

February 1999

\$10.95 USD

Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE
FOR RECORDING, POSTPRODUCTION AND BROADCAST



EXCLUSIVES

Dolby DP569

Millennia Media NSEQ-2

GLM Dynamics DB500s

Innova Son Sentury

Creamware Pulsar

Audient ASP8024

Marantz CDR640

ME&K MPS-150

MBHO mics

Røde NTV



PRINCE OF EGYPT

Audio alternatives in epic animation



The
**LAMONT
DOZIER**
Interview

DIGITAL TV AND RADIO DEVELOPMENTS

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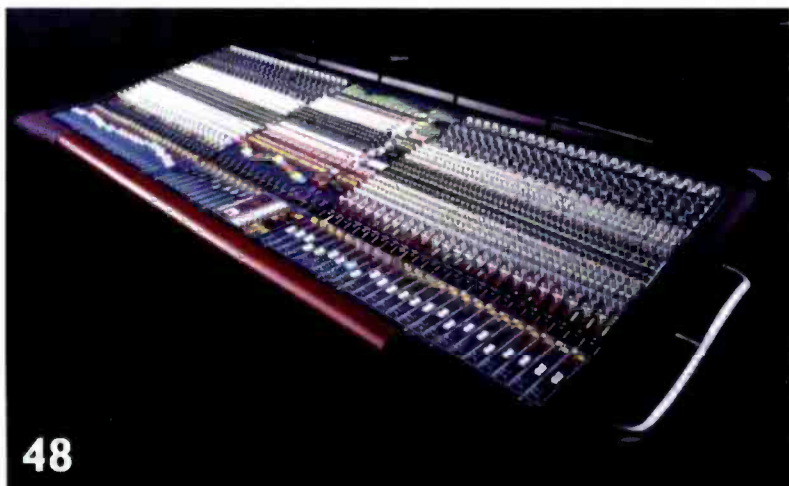
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SSAIRAs
Nominate the equipment of your choice for inclusion in *Studio Sound's* 1999 Audio Industry Recognition Awards. See page 11.

www.prostudio.com/studiosound

Around the bend

IT WAS THE EXCELLENT REPRODUCTION of a drawbar organ that caught my attention and caused me to sit down at the demo. I aim to sit-in on as many products demos as I can at NAMM as I always learn something, and it gives me feel for where MI orientated technology is going. Taking in demos also gives an invaluable snapshot of the prowess of the current generation of demo stars.

I do not know whether it tells me more about the skill of the presenters, or the gullibility of the audiences, but I witnessed several heads nodding in agreement with the suggestion that in the absence of a guitar with a suitable MIDI pickup, entering notes via mouse from an on-screen representation of a guitar neck was 'a really cool idea' in 1999. Elsewhere the audience seemed mesmerised and outwardly oblivious to the fact that the presenter, with biblical mastery, managed to distract and continue talking while he performed a shallow reboot as the result of a 'mildish' system hang. However, the real star of the drawbar demo kicked in with a new keyboard that was able to play long loops which could be assembled, layered and squeezed in to time seamlessly. The keyboard had a high degree of inbuilt 'intelligence' that would even allow it to choose at random seemingly incompatible bass, drum and keyboard chord loops and to force them together in a random manner for what, the demonstrator assured us, was excellent 'for generating ideas and grooves as starting off points.' The audience clearly agreed.

At a different stand I heard how a new radical introduction would 'forever change the way in which music was made' by allowing audio to be piped around a closed group of users who were free to add sections, interact with it or mix it.

So what do I have a problem with? Simply the observation that the mechanics of sound production, the controlling of a keyboard that makes decisions for you and the adjustment of relative levels of sources now seems to be accepted as being part of the music making process. Making music, in the industrial sense, it most certainly is, but is this the same as creating music? Is there anything unsatisfying about creating music in the more established ways? Do we need new ways to make music any more than we need new ways to brush our teeth? They are rudimentary functions. Judging by the number of nodding heads, musicians are buying into this new dream. You have to ask where it all leads and where it will end.

Zenon Schoepe, executive editor

Alternative reading

SLEEP. YOU ARE DEEPLY ASLEEP. You are travelling back in time. Back, to your childhood, to your birth. Back, through previous lives to an earlier civilisation. At the dawn of communication you do a lot of talking. You talk about the weather, about food, about territory, about health. But significantly, the word 'record' is not in your vocabulary.

Correspondingly, the only means you have of keeping track of anything is by memory. You find rhyme an invaluable tool in managing your life—'red sky at night, shepherd's delight...', 'a stitch in time saves nine'. News comes with travelling news bodies bringing word of events in distant places. Again, it is in rhyme, enabling incredible feats of memory.

Move forward in time to the appearance of the word 'record'. The monks have mastered the art of writing and have amassed vast libraries of books covering everything from their own daily duties to the latest lines in philosophy. Reading and writing are enviable skills, giving their masters new opportunities. Your accountant, for example, keeps a record of your business, and an auditor comes around periodically to read it to you so that you can be sure you are still in the black ink. Your memory fades as ink soaks into paper.

Forward again to the news of a great invention from Germany. The mercurial schemer Johann Gutenberg is ringing profound social changes with an incredible piece of technology. But wait, it is not a printing press, it is a sound recording machine. The potential of the written word, it seems, is being eclipsed by that of the spoken. The word is that sound recorders will soon be commonplace, enabling every aspect of business, culture and art in ways never before imaginable. The discovery of electricity brings new horizons to recording and it becomes the backbone of world society. The term memory assumes new significance as machines are developed to carry pictures as well as words.

Forward one more time. News on the wire is of an incredible demand for the written word. Although it has been technically possible for ages, it took an enterprising American to recognise the commercial potential of a medium with no dependence on electricity, replay equipment, or compatible recording formats, and to invest in paper. Words, it seems, can be cheaply propagated and have incredible applications in news, in noisy environments, and even on the emergent AV Internet. Pundits are confident that the future of sound and video is secure, but the world reads on with nervous exhilaration.

Tim Goodyer, editor

Studio Sound

Incorporating Broadcast Engineering
January 1999, Vol 41, No 1, ISSN 0144 5944

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+39 02 2622 4956

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+65 (0)438 2272

February

23-25

Internet Service Provision 99

RAI Centre, Amsterdam, Netherlands.

Contact: The Conference desk.
Tel: +44 171 404 7722
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Email: confdesk@firstconf.com
Net: www.firstconf.com/isp99

25-27

33rd SMPTE Advanced Motion Imaging Conference

Omni Rosen Hotel, Orlando, Florida, USA.

Contact: Linda Alexander.
Tel: +1 914 761 1100.
Net: www.smpte.org

March

3-7

MusikMesse Prolight & Sound

Frankfurt, Germany Contact: Messe Frankfurt.

Tel: +49 69 7575 6130
Fax: +49 69 7575 6613
Net: www.messefrankfurt.de

6-9

Middle East Broadcast 99

Bahrain International Exhibition Centre

Contact: Overseas Exhibition Services.
Tel: +44 171 862 2043.
Fax: +44 171 862 2049.
Email: idroberts@montnet.com

April

10-12

16th International AES Conference 'Spacial Sound Reproduction'

Arktikum, Rovaniemi, Finland.

Contact: Juha Backman, Nokia.
Tel: +358 10505 9140.
Email: aes16@acoustics.hut.fi
Net: www.aes.org

13-15

PLASA Light and Sound Shanghai

Intex Shanghai, 88

Loushanguan Road, Shanghai, China.

Contact: Marcus Bernie, P&O Events.
Tel: +44 171 370 8231.
Fax: +44 171 370 8143.

17-22

NAB 99

Las Vegas, Nevada, USA.

Tel: +1 202 429 4149.
Net: www.nab.org/conventions

21-22

ABTT's 21st Trade Show

Royal Horticultural Halls, London SW1.

Contact: Association of British Theatre Technicians,
47 Bermondsey Street, London SE1 3XT.
Tel: +44 171 403 3778.
Email: office@avtt.org.uk

May

8-11

106th AES Convention

MOC Centre, Munich, Germany

Contact: Martin Woehr, Bayerischer Rundfunk Studioproduktion.
Tel: +49 89 59002434.
Email: 106th-chairman@aes.org
Net: www.aes.org

10-15

21st Montreux International Television Symposium and Technical Exhibition

Montreux, Switzerland.

Contact: Patricia Savioz.
Tel: +41 21 963 32 20.
Net: www.montreux.ch/symposia

17-19

Cable & Satellite Mediast 99

Earls Court 2, London, UK.

Contact: Reed Exhibitions.
Tel: +44 181 910 7717.
Net: www.cabsat.co.uk

24-25

DVD Production Europe 99

The Conference Forum.

London, UK.

Contact: CCW.
UK Freephone:
+0800 917 3596
Tel: +44 1306 501 530.
Fax: +44 1306 500 9600.

25-30

Expo Light & Sound 99

Romexpo Exhibitions Centre, Bucharest, Romania.

Contact: Romexpo.
Tel: +40 1 222 43 56.
Email: romexpo@ccir.ro
Net: www.ccir.ro/romexpo

June

1-3

Showtech 99

Berlin, Germany.

Contact: OTSA.
Tel: +44 171 886 3106.
Fax: +44 171 886 3101.

10-15

Montreux International Television Symposium and Exhibition

Montreux, Switzerland.

Contact: WHD PR.
Tel: +44 171 799 3100.
Email: news@whdpr.com
Net: www.montreux.ch/symposia

July

8-10

11th PALA 99

Singapore International Convention and Exhibition Centre (SICEC).

Contact: Ann Tan, IIR Exhibitors.
Tel: +65 227 0688.
Email: ann@iirx.com.sg

26-28

Conference: Advanced A-D and D-A Conversion Techniques and their Applications

University of Strathclyde, Glasgow, UK.

Contact: ADDA99 Secretariat.
Tel: +44 171 344 5472.
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Miller Freeman
A United News & Media publication

ABC
AUDIT BUREAU OF CIRCULATIONS
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www.americanradiohistory.com

Pirates sunk

World: The recently set up Copyright Control Services is claiming that some 80% of main pro-audio software manufacturers have lent support to the body's anti-piracy initiative. The first three months of CCS' campaign to stem the increasing amount of software piracy has focused on infringements taking place on the Internet. As a result, 300 sites offering unlicensed and 'cracked' versions of CCS member's audio software have been closed. Focusrite MD and CCS member Phil Dudderidge, comments, 'Focusrite is very pleased to support CCS' activities, policing the Internet for

pirate software and taking steps to identify and prosecute individuals who, for mischief or profit, distribute unauthorised copies of software developed by CCS members. Many music and audio software developers are small companies or individuals who invest their time and ingenuity in the development of solutions for the creative artist who themselves produce work that is protected by the laws of copyright. I don't know any musicians who would not be upset to have their work pirated or illegally distributed.' Copyright Control Services. Tel: +44-181-977-1001. Net: www.CopyrightControl.com



▲ **UK:** Making a considerable impact upon its release, Mark Herman's *Little Voice* saw London's Angel Recording Studios busy late last year. Starring Ewan McGregor, Michael Caine and Jane Horrocks (pictured), the Buena Vista feature is based on a West End play and boasts a score by John Altman produced by music supervisor Bob Last and engineered by Steve Price to 24-track analogue with Dolby SR, mixed to Tascam DA-88 for surround. The recording used a variety of acoustic instruments including accordion, harp and cello, and took place in Studios 1 and 3. Angel Studios. Tel: +44 171 354 2525.



Dolby SR and numerous Alesis ADAT XT MDMs. The facility was designed by Russ Berger (pictured third from left with Stir's Andy Schmidt, 4SMP owner Steve Richards Mahoney, 4SMP's Debbie Ross, and Stir's Brad Booker) and further offers vintage outboard such as Pultec EQs, Urei 'Blackface' 1176s Teletronix LA2As, Telefunken V-78 mic preamps and Neve 1073 console modules. Mics include Neumann KM852a, AKG C24 stereo, Neumann-Telefunken U-47 and RCA and Coles ribbons. Four Seasons Media Productions. Tel: +1 314 423 4767.

◀ **US:** St Louis' new Four Seasons recording studio has opened with a 48-input API Legacy analogue console at the heart of its main room, Control One. The desk is equipped with 40 channels of AudioMate automation, and partners 4SMP's Pro Tools 24, Studer A820-



▲ **US:** The staff of New York's Superdupe Recording (Henri Perotti, Mitch Rayboy, Glenn Navia, Bill Smith and Gary Arnold) sought alternative uses for their Fairlight MediaLink network before putting it to its intended use of linking the facility's six MFX3 Plus and lone Fame systems. Accompanying the network were four of the workstations bringing the post house onto single-platform working.

► **Germany:** Previously the state-run DEFA studio complex in Babelsberg, Park Studios post-production operation is the result of complete refurbishment by the Cologne-based Video Company. Part of Germany's 'Hollywood', the new-look studio is centred on a 24-fader Fame workstation and has a new management team intent on capitalising on the collapse of former East German state-run facilities after a period of neglect and lack of investment.



On a roll

UK: M4 Outside Broadcast has been bought out by Middlesex-based Roll to Record, adding two scanners to the RTR fleet. Now known as Unit 4 and Unit 5, these offer 10-camera and 14-camera operation respectively. The acquisition also sees M4 MD Peris Edwards joining RTR as marketing director. RTR. Tel: +44 181 813 5622.

Radio report

UK: A study of the state of British radio broadcasting has been published by Plimsoll. Entitled *The Plimsoll Portfolio Analysis—Radio*, the report details such issues as market and company growth, industry profitability, and salary trends. The report is available to readers at 5% discount if they mention *Studio Sound* when ordering. Plimsoll Publishing. Tel: +44 1642 257800.



◀ **France:** A recent series of recordings at the Lerab Ling Tibetan Retreat Centre as part of the Rigpa Foundation's Sacred Music project made extensive use of AKG mics. Voices, cymbals, traditional wind instruments (such as the rolmo, kaaling and jaaling) and conch shells were captured with four C3000 condensers while a large drum enjoyed the attentions of a DI 12. Over 40 hours of music from Tibetan ceremonies resulted from the sessions and is being edited for imminent CD release. Rigpa.music@btinternet.com

Secure digital distribution

World: Launched at the recent Cannes Midem event, Mode is claimed to be the first pan-European digital distribution system for music. Marketed by an eponymous Scottish company, Mode (Music On DEMand) has been developed in conjunction with companies including Lucent Technologies, and is reckoned to be a secure means of selling and distributing audio including such facilities as by-territory licensing. Its operation includes the ability to receive, encode and encrypt audio, securely store the resultant data, deliver audio to purchasers complete with copyright support, monitor usage and collect royalties, and derive market statistics.

Mode. Tel: +44 1349 865000. Lucent Technologies. Tel: +1 908 582 7571.

In another move to support copyright, media manufacturer Iomega has announced its support for the recording industry's RIAA-led Secure Digital Music Initiative. A voluntary initiative, SDMI is an open specification system intended to allow downloading of music from the Internet while protecting the copyright of the artist. Iomega's support comes as a consequence of a commissioned study conducted by US research company Yankelovich Partners into Net users' interests and needs regarding its Record Play secure distribution technology. Iomega. Tel: +353 1 4105 135. Net: www.iomega-europe.com.



▲ **UK:** Grand Central Studios has completed the rebuild of Studio One at its Foubert's Place HQ while TSI has opened new premises in Grape Street to complement those in Shaftesbury Avenue. Both projects are the work of studio design company White Mark. Following its opening some four years ago Grand Central has undergone a major reconfiguration to serve the growing demands of surround-sound working. The new control room allows 'full involvement of the clients in the creative process whilst placing the engineer in an optimised environment'. The room accommodates all standards of surround mixing and voice-over recording, and maintains eye contact between the recording engineer, the producer, the clients and the artists. A motorised loudspeaker system allows the centre front monitor to be lowered into place for surround mixing while remaining out of the critical centre section of the control room window during voice work in the booth. Meanwhile, the latest diffuse surround field creation techniques give the room the acoustic dimensions required to correctly simulate the cinema monitoring environment. The monitor system is controlled from a touch screen and can be optimised for monitor position within the room and for all current stereo and surround formats through a total of five (of the Grand Central's 16) BSS FDS-355 Omnidrive digital crossovers. Meanwhile, TSI's new rooms use Fairlight editing and mix systems and offer comprehensive voice-over and surround mixing facilities. Based on Genelec monitors, the suites both offer voice-over booths and share a common machine room with the Smoke Suite, an Edit Box equipped video postproduction room also built by White Mark. Net: www.whitemark.co.uk.

Studio Sound February 1999

■ Norwegian broadcaster NRK has installed a 64-channel 24-fader Soundtracs Virtua digital console at its Oslo Radio Broadcasting Complex. The desk will be used for music multitracking and to provide a 'front end' for a SA&V Octavia system when used for dubbing, as well as running with Tascam DA-88 MDM machines.

PSS, Norway. Tel: +47 33 035320. Soundtracs, UK. Tel: +44 181 388 5000.

■ Allentown, Pennsylvania, home to New Century Productions is also home to a new Calrec Q2 dual in-line analogue console. The 60-channel Q2 is the centrepiece of a new 53-foot TV OB vehicle, christened NCP III.

NCP, US. Tel: +1 610 797 4530. Calrec, UK. Tel: +44 1422 842159.

■ Ireland's CEL-Studios has installed the territory's first Fairlight Fame and a Softimage DS digital video editing system as part of its studio renovation. Also the first Irish facility to install and use ISDN. CEL is a subsidiary of national broadcaster RTE, handling diverse duties including TV, post, radio commercial creation and DVD authoring through the twinned CEL-Sound and CEL-Vision facilities. Ulster TV in Belfast, meanwhile, has installed a Telex RTS ADAM digital intercom system in the new master control room that accompanies two new studios and assorted edit and production areas. The 104 x 104 matrix system will serve the whole facility including remote links to OB trucks is part of the facility's move towards total digital operation.

CEL-Sound, Ireland. Tel: +353 1 208 2165.

Ulster TV, N Ireland. Tel: +44 1232 328122.

Fairlight, Europe. Tel: +44 171 267 3323.

Telex, UK. Tel: +44 1908 233916.

■ Canada's National Film Board has completed the refurbishment of its Theatre 3 with the installation of a 2-operator 128-input SSL Avant digital film console. Founded in 1939 by legendary documentary maker John Grierson and possessing three sound theatres, the facility boasts over 3000 international awards including nine Oscars and continues to produce documentaries, animation and feature films. The Avant will work with 16mm and 35mm film formats producing English and French language versions of projects in Dolby Digital. Dolby SR and Imax.

NFB, Canada. Tel: +1 514 283 9000. SSL, US. Tel: +1 212 315 1111 and +1 213 463 4444.

■ London post house The Frame has taken delivery of a Tascam MMR-8 HR recorder for recording post sync dialogue. The machine is set up to run in WaveFrame native file format. Meanwhile, London's SH Productions has upgraded its DAR Sabre Plus to 16 channels incorporating Genesis software and the CDAdvance CD access system. Early work for the new setup included posting the first UK production of a complete package of Radio One jingles.

The Frame, UK. Tel: +44 171 734 8617. SH Productions, UK. Tel: +44 7000 705432.

Tascam, UK. Tel: +44 1923 819630. DAR, UK. Tel: +44 1372 742848.

■ German music studios have been particularly active with Syndicate Musikproduktion. Unno Production and Volker Lindner, Tommaso de Donatis, Turbo Beat and Bros Music all installing Amek Rembrandt analogue consoles. Media House Studios has installed a 56-input Amek Galileo. Big U Music has opted for an 80-input D&R Merlir along with Dynaudio Acoustic M3 monitors, Studer A80 Mk.II and Tascam DA-88 recorders, and outboard including Amek 9098 mic amps and EQs. Eventide, dbx, Lexicon and Tube-Tech units. Meanwhile, TV production in Studios 5 and 6 at SWR's Baden-Baden facility has been improved with the installation of a 144-channel 48-fader Lawo MC82 digital console.

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

D&R, The Netherlands. Tel: +31 294 41 8014.

Lawo, Germany. Tel: +49 7222 10020.

■ Top Polish commercial radio stations, Radio RMF-FM and Radio ZET, have placed large orders for Orban 8218 digital stereo encoders. Fifty 8218s have gone to the country's largest radio network, Radio RMF-FM, which uses 70 FM transmitters to deliver popular music and information from its Krakow studios. Radio Zet has taken a further 60 8218s and uses a satellite uplink to deliver a competing pop format to Polish listeners.

Radio RMF-FM, Poland. Tel: +48 12 426 2625.

Radio ZET, Poland. Tel: +48 22 695 5846.

Orban, UK. Tel: +44 171 799 3100.

■ Hire companies based in the UK have been stocking up on touring kit. Handheld Audio has purchased eight Aphex Dominators and immediately pressed them into service with M People. Meanwhile, V-Dosc Rentals has purchased two LA Audio DigEQ programmable EQ-dynamics units for use with its unique PA systems.

Handheld Audio, UK. Tel: +44 181 880 3243.

V-Dosc Rentals, UK. Tel: +44 1722 411234.

■ The Netherlands has seen its first Soundtracs Jade-S console installed in its Dancability Studios for use by the 2 Brothers on the 4th Floor production team currently working on dance remixes for London Beat and Twenty 4 Seven. SAE's Rotterdam school, meanwhile, has installed a new Pro Tools system and upgraded its 13 multimedia computers to Apple Mac G3s.

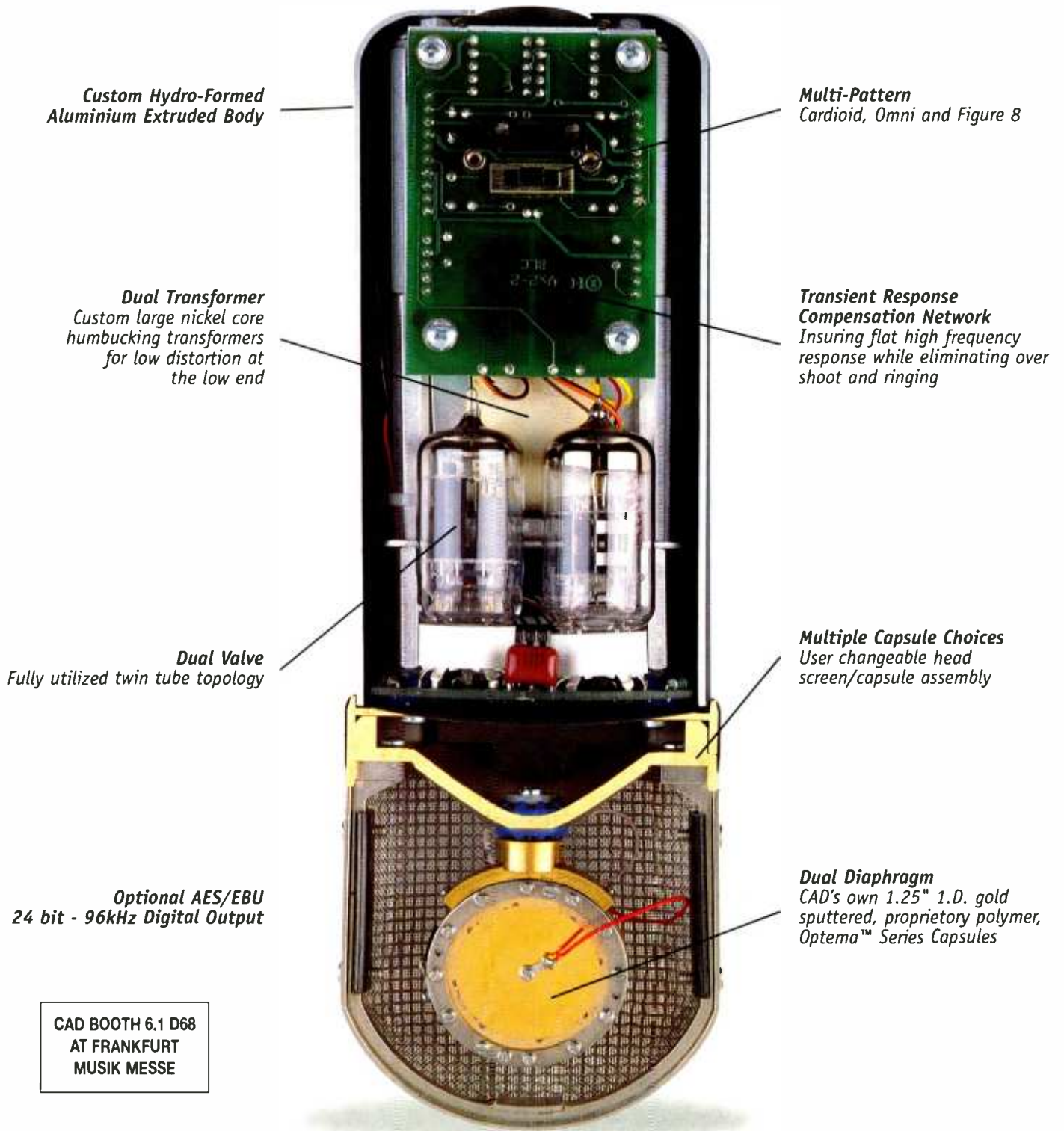
Dancability, The Netherlands. Tel 035 68 38634.

SAE, The Netherlands. Tel: +31 20 421 7575.

■ Canada's Dome Audio Video and Effects postproduction house has bought six Tascam MMR-8 24-bit nonlinear recorders and is anticipating buying a further six. The modular MMR-8s are set up 'in sixes' as 48-track machines and are already seeing heavy service on projects for all the major American television networks and a number of motion picture companies.

DAVE, Canada. Tel: +1 416 364 8512. Tascam, UK. Tel: +44 1923 819630.

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1999 SSAIRA NOMINATIONS

THE MUNICH AES Convention in May 1999 will serve as the setting for the second SSAIRAs—the *Studio Sound* Audio Industry Recognition Awards. This follows the outstanding success of last year's awards in which the readers of *Studio Sound* voted for products in 13 categories.

In response to popular demand we have expanded the number of category types this year to take in desktop duplicators, location-portable equipment, plug-ins, and communications products.

However, we first need to gather the nominations from which the winners will be selected. And quickly. This is where you come in...

In short, anyone can nominate a product for a suitable award category, but only fully qualified readers of *Studio Sound*, not manufacturers or related personnel, will be permitted to vote.

To nominate a product simply fill in the form and post it or fax it to us or send your nominations via email by listing the category number followed by the product.

To be eligible, a product should have been released since the Amsterdam AES Convention (held in May 1998) and obviously needs to conform to the description of a particular category.

The resulting nominations selection

Studio Sound February 1999

1. Large scale console:

Analogue or digital, recording, broadcast, post or film.

2. Medium to small scale console:

The affordable end of the console business continues to see plenty of innovation.

3. Outboard dynamics:

A 'by-function' category covering any outboard featuring dynamic processing.

4. Outboard preamp:

A 'by-function' choice from outboard including microphone preamps.

5. Outboard equaliser:

Graphic, shelf or parametric.

6. Outboard Reverb:

The final 'by function' category addresses reverb processing.

7. Combined outboard device:

Some units benefit from the combination of their processes.

8. Monitors:

Big or small, unbelievably impressive or unbelievably practical!

9. Microphones:

From unprecedently cheap to imitating yesterday's classics.

10. Convertors:

A hot topic, today's convertors will shape tomorrow's recordings.

11. Audio editor:

Hardware or computer-based?

12. Audio recorder:

Your choice can draw from CD-R, MD, DAT, HD, or HR.

13. Desktop duplication:

The economies of rolling your own are now apparent.

14. Location-portable equipment:

Gear for guys on the move.

15. Comms:

Where would we be without fast modern communications tools?

16. Plug-ins:

The list continues to grow but which has tickled your fancy?

17. Special category:

Your opportunity to recognise anything or anyone that has benefited pro-audio. Think carefully and laterally.

NOMINATIONS can be made by photocopying or cutting out this page, filling it in and returning it to: SSAIRAs Nominations, *Studio Sound*, 8 Montague Close, London Bridge, London SE1 9UR UK. Fax: +44 171 407 7102. Alternatively, you can email the category numbers and your nominations to SSAIRAs@unmf.com

will be published in future issues of *Studio Sound* for postal voting and for interactive voting from the *Studio Sound* web-site.

With regard to the categories, it should be noted that, in the case of outboard equipment, this is described by function rather than product description—hence a 'voice channel' may legitimately be entered as a compressor if

you feel it excels in this area. Not all the categories work this way, however, but all are explained in the table. There is also a special category in which you are invited to nominate equipment, people, initiatives or anything else that falls outside the other categories yet warrants acknowledgement.

Nominate only in the categories you feel comfortable with. Do it now!



Roland VS1680: now available on video

Linux Wine

I LOVED the article on Linux (*Studio Sound*, November 1998). One thing that was unmentioned is the fact that Linux can also emulate Windows 95-98 and NT, via Wine, the Windows emulator (www.winehq.com). This is still alpha but it is very robust, even now. Check it! <http://www.distortion.com/ls>
Vancouver, BC, Canada

Historical dispute

PIKE AND TALBOT'S fine December piece, 'Wandering in Magnetic Fields', was marred only by the subhead that reads 'December 1st marks the centenary of the invention of magnetic recording...'

Sorry, but Oberlin Smith, here in the 'colonies' invented magnetic recording in 1887. While Valdemar Poulsen produced a practical recording in 1898, the concept is clearly Smith's. Moreover, my grandfather, Emile Berliner, experimented with magnetic recording in 1894 and his magnetising coil has been on display in the Smithsonian Institution for decades.

Poulsen's situation can further be likened to that of my grandfather in that the latter introduced the disc record (and gramophone player) in 1887 based upon a concept of a disc record by Charles Cros in 1877. Just as it took Emile Berliner to actually create the first practical disc, it took Poulsen to make Smith's magnetic recording concept (introduced, coincidentally, the same year as the gramophone, you'll note) practical.

Oliver Berliner, Gramophone Songs & Sounds, California, US

Fail some more

THERE'S ANOTHER ASPECT to your eminently supportable comments about the 'dumbing down' of TV sound by the 'mic on top of the one man digital mini-camera' budget approach (*Studio Sound*, January 1999, p4). When material was sourced on analogue formats with only two audio channels, and edited on similar equipment, there weren't sufficient streams to combine actuality sound, narrator, music and spot FX in one go. The assistance of an audio specialist was needed in postproduction

to make this possible.

Then digital edit controllers appeared, allowing an automatic audio crossfade on the same track, along with a picture dissolve. This only partly eased the editor's problem, but brought a new one—the pics went across with a one-frame delay compared with the audio. After a couple of passes through the system, a complex edit could get badly out of sync (unless the edit machine purchaser had invested a further £2k in an audio delay system—something that a 'pictures man' could begrudge). So there was still scope for an audio specialist to use a synced editing system (like my SADiE) to bring everything back into line.

But the very advances in PC-based computer editing systems that enabled me to afford my SADiE are now becoming mainstream in the video editing world. A low-budget company can now achieve full broadcast-spec nonlinear editing for a fraction of the price of a few years ago. With four or more digital audio channels, animation, and no risk of losing sync, there's even less need for an audio specialist to get involved in the postproduction process.

I know—with one of my other hats on, I'm in the process of editing a video for a client, using his Sony ES-7 system. Compared to my SADiE, the audio facilities are pretty basic—there's only rudimentary EQ, you can't juggle the audio while the video is playing, and there's no visible waveform to help with audio identification. But it works far better than his Beta suite used to—so I'm (very reluctantly) keeping the budget down by not employing myself with my SADiE hat on.

But at least I'm an audio man editing the pictures—that doesn't always happen!

Graeme Aldous, Teeafit Sound & Vision, Saltburn, UK

Manual labour

I READ WITH INTEREST Rob James' excellent review of the Roland VS1680 in the January 1999 issue. Readers might like to know that comprehensive supplementary video manuals are available for the VS1680, 880 and 840 from Labyrinth Communication. Tel: +44 1282 835800.

Nick Cooper, Roland UK.



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Dolby DP569

Bringing cost-effective Dolby digital encoding to the broadcast and mastering industries, the DP569 makes commercial sense of DVD. **Rob James** takes the surround view

THE TERM DOLBY DIGITAL is potentially confusing. The confusion can arise because people have a habit of using the term to mean a specific delivery format, a type of encoding or both. In reality Dolby Digital is a family of formats which have in common the AC-3 (Audio Coding type 3) Dolby proprietary codec. AC-3 is a versatile 'perceptual' codec capable of accommodating various channel formats, bit rates and additional data and metadata (data about the data).

The codec uses psychoacoustically derived modelling to determine what information can be considered 'redundant' and thus dispensed with to reduce the bandwidth requirement. The model used by the encoder is also present in the decoder, so the encoder does not need to use bandwidth defining it. The model is not fixed and can be modified by the encoder sending 'delta bits' to cope with variations in the spectrum of the signal.

The psychoacoustic model does not simply consider the effects within one channel but also looks at the interactive effect between the channels. This is combined with the concept of a bit 'pool' that allows for uneven distribution of bit bandwidth between the channels to suit the nature of the content. Thus if one channel is silent the bit bandwidth, which would effectively be wasted, is made available to other channels which may require extra bits to adequately describe their content.

So far all this is equally applicable to broadcast, film and other delivery formats. Where these differ is in the additional data. BSI or BitStream Information fields, metadata and the 'wrapper', that is the way in which the AC-3 information is actually coded for physical recording or transmission. Dolby Digital for film will ultimately be optically printed in blocks between the sprocket holes of a projection film print. This brings a particular challenge to prevent loss of data due to physical damage, particularly at the beginning and end of reels.

Broadcast and laserdisc or DVD have rather different requirements.

The Dolby Digital audio stream carries the signals fed into the encoder with no changes to level or dynamics. It is the metadata that is used by the decoder to alter these parameters in the reproduced audio. The first of these parameters, Dialnorm or dialogue normalisation is used to control the volume setting of the decoder with the object of achieving a more constant subjective acoustic level between programmes. Dynrng, Dynamic Range Compression and Compr, compression control are, as the names imply used to feed dynamics parameters to the decoder.

In domestic decoders Dialnorm is permanently enabled, Compr is usually enabled in consumer RF decoders but with Dynrng it is usually left up to the consumer to decide whether full, partial or no use of the parameter is required.

Dolby Digital is intended for use in final programme delivery—'emission' in Dolby parlance. It can be used in distribution, that is between completion of programme and delivery, but there are limitations. The encoding process necessarily introduces delays, up to +50ms which require compensation. Editing and switching of encoded signal, for example with picture, will cause muting of the output. The signal must be decoded to PCM, edited or switched, then re-coded. Limited encode-recode generations are permissible, but only if the data rate chosen is high enough. A new coding technology, Dolby E, is intended specifically for the distribution process and will enable existing 2-channel digital infrastructures to carry 5.1 channel audio and metadata. Alternative formats carrying up to 8 independent channels are also possible.

The number of parameters that must be considered when encoding material is quite daunting. In addition to the metadata already discussed there are centre and surround downmix values to consider along with surround phase shift. Then there is the Audio Service

Configuration. The parameters here specify the audio coding mode, the number of channels and their uses, the data rate, sampling frequency and Bit Stream mode. (For example see box 'Audio Coding Modes'.)

(In addition there is an LFE (Low Frequency Effects) channel switch, the point one part of 5.1.) (See box 'Bitstream Mode Types'.)

Audio Coding Modes

000	1+1 (L/CH1, R/CH2)
001	1/0 (C)
010	2/0 (L, R)
011	3/0 (L, C, R)
100	2/1 (L, R, S)
101	3/1 (L, C, R, S)
110	2/2 (L, R, LS, RS)
111	3/2 (L, C, R, LS, RS)

Bitstream Mode Types

000	Main audio service: Complete main (CM)
001	Main audio service: Music and effects (ME)
010	Associated service: Visually impaired (VI)
011	Associated service: Hearing impaired (HI)
100	Associated service: Dialogue (D)
101	Associated service: Commentary (C)
110	Associated service: Emergency (E)
111	Associated service: Voice over (VO)/Karaoke

Other Bit Stream Information fields cover Dolby Surround mode, a language code, an 'Audio Production Information Exists' flag that indicates the presence of Mixing Level and Room Type parameters in the bitstream, and a copyright flag. It is also possible to use external LTC or VITC to set the time stamp values of each synchronisation >



moving ahead



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- Scott Jackson, Magmasters
- ▣ "I wish we had a DPC-II in all our dubbing theatres."
- Peter Brown, SD Post
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The DP569 moves the goal-posts on Dolby Digital encoding. Prior to the introduction of this unit the premium paid for real-time encoding was sufficiently high to make the compromise of non-real-time encoding just about tolerable

<frame. Early examples of Dolby Digital encoders have been notable for either their high cost or the inconvenience of non-real-time operation. With the Model DP569 Dolby have set out to provide a comprehensive and versatile real-time hardware encoder for the broadcast and mastering industries at reasonable cost.

A number of features are designed to make installation and use robust and comparatively simple.

Partly in order to cram the required number of connections into one unit, and partly reflecting the broadcast applications of the unit, all the digital audio

connections are of the AES 31D type, that is unbalanced 75Ω BNCs. Six sockets for audio in and loop through, two for VTC in and loop, and one each for Bypass in, TTL delay in, and main and switched digital outputs. An XLR is provided for LTC in. Four 9-pin sub D-connectors cover auxiliary data input, RS-485 Remote and GPI and GPOs. Internal terminations for all the interfaces are set using jumpers accessible once the lid has been removed. The choice of the coaxial standard for the AES connections is understandable given the majority of units are likely to be found in broadcast, but for most sound studios conversion transformers such as the Graham-Patten DATS converters will be required at some cost.

The front panel is divided into blocks. At left is the small, clear, backlit LCD display. The next block is navigation with a group of six keys, four cursor plus SHIFT and ENTER and two associated LED indicators. Separated from this are two keys for SETUP and ESC. The last block of keys are eight internally illuminated PRESET selectors. The first block of status LEDs indicate active digital inputs, FAIL, ERROR and TEST. Two further LEDs indicate the presence of REFERENCE in and Time Code and the final block of six indicate channel activity on the six possible channels LCR, Ls, LFE and Rs. These last are tri-colour LEDs which give some indication of the levels present, red means clip,

orange lights from -30dBFS to -0.1dBFS, and green from -45dBFS to -30dBFS. A mini DIN socket duplicates the rear-panel remote connection in RS-232 and takes precedence over it.

The most 'mission critical' application is for live broadcasting and real-time encoding in transmission areas. Many of the features of the DP569 are clearly designed with broadcast integration in mind. For example, the GPIOs allow for dedicated remote control. The bypass input can be used to provide system security. Two encoders may be used arranged so that, if the primary unit should fail, the 'hot swap' spare will automatically come into use.

The unit can be set to pass through signals already encoded. An autodetect mode looks at the first pair of digital inputs and automatically encodes PCM or passes through pre-encoded data directly to the output. Only valid pre-encoded material will be passed through.

The delay input can be interfaced with a video delay to ensure precise picture to sound sync is maintained.

Encoding can be initiated or stopped manually or by linear or VTC time code and presets may be similarly invoked.

In addition to the encoding functions the unit will generate test tones. These tones are generated on all channels except the LFE at around 1kHz dependant on sampling rate. The level is selectable between silence, -18dBFS and -20dBFS. >



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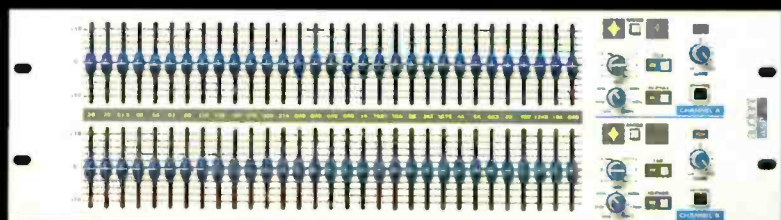
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The Bitstream Multiplex mode enables multiple encoded bitstreams to be combined into the main output bitstream. This is restricted to the Pro bit 16 output modes and uses the reference input as a source of pre-encoded bitstream(s). This mode can be used, for example, to record a number of different language versions of a programme onto a VCR. If Dolby E proves successful, this would arguably be a better way of achieving the same end.

The DP569 can be operated as a stand-alone unit, as part of a sophisticated automated broadcast installation or controlled by a PC or audio workstation. The unit supports all currently defined Dolby Digital coding modes at sample rates of 32kHz, 44.1kHz and

48kHz. Each of the digital audio inputs is equipped with a sample-rate converter. The DP569 arrived with a remote control lead and a couple of PC applications. The first of these is a remote package that makes keeping track of the large number of variable parameters considerably easier. The remote ports are also used to download firmware updates to the unit. Each unit may have an address set to facilitate control of multiple machines from one controller. A 16-character name can also be defined to aid identification. The other software package supplied was a simple recorder for encoded material, Dolby Recorder. This recorder application allows you to input the encoded stream from the 569 to the same PC used to control the encoder so it can be stored on the hard disk. A stereo digital soundcard is used for I-O, in this case an SEK-D prodiff 32.

The resultant files are .AC3. This file type for AC3 encoded data is a standard between all authoring applications.

A total of 32 preset memories are provided of which 28 are user-definable. Presets can be called via the front panel, remote software or presets 1-4 can be recalled via GPIs. Each preset can be named and carries a total of 40 parameters. Not all of these are required or appropriate for all applications, but the number gives a flavour of how much there is to consider when encoding.

The generous provision of presets enables almost instant comparison between complete sets of parameters. Any preset can be further modified as required and also saved under another name. The LCD display is used in conjunction with the various LED indicators to provide information on the status of various parameters.

With the number of variable parameters to consider the front-panel navigation controls are not especially intuitive or fast in operation. They are fine for setting up presets which are unlikely to be altered very often, but the PC remote option is infinitely preferable in applications such as DVD mastering where tweaking of parameters is a major part of the exercise. The minimum delay through the unit is 179ms at 48kHz or 195ms at 44.1kHz.

The delay may be set anywhere from the minimum up to 450ms either manually or by the width of a TTL pulse on the delay input. (sourced from a video delay). Preprocessing options cover low-pass filtering, DC filtering, de-emphasis, LFE low-pass filter, surround phase shift and surround attenuation. Dolby have paid a considerable amount of attention to the thorny subject of matching perceived levels. This area has been the subject of debate for many years with a good many com-

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Pro 16-bit
Ch2—professional mode 16-bit (CH-2);

Consumer
(As Pro 32-bit, but with the consumer flag set).

plaints from broadcast television consumers about changes in level between programmes. This has been exacerbated in recent years by the comparatively huge dynamic range available on CD and film.

The dialogue normalisation and dynamics parameters provided should enable the broadcaster to minimise these perceived level changes, and, when combined with a careful choice of downmixing parameters, allow consumers listening in very different conditions to get the best out of the material. There is a considerable advantage

The most 'mission critical' application is for live broadcasting and real-time encoding in transmission areas. Many of the features of the DP569 are clearly designed with broadcast integration in mind

in using a real-time encoder where material is to be encoded for purposes other than broadcast transmission, for example for DVD or laserdisc. Given a suitable professional standard real-time decoder capable of mimicking the common consumer decoders it is possible to rapidly assess the results of changes in parameters and make changes if required. I found this combination enabled me to rapidly achieve results with considerably more confidence than a non-real-time setup, especially using the supplied PC remote software. In particular, juggling with the various dynamics settings is far easier to judge in this way. It is perfectly possible with some care and experience to make a mix 'work' for a variety of consumers who may be listening on anything from a sophisticated home cinema system to an integrated TV. The Dolby Digital Professional Encoding Manual is a very useful source of information about the whole process and should be required reading for anyone contemplating Dolby Digital encoding. (Download a copy from the Dolby web-site at www.dolby.com/tech/)

The DP569 moves the goal-posts on Dolby Digital encoding. Prior to the introduction of this unit the premium paid for real time encoding was sufficiently high to make the compromise of non-real-time encoding just about tolerable. I now believe anybody serious about encoding for DVD should be looking carefully at this unit and the associated decoder, the DP562. The temptation is there to attempt to use a domestic decoder for checking purposes on the grounds that this is what the consumer will use. This temptation should be resisted, partly because it will not necessarily work in some configurations and also because there are a number of detail differences between various models of domestic decoder. The DP562 decoder also allows the Bitstream parameters to be monitored and checked and flags any errors or faults for quality assurance purposes.

I would strongly recommend using a PC to control the encoder for non-broadcast use because this considerably simplifies operation when compared

with the front-panel controls.

In a joint development with Dolby, Studio Audio and Video has already integrated the DP569 with their SADIe 24-96 workstation. SADIe controls the DP569 while it also plays the source tracks and records the resultant encoded files for use in DVD authoring.

I fully expect to see similar developments from other workstation manufacturers in the coming months.

Dolby succeed not by providing the 'best', 'most elegant' solutions, whatever those terms actually mean in this context, but by being timely and recognising what the ultimate paying consumer actually wants, that is software (product) that vindicates their choice of hard-

ware. Once again, while Europeans sit around debating, Dolby are delivering a workmanlike solution at both the consumer and production ends of the chain.

I might have a little more confidence in MPEG audio, not to mention DTS and so on, when I see similarly well thought out and professional encoding tools actually shipping at reasonable cost.

Meanwhile Dolby have lowered the entry cost into professional Dolby Digital encoding apparently without visible or audible compromise. Given the bullish feel of consumer DVD, with a shortage of machines even at the current premium prices I suspect the DP569 will rapidly become standard equipment in mastering houses. ■

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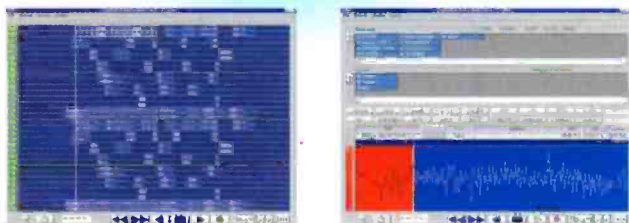
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Innova Son Sentury

The concept of the digital live console is alive and well, and being pursued by an innovative company in Brittany. **Zenon Schoepe** says you should be paying attention

MUCH TALK has surrounded the likelihood and timescale for the arrival of digital desks for live sound. Rumours abound concerning impending launches from big-name manufacturers and just how much these will impact upon this the last true stand of the analogue board. Many heralded the arrival of Harrison's re-application of its digital engine to live sound in collaboration with Showco in the US as the first step in the conquest, while a small French company in Brittany has now been building digital live production boards for years.

I reported on the Sensory desk from Innova Son almost two years ago (*Studio Sound*, May 1997) and now the company has a new more affordable variant on offer called the Sentury. Based on the same technology, I would refer readers to the original article for more specific explanations particularly of the Muxipaire digital stage box and digital multicore replacement, the Sentury deserves to be recognised as a remarkable board that manages to answer most of the objections that remain in the live industry for not taking the digital leap.

Its abilities are impressive: snapshot automation of all desk parameters, moving faders that incorporate a patent pending software-controlled resistant detent for finding snapshot null positions entirely by feel, and operation that relies on a super channel strip to which channels are assigned using Select switches in established fashion.

The differences between the Sensory and the Sentury centre around packaging. The Sensory should be regarded as the custom and system solution from the company while the Sentury is a far more fixed product. The new desk has largely the same features as the Sensory but is geared towards even faster installation. You don't get the Muxipaire stage box as standard although you can add them but you're presented instead with an A-D front-end for connecting directly to a multicore or other existing wiring. The Sensory work surface is also slightly different with a more sophisticated monitoring panel which would endear it to broadcast use.

Sentury is available in two basic versions for FOH or monitor use but it's important to note that either version can be reconfigured into the other easily via software. The package includes the console surface, a PC, and screen all mounted within a flight-case plus the separate Texas Instruments-based DSP and audio rack. It has 48 channels, 40 of

which have mic-line inputs using Innova Son Universal preamps which can handle anything from -27dB up to +66dB. Eight additional inputs run at line level for effects returns but all 48 channels can be routed to 8 groups and 12 aux buses in the FOH version or to 20 group-aux (group-aux) in the monitoring version.

Both versions get three master buses—LR and mono or centre. A refreshing concept is that there are no processing options and for each channel you get a 5-parameter gate, five-parameter compressor, and 4-band fully parametric EQ plus a five-frequency low cut filter. At the front end the signal path passes through a software patching matrix which allows any preamp to be assigned to any channel via a screen grid. Inputs can be labelled and the patching arrangement permits the same preamp to be assigned to a number of faders.

The fader panels are clear and uncluttered with only a few associated switches while all the tweaking activity occurs in the super strip. It is supremely simple. Gate and compressor adjustment is conducted from the same five controls with a switch flipping between the parameters while the EQ section gets a knob per function chunky sized panel with masses of space between the controls and it's bigger than you have ever seen on any analogue console or for that matter any digital console. Parameter adjustment is reflected immediately on the

screen and there are no displays on the super strip section. With the screen mounted near vertically above the work-surface it also means that the engineer can easily take in the screen while looking up at the act.

All EQ bands cover 20Hz to 20kHz and offer 15dB of boost and cut plus a notch which additionally interacts with the Q value. It's an extremely powerful section. A panel of buttons contains additional function switches which pertain to the automation in particular. Aux send contributions are adjusted from faders as are the aux master levels. Assigning a channel to a group is simply a matter of pressing buttons on paths involved. A second matrix controls the assignment of mix buses to physical outputs and there are 24 of these.

Advanced functions include the ability to link channels together for linked operation of all parameters, with offsets if required, and the ability to exclude a channel from linking temporarily for instances where you would want to enter a parameter offset. Parameters can also be copied from one channel to another and across the board.

The underlying philosophy of the Innova Son desk, which is apparent throughout, is to give the maximum amount of automation available but always to give the user the option to get out of it to manual control if any adjustments are needed. This extends to isolating channels from the automa- >





< tion and a selection of channels can be prepared for single RELAX button isolation for stages in a set where manual control is required. These channels can then be 'unrelaxed' back to automation control with indicators keeping you informed of which channels are in what condition.

A Request mode serves as a means of interrogating all channels to see which have, for example, their compressors selected. These are indicated by illuminated switches on the active channels after striking the REQUEST button and the compressor select switch in the super channel strip. Other tricks include one-button flattening of EQ and the resetting of the compressor or gate to

preset default values.

Operation and programming of the snapshot automation is straightforward with buttons for Previous and Next scenes within sets and the recalling of a scene from any location directly. A very neat feature is activated by the OVER RAM button which can fix a channel to remain constant regardless of any snapshot changes. This would be useful in instances where you need to make a permanent adjustment on a channel but don't have the time to rewrite all the snapshots with this value in place.

Crossfades between snapshots are currently adjustable at a system level but will be made available for user adjustment using a cross-speed fader for manual control of the transition.

Up to 256 snapshots are held in RAM but a save routine allows you to save these to the PC hard disk for practically limitless storage. This is planned to change with a shift in emphasis to greater reliance on the hard disk and the storage of additional original and mirror snapshot files.

There's even an off-line mode in which you can temporarily disconnect the worksurface from the audio rack, which carries on processing unaffected, and go to the next snapshot and adjust any parameters you choose including the patching assignment of signals and create or edit snapshots. Going back on-line flips the surface back to its previous state.

The Sentury is a pleasure to use with so much of the fundamental routine of driving the board placed right on top that I would defy anyone to walk up to an installed desk from cold and not be able to run it. The clever automation tricks are all accessed on dedicated keys

within the super strip panel and while these will require initial explanation, there is a consistent mature logic to the way things work. Indeed, so much of the operation

is child's play that I'm not convinced that I have done the simplicity of this desk justice. Without any reservation I consider the Sentury to be the easiest to operate digital desk that exists. You really have to sit behind one and try it for yourself.

The price starts at 58,000 Euros and for that you will be buying in to technology that is proven and that is being worked every day with a good number of live sound and live broadcast production operations predominantly in France. And therein lies Innova Son's dilemma. It is already fairly strong in its home market yet remains largely unknown outside of its frontiers. The company has grown substantially in the last two years but is still small even by pro audio standards. Yet it has produced one of the most exciting products of recent years and I find it incredible that it is still to be seen by a whole world of engineers. If they were to see this console, and it's more expensive Sensory sibling, then I believe many would spot its sense and take to it.

In these times, it is now increasingly rare for a small company to appear from nowhere with an innovative product that has the potential to shake the tree and make a difference. If you are into live sound and are intrigued by the prospect of a digital desk, then you owe it to yourself to go out of your way to investigate this. ■

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MBHO microphone range

The eagerness with which obscure European microphones were welcomed by Western recordists says much about both parties. **Dave Foister** discovers the party is not yet over

AFTER ALL THIS TIME you would have thought there would be no more surprises left in terms of unknown microphone manufacturers emerging from obscurity of Europe. We have seen so many, challenging the status quo for sheer value for money and shaking up the market in the process, but surely there can not be any more. Yet Mikrofonbau Haun, or MBHO, is little known, despite having been in the business for many years, and despite having manufactured capsules for other companies. MBHO has supplied capsules to the highly acclaimed Brauner, as well as for certain Audix models. In fact MBHO's own microphones are not entirely new to us; in the UK, Canford Audio stocked several models some years ago, originally appearing to see some of them as comparable to the extinct and much-lamented Calrec range. The full catalogue from MBHO is unusually comprehensive, including a measurement microphone, a boundary layer design, and a stereo array based on the Jecklin Disc (which MBHO also markets). More conventional studio models

include both large and small diaphragms, and feature heavily the idea of a modular kit with interchangeable capsules in the manner of the AKG 460 and the Neumann KM100 range. A wide-ranging and well-specified set of heads can be used with a choice of preamp bodies, of which the most sophisticated is the MBC 603.

Outwardly the 603 is a very simple affair, a straightforward black stick with the capsule attachment at one end and the output XLR at the other. The MBHO logo and model number are engraved with unusual precision and clarity for microphones of this type, and these are the only marks breaking up an otherwise featureless black cylinder. There is no high-pass filter and no pad—all the usual adjustments are carried out by the selection of what is attached on the front.

Electronically the 603 is more advanced than the other MB bodies in that it uses a transformerless output stage, intended to give reduced coloration and better capabilities for driving long cables. Besides this it will operate on phantom-power sources as low as 12V, unlike the 6-8, seen by MBHO

as very much the standard model above which the 603 sits as top of the range.

One of the measures of the engineering quality of a system like this is how well the components fit together, and the overall appearance of the completed microphone. In the case of the MBHO series the tolerances are tight enough that you can hardly see the join between body and cartridge. The capsules screw on to the bodies with a typically fine thread, but it appears well-enough machined and robust enough to avoid the dangers of cross-threading that often accompany this arrangement.

The full range of capsules comprises nine different models offering a choice of polar patterns and tonal compensation. Two of them are side-firing large-diaphragm capsules, but the rest are more conventionally styled and distinguished by the grille arrangements and small engraved graphics. Three types were supplied to me in conjunction with two bodies, giving a stereo pair of KA-200 cardioids, a stereo pair of KA-100D omnis and a single KA-800 figure-of-eight. The whole lot was



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presented in a briefcase-type carrying box along with two types of stand mount and two types of windshield, very well packaged and protected, and looking, when opened, more like a set of engineering tools or medical equipment than a bunch of microphones.

No doubt the cardioids will be the most widely used, making for an ideal all-rounder, and indeed the 603 comes with the general purpose KA-200 fitted as standard. The resulting combination is a particularly clean and open microphone: the specs look good, with a pretty flat frequency response, and the sound bears them out. The noise floor is very low, and the dynamic handling good. The matching between the two in the review kit was excellent, and I found myself using the two mostly as a coincident pair. As drum overheads they gave a very natural stereo picture of the kit with good highs and no strain whatever at high levels. For piano the results were equally impressive, with a surprising amount of warmth along with the detail. The depth is important; too often a microphone of this size can do much better at the top than at the bottom, reducing its suitability for many things. The 603-200 combination would be a genuinely useful all-round workhorse, covering all the bases very competently and giving good results on virtually anything.

The only down side is the lack of

switchable facilities, although the keen collector can have all the usual options available by switching capsules. There is another cardioid, the KA-100, with a built-in high-pass filter rolling off around 50Hz, and if pads are needed they can be fitted between the capsule and the body. This is a familiar concept from other ranges, the little plain extension element giving 10dB attenuation, although obviously it is not something you would want to have to adjust in a hurry—give me a switch every time. Unusually, there is also a wide cardioid, the KA-300, whose design places particular emphasis on smooth off-axis performance for minimal spill coloration, although to be fair the straight cardioids I had were above average in this respect.

Similarly there are two versions of the omni capsule. The straight KA-100 is flat and neutral, while the D version as supplied to me is optimised for diffuse field pickup by having a distinct lift in the frequency response around 8kHz to 9kHz. Again, the two made an ideal spaced stereo pair for drum overheads, and they got a lot of use in this situation while I had them around. I was not quite so convinced by the neutrality of the sound as I was with the cardioids; despite the HF boost they seemed warm and missing a little sparkle. This was clearly a gentle slope rather than an early cut-off, as with a touch of EQ it was immediately obvious that the top

end was all there if a little restrained. At the same time this apparent warmth was an advantage in other situations such as a grand piano, where the spaced set-up did a very good job of conveying the size and depth of the instrument.

Neither of these pairings was easy to rig using the supplied stand mounts as the two in the kit were different designs. One is a basic swivelling holder that the microphone simply clips in to, while the other is an interesting suspension mount, consisting of a tube that locks easily on to the body hanging in a ring by means of elastic bands. This is quite a loose suspension, and, although it handles the microphone's weight adequately it tends to get pulled in the direction of the attached cable rather easily. It has the same knurled screw for tightening the swivel as the simpler mount, and it is a little awkward to get at with the force necessary to lock it off properly. Fortunately the 603 is a nice standard 21mm in diameter so general purpose mounts like the AKG SA 10 manage very well.

The final capsule in the review box was the figure-of-eight, and it would have been nice to have had a pair of these as well—I am very much a crossed-eights fan in the right circumstances. A single figure-of-eight has far fewer standard applications than other patterns, the chief one being as the side element in an M-S array. This then was >



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< the obvious thing to try, lashing together a front-facing cardioid and the eight on the same stand—easier than it might have been thanks to the light weight of the microphones. The KA-800, obviously, fires at right angles to the body unlike the other capsules.

The results were superb. The 800 shares the sonic character of the cardioid rather than the omni, so the two together worked very much in harmony to paint the stereo picture. One of the advantages of the M-S concept is that slight mismatches between the microphone characteristics matter far less than they do with crossed or spaced pairs where the smallest difference wrecks the stereo image. A crossed pair of different models of microphone is a Bad Idea whereas an M-S array is often cobbled together from whatever's handy without any serious consequences other than the fact that the tonal quality can change as the stereo width is adjusted. Even so, having a cardioid and a figure-of-eight that sound basically the same can only be good news, and these two capsules achieve that remarkably well.

Again piano is an obvious test for such a setup, and indeed is often a good candidate for M-S techniques anyway as adjustment of the width is particularly useful here. The MBs did an extremely impressive job, augmenting the excellent basic sound of the crossed cardioids with the flexibility of M-S with no drawbacks other than the necessity of setting up an M-S matrix.

There are two other capsules in the range incorporating larger diaphragms in a side-firing configuration; one is a cardioid while the other is a spectacularly flat omni, and on the showing of the capsules I tried I would welcome the chance to check these out as well.

The kit of parts also included two windshields: one is just a simple foam sock while the other is a much more complex affair consisting of a spherical plastic basket supporting a couple of layers of thin fabric like the traditional nylons. This simply clips over the capsule and has been carefully designed not to foul any of the slots in the grilles.

Also included in the box was a new model, the MBC-608. This looks very much like a 603 with one of the big heads fitted, but in fact is a fixed-cap-

sule microphone using a newly developed dual-diaphragm cartridge. The obvious addition on the body is a three-position switch for selecting polar patterns—the usual choice of cardioid, omni and figure-of-eight is provided—plus a 0° engraving to show which is the front. The switch has to be operated with something pointy shoved into its slot, which can be a pain but at least it stops people fiddling.

According to the accompanying literature much attention has again been given to the off-axis response of the 608's capsule, and this certainly appears to have paid off. The microphone shares many of the characteristics of the smaller cardioid and figure-of-eight capsules, notably their clarity and upper extension, coupled with a slight improvement on the already impressive lower frequencies. As a vocal microphone it perhaps lacks some of the character and fullness generally associated with vocal favourites, but for other purposes where large-diaphragm models would be the normal choice the 608 can undoubtedly deliver the goods. It has the distinct advantage of its slender shape, light weight and easy mounting when compared with much of the competition, and its sound will stand comparison with many more familiar models.

Most of the ranges of microphones that have belatedly come to our attention over recent years have been much more restricted than this, with, perhaps, a couple of ageing models to begin with, and more added later as their popularity grows. By contrast MB comes to us with a ready-made family of equipment to give unusually comprehensive coverage of all the standard requirements. Not only this but the microphones generally work extremely well, delivering a performance out of proportion to their price. I would be

keen to explore the rest of the range, partly to see whether my reservations about the diffuse-field omni apply to any of the others, but also in the hope of finding more gems like the cardioid and figure-of-eight pairing. The

combination of performance, price and engineering excellence makes the MBHO range of considerable interest to anybody in the microphone market and their status at home should find itself reflected elsewhere once the reputation they deserve becomes established. ■



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Sync to Picture

Creamware Pulsar

From its early success with digital workstations, Creamware has moved into the realm of the virtual studio and virtual vintage synths. **Rob James** explores the 'music production environment'

THE NAME CREAMWARE has been established through the success of its TripleDAT and T-16 PC-based workstations. Given such a starting point, the new Pulsar and larger Scope systems come as a surprising departure. At first glance, Pulsar looks like a PC soundcard with good I/O capabilities together with a healthy amount of onboard DSP to take some of the load off the computer's CPU—and this is precisely what it is. The surprise comes when you discover what software Creamware supplies to exploit the extra horsepower.

In fact, to suggest that Pulsar is more of a musical instrument (or instruments) than a digital audio workstation is to understate the case. The first systems supplied will arrive with a modular synth package reminiscent of the big Moog or Roland 100 series, a couple of

polysynths, redolent of classic analogue designs in both 'look and feel' and sound, but with a stack of new tricks to bring them up to date. Accompanying these are an 8-operator FM synth, three mixers, a couple of sample players and effects. For me, the *pièce de résistance* is the MiniScope, a virtual simulacrum of the classic Minimoog.

The card is a medium-sized, bus-mastering, PCI slot specimen with a SCOPE bus expansion connector that will be used if multiple cards are combined into one system. The DSP is provided by four Analog Devices SHARC chips. These really are flavour of the month, with manufacturers such as Harrison, Stage Tec and Studer using them in high end mixing consoles. The rear of the card carries four optical Toslink connectors for 16 channels of I/O in ADAT format and a 26-pin mini D-connector for breaking out the other connections. The supplied break-out cable consists of SPDIF I/O on phonos (or AES-EBU on XLRs on a Pulsar Plus), two channels of analogue I/O on phonos (balanced XLRs on Pulsar Plus) and MIDI In, Out and Thru connections. Sample rates of 32kHz, 44.1kHz, 48kHz and 96kHz are supported when the card is wordlock master and from 30kHz to 100kHz as wordlock slave. A-D converters are described as '24-bit multibit sigma-delta-modulators with Perfect Differential Linearity Restoration', however, the quoted dynamic range of 102dB indicates the 24 bits should be viewed somewhat sceptically in practice. The D-As are sigma-delta 20-bit 6-ix oversampling types. Note the recommended PC specification for this card is a Pentium II running at 300MHz with 128Mb of RAM; although I ran it quite happily on a PII 233 with 96Mb. The card is not guaranteed for bus speeds over 33MHz, overclockers beware.

The drivers supplied with Pulsar enable it to be used with sequencer-audio packages such as Cakewalk and Logic Audio. Also included are ASIO drivers for use with Cubase VST. The graphic design of the interface is a fairly radical departure from the Windows norm. Although things work in a Windows-like manner there are considerable differences. One thing I found annoying is that the Task Bar is not accessible—meaning you have to use ALT-F4 to access any other programmes, a sequencer for instance. Pulsar multitasks with a sequencer perfectly happily so I do not really see why Creamware has chosen to do this. Further, while the graphics are extremely pretty I do not see why it is necessary to reinvent the wheel by presenting a new GUI (Graphical User Interface). Even the mouse pointer has been redesigned into a natty little conical metallic object; although once the novelty has worn off the

option is there to use a conventional arrow.

In operation the model works like this. First, you open a project. This will contain a number of building blocks or modules. More can be added by dragging from the file-selector window onto the main screen. Connections are made by clicking on source and destination points. Illogical connections are generally not permitted. In this way, for a simple start, you might connect a synthesiser module to the physical MIDI input and connect the audio outputs of the synth to one of the physical audio outputs. Double clicking on the synth module will bring up a graphic representation of the knobs and switches you would find on a hardware synth. All the parameters can be changed with the mouse in real time or, in many instances, under MIDI control. For more complex projects audio inputs can be incorporated together with effects, mixers and multiple synths-sample players. Projects can, of course, be saved. In the case of the Modular synth, when the supplied templates have begun to pall, a blank 'frame' window can be filled with an awesome selection of modules. Modules are interconnected in the same way as their physical counterparts with virtual patchcords.

The mixers range from the simple to the reasonably complex with 32 inputs 16 outputs and comprehensive bussing for auxes and so on. Effects modules come in two flavours, inserts points that are fairly basic, but economical with DSP power and auxes that are more flavoursome, but use more power. One glaring omission at present is the lack of any reverb.

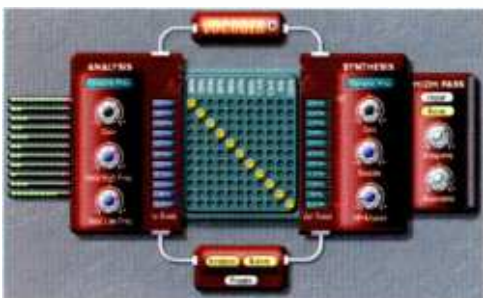
Pulsar is a major achievement. If you ever had an ambition to own a studio full of synths but neither the space nor the purse to achieve it, you now have your chance. The synths sound good too. But for the lack of drifting you could swear there was a Minimoog hiding in there somewhere. There is already a trickle of third-party software for this platform which will surely turn into a flood.

I still do not understand why Creamware has elected not to stay closer to Windows conventions which would make the system still more attractive. Notwithstanding this, the potential here is enormous. Not only for the most innovative production system to arrive for ages but also the other possibilities. The DSP and I/O hardware have the capabilities to make a killer DAW with the PC handling the recording and the card doing all the mixing and

effects donkey work. In fact Pulsar is already half way there. I know it is a dangerous thing to say, but all that is needed is some more software... I await future developments of Pulsar with keen interest. ■



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Millennia Media NSEQ-2

Why choose between valve and solid-state equaliser circuitry when you can choose to have both? **David Foister** discovers the Twin Topology EQ

IF YOU WANT SOMETHING DONE properly, do it yourself. The recording industry has a fine tradition of this approach, of studios building equipment to their own specifications to meet their particular requirements. In fact in decades gone by many of the significant forward steps in recording technology originated in the studios themselves, either as major R&D projects or as an extension of the traditional hobbyist approach. The enterprising ones have marketed the best of their efforts often to great acclaim—Massenburg is a prime modern example. Millennia Media has taken this line too; having designed mic pres and other outboard equipment for in-house use on its recording projects, it put them on the market as top-end audiophile units and did quite well with them. The range of equipment has expanded substantially since, and now includes an elaborate opto-coupled compressor and a complete rackmounting mixing system boasting 100% bus compatibility with the Massenburg HRT-9100 system. The latest product is the NSEQ-2 equaliser, sharing the compressor's novel approach to the heated debate surrounding the relative merits of valve and solid-state.

Because, like the compressor, the NSEQ-2 is both, yet it is not a hybrid. It is actually two complete 2-channel EQs in the same box, one with valve circuitry and one with no-compromise discrete solid-state. Each channel can be selected as either valve or solid-state independently, but neither can use both simultaneously. This choice is unique in my experience, and must surely represent the best opportunity of a straight A-B comparison you could wish for, as much of the circuitry and all of the controls

are common to both signal paths.

Both versions are class-A and designed to be as sonically neutral as possible. Audiophile components are specified in key areas, with the names of the esoteric component suppliers—Vishay pots, Roederstein resistors, Wima and Electrocube capacitors—listed along with the OFC cable and mil-spec switches. Of course all relay and other switching contacts are gold. The high quality of the construction is obvious from the front panel, a hefty sculpted slab with apparently custom-designed knobs all made from aluminium. A glance through the ventilation slots in the top panel reveals a state-of-the-art PCB and as good a standard of construction as you are likely to find. The slots, by the way, are vital, as is the recommended spacing in a rack; imagine the combined heat of a class-A transistor amplifier circuit and a couple of tubes blazing away and there's enough surplus energy being dissipated to make the air con work for its living.


The EQ facilities are certainly comprehensive—this is not a box that depends purely on its novelty without delivering the tools for the job. Each channel has four bands, all of which can be separately switched in and out. The middle two are fully parametric, with swept frequencies in two ranges each and Q variable from 0.4 to 4—not high enough for tight notches, but a good range. The frequency ranges as selected by the x10 switch curiously do not overlap at all, which can be a nuisance. One is used to getting to the end of one range, finding perhaps that it does not go quite far enough, and starting again in the next range with plenty of latitude either side.

The outer bands are more flexible than many high and low bands would be without having the full parametric attributes of the mid bands. They can be independently switched between peaking—with a fixed Q of 1—and shelving, and have switched frequencies with a good range, running all the way out to 20Hz at the bottom and 21kHz at the top. The shelving setting has a very gentle 6dB per octave rolloff and is clearly intended for smooth musical adjustment rather than corrective surgery, which means that the one thing missing is high-pass and low-pass filtering.

20dB of boost and cut is available on each band, with a switch on each channel to change the range of all four to 10dB for more precision. In fact it is indicative of Millennia's intentions for the unit that the manual assumes that the 10dB setting will be the normal one. The gain knobs are huge and protruding, and, unfortunately, it is not always easy to see exactly where they are pointing, partly because of parallax, and partly because the pointer grooves do not all line up quite vertical at the zero position. The other controls, by contrast, are a bit fiddly, both in terms of their size and their positions, but with such a full set of adjustments within the 2U-high panel this is unavoidable. In their favour they have large flat handles to turn them.

The key to the NSEQ-2 is the panel in the middle with Twin Topology written on it in big letters. Here are switches for selecting the valve or solid-state signal paths, with the valve version being the default with the switches out. This is designed around twin triode tubes, while the alternative is based on all-discrete J-FET servo amplifiers. Both circuits are >





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< described by Millennia as minimalist as they have only one active stage in the signal path, performing the functions of input buffer, EQ amplifier and output driver all in one block. Switching between the two topologies is not exactly silent—the sound mutes for a moment accompanied by a bit of a thump. In fact most of the switches click, presumably because stopping the clicks would compromise the sound.

And it is, of course, the sound that is the primary concern, here, even more than usual. It may seem contradictory to claim sonic purity and neutrality yet at the same time to offer two approaches with different characteristics, but a few moments spent playing with the NSEQ-2 helps make more sense of it. Whichever type of EQ is in use, the transparency of the signal path is remarkable, and the smooth musicality of the EQ bands as they are adjusted is something special. The extremes of the HF and LF frequency ranges are on the edges of the conventional spectrum and yet their effect is smooth and useful. With the NSEQ-2 I got exciting results out of otherwise familiar signal paths that I had not heard before, and found it uncommonly easy to achieve just the colour I wanted. This was primarily true of sources that were already good and needed a little reshaping, but there is enough power in the design to deal with problems as well.

The surprising part, and the most intriguing, is that despite the remarkable apparent transparency there is a distinct audible difference between the two circuits. Firstly, the valve EQ is ever so slightly noisier, although, perhaps, it would be fairer to say that the solid-state is even quieter. Both are astonishingly clean, with little self-generated noise to be boosted with the HF. The most important noticeable difference offers an interesting insight into the nature of the intrinsic contrasts between the two technologies. There is a just perceptible thickness to the sound of the valves; everything, wherever it is in the spectrum, sounds just a little fuller—not

necessarily warmer, richer, or louder, and certainly not lacking in top, but a bit bigger. There is no apparent difference in the nature of the EQ itself, nor in the operation of the controls and their effect, but compared with the absolute clinical clarity of the J-FET sound it is like an extremely subtle soft focus. Clearly Millennia has not set out to overplay the usual valve attributes, as that would have completely undermined the transparency that is the NSEQ-2's aim; what we have instead is something approaching the best that each technology has to offer, perhaps similar to comparing the best analogue tape machine with high resolution digital.

Whichever you choose, the NSEQ-2 will surely stand comparison with any equaliser you care to put it up against—but you do not have to choose. Whichever character works best in a given situation is there at your fingertips, and can be selected using exactly the same EQ curve. This is quite impossible any other way, as there surely can be no pairing of separate equalisers whose filter characteristics match this exactly. Matching settings is simply not possible, however precisely calibrated the controls may be, and a comparison between them will be a comparison of the circuit designs, not just the topologies.

This is a neat idea that can only be justified by working extremely well, and it does. While some manufacturers might have been tempted to sell such a box on the strength of the dual identity alone, letting it operate on merely adequate EQ, this is clearly contrary to Millennia's principles; instead the box contains four world class equalisers fit to be used in the most demanding situations. The only regret you may have is that you can only use two at a time. ■

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Lexicon Studio System

Choosing Steinberg's Cubase as the platform for its plug-ins reveals Lexicon's new strategy. But it is not the company's first experience in workstation systems, writes **Rob James**

LEXICON IS CHIEFLY KNOWN these days for reverbs and multieffects processors. The 480L and 300 are *de rigueur* in the arsenal of any studio with pretensions of qualifying for the top table. Far less prominent is the company's involvement in the early days of digital audio workstations, yet the Opus was innovative and powerful for its time. Although out of production for some time a number of studios are still doing very good business with it. The introduction of a PC audio interface card, reverb and break-out box from a company with this heritage should be something of an

event. There is one surprise: Lexicon is not offering yet another set of application software to an already bulging market; instead, it has taken advantage of the existing installed user-base of sequencers. The first application to take advantage of the Lexicon Studio hardware is Steinberg's Cubase VST. Windows drivers are available to enable other applications to use the hardware.

The review system consisted of a CORE-32 card, PC-90 daughter board, LDI-12T interface (break-out box) and a demo version of VST Audio. Physical installation consists of plugging the daughter board onto the

CORE-32, adding a PCI extender to support the combination and finding a spare full-length PCI slot to put it in—this is a big board. There are a couple of kludge wires and piggy-back resistors on chips in evidence, but these should be absent from production samples. The CORE card has a further socket for a TBUS daughter board when this becomes available. The external interfaces comprise two micro D-connectors with proprietary pin-outs which connect to the LDI-12T break-out and the LDI-16S when that becomes available.

It is necessary to install your application software before the Lexicon drivers because the Lexicon installer puts files into the directories created when the application is installed. All the software installation was accomplished without much drama. In addition to the low-level drivers for the hardware and a control panel applet that is invoked from within Cubase, the Lexicon installer adds diagnostics and documentation to a separate directory. Something to watch—Studio requires IRQ5, and only IRQ5, any other hardware that is similarly consistent will give problems.

The LDI-12T is a 1U-high shallow rack-mounting unit with 'wall wart' power supply. Not only does this mean routing a flimsy cable carrying 9V AC up the back of the rack, but also that the transformer is too large to fit in many likely locations.

Rear panel connections consist of a socket and cable retainer for the low-voltage supply, a micro D-connector to the CORE-32 card, BNC for wordclock input, two 9-pin D-connectors for ADAT sync I-O and two associated optical Toslink connectors for 8-channel ADAT or 2-channel Optical SPDIF I-O. In addition there is a further 9-pin D-connector that carries RS-422 serial data.

On the front panel, XLRs deal with balanced stereo analogue I-O while phonos are provided for unbalanced analogue in and SPDIF I-O. A further XLR accepts LTC (Linear Time Code) and there is a small power switch. The unit converts time LTC to MFC to interface with the application software.

The analogue stereo input can be switched between the +4dBu balanced XLRs and the -10dBV unbalanced phonos. Input converters are 24-bit with a claimed A-weighted dynamic range of 106dB, the outputs are 20-bit with claimed 97dB dynamic range. Sampling rates supported are from 44.1kHz (-5%) to 48kHz (+5%).

The PC-90 reverb card uses 20-bit processing and provides two independent stereo reverbs; although these may be chained in software if more horsepower is deemed necessary.

Since I last looked at Cubase it has changed considerably. Despite what is clearly a massive amount of work I have difficulty getting away from the feeling this is still fundamentally a sequencer with audio bolted on. Since

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my background finds sequencers thin on the ground. I am more comfortable with a sequencer allied with a DAW. That said, VST certainly looks the part. You need either a very large monitor or 20-20 vision to take full advantage of all there is on offer. It is some considerable tribute to the software writers that I was able to configure the system and get audio out of it with only occasional reference to the on-line manual.

My main criticism of the application is that I found it far too easy to clip material using the EQs, so I can only assume the internal headroom is rather limited. The 'high-quality' EQ option is better, but still nothing special.

The Lexicon PC-90 reverbs are configurable as plug-ins but can also be used as a direct effects unit. Reverb algorithms are well up to Lexicon's usual standard. I have always found their menu systems a little arcane and these are no exception. Anyone familiar with other Lexicon products already knows how to use them and what sounds to expect. As with other VST plug-ins the first 16 parameters of the reverbs are fully and dynamically automated along with levels, pans, EQs, and a host of other virtual controls.

The control panel applet has four pages. One deals with I-O control using four on-screen faders to set I-O levels and buttons to select the various I-O options. SCMS copy protection and de-emphasis are also set here. The Reverb page selects the source and destination routing to and from the two virtual reverb machines. The Time Code page offers the various source options and frame rates and is also where the reader is enabled.

The Punch Record page enables you to overcome the latency delay introduced by the operating system. This is accomplished by summing a mono mix of the selected input signals back into the output along with any playback tracks so that you can listen to what you are recording, in context, and with no delay. A MIX LEVEL fader adjusts the balance between the input mix and the VST output. Set to Loop, return and restart are seamless giving a 'proper' loop.

The big selling point with this approach to PC audio is the lightening of the load on the computer's CPU by removing processor intensive functions to dedicated processing. Reverb is one of the more demanding activities so this is a sensible place to start. With an application package of the size and complexity of VST this still does not obviate the need for a capable and carefully set up PC. The well-written manual includes a lot of sensible and accessible advice on suitable combinations of hardware and setup tweaks to optimise performance. In particular, Lexicon favours the use of IDE drives for main audio storage because a high-speed SCSI interface competes for PCI bus bandwidth. For the same reason, use of one of the more recent AGP

Lexicon,
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performance. In particular, Lexicon favours the use of IDE drives for main audio storage because a high-speed SCSI interface competes for PCI bus bandwidth. For the same reason, use of one of the more recent AGP



LDI-16

graphics cards is strongly recommended. Using VST I found it possible to get 32 tracks of audio playback with 60 bands of EQ. Bearing in mind the PC's CPU is still doing the EQ number crunching, this represents a considerable improvement over using a basic I-O soundcard. Add reverbs and you start to appreciate what Studio is all about.

Lexicon has a well thought out and expandable package with Studio and there are possibilities here for other software writers. The

inclusion of an LTC reader and RS422 port give further clues to what might be achieved.

I hope and expect to see other major applications supporting the Lexicon Studio in the near future, but in the meantime, if you are fed up with inadequate computer resources for MIDI sequencing, Studio may be an answer. If its price seems high, consider this—you are effectively getting a 32-track recorder free with a PCM90. Or a PCM90 thrown in with a 32-track recorder. ■

DIGITAL POT

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M&K MPS-150

For methodology see *Studio Sound*, April 1998, page 14.

See it on the Internet website:

www.prostudio.com/studiosound/apr198/r_tannoy.html

Studio Sound's 'bench test' loudspeaker reviews continue with the MPS-150. **Keith Holland** reports

THE MPS-150 by Miller & Kreisel is a 2-way passive loudspeaker comprising five drive-units: two 130mm bass-mid drivers and three 28mm soft-dome tweeters, which radiate through very shallow (5mm deep by 80mm wide) horns. Both sets of drivers are arranged as vertical arrays with the tweeters alongside the bass-mid drivers, and all drivers are mounted as close together on the baffle as is possible. The cabinet is a sealed-box design having external dimensions of 318mm high by 267mm wide by 305mm deep and a weight of 10.4kg. The loudspeaker is supplied with a cloth grille that was removed for these tests. There are two switches on the back panel: one changes the vertical radiation pattern from Normal (THX) to Wide, and the other switches between Single Speaker or Vertical Stack usage. The test was carried out with the switches set to Normal and Single Speaker. The MPS-150 has an electrical impedance of 4Ω and a claimed maximum (unclipped peaks) power handling of 400W rms. The supplied manual stresses that the loudspeaker must be used with the tweeters in a vertical line.

Fig. 1 charts the on-axis frequency response and harmonic distortion for the M&K MPS-150. The response can be seen to lie within ± 3 dB from 100Hz to 20kHz except for a minor peak at 600Hz and a dip at 7.5kHz, with an average sensitivity of about 90dB for 1W at 1m. The low-frequency roll-off is seen to be 2nd order (12dB/octave), which is as expected with a sealed-box system, with -10dB at about 60Hz. Harmonic distortion is below -40dB (1%) from 100Hz upwards, below which the 3rd harmonic rises sharply; this is an acceptable result given the small size of the loud-

speaker. Due to the drive-unit layout of this design, it is expected that the horizontal directivity will be different to the left than to the right; also, the vertical directivity will be the same up as down. The horizontal directivity plotted in Fig.5 is with the microphone moving away from the tweeters, and the other directivity plot (Fig.6) shows the horizontal directivity in the other direction at two angles (marked*) and the vertical directivity (Fig.5) is well controlled, maintaining very wide dispersion up to 8kHz above which it narrows with increasing frequency. A comparison with the horizontal directivity in the other direction (Fig.6) shows that the dispersion is similar. There is little evidence of narrowing at the crossover in either direction; a remarkable result. The vertical directivity (Fig.6) is narrower than the horizontal and is a little less well controlled with some evidence of lobing at around 8kHz. The time-domain performance of the MPS-150 is displayed in the acoustic centre (Fig.1), step response (Fig.3), power cepstrum (Fig.4) and waterfall (Fig.7) charts. The acoustic centre reaches a maximum distance of only 1.5m behind the loudspeaker, indicating a rapid low-frequency decay time that is due to the closed-box design. The step response shows that the tweeters respond about 200 μ s earlier than the bass-mid drivers, but this delay is unlikely to be audible. The power cepstrum shows some evidence of echoes at about 220 μ s and 500 μ s which give rise to unevenness in the on-axis frequency response. The waterfall plot again shows the rapid low-frequency decay and, apart from some minor ringing at mid-frequencies,

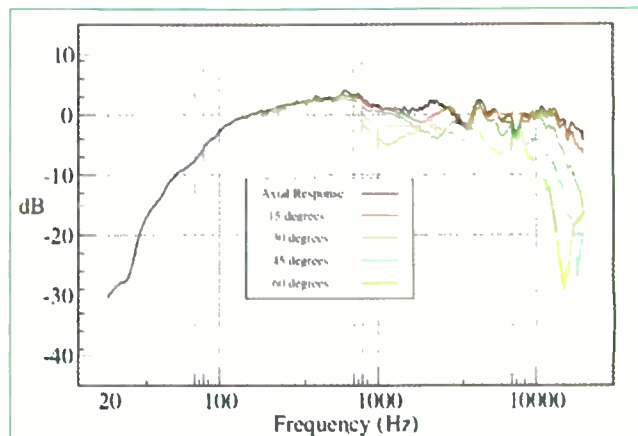


Fig.5: Horizontal directivity

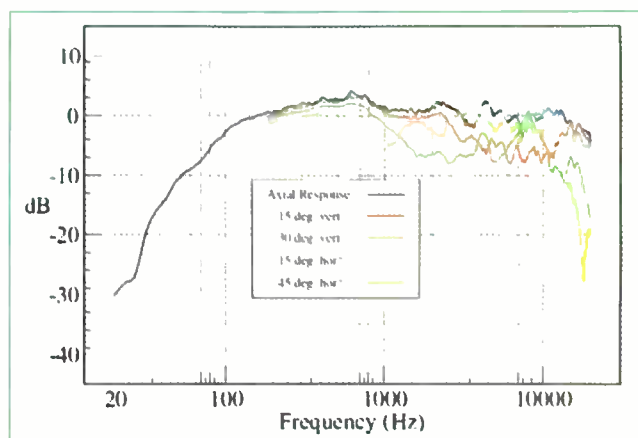


Fig.6: Vertical directivity

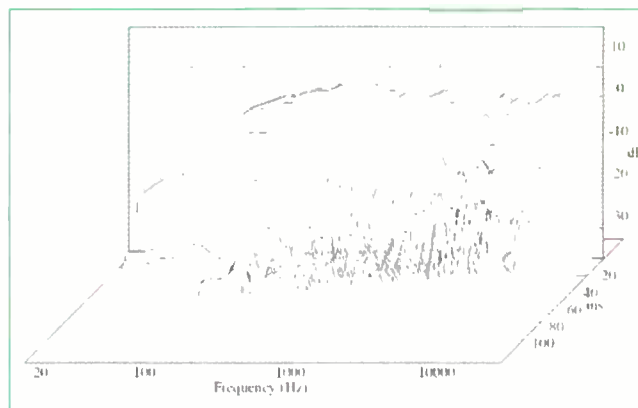


Fig.7: Waterfall chart

demonstrates very good time-domain performance. Overall the MPS-150 is an impressive performer. The directivity control is especially worthy of note; designing a non-coaxial loudspeaker with little or no narrowing at the crossover is a commendable achievement. Time domain performance is also very good, due in part to the closed-box cabinet

design; a choice that does limit the low frequency extension compared to equivalent ported designs. The on-axis frequency response and harmonic distortion are acceptable for a loudspeaker of this size. The 4Ω impedance must be borne in mind when selecting a suitable power amplifier, and in any comparisons with other loudspeakers. ■

Miller & Kreisel, US.
Tel: +1 310 204 2854.
Fax: +1 310 202 8782.

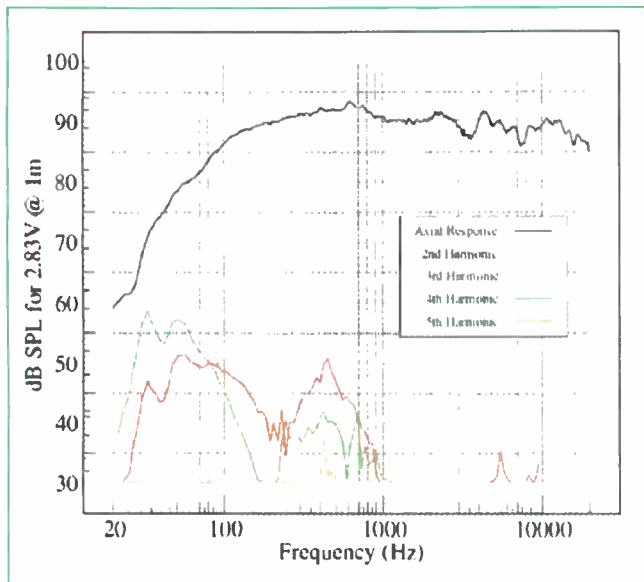


Fig 1: On-axis response and distortion

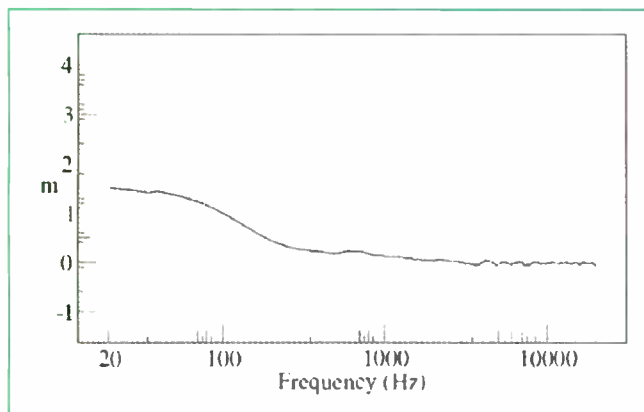


Fig 2: Acoustic centre

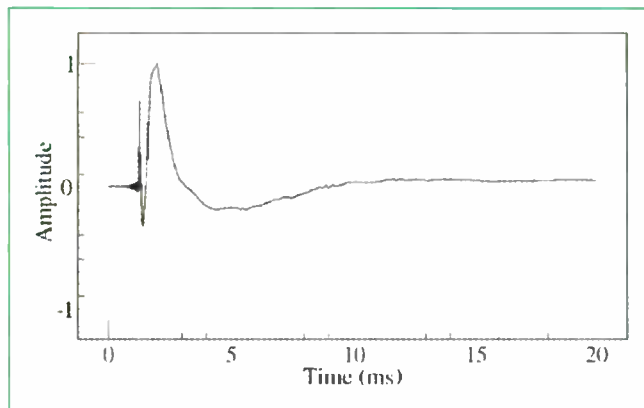


Fig 3: Step response

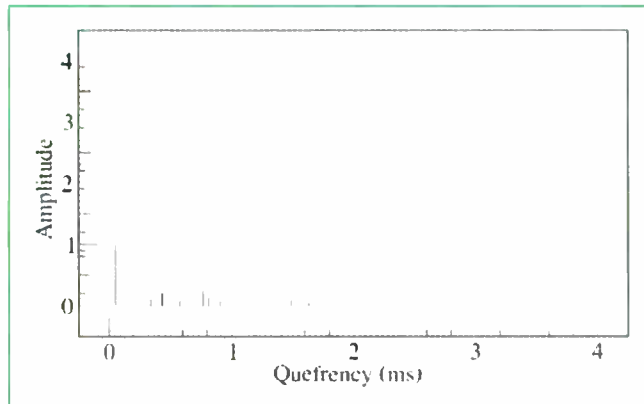
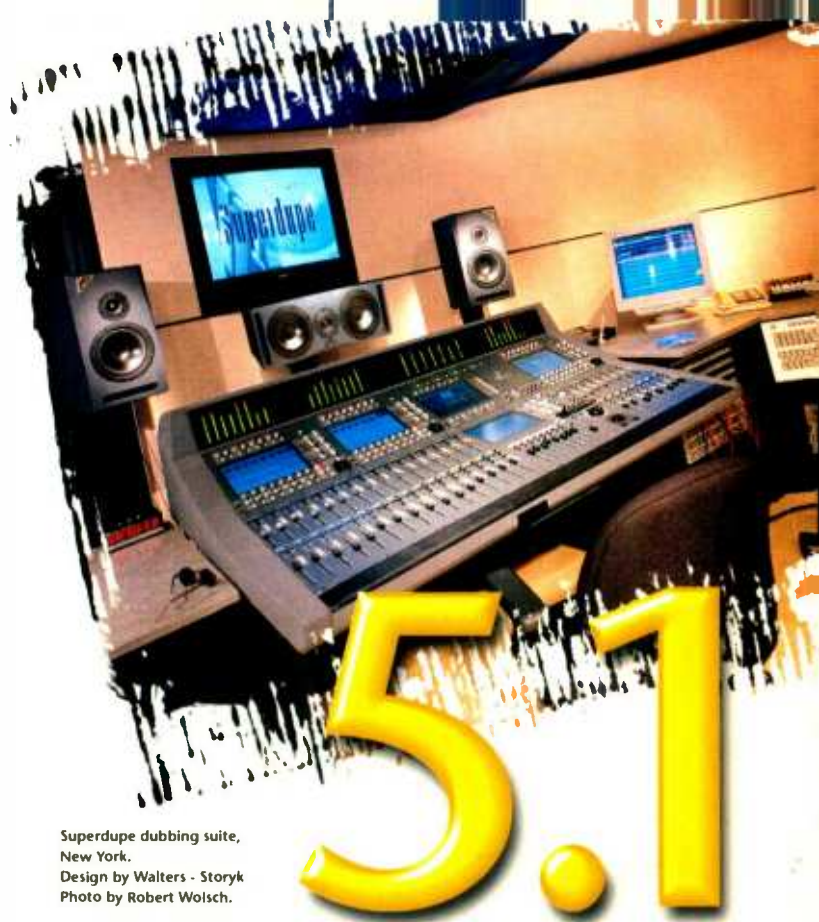


Fig 4: Power cepstrum

Studio Sound February 1999



Superdupe dubbing suite,
New York.
Design by Walters - Storky
Photo by Robert Woisch.

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Amek thinks big

Launched as its flagship console, the Amek 9098i is a large-format analogue design with circuits designed by Rupert Neve. Although derived from the original 9098 split console, the 9098i is an inline design with dual paths through each module. Amek says that the concept has been developed to be the most flexible yet seen, with motorised faders on



both paths, and a variety of 'master modes' to make best advantage of the possible configurations. This includes all current surround formats up to 5.1. In support of its claim to have produced the best sounding audio console in the world, Amek cites an extended frequency response to 200kHz (-3dB), as linear phase as possible, virtual Class A operation 'Transformer-like Amplifier' mic amps, custom transformers and balancing throughout.

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

Celestion speakers

Now in production, the Celestion C2 and C3 hi-fi speakers are floor-standing units based on a combination of extruded aluminium cabinets with MDF baffles. C2 is a compact design loaded with a 1-inch tweeter and two 5/8-inch bass drivers. The tweeter is a ferrofluid-cooled design with titanium diaphragm and neodymium magnet. C3 is a larger design, combining the same tweeter with a 5/8-inch mid-range cone, two 5/8-inch bass drivers and two 5/8-inch ABRs. Celestion claims a frequency response of 39Hz-20kHz for the C3 and cites the gold binding-posts, with large busbar connections to the passive tweeter as evidence of attention to detail. The C2 can be biwired.

Celestion, UK. Tel: +44 1622 687442.

Muscle Fish manages

Created as an audio database management application, SoundFisher is said to be able to extract salient features from a sound file and then locate others using a 'sounds-like' query. According to developer Muscle Fish, the patent-pending technology can achieve around 10,000 sound comparisons a second, based on queries such as, 'Search for the 10 sounds most similar to this sample of a rain forest and whose sample rate is greater than 22kHz.' Aimed at sound designers, editors and librarians, SoundFisher can read most common sound file formats on local or networked systems, CD-ROMs or the Internet. Muscle Fish says its system >

Studio Sound February 1999

Neumann M147

Re-establishing the place of the old guard against the new, Neumann's M147 revamp is pure performance. **Dave Foister** reports

THE M147 IS THE LATEST in a remarkable line of Neumann microphones.

Alongside its mainstream new models, there are now several that acknowledge the heritage of the company's unique history and answer the many manufacturers that have tried to cash in on the almost divine status achieved by old Neumanns. There are possibly more classics with a Neumann badge on than any other, and over the past couple of years we have seen the introduction of the M149 and the TLM50, putting a new slant on two of them, and now the M147 presents itself as, at last, a modern version of the daddy of them all, the U47.

The one-inch M7 dual-diaphragm capsule central to the vintage models has remained in production, with various improvements, ever since, and still lies at the heart of the current range. In the case of the M147 it is housed in a classically shaped matt nickel body, with the grille of a U47 mounted on the smaller overall shape of a TLM-150. In fact it looks very much like a satin silver TLM150, except that it has a multiway connector in its base instead of the solid-state microphone's XLR. Connection to the power supply is via 8-pin Tuchels, and Neumann's choice of cable is interesting; clearly it is felt that there is no need to try to impress with huge heavy-duty wiring as the professional market will know that it is quite unnecessary for the small signals and currents present here. The connecting cable is therefore quite lightweight, and while this is in some ways more convenient it will require slightly more careful handling than some, like the microphone itself.

The power supply at the other end is the N149, the current version of the supply shipped with the M149, since evidently the requirements are the same. It is about as basic as it is possible to be: IEC mains connector on the back, Tuchel in and XLR out on the front alongside an illuminated power switch. There are no other switches, as the M147 is cardioid only, sees no need for a pad and even dispenses with LF filtering.

Consequently the microphone itself is similarly simple; although this belies what is going on inside. In line with Neumann's now established way of doing things, the circuitry is a hybrid affair, marrying a transformerless solid-state output stage with a valve-based preamplifier. The specially selected triode provides around 10dB of gain to the capsule signal,

and since the familiar TLM output stage is felt to be effectively transparent this means that the sonic character of the M147 is determined entirely by the valve. As with the other TLM models, the transformerless output means not only less likelihood of saturation but also an improved ability to drive long cables and capacitive loads.

The presentation of the assembled kit is in true Neumann style, with a sleek flight-case accommodating microphone, power supply, cables and a simple swivel stand-mount that attaches to the base of the microphone. The usual Neumann range of accessories is on offer including a suspension mount and windshield, neither of which is supplied as standard. In fact the internal shock-mounting is very effective, and the small size of the M147 in its basic mount is a decided bonus in a valve microphone, allowing it to poke into places many of its kind could not reach.

If the look of the M147 is guaranteed to gladden the eye of the connoisseur, then the sound is certain to please the ear. This is Neumann class through and through, with just the combination of old and new qualities one would hope to find. The smoothness of the sound is like silk; the classic character shines through in its most open and versatile form. The spectral balance is superb, and the off-axis coloration minimal, confirming a well-controlled

polar behaviour. At the same time the noise floor is ludicrously low, and despite the absence of a pad the SPL handling capabilities are very impressive. The M147 is as happy inches from a trumpet bell as it is feet from a violin, or indeed centimetres from the lips of a singer. Even without a windshield it seems fairly insensitive to blasts and pops, and its overall character and sheer quality make it the ideal vocal microphone that one would hope it to be. In fact it is hard to think of anything that it would fail to do justice; like its illustrious predecessors this should be able to cope with anything and compete with any other cardioid in the business, whatever the job demands. It will not, of course, be the easiest microphone to rig a stereo pair of, but if it can be done with U87s it can surely be done with these.

The M147 proves again that however close the imitators get there is no substitute for the genuine article. This is the real McCoy, and although it cannot be called cheap, its simple approach means it is far more accessible than a valve Neumann would normally be expected to be. Another classic in the making. ■



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Audient ASP8024

An all-new medium-scale analogue console for music in 1999 that doesn't break the bank? **Zenon Schoepe** looks at the drawings of one such creation

FOR THOSE WHO did not spot the appearance of a graphic equaliser from new company Audient (*Studio Sound*, December 1998), you have missed the introduction of the operation that has been founded by Dave Dearden and Gareth Davis, formerly of DDA.

The more recent attentions of the former Associates have focused primarily on live sound, and it has to be said that the return to the creation of a music recording desk by the pair follows a lay-off that has seen the market change dramatically.

What is being previewed here (for world launch at the Frankfurt Musikmesse) is a traditional music-style console with loads of inputs, a well planned in-line strip and a sympathetically complete master section. The whole lot will weigh it at around £12,000 (+ VAT, UK) and shipping is expected by the middle of the year.

I saw only the frame, cards from each of the relevant sections and general schematics showing how it will look—I can say that it is more akin to a console you might have expected to buy some time ago for considerably more money than more modern derivative consoles for which prices and feature count have dropped. The line is that there are now savings to be made in the careful design and planning of analogue providing you do not tie yourself down to the performing miracles at the absolute lower end.

A point that is made much of by the designers is the service aspect of this console. It uses large horizontal boards of components mounted beneath the panel facia in a manner that is now commonplace, but these are split into 12-channel blocks and this is reflected in the desk surface panelling. However, you can actually get to the boards themselves as each panel section can be opened and tilted up. While this alone will not make the replacement of a single component any easier it does permit a board to be replaced after loosening screws and unplugging ribbon connectors. Because the desk is constructed from blocks of boards, once faults are localised they can be remedied with a straight swap.

To start with, this is no super compact console, the frame is large

enough to feel substantial with tubed reinforcing working across the entire length. Front to back reach is reduced by the mounting of the mic pre section on the inclined meter bridge to give almost a retro look.

It's called the ASP8024 because the standard frame handles 24 buses and 80 inputs at remix, the latter composed of the two signal paths for each of the 36 in-line strips and an additional four stereo returns placed in the master section. ASP is said to stand for Analogue Signal processing.

The in-line strips boast no fewer than 14 mono effects returns the first 12 of which are accessed on six paired pots with switching between their contribution to the first and last half dozen in pairs, plus two additional pots dedicated to Aux 13 & 14 which are intended to be pressed into service as cue feeds. EQ is 4-band with fully-parametric swept mids and fixed, 2-frequency HF and LF shelves. Predictably the mids and high-low can be switched independently between channel and monitor path and there is excellent flexibility for routing and aux allocation for the long and short fader paths. Dedicated indicators track a strip's two signal sources when flipping.

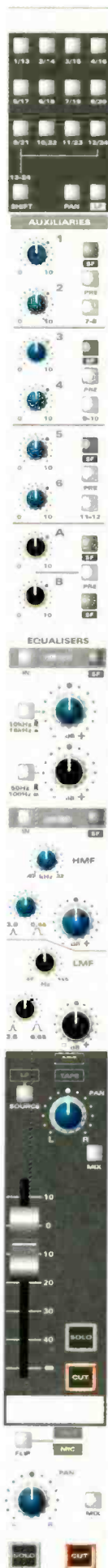
The master section will provide wide ranging control and monitoring options with studio and control sections, multiple speaker selection, good talkback, and a solo mode that allows you to alter the relative volume of the backing to the in-place signal. There are also 24 bus trims, and aux masters with blending capabilities.

What may surprise some is the complete dedication of this desk to stereo music recording with no concession to multichannel capability—although the designers make it clear that such features are on the wish list.

As it stands, the ASP8024 attempts to appeal to those who cannot get enough mic inputs together for their intended purpose on their affordable digital desks and those who like a trad-feel analogue desk.

Add an Optifile automation system to this board and it promises to deliver something of a baby SSL. Certainly one to look out for as there is a dearth of activity in all-new analogue 'proper' music recording desks. ■

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Muscle Fish, US.Tel: +1 510 486 0141.

TDK MD-Data

Suggested for use with Tascam, Yamaha or Sony multitrackers, TDK now offers MD-Data discs with a capacity of 18 minutes in 8-track mode or 37 minutes in 4-track. Named the MD-RGX PRO uses the same amorphous resin substrate as CDs and have been designed for the best possible optical accuracy in order to reduce errors.



TDK says that this is especially important in MD as the volume of the laser beam that is read back is only 3% of the beam originally emitted. MD-RGX PRO is also said to be unique in using a three-layer shell with greater mass, helping to suppress error inducing vibration.

TDK, UK. Tel: 44 1 737 773773.

BGW powers on

Millennium 3-HPS is a specialised variant on the existing Millennium 3 power amplifier, optimised for use with HPS speakers in cinemas. Notable features include: larger power supply and increased number of output devices for more power, locking shaft input level controls on the rear, signal reduction pads on processor outputs and full front panel controls. HPS speakers are made by US manufacturer High Performance Systems, which markets the amplifier and speaker combination as the 4000-HPS Motion Picture Sound System.

BGW Systems, US.Tel: +1 800 468 2677.

SAV alignments

Console manufacturer Soundtracs has reached agreement with SADiE manufacturer Studio Audio & Video to jointly develop a combined digital mixer with large-scale hard-disk recorder. Studio AV has also announced the availability of the SynchronArts VocAlign for SADiE. The Soundtracs alliance is projected to produce a 96kHz, 24-bit system with 24 or 32 tracks. It is also intended to include the kind of dynamic editing capabilities required to attract the postproduction sector. Soundtracs is said to have an installed base of more than 250 digital mixers, while the SADiE customer base is said to be more than 3,000. VocAlign for SADiE v3.7 will automatically align two audio tracks, using 'micro-editing' techniques to achieve a precise match. Applications include ADR and the tightening up of double tracking. The V.3.7 >

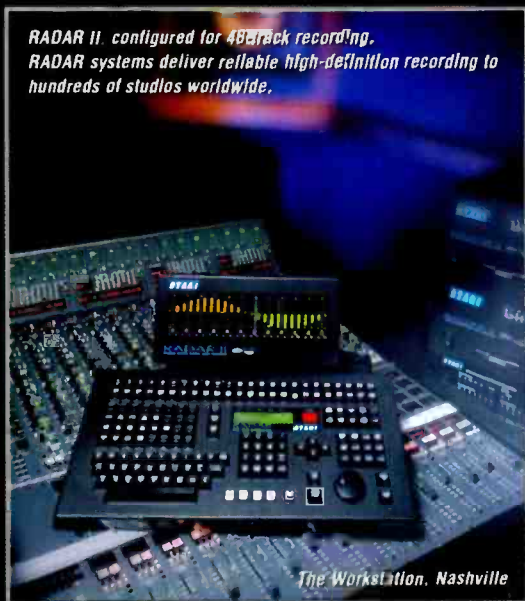
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Røde NTV

Forsaking poise in favour of performance, Røde's new valve mic is big and simple. **Dave Foister** finds a colossus

RØDE HAS SUCCEEDED better than most in its shameless imitation of classic microphone designs, largely, perhaps, because it does little else. Apart from the Broadcaster, none of its models has any qualms about conjuring up images of an old favourite, and yet they have all achieved success in their own right as quality microphones of character. The original solid-state models were joined a couple of years back by the Classic, with a clearly stated valve personality. Now, acknowledging the fact that valves do not always equal warmth and presence, there is the NTV, a big valve model with simple quality as its aim.

Paradoxically Røde's takes on vintage designs have acquired a style of their own,

so that the NTV is instantly identifiable as a Røde. A featureless cylindrical silver-grey stainless steel body carries a heavy-duty, wire-mesh grille, and a printed ring round the base carries the make and model details. This is the only marking on the microphone, and like the Classic it is not immediately obvious which is the front, the only giveaway being a gold spot below the grille. This gold spot is becoming a Røde trademark, standing out from its satin silver

surroundings on microphones and power supplies alike. ably one of the biggest cat's cradles ever to cocoon a microphone, it attaches to the base of the NTV and has all the necessary stiffness to maintain the orientation without drooping. Its swivel lock is a little on the fiddly side, and it is tricky to apply enough force to lock the thing off confidently. High density plastic construction ensures that it contributes no more weight to an already heavy microphone than necessary. The aluminium flight case for the whole outfit is reassuringly huge.

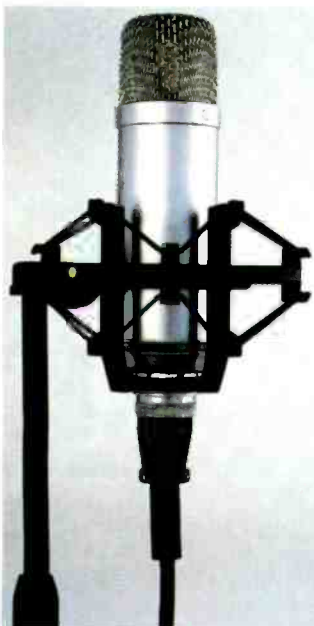
The power supply is relatively anonymous by comparison with the rest of the kit. Its front panel carries nothing more than a blue LED to show the microphone is on; the only switches are on the back, one for power, and one for earth lift—there is nothing adjustable about the NTV. It is cardioid pure and simple, and has no pad or filters.

Instead of bells and whistles, Røde has opted in this microphone for out and out audio quality in the sense of transparency and accuracy. The instruction leaflet makes much of special components—capacitors from Solen, Wima and Black Gates, output transformer by Jensen—and even the capsule is new. It is still a 1-inch diaphragm, but is now edge connected. The ECC81 valve is hand selected and graded.

The resulting specs are impressive—noise less than 19dBA, maximum SPL of 130dB—although the 20-20,000Hz frequency response has no tolerance given and no chart to back it up. More importantly, the resulting sound is even more impressive than the brief spec can reveal. The Classic went so strongly for the valve flavour that it overdid it for some tastes, and while the character is just the job for some situations it can be a little bright in others. The NTV avoids this altogether, giving a far more neutral rendition of the source. The extremes are particularly notable, as is the low noise floor, and the overall feeling of openness is comparable with the best. A microphone with no pad can be a worry, but I have recorded close saxophones with the NTV with no complaints whatever. Its behaviour with a little more distance is everything you could ask of a top-flight microphone, with minimal spill coloration, no imposed character on the sound other than a superb clarity, and the elusive feeling that everything is coming through as it should.

For my money, the NTV is the best Røde yet—the colossus of Rodes, you might say. If emulation of the classics is the aim, then the nostalgists should be happy; if general excellence is the aim, there is much here to please the purist. The NTV moves Røde into a new league, where audiophile aspirations are matched by a genuinely smooth performance. If previous Rodes have passed you by as being too characterful for their own good, check the NTV out, it may surprise you. ■

UK: HHB Communications.
Tel: +44 181 962 5000.
Fax: +44 181 962 5050.
US: Event Electronics.
Tel: +1 805 566 7777.
Fax: +1 805 566 7771.



ver surroundings on microphones and power supplies alike.

It is not immediately obvious either how to mount the microphone on a stand, despite the presence of a simple swivel and a complex suspension mount as standard in the kit. The answer lies in the connecting cable, a monster that looks capable of feeding mains to a house and would need two to handle it if it were any longer. I imagine if it were left in the cold for any length of time it would need special equipment to straighten it out. It is terminated in connectors stolen from a tank, and the screw-down locking ring at the microphone end is what holds the stand-mounts on—a simple and effective arrangement. It mates easily and firmly, and, although it is completely over the top for the electrical job it has to do, its mechanical solidity is well worth having.

The suspension mount is similarly specified above and beyond the call of duty. Prob-

NEW TECHNOLOGIES

< software for SADiE and Octavia is now available. Additions include Macintosh disk support, direct import into AudioFile, Version 2.0 DDP and real-time CD-R burn.

Studio AV, UK. Tel: +44 1353 648 888.

Soundtracs, UK. Tel: +44 181 388 5000.

QSC Audio

QSC has enlarged the PLX product line with a new amplifier and a plug-in processing card. PLX 3402 amplifier uses QSC's PowerWave switching power supply to produce 700W/8Ω, 1,100W/4Ω and 1,700W/2Ω. Mounted in a 2-U high chassis, it weighs 9.5kg. Hum and noise are said to be -110dB 20Hz-20kHz and THD .03% at rated power into 8Ω. There are low-frequency filters for



speaker protection and proportional clip limiters are said to reduce distortion while maintaining dynamics. Designed for use with the PLX series, the BSC-3 Buscard accessory adaptor adds a 2-channel crossover filter and input isolation transformers, plus input attenuation for excursion processors which require less than 32dB of gain. The filter can be configured as a 2-way active crossover, bandpass filter, CD horn equaliser, subsonic or ultrasonic filter. It features 4th order Linkwitz-Riley filters with selectable crossover frequencies and independent configuration of the two channels.

QSC, US. Tel: 1 714 754 6175.

Telos MPEG-2 AAC encoder

The world's first audio codec to employ MPEG-2 AAC (Advanced Audio Encoding) has been demonstrated by Telos. The most advanced MPEG endorsed technology, AAC is said to have a performance twice as good as MPEG-2 Layer 2 and about 30% better than MPEG-2 Layer 3. Therefore, less bits can be used or greater audio fidelity can be achieved for the same bit-rate. Due for delivery this quarter, the new Telos encoder occupies 1 unit and accepts analogue, AES-EBU or TCP/IP connection. Outputs are via RS-232, X.21 or TCP/IP. A companion hardware decoder is expected soon and AAC plug-in PC cards and software are also anticipated.

Telos Systems, US. Tel: +1 216 241 7225.

Dolby Headphone

The idea behind Dolby Headphone is that users can experience programmes through headphones, as if they were listening to a surround system in a cinema. A joint development by Dolby Laboratories and Lake DSP of Australia, the technology will be available on a DSP chip for easy inclusion in DVD players, VTRs set-top television boxes and other home entertainment devices. Although the primary focus will be products incorporating Dolby Digital or Pro Logic Surround decoding, the >

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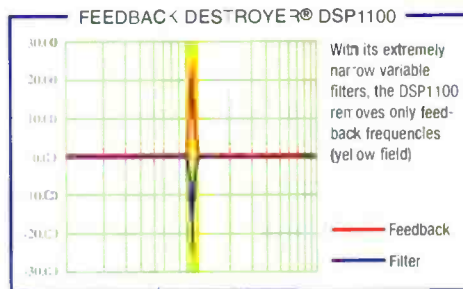
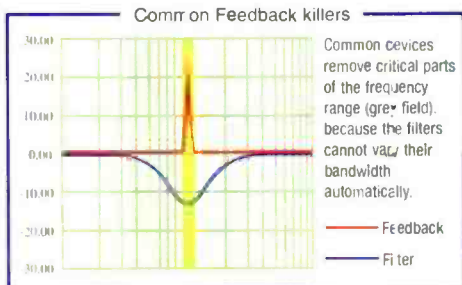
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CLM Dynamics DB500s

Much attention is devoted to 'classic' outboard circuitry, but traditional demand for new processes continues. **George Shilling** reports

IN THE AREA of studio outboard, there is always room for a new twist on an old tale. Obligingly, then, Scottish company CLM has popped up, seemingly from nowhere, with this 'Dynamic Equaliser', an EQ with several new twists. The stunning front panel has a classy appearance mainly due to the unusual and plentiful brass knobs on its 3U-high facing. However, this stereo equaliser has several features (apart from brass knobs) that set it apart from the competition.

First, the four frequency bands on each channel have a terrific range and power. The HF and LF bands can provide a massive 20dB of boost or cut. Each band features a very wide frequency range with much overlap—for instance, 1.5kHz is available on all except the lowest band. All knobs are smoothly damped, (although a few were slightly loose laterally). Gain controls feature a centre (zero) detent. In addition, each band has a separate ENABLE button (with LED) that usefully allows you to assess the effect of each individual tweak. Every band has a small switch labelled β that

there can be a dynamic increase of up to 5dB in each band, and with fast preset attack and release times the effects can be quite dramatic. With smaller boosts, the low-frequency band can add subtle warmth and the high end can exhibit an apparent increase in clarity and detail.

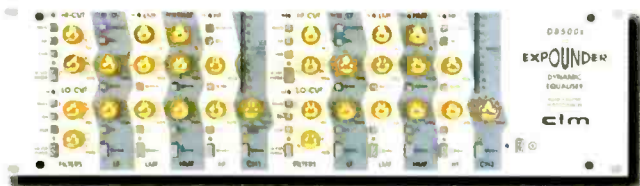
In addition to the above, each channel includes powerful high-frequency and low-frequency filters, which overlap each other by a large margin. In fact, both high and low filters individually cover nearly the entire audio spectrum. These are powerful 12dB/8ve circuits with a separate switch on each filter for even steeper 24dB/8ve filters. The high and low filters also each have a RES button, that enables a RES knob for a variable resonant frequency boost at the cut-off point. This feature is more usually found on synthesiser filters, but certainly has its uses in the studio. The knob is simply marked 0-10, but at full boost the gain is approximately 12dB, safely stopping before self-oscillation is reached. A TRACK button enables envelope following by the filter, which can be used for hiss or hum reduction, or more extreme synth-like special effects using a large resonance boost. This is particularly good on drum loops, where the fast characteristics of the Track function can be put to good effect to create juicy filter squelches.

If using the filters for 'semi-gating' noise-reducing functions, the resonance control is useful for minimising the inevitable loss of extreme frequencies in the signal by enhancing the remaining ones by a few dB. Each filter has its own ENABLE button, and when working in stereo you must be sure to enable both channels or a phase shift will ensue.

Each channel also has an overall ENABLE button, and an LED bar-graph PPM and input gain knob. However, adjusting this does not affect the filter-tracking side chain. Each channel has a DYNAMIC LINK button for slaving to the other channel. Pressing both buttons enables proper stereo operation with no image shifting.

The painted front panel is exceptionally thick—a sensible move that makes the whole thing feel robust. The back includes XLR connectors, +4dBu/-10dBV switching, and a useful Outputs earth lift button. A toroidal mains transformer is employed, mounted on one of 13 vertical PCBs.

The Expounder's notched knob pointers can be a little difficult to set accurately. And perhaps the panel legending could have been a little larger and bolder. Overall, though, this box is a joy to use. For ultimate signal control and power, nothing beats the Expounder. Judging from the smart home-made manual, CLM is a small company, but it has quickly won many admirers with this unit, and I am certainly one of them. ■



reduces the amount of available boost or cut to approximately one-third of normal. This is excellent for subtler adjustments, as with up to 20dB of boost small adjustments can be tricky. The increased knob travel certainly makes matching settings easier when working in stereo or recalling previously noted settings. The two mid bands on each channel feature a Q control variable between an extremely narrow notch and a reasonably broad band. These bands also feature an unusual NOTCH push button. When depressed, this disables the boost function and substitutes 30dBs of cut, with flat being fully clockwise instead of at the centre detent. This is useful when trying to remove particularly offensive tones such as feedback howls or nasty resonances, and tape-phase emulation can be achieved by sweeping the frequency of a deep and narrow notch.

The low and high frequency bands normally operate in Shelf mode, but by depressing BELL will operate in Peak mode. When in Bell mode another button marked SLOPE changes the gradient of the curve from 6dB/8ve to 12dB/8ve for a narrower Q. One further button on the extreme bands is marked DYNAMIC, and serves to expand the selected frequencies. No effect is obtained in a 'cut' situation, but with a boost the dynamics of the high or bass frequencies are emphasised. With large boosts

CLM Dynamics,
26 Tay Street, Monifieth,
Dundee DD5 4BG.
Tel-fax: +44 1382 534 868.

NEW TECHNOLOGIES

< system will work with 2-channel stereo, according to the developers.

Dolby Laboratories, US.

Tel: 1 415 558 0200.

Philips reaches ceiling

Calculating ceiling loudspeaker requirements is easy, using a free program from Philips Communication & Security Systems. Designed to assist dealers and installers, the program includes a complete database of Philips' ceiling speakers. All the user has to do is enter the room dimensions, select the speaker to be used: the SPL and the number of speakers required is instantly calculated.

Philips CSS, UK. Tel: +44 1932 765666.

Korg's Mindprint

The first in a range of Mindprint products, En-Voice is a valve compressor, equaliser and microphone preamplifier in one. There



is also an optional SPDIF interface for direct connection to digital recording systems. Priced to attract personal users, En-Voice has XLR mic input, versatile EQ and what is said to be 'incredibly solid construction'.

Korg, UK. Tel: +44 1908 857100.

Frontier expands

The Frontier Design Group has released two PCI boards which together bring 32 I/O digital audio interfacing, MIDI and synchronisation capabilities to a desktop computer. Dakota has two sets of ADAT connectors, giving 16 channels of digital I/O. A breakout cable terminates in RCA jacks for SPDIF audio and 9-pin connector for ADAT sync. There are also two MIDI inputs and outputs on Din connectors, plus an internal CD-ROM connector for direct audio transfer from CD. Montana is a PCI card that can be used alongside Dakota to double the ADAT I/O. Montana also offers synchronisation capabilities. An RCA input synchronises the computer to an external (PAL or NTSC) video signal, or external audio word clock. Alternatively, video sync can come from an internal header for direct connection to a digital video board. Montana is fitted with PCI and ISA connectors, increasing the number of ways it can be installed next to Dakota.

Frontier, US. Tel: +1 800 928 3236.

TerraSonde Toolbox

A hand-held unit with LCD, the Audio Toolbox combines digital SPL meter, real-time analyser, mic and speaker polarity checker, signal generator, dB and vu meters, frequency counter, time-code reader/generator, MIDI analyser, cable tester, tempo computer with 'lead-in-laggin' analysis and guitar practice amp with effects, among other functions. The device is fitted with balanced XLR and 1/4-inch audio connectors, plus MIDI sockets. TerraSonde was formed by Uptown Automation designer Andrew Smith and Mike Grace of Grace Design.

TerraSonde, US. Tel: +1 303 545 5848. >

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Marantz CDR640

CDR630 raised the game for Marantz's price expectations, but lacked the features of this latest CD-R. **Zenon Schoepe** finds out

PICKING UP from where its CDR630 left off as Marantz's entry-level professional CD-R with CD-RW capability, the CR640 is a serious proposition. Benefiting most pertinently from an elegant optional wired remote complete with a duplicate of the main deck's display and proper buttons, standard facilities include balanced XLR analogue I-Os, AES-EBU I-O, phono analogue output and SPDIF coaxial I-O. There is also a 9-pin control port for pulling out transport and major function keys.

The front panel 'professional' moniker manifests itself in the use of large coloured keys for the main function buttons but the remote adds a few extra such as a dedicated switch for the sample-rate convertor complete with associated LED and IED indicators for the status of the all-important manual and auto track increment modes.

Similarities with the CDR630 are purely passing and the deck employs an off-set



mounted drive rather than the cheaper machine's centrally located door, and I have to add that the loading mechanism feels substantially more robust. Those acquainted with earlier Marantz CD-R machines will spot a similarity with the company's late CDR620 that boasted a very similar-looking remote, general approach and a good deal of the features. However—and this indicates just how far these things have moved along in the last two years—the CDR640 has no SCSI II port or any of those annoying DIP switches for doing those smart things that the CDR620 promised to do when connected to a computer. It is an example of how simple CD-R burning has become when only a couple of years ago it seemed necessary to make it complicated.

The concept of a preset to store a set of rather straightforward configuration settings into the deck has been carried across from the CDR620. On the CDR640 we are presented with programmable audio delay time (up to 4s) which offsets the programme against the track increment, and auto and manual track incrementing, the former firing from a fully programmable threshold level. A real boost is the ability to enable an Auto Stop mode that serves as a good safety net for all those unattended dupes. You can also alter input sensitivity (-

10dB/+4dB), activate pre-emphasis, and fool with the SCMS status of what you are burning from this menu.

There are a few features that the CDR620 had that have been omitted, however. For example, there is no programmable mute (it is fixed at 3s), no index increment (whatever happened to this feature on CD-Rs?), and, perhaps most significantly from the operational side, no peak-hold metering or available headroom display. I reckon the metering issue is the most irritating, not because I cannot live without it but because it is just handy to have.

Even so, the addition of CD-RW capability is undoubtedly an important one with individual track or total disc-wipe options and the machine boasts yet another of those super-sweet headphones circuits that most of the Marantz machines I have ever played with seem to have.

So how does it go? The remote is superb and essential if you intend to work this machine hard. I know it should not make any difference, but I remain uncomfortable about thumping the front-panel manual increment buttons with the sort of gusto associated with a particularly tricky cue when writing. Using the remote also means you do not have to loiter near the rack-mount for the duration of the proceedings and by virtue of including a numeric keypad it also means getting more value out of the machine when using it as a player and this includes programming play orders.

Recording duties are as straightforward as could be and there is enough customisation available to optimise the process for the job in hand. Predictably there is a sync mode for translating IDs into track increments and in line with most machines of this type you can employ it as a stand-alone convertor or SRC providing you put a disc in the drive. The SRC can be 'forced' to be on permanently regardless of the incoming rate or bypassed on a 44.1kHz input in acknowledgement of the observation that unless this action is taken then a 'true' 1:1 copy does not occur.

Convertors are 18-bit A-D and 20-bit D-A and sound fine to me and certainly perform better than some of the monstrosities that are found on older generation DAT machines.

I like my CD-R machines simple and easy and it is an excellent recommendation for the CDR640 that once you grasp what this unit can do then operation progresses without the need to keep the manual in your lap.

There are some small omissions that would undoubtedly have strengthened the device's hand, but the professional level of interfacing alone and the

existence of a proper remote elevates the CDR640 well above more budget orientated machines including the CDR630. All in all, the CDR640 is nicely balanced and a straightforward package. ■

Contact

Marantz Professional,
Tel: +31 40 2736634.
Fax: +31 40 2735578.
UK: Marantz Professional,
Tel-fax: +44 1753 686080.

NEW TECHNOLOGIES

MO HHB product

New from HHB is a 5.2Gb MO disc designed for professional audio use. Each disk is individually certified for use with a range of popular hardware. HHB claims exceptional long-term archiving ability due to a highly stable recording layer with a specially compounded polycarbonate substrate, said to function dependably under extreme variations in temperature and humidity. The labelling system for the MO5.2Gb was apparently designed in consultation with professional users, as with other HHB storage media.

HHB Communications, UK.
Tel: +44 181 962 5000.

Audionics monitors digital

New from Audionics are a digital audio monitor unit and digital distribution amplifier. The SC1D digital audio monitor unit automatically sense and monitor analogue as well as AES-EBU and SPDIF signals. Digital signals are automatically routed to a 24-bit convertor and the presence of a



logged signal is confirmed on the front panel, which also indicates the sample rate and warns of errors. A bar graph and powered stereo speakers are included in the 2U-high casing. The digital distribution amplifier is a 2-input, 10-output AES-EBU D-A in a 1U case. It can be used in four different configurations and can present all 10 outputs relocked to a reference signal. All incoming audio is relocked for jitter attenuation and incoming sample rates are indicated, along with error warnings.

Audionics, UK. Tel: +44 114 242 2333.

tc electronic Unity 2

Version 2 software has been released by tc electronic for the Unity Yamaha 02R plug-in card. In addition to the M2000 software already found on Unity, version 2 brings improved routing and Finalyser algorithms, plus more channels. Unity adds two external stereo inputs as well as two internal tc effects. All new Unity cards come loaded with M2000 DC and Finalyser DC software, both of which are active for 100 operating hours. After the try-out period, the user may elect to keep one of the packages by entering a registration number, or both of the packages by buying a further license. Existing Unity users will automatically receive a free Version 2 upgrade.

tc electronic, Europe. Tel: +45 86 21 75 99.

Guillemot Maxi Studio

A combined PC audio recording and synthesis system designed for compatibility with major MIDI sequencer packages, Maxi Studio ISIS comes with eight inputs and four independent outputs. An external rack unit contains the 1/4-inch analogue connectors, RCA and optical SPDIF connectors, plus >

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Winter NAMM

Positioned at the beginning of the new year's exhibition season, NAMM again enjoyed an early crop of kit. **Zenon Schoepe** reports

MUSIC MANUFACTURERS may account for half of NAMM's initials but the LA-based show still counts a healthy pro-audio contingent among its throng driven by the popularity of the event, blue skies in January and the fact that the show remains cheaper to attend for visitors than its great European rival the Frankfurt Musikmesse. Roland introduced the affordable VM3100Pro and VM3100 V-Mixing Stations. These compact digital mixers, available in June, offer flexible signal routing and onboard effects for MIDI musicians and above and can also serve as a means of expanding I-O capability for users of the company's V-Studio workstations.

The VM3100Pro, priced at £899 (UK), boasts 20-channels, 8-buses and 24-bit converters in and out. It can store and recall complete Scenes containing mixer settings, EQ, signal routing and effects settings plus real-time automation via MIDI.

Additionally it has an RMDB II port for 8-in/8-out 24-bit digital audio transfer, and optional ADAT and TDMF interfaces. Dual onboard stereo effects processors include dynamics processing, reverb, chorus, delay, guitar, vocal, keyboard multi-effects, mic simulation, and COSM Speaker

Modelling for simulating a variety of popular near-field monitors for connection to Roland's new DS-90 24-bit digital reference monitors with 24-bit digital inputs as well as analogue. The monitor's 60W/30W bi-amplifier system with discrete circuitry is matched to a 6 1/2-inch polypropylene woofer and a 1-inch soft dome tweeter in a bass-reflex cabinet. Speaker response is adjustable from HF

and LF controls on the rear of the monitor.

The cheaper VM-3100 digital desk at £699 (UK) offers a 12-channel 8-bus design with 24-bit resolution and a single stereo multi-effects processor. Both desks can be configured as 8-bus mixers via stereo main, auxiliary, bus and monitor analogue outputs while there are two digital outputs bringing the total number of buses to 12. Channel inputs include two balanced mic-line inputs with phantom-powered XLR or TRS jacks, six unbalanced mic-line inputs (including a Hi-Z input for direct guitar connection), and four line inputs. An SPDIF input is also included and operation centres around a 136 x 22 backlit graphic LCD with associated buttons.

However, the real revelation was the preview of a decidedly more advanced and far more up-market range of digital desks which most significantly employ separate work-surfaces and modular separate rackmount processing and I-O racks. These were being played down by Roland as the VM7200 and VM7100 processors, and VMC7200 and VMC7100 control surfaces are not expected to start until the end of the year, but as a statement of intent they are by far the most forceful made by the company to date. Prices are rumoured to start in the region of £3,000 UK for the smallest configuration, but will extend to circa £12,000 for the most elaborate. Things you need to know are that the system is claimed to be a new generation of technology from Roland and should not be confused with other previous attempts, including the VM3100 desks, and will handle 94 channels, 8 stereo onboard multi-effects, long-throw motor faders, 5.1 mixing, onboard dynamic automation and snapshots, up to 48-channels of ADAT-TDMF interface, 24-fader groups, dual channel delays, 4-band parametric channel EQ, and a virtual patch-bay. It has to be said that first impressions of the largest VMC7200 worksurface, essentially a 24-fader version of the smaller 12-fader VMC7100 worksurface, is that it is extremely approachable and well thought out, and instantly elevates this effort into uncharted territory for the manufacturer. The fact that worksurfaces can share racks, and vice versa, underlines Roland's identification of live sound as a possible application for this technology. Convertors are again 24-bit and the VM7200 and smaller VM7100 processors handle 48 and 38-channels as standard, but can be expanded with a variety of interfaces. Roland has shown its technology hand through these mixers and the presence of RMDB II (Roland Multipurpose Digital Bus II) interfaces on these and the cheaper >



Roland gets serious with digital mixing



Below: HNB's latest CD-R

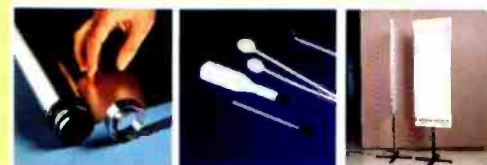


NEW TECHNOLOGIES

< MIDI connectors. Convertors are 20-bit. The GM-GS synthesiser includes 4Mb RAM containing Roland authorised sounds. Included with the package are a PCI carry carrying the RISC-based DSP and software that will run under Windows 95/98. UK price is a little over £200(UK) excluding vat. **Guillemot, UK. Tel: +44 181 944 1940.**

Film show

An innovative electromechanical film has been developed that can act as an attenuator or sensor. Approximately 0.05mm thick and containing electrically charged flat micro-bubbles, it generates voltage when exposed to mechanical or acoustic pres-



sure. Alternatively, it can produce sound in two ways when an electrical signal is introduced: either by compressing and expanding or vibrating between metallised stators. It is said to be significantly cheaper than piezo-electric polymer films. Developed by Messt and VT Chemical Technology, it is available from suppliers including EIBIS in the UK.

EIBIS International, UK. Tel: +44 171 207 2300.

JBL ups power

MPC series amplifiers are designed to give contractors a wider range of choices. The three models offer two channels of amplification, producing 225W, 300W or 600W per channel at 4Ω. There are also 'T' versions with distributed line drive capabilities of 175W, 250W and 500W per channel respectively. In addition, the 'T' versions have multiple outputs which can be loaded simultaneously. These include 100V, 70V and 25V outputs for distributed speaker lines, low impedance output and bridging capability for 140V or 200V output. The new amplifiers have protection against short circuits and have been granted THX approval, as well as safety approvals from UL, CSA and CE.

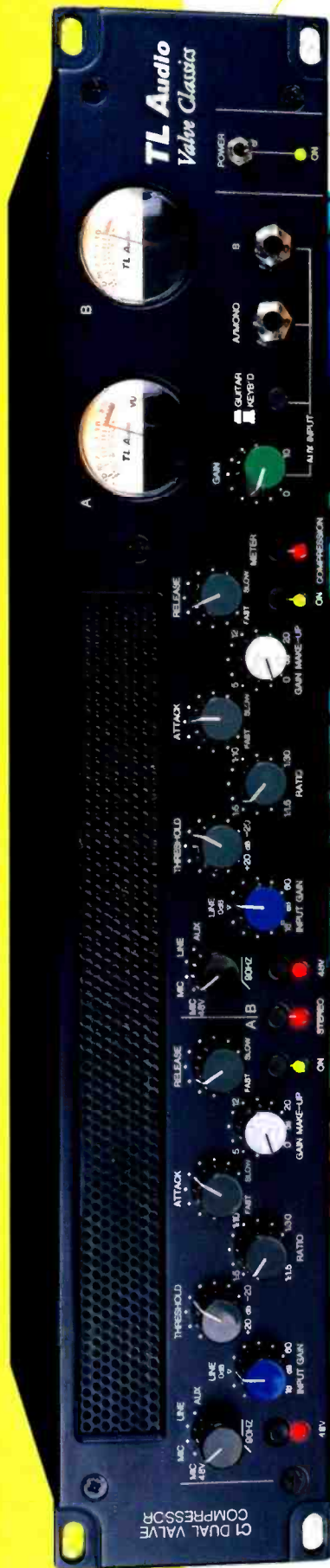
JBL Professional, US. Tel: +1 818 894 8850.

Avalon opto-compressor

A combination, stereo valve-discrete Class A opto-compressor and 6-band equaliser, the VT-747SP is described as ideal for applications including DAW signal conditioning, stereo bus compression-EQ, mastering



and keyboard sweetening. An extremely high headroom of +36dB input before overload and low noise of -92dB unweighted are claimed. The programme equaliser section is passive and the compressor is fitted with a spectral control. A large vu is >



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TL Audio products have been part of some of the most important records of recent years, and none more so than the C-1 stereo valve compressor. So when Portishead - who are without doubt one of the most influential and ground breaking acts of the 90's - came to choose some high end valve outboard to use on their latest 'PNYC' album, the decision was easy:



"There seems to be a real buzz about TL Audio equipment at the moment, and I've encountered so many engineers and producers using TL Audio products that it just seemed to be the obvious choice. The C-1 and EQ-2 were used to process the string and horn sections that feature heavily on the album - and they sounded great. The units just seem to add something special to the sound, even before you start to make any adjustments!"

Adrian Utley - Portishead
(Guitarist, Writer, Co-Producer)

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adrian utley portishead

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VM3100 products as 8 I-O, 24-bit, 25-pin D-sub's with transport sync info and powering for ADAT-TFDIF interface boxes must surely point towards the development of some form of random-access audio capability and interconnection in the future. Still at Roland, the SRV-3030 and SRV-3030D 24-bit digital reverb processors were introduced, the latter adding digital I-O to the base unit. A neat idea is a Dynamic Separation Algorithm, that can separate signals and send them into independent reverb paths. The user can specify the variable by which the signal is split according to dynamics, frequency range, or note density permitting, for example, a kick drum to be assigned a tight reverb while the snare is given a bigger one; guitar solos to have less reverb on the faster phrases and more on the slower ones; and a quiet violin to receive drier treatment, while full orchestral stabs get the full room sound. Meanwhile, Mackie announced Mackie Real Time OS Version 2.0 software for its Digital 8-Bus mixing console that was described as a significant upgrade at no charge to the user. New features include a new graphic automation editor; four user-selectable types of EQ; solo latch; solo isolate; surround bus solo isolate; record safe; a new Fat Channel overview window; compressor and gate input, output and reduction metering; a channel list that includes MIDI send and receive commands on all 97 faders (over 4 banks); and the linking of multiple consoles. New hardware options for the desk include an Apogee Low Jitter Clock I-O, the PDI-8 8-channel professional digital interface, the 24-Bit DIO-8 expansion card, and the LFX Universal FX Card. Alesis introduced the AI-3 Analogue to Optical Interface, a compact and low-cost solution for bidirectional conversion between analogue and ADAT Optical. Priced at \$499 (US) for a single rack space unit with eight balanced 1/2-inch I-Os and 20-bit A-D and D-A converters with 128x oversampling, the AI-3 is one of the cheapest ways of getting in and out of the digital domain.

The previously announced ADAT-EDIT package should be available by the time you read this. It permits hard-disk editing and

signal processing capabilities to be added to existing ADAT systems via PC at \$399 (US) by transferring data from tape to PC for manipulation and then transferred back. It includes the ADAT-PCR interface card, ADAT-EDIT audio editing software, ADAT-CONNECT audio transfer software and all the cables required to connect ADATs to a personal computer. C Audio has developed the Pulse amp range, with 2 x 650W amplifiers and 4 x 300W amplifiers (into 4Ω). They use switched mode power supplies with an associated weight reduction and two massive heatsinks with variable speed fans and open channels for easy cleaning.

Pulse amplifiers are compatible with C Audio's Connect remote control system, that allows a PC to control more than 100 amplifiers over standard Category 5 twisted-pair cable. The PC can monitor input and output signal levels and output current, as well as operating temperature, and can remotely control gain and mute for each channel.

Still on the amp front Akai made an unexpected entry with three models—the PAD500, PAD1000 and PDD1000—offering 250W and 500W stereo and 1000W bridged respectively. Meanwhile the DR16 Plus hard-disk system is externally similar to the DR16, but adds features from Akai's workstations and dubbers and 24-bit/96kHz capability. The machine records in native Akai format and supports Mac Pro Tools and MS-DOS B.Wav formats. A new sync system has been developed for multemachine use and ethernet linking to a DL1500 remote is standard. Optional cards include 16-channel EQ, SMPTE, MIDI, 8-in/16-out AES-EBU, and 8 I-O TDFIF and ADAT. Existing DR16s can be upgraded to plus status with a Kit-DR16.

HHB weighed in with the CDR850 CD and CD-RW recorder with control over copy prohibit status, fade in-out times, auto-track increment level settings, auto-stop delay, sample rate convertor on-off, and margin indicator. It has four separate recording modes: analogue, digital and two modes of digital synchro recording including the transfer of track IDs. Interfaces are balanced XLR and unbalanced phono analogue I-O,

NEW TECHNOLOGIES

< provided to indicate gain reduction, as well as bar graphs for stereo output level. The unit has a suggested price of \$2,495 (US).

Avalon Design, US.Tel: +1 949 2000.

Lucid interface

ADA8824 (ADAT) is an 8-channel 24-bit A-D and D-A convertor system with ADAT interface. Digitally controlled analogue attenuators are provided on inputs and outputs as an aid to optimising levels. The oversampling delta-sigma converters are said to yield a dynamic range of 113dB and the sample rate can be set to 44.1kHz or 48kHz. Included on the 2U-high device are eight analogue inputs and outputs, one digital SPDIF I-O pair, and one ADAT lightpipe I-O pair, as well as 15-segment LED metering.

LucidTechnology, US.Tel: +1 425 787 3222.

ATC low-down

New from ATC are multichannel monitoring control units and a sub-bass enclosure for use with this type of system. The controller bears the model number MCU-6. It allows simple integration of a sub-bass unit by providing gain control for each chan-



nel, plus the ability to allocate the sub to any number of channels, as well as the ELF. The fully specified MCU-6a has front panel controls for mute and solo, which can also be addressed via a remote control. MCU-6b has no front-panel mute or solo, but does have an optional remote for them. MCU-6c does not have the front-panel controls or remote facility. Sub-bass unit SCM0.1/15 has a newly developed 15-inch driver that is said to produce SPL up to 124dB with a response down to 18Hz (-6dB). The built-in amplifier is specified with a peak power of 1kW.

ATC, UK.Tel: +44 1285 760561.

The 7.1 standard

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coaxial and optical digital I-O, and an AES-EBU digital input. Bearing a remarkable similarity to the HHB machine except for its purple front was Fostex's CR300 machine. This was complemented by the D108 8-track hard-disk recorder with .WAV compatibility and SCSI interface and SPDIF and ADAT connectors. Matters are assisted by a graphical preview function and a sound envelope display. It includes 16 additional virtual tracks and an internal drive caddy and comes in a variety of configurations including a time-code sync card.

Fostex's first toe in the water with digital mixing arrived with the \$299 (US) VM04 20-bit stereo mixer. It has a pair of trimmable mic-level inputs and a pair of line-level inputs with rudimentary EQ and effects, and 30mm faders running to a SPDIF output.

Meanwhile v2 for the D160 hard-disk system adds .WAV compatibility, a level envelope display, six user-assignable edit memory points and 99 memory locations.

Elsewhere, Tascam superseded the DA-30 mkII DAT machine with the DA-40 that boasts trim controls for the analogue XLR outputs, character-pack recording and playback, two memory locate points, variable auto ID time setting, auto end ID setting, variable record mute time and programmable repeat times.

Dbx launched the Quantum digital mastering processor with 48-bit internal resolution and 24-bit 96kHz capability. Processing includes multiband compression, limiter, expander, gate, parametric EQ, de-esser, normaliser and the company's Type IV conversion system as found on its blue series products. New Silver series processors are the 576 valve preamp compressor and the 566 valve compressor that can have optional digital output boards fitted again with the Type IV's selectable noise-shaping algorithms and dither types. Very attractive boxes these. Software? Of course there was software. Peavey co-operated with Cakewalk to produce the StudioMix combined recording and mixing system for PC. It plays eight simultaneous tracks of audio, with additional tracks archived and the software supports real-time audio and MIDI effects processing and mixing, SMPTE-MTC synchronisation and staff notation editing and printing. A hardware

control surface has nine motorised faders, 14 soft buttons, and 18 rotary encoders and users can configure these as desired. The multitrack software is compatible with DirectX. Steinberg announced that when Cubase VST is combined with Rocket Network's Internet technology, multiple users can work together and share projects, using the Internet as a live connection. According to the company, users log into a studio on ResRocket.com and invite others to join on a project. There was also the announcement of ASIO (Audio Stream In/Out) 2.0 which further enhances the communication between audio software and hardware, according to the company. ASIO is a way of describing the communication between audio software and a piece of hardware. It enables audio hardware manufacturers to write optimised drivers for their hardware that bypass the potentially high latency operat-

ing system mechanism for supporting audio hardware. For a user, the knowledge that an ASIO driver exists for a particular of hardware, is said to be a sign that there will be a performance boost, compared with the same audio card configured to use the Operating System's own mechanism, and often an accompanying latency reduction, shown by reduced monitoring delays.

Enhancements include improved sync options, the sharing of hardware with other ASIO 2.0 applications, and the implementation of an additional protocol that allows Direct Monitoring avoiding the delays associated with Operating system buffering and These changes are downwardly with existing ASIO and hardware that support the ASIO 1.0 protocol. For an application to benefit from these new features, both ASIO host application and supported hardware needs to conform to the ASIO 2.0 protocol. ■



MIDAS PLAYED ON ITS near 30-year tradition in console design and manufacture and launched the Heritage 3000 dual-purpose desk for FOH and monitor use. Resplendent in blue panelling and burgundy end cheeks, the new board is more handsome than any other built in recent years. It is also the first of three desks that will be launched this year by Midas and slots

in at around the XL3 price point; although the old war-horse still remains available. Features include multiple stereo inputs and generous facilities for stereo in-ear monitoring and matrix mixing. The desk operates in LCR or stereo and to overcome the disparity of system size configuration between centre and LR clusters an Image rotary is included on each input module. This varies the amount of LCR the user can dial into the centre cluster effectively allowing assignment of less power to a small centre cluster but maintaining the overall spatial imagery of LCR.

Also included is a 3-position switch on pairs of mix outputs on the group module which permit each output pair to be selected either as discreet aux-mix sends or as an audio subgroup and assigning those sends at 0dB to the group fader bus regardless of the pot position. This enables a mixture of discreet outputs; stereo outputs or sub groups to be configured simultaneously across the 30-bus console.

Meanwhile, Klark Teknik celebrated its 25th anniversary with a limited edition, nickel plated, 360-unit run of the DN360 graphic equaliser which will come with transformer balancing and a 25-year warranty.



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CEDAR

Since the arrival of digital technology, audio has become dependent on mass-market development.

Chris Edwards looks into the digital crystal ball

WHEN IT WAS INVENTED in the late 1970s, nobody thought that the digital signal processor (DSP) would find greater application than in military radar systems and cruise missiles. Yet it has become a fundamental part of any pro-audio equipment that works with digital samples. The techniques needed to build a radar system turn up in designs as different as cellular phones, digital mixing desks and effects processors. That means that the pro-audio world is about to see a new generation of systems that take advantage of much faster DSPs to build cleaner EQ, noise reduction and effects. It all comes down to one basic process—filtering.

It is difficult to avoid talking about digital filtering when it comes to the subject of digital signal processing. Filtering is the fundamental technique that links many digital audio processes together. Conceptually, a digital filter is far simpler than its analogue counterpart because, once you have converted a signal into samples, you have much more freedom to manipulate the data. Analogue filter designers have the problem of determining the effect that each electronic component will have on the signal. None of those components has completely linear behaviour and working out how those nonlinearities interact comes down to one part theory, one part experience and one part intuition. With a digital filter, nonlinearities come down to how much you want to tweak the filter.

The simplest possible filter is nothing more than a moving average. You take one sample, half it and add it to the sample following it, which has also been halved. You then output the result and move onto the next sample, averaging that with the sample behind it. Simple as it may seem, this is a low-pass filter. If you take the difference between samples by subtracting, you end up with a high-pass filter.

In truth, neither is a particularly good filter: the roll-off extends gradually all the way from 0Hz to half the sample frequency—hardly a useful tool for sound sculpting. But simply adding more following samples to the equation and altering the contribution made by each by multiplying it with a different coefficient to 0.5 soon improves the quality of the filter, in the Q sense of quality.

From this one basic algorithm—the finite impulse filter (FIR)—it is possible to create a huge range of audio pro-

When the Chips are done

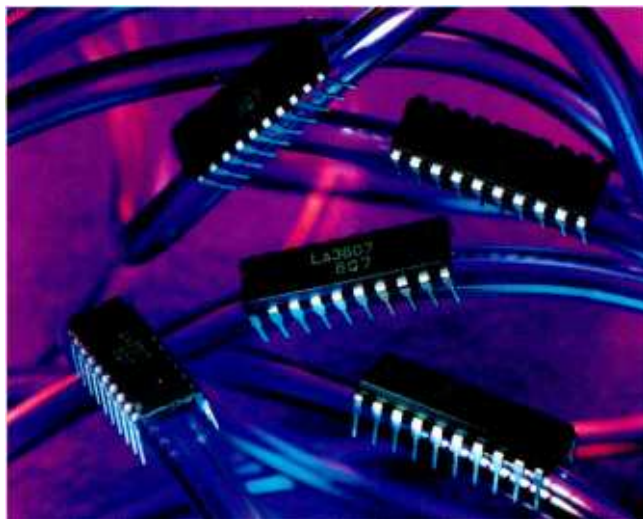
cessing schemes, from EQ to delay to reverb. All you need is an engine that can multiply and add at high speed: exactly the sort of workload for which the DSP was devised.

The FIR filter has one important property when it comes to audio processing—it has a linear phase response that prevents stereo from being blurred by the filtering process and other phase-mangling problems. There is a further problem, however, to get the right response, a FIR filter can have thousands of stages. This is particularly true of filters designed to simulate reverb. With a room in which reverberations can be expected to die within 4s, you would need a 32,000-stage filter to even come close to an effective simulation working with the severely bandwidth-limited sampling rate of 8kHz. That means 32,000 multiplication and addition operations for each sample. The processing horsepower needed to run the algorithm in real time, without any additional techniques to better simulate early reflections and other room properties, adds up to 256 million instructions on a conventional DSP. Only recently has DSP appeared that can cope with that processing workload.

Fortunately, there is a shortcut. The infinite impulse response (IIR) filter differs from the FIR by feeding back samples into the filter. This simple change has a dramatic effect on its filtering properties. It becomes possible to achieve high Q factors and long reverb times using many fewer filter stages. The IIR also makes it easier to simulate the properties of classical analogue filters using a much smaller number of stages. Not surprisingly, the IIR filter is

widely used in audio applications. Its drawback is that, thanks to the feedback effects, you lose the linear-phase response of the FIR filter and become much more susceptible to rounding errors in the arithmetic, causing the digital crunchiness found in cheaper digital effects. Fortunately, as they have more powerful DSPs to play with, professional desks and effects units can devote more processing power to ameliorating phase problems.

The best way to overcome problems caused by rounding errors is to use more bits in each calculation. Each bit corresponds to about 6dB of dynamic range in an audio system. With 16 bits to play



PROFUSION LA3807 7-BAND GRAPHIC

with, a DSP can support a dynamic range of 96dB, which is just about adequate for audio but leaves little room for accumulated errors after a long filtering operation.

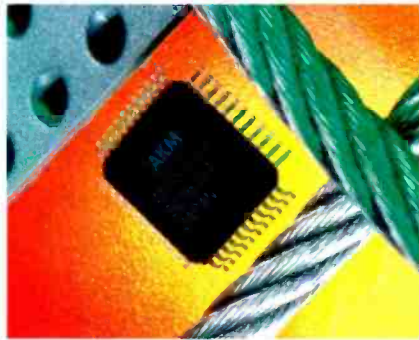
Although most DSPs have internal storage areas that can be up to 40 bits wide to cope with a large number of successive multiplies and additions, the data needs to be converted back to 16 bits at some stage. This will incur rounding errors. If that data needs to be used again and again, the lack of headroom means that the errors caused by rounding soon become audible.

If more bits are devoted to each >

<sample, there is a better chance of making sure that rounding errors remain inaudible, hence many designs use DSPs with at least 24 bits of storage for each sample. A 24-bit device has a theoretical range of 144dB. For a processor that works with 32-bit numbers, it can be as much as 192dB.

The first best-selling audio DSP was the Motorola DSP56001. A number of pro-audio designs continue to use this part and its derivatives because it was the first to handle 24-bit data when most other DSPs designed at the same time only deal with 16 bits. The main target for a 16-bit DSP is the cellular phone, although it is just about suitable for consumer audio. With millions of cellular phones sold every year and each one containing one of these devices, it is no surprise that the chip suppliers put most of their effort here. Because of its 24-bit architecture, Motorola got off to a slow start in communications because of the extra cost. The on-chip multipliers soak up a lot of chip space, and the more bits it handles, the bigger it gets. Worse, the growth is exponential and a big chip means an expensive chip.

TODAY, THE DIFFERENCE in multiplier size is less crucial than it was a couple of years ago, mainly because other things have gone on-chip. In the case of Analog Devices' Sharc, a 32-bit DSP now used in a num-



AKM AK4526 MULTICHANNEL CODEC

ber of mixer designs, the memory accounts for more than three quarters of the total chip. The reason why Analog can get away with this huge overhead on the chip is that it works out cheaper to put the two together than to buy the DSP and memory separately, assuming you want as much as 128Kb of memory on a DSP. Many cellular phone DSPs use significantly less memory to hold their data, making the choice of multiplier size more important. A cellular phone does not demand 96dB of dynamic range and the issue of multiplier size means that most DSPs shipped will continue to use 16-bit implementations. However, many pro-audio and other specialised designs can make use of that extra memory. Because the DSPs suitable for pro-audio tend to be more specialised designs, it means that they will not fall in price as quickly as those made for communications or consumer

audio. However, that does not mean that development has stopped on high-end designs. The concentration has shifted from 24-bit to 32-bit devices because of most general-purpose computers and the memories designed to support them. Over the next couple of years, the performance of 32-bit DSP chips is expected to grow rapidly.

The Sharc can typically handle 80 million individual filter operations in one second, assuming that each operation involves one multiplication and one addition. The Texas Instruments (TI) 320C40 has similar performance, but lacks the large quantity of on-chip memory. Both devices have been around for four or five years, but the two companies are now preparing designs that will double or quadruple these speeds. These will put two or more multipliers on each chip, making it possible to do more in parallel, boosting performance to more than 200 million filter stages per second.

For the moment, the DSPs used in pro-audio are hardwired: the functions they can perform are baked into the silicon when they are manufactured but this may not always be the case. One possible contender for future designs is a type of circuit that goes under the cumbersome name of field programmable gate array (FPGA). This is an uncommitted array of logic that can be programmed on the fly to do just about >

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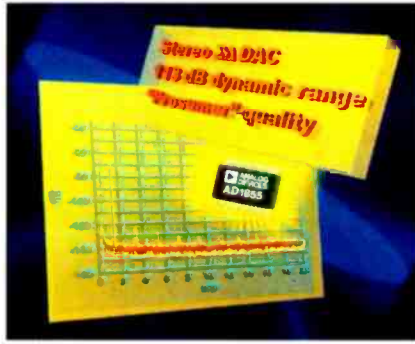
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< any job. This means that you can tune the design of a DSP for a particular job and, when it is finished, alter the internal design for something else. For example, allocating more multipliers to the design needed for high-quality EQ can enhance the filtering. A reverb simulator may opt for more memory to store the data needed to accurately model the tail signal.

Some low-end designs are already using FPGAs to handle real-time mixing, but there is a catch. The programmability comes at a high cost because it uses many more digital transistors in each circuit than its hardwired counterpart. Typically, the overhead can range from 10x to 100x per circuit, making the FPGA an expensive option if a DSP can already do the job. As with the hardwired version, the multiplier needed for 24-bit accuracy can soak up a huge amount of the real estate on the current generation of FPGAs. But the technology is developing rapidly.

Right now, it is just about feasible to put a communications DSP onto an FPGA. It will not be long before the same is true of audio DSPs and, potentially, the FPGA implementations can be much faster. In a bid to be flexible, a hardwired DSP can make compromises. An FPGA programmed for one job, such as a particular filter, need not make the same compromises. Also, depending on the filter and its coefficients, it is possi-



ANALOG DEVICES AD1885 D-A CONVERTOR

ble to use some design tricks to reduce the size of each multiplier.

A move to FPGA-based designs will make it possible to adopt more complex filter structures long before a hardwired DSP could achieve the same performance. Volume is also on the side of the FPGA. Being uncommitted, just about every electronic design can make use of an FPGA. The same is not necessarily true of an audio-capable DSP.

As a result of this shift, there is a third approach that mixes the flexibility of an FPGA with the cost advantages of a dedicated DSP. These are devices that have all of the main building blocks needed for DSP, but with the connections between them made programmable. This slashes the overhead caused by making the entire logic array programmable, but keeping much of speed and flexibility. For largely historical reasons, these devices have become known as

very long instruction word (VLIW) or explicitly parallel instruction computing (EPIC) processors because of the way in which they are programmed. However, the designs have developed a long way from the devices that spawned such cumbersome acronyms.

With much more performance to play with, there are two possible trends in high-end digital audio, and both are likely to happen in parallel. One is the ability to use more complex filters and possibly even use FIR-based designs to create equalisation and similar processes that have minimal colouring effects on the sound. The other is to use those complex filters to emulate analogue circuits much more precisely. The current retro vogue for using real valves in certain parts of the market may simply be a passing fad.

The limiting factor is one of our understanding of psychoacoustics. Many consider valves pleasing because the circuits have evolved over the years into a few forms that distort in a pleasant way. Clearly, there are psychoacoustic processes at work. Once those are better understood, it will be possible to create filters that take advantage of the same properties. It will also help drive compression techniques better than MPEG Layer 3 audio or PASC. One thing is for sure: the performance available from the next generation of DSPs is unlikely to go to waste. ■

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LIFE AT MOTOWN'S Hitsville USA was like a factory during its sixties heyday. Before the working practices were learned and refined, the staff were clocking in and out of the Detroit studios just like they did at the city's numerous automobile plants. One of the staff was Lamont Dozier.

In collaboration with Eddie and Brian Holland, Dozier wrote and produced some of the most memorable pop songs of all time, securing an astounding number of chart successes for Berry Gordy's Motown label. The Supremes, The Four Tops, Marvin Gaye, Martha and the Vandellas, Junior Walker and the All Stars, The Miracles, The Marvelettes and The Isley Brothers, all have their place in the catalogue. But there was no lack of talent on either side of the control room window or in the executive offices, for while the songwriters, producers and artists (in that order) took care of business on the studio floor, Gordy himself kept a sharp eye on quality control.

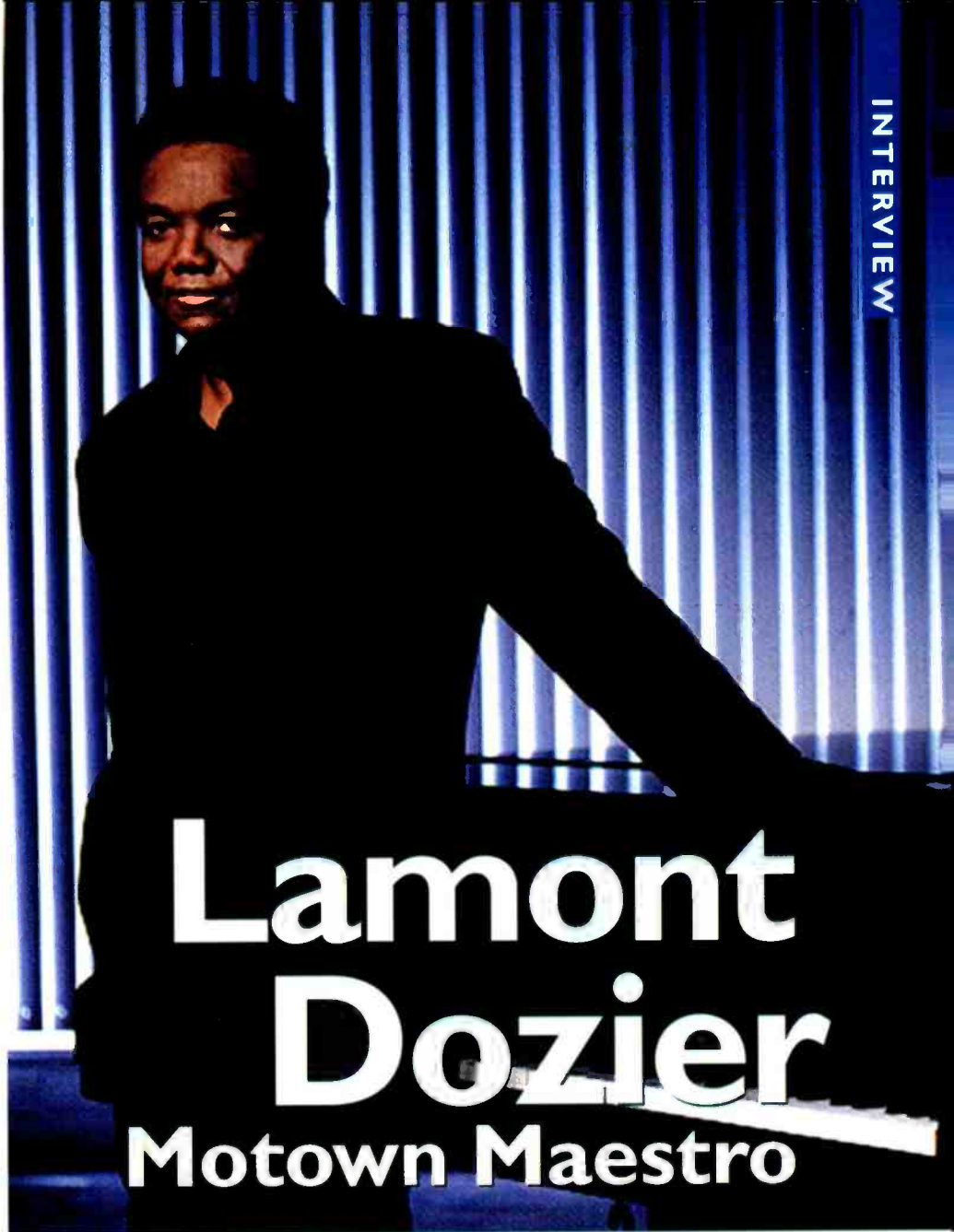
'We didn't have an A&R meeting,' Dozier recalls. 'We called it a "quality control meeting", and we actually used to get people off the street to come in and listen to the new material. Eventually, through word of mouth, people got to know that on the first of the month or every couple of months we would have one of these listening parties, and so they would hang out in front of the Hitsville building and then we would bring them into the studio, give them Coca-Cola, potato chips and hot dogs, and play a bunch of stuff for them to rate.'

'Later on we did away with that and had a nucleus of staff in the A&R department that was unmatched by any company in the world, but early on we did everything to try to be on the ball and keep up with what people wanted to hear. We were trying to give people things that would touch them emotionally, and we didn't think that because we were black we would only do this for the black population. We had all mixes, all races of people in there, because Motown embodied the notion that music is a language of its own and it crosses all barriers.'

As a means of satisfying the media's need to categorise, there have been numerous 'sounds' since the early fifties. Some of these are more credible than others, yet all have been labelled by location—the Nashville Sound, the Sun Studio Sound, the Philly Sound and even the Mersey Sound.

'If it's anything it's gospel and classical music merging together,' says Dozier of the Motown Sound. 'Also, if you listen very closely, you'll hear a sprinkling of country and western in there.'

'I was raised on classical and gospel music,' he continues. 'That's all we ever heard in our house. My grandmother wouldn't allow anything else—unless it was Tony Bennett or Nat "King" Cole or



Lamont Dozier

Motown Maestro

Frank Sinatra—and so I had this stuff ingrained in me. At the same time, being indoctrinated into the gospel way of thinking I wound up being a lead singer at church. A good friend of mine, Aretha Franklin, was there and a lot of influences were around. So the Motown sound definitely has those elements in it. If you listen to the chords of "Reach Out (I'll Be There)" or "I Hear a Symphony" or "Stop! In The Name of Love" there are very intricate patterns, and to my knowledge those structures that we were using had never been explored before.

'In terms of the bulk of the music and what people remember of the Motown sound, many of them give a lot of the credit to H-D-H, but then you've got The Temptations and what Smokey was doing. "The Way You Do The Things You Do" and "My Girl", Norman Whitfield with Marvin Gaye's "I Heard It Thru The Grapevine" and then Marvin when he started doing his own productions, so Motown has got all of these facets to it. You really can't pinpoint where it started or how it started. It just evolved

Through the Motown label, the team of Holland, Dozier and Holland were responsible for defining a new musical genre during the sixties. **Richard Buskin** hears about Hitsville and beyond

over the years, from "Please Mister Postman" and "Shop Around" to "Forever Came the Day". I could name a bunch of songs that were semiclassical, semi-country, jazz.

'A jazz musician I know used to buy the stuff and he would say, "Man, how did you do that? That jazz reference is very clever", and I'd say, "Jazz?" But that's what he heard in the music. The gospel stuff is very apparent, with the tambourines and the organs and the way the piano was pushed, and then you have your classical influence >

< there. The chord progressions were also very poignant, and so it's a combination of very many things that make up the Motown sound. There's a little bit of something for everybody, and that's why everybody bought it."

When Lamont Dozier arrived at Motown in 1962, he was there in his capacity as both a singer and a songwriter. However, after he and Brian Holland began garnering attention with their initial compositions, label head Berry Gordy advised him, "If you really want to be successful and make some money at this thing then the writing and producing aspect of it is the way to go."

Dozier heeded his advice, and shortly thereafter Brian Holland's brother Eddie decided to trade in his own career as a singer in order to join the songwriting ranks.

"He's basically an accountant-type and he didn't like to be up on stage, jumping around," Dozier explains. "That was just silly to him. He liked to be in the background and he could write lyrics, so we brought him in and that's when things started to click for us."

"We took on more of a workload and the chemistry just gelled. The three of us working together could get a lot more accomplished. I'm a lyricist and a melody man, so I would work with Brian first, getting things together in terms of the melody and the idea. I was basically the idea man in the group, and

I came up with a good 70% to 75% of all the ideas for the songs. Brian was a recording engineer as well as a melody man, and so I would team up with him to produce the track, and then I would start a lyrical idea and give it to Eddie to finish. He in turn would teach the song to the artist, and so you might say that we had our own little factory within a factory. We were able to turn out a lot of songs that way."

Working with a specific budget, Berry Gordy's contracted songwriter-producers were expected to come up with the goods—records that sold. But in addition to putting up the cash, Gordy also provided his resourceful employees with just the right creative environment. "We called it Motown College," Dozier recalls. "He just let us do what we wanted to do. We were all talented people and he believed in us, otherwise he never would have brought us in to do what we wanted to do, to do what we felt, so it was very interesting that way."

As a songwriter himself, Berry Gordy was well aware of how nerve-racking it can be to have somebody standing over you while you are working, and so he tried to provide his innovators with as much leeway as possible. In turn, when they attained the results that he had hoped for (and then some), breaking one new act after another and selling millions of records, they started to

take on the responsibility of also deciding what material should be released.

"We became so prolific that Berry trusted us to the point where he would say, 'What are you guys putting out on Diane now?' We'd say, 'Well, we like the song 'Stop! In The Name of Love'" and he'd say, "Yeah, I heard that. I liked that too. Great, you're gonna go with that?" We'd say, "Yeah", and that was the conversation."

Consider some of the hits that the H-D-H team turned out between 1963 and 1967: Marvin Gaye's 'Can I Get a Witness' and 'How Sweet It Is (To Be Loved By You)'; 'Heat Wave'; 'Nowhere to Run' and 'Jimmy Mack' by Martha and the Vandellas; The Isley Brothers' 'This Old Heart of Mine'; The Four Tops' 'Baby I Need Your Loving', 'I Can't Help Myself', 'It's The Same Old Song', '(Reach Out) I'll Be There', 'Standing in the Shadows of Love' and 'Bernadette'; and 'Where Did Our Love Go', 'Baby Love', 'Stop! In The Name of Love', 'I Hear a Symphony', 'You Can't Hurry Love' and 'You Keep Me Hanging On' by The Supremes—talk about a hot streak.

"It was amazing," agrees Lamont Dozier. "I mean, we were astounded. I remember having a conversation with Brian; I said, 'Man, I don't know what this is, but I don't think this stuff is ever going to end'. I said, 'I get the feeling that we've stumbled into something here that's worldwide and lasting', >

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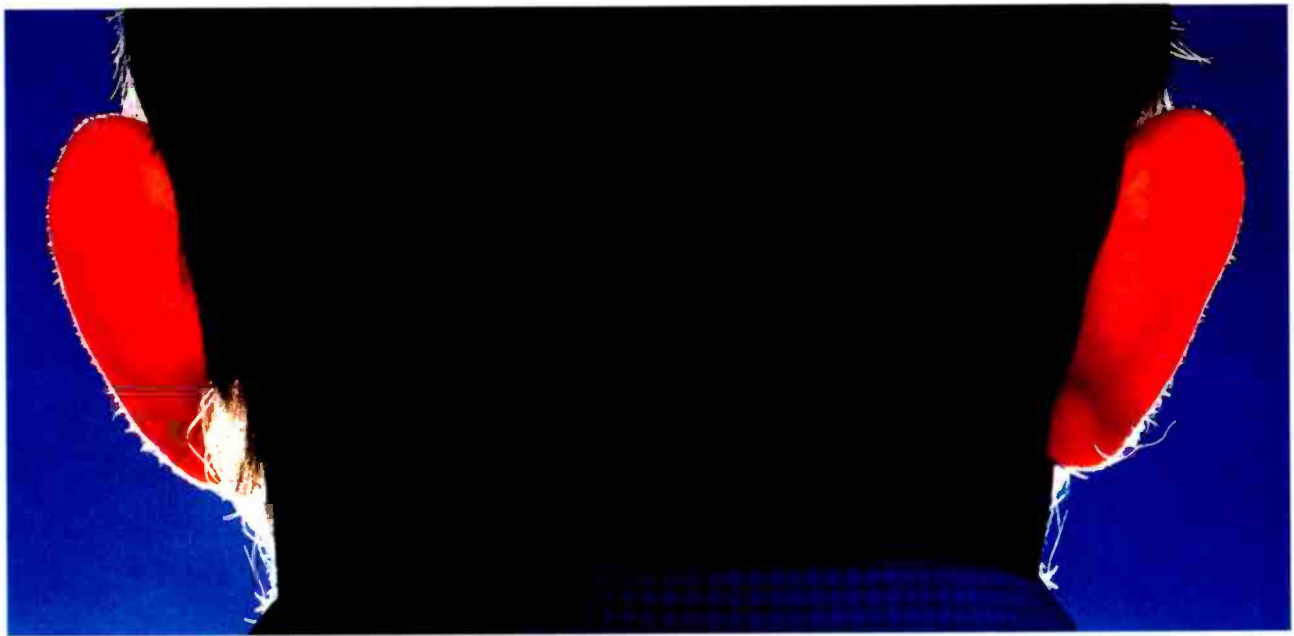
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< and he said, "Yeah man, I think so too. It's awesome. I get a weird feeling, man, like somebody has zapped us". It was like, "Okay, you got the power". I mean, how else can you explain it? And as the years went on and the success continued I knew that there was a bigger picture here and a bigger thing happening, and I truly give God the credit. We just happened to be in the right place with the right chemistry, and, for whatever reason, it was time for Motown to happen. After all, we weren't the only ones for whom it started to happen; Smokey [Robinson] was the first, and then there was Brian with [previous writing partner] Robert Bateman, and subsequently Brian, myself and his brother, and then it just went through the roof with The Supremes and The Four Tops, and so on.

'Nobody knows what a hit is. I mean, you just do what you feel. We had such a closeness together and we all would just stop and look at each other in the office when we hit this certain chord, and we'd go, "Yeah, that's it..." Bam! We'd all have that feeling, and where that comes from God only knows, because what you're doing is selling a feeling to get to people of all races from all over the world, and they pick up on what you're feeling and they know where you're coming from. Well, to get them to feel that way there's got to be somebody else in the picture, quiet and invisible, sitting on our shoulder and leading us down this path. Motown became such a legendary company, what with everything that it stood for at the time and what it put into the mainstream of life for all people around the world, that you have to say that God or that power which touches people was there in the room when we were creating this thing and it chose us to be the recipients.

'It just fell into place. Brian would play half the song sometimes; he'd play [the intro to 'Reach Out (I'll Be There)'], and then I'd jump in, push him out of the way and sing, "Now, if you feel

that you can't go on..." We would feel it like that on the spot. Then he would jump back in with, "Here's the bridge..." We would literally be sliding on and off the piano stool; I'd slide him off and go, "Darlin' reach out...", he'd slide back in for "I'll be there..." and that's the way we would do a lot of the stuff. It was a beautiful experience and one I'll never forget.'

At the same time the team was not above a little recycling when circumstances called for a quick hit in even less time than usual. Sample the occasion when The Four Tops struck paydirt with 'I Can't Help Myself—When the single began to fizzle back down the charts



the band's former label, Columbia, decided to capitalise on the situation by rereleasing one of the Tops' old albums. Execs there had correctly figured that there was nothing else in the Motown can, but what they hadn't reckoned on was the ability of Dozier and the Hollands to come up with something in short order once they had got wind of what Columbia was up to.

'We had to rush the band into the studio,' Lamont Dozier recalls, 'and I came up with 'It's the Same Old Song', which was similar to 'I Can't Help Myself'. I found a way of turning the bass figure around but basically the chords were all very similar, and so I added a few

chords on top of the high part just to give it some new nuances. We did that and had it out on the street in five days, and we squashed the Columbia record.'

Then there were the songs that, although never recorded by the people who they were intended for, turned into a hit for somebody else. In one particularly notable instance one act's rejection resulted in another's road to fortune.

'Where Did Our Love Go' was written for The Marvelettes and they refused to do it. The backing track was cut in Gladys Horton's key, which was kind of low, but they didn't like it. So without bothering to recut the track, we just went in and got Diana Ross to do the vocal, even though she had this high, shrill voice at the time. You might say that The Supremes were low down on the totem pole of artists needing assistance, but we decided to just give the song to them. Then they found out that it had been rejected by The Marvelettes and they were really pissed. They were sitting around in the studio cursing, and they didn't want to do it but they went along with it.

'Diana was already feeling unhappy about doing this song because of the key, and a lot of things were said, but she came off sounding very sultry as a result of that key. I was trying to teach them intricate harmonies for the background and I just was getting nothing, so I suggested singing "baby-baby" [at a fairly quick tempo] and the only way Diana could do it was to sing "baybeh, baybeh" in that low and sultry way. All of a sudden that was her sound, whereas previously she had been up in the air. Usually we would have put it in the higher key that she was used to singing in and it wouldn't have come off the same way. Those kinds of moments in the studio you can't explain. Nobody plans them, they just happen, and all of a sudden that became their blessing and started them on a string of hits.'

The Supremes, on the other hand, never acknowledged that 'Where Did >

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◀ Our Love Go' was not such a bad song after all. They simply cashed in on its success by embarking on an extensive concert tour, and then when they returned it was with a whole new attitude.

'Brian and I picked them up at the airport,' Dozier recalls, 'and when they came off that plane, man, and I didn't know these girls. They had a way of walking and talking that was almost funny to us: "Oh, hi darling!" I mean, star time, you know? Brian looked at me and we kind of smiled at each other, but they were into it. They were riding this crest, and then right after "Where Did Our Love Go", bam! "Baby Love", bam! We didn't have an album of songs, so we had to get right in the studio and when Berry heard "Baby Love" he said, "Hmm, this is kinda different. I think it



PHOTOGRAPH OF HOLLAND, DOZIER, AND HOLLAND FROM THE MICHAEL OCH ARCHIVES © REDFERNS

could be a Top 20". Nobody knew it was going to sell however many millions. It was incredible, and it launched their career and then the hits came one after the other. We were looking at each other and saying, "What the hell is this?" It was very eerie because no one had ever done anything like this, and being the first made you feel kinda funny.'

There again, working with lead singers of the calibre of Diana Ross, Marvin Gaye and Levi Stubbs certainly made the producers' job fairly straightforward when it came to inciting the right performance. 'They were great artists and they had such a handle on what they were doing,' asserts Lamont Dozier. 'With Levi Stubbs it would be one take. They'd be given the song, they'd be told what to do, they'd learn it in a day or two, come in and, bam, they'd be out of there. If they weren't like that they'd never be signed in the first place, so all of the artists were very good in that regard. The talent was there and that made the work much easier. It meant we were able to crank out a lot of stuff, because otherwise, boy, if the talent was kinda lousy or just mediocre we wouldn't have been able to do that.'

'Still, when we were riding this crest

of success we had to keep coming up with the goods. I mean, we weren't in the best of shape health-wise, because eventually everything takes its toll. The problems of not getting enough rest mean that you get tired, a little anxiety sets in, and then you find yourself talking to a therapist because you're mentally exhausted. For Brian and myself it got to be pretty rough there. Also, given the emphasis that was placed on Motown as this all-powerful force, we didn't really get the credit that I thought we should have, and eventually we left because of some of that, but mostly because of the money part.'

Indeed, Holland, Dozier and Holland were only modestly rewarded for all of their efforts, receiving statutory rates that were fairly minuscule in comparison to all of the publishing proceeds that were surrendered to the company.

'We didn't get the chance to share in all of the money, the billions of dollars that this company was making, and we became disenchanted. We tried to talk about it and come to some agreement, but any time we brought up the subject it fell upon deaf ears. We were making this machine richer and richer and richer, and we were the ones who were getting less and less of the pie. I mean, you put your life, your being and whatever you're about on the line, and then somebody says, "Okay, two for you, five for me, three for you, 15 for me".'

H-D-H subsequently fared better with their own Invictus and Hot Wax labels, producing hits such as Freda Payne's 'Band of Gold'. Lamont moved from Detroit to Los Angeles in 1972 and enjoyed solo success both as a singer and as a composer for numerous major artists, ranging from the familiar (The Four Tops' 'Loco In Acapulco') to the new (Phil Collins' 'Two Hearts').

Still, the past and all which that encompasses is never very far away. Mindful of the fact that others are primed to tell 'the real story about Motown', Lamont, Brian and Eddie have recently been writing together again for the first time in more than 25 years. A stage musical entitled *Holland-Dozier-Holland: The True Motor City Music Story* is intended to set the record straight about life at Hitsville USA during the 1960s.

'You need to get compensated for work that can destroy your mind and body and drag you down into the depths of depression,' asserts Lamont Dozier. 'It just isn't fair to not get what you worked for, what you made yourself sick for in a lot of cases. We need to put that kind of thing to rest. I think, and start paying creative people for what they do.' ■

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The Prince of Egypt



A BLOOD-AND-GUTS chariot race, a massive sandstorm, a pillar of fire that reaches the sky, an exodus of more than 100,000 people, a burning bush, the parting of the Red Sea, and no less than ten plagues were on the menu for the sound team that toiled for up to three years on Dreamworks' recent animated feature, *The Prince of Egypt*.

The directive from the studio's top brass was for the audio elements to be developed in tandem with the visuals, as the animators would be using the audio to help shape the visuals from the line-drawing phase onwards. Consequently, a far higher proportion of the sound work took place during production (as opposed to postproduction) than is the case on regular live action features.

'We pre-edit this type of film so that there's no unnecessary work done by the animators,' explains Nick Fletcher, supervising editor on *The Prince of Egypt*. 'The script that we start with isn't usually as tight as one on a live action movie. A lot of the people in the story department often sketch ideas and even whole sequences, pinning their drawings up on the wall and discussing everything. Then, being that we have the Avid here, it's very easy to point a video camera at those drawings and shoot them in, so that is why we now edit stuff at an earlier stage than we used

Using subtlety in preference to bombast, Dreamworks' biblical epic may be destined to become an animated classic. **Richard Buskin** talks to the audio team behind *The Prince of Egypt*

to. Next we record scratch dialogue here, put music on as well as sound effects, and that is how we kind of build the story reel.

'This obviously is when ideas are very loosely developed, and the editing therefore becomes part of the process in developing the story,' he concludes. 'When people are fairly comfortable with a sequence we then bring the actors in, and we record the final production dialogue and cut that against our storyboards.'

'During the production phase my main directive was to create a fluid environment and bits of action for the transition from storyboards to animation,' adds sound designer Lon Bender who, along with Wylie Stateman, founded the Soundelux Entertainment Group back in 1982. 'The fluidness of the movement of the characters through space was totally undeveloped because they were

just voices in an ADR studio and storyboards on a one-dimensional piece of paper. The movement and environment for them to act in was often created by the sound, and then the animators were able to do all of the layouts and design the movement of the characters from one location on the screen to another from the visual standpoint.'

For his part, the fact that he was so involved in the overall development of the film made Nick Fletcher feel that his job extended beyond that of picture editor. 'Whereas with live action footage you make your cuts from the daily rushes, as the editor on a film like *The Prince of Egypt* you can actually design shots too,' he says. 'You can say, "I'd love to get a crowd shot here", and you knock up a rough sketch and put it in, and if it works then we'll carry it through into production. We're involved in the storytelling process from the beginning, and I think that's more interesting in a way.'

Given the high cost and time-consuming nature of animation, there is normally not nearly as much shooting of new scenes on a feature-length cartoon as on a live action picture, yet there were still certain shots in *The Prince of Egypt* that, once viewed, required re-animating. At the same time, while Lon Bender and Wylie Stateman (his partner at Soundelux Hollywood) were involved from the movie's inception,

several audio ideas were also developed in the cutting room, and so there was often a close collaboration between the Dreamworks and Soundelux teams.

A case in point is the creation of the voice of God for the pivotal scene when Moses hears from his maker via the burning bush. 'That was a particularly interesting challenge for me, and something that I was very fond of working on,' comments Nick Fletcher. 'I remember we tried so many different versions of that. Being that it had the theological aspect to it that you don't really get in most movies, some brilliant ideas just didn't work on religious grounds. For instance, in terms of the effects that we tried out to manipulate the voice, if you want to make someone sound like an alien or the Devil it's relatively easy, but of course that was a no-go for us. I did a version myself using the actors, actresses and children within the film, kind of morphing from one voice to another, which for me was great fun to do and produced a pretty amazing sound. But it crossed the line theologically and so we had to abandon that idea.'

The task of creating God's voice was thus handed to Lon Bender and the team working at the facility of the film's music composer, Hans Zimmer. 'The challenge with that voice was to try to evolve it into something that had not been heard before,' says Bender. 'We did a lot of research into the voices that had been used for past Hollywood movies as well as for radio shows, and we were trying to create something that had never been previously heard not only from a casting standpoint but from a voice manipulation standpoint as well.'

The solution was to use the voice of actor Val Kilmer to suggest the kind of voice we hear inside our own heads in our everyday lives—as opposed to the larger than life tones with which the Creator has been endowed in prior celluloid incarnations.

The chariot race, on the other hand, demanded a sound that realistically conveyed the flimsy, lightweight construction of vehicles of the day. After much experimenting, bamboo and a variety of squeaks were settled upon as the raw elements with which the Foley artists could perform their moves.

'We wanted to get away from the classic Hollywood idea that, in this kind of setting, weight equals excitement,' says Lon Bender. 'We wanted something in the mid to high frequency range, not only allowing the characters to be in an environment that was real from an historic standpoint, but also enabling us to test how we could use mid to high frequency sounds that work with a score that has a lot of low and mid frequency sounds from the percussion section. In fact that was quite successful, because we weren't competing within the aural spectrum with the score, and so the chariot race not only turned out to be

historically accurate, but also entirely separate from the music.'

Again frequency considerations came into play during a desert montage that highlights the changes taking place with regard to Moses' perspective on himself and the world around him, by focusing on his own diminishing stature in relation to the increasing size of his environment.

'The low frequencies expand as he gets further and further out into the desert and as the desert grows,' explains Bender. 'As we dissolve from one phase of his life to another, long exhaling breaths emphasise his new take on life, and the sound of the desert gets deeper and deeper and deeper, and finally it goes into the windstorm that completely takes over the screen. That then contrasts with the silence that follows, and the same is true with the Angel of Death sequence, which is one of my favourites.'

In this scene, which has no music, the Angel's sound comprises the breaths of adults and children, while extremely sharp knives are used to convey the Angel's movements and the souls of the deceased are represented by a single exhale.

'We purposely played everything very quiet and very subtly to add to the feeling of danger, instead of going in the traditional Hollywood direction of everything getting louder and more exciting,' says Bender. 'We went for a much more surgical sort of scariness where things are extremely quiet and lurking around in the shadows. I think that scene is very successful.'

Equally successful in its own way is the scene that depicts the parting of the Red Sea, blending the powerful visuals with huge oceanic and gale-force wind sounds that, courtesy once more of keeping a sharp ear on frequency differences, manage to circumvent Hans Zimmer's dramatic score.

'I had the elements of that score in my hands as we were putting the sounds together,' says Bender. 'There was a certain amount of clashing going on. In fact, we had to re-envision some of the big, broad sounds—mostly of the water playing against the rocks and against the sand, and where the water goes right by the camera—in order to make room for everything. These were the things that were less static, whereas the things that were static did not fly because of all of the elements of the music, which included a lot of strong woodwind instruments and also some synthesiser pads that were very heavy. These gave size and scope to it but they also conflicted with the broad organic sounds, so we went for the things that were less static and that seemed to work very well.'

Multiple systems were used on the *Prince* project: ProTools integrated with Nick Fletcher's Avid, while WaveFrame >



< was also used for a lot of the editing. 'We did a lot of our previews and playbacks off of the WaveFrames where we were coming off the hard drive,' recalls Lon Bender. 'We also used the Dolby ISDN line to play back a lot of the material off Pro Tools when I was at a remote location in San Francisco, which is where I was most of the time.'

At Soundelux, with Bender and State-man in their complementary roles as sound designer and supervisor, the audio postproduction team consisted of two dialogue-ADR supervisors, eight sound editors, assistant sound editor, Foley supervisor, Foley mixer, a pair of Foley walkers, Foley recordist and to people taking care of any additional audio. Andy Nelson was the dialogue mixer, Anna Behlmer the effects mixer and Shawn Murphy mixed the music.

'Because there's no production track and no contamination from natural exterior recordings, you have a lot more versatility in terms of what you play and the control that you have,' says Bender, who supervised and also participated



Nick Fletcher, supervising editor

in the mix of *The Prince of Egypt* on Stage One at Todd-AO West. 'Animated mixes are more complex for that reason. You really have to make choices to play certain things and leave out certain things, whereas with live action you're often stuck with a production track that dictates how you play certain scenes.'

Andy Nelson spent a couple of months mixing 24 channels of dialogue on an Otari Premier console that also assigned 30 channels to the music and 64 channels to the effects. This was the first full mix that he had ever done for an animated feature, and he concurs with Bender about the advantages and drawbacks.

'It's good that you don't have to get rid of any extraneous sounds,' he says. 'The bad thing is that you've got to start creating an environment for these voices to live in, because, obviously, if you just play them the way that they're recorded straight off the microphone it's going to sound like a radio show. The thing that was interesting to me was that, right from the beginning when they discussed the style of the soundtrack and the way that we would go about the mix, it was very clear that they wanted to create a soundtrack that would be more inclined towards a live action film than a traditional animated feature. You

see, it was dealing with a serious subject instead of the usual light-hearted ones that cartoons usually revolve around. In terms of the sound and the visuals you're normally creating a big illusion, but the only illusion in this film related to the characters being drawn.'

'From my point of view with the dialogue, what I really strove hard to achieve was a way of creating an environment for the voices to live in, to get a sense of realistic ambience rather than just slinging a lot of echo on things and making them big and broad in the way that animated films are generally treated. I wanted to play on the subtlety of those environments, which is why the dialogue was complex. Then there were a couple of instances where it was even more complicated, such as the voice of God, where we wanted this out-of-body experience without it being booming in the traditional sense. I therefore went to great lengths to place it in the different speakers, but not in an overwhelming sense, opting instead for a warm, comfortable feeling which we achieved with the breaths that were added. That whole sequence with the voice of God and the burning bush was one of the most complicated areas, because there was this constant battle to achieve something that felt very special while not showing your hand as to how you were doing it. I think we pulled it off, but I could have spent longer on it, as we could have all spent longer on certain things.'

Needless to say, even with a three-year schedule in which to complete the audio production and post work, things ran down to the wire. 'There's always a rush to make the deadline in the end, but we just do the best that we can in the time that we have,' says Lon Bender. 'We certainly could have taken twice as long as we did to mix the movie, and I've never worked on a movie where that wasn't the case.'

'During the three years that I was involved with *The Prince of Egypt* there was never a lull when we weren't doing anything,' adds Nick Fletcher, whose own work on the film lasted until just prior to its release. 'We've got a great postproduction department at Dreamworks and the postproduction supervisor Jan Owen was guiding it through the final stages, but we'd still get into all of the print checking, signing off on the various sound formats and ensuring that everything matched.'

'We went down a lot of different roads,' comments Lon Bender. 'The soundtrack was well thought out and we tried many, many different things, some of which ended up on the screen and some of which did not. The outcome of all that we tried helped us to make decisions, and I really have to applaud Dreamworks for supporting that type of process because that's normally not done.' ■



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Vision of the Future

The inexorable transition from analogue to digital television reaches a decisive cusp. **Kevin Hilton** explores the state of broadcasting and reviews the global picture

THE FUTURE—or the adventure, depending on whose advertising campaign you listen to—has begun. Digital technology has changed the nature of many aspects of life and now its effect is being felt on the entire television chain, from programme making to postproduction to transmission and, ultimately, viewing. It has started at different times for different countries but the opportunities offered and the problems faced are universal. This is the beginning in many senses; things may now be finally happening but broadcasters and viewers now have to start coming to terms with this new situation and make it work.

Satellite television being the precocious upstart, was the first area to go digital, with France, through Canal+, and the US, via DirecTV, among the first countries in the world to enjoy the proliferation of channels and the promise of extras like interactivity and data broadcasting. This aggressive desire to be first is, perhaps, an acknowledgement that satellite remains only a small element in the overall television delivery scenario.

This was underlined at the DVB-T (Digital Video Broadcasting-Terrestrial) seminar held during International Broadcasting Convention; although, as moderator Dr Gary Tonge of the ITC (Independent Television Commission, the UK commercial regulator) pointed out, this could have just been a case of preaching to the converted. The audience was polled as to what the delegates felt would be the most important transmission format in their country within five years: 63% were convinced that it would be terrestrial, while 20% were of the opinion that cable would be the primary system. Only 15% predicted that it would be satellite.

Such findings only begin to mean anything when specific national situations are examined. As Ed Wilson, project

manager of DigiTAG (the Digital Terrestrial Action Group) says: 'In the world situation in general there are a lot of different market drivers. We have to cope with diversity: different frequency availability, different network topologies (single and multifrequency networks, plus local, regional, private and perhaps individual transmission) and very different time-scales. The urgency seen in Europe is not so pressing in other parts of the world. But we can't just go ahead and introduce DTT willy-nilly, we have a lot of things to deal with.'

This explains the staggered nature of digital, particularly in Europe and most particularly in terms of terrestrial. Each country has its own priorities and its own problems, in terms of terrain and frequency allocations. At the IBC seminar, Wilson said that a prime concern was to encourage governments to think about the politics of introducing digital services. 'A lot of politicians are interested in the prospect of adding more TV in their countries,' he explained, 'but are very keen to keep the regulators fully in control of what's going on. They are concerned about frequency availability and in particular countries where there may be no frequencies available as far as some of the original planning is concerned. We've got to get the network infrastructure built in order to launch services, and we've got to get a lot of programme people excited about putting their content onto the new medium, and we've got to get the timeframe to startup right as well.'

The first network infrastructure has been seen in the UK, which one IBC delegate nervously described as a 'front-row penguin'. In being the first in Europe (as the US is generally considered as the worldwide front-row penguin), the UK has the dubious honour of making all the first mistakes but without the luxury of being able to learn

from others as matters progress. Digital terrestrial television was officially launched in the UK on 15th November 1998: the commercial pay service ONdigital—owned and run as a joint venture by independent TV companies Granada and Carlton, with some programming from BSkyB, which was prevented from being a full partner by the ITC—went on air, staging a massive firework display at the Crystal Palace transmitter in South London. It was probably no coincidence that this event took place on the 29th anniversary of the start of colour television in the UK. ONdigital will open its own broadcasting schedule with 'free' live coverage of Mike Tyson's comeback fight against Francois Botha in January.

The UK government allocated six multiplex carriers for DTT, providing space for the five existing terrestrial channels and 25 new services. The BBC was gifted its own multiplex, which offers simulcasts of BBC1 and BBC2 (in widescreen), BBC Choice (showing a mixture of archive programming, behind-the-scenes shows and full coverage of events that the existing channels can only highlight) and News 24 (launched earlier in the year on cable, with a simulcast overnight on BBC1). Additionally, there is audio coverage of the British Parliament (with visuals to follow) and the Learning Channel, scheduled for May launch. A new multimedia service, provisionally titled BBC Active and using MPEG5 technology, was due to be launched at the end of 1998.

The second UK multiplex holds Digital 3 and 4, shared between the ITV network and Channel 4: this offers existing ITV and C4 commercial programming, the new ITV2 service and C4's dedicated subscription movie channel, FilmFour. The third is operated by S4C, the Welsh equivalent of C4, under the guise of SDN (S4C Digital Network), offering S4C >

< in Wales and Channel 5 in England, Scotland and Northern Ireland, with room for five or six new services, which will be a mixture of free-to-air and pay channels. ONdigital is primarily a subscription service, with 15 channels showing programming provided by Bosky and UK TV (a joint venture between Flextex and the BBC's commercial arm), plus new services from Carlton, Granada and others.

Just prior to the start of DTT in the UK, Bosky had belatedly launched its new satellite service, Sky Digital, with an expensive and omnipresent advertising campaign showing many distressed television sets crying out for the new service so that they could achieve their full potential.

In both digital television and radio, the UK has been either closely followed or matched by Sweden. In June 1998, 11 licences were granted by the Swedish government for the first phase of DTT, which began in October, covering approximately half of the population with two multiplexes in each region. One and a half of these multiplexes are for national services, the remainder for regional local broadcasting. Due to the demand for space, broadcasters are currently working on a time-sharing basis. This includes traditional services, pay TV, learning channels, regional and local stations and two Internet related services. The first eight bouquets (or groups of channels) were due to air in January 1999, with two more multiplexes due in August. The major difference between the British and Swedish situations is that the licences in Sweden are directly held by the programme providers, rather than the multiplex operators.

The rest of Europe, and, to an extent, the world, is falling in behind these two pioneering penguins. In Spain, a legal framework has been in place since December 1997. There will be up to 11 multiplexes, making for around 50 to 55 channels. The plan is for 50% of the population to be covered by the end of June next year and 70% a year later, with

the final target being 95% of coverage. Regional and local licences will be managed by a regional administration, rather than the national one and will begin in 2000. Spain already has two satellite platforms (Telephonic and Canal+), which last year announced their intention to merge operations.

Terrestrial transmission is a priority for Spain because of the low penetration of cable. The situation is reversed in the Netherlands (and to a lesser extent, the Republic of Ireland) as 90% of households use cable and only 5% terrestrial reception. The government is moving to the opinion that DTT may not be addressed to the mass market, with further doubts concerning frequency availability.

While there does not appear to be much enthusiasm for DTT in the Netherlands, the Irish public service broadcaster, RTE considers it the best solution to the country's problems in getting full coverage over difficult terrain. A switch-on is planned for the second quarter of 2000, with RTE proposing a joint venture with media group Digico, which would offer the existing RTE One and N2 services, plus a further six national multiplexes, giving 50 to 55 channels. New commercial station TV3 has been allocated half a multiplex with Irish language service TnaG, but there is concern that the government is creating a scenario that could be dominated by the state sector.

In Northern Europe, Finland, Denmark and Norway are carrying out tests, with the intention of introducing services towards the end of 1999 or the beginning of 2000. In Central Europe there is the problem of the crowded frequency spectrum. Like the Netherlands, Germany is heavily cabled but is showing interest in DTT, in particular mobile reception; Volkswagen, Daimler-Benz and others have been involved in tests in the north of the country. France is developing step-by-step and already has a regional service trial in the Northwest. Broadcasters in Hungary

and Poland are keen to see that the frequency spectrum is not filled up with analogue too quickly, looking for the opportunity of more capacity with digital taking place at the same time. In Southern Europe, reports are being made to the Italian government regarding moving existing analogue broadcasters to satellite to release some of the terrestrial spectrum. Portugal had plans to set up a small network in Lisbon for the World Expo.

On a wider scale, the European DTT system, DVB-T, is being tested in Singapore, while it will be used for HDTV simulcasting in Australia from 2001. It will also be the future standard in New Zealand and there are plans for testing in Hong Kong, which is awaiting a government directive. Japan is committed to commence DTT services by the year 2000, (though a recent report indicated a postponement to 2003). The Republic of South Korea plans to introduce digital broadcasting by the year 2000, while China is studying the existing standards and will decide by the middle of 1999.

The digital direct to home market in Asia is following the success of satellite in the US, which is seeing a consolidation of the market following the buy-out by Hughes Electronics—owner of DirecTV—of its main programming affiliate, US Satellite Broadcasting (USSB). India, Korea, Taiwan, Malaysia, Indonesia, Thailand and the Philippines have been the forerunners in DTH, as well as, obviously, Japan. China expects to remove the current ban on private ownership of DTH dishes by the year 2000.

There are still issues to address: when analogue services will be finally switched off; how to speed up the introduction of set-top boxes (and, more importantly, integrated digital televisions); getting the message across to the viewers; and how to make it sufficiently affordable to replace analogue TV.

The adventure has truly started, but there is still a way to go. ■

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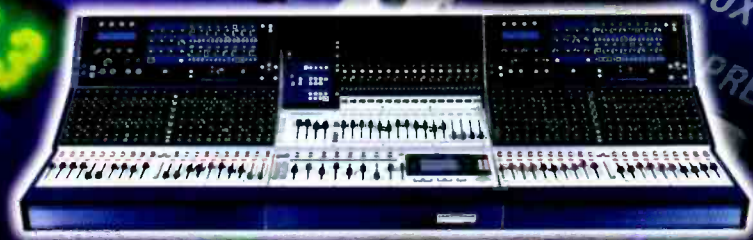
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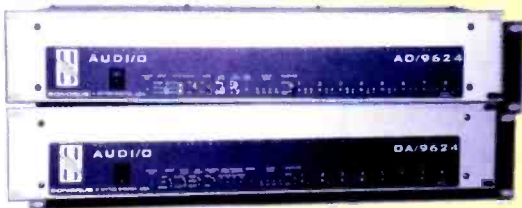
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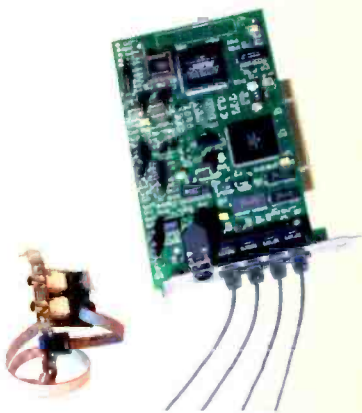
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The Vanguard

IT MIGHT HAVE BEEN an audio engineer's dream—or nightmare. When Walter Samuel sat down to mix 30 tracks from Van Morrison's considerable unreleased back catalogue, he was spoilt by a wealth of material he describes as being better than many current artists' albums. The catch was that the process involved working through hundreds of reels of tape that had been moved to England from the Warner Brothers library in Burbank: many were mislabelled or badly labelled, and all were characteristic of Morrison's uncompromising recording practices.

It started in 1994 when Samuel was called to The Wool Hall to replace the unavailable Mick Glossop for some horn overdubs on Morrison's 'Days Like This'. The session went so well that Samuel stayed found himself mixing the whole album. The event was significant in that it not only marked the end of Glossop's long-standing period as Morrison's regular engineer, but also precipitated the artist's acquisition of the studio to replace his Californian home facility, Caledonia.

Since then Samuel has been responsible for remastering Morrison's entire back catalogue (to half-inch without the use of sound restoration processes) as well as finishing the first volume of old

Van Morrison's considerable recorded catalogue has been swollen by the release of songs spanning three decades. **Tim Goodyer** talks with Walter Samuel about new songs, old tape and enduring values

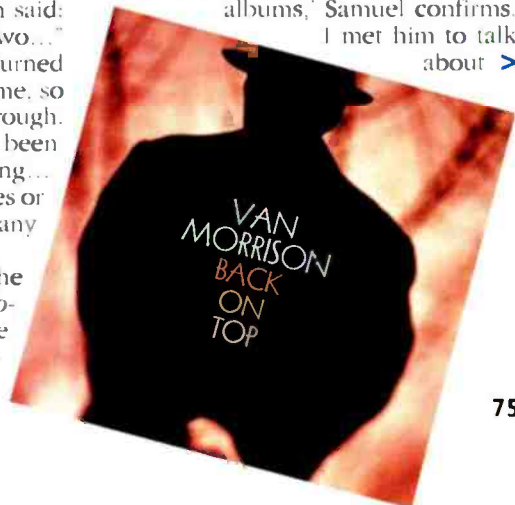
material, a double CD entitled *The Philosophers Stone*. More recently he has finished a new album, *Back On Top*, and been deluged by yet more archive tapes in anticipation of a sequel to *The Philosophers Stone*.

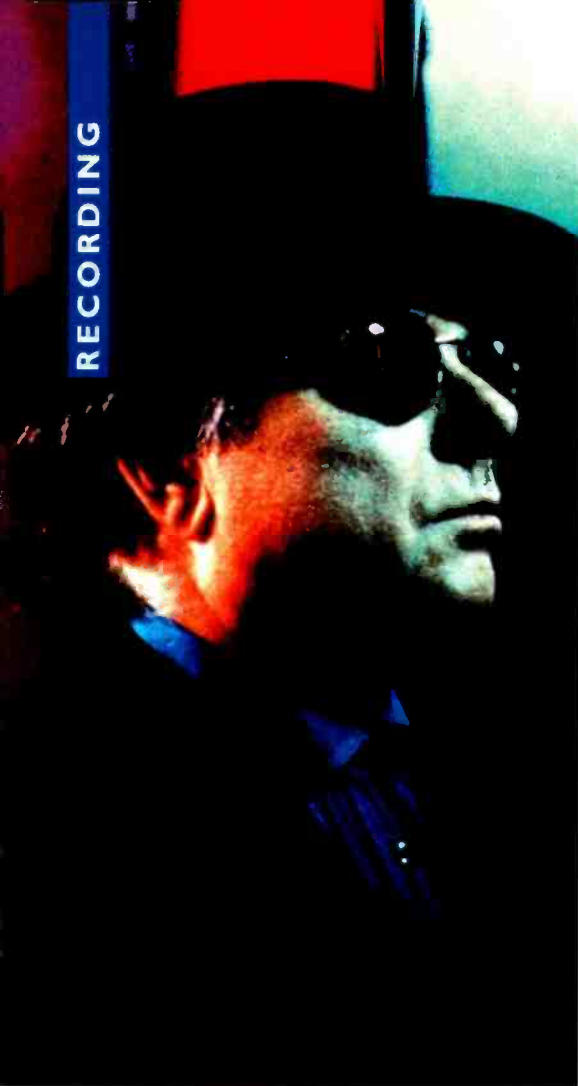
The Philosophers Stone sat on the shelf for a couple of years because Van had a new album to do," Samuel elaborates. "It didn't come out until last year, but it got very good reviews because there was some very good stuff on it, so in the middle of last year Van said: "Let's start working on volume two..." A whole load more tapes had turned up from the States in the meantime, so I had another 200 reels to go through. It's an awful lot of songs, so I've been mixing, and mixing, and mixing... I must have mixed a hundred titles or more. I can't even imagine how many hours of tape I've listened to."

Apart from their artistic merit, the 30 tracks that make up *The Philosophers Stone* provide a genuine insight into Morrison's song-

writing and recording—and as Samuel points out, there have been numerous bootlegs of Van Morrison over the years, and this album covers some of that ground. The multitracks from which they are drawn span everything from 4-track upwards, and were recorded primarily at Caledonia and the Record Plant. Jim Stern, whom Samuel contacted to get some background on their recording, engineered many of them.

"Jim Stern did an awful lot of Van's albums," Samuel confirms. "I met him to talk about >





< how things were in those days, and my problems now are pretty much the same as his were then. He recorded maybe six albums for Van in Sausalito, and he was also able to tell me who played what.'

There was more to the project than working through a pile of old multitracks however.

'We had some old finished mixes, some old rough mixes, and some songs that were never mixed at all,' Samuel recounts, 'but where we had mixes that were done at the time, they sounded so different from the ones we were doing then, and the out-takes that never made it to a final mix were just quick, rough mixes. But in the end it's very difficult to fit a mix that was done in 1976 among mixes that you're doing now so Van decided that we should remix everything.'

'Because the music is spread over such a long time the quality is variable as well. From 4-track up to 48-track, it's so different that maintaining the continuity is quite hard to achieve. The only constant is Van—he's live for 90% of it. Some of the 4-track stuff is actually really good—you get a stereo pair of the rhythm track, one track of Van and maybe an overdub or Van's guitar, and that would be the 4-track. So there's not an awful lot you can do apart from limiting the voice and adding a bit of EQ here and there. Those recordings are really good and

they were done at Van's home studio. And, of course, some of these are out-takes—there's a basic rhythm section with very few overdubs and you have to keep it sounding that way.'

The result was that everything was mixed from the raw multitracks with the aim of retaining the feel of the original sessions—adding to the recordings was not an option. Machines to play the 4-track and 8-track tapes were hired in, and Samuel felt that the Wool Hall's 'good old Solid State' SL6056 console fitted comfortably with the original setting. Outboard was carefully selected from the Wool Hall's racks to maintain the theme.

'It's actually quite hard to do,' he asserts. 'A lot of the stuff was recorded at the Record Plant on an MCI 500-series and at Van's own studio on, I think, an MCI 400 during the seventies and eighties. We're not talking ancient antique Neve here, it's state-of-the-art for the seventies. The way Van records there is no chorusing or delays, it's pretty pure music so I've kept my work the same way—I've used valve stuff and other things of the era. We've got Ureis, dbxes, Pultecs, Fairchilds, Summits and TL Audio EQs here.'

'I like analogue,' he concludes. 'The sessions with Van could be nineties or they could be mid-seventies. We record to 2-inch and try to keep it as organic as possible.'

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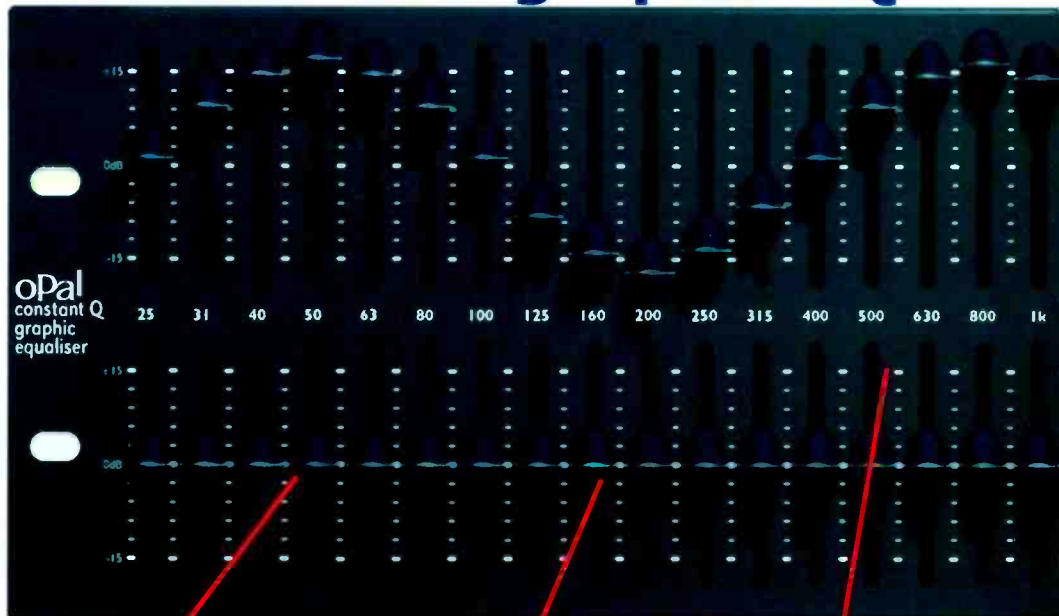


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Then there was the problem of the tape itself

A lot of tapes had to be baked—in fact the majority of them had to be baked. They were all Ampex, and those from the mid-seventies right up to the late-eighties had to be baked. All the very early tapes, the 4-track recordings were on Scotch—3M—and they just played straight away. They hadn't been out of their boxes for 20 years, and they were perfect. If I could have played them all straight off it would have been perfect, but we had to send them away, wait for them to be baked, wait for them to come back... I couldn't just go into the library, grab one tape and listen to it, it was a long drawn-out process.

But even with the equipment in place and the tapes freshly baked, Samuel was only halfway to solving his problems. The next hurdle was to make sense of what was on the tapes.

'Van said to me, "don't believe what's



on the box label", Samuel begins. "The way he records, the tape just keeps rolling. Basically, as soon as he walks into the studio the machine goes into record and keeps running until he walks out again. There are no beginnings and ends to the takes, he doesn't say, "Right, start the take now", he rehearses the chorus and then suddenly goes into the song. Not surprisingly, the tape often gets very confused so you often have to put the tape on and listen to it to know what's there. And over 25 years' worth

that had been abandoned without being considered for release.

'Van was particularly prolific during the seventies,' Samuel explains, "and there was a period when there weren't any records coming out for contractual reasons or whatever. He stopped touring, but he was always in the studio and he made recordings then that he'd decided weren't good enough that he went on to do again. So there were two albums' worth of material that never saw the light of day. I'm not sure that that >

of tapes, that's quite a lot of listening.

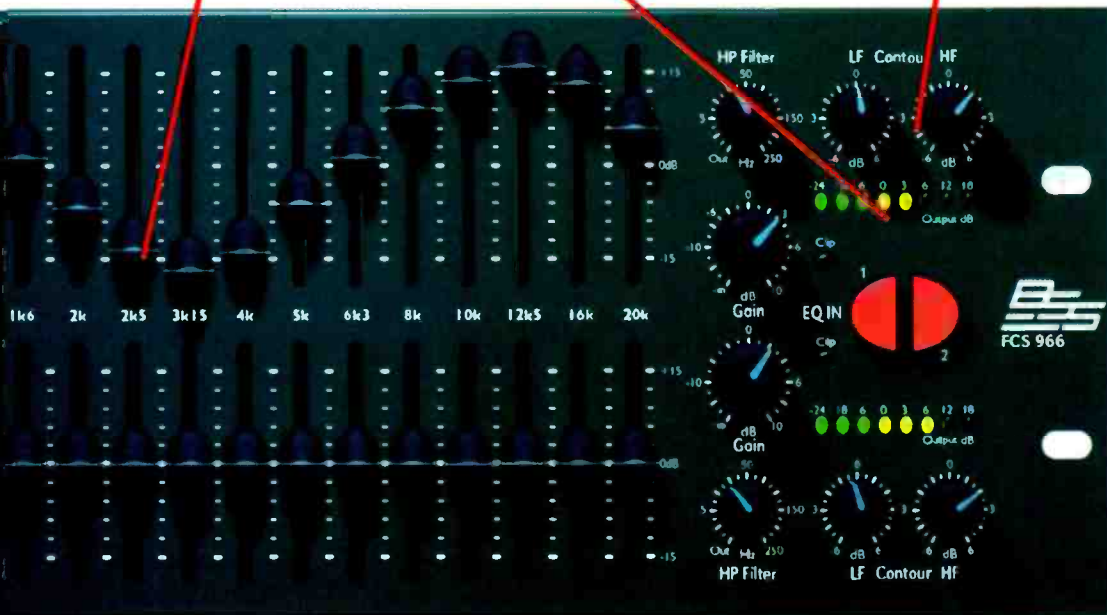
It amounted to hundreds of tracks because when Van records an album he'll do about 15 songs of which 10 will be chosen for release. There will be different versions of all of them: different styles, musicians, keys, tempos, lyrics. There was all this stuff to go through and it took a heck of a long time.'

On top of straightforward out-takes, it seems that yet more material

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was for purely artistic or musical reasons in the end, he was just on to the next thing."

Preliminary mixes made by Mick Glossop and Richard Mainwaring along with some old cassettes had enabled Morrison to give Samuel a list of takes with which to begin.

"Van's listened to just about all of it," Samuel confirms. "He would have had cassettes of the sessions from when they originally took place, and he's listened to them over the years. It's not the sort of thing you can sit down and say, 'This week I'm going to listen to...'," there's just too much to take in. So he's listened to it over the years and then we whittled it down from there.

"He'd ticked a whole load of things and said, 'mix this, mix this...'," and while I was going through those I was finding more stuff on the tape that was on the tape, but hadn't been marked down or is marked just as a title, but turns out to be yet another entirely different version to the one I thought it was going to be. And a lot of it was brilliant—say a completely different version of *Tupelo Honey* to the one everyone knows."

Long before the forgotten recordings garnered praise from the press, they had to be evaluated by artist and engineer. Although quick to draw attention to the enormity of the task of working on it, Samuel is evidently impressed by what he found, but what of Van Morrison?

"I think some of it has surprised him," comes the ready reply. "He hadn't heard some of the stuff for a long time and he's been surprised that it's so good. I think he wondered why he left it out of the albums at the time. But he records so much material that it must hard to

choose between different versions. I think he's a man for the moment—if it sounds good now, that's it."

Getting into the sessions of the seventies, it's clear that the recording techniques were simple and performance was everything. With overdubs kept to a minimum and all the musicians gathered in one room for much of the time, separation is minimal.

"Because these are out-takes there are imperfections—tuning stuff and timing stuff," Samuel concedes, "but the way Van's recorded since the early seventies, the late sixties, is to do a live vocal and then everybody else's performance gets repaired around his. You just have to work it out the best you can."

"For a lot of the early stuff at the Record Plant there were no booths," Samuel elaborates, "so one of the major problems is spill. If there were girl backing vocals lots of drums went down their mics, so when one of the girls wasn't sure of her words and I wanted to cut her out, suddenly the drum sound completely changed. It's a problem with Van as well—they had him in the middle of the room next to a guitar amp with a U87 and all sorts went down there. You just have to keep to the spirit of the way it was recorded. When Van records it's live, so you can't afford to make it too sterile."

With *The Philosophers Stone* and *Back On Top* under his belt, Walter Samuel is in a unique position to appreciate Morrison's approach to the recording studio.

"Van's method of recording hasn't changed over all these years," he says. "If anything he's working more live than he was in the eighties—live vocals and backing vocals—although I think it's a lot more disciplined now, certainly than he was in the early seventies. We wanted

ten songs for *Back On Top* and ten songs were recorded—and he had them pretty well sorted before he comes into the studio. It was very quick, mind you, he would go in and cut three or four songs a day. Short and sharp, really. I think during the seventies he was doing a lot more experimentation.

Happily, Morrison's own guidance was on hand.

"Van's not one to sit in the control room and peer over your shoulder," says Samuel. "The way it works is that I'm in the control room by myself for most of the time, then Van will come down to listen to a mix, say 'take this out... I don't like that...'," then he will take a cassette and say yes or no. But he wants to hear the thing pretty well finished and then he'll decide whether it's good enough."

With *The Philosophers Stone* joined by Bruce Springsteen's *Tracks* in setting a new standard for archive releases and *Back On Top* assuring that it is no swan song, the stage is set for the second retrospective album to pick up the story at the end of the seventies where its precursor leaves off. But there's a problem...

"The first CD was, I think, 30 songs and it was really hard to choose the final songs," Samuel begins. "There was a lot of stuff we had to leave out. From the period I've been doing now we've finished maybe 80 mixes of different titles, although some of them are a bit remote. I think we've got almost four CDs of material at this point and Van wants a break from it—it could be two years down the road. I don't even think it's possible to say that it will come out for certain, but if it doesn't, the world will have missed something. *The Philosopher's Stone* gives you a taste of what's coming, but there's some even better stuff that we got hold of after we'd finished it. I don't think anything really important was missed though. Everything that went on the albums at the time went on for a reason, although without having been there you don't always know what those reasons were."

One thing is for certain, the songs that comprise the established catalogue have established Van Morrison as a classic element in the history of rock music—regardless of what has remained in the can. Anyone preparing to present an alternative to this must, surely, have done so with trepidation.

"People get used to the released versions and when suddenly a different version of 'Real Real Gone' comes out and they're bound to make comparisons," Samuel agrees, "but I'm happy with what I've done and it's had good reviews all round. And these are Van's out-takes—they're better than most people's released albums. Musically they're full of mistakes, but they're part of it. That's certainly the way Van likes it and I think he's enjoyed revisiting it."

Let's hope that the tour is not yet finished. ■

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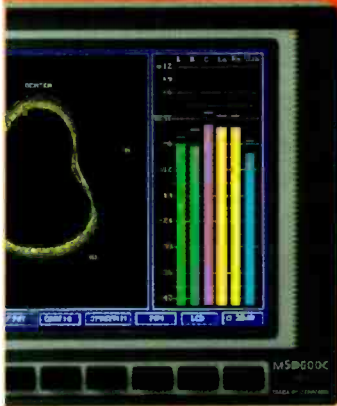


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Riding the Waves

Taking the digital radio initiative outside Europe and the US may be less an initiative and more a response to the market.

Kevin Hilton examines a new move in establishing DAB

DIGITAL RADIO IS NOW a reality, but the attitudes towards it are similar to how people view an exciting but distant place like Australia: some want to go there as quickly as they can, regardless of cost or effort; others know that it would be a good idea to go but are willing to wait; then there is the contingent—largely consisting of the listening public—who know where it is but do not see any reason to go there. This could partly explain the current staggered nature of digital radio development around the world; the pioneering countries are now consolidating as other territories pick up the lead and move towards full services. This explains the present shift in attention away from Europe—specifically the UK and Sweden—and North America—more specifically Canada—and towards the Asia-Pacific region,

in particular Singapore, and, fittingly, Australia. The emergence of Asia and the Antipodes as the next crucial area in the development of digital radio was recognised in January by the WorldDAB forum, the broadcaster and manufacturer grouping that is promoting digital audio broadcasting—albeit primarily the Eureka 147 format—on a global level, when it held its fourth International DAB Symposium in Singapore. It was the first time that the event had been staged outside North America or Europe and, says Simon Spanswick, chair of the promotions and marketing module within WorldDAB, shows that parts of Asia are moving towards adopting DAB as a broadcast technology. Singapore itself is the leader in the region: trial licences were granted to the Radio Corporation of Singapore (RCS) and SAFRA Radio to conduct 6-month trials at the end of 1997. The country is now in what is described as a 'pre-operational' phase, having used the Symposium as a trade launch and becoming the first Asian country to introduce a digital radio service. RCS has gone on air with a fully operational service as retailers gear up to stock the in-car and hi-fi units that were launched in Europe towards the end of last year.

In Australia a permanent test facility is running in the national capital, Canberra, where the possibility for a single frequency network (SFN) and other ser-

vice plans are being evaluated. The majority of services will be 'parked' in the L-band, with some VHF spectrum also set aside. Initial plans are for five services per multiplex, with channel splitting likely to be approved for some data service applications. The Australian government has announced that full services will start on 1st January 2001, something that WorldDAB sees as working with advances in Singapore to encourage other countries in the region. 'These are two reasonably important players,' observes Spanswick, 'and we hope that other countries will take up the challenge now.'

Elsewhere in Asia, Radio Television Hong Kong began trials last August; China continues with tests started in 1996 as a collaboration with the European Community, which the official Chinese news agency described 'a watershed in the development of China's radio broadcasting system'; a draft DAB spectrum plan has been drawn up for Malaysia by domestic regulators working with counterparts from Singapore and Brunei, while a pilot scheme was due to begin in Kuala Lumpur during 1998; and in India tests are centred on Delhi, with plans underway for satellite delivery in other major cities.

In Europe, some of the early development has appeared to slow down. Currently the UK only offers BBC >

< services, commercial tests having ended on 31st December 1998. This latter sector is now waiting for the independent national contractor, Digital One, to go on air later in the year, while regulatory and licensing body the Radio Authority has started to advertise local and regional licences. This situation means that more attention can be focused on other European schemes, in particular France, where the transition is being made from tests to the awarding of licences. The tests included a TDF (public broadcaster) bouquet comprising eight programmes in the L-band and a commercial bundle offering five.

Experiments were also underway concerning data-only transmissions.

Simon Spanswick describes the next phase of French development as 'an ambitious programme', that intends to see 25 cities running DAB services by the end of this year. These include Lyon and Nantes, with more stations being added to those already on air in Paris. An even bigger market for DAB is Germany: although it has been a country of contradictions in terms of the technology. It has undoubtedly been one of the main centres for research—the IRT being at the forefront since the inception of digital radio—but its federal make-up means that different regions are working to different schedules. Bavaria continues to be the most

Scandinavia continues to roll out its networks, with Finland, Denmark and Norway following the Swedish lead but still at varying stages of development. In Italy, RAI has run tests for the past two years and intends to achieve approximately 60% of the population by this year. Irish public service broadcaster RTE plans a five-channel pilot multiplex in Dublin by April

advanced area of the country, with the first generally available operational services due to start last month. Total DAB coverage of Germany has a target date of 2008, a tight proposition given that regulators have decreed that the change-over between analogue and digital, for both radio and television, should be achieved only two years later.

Aside from traditional radio broadcasts, German broadcasters are look-

ing at mobile reception, a concept that is being applied to digital terrestrial television. A test project is currently underway on an 400km-plus stretch of railway line between Frankfurt and Saarbruecken, providing MTV and scrolling text information (including news and stock exchange updates) to travellers. Although this involves pictures, the DAB transmission format is being used to distribute the data, indicating that companies such as Deutsche Telecom, the network provider in this case, are looking towards applications other than specific radio transmission.

Scandinavia continues to roll out its networks, with Finland, Denmark and Norway following the Swedish lead but still at varying stages of development. In Italy, RAI has been running tests for the past two years and intends to achieve approximately 60% of the population by this year. Irish public service broadcaster RTE is planning to have a five channel pilot multiplex running in Dublin by April, with the intention of accessing the potential for multimedia programming, connecting radio services to the broadcaster's Web site and whether DAB transmission will cause interference to Ireland's extensive cable TV network.

All this development emphasises the dominance of Eureka 147 as a DAB delivery format, but there remain two major territories where it has not as yet

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fully established itself. Although a fair proportion of North America has committed to Eureka, with 40 services running in the principal Canadian cities, the US is still veering towards the IBOC (in-band, on-channel) system. The National Association of Broadcasters prefers this option for two reasons: firstly, there are doubts that new spectrum will be made available for Eureka; and secondly, as US broadcasting is more localised than the European model, local stations fear that a broad system like Eureka would encourage the growth of new national stations, thereby creating an equality between AM and FM.

There are signs, however, that IBOC has not yet won out over Eureka. With Mexico and Chile giving clear signs that they will adopt the European standard, the US could be caught and squeezed as an IBOC enclave between the Latin American and Canadian forces of Eureka. Simon Spanswick adds that among the delegates to the Singapore Symposium was a representative from National Public Broadcasting in the US. This network is apparently keen on Eureka as it would better suit its needs.

The other major territory that has not yet made a decision on which format to adopt is Japan. Broadcasting authorities there are still evaluating both Eureka 147 and ISDB. Apparently a decision will not be made until later this year, although there are indications that things could

Within the current DAB format, there is still the dichotomy between terrestrial and satellite delivery. In some parts of Asia, terrestrial is not considered the best solution due to the huge geographical areas that have to be covered. In this sense satellite would be more efficient, but this method is still considered to be five years away from full implementation

go the way of Eureka on the grounds that it is a mature technology.

Discussions at the Symposium had a bias towards business aspects of the technology. 'The opinion appears to be that if broadcasters don't go digital, then they will be overtaken,' reports Spanswick, underlining that full business plans have to be considered as well as the founding technological elements of

digital radio. Another vexed question was whether, after supplanting FM, AM and MW radio, DAB itself would be replaced by a new format some ten years down the line. 'The collective answer to this was "No",' says Spanswick. 'Nothing on the horizon was considered to be better than DAB. DVB-T was dismissed because it is principally aimed at stationary reception and that it is less spectrum efficient than DAB, which needs less bandwidth because it is just audio.'

Within the current DAB format, there is still the dichotomy between terrestrial and satellite delivery. In some parts of Asia, terrestrial is not considered the best solution due to the huge geographical areas that have to be covered. In this sense satellite would be more efficient, but this method is still considered to be five years away from full implementation. WorldSpace, the satellite project for Africa, and, in the future Asia and Latin America, will implement outer-space delivery sooner than this, but its first phase launch date has now shifted back to April this year.

As ever, broadcasters need the support of the domestic receiver manufacturers and the knowledge that listeners understand what is happening and why. This year will be crucial consolidation and education period that digital radio needs to establish its credentials. ■

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THE POPULAR VIEW that when recording studios fled from London's Soho the audio postproduction community moved in is largely an inaccurate one. This central area of the capital has enjoyed a long association with the origination of audio for picture-based and pictureless material. What is, however, irrefutable is that the audio postproduction community is the only remaining bastion of sound in an area once populated with famous recording studios. What is not made enough of, and should be continually restated, is that Soho contains the highest of density high-end digital audio gear on this planet. It is not for nothing that London is one of the few recognised media capitals on the globe with its diversity of absolute leading-edge post facilities, down through a vigorous middle market, down still further to compact rooms filled with supporting editors and jingle writers.

Paul Headland's Wild Tracks sits comfortably in what he describes as the middle market; although its level of technology and a recent expansion belies his modesty. But it also serves to remind of the huge investment that accompanies the top pound per hour commercials houses.

A well-known and respected face in the Soho post community, Headland started Wild Tracks in 1987, having left the crucible of talent and technology at Molinaire. He opened with Studer A800s, two studios and six people, and now has five studios and 18 staff. He went for his first DAR in 1990 and now runs Sigmas in all rooms apart from one Delta and a floating spare Sabre. Other associated gear includes a Translation Station for taking in Avid material.

However, it is the recent investment in two Amek DMS digital desks to run in the two main mixing rooms that is the hot topic for discussion together with the installation of one of the first DARD-Net networks and Axis server, and the promise of combining the desk and editor technologies through Amek's Stargate interconnection concept. Ever practical, Headland points out that one of the best points of the DMS is that it allows for more metal work to be specified to accommodate more faders at a later date and to mount the DARD-DAWs ergonomically.

'Our difficulties have not been to do with the desk crashing, it has proved to be unbelievably stable and I'll always trade features for stability,' states Headland, 'our problems have been that the desk is so flexible that it's difficult to decide what you want it to do. We spent

a long time clarifying what we want the buttons to do. There's a macro panel that lets you write 12 pages, which you can access immediately. Funnies that we need are ones that handle our monitor switching and when the producer presses the talkback buttons he's actually firing a macro in the desk and the same goes for the voice-over's cot on button.

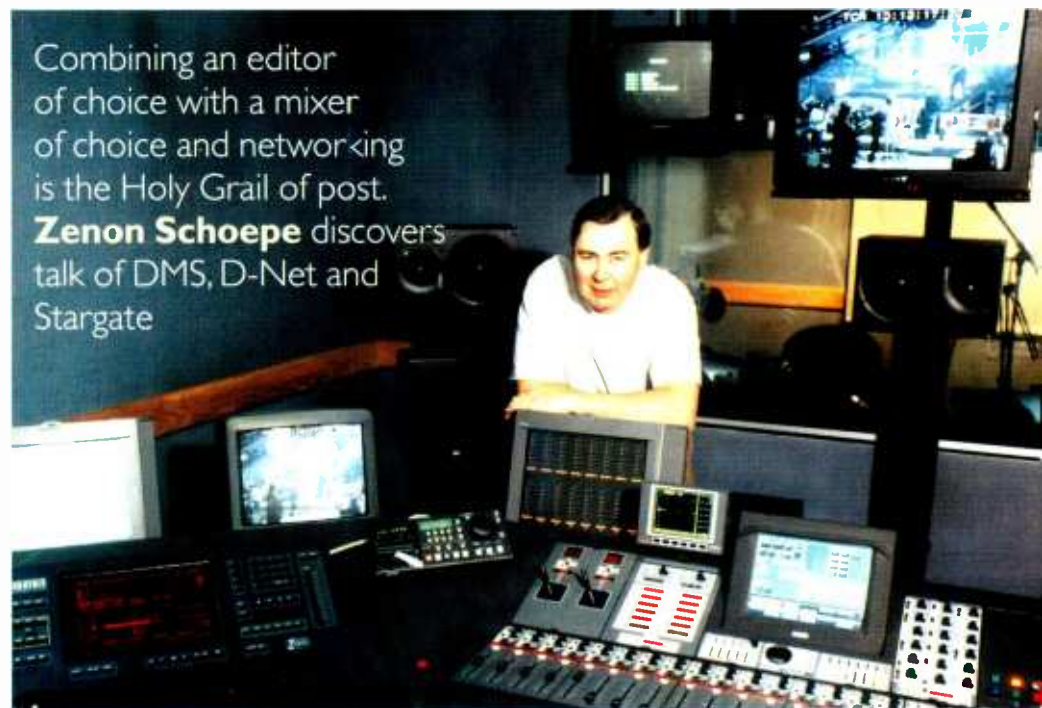
'Things like the macro panel are major for me because it means that I know that when the guys start asking to do things we'll be able to program a button to do it. That's essential because our side of the business is now so fast and the clients expect the impossible as the norm.'

The two DMSs are installed in two near-identical multichannel mixing rooms—identical because productions move around the facility and compatibility is

VHS. We're starting to see a case for 5.1 for the corporate world.'

Hourly rates for the two premier rooms have gone up, but Headland explains that this is not entirely down to the new technology investment. 'We tend to put the rates up every year anyway,' he explains. 'Probably 40% of our work is regular and those people are on annual deals anyway, but the rates have to go up simply because I have to be able to keep my talent and invest in kit—we've spent half a million pounds in the last three years and we're a small company.'

'The rate would have gone up anyway, but there's a little extra on it now. Rate card for those rooms was £165, it's now £180 which I stress is not excessive. If we were in commercials we'd be saying £250 but we're not partly because



an issue. TV programming will be the rooms' primary concern sitting on top of the facility's smaller track-laying rooms and benefiting from the DAR network's ability to move material around.

'We're hoping that these rooms will get us into doing different types of work,' he adds. 'Multichannel will be so much easier, although we could get away with Pro Logic. There's the area of DVD preparation, which we've done a bit of before mainly in conforming DA-88s for multiple languages. We also do corporate work for people like British Airways and Shell, and there is a lot of talk of companies using DVD as the release format within their organisations to replace

most of our clients book by the day or half day so it's hard to fit hours and half hours in, but we do a few commercials for the likes of Nintendo and Orange mobile phones. You have to price for the market you're in and be realistic.'

Wild Tracks has Yamaha 02R desks in its smaller editing suites, which are used mostly for promo work, desks that Headland has been impressed with. 'You cannot ignore that desk and when you're doing work for which the price is fixed and low then it becomes possible to build a room and still put in a good editing system and good people to run it,' he says. 'You can economise on the console, it's straightforward >

WildTracks

work and it doesn't need anything else. You can't cut cost on the editing system or the talent doing the job.'

However, one of the aspects of the DMS that has been promoted is its ability to run multiple worksurfaces from one large digital engine allowing small worksurface to replace the O2Rs, at least potentially, and this is something that Headland has spotted. 'The point about this technology is that you could regard it as being over the top and for some of the work we do here the O2R is over the top,' he states. 'But you never know when you'll be asked to do something really sophisticated and in those cases the DMS will come in to its own.'

Headland admits that 90% of the reason for going with the DMS was that he and his engineers liked the desk, the promise of Stargate represented an additional bonus. 'I have an affinity with Amek,' he confirms. 'We had a BC2, we like the company and it's British. It's a brand that suits us because we can't afford to put in the big SSLs and they wouldn't be appropriate for the work we do. I monitored the DMS' progress and I never lost my excitement for it. It's been a long time coming and it wasn't until IBC 1997 that I felt they had a product that we could order. It took us a while to understand it because it's not simple and we did a lot of spreadsheet modelling on how we work, how many inputs and outputs we'd need, and how to economise to keep the price down.'

Early exhibition appearances of Amek's Stargate coupled the DMS with editors from Akai and DAR as a means of tying the desk's timeline, automation and storing procedures in with those of the DAW. The idea was visionary and while still not effectively implemented with any DAW, the concept is beginning to progress.

Stargate opened up a way out for the host of DAW manufacturers who did not have the expertise or indeed the inclination or spend to develop a companion integratable digital desk. For Amek, it opened up an area of the market that it would not have been able to exploit without the development of its own editor. The combined package allows, at least on paper, a highly attractive route for customers with existing and preferred editing systems to expand their functionality with the incorporation of digital mixing from Amek. Stargate should not be confused with the Fairlight MFX3/DMS worksurface tie up that resulted in the FAME, as this is a more custom configuration.

'The ideas of Stargate, like being able to archive all the material in a project in one place, are hugely powerful,' claims Headland. However, of the three increasingly integrated proposed layers of Stargate, Wild Tracks, if the truth be known, is currently at Level zero but DAR has already run out a beta version of Layer 1.

'We have got the wire in and we have the slot in the PC ready to take the card,' laughs Headland. 'We've not pushed the issue as we have had our hands full.'

One of the interesting points is that the Stargating of DARs will be presented as a software upgrade. In the case of Wild Tracks, Stargate will ultimately allow the piggybacking of the DMSs onto D-Net and then to the Axis server. 'That would be the ideal because we have the infrastructure set up and the whole archival system,' says Headland who adds that in terms of performance and promise his DMS-DAR Stargate arrangement should be about as good as it gets with the current state of technology.

The layer 1 implementation will allow transport control from either surface, timeline to be sent from either surface and to save projects in an organised linked manner that will for this first Layer save the material on each item's drives.

'The strength of what we have here is the DAR network,' continues Headland. 'I can't praise it enough, and so many people that I've talked to have had terrible problems trying to network other systems. It really was plug and play. Every year we upgrade our DARs and they came up and did that, put the network in, plugged it into the hub, turned it on and it worked. And it's continued to work and we've been using it ever since.'

'The classic example of how it has helped is a client who rang up with an M&E on a DAT that was faulty—the usual DAT problem—and we had to give them an M&E again. It was in the Studio 3 SoundStation, which was doing a voice-to-picture session. We went to Studio 1 which was free, we put the station on to the network, as it happened what we wanted was on a different drive to the one he was recording on, and in real-time we played the M&E out from the Studio 3 system onto a prestriped DAT while he was recording voice. It was seamless. If that happens once, then whatever it was worth it was worth it because the client was happy and we got them out of trouble by lunchtime otherwise they would have had to wait to the end of the day. And it made us look good too.'

He adds that engineers have not had to relearn anything as far as DAR operation goes to benefit from the network and they have now created their own sound effects areas on the server.

'It also means that if they have something on one machine that they've forgotten about then they can always reach in and grab it out when they've moved to another studio,' he says. 'We never bought CD jukeboxes, although I suppose we should have, but we've leap-frogged that now. I think what

we'll do is once the server starts to get used more and more we'll put another on so we have one for sound effects and one for work in progress and backups.'

Wild Tracks uses a D-Net intelligent routing switcher for intelligent packet switching that increases the bandwidth of the network to allow multiple streams to run simultaneously without clashing. It currently runs at 10Mbps but the switcher is an autosensing 10/100 type for even higher capacity when the system is upgraded. Headland attributes most of his purchasing decisions back to that original choice of the first editor.

'It was the touchscreen that did it for us, and it's not numbers and list based,' he explains. 'Every time we've bought another we've all questioned whether we shouldn't perhaps look at something else. It's all done very democratically here, but we keep on with the DARs.'

'But it's amazing how little interchange we do with other DAR companies or other DAW brands,' he continues. 'Clients either start and finish a job here or finish part and then put it back on digiBeta, for example, and you'd really want to be able to suggest a better way for them. The trouble is that because of the speed at which clients are working at now they seem to have cut out the talking to you process that used to occur beforehand. They just present it to us, and, of course, we make money out of that, but they just want us to sort it out, they don't care how, there is no time. If they have to go somewhere else they just want it dumped down on to something they understand and know they can take anywhere and get on with it. Our clients are under pressure, but their clients are under pressure too. Turnarounds are now so fast and everything has to be right first time. We do very few remixes.'

Part of the recent refit and expansion has also involved taking on half of the Wild Tracks building's basement area to give the facility half as much space again. But plans have not been hatched for the new area, which is being used for storage as Headland wants to consolidate for a while before pushing on again.

'What I've found is the market we're in changes with the wind,' he observes. 'Every year our work-mix changes.'

Before the recession we were doing probably 60% corporate work and half of that went but other stuff came in—we're doing masses of satellite so it's nearly all broadcast work now. That makes deciding

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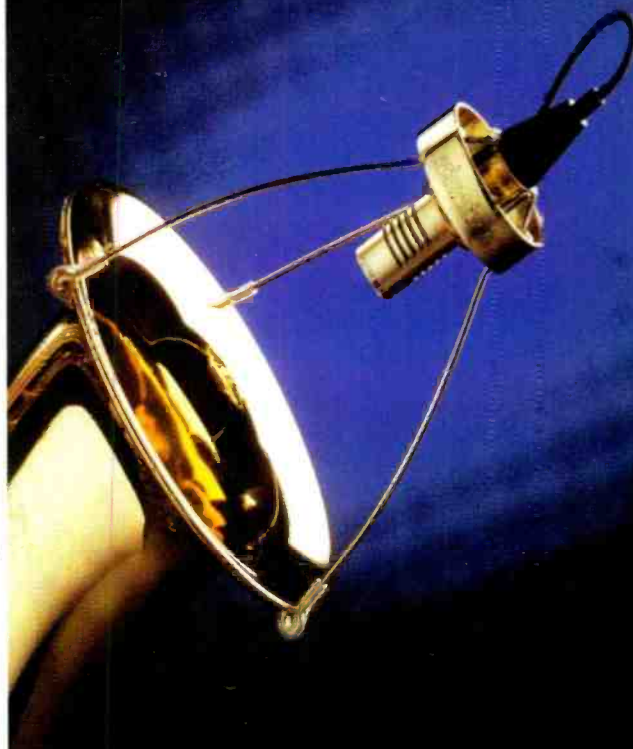
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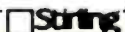
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US: Cuba libre?

With business opportunities thinning in the capitalist world, American thoughts might turn to Cuba writes **Dan Daley**

IMAGINE A PLACE brimming with fabulous musicians, talented producers and inventive recording engineers. A place with a diversity of acoustical instruments—cool percussion toys and boxy baja marimbas—and experts who can play them, that microphone placement in and of itself could become a life-long career. Now imagine that you cannot go there, even though it is only a 20-minute flight away.

Welcome to Cuba. Or more to the point, welcome to the US, which has had a strange love-hate relationship with that verdant sliver of land 90 miles south of Key West ever since we acquired it as part of the spoils of a war that made Operation Desert Storm look like the Hundred Years War. It took Admiral Dewey about four hours to decimate the Spanish fleet half a world away, in Manila Bay, in the Philippines in 1898, and the US Army a bit longer than that to defeat Spain's troops there. This 'splendid little war' made the US a world power for the first time, getting us into the colonial business. Cuba was part of the deal.

Cuba chafed under a peculiarly guilt-tinged American sort of paternalism for the next half-century, with periodic military interventions even after it gained its independence in 1902. We can be as condescending as the French—we just make more money in the process. And no one much seemed to mind later on when the money was coming from people like mobsters Bugsy Siegel and Meyer Lansky, who were looking to make Havana into the next Las Vegas, only without annoying encumbrances like paying taxes.

Not that Cuba's home-grown variety of leadership was any paradigm of virtue. Lead through the 1950s by Fulgencio Batista, a former army sergeant with a Napoleon complex, they were more than happy to cut deals with any sort of organised crime syndicates, whether they were based in Brooklyn, New York, or Washington DC. Thus, the revolution that brought Fidel Castro to power in 1959 was hardly unexpected, and for a brief moment there was a honeymoon between he and Washington as each tried to figure out the

other's actual inclinations.

Castro—who once came close to a career in US major-league baseball—actually spent a week or so in Harlem after toppling Batista, but Cold War suspicions nicked any hope of rapprochement and the debacle of the Bay of Pigs drove Fidel into the arms of the Soviets, where Che Guevara's Socialist ardour would driven Cuba in any event. This precipitated a comprehensive economic embargo nearly 40 years ago that has outlasted the Berlin Wall, not to mention the Cold War itself.

You are probably wondering why you are getting a history lesson in a studio magazine. Well, it is because this Cuban-American relationship is unique, and because it is stunting a musical influence that could be as significant to world music—and studios—as Jamaica's reggae became thanks to artists like Bob Marley. Cuba's native music, son, is a rhythmic folk music that's heavy on percussion, guitars and squeezeboxes as well as tight harmony, and is the basis of salsa, the rumba and the mambo. It is already influenced two generations of salsa, and, by inference and implication, hip-hop, jazz and numerous other idioms. And despite a blockade that for the most part has left the Cuban pro-audio community working with the equivalent of two Dixie cups and a piece of string (which is actually a vast improvement over the crap the Soviets brought with them—East German guitar amps

Europe: Low tide for the watermark

The issue of protecting music copyright is thriving thanks to new digital delivery formats writes **Barry Fox**

THE WATERMARKING TESTS run in Europe by the IFPI for the EU-funded Muse project are now finished. The aim is to bury copyright information in the audio waveform, so that it survives conversion between analogue and digital domains, digital compression, transmission over the Internet and recording in any format. The mark can then be used to prove origin, or to trigger circuitry in future recording devices to prevent copying.

Eleven rival systems were put through the mill, to find out whether they are able to mark music indelibly without spoiling the sound. Several passed, or failed only on minor counts. Paul Jessop, the IFPI's Technical Director, will not name the winners for fear of upsetting the commercial bargaining that will now follow as record companies strike deals to use the systems. Also the tests are being run again, this time in New York, at Sony's studios and with 24-bit, 96kHz source material. The European tests were based only on Red Book CD. And a rerun in New York gives North American golden ears a chance to participate.

The matter is now urgent because, just

before Christmas, the IFPI, RIAA and RIAJ announced their plans for a Secure Digital Music Initiative. Although the announcement was gloriously vague, the SDMI committee wants to issue an approval mark for any music distribution service that uses agreed watermark technology. The RIAA hopes to have the SDMI up and running by February, with compliant products and services on sale before the end of the year. The New York watermark tests were scheduled to start in January.

Paul Jessop explains that there will not necessarily be a single standard system. Instead there will be interoperability between several approved systems. He likens this to the way the rival Netscape and IE4 Web Browsers can work with Windows to surf the Internet and mate with plug-in software, like Real Audio or Liquid Audio.

Although the RIAA said it has been planning the SDMI for a year, the announcement followed just two weeks after computer company Diamond Multimedia dramatically turned the tables on the RIAA. In early October the RIAA sued to try to stop Diamond launching Rio, the solid-state stereo that records music from the

Internet. Three weeks later, a court in Los Angeles ruled against the RIAA. On 1st December, Diamond counter-sued the RIAA under anti-trust law for attempting to stifle the new market for Internet audio. Diamond also claims treble and punitive damages from the RIAA for lost production after the RIAA sued.

Finally, a word of caution: even if the SDMI can organise a seal of approval by the end of 1999, there is no guarantee that the music industry will use it.

In 1986 the IFPI set the ISRC standard for marking a digital bitstream to check the origin of a recording. The

Even now, pitifully few record companies use ISRC—although PolyGram has done more than most

International Standard Recording Code is a 12-character message, which can be slotted into the Q sub-channel of Red Book audio to identify the recording by title, artist and date. In 1988 the IFPI recommended that record companies start using the ISRC 'as soon as possible'. Every year since then the IFPI has repeated this advice. In 1991 the BBC tried to automate its Dickensian system of logging copyright music played over the air. Instead of filling in forms by hand, the BBC record library wanted to use a computer network, that would automatically read and

have, appropriately enough, square knobs), there are some very good studios there, including a twin-SSL G+ installation, Estudios Abdala, opened just last year, co-owned by Cuba's greatest living trovadoro, Silvio Rodriguez.

Everyone else in the world can make deals with the Cubans except Americans. But, as the studio manager at Abdala told me, the US, because of its size and proximity, is 'our natural client'. A partnership between the world's largest music producer and market, and one of the most musical cultures in the world, is inevitable. It is one I would also like to see happen on its own terms—it would not surprise me if Disney chairman Michael Eisner already has a strategic map of Cuba on a conference room wall in Burbank, salivating at the notion of turning the most prime piece of undeveloped real estate that close to the mainland into a gaudy Latino Disneyland. (Complete with Fidel and Che robots singing 'It's a Small World After All'.) But at least musicians, engineers and producers will have the chance to interact in a way that could change music in a positive way. So it's time to take Ronald Reagan's 1989 plea to the end the Cold War ('Mr Gorbachev, tear down that wall!') and apply it to the biggest musical barrier left in the world: 'Bill—tear down that embargo!' And while you're at it, pull up your pants.

register the ISRC information every time a CD was played. This would have let the BBC provide the copyright agencies with immediate, accurate returns.

But the plan collapsed because, even now, pitifully few record companies use ISRC—although PolyGram has done more than most. The majority of CDs still has a string of zeros where the code should be because the record company has not given the pressing plant an ISRC number to insert. Sony and Philips say they will launch Super Audio CD during 1999 with dual-layer discs to allow record stores to stock single inventory titles that play Red Book audio on a conventional CD player and super hi-fi on a new SACD player.

I have been asking for a sample disc to try on an ordinary CD player and a DVD-ROM drive. After more than six months I finally got one, from Sony in Japan via a devious route. Its a milky gold colour with the SACD logo buried in the coating like a hologram. The disc played Red Book audio on a consumer CD player and played silent on a DVD-ROM drive, presumably indicating that the drive is reading the bitstream but can't decode it. So all appears as intended.

But my disc was marked, like a rare etching, number 9 out of 20. How can it be, when dual layering is fundamental to the SACD launch that Sony has only pressed 20, of which only three were in Europe? And SACD partner Philips has never been able to provide me with anything...

Resources beyond repair

Once an essential skill in any technical job, the ability to mend and make do is dying writes **Kevin Hilton**

MAYBE I HAVE ONE of those minds but I often find myself wondering about silly things. For example, if I had been a character in *The Great Escape*, what would my special skill have been? If Donald Pleasance was the forger, James Garner the forger and Charles Bronson one of the Tunnel Kings, what would have been left for me? A friend remarked that I would have been the one sitting around making wise-ass comments, which, sure, is a necessary task, but not one that is crucial to any escape.

This seemingly irrelevant train of thought does make a general point about ingenuity and resourcefulness, both qualities I feel I possess, albeit not in a practical sense, which, as far as my fellow escapers would be concerned, is where it matters. The subject came up again a little while later at the Panasonic Broadcast Christmas lunch in London. I was on a table with the chief engineer of an international TV news organisations and another freelance journalist.

The hackette reminisced about her father, who was renowned for his ability to fix things, something she had inherited. This started a general discussion about how, 15 to 20 years ago, people would always try to fix things, partly because electrical goods, cars and other mechanical devices were too expensive to replace, partly because there was not the service infrastructure there is now and partly because the practical fixing instinct was still strong.

Just like the primitive urge to hunt, the instinct to fix things has diminished as society has become more ordered and people have disposable income that can be used to pay somebody else to repair something or merely buy a replacement. This reminded me of my father, who, in his younger days, was an almost obsessive do-it-yourself freak. It is said that many childhood memories are of the smells coming from the family kitchen; in that case, my nasal recollections are a mixture of boiled potatoes and cabbage and boiling engine oil, as my father cooked up old spark plugs to revitalise them.

This caused a mixture of amusement and understanding, such bizarre behaviour explaining why I've turned out the way I have. To move attention away from me, I suggested we pull the crackers. One of the gifts inside was a miniature tool kit, which everyone jokingly said the chief

engineer should keep just in case the large number of DVCPRO video recorders he had bought broke down. While appreciating the joke, he pointed out that it would be of little use.

Unlike analogue equipment, digital cannot be bodged to keep it running until more lasting repairs can be made. If something in a digital chain does not work, then it just does not work. This is another of the areas where the new technology differs greatly from its predecessor. Analogue gear may not break down completely, enabling something to be recorded. It may not be of the best quality, but at least it is something. With digital, a failure means nothing to salvage.

Looking at the two technologies in a generational way, analogue could be seen to represent inventiveness, resourceful, where those who carried out repairs to

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existing equipment could improve it or change it to meet their specific needs. While digital gear is undoubtedly the result of innovation, this occurs in the first stages, carried out by the design engineers of the manufacturing companies. When the products come to be used at the broadcast stations, the thinking appears to be that time will not be wasted on trying to repair something; enough budget is made available so that duplicate machines are bought that can be slotted in when a failure occurs.

This is and practicality could also die out, or, at the very least, become suppressed. This could lead to a homogeneity of products and installations, something that could also be seen as a lack of imagination and initiative. But giving practical creativity an open licence can produce problems too: stories have been told of brilliant engineers within the BBC who produced mixing desks for specific purposes that were triumphs of design. The trouble was that when the respective engineers left, nobody knew how to fix them.

Without initiative creating something for a specific purpose, there will be no innovative mass produced new products. Without a sense of proportion that realises when something is broken it should be replaced by something newer and better, there will be waste and inefficiency. And without wise-asses like me, people may not immediately recognise this. Hey, maybe I would have been a valuable member of *The Great Escape* team after all.

Operational amplifiers

This month's investigation into electronic components concerns a vital building brick in audio systems. **John Watkinson** considers the op-amp

THE OPERATIONAL AMPLIFIER (or op-amp) has its origins in analogue computing. Just as we had analogue audio before digital audio, there were analogue computers before digital ones became economically viable.

Analogue computers would represent their input variables by the magnitude of various voltages, calculations being performed by carrying out operations on the input voltages. These computers did not 'run' programs, but were patched by wires in the configuration needed to solve a particular problem. Frequently the patchbay was replacable so that the machine could switch rapidly between different programs. Obtaining the necessary precision was a continual problem with analogue. Errors could be caused by voltage offsets, which would give a fixed error in a static calculation and a varying error if an integration was required. Gain errors were also serious in analogue computing.

With this in mind, the operational amplifier was designed as an amplifier that could be made precise enough by the use of external components to carry out analogue computations. The key here is the phrase 'by the use of exter-

nal components'. Operational amplifiers then and ever since are not in themselves accurate devices. The accuracy comes from properly incorporating them in feedback loops.

As a result understanding op-amps also requires an understanding of feedback. Unfortunately most treatments of feedback assume an ideal amplifier, and many designers consequently assume that real amplifiers are also ideal and the results are disappointing. High-end hi-fi enthusiasts, whose irrationalities include an ability to argue from the particular to the general, then conclude that feedback is a bad thing *per se*. May we be delivered from these enthusiasts.

Back in the real world, all that is necessary is an understanding of how feedback works with non-ideal amplifiers. It is then much easier to engineer equipment that meets sound quality needs.

Fig.1 shows the basic concept of negative feedback. The input signal conveys the desired result. The actual result achieved is monitored at the output. A comparison between the actual result and the desired result is made. This is called the loop error and if this is not tiny, the output is modified to make the error smaller.

Frequently a feedback system is trying to control a process despite some disturbance. We may want to control the attitude of an aircraft despite turbulence, or we

may want to control the output voltage of an audio amplifier despite the best efforts of the loudspeaker to drive it to some other value. Clearly if the power of the disturbance is equal to the power of our control system, the outcome will be the average of both, but this is not a recipe for accuracy.

Accurate feedback control systems require a small number of things to be correct. Firstly, the forward path must be significantly more powerful than, and have greater bandwidth than, any expected disturbance under all conditions, so that disturbing effects can always be overwhelmed. Secondly, the error must be subject to amplification or gain so that the full correction power is available even with a small error. The requirements for an operational amplifier are simply defined by these requirements. It needs an input stage, which can subtract the desired and actual sig-

nals to obtain an error, and it needs wide-band amplification of the error. As a practical matter, less loading is applied to signal sources if the input impedance is high. This also means that integrators are less likely to drift. Thus our ideal op-amp not only has high voltage gain but because of that high impedance has phenomenal power gain.

Fig.2a shows the stages of an op-amp and the symbol used. There are two inputs and one output. If the 'plus' input is taken positive, the output will also tend to go positive, so this is also called the 'non-inverting' input. If the 'minus' input is taken positive, the output will tend to go negative, so this is also called the 'inverting input'.

The subtraction process of an op-amp is done using the long-tailed pair or differential amplifier shown in Fig.2b. A current source drives a parallel combination of two transistors (or FETs). As the total current must be constant, if the current in one device increases, the current in the other must reduce by the same amount. As a result the distribution of current between the devices is determined by the difference between the input voltages, not by their absolute values.

As it is only the difference between the inputs that matters, the input voltages can both change by the same amount in the same sense without affecting the output; this is known as common mode rejection. A small bias current flows into each input of a differential amplifier. It is important that each input sees a similar resistance otherwise the result will be a DC offset in the output.

Fig.3a shows the simplest way of using an op-amp. The output is connected directly to the inverting input and the input is fed to the non-inverting input. The output voltage will be any voltage, which makes the inputs identical. This must result in a gain of unity. In this case the massive power gain is being used as an impedance conversion. The output impedance is very low; the input impedance is very high.

The non-inverting configuration can be given gain by putting a potential divider in the feedback as shown in Fig.3b. If the potential divider reduces the output by a factor of N:1, the output will have to be N times greater to make the inputs have the same voltage.

The inverting configuration is obtained by grounding the non-inverting input (through an offset cancelling resistor) and placing a potential divider between input and output as shown in Fig.3c). The output voltage will be whatever

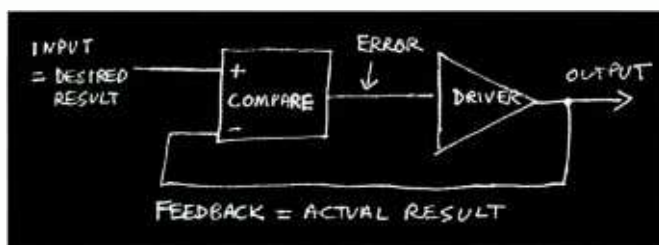


Fig. 1: Basic principle of feedback

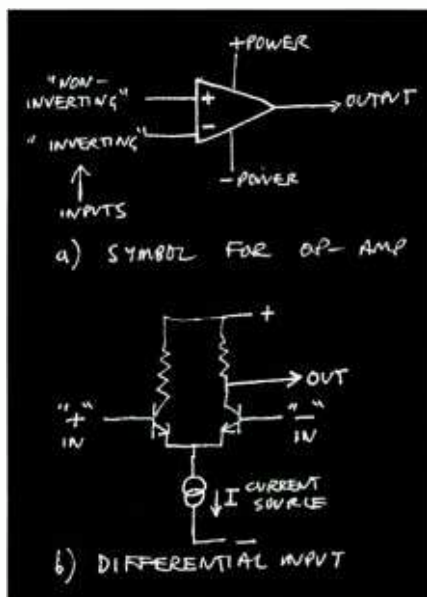


Fig. 2:

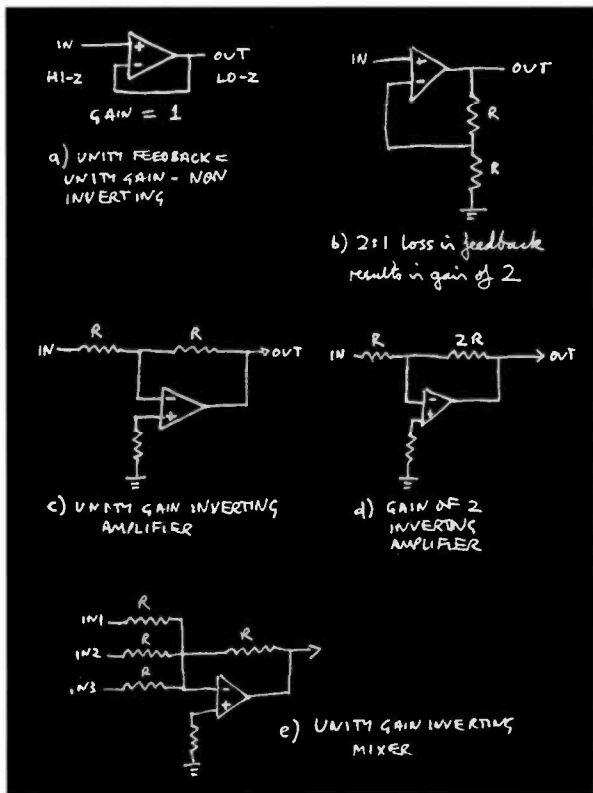


Fig. 3: Op-amp configurations

makes the inverting input have a voltage of zero. Thus if the input goes positive, the output will have to go negative. If the input and feedback resistors are equal, the gain will be unity. If greater gain is required, the resistor ratio is changed so that when the inverting input is brought to zero the output voltage will be higher as shown in Fig. 3d.

It is easy to predict the behaviour of op-amps by drawing an analogy with a simple lever and fulcrum. Fig. 4 shows the in the non-inverting configuration the input and output are on the same side of the fulcrum. The gain is given by the division factor of the feedback (Not the same as the resistor ratio). Fig. 4 also shows that the inverting configuration is represented by a seesaw-like arrangement with the fulcrum in the middle, coincident with both inputs of the op-amp. The gain follows from the resistor ratio.

Note that in the non-inverting case the input voltages are always the same, whereas in the inverting case they are always at ground. The non-inverting input is actually earthed, whereas the inverting input is kept at earth potential

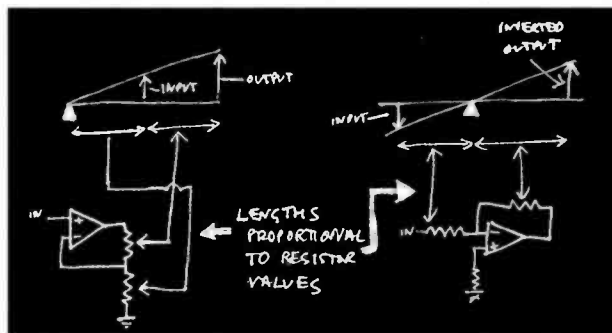


Fig. 4: Finding op-amp gain graphically

by feedback action. It is thus called a 'virtual earth'. It is possible to add several signals together by connecting several input resistors to one virtual earth point. Fig. 3e shows that a simple audio mixer can be made in this way. Note that the term 'mixer' is peculiar to audio. In analogue computing, the stage is an adder. In RF engineering, a mixer means a multiplier.

With an ideal op-amp, we could keep on increasing the gain just by increasing the feedback resistor. In practice this does not work because the op-amp has finite open-loop gain and frequency response. The astronomical gain of the op-amp is only available at low frequencies. The open-loop frequency response of the op-amp shows a roll off

(typically at 6dB/octave) from a remarkably low frequency. As a result, some of the feedback is used up extending the frequency response of the op amp. Thus the more gain that is required, the less the available bandwidth will be.

Operational amplifiers are specified in terms of a gain-bandwidth product so that any viable combination can be found. The gain-bandwidth product actually used must always be well below the open-loop figure, or the op-amp is not feedback controlled and will not perform as advertised.

The gain of an op-amp is finite, but it gets used in a variety of ways. It may be used to reduce distortion, to extend frequency response or to give voltage or power gain to a signal. Trying to do all three just won't work. In practical cases, using two op-amps stages in tandem can often give better results than a single stage with the same overall gain.

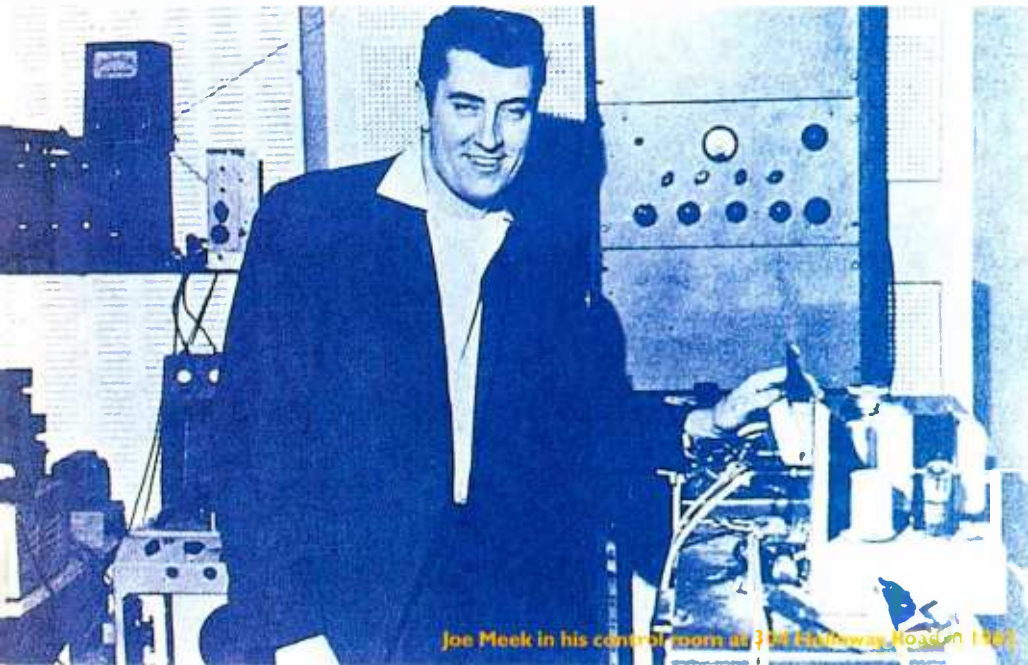
Another thing to watch is slewing rate. People expect miracles of feedback, but it is not magic. You cannot make a race-horse by putting feedback round a donkey. If the output voltage of the op-amp can't change fast enough driving a given load, then feedback will not speed it up. When the output cannot change fast enough to cancel the error, the op-amp has gone open loop and you can tear up all of those equations in the text books because the output is no longer a replica of the input. ■

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The Joe Meek Tapes

The 3rd February is the anniversary of that nightmarish morning in 1967 when, aged 37, Britain's first independent pop producer shot his landlady dead and then himself. But Joe Meek's story is not over writes **John Repsch**



Joe Meek in his control room at 333 Holloway Road in 1967

IN 1964 JOE Meek had been Britain's wunderkind, with dramatic epics topping charts around the world: John Leyton's 'Johnny Remember Me', the Honeycombs' 'Have I The Right' and the Tornados' extraordinary 'Telstar'. His maverick panache had known no bounds. As if setting himself up as an independent were not unorthodox enough in a country where just half a dozen major companies ruled the pop airwaves, he had isolated himself still more by creating his own instantly recognisable Meek sound. In the early sixties, the British speciality was supposed to be limp cover-versions of American discs.

The jealousy he had reaped from his successes fuelled his craving to stay ahead and the highly imaginative sound effects he conjured up were via equally outrageous techniques. His records, produced over a shop in London's Holloway Road, had left the music world gasping at how he could concoct such advanced noises in such antiquated conditions.

Many of his methods have been documented in recent years. We hear of drummers beating biscuit tins and scaffold pipes, and of sessions where Meek burst furiously into the studio to smash a chair and turn it into drum sticks. Sounds existed to be endlessly reassembled and played inside dustbins and drainpipes; Neumann microphones would be dangled down the loo while

it flushed or were sent tumbling down the stairs; ashtrays, lavatory chains, twanging knives and fluttering pages would all find themselves squeezed through limiters, equalisers and home-made echo units.

Sessions might occur all over the house. From the organised chaos of a closet-sized control room that looked more like a radio ham's shed, he would conduct his scattered battalion into a harmonious ensemble.

When Meek died on the 3rd February 1967, most of the evidence of his techniques might easily have died with him. His equipment was auctioned in 1968 to help pay off debts, and but for the vision of his solicitor, John Ginnett, the stories we now hear of his studio methods would have mainly relied upon hearsay. Instead they live on in his tapes.

At first Meek's vast collection of 3,000 reels was stored away in tea-chests. The plan was to wipe the lot and sell them off as blanks at five shillings each. But on playing them, Ginnett changed his mind.

What he found himself listening to were masters in full stereo, rhythm tracks, voice tracks, songwriting sessions and spoken word. He could, for example, follow the progress of a recording as Meek gradually built it up, layer upon layer, in effect multi-tracking via a 'composite' method. Ginnett

could eavesdrop on Meek and fellow songwriter Geoff Goddard composing together through the night in an atmosphere electric with prospective Top Ten hits.

There were also intriguingly 'bugged' conversations. Meek's paranoid insecurity about people's opinions of him would impel him to wire up his living room, and then exit during a meeting, on the pretext of being wanted on the telephone. There in his office he would don headphones and listen in for telling comments. Other times he would record discussions with artists' managers and the rows he had with bands. One priceless document that he taped in 1962 was a guided tour of the studio. Walking around alone, he described in detail the equipment, his ways of recording and his hopes for the future.

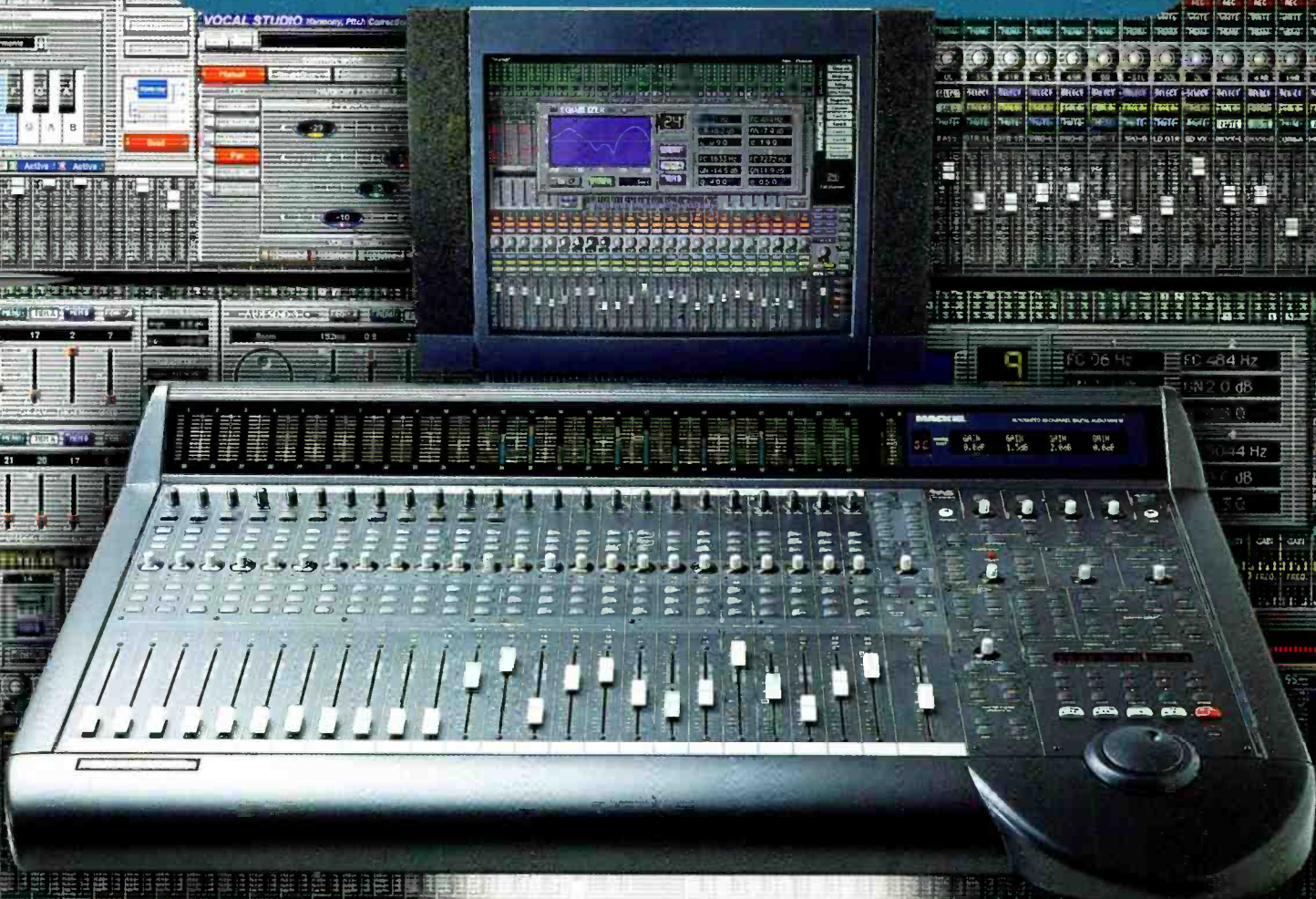
Mesmerised by the quality of the sound and the variety of the tapes, John Ginnett realised their immense significance both for our musical heritage and for students of sociology, and decided they had to be preserved. He impressed this upon the eventual purchaser, Cliff Cooper, who had been the singer in Meek's band, the Millionaires.

Since Cooper was to look after them for posterity and would own only the physical tapes—for 'the study of the musical methods of the late R G Meek'—he was charged just £400.

But it seems that the tapes are not being well looked after. Cooper has admitted he is too busy to listen to them and that some are now deteriorating. Bearing in mind he was sold them on condition that they benefited future generations—'so something good can come out of Meek's tragic death'—Cooper told me he would donate them to the National Sound Archive. 'I give you my word,' he said. That was in February 1997. They are still hoarded away unheard and unappreciated. Meanwhile, the NSA's curator patiently awaits the consignment in 'cautiously optimistic' mood, and the artist whose talents were captured on those reels—and who actually own the copyrights—grind their gums in frustration.

Many will be staging a demonstration outside Cliff Cooper's Denmark Street store 'World of Music' on Wednesday, 3rd February at 12.30pm. Let's hope it prompts the swift transportation of what I would call a remarkable sound snapshot of a pioneer's life. Before it rots. ■

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