, the close-field choice in the aforementioned rooms, take on main duties in Studio 3.

Studio 1's recording area is interesting in employing adjustable absorbers in the walls which can alter the reverb time from 1.0s to 0.6s. However, the enormous performance area (120m² and 600m³), which maintains the stout traditional cross-beam structural supports of the original building, lends itself extremely well to selective screening. There is a large iso booth in one of the corners, but other areas of the room are treated differently to impart their own character. For example, the Yamaha C7 piano stands on its own concrete foundations with a granite floor that is separate from the wooden floored remainder of the studio area. This is a

room that is big enough, and airy enough to handle large string, sections or for a band to spread itself out comfortably for an extended campaign.

Studio 2's live area is tiny at 20m² by comparison, but is still large enough to perform its role as an affordable tracking room. Originally the studio ran only a Danish Lyrec 2-inch, but this was soon replaced by an Otari MTR90 and this has now been supplemented by RADARs in Studios 1 and 2.

'That was one of the biggest decisions we made because before the RADAR we were talking about buying another MTR90 or Akai hard-disk machines, but the RADAR impressed us, and with the interface unit it means clients can come here with any format and we can deal with it,' explains Tobiasen.

The M2500 had been destined to be the studio's main and best board, but as with many things at Lundgaard, its owner has consistently gone a little further—in this case to a Euphonix—with each step gradually gearing the facility up from local studio status to one that can bat on the international circuit.

'I didn't start off dreaming about international business,' says Tobiasen, 'because it was the Danish market that I was concerned with, but as time passes and you get a few nice things you get a taste for the better things in life.'

Taste for the finer things is borne out by traditional Danish produce in the outboard racks with at least one representative model from the entire Tube-Tech range and of course the portfolio of electronic effects boxes. There's even a selection of dynamics devices from little known local manufacturer Danfield.

The Euphonix CS2000 was a popular choice with the studio staff because of its compact size and its flexibility. The 56-fader desk complete with large Cube router was installed over a year ago and has pulling power as a novelty in Denmark and is said to be popular with a breed of open-minded, pro-



gressive engineers.

'It was certainly a risk but it differentiates us and that's not a bad thing in the studio business,' he adds. Trade has been good in the complex despite the economic climate,

says Tobiasen, with Studio 1 representing jaw-droppingly extraordinary value for money at around (UK)£450 a day.

With enough luxury accommodation on site in the beautifully refinished long-houses for a band and its entourage, it is a residential studio with a unique feel. With the Copenhagen studio scene suffering of late with a number of closures, Tobiasen believes Lundgaard is in a position to compete with the City particularly as road links between the

two have improved dramatically bringing journey times down to within a 3-hour drive. Similarly, Germany is within easy driving distance and the studio is only 35km from the international airport at Billund. 'We started off doing demos with amateur bands and we have proved ourselves slowly, but surely, and we now have a good reputation. We're on the map,' he states.

Future expansion will see the addition of more maintenance rooms and more kitchen facilities, but there are no immediate plans for more studios. 'It's never ending, there is always new equipment to buy, maybe a new desk for Studio 2,' he muses.

This is a man with his feet firmly on the ground and his staff will tell you that clients can be at the studio for days and still not know who the owner is, particularly when he's helping with the bags and generally playing porter.

'When I went in to this business I knew what the situation was, but I have one advantage and that is that I have the time to wait,' comments Tobiasen. 'We still have things to prove here, and that is something you always have to believe. It's hard work. You can

make some of your luck, but above all it is hard work that brings success.'

I think he probably knows what he is talking about. ■



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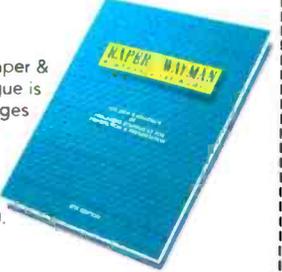


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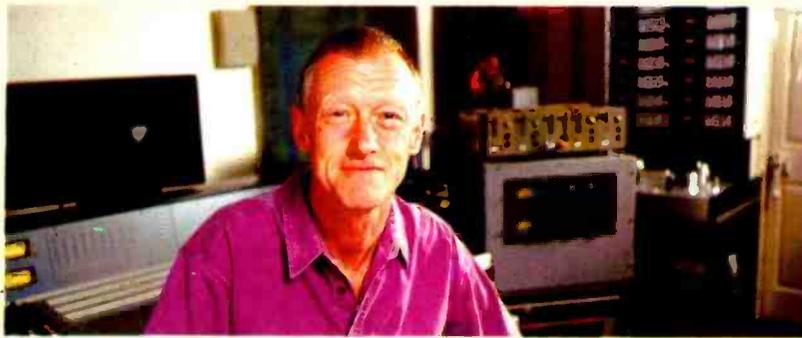
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5.1? Anyone?

On its progression from an academic war towards a business war, surround sound is an increasingly hot topic writes **Dan Daley**

SURROUND AUDIO, multichannel mixing, however you wish to refer to it, has been passing like a wave through studios in the States in last year. And the fact that the WG-4 working group of the DVD Consortium has yet to agree on a final, definitive set of standards for the DVD Audio format has not slowed its pace one whit.

The rush to multichannel sound mixing is being fuelled by two things, both of which are directly related to the business end rather than the engineering side. On one hand, most studios in the US have not seen their rates increase in any real sense in years—in fact, many have experienced rate erosion that has driven more than a few out of the business altogether. Thus, the Second-Coming sort of appeal that multichannel sound offers: it promises the possibility that many catalogue recordings will be remixed in 5.1 or other formats, as well as the need for current records to make both stereo and multichannel mixes. These are all billable hours, and conventional studios feel that they have an edge over the project studio competition on this particular issue because record companies, engineers, artists and producers are looking to the upper

end of the business for the expertise needed for this new frontier in sound.

The second propellant of this trend is the format companies themselves. Dolby had been coasting along as the only real consumer audio plug-in, had pretty much cornered the noise-reduction market, and had a comfortable lead in film surround sound. But as movie studios realised that there was a limit to the 'wow' factor that visual graphics could provide to draw people into their theatres, they began recognising the potential that sound had to augment big-screen antics. That led the surround audio becoming *de rigueur* in cinema, and it migrated into the home with the growth of home theatre, which the Consumer Electronics Association reports as one of the fastest-selling items on its agenda.

The advent of DVD and the growth of multichannel sound kicked off a competition that is still going on in the States. Cinema sound company DTS, backed by Universal Pictures and Steven Spielberg, among others, came on bullishly in 1997, commissioning a stream of catalogue music masters to be remixed using its approximately 3:1 data compression system, touting it as far superior to

Dolby's, which is about five times that. In Los Angeles, New York and Nashville, DTS paid for album licenses, and in many cases card rates for the original producers, engineers and studios, where possible, to reissue \$25-plus CDs that were playable in surround only through DTS-decoded players, of which there are not that many. But that's the point of the entire campaign: to enhance and promote the DTS technology to the point where it would not be possible to keep it off consumer electronics systems—there would be a 'DTS' button next to the ubiquitous 'Dolby' button on every receiver. Dolby itself began reacting on two fronts: first, it was battling with Netherlands-based Philips for the compression scheme that would be the standard for DVD: Dolby AC-3 or MPEG. Dolby has been quite successful on that front, with the Dolby system being the primary choice for all DVD movie discs in North America—the world's largest entertainment market—and included as a secondary system on discs encoded for other regions. Only Sony, with its digital cinema SDDS 7.1 format, has thus far stayed out of the music fray. But that could be a matter of time.

Where this applies to studios is that the term 'card rate' has been ringing bells. A number of studios I know of in New York and Nashville have been attempting to contact DTS, to make them aware of them and hopefully bring in some of that card rate business. Almost every upper-tier studio already has some kind of 5.1 monitoring system at least available. But just as there are no rules for 5.1 mixes, there

DVD: playing for monopoly

The talking may be done; the product finally launched; but now the real deal for DVD appears on the table writes **Barry Fox**

DVD HAS FINALLY LAUNCHED in Europe, or more accurately limped into view. Warner never held the promised pan-European shindig, even though it was Burbank's grand plans for this event that forced Warner UK to opt out of the UK DVD Launch Committee's 'all industry' launch briefing.

The sound system in Europe is Dolby Digital AC-3, not MPEG2. But the selection of software is poor, mainly back catalogue. Warner is keeping the price low (at £160), but the same titles (*Batman and Robin*, *Tin Cup*, *Mars Attacks*) are now on offer on VHS tape at £5 each.

We are promised a better range of software, up-to-date titles even, at the end of the year. But there is already a thriving trade in chips and mods that let a European Zone 2 player play North American Zone 1 discs. Universal and Disney are fighting back with discs which try to handshake with the player and play only on non-modified units. But the hackers stay one step ahead or European movie enthusiasts simply buy a Zone 1 player from America.

This has exactly the opposite effect to what the Hollywood studios wanted. Once a Euro-

pean home has bought a Zone 1 player, it can only play Zone 1 discs bought in from America. So releasing dull titles in Europe just kills the future market for European releases. How can the movie studios be so stupid as to miss this blindingly obvious fact?

Likewise, the audio industry remains blind to the fact that the European digital TV standard uses MPEG2 stereo instead of AC-3 surround. I ask companies like THX what they think and sense no sense of urgency or understanding.

But with some prodding, Dolby Labs are now speaking out.

'We've been here before. It's like DVD, with no MPEG decoder available and scores of facilities round the world producing Dolby Digital programmes,' says Tony Spath, Dolby's director of market development, 'Broadcasters like to talk about better sound and pictures from digital TV, but if the sound part is only two audio channels, they are giving people nothing better than they have at present.'

'The broadcast industry is now presented with a unique opportunity to make a real change. These do not come often. Not preparing now for multichannel audio will lead to a blind alley, where multichannel audio is

available in cinemas, home theatre, PC gaming, DVD and even in-car players—but with broadcasters confined to today's stereo surround technology.'

Sixty companies are now making the integrated circuit chips needed for Dolby decoders, there are 150 different models on offer and half a million have been sold. Over 150 studios are equipped to produce entertainment programmes. But there is still no sign of an MPEG-2 decoder that home users can

Pay TV stations are under commercial pressure to transmit as many channels as possible. The omens are not good

buy. So digital TV in Europe will rely on MPEG stereo with matrixed surround. And, like blood from a stone, we are getting the first hard facts on data rates.

MPEG2 stereo has two options, a data rate of 256kb/s for 'true stereo' and 192kb/s for 'joint stereo'. Joint stereo takes advantage of the fact that some of the sound in a pair of channels will be the same, so need only be recorded once. In theory the bit rate can be reduced from 256 to 192kb/s, without quality loss.

In practice this can spoil the surround effect because the phase shifts introduced by matrix

are few for multichannel speaker arrangements, ranging from the 110° splay to the overlapping equilateral triangles whose diamond created by their overlaid apexes supposedly creates the optimum sweet spot and best phantom centre images.

A lot of the recording studio industry here is banking on multichannel audio as a salvation after years of being eaten alive from below by ADATs and DA-88s. And in the dichotomous world of SSL and Neve that much of the upper-tier of studios has found itself in recent years, the vast range of approaches to monitoring surround audio could bring back some of the variety that helps differentiate studios and thus helps them remain more competitive.

Whether the public goes for multichannel audio remains to be seen: several record labels have been cautiously approving 5.1 additional mixes for major acts, just in case. But most label heads, like Joe Galante of RCA in Nashville, are even more cautious, reported as saying, 'Based on the sales numbers I've seen so far [in DVD], it's not sufficient enough to warrant us going in on a full scale'.

And could it be long before the private and project studios get into the act, with less expensive self-powered multichannel monitoring systems being touted on the NAMM Show floor? But in the meantime, multichannel audio represents the first real, positive change that could put some serious life back into the edgy business of recording studio operations.

encoding play havoc with the assumptions made by a joint stereo encoder. BBC engineers have now tested and rejected the idea of using joint stereo, and will broadcast all digital tv sound in true stereo at 256kb/s. But pay TV stations, like the UK's British Digital Broadcasting, are under commercial pressure to transmit as many TV channels as possible, by using the lowest possible bit rate for pictures and sound. The omens are not good.

The hi-fi press has been getting hot and bothered about subtle audio problems which are supposed to blemish Philips' excellent and low cost 870 CD Recorder. Personally I was so relieved to find that it worked so easily, without all the nightmare hassles of trying to set up a ROM recorder in a PC and make it work with Adaptec's Easy CD software, that I never noticed anything wrong with the sound of the 870.

Why even bother to install a PC recorder? Because the drive costs even less than the 870 and uses PC blanks that are a fraction the price of audio blanks, and much easier to find in the shops.

Now, courtesy of *Home Cinema Choice* magazine, comes a tip that will be worth its weight in gold discs to anyone wanting to use the low cost recorder instead of a professional unit or PC drive.

Put an expensive hard-to-get consumer blank in the tray of the low cost consumer recorder and let it go through the checks. Then manually pull open the tray and replace the consumer blank with a cheap PC blank. The consumer recorder should now be fooled into using the PC blank.

Euro-trash extravaganza

Passing the Eurovision Song Contest to the British only moved the problem out of Ireland writes **Kevin Hilton**

BLAME ALANIS MORRISETTE. There is a generation growing up that has no idea of the true meaning of the word ironic. From being an expression of meaning by using opposite or different language or a perverse event, it now means something that is a tad unfortunate (to borrow from the comedian Ed Byrne, who also has a theory that the Canadian grunge queen used to be a man—Alan Morris). This shift in the definition of ironic also means that it can be applied to things that were once reviled, but, because they are presented in a knowing way, are now acceptable.

Thus it is okay to be sexist because it is seen as ironically laddish. In the same way the Eurovision Song Contest, while still viewed as an anachronistic kitsch fest that celebrates all that is wrong with the songwriter's art, is now trendy because it can be watched with a sense of irony. Forget about the original intention of the event, to bring the nations of Europe closer together through the power of television, see it as an excuse to get together with friends, drink beer and have a laugh at somebody else's expense. Even Ireland, a country that used to take Eurovision very seriously and paid the price by hosting the thing more times than anywhere else, promoted the show in this fashion.

Granted, nobody has taken the Song Contest seriously for a very long time, but it seems perverse to extol its tackiness over the, admittedly, minor virtues it may still possess. And rather than emphasis the altruism of bringing countries together, partisan feelings are encouraged. During the voting—which, as the BBC's commentator Terry Wogan rightly observed, is the only part of the proceedings worth watching the show for (along with the odd flash of wit Wogan himself may utter along the way)—the audience in Birmingham booed and cat-called every time a country did not give the UK the points they felt it deserved. Which was completely missing the point that nobody wants to win Eurovision more than once in a row.

In the voting, national juries have often been accused of favouritism. Such behaviour further devalues the intention of closer harmony. But it always has. The true irony in all of this is the notion that a competition between nations could possibly bring people together. Did the founders of the World Cup originally think that it would unite countries? The thought probably never occurred to them; the idea is to see which is the best

footballing nation on the planet. The competitive nature of Eurovision is underlined by the recently introduced rule that countries which do not garner a set number of votes are automatically excluded from the next competition. This explains the absence of Italy this year and the future non-appearance of Switzerland (which 'did a Norway' and stuck on zero throughout the night. Already it is becoming like a sporting tournament, with qualifying heats; the nightmare scenario is that it will be stretched out over two weeks, with several rounds building up to a grand final.

A few years ago, a columnist wrote that songwriters of the calibre of Paul McCartney should be encouraged to contribute, thereby raising the standard of the songs and creating a real competition. Regardless of whether Macca either needs or would want to be a part of this, established and experienced artists have never fared well at Eurovision. Take the bafflement of a great tune

like Hothouse Flowers' 'Don't Go' under-achieving in 1988 while Ireland went on to dominate the Contest with a string of entries not even half as good.

Which brings the event down to being about television. The idea is that subsequent host broadcaster has to out-do its predecessor. In that case the mighty BBC failed abjectly to top RTE's 1997 effort.

Whereas the Irish public service broadcaster created a stylish, futuristic set, its UK counterpart came up with something that took a week to build, but still looked like a light entertainment show from the seventies. Hundreds of words could be spent discussing the interval act (a well-intentioned, but lumbering, celebration of Britain's multiculturalism) but I have never been one to go for easy targets.

Irony notwithstanding, the Eurovision Song Contest has no relevance today, either in terms of the music business, television or international relations. The idea of bringing countries together through television and so showing the potential of the medium is still a good one. The solution could be to replace the Contest with an event like the *Our World* show of 1967, which was designed to use communications satellites to showcase artists from around the world. Forget the competition, broaden the remit and produce a show from scratch, rather than relying on a bunch of mediocre songs being entertaining. And above all, don't ever book Ulrika Jonsson to host a live TV programme ever again.

Irony notwithstanding, the Eurovision Song Contest has no relevance today, either in terms of the music business, television or international relations.



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Microphones 3

Microphone operation is based on two dominant mechanisms: electrostatic and electrodynamic. **John Watkinson** looks at the principles involved in both

THE electrodynamic microphone operates on the principle that a conductor moving through a magnetic field will generate a voltage proportional to the rate of change of flux. As the magnetic flux is constant, then this results in an output proportional to the velocity of the conductor. The most common type of constant velocity microphone has a moving coil driven by a diaphragm. In the ribbon microphone the diaphragm itself is the conductor.

The electrostatic microphone works on the variation in capacitance between a moving diaphragm and a fixed plate. As the capacitance varies directly with the spacing the electrostatic microphone is a constant amplitude transducer. There are two forms of electrostatic microphone: the condenser, or capacitor, microphone and the electret microphone. The ribbon and electrostatic microphones have the advantage that there is direct coupling between the sound waveform and the electrical output and so very high quality can be achieved. The moving-coil microphone is considered to be of lower quality but is cheaper and more robust. Microphones can be made using other techniques but none can offer high quality and use is restricted to consumer or communications purposes or where something unbreakable is required.

There are two basic implementations of the electrodynamic microphone; the ribbon and the moving coil. Fig. 1a shows that in the ribbon microphone the diaphragm is a very light metallic foil suspended under light tension between the poles of a powerful magnet. The incident sound causes the diaphragm to move and the velocity of the motion results in an EMF being generated across the ends of the ribbon.

The most common form which the ribbon microphone takes is the fig-of-8 response; although cardioid and pressure variants are possible using the techniques described last

month. The output voltage of the ribbon is very small, but the source impedance of the ribbon is also very low and so it is possible to use a transformer to produce a higher output voltage at a more convenient impedance.

The driving force on a pressure gradient transducer is proportional to frequency, so the resonant frequency of the ribbon is set below the audio band at only a few Hz. In this way the ribbon works in the mass-controlled region where for constant drive force the velocity falls at 6dB/octave. This balances the 6dB/octave rise of the pressure gradient effect to produce a flat response. The very high compliance needed to set the resonance below the audio band means that the ribbon microphone is shock sensitive. If the body of the microphone is moved, the diaphragm will lag behind causing relative motion. Good mounting isolation is required.

The advantage of the ribbon microphone is that the motion of the ribbon is directly converted to an electrical signal. This is potentially very accurate.

However, unless the transformer is of extremely high quality the inherent accuracy will be lost. A further problem is that to obtain reasonable sensitivity the diaphragm must be relatively large giving a low cut-off frequency and leading to directivity problems (*Studio Sound*, April 1998). Traditionally the magnet was also large, leading to a heavy construction. A further problem is that the diaphragm is extremely delicate and a single exposure to wind might destroy it.

ALTHOUGH the ribbon microphone was at one time the best available it has been overshadowed by the capacitor microphone and is little used today. The ribbon principle deserves to be revisited with modern techniques. A smaller diaphragm and a physically smaller rare-earth magnet would push up the cut-off frequency by reducing the path length difference. The low output level could be offset by incorporating a modern low-noise amplifier in an active design.

The most common version of the electrodynamic microphone is the moving coil system shown in Fig. 1b. The diaphragm is connected to a cylindrical former upon which is wound a light coil of wire. The coil operates in the radial flux pattern of a cylindrical magnet. As the output is proportional to velocity, a moving-coil pressure microphone has to work in the resistance controlled domain using a mid-band resonance that is heavily damped. The range is often extended by building in additional damped resonances. A moving-coil pressure gradient microphone would need to operate in mass-control.

As it is possible to wind many turns of wire on the coil, the output of such a microphone is relatively high. The structure is quite robust and can easily withstand wind and handling abuse. However, the indirect conversion, whereby the sound moves the diaphragm >

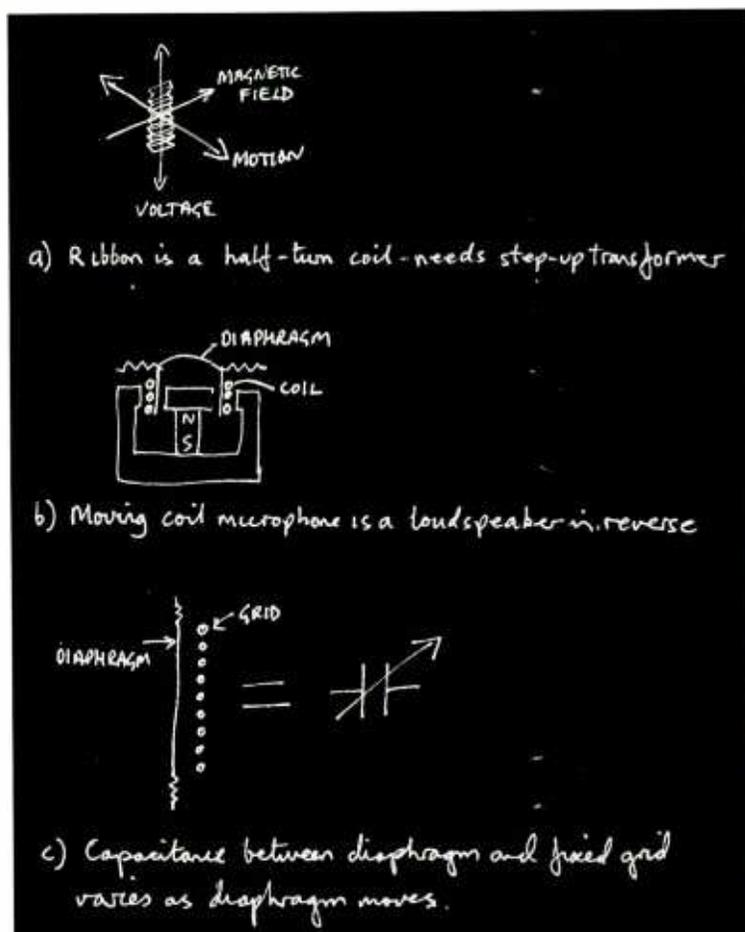


Fig. 1: Microphone mechanisms

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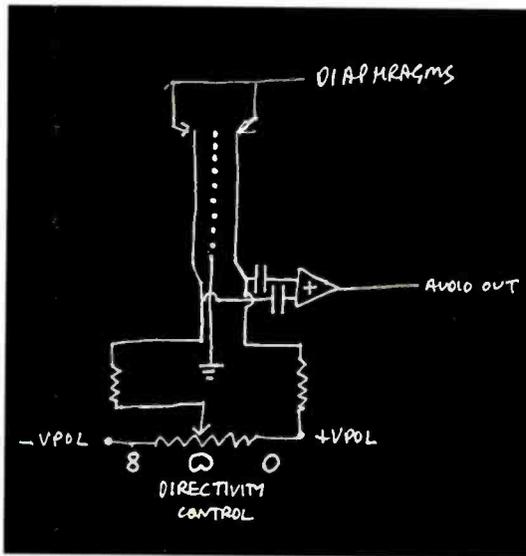


Fig.2: Variable directivity capacitor microphone adds diaphragm signals in or out-of-phase

and the diaphragm moves the coil, gives impaired performance because the coil increases the moving mass and the mechanical coupling between the coil and diaphragm is never ideal. Consequently, the moving-coil microphone, generally in a cardioid response form, finds common application in outdoor use, for speech or for public address, or for being beaten to death inside a drum kit, but is considered inadequate for accurate music work.

In the capacitor (or condenser) microphone the diaphragm is highly insulated from the body of the microphone and is fed with a high polarising voltage via a large resistance. Fig.1c shows that a fixed metallic grid forms a capacitor in conjunction with the diaphragm. The diaphragm is connected to an amplifier having a very high impedance. The high impedances mean that there is essentially a constant charge condition. Consequently when incident sound moves the diaphragm and the capacitance between it and the grid varies, the result will be a change of diaphragm voltage which can be amplified to produce an output. The condenser microphone requires active circuitry close to the capsule and this requires phantom power.

As the condenser mechanism has a constant amplitude characteristic, a pressure or omni condenser microphone needs to use stiffness control to obtain a flat response. The resonant frequency is placed above the audio band. In a PG condenser microphone resistance control has to be used where a well damped mid-band resonant frequency is used.

If the impedance seen by the condenser is not extremely high, charge can leak away when the diaphragm moves. This will result in poor output and phase shift at low frequencies. As the condenser microphone requires high impedances to work properly, it is at a disadvantage in damp conditions which means that in practice it has to be kept

indoors in all but the most favourable weather.

Some condenser microphones contain a heating element which is designed to drive out moisture. In older designs based on vacuum tubes, the heat from the tubes would serve the same purpose. If a capacitor microphone has become damp, it may fail completely or create a great deal of output noise until it has dried out. As an alternative, the capacitance can be measured by making it part of an RF tuned circuit. This has the advantage that it works at low impedance.

In the electret microphone a material is employed that can produce a constant electric field without power. It is the

electrostatic equivalent of a permanent magnet. An electret is a extremely good insulator that has been heated in an intense electric field. A conductor moving in such a field will produce a high impedance output that will usually require to be locally amplified. The electret microphone can be made very light because no magnet is required. This is useful for hand-held and miniature designs.

IN EARLY DESIGNS the diaphragm itself was the polarised element, but this required an excessively heavy diaphragm. Later designs use a conductive diaphragm like that of a capacitor microphone and the polarised element is part of the backplate. These back-polarised designs usually offer a better frequency response. While phantom power can be used, electret microphones are often powered by a small dry cell incorporated into the microphone body.

In variable-directivity condenser microphones the double cardioid principle is often used. The variable mixing of the two signals is achieved by changing the polarity and magnitude of the polarising voltage on one diaphragm such that the diaphragm audio outputs can simply be added. Fig.2 shows that one diaphragm is permanently polarised with a positive voltage, whereas the other can be polarised with a range of voltages from positive, through zero, to negative.

When the polarising voltages are the same, the microphone becomes omni, whereas if they are opposing it becomes an eight. Setting the variable voltage to zero allows the remaining diaphragm to function as a cardioid. A fixed set of patterns may be provided using a switch, or a continuously variable potentiometer may be supplied. While this would appear to be more flexible it has the disadvantage of being less repeatable. It will be clear that this approach cannot be used with the electret microphone which usually has fixed directivity. ■

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The 96kHz debate: 2

When it appeared recently John Watkinson's article *Spotlight on 24–96* met with a deluge of response, both dismissive and supportive, some of which has been published.

Now, **John Watkinson** replies

NEW, HIGH, SAMPLING RATES would require enormous expenditure and upheavals and this can only be justified if there is a clear reason to proceed.' In my article ('Spotlight on 24-96', *Studio Sound*, February 1998) I expressed a few of my reservations on this matter. I have already mentioned in *Studio Sound* the importance of thesis and antithesis leading to synthesis so I welcome any criticism. If I am unable to defend an assertion, I may have been wrong and I can learn by that.

I ought to make clear my position on the question of whether to use 96kHz sampling. I remain completely sceptical and I am neither for or against until I understand the issues fully. As a scientist, I am only interested in the truth and I must necessarily adopt any theory that fully explains a phenomenon and repeatably predicts the results of scientifically performed experiments. If such a theory is ever put forward regarding 96kHz, then I shall accept it warmly.

However, that theory backed by experiment does not exist. All of the arguments I have heard to date for the adoption of 96kHz as a digital audio interchange standard are flawed. Furthermore I suspect that the listening tests carried out by dCS are flawed because they have not proved that there is any other difference than the sampling rate between the two sounds which are auditioned.

My opinion on this matter is irrelevant as I don't have one. Instead, I shall point out here, how, apart from Jean Luc Moncel's letter, all of the arguments carried in the May issue are contrary to well-accepted teaching of psychoacoustics, communications theory and transform theory.

First, the filter responses Mike Story shows in his May article are phase linear, but he is careful to distance these from a real product. Noise-shaping convertors use recursion and so are not inherently phase linear. Phase linear decimation filters require more processing than non-phase linear architectures. In either of these cases a group delay error would be halved by doubling the sampling rate.

When switching from 48kHz to 96kHz, how do we know that listeners don't just detect the improved phase linearity? This would certainly improve the

spatial resolution as Mike has noted, but not for the reasons he suggests. I think it would be a useful step to measure the phase linearity of a dCS convertor at both 48kHz and 96kHz sampling rates to see if it changes.

In his letter (*Studio Sound*, May 1998, pp10), Keith Howard accuses me of misleading readers with 'grand sounding' references to Heisenberg's Uncertainty Principle, suggesting that it only applies to quantum mechanics. Strang and Nguyen's authoritative tome (Wellesley Cambridge Press, ISBN 0-9614088) entitled *Wavelets and Filter Banks* gives the proof of Heisenberg's principle (pp67–68) and shows how it applies equally to frequency-time in electronic waveforms as it does to position and momentum in quantum physics.

Frequency-time resolution is crucial to an understanding of transforms and

transform-like processes such as human hearing. In both, the more accurately something is known in the frequency domain, the less accurately it is known in the time domain and vice versa. I would simply quote David Howard and James Angus in *Acoustics and Psychoacoustics* (Focal Press, ISBN 1-240-51428-9, pp63): 'Ideally one would like a filter which has fast time response and a narrow bandwidth, but this is impossible. However, as we shall see later, the human hearing system is designed to provide a compromise which gives both good frequency and time resolution'.

Oddly, Keith Howard also cautions us not to refer to the Q factor in relation to critical bands, 'since to an engineer it immediately suggests resonance'. That is exactly what I meant it to suggest. See Brian Moore's *An Introduction to the Psychology of Hearing* (Academic Press, ISBN 0-12-505624-9) in which it is stated: 'For many types of filters, and for the response of the basilar membrane, the bandwidth is not constant but increases roughly in proportion to centre frequency. Thus it is sometimes useful to use the relative bandwidth, which is the bandwidth divided by the centre frequency. The reciprocal of the relative bandwidth gives a measure of the sharpness of the tuning, known as Q'. Please also see Fig.4 which shows that resonance. >

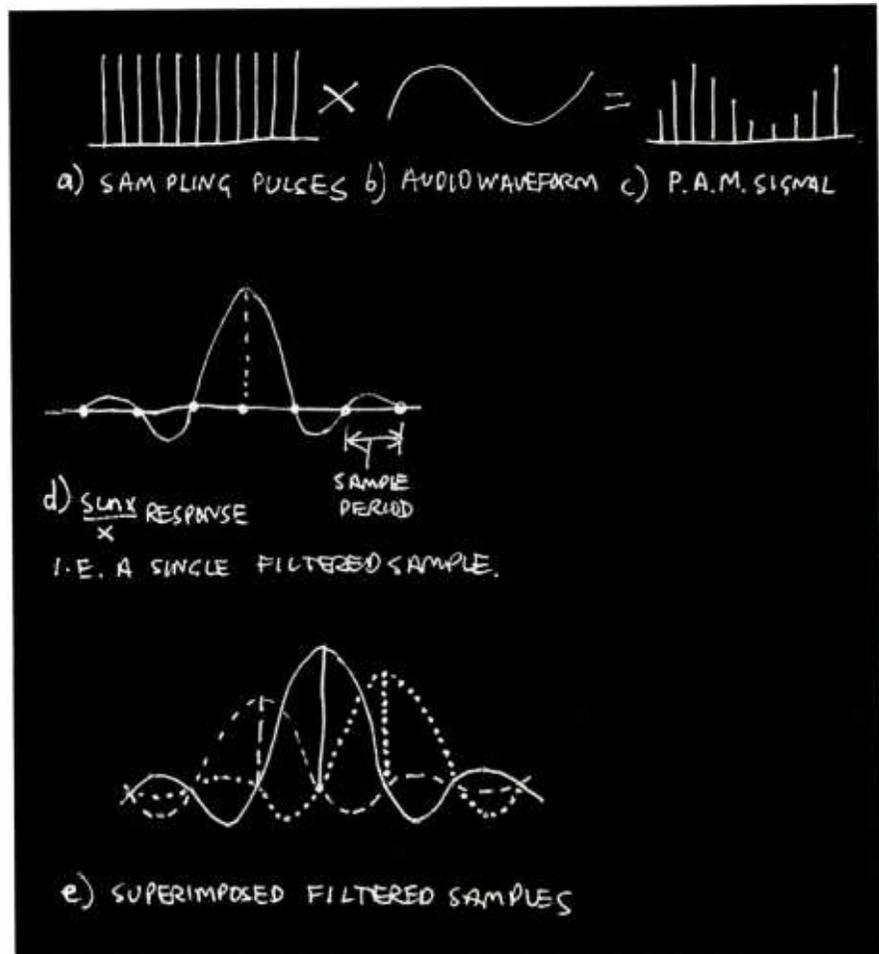


Fig. 1: How sampling works—see text

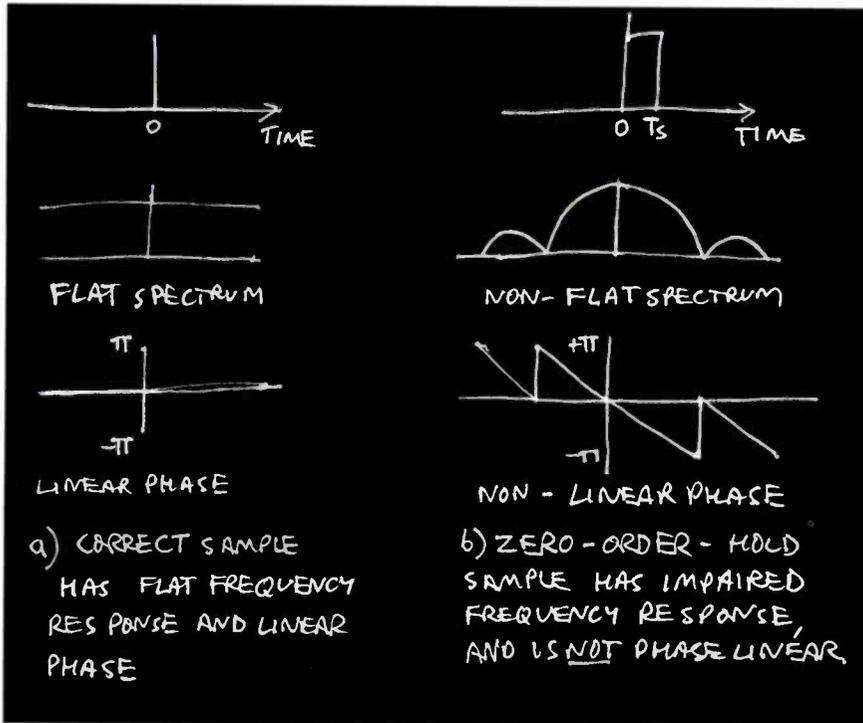


Fig.2: Correct sampling compared with zero order hold (ZOH)

< Jean Luc Moncel's letter is gracious and constructive, and I welcome it. He is right that my arguments only showed that there is no useful pitch information at high frequencies as Zwicker has stated. I stand corrected and I shall need to advance another argument to show that there is no useful information of any kind and I shall do that later in this piece.

Importantly, Jean Luc confirms that 96kHz is used as one way to solve an implementation problem. My suggestion was theoretically based and now we have practical evidence to support it. Perhaps this is the real explanation of the 96kHz debate. As of now it is my favourite contender. If 96kHz is only required for implementation, there is no fundamental need for it and a more rigorous implementation at conventional sampling rates may be all that is needed. There must be more DSP engineers out there with some evidence. Let's hear it folks.

Jean Luc also obviously appreciates the fun element, and to him I dedicate my favourite graffito from a university physics department wall: 'Heisenberg might have been here'.

Paul Griffith queries the heading under which *Studio Sound* published my article. To me the sign of editorial wisdom is the right article at the right time and the heading isn't important. That said, it's unacceptable to suggest that my article represents opinion or bias when everything I have said about the hearing mechanism comes from established works on the subject. I have been scrupulous in naming those references here.

Webster's definition of scientific method is fine, but Paul is wrong to suggest that there is no scientific basis to evolution; he has confused science and

physics. Physics is part of science, but it is perfectly possible to have scientific method outside physics as Paul admits when he refers to physiology.

What I should have said was 'this often reflects in the quality of opinions one hears where the laws of physics and scientific method are temporarily suspended to allow the latest theory to hold water'.

Paul Griffith states that most of the function of the human body is still a mystery to doctors. That may be true but I'm more interested in how much is known about human hearing by researchers: quite a different matter. There is a great body of work and a pretty good model exists. Paul does these researchers a disservice by dismissing that work when he should be reading it. His oxymoronic last sentence brought me a smile: 'I'll even wager that Mr Watkinson can hear the difference—that's my idea of science.'

Scientific tests are designed to avoid bias, but how can I be unbiased when there is a wager on what I will hear? In fact there is no need to wager that I will hear a difference between 44.1kHz and

96kHz, because that is merely an observation. What I want to know is the real reason why the difference is audible. To give an analogy, everyone knows that a boomerang comes back from observation, but I can explain why and give references. That's my idea of science.

Tony Drummond-Murray's article has put me in a difficult position. I cannot allow unfortunate misconception pass, but his delight with my reply may not be total. All I can really do is to state how sampling really works. Sampling is periodic measurement. Digital audio mostly uses pulse amplitude modulation (PAM). Fig.1a shows the sampling pulse train, Fig.1b the band-limited modulating audio and Fig.1c the modulated pulse train. The peaks of the pulses actually lie on the original waveform. In order to return to a continuous signal, a phase-linear low-pass filter is required which rolls off at half the sampling frequency.

Transform theory shows that the impulse response of such a filter is a time-symmetrical sinc/x curve Fig.1d that goes through zero volts at uniformly spaced intervals equal to the sample period, in other words it 'rings'. Fig.1e shows the result of superimposing the sinc/x impulses. The impulse due to a given sample goes to zero at the location of all the other samples, so the output waveform must join up the tops of the samples. In between samples the waveform is obtained by summing the contribution of all of the impulses and is identical to the band limited input waveform.

For a more detailed explanation, see my book *The Art of Sound Reproduction* (Focal Press ISBN 1-240-51512-9, pp224-232), or for a mathematical proof see John Betts' book *Signal Processing, Modulation and Noise* (Hodder & Stoughton).

Tony has inadvertently replaced precise or Shannon sampling with a sample-and-hold process; although to be fair to him this erroneous explanation has been published elsewhere (Blyton, E. *Big Ears builds a DAC*) without making the distinction and he may have taken it in good faith. I make the distinction at some length in my own books, as does Boaz Porat in his

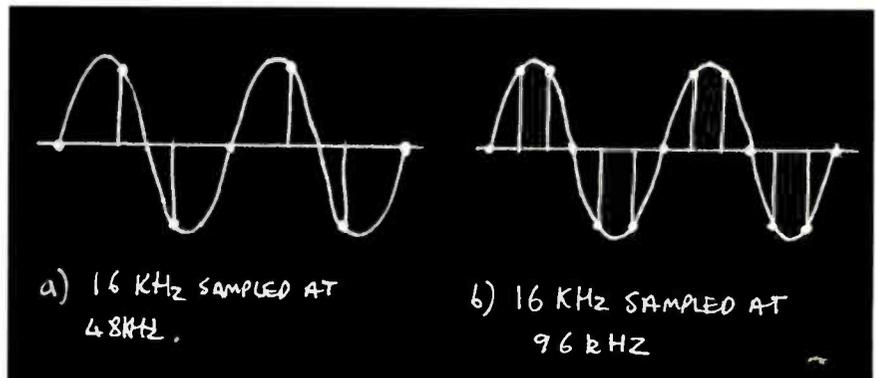


Fig.3: 48kHz is enough in a correctly implemented system

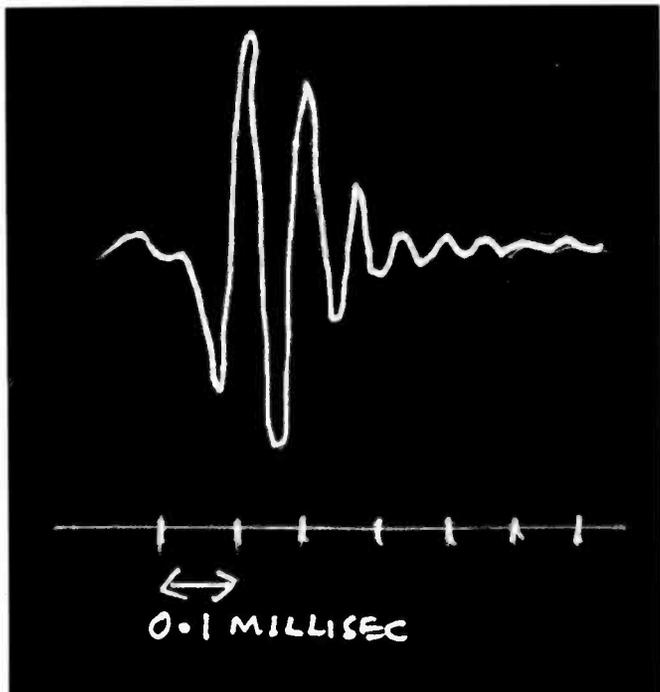


Fig.4: Physical ringing at a point on the basilar membrane

A Course in Digital Signal Processing (Wiley, ISBN 0-471-14961-6, pp59-62).

Fig.2a shows an instantaneous sample with its transform which is a uniform spectrum. Fig.2b shows a zero-order-hold (ZOH) waveform which is shown in all of Tony's figures. The transform of the sample-period pulse is a sinc/x spectrum showing a

serious roll-off of high frequencies and an equally serious departure from phase linearity which is absent or negligible in correct sampling.

Given the serious deficiencies of the method Tony describes, we would expect it to improve as the sampling rate is raised. Tony has simply confirmed that oversampling works. I do not know what D-A was responsible for these waveforms, but I would not let it near an audio waveform. It would be okay for testing torch batteries.

Fig.3a shows a correct sampling process at 48kHz with a 16kHz sine wave reconstructed from it by linear phase filtering. Fig.3b shows the same sine wave reconstructed from 96kHz. Can anyone see the difference? Allowing for filter slopes is one thing, but if a system needs a sampling rate nearly two-and-a-half times what Shannon

suggests to work properly, there is something wrong.

Tony's comments on early broadcast video recorders caused me a twinge of nostalgia as I used to be the training manager at Ampex and I taught those machines to component level. However, there is no paradox to their operation as he claims; it's all in good text books and was taught routinely. I would suggest Joseph Robinson's *Videotape Recording* (Focal Press ISBN 0-240-50791-6), now unfortunately out of print because everything has gone digital. Tony's explanation of the phenomenon is incorrect as it has nothing to do with any second harmonic. Furthermore analogue VTRs use frequency modulation whereas digital audio uses pulse amplitude modulation and regrettably Tony's analogy is invalid.

In his piece entitled 'The High Life' Mike Story makes some statements with which I agree, but also many which cannot go unchallenged. Mike has it right when he says that it seems unlikely that we have all suddenly developed ultrasonic hearing. He further states 'it seems that frequency response flat to 20kHz to 1dB or so is important'. Hooray to that.

Beyond that the problems begin. The first problem is when it is claimed that 'the bulk of the work on explaining how we hear has been concerned with frequency response'. This is not true >



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as will be seen from reading Moore or Howard and Angus or elsewhere. It is impossible to explain direction sensing or stereo reproduction in the frequency domain. I would instead say that the time and frequency characteristics of human hearing are equally well documented, but the audio industry retains an inexplicable fixation with frequency response and often neglects time response.

The second problem is the claim that 'phase is a mathematicians plaything that is not a natural in explaining real physical effects'. The Chinook helicopter that just went over only avoids destroying itself because the phase of the overlapping front rotor is always 60° out from the rear. My CD player works because the phases of the wavefront from the full aperture of the objective lens interfere to produce an intensity function or light spot on the disc. My phased-array electrostatic speakers radiate like spheres even though the panels are flat. Come off it Mike.

The third problem is the claim that ringing is due to the Gibbs effect. This is totally wrong. The Gibbs effect occurs when the infinite-duration impulse response of an ideal filter is truncated by a rectangular window in a real filter. The result is ripples in the frequency response in both passband and stopband. Josiah Gibbs was the first to offer a mathematical explanation. The Gibbs

effect is minimised in real filters using non-rectangular window functions. This is made clear in Peter Kraniuskas' book *Transforms in Signals and Systems* (Addison Wesley, ISBN 0-201-19694-8, pp419), or in Porat (pp291-293).

The fourth problem is the concentration on ringing. My Fig.1d shows a reconstruction filter ringing. The crucial point here is that were it not for the 'ringing' it would not be possible to recreate the continuous waveform. It is the summation of the 'rings' which produces the parts of the waveform between the sample points. Consequently sampling in general and digital audio in particular are totally dependent on controlled ringing and to regard ringing as a universal evil is quite inappropriate when it is an old friend.

Life is full of bandwidth limited processes which ring, but provided the ringing is beyond human perception there isn't a problem. Try dialling a new flight level into the autopilot of a Boeing 747—300 tons of airliner is not going to change altitude like a logic level. Instead the autopilot is low-pass filtered so it interprets the command as a gradual change. Yes, and it rings as it settles at the new flight level. You can't feel it; you have to look at the altimeter.

The real issue in audio is that of time smearing or dispersion rather than ringing. All low-pass filters, including our ears, cause time smearing whether they ring or not. Gaussian filters do not ring, but they cause enormous time smear. Time smear is a direct consequence of bandwidth limitation (Heisenberg again) and so our bandwidth limited hearing must also suffer smearing. If the smearing of our ears (which can be measured) is more than the smearing of the audio system, we are okay.

Fig.4 shows the ringing response of an ear to an impulse. The response would not be any different whether the stimulus was an impulse from a 48kHz system or a 96kHz system because the energy dispersion of the ear exceeds that of both signals; although it could be marginal at 44.1kHz. Filter ringing is masked by the ring-

ing of our hearing. Mike's claim that energy above 20kHz is mathematically necessary to localise energy in signals below 20kHz violates transform theory.

Sufficient practical measurement of the time and frequency behaviour of human hearing exists to model its transform-filtering behaviour quite well. As far as I can see it is inconceivable that the dynamics of the hearing mechanism can be more agile than an audio waveform of 20kHz bandwidth sampled at 48kHz. With a 4kHz transition band, the filter ringing can't be heard.

It is not only phase, but also time which conveys the spatial attributes of sound. Our spaced ears locate sound objects by the different time of arrival of transients to a measured accuracy of about 6 microseconds under the best conditions with a broad-band transient (Moore). A broad-band transient excites the whole length of the basilar membrane allowing a process of correlation to average out the inherent jitter of individual nerve firings. This means that energy dispersion at the edge of the band represents only a few percent of the information used by the hearing process.

Fig.5a shows a transient that is at -24dBFS in a 16-bit system at 44.1kHz, a level that is often found on real recordings. This exercises 4096 different quantising intervals. At Fig.5b is shown the same transient displaced by 6 microseconds, the limit of inter-aural delay resolution. I need to change the value of the samples carrying the transient by the amounts shown. These are huge numerical changes of 128, 384 and 256 quantising intervals, so I think it is clear that CD has enough time resolution to exceed the localisation ability of human hearing. I think it is also clear that a sampled system can locate a transient much more finely than the sampling period.

Incidentally, what happens when the program material contains no energy at the band edge? According to Mike's theory, localisation would be impaired, but in practice it isn't. I have plenty of CDs where the stereo image is razor sharp even though no very high frequencies are present due to the nature of the source material.

When Mike states that improving filters is academic because of energy dispersion in today's loudspeakers and microphones, he helps me make my point. Mike would do well to measure the time response of some loudspeakers. Perhaps when he puts a low dispersion signal in series with a high dispersion speaker, the combination has less dispersion than the same speaker with a conventionally sampled signal. The simple solution would seem to be to improve the speaker. On state-of-the-art loudspeakers there is no lack of imaging. Perhaps these will not show such a dramatic improvement on high sampling rate material. ■

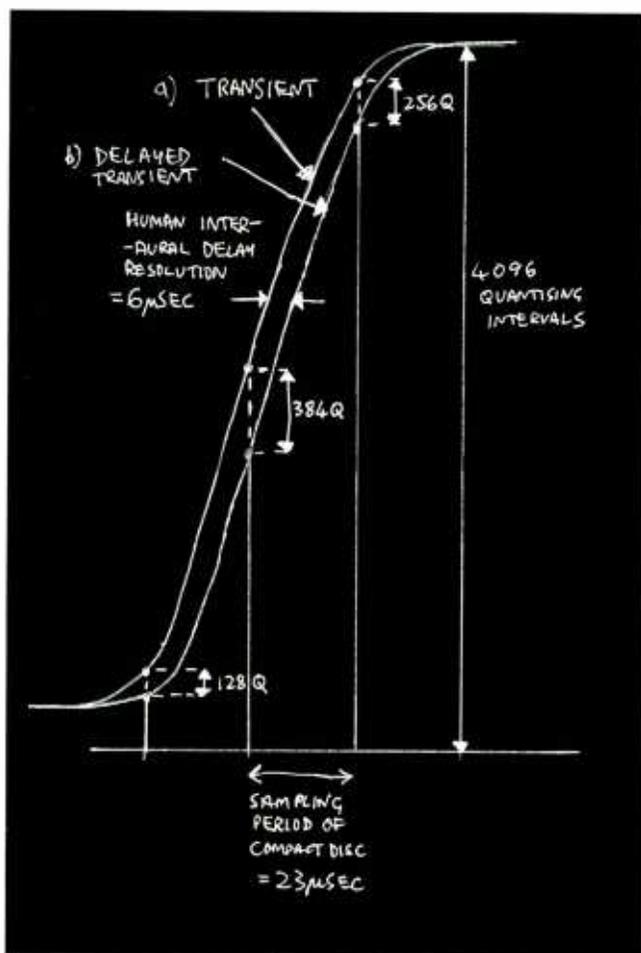


Fig.5: Time resolution of CD

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Escalating confusion

The conflicts between objective artistic goals and profitable marketing strategies constantly threaten the professional studio. **Philip Newell** relates tales of woe

AFTER COMPLETING WORK on a recording studio, I spent a couple of days assessing the monitoring prior to the installation of the bulk of the recording equipment. For this I use a collection of about a dozen CDs. All are well performed, well balanced, well recorded, and cover a range of musical styles and instrumentation. I listened with people whose ears and opinions I trust, and we adjudged the monitor system to be performing optimally.

The studio owner had employed people from a local musical equipment shop to do the wiring, and they had been impressed by what they had heard during some of the tests. The owner, himself, was satisfied. A couple of days later, when none of the design or construction team were around, one of the wiremen took in his favourite ZZ Top album, then pronounced to the studio owner, and to all others around, that the monitors were aggressive sounding. The studio owner agreed. The market place can lead this industry on some very strange paths. This one is not new.

About ten years ago, I installed a monitor system ahead of schedule, and the only CD in the building was by Jesus and Mary Chain... We spent the rest of the day trying to find out what was wrong. Only when somebody turned up with an Elton John CD did we realise that even played at 70dB, the J&MC CD could take your ears off at 50m.

My first recollection of escalating nonsense in this industry (back when God was in short trousers) was the battle for how much level you could cut on a 45rpm vinyl single. The argument went that the louder it sounded on the radio, the more records would be sold. Well, what you could cut on to a vinyl disc had little bearing on what could be clearly reproduced by the pick-up, so gross playback distortion was often accepted as a price to be paid for more level, and (supposedly) more sales. The recent equivalent seems to be that nobody wants their recording to sound any less bright than whatever is currently selling well, so the harshness of many recordings has ratcheted upwards. The latest phase in this rat-race is sonic maximisation which

all but ensures that the meters never fall more than 1dB below peak, except (perhaps) during the fade. I have even come across people using this on classical music. Surely if Beethoven had wanted a section to be forte, he would not have written pianissimo on the score.

Where all this will end, I have no idea, but I doubt that it will lead to better recordings. Unfortunately, marketing forces being what they are, there seems to be a growing number of small monitor loudspeakers that are compensating for these escalations, and on which some of the aberrations sound good. I have noted recently that some excellent monitoring systems are judged to be nasal after listening to some of the newer systems. That these new systems can be used as a part of a music production process is fair enough, but to use them as a general reference is folly in the extreme. Our ears readily adapt to differing response curves, and soon perceive that response to be normal. However, upon switching directly to a more objectively neutral system, that system can be deemed to be 'wrong', at least by inexperienced ears, and if a currently popular CD sounds 'great' on the less objectively accurate system, the system that actually is

more accurate may be rejected as 'unnatural', when, in fact, the reverse is more likely to be true.

In my own opinion, some of the most 'accurate' close-field systems currently around are the ATC SCM20s, and the Genelec 1030As; if switching to these systems, after a few minutes listening to another system, causes them to sound as though they have an undesirable frequency balance, then I strongly suspect the system under test as having been designed to follow fashion rather than convention. Other peoples' opinions may differ.

Finding the definitively neutral musical signal source is not an easy task. This is the reason why most designers use a dozen or so, known CDs of reputable pedigree for reference purposes. I had hoped that by now we would have been seeing greater convergence in the responses of small monitors, but it seems that we are not. There are some solid, technical and psychoacoustic reasons why some variability should remain, but I fear that, as in so many other cases, commercial interests seek the advantages of diversity for less respectable reasons.

This is borne out by the fact that there probably has been a greater convergence in the performance of large professional monitor systems. These have two advantages that help them to converge. Firstly, they do not have to take into account variables in the listening rooms: most are installed in well-designed control rooms.

Secondly, they tend to be used by more experienced people. In addition, there is no mass market for these things, so they are less attractive as big profit makers, and thus do not attract the same marketing attention as their smaller relations. The blur between the small professional monitor market and the home studio monitor market has made the convergence of small professional monitors a much more difficult task to realise—and manufacturers who want to penetrate the consumer recording market sometimes use the 'professional' tag to gain credibility. The current situation on small, studio monitors is somewhat unclear, even to experienced professionals—the escalator syndrome at work again. ■

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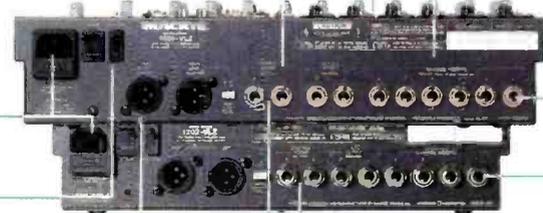


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