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# Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE  
FOR RECORDING, POSTPRODUCTION AND BROADCAST



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**Power Technologies DSP FX**  
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## The hammer

YOU'RE NOT ALONE. It is too easy to become blinkered and preoccupied by constant reminders of the neglect of the audio quotient within the much wider context of picture driven productions and to overlook the fact that vision professionals and their industry are not without problems of their own. This was pulled into sharp focus for me with the outcome of a panel session I sat in on at the recent IBC.

We can crow on about the lack of appreciation and importance attributed to audio within broadcast or film release but the other side of the equation has its own voices of dissent. You'll hear talk of the computer industry leading the broadcast and production industries by the nose, talk of the lack of standard consensus leading to hijacking by those with the most money and the most aggression, and talk of dissatisfaction with the progress and evolution of system solutions once users have bought into them on a grand scale.

There is clear objection to the fact that the majority of leading-edge technology whizz-bang picture boxes—and there are now very many—concern themselves with the generation of special effects and object generation, processing and animation despite the fact that the greatest bulk of programme material still concerns itself with the altogether more mundane production requirements of news, documentaries and live action. They resent it, even though they acknowledge that it is more exciting and more creative, because they believe it is unrepresentative of real-world, day-to-day. Most of all, they dislike the imposition of tools that are not so much specific for a task as an adaptation of technology that happens to exist and is no better than what it attempts to replace.

A quote I particularly liked was the observation that if the only tool you have is a hammer, it is strange how quickly everything starts to look a bit like a nail.

Perhaps the most damning comment was the selection of the developments made by the very few remaining film-oriented manufacturers as the highlight of IBC's technological extravaganza. It all sounds very familiar and analogies are simple to draw. No, we're not alone. We're actually fairly well sorted.

**Zenon Schoepe, executive editor**

## Trust matters

WITH BILL CLINTON testing the American peoples' trust in their President on the world stage, it seems timely bring this up.

For where Bill Gates went up against the American Anti-trust laws, he'd have found the Monopolies and Mergers Commission, and the Trading Standards Association serving the same purpose in the UK, and similar setups in other territories—their common purpose being to ensure that business is conducted in as 'fair' a manner as possible. For example, the BBC is restricted in its use of its own television channels to promote its activities outside of television on the grounds that, since the BBC is a public service broadcaster, nobody else can use it for advertising.

In operation, these mechanisms are usually brought into play by those believing themselves to have been wronged by a competitor. And Sony's NYC studio complex found itself in exactly this position when it considered installing a Sony OXF-R3 digital console before it was available on the open market. I'm not about to take sides over the matter, and Sony's solution to the situation is a matter of record—but there is another side to 'unfair' competition.

Sometimes it takes a rich corporation to fund aggressive R&D, and to accept the consequences when it's got it wrong, since there is a low ceiling on the risk a small concern can take. So while it's easy to feel intimidated by their weight, without the Sonys, Philipses and Matsushitas of the world, we might find our business a less exciting place to work.

Having recently written on the value of peoples' passion—over commercial wile—in driving pro-audio forward, it seems to me that, if Sony wants to risk its cash and reputation on a pretty revolutionary desk, I'd like to sit back and watch. Easy to say, I know, and I don't know how the law might be better conceived, but I am concerned that its use could cost us more than it pays.

**Tim Goodyer, editor**

# Studio Sound

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October 1998 **Studio Sound**

Not Just  
**Any Studio**  
Can Afford An SSL



**Technical Notes**

Flexible in-line console architecture - Standard configurations start at 32 channels in 40-module frame - G+ Studio Computer provides comprehensive session management and console automation - Choice of E/G Series EQ - Ultimotion™ and Total Recall™ options (standard on G+ Special Edition) - Dynamics processing in every channel - One stereo and four mono aux buses with additional auxes via output routing - 8 automated VCA control groups with dedicated faders, solos and cuts - External machine control, track arming etc - Optional Motionworker™ interface for digital multitrack formats - SSL on-site commissioning and training - World-wide 24-hour technical support hotline.

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## Multichannel Sound Forum

**France:** *Studio Sound* has given its support to next month's First International Multichannel Sound Forum (5-6 November) which will be held in Paris during the course of the French SATIS national exhibition held 3-6 November at Paris Expo, Porte de Versailles.

Organised jointly as a fringe event by SATIS and Radio France, it aims to bring together manufacturers and end-users to encourage education and exchange.

Japan, Germany and Denmark—three countries regarded as advanced in this area—have been invited to participate and share their knowledge of multichannel television broadcasting.

The Forum will open at the SATIS exhibition with multichannel presentations held at the Maison de Radio France in Studio 105. Price for full 2-day registration is FF1400 and includes lunch. For programme see *World Events* on page 10.

**Tel: +33 1 45 45 65 25**

**Fax: +33 1 45 45 65 35**



▲ **Net:** London's Abbey Road studios was the setting for an historic performance and Internet broadcast of the Pretty Things' fourth LP, *SF Sorrow*. The original line-up (pictured) plus Pink Floyd's Dave Gilmour and narrator Arthur Brown assembled in Studio 2 and gave Norman Smith's 1968 production a second shot at gaining recognition as the first ever rock opera and a major influence on The Who's *Tommy*, released a year later.

The event was followed just 18 days later by the Netcast of a live performance by Queen's Roger Taylor of his album, *Electric Fire* using the MediaWave system. The performance took place at Taylor's Cyberbarn studio with *The Guinness Book of Records* hoping to log the largest ever audience for an on-line gig.

## Copyright co-op

**US:** Following news of Microsoft's collaboration with Matsushita over the future of broadcasting along with that of domestic computers and the Internet, comes a deal between IBM and NEC on DVD piracy.

The companies' collective interest in the new delivery format

and expertise in IT technology has caused them to combine their watermarking efforts in an attempt to establish an industry standard—replacing present systems such as CSS and APS with a watermark and corresponding circuitry for inclusion in domestic DVD players. The results will be presented to the presiding CPTWG group in due course.



▲ **US:** St Louis is to be the location for a brand new music and A-V facility in the form of Steve Richards Mahoney's Four Seasons studio. The main of three Russ Berger rooms hosts an automated API console, with Control Two using two Yamaha O2Rs and all three equipped with Pro Tools 24. Outboard includes vintage Pultec EQs, Urei 'blackface' 1176s, Teletronix LA2As, Telefunken V-78 mic preamps, dbx 160s and 165s, and Neve 1073 console modules. Among the mics in the microphone cabinet are a Neumann-Telefunken U47, Neumann KM582s, RCA 77-Ds and an AKG C24. Four Seasons. Tel: +1 314 423 4767.

## Speaking volumes

**US:** Loudspeaker notable Joseph D'Appolito has penned a book entitled *Testing Loudspeakers*, published by Audio Amateur Corporation (tel: +1 603 924 9164).

Comprehensively addressing

the tricky matter of machine testing drivers and systems 'in a way that has not been available before', the book is intended to assist in the design and assessment of multiway systems for both amateur and professional applications.

## Dolby down under

**Australia:** The Australian Digital Terrestrial Television Broadcasting selection panel has declared Dolby AC-3 its preferred system of audio encoding for broadcast.

The announcement is expected to speed the introduction of HDTV broadcasting to the territory. The selection of the DVB-T modulation system follows evaluation exercises undertaken by Australia's Government Communications Lab on behalf of the DTTB, and contrasts with the European DVB standard by combining MPEG video with AC-3 coding.

It is, however, in line with the US, Canada and Taiwan, all of which have opted for AC-3.



▲ **US:** Recent recipients of BASF Master Awards include the Dust Brothers production team—John King and Mike Simpson—for their work on Hanson's 'Mmmmbop', and the production-engineering team of Julian Raymond and Joe Barresi for theirs on 'The Way' from Texan rockers, Fastball. 'Mmmmbop' was recorded at the Dust Brothers' own PCP Labs studios in Silverlake, California, while 'The Way' earned a Master Award for A&M Studios. Both were recorded on BASF SM900 tape. Also on the award trail recently was Yoko Ono, whose platinum disc for Lennon's *Legend* album was presented by a selection of EMI execs at Abbey Road studios following a tour of the facility.

◀ **UK:** London's Eden Studios has reopened its Studio One after a pause for refitting. Now housing a 60-input SSL G-series console, the control room has been enlarged and sports new acoustics, lighting and decor under the guidance of the studio's technical director Mike Gardner. The refit also finds a new vocal booth and 'keyboard station' in attendance. Tel: +44 181 995 5432.





▼ **Africa:** Leading film, TV and commercial post facility, The Refinery, has become the setting for Africa's first Fairlight Fame workstation. The 24-channel Fame is installed in a third, new, digital audio suite and is part of The Refinery's full-service approach to post and has already seen action recording, editing and mixing short-form cinema features and TV commercials for the South African market. The Refinery. Tel: +27 11 706 0500.



## IBC round up

**The Netherlands:** Amsterdam again hosted the largest broadcast gathering outside of the US's NAB at September's IBC with a predictable, but at press time unconfirmed increase in attendance.

It was a show of two halves: a noisy and rather sensational half, which comfortably exceeded the SPLs encountered at the PLASA pro sound and light show held in Earl's Court London earlier in the month, and a quieter and more civilised half which incidentally also contained the majority of the audio representation.

The IBC organisers should attempt to curb the distressing and inappropriate increase in volume at what is after all a broadcast

event with the picture companies emerging as the offenders. If anything the non-stop and largely distorted and unintelligible demos from the non-audio manufacturers served to underline the importance of good audio in all related disciplines.

IBC saw little that was truly new in the audio sphere. The event is relatively late in the calendar for the audio manufacturers who now seem to have their R&D cycles synchronised for Spring launches followed by world tours of the products.

Nevertheless it remains an important and extremely popular one-hit exhibition that has consistently grown from strength to strength.

**Zenon Schoepe**

▼ **UK:** The 'biggest dance show ever staged' in Britain showcased *Riverdance* star Michael Flatley in his last performance as Lord of the Dance, *Feet of Flames*. To capture the Irish magic, the Fleetwood mobile joined the 84 supporting dancers, 25,000-strong audience, and 25 television cameras necessary to cover the massive stage set for the broadcast and video recording. Keith Mayes, Tim Summerhayes and Ian Dyckhoff piloted the 72-input Fleetwood Euphonix CS2000, and a pair of Sony PCM-3348 machines were in attendance to record their efforts. The project is currently being mixed at Air Studios in 5.1 surround.



Japan has two more Amek Digital Mixing System installations: a 28-fader, 64-channel desk in Osaka's new 5.1-capable MA studio, and a 20-fader, 56-channel desk, in Tokyo's radio production facility, FM Sounds. Meanwhile, Japanese record label Avex is to centre a new dubbing facility around three 96-fader Euphonix CS-series console and postproduction house Maruni Studios has installed a third Euphonix console. The latest sales bring Euphonix' presence in the territory to 50 desks.

**Amek, Japan.**

**Tel: +81 3 5707 0575.**

**Euphonix, Japan.**

**Tel: +81 3 3288 4423**

German take-up of Lawo's Diamond Digital on-air console and Diamond Matrix has been strong, with Berlin's ARD-Hauptstadtstudio, Mitteldeutscher Rundfunk, and Saarländischer Rundfunk having already taken delivery. ARD has four identical consoles and one matrix, MDR has 13 consoles and six matrices in its 12 control rooms, and SR has two consoles in its new Seerbrücken on-air facility. Also, Frankfurt's new Heissischer Rundfunk has ordered six Lawo MC-50 on-air consoles, MC-50 and MC-80 broadcast-production consoles for the HR1, HR1+, HR2, HR2+, HR3, HR3+, HR4 and HR4+ radio stations. Westdeutscher Rundfunk, meanwhile, has ordered some 60 Alphonon MPV-33 mic splitters for use in its OB operations.

**Lawo, Germany.**

**Tel: +49 7222 1002 0.**

**Scheck Audio, Germany.**

**Tel: +49 62 05 3522.**

The BBC has taken delivery of two Amptec Stone D001 digital broadcast desks and contracted Nicral to supply ISDN codecs and control systems to the Resources Projects. Nicral is expecting to provide more than 100 CCS MPEG-G.722 codecs and some ARC control systems following the digitisation of British Telecom's network.

**Amptec, Belgium.**

**Tel: +32 11 281 458.**

**Nicral, UK.**

**Tel: +44 1672 515727.**

Manhattan's Sound Lounge recording studio has ordered a Soundtracs DPC-II digital console. Its installation will bring NYC's DPC-II count up to five. Meanwhile, the East New York Todd-AO studio has ordered a 3-operator, 80-fader AMS Neve Logic DFC for feature film rerecording in Studio C.

**Soundtracs, UK.**

**Tel: +44 181 388 5000.**

**AMS Neve, US.**

**Tel: +1 212 965 1400.**

London's SAE audio college has bought three units from TL Audio's Ivory range of valve outboard processors. Its SSL G+ and Neve VR-equipped studios will share the 5013 EQ, 5021 compressor and 5051 voice processor:

**SAE, UK.**

**Tel: +44 171 609 2653.**

**TL Audio, UK.**

**Tel: +44 1462 490600.**

Milan-based mastering facility

Profile Studios has taken delivery of a Crookwood Mastering Bricks console. Installed in a new flagship mastering suite, the console includes a custom 2U-high vu-phase metering unit that has been incorporated in the Crookwood catalogue.

**Profile Studios, Italy.**

**Tel: +39 2 295 15061.**

**Crookwood, UK.**

**Tel: +44 1628 528026.**

LA's Disney, Warner Brothers and Todd-AO film facilities have bought AMS Neve Logic Digital Film Consoles, while Paramount has added 40 channels of Uptown System 990 moving fader automation to its Raindirk Symphony LN and upgraded the Neve VR Legend in Scoring Stage M to handle 96 inputs (making it the world's largest VR-series desk). Disney's 88-fader, 200-input, 3-operator DFC is destined for Buena Vista Stage A and will be used for feature-film dubbing, while Warner Brothers has ordered 96-fader, 250-channel DFCs for its Hollywood Stage D, Burbank Stage 5 and new Stage 8 all for feature film dubbing, and Todd-AO has ordered a 3-operator, 104-fader desk for film recording in Studio A.

**AMS Neve, US.**

**Tel: +1 818 753 8789.**

**Uptown Automation, US.**

**Tel: +1 410 381 7970.**

Telekom Malaysia has contracted Barco exclusively to supply ETSI MPEG2 140Mbit/s and 155Mbit/s codecs until 2001. The deal worth US\$10m follows Barco's supply of more than 200 RE3400 34Mbit/s codecs, which were used, on the Commonwealth Games broadcasting. The Malaysian Ministry of Information is to implement digital TV transmission by 2000.

**Barco, Belgium.**

**Tel: +32 56 233450.**

Texas's renowned Pedernales music recording studio has installed a 48-channel SSL SL4000G+ console with Total Recall. Co-owned by Willie Nelson and nephew, the facility was built in 1976 for country music star Nelson's exclusive use but now operates commercially for clients such as Neil Young and Phil Ramone.

**SSL, UK. Tel: +44 1865 842300.**

America's Armed Forces Radio and Television Service Broadcast Center is set to update its automation system with a Broadcast Electronics AudioVault system and AudioPoint routing switcher. Located at the March Air Reserve Base in Quincy, Illinois, the AFRTS-BC serves over 800,000 US servicemen and their families in more than 155 countries and on US Navy ships.

**BE, US. Tel: +1 217 224 9600.**

Ohio's Acoustic Musik studio has recently completed a new mixing and mastering suite containing a 12:8:2 Audiotronics Grandson 110B console, Alon IV-Hafler Pro-2400 monitor system, Digidesign Audio Media II, Tascam DA-88/DA-38, tc electronic Finalizer, Marantz CDR-620, and Sonic Solutions AES-EBU optical converter.

**Acoustic Musik, US.**

**Tel: +1 440 775 3681.**

## October

## 12–November 6

**ITU Plenipotentiary Conference**

Minneapolis, Minnesota, US.  
Tel: +41 22 730 5969.

## 14–18

**2nd Expomusica 98**

Fisa Maipú, Santiago, Chile.  
Contact: Juan F Moreno,  
Puntodiez SA.  
Tel: +56 2 231 6515.  
Fax: +56 2 233 4981.  
Net: www.puntodiez.cl

## 20–24

**Tele-, Kino-, Radio Technologies**

Exhibition Centre, Sokolnik,  
Moscow, Russia.  
Contact: Ekaterina Zotova  
Email: main@admrt.ru

## 22–25

**Reproduced Sound I4 'Surrounded by Sound'**

Hydro Hotel, Windermere, UK.  
Contact: Institute of Acoustics  
Tel: +44 1727 848195.  
Fax: +44 1727 850553.  
Email: Acoustics@clus1.ulcc.ac.uk  
Net: ioa.essex.ac.uk/10a/

## 27–31

**Broadcast India 98**

World Trade Centre, Mumbai  
(Bombay), India.  
Contact: Kavita Meer, Saicom  
Trade Fairs & Exhibitions.  
Tel: +91 22 215 1396.  
Fax: +91 22 215 1269.  
Email: saicom@bom2.vsnl.net.in  
Net: www.saicom.com/broadcastindia

## 27–28

**DVD Conference Europe**

Fira Palace Hotel,  
Barcelona, Spain.  
Contact: Cheryl Aggett, Understanding  
and Solutions  
Tel: +44 1582 607744.  
Fax: +44 1582477303.  
Email: U&S@undansol.co.uk

## 31–November 2

**15th International AES Conference 'Audio, Acoustics, and Small Spaces'**

Scanticon Conference Centre,  
Snekkersten, Copenhagen, Denmark.  
Contact: Jan Voetmann, Delta Acoustics  
& Vibration.  
Tel: +45 45 93 12 11.  
Fax: +45 45 93 19 90.  
Email: aes15@delta.dk  
Net: www.aes.org

## November

## 4–5

**23rd Sound Broadcasting Equipment Show (SBES)**

Hall 19, National Exhibition Centre,  
Birmingham, UK.  
Tel: +44 1398 323 700.  
Fax: +44 1398 323 780.  
Email: info@pointproms.co.uk  
Net: www.i-way.co.uk/~dmcv/sbes.htm

## 3–6

**SATIS 98**

Paris-Expo.-Porte de Versailles,  
Paris, France.  
Contact: Alexandra Tholance Conseil.  
Tel: +33 1 45 45 65 25.  
Fax: +33 1 45 45 65 35.

## 4–8

**News World 98**

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

## 5–6

**First International Sound Multichannel Forum**

SATIS exhibition and  
Radio France, Studio 105, Paris.  
Tel: +33 1 45 45 65 25  
Fax: +33 1 45 45 65 35  
See panel right

## 17–19

**Digital Media World 98**

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

## 20–23

**20th Tonmeister Convention**

Municipal Hall, Karlsruhe, Germany.  
Contact: Ernst Rothe, Bilungswerk  
des VDT  
Tel: +49 2204 23595.  
Email: vdt@tonmeister.de

## 25–28

**Apple Expo 98, Total Design Technology**

Olympia, London, UK.  
Contact: Liz Scriven, Showcase  
Communications  
Tel: +44 171 381 2442.  
Email: appledpr@aol.com  
Net: www.apple-expo.com

## December 98

## 9–10

**Cable and Satellite Asia 98**

Singapore International Convention  
and Exhibition Centre  
Contact: Reed Exhibitions  
Tel: +65 299 8992.  
Fax: +65 299 8983.

## 9–11

**5th Broadcast Cable & Satellite India 98**

**6th Comms India 98**  
Pragati Maidan, New Delhi, India.  
Contact: Mr Bhavuk Kaul,  
Exhibitions India  
Tel: +91 11 463 8680.  
Email: exhibind@nda.vsnl.net.in  
Net: www.exhibitionsindia.com

## 9–11

**Cable & Satellite Asia 98**

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

## 1999

## 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

## April

## 10–12

**16th International AES Conference 'Spatial Sound Reproduction'**

Arktikum, Rovaniemi, Finland.  
Contact: Juha Backman, Nokia.  
Tel: +358 10505 9140.  
Fax: +358 10505 5738.  
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

## 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.  
Fax: +41 21 963 88 51.  
Net: www.montreux.ch/symposia

## July

## 8–10

**11th PALA 99**

Singapore International Convention  
and Exhibition Centre (SICEC).  
Contact: Ann Tan, IIR Exhibitions.  
Tel: +65 227 0688.  
Fax: +65 227 0913.  
Email: ann@iirx.com.sg

## October

## 8–17

**Telecom 99**

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

## November

## 2–3

**24th Sound Broadcasting Equipment Show**

NEC, Birmingham  
Contact: Point Promotions.  
Tel: +44 1398 323 700.  
Fax: +44 1398 323 780.

**Studio Sound**

## November 5–6

**First International Sound Multichannel Forum**

Organised by SATIS and Radio  
France with the support of *Studio  
Sound*, Cabasse, Dolby Laboratories  
and Solid State Logic.

The Forum opens within the SATIS  
exhibition on 5 November and the  
presentation of multichannel TV,  
radio and record productions will  
then follow at the Maison de Radio  
France in Studio 105. Each presenta-  
tion will be commented on by Radio  
France and invited radio and TV  
stations. Shuttles are available  
between the SARTIS exhibition and  
Radio France The SATIS Sound And  
Image Technologies exhibition will  
be held 3–6 November at Paris Expo,  
Porte de Versailles, Hall 4. Opening  
hours 10:00 to 18:45 with a 22:00  
late night on 4 November.

**Programme**

Thursday 5 November  
SATIS exhibition  
10:00 Presentation of the Forum  
and discussion of multichannel sound  
recording and mixing  
12:00 Screening of the CST test tape  
for audio control of TV programmes.  
Radio France Studio 105  
17:00 Welcome to participants by  
Francois Rochiccioli, technical direc-  
tor, Radio France. Surround demo  
examples of NHK production by  
Kimio Hamasaki, technical director,  
Production Centre, NHK.  
18:30 Surround-demo examples of  
Radio France's productions by Didier  
Gervais, head of the sound  
department, Jean-Marie Porcher  
and Guy Senaux, sound engineers  
19:00 Debate  
Friday, 6 November  
Radio France Studio 105  
10:00 Surround examples of  
German and Austrian productions  
by Gunter Theile, head of audio  
systems, IRT  
11:30 Surround examples  
by Radio France  
12:00 Debate  
Radio France Studio 105  
15:00 Visit to digital studio 103.  
Surround demo examples of inter-  
national productions  
17:00 Surround demo examples  
of Danmarks Radio productions by  
Lars Christensen, sound engineer  
and member of EBU multichannel  
audio group  
18:30 Surround examples  
by Radio France  
19:00 Final debate and conclusion.

**Cost**

1 session: FF400 | day session: FF800  
2 days: FF1400

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## Ribbon blues

JOHN L. ANDREWS' comments (Letters, *Studio Sound*, July 1998) prompted me to pull four well-known (and loved) classic ribbon microphones from my collection and measure the lengths of their ribbons. The result was as follows: BBC AXBT—2½ inches, RCA 44BX—2½ inches, STC (Coles) 4038 & RCA 77DX—1 inch.

Memory does play tricks on us old codgers which, no doubt, accounts for the 100% exaggeration of a 5-inch long ribbon which would indeed sag under any conditions. However, while I had the covers off, I looked carefully but could not detect any sagging on my particular examples of these microphones.

Having asked other engineers for their experience on this subject, I will concede that it is advisable to store ribbons in the vertical plane (or on edge) for long periods of time.

But I do think that Mr Andrews missed the point I was trying to make, that undue bureaucratic pedantry can discourage us from necessary experimentation.

**Malcolm Addey, New York City**

## On the case

THE PICTURE of Neil Hillman's flight cases at the United Baggage Claim at O'Hare Airport in Chicago (*Studio Sound*, June 1998) was a sight for sore eyes. Now the whole world knows the glamour of location production for video—I've been collecting my own gear from that baggage area three times in the last month.

More to the point, I'm glad *Studio Sound* is branching out a little to show what location recordists are up against and I couldn't agree more about stereo field recording. I've had to educate some clients about the advantages of stereo and have had others who asked why we didn't do it sooner. The biggest prob-

lem is not in recording M-S, X-Y, or any other method of stereo recording, it is getting a post budget to include time in an audio suite to take advantage of what's been recorded. Since X-Y can be accommodated easily enough in an Avid suite, that's often a far as it goes. However, I agree with you that it's a good fight worth the effort, and the reward is an inexpensive way to greatly increase the production values on a show.

**Bruno Strapko CAS, Strapko Recorders, Schaumburg, Illinois, US**

## The stereo scam

I FOUND John Watkinson's article (*Studio Sound*, July 1998) on microphones particularly interesting. His explanation of co-incident microphones was succinct and well done. This got me to speculating on why it is that the vast majority of professional classical music recording engineers prefer to use some form of spaced microphones. This is in spite of a long tome by the brilliant Stanley Lipschitz published some years ago in the *Audio Engineering Society Journal*, citing the evils of using spaced microphones and praising the merits of co-incident microphones.

The term 'fat mono' is often applied to co-incident techniques by the spaced microphone people, and M-S seems to stand for Maybe Stereo. Apparently the mathematical elegance of Blumlein's invention escapes them. Perhaps a clue as to why some recording engineers prefer spaced microphones can be had from the mention in John's article to direct, early reflected sound and reverberation in relation to stereo. Of course, we all know this is a useful but gross oversimplification of what is really happening, thus the clue to that preference for spaced microphones might be hiding in that oversimplification.

Although our hearing system utilises the direct sound to locate a sound

source, that is not the end of the story. A musical instrument radiates in an incredibly complex way, the fundamental and the various overtones emerge in a multitude of directions—then these combine with their individual reflections from all six boundary surfaces before they reach the listener, this total sound being the true timbre of the instrument. The brain uses its cognitive sense to analyse all of the incoming sound for purposes such as the enjoyment of music.

As John says, spaced microphone techniques result in a spatial effect that some people find pleasing. Maybe the spaced microphone advocates think it more nearly represents the timbre or three dimensional radiation patterns of musical instruments. After all, everyone knows that ersatz stereo can be synthesised from mono by simply delaying the sound to one channel by 20ms; isn't that built-in when you use spaced microphones?

It is no secret that the best recording techniques in use today cannot rival the experience of a live event. Michael Gerzon once stated it would take a million channels to do it and some years ago Sir Thomas Beecham, at an event Columbia Records gave celebrating his 50 years of recording, told his audience that they have been 'engaged in a fantastic public swindle', and that their records didn't sound anything like his music.

What, I think, this points out is that neither spaced nor co-incident techniques are adequate for 21st century technology. DVD and surround sound are almost here and a industry-wide dialogue should begin on how best to utilise multichannel sound for the home listener—before we plunge into another disaster like quadraphonic sound.

Who wants to go first? John?  
**James Cunningham, Highland Park, Illinois, US**

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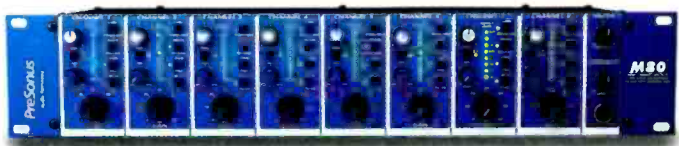


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# CreamWare SCOPE and Pulsar

After the success of its tripleDAT family CreamWare is boldly going into new realms with its Pulsar and SCOPE cards. **Simon Trask** previews the next generation, in Germany

**O**VER THE LAST WEEKEND of August, German company CreamWare chose to preview its grand new design for the computer-based digital studio era in a grand design from a former age. Recently purchased by the company as a base for its development activities, the long-disused Stockert radio telescope is still an imposing edifice, situated high amid hills in remote countryside and visible for miles around. The original opening of the telescope in 1956 ended the ban on radio wave measurement in Germany following the Second World War, and was considered an important enough event for representatives of the Allied forces to attend the ceremony.

It was a somewhat more modest gathering of journalists and distributors who attended the preview of SCOPE and Pulsar. CreamWare heralds SCOPE as marking 'a new milestone in the way we generate and produce audio in the digital age', and describes its new system as: 'a complete studio design environment', and simply, 'The studio of the future.' Bold statements indeed. There is no denying the ambition of these latest products from the company. With SCOPE (or 'Scalable Object Processing Platform'), CreamWare sets out to combine synthesis, sampling, recording, editing, mixing, effects and multiple I-O on a single card; Pulsar is essentially a scaled-down version of SCOPE, offering mixing, effects, sample playback, predefined synthesisers, and multiple I-O.

Both take the form of DSP-based PCI cards for Windows 95/8 computers; the heavy-duty audio processing work is done on the cards by the latest Analog Devices SHARC DSP chips, while front-end graphical user-interface work is handled by the PC. Although Mac versions of the two products have been mentioned in publicity, there were no Mac-based systems in sight at the preview. In fact, from talking to CreamWare representatives it soon became apparent that the company, which has always specialised in the PC, is concentrating its energies on getting the Windows versions out before turning to the Mac.

Since the introduction of SCOPE in an alpha version at Frankfurt earlier this year, CreamWare has upgraded the system with the latest SHARC DSP chips, which run 50% faster than those used in the original version, and has also upped the number of chips from 6 to 15; Pulsar, meanwhile, runs on four

SHARC DSPs. The company is quoting a price of \$1298 for Pulsar, and around \$6500 for SCOPE—positioning the former at the upper end of the I-O card market (though clearly it has more to offer than straight I-O) and the latter in a more ambitious niche.

SCOPE is a late-nineties version of the dream of a self-contained music production system that fuelled the development of early 'computer music' systems like the Fairlight CMI, NED Synclavier and PPG Wave. And by implementing virtual synthesisers in software, complete with freely configurable graphical front panels, CreamWare's SCOPE also realises the dream of another PPG product, 1986's

virtual synthesisers and modules from pre-existing elements, and customise the graphical presentation.

No software effects, third-party or otherwise, were demonstrated by CreamWare; instead, the company was using SCOPE I-O in conjunction with effects routing on the virtual mixing desk to integrate external effects processing into the SCOPE environment (a valid feature in its own right, as the stand-alone effects processor is far from dead).

By its own admission, CreamWare was showing alpha software at the preview event, not a finalised release; it would, perhaps, be more accurate to call the weekend (which was billed simply as 'SCOPE Event 1998') a proof-of-concept



abortive Realizer, an instrument that was way ahead of its time.

Only where all these early systems were stand-alone products, SCOPE takes the contemporary route of using a generic desktop PC to host a system-on-a-card. CreamWare is also adopting the modern-day approach of letting third parties take some of the strain, rather than trying to do everything itself. This approach ranges from letting existing products do what they do best (For example why reinvent the sequencer when you can integrate SCOPE with an established program such as Steinberg's Cubase VST?), to encouraging other companies to develop plug-in effects for the SCOPE architecture, to allowing SCOPE users to put together their own

showing. A rolling program of workshops covered system overview, studio integration, the Pulsar Modular Synthesiser, sound design, and (control) surface design. The elements being highlighted were the virtual mixing desk and virtual synthesisers. The desk provides 32 channels in Pulsar, 48 in SCOPE, complete with 4-band EQ and four inserts per channel. The release version of the mixing desk software will include channel grouping, plus the ability to control all desk parameters via MIDI using SysEx commands—enabling mix automation from a MIDI sequencing package, and live control of the mixer from a hardware control surface.

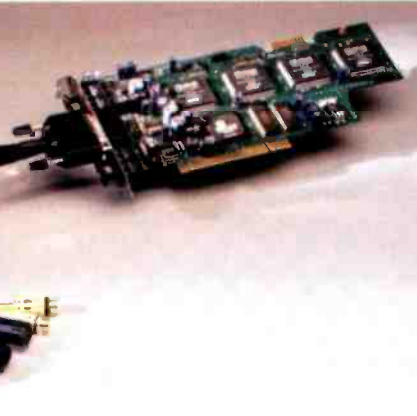
ASIO input capability within SCOPE and Pulsar means that audio tracks >

< in an ASIO-compatible MIDI + Audio sequencer can be routed through the Pulsar-SCOPE mixer, while MIDI input capability allows the synthesizers on the Pulsar and SCOPE boards to be controlled from the external sequencer. In addition, audio outputs of external MIDI synths controlled from the sequencer can be routed through the mixer channels via the I-O—analogue inputs or, in the case of synths such as the Alesis QS8 and suitably expanded Korg Trinity, via ADAT optical inputs. CreamWare demonstrated the SCOPE system to good effect running, with Steinberg's Cubase VST on a PC, with VST audio tracks routed via ASIO and MIDI tracks playing the SCOPE synths, all through the SCOPE mixer. Built-in digital audio recording and editing for SCOPE is still a year away, by CreamWare's own esti-



mates, as the company is aiming to develop a new generation of digital audio recording software built on the SCOPE technology. However, SCOPE and Pulsar owners using the PC platform will be able to integrate the functionality of their boards with CreamWare's tripleDAT system; release 3.0 of the tripleDAT software, due in December, will feature the necessary support capability.

On the virtual synthesiser front, 'Mini-moog plus', Blue Synth and Easy Synth analogue-style synths, and a versatile modular synthesiser complete with graphical patchcords were all demonstrated, along with the functionality in SCOPE (but not Pulsar) for custom creation of synths and modules from pre-existing elements. These are not physically modelled synths or modules, but digital versions of familiar synthesis functionality; however, the sounds emanating from the synths were impres-



sively crisp, powerful, well-rounded and dynamic.

Also shown was the Pulsar sample player, which includes pitch, filter, amplifier, LFO1 and LFO2 functionality; the initial release will support Akai CD-ROMs only, while later releases will support additional formats; SCOPE users will be able to do their own sampling. Multiple synths and samplers can be run simultaneously, each accessible on a separate MIDI channel, with up to 16 voices of polyphony per instrument depending on its complexity; total polyphony is expected to range from 32–64 voices.

Another workshop showed how within SCOPE you can customise the graphical environment, from simply changing colour selections to importing graphical elements created in external design programs. CreamWare foresee SCOPE users making custom environments, along with custom synths and modules, available for download over the Internet for use by other SCOPE as well as Pulsar users.

While the Pulsar board comes with built-in I-O functionality, SCOPE users will be able to add on various I-O options—one of which will be the Pulsar board itself. It will also be possible to use multiple SCOPE and Pulsar boards together, hooked up via a dedicated TDM bus that allows DSP processor load to be shared dynamically across

**Creamware, Wilhelm-Oswald Strasse O/K1, 53721 Siegburg, Germany. Tel: +49 2241 59580. Fax: +49 2241 595857.**

the boards; how many boards you use seems to be a question of available PCI slots and available cash. CreamWare is putting together a music production system that promises to be impressively powerful and versatile while retaining the sort of ease of use for which the company's existing products are known. On first impressions, Pulsar in particular should appeal to PC-based musicians and studios, with its sophisticated, professional I-O, mixing and synthesis environment proving a valuable and relatively affordable addition to a MIDI + Audio sequencing setup. ■

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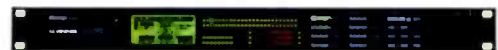
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# Otari RADAR II

For a hard disk to be accepted as a multitrack replacement it must combine the skills of the DAW with the front end of tape. **Dave Foister** looks at the next generation

**W**HILE THE WORLD debates whether the tapeless studio is yet a truly practical proposition, one company has been quietly installing them with great success since 1994. Otari's RADAR hard-disk multitrack now has well over a hundred satisfied users in the UK alone, yet this has been achieved with so little fuss that many (including myself) remain hazy about what the system does and how. Its image and intended market slot have been hard to define, and even the fact that entire hit albums have been produced on them (George Michael's *Older* being the first) has not raised general awareness of what RADAR is. Now a new version, RADAR II, is with us, providing an opportunity to take another look at the system.

RADAR stands for Random Access Digital Audio Recorder, and what sets it apart from most hard-disk-based systems is its determination to behave like a tape machine. Although there is a PC motherboard inside the box, it doesn't feel like a computer running recording software; rather it is a recorder that happens to look a little bit like a computer. And while this idea has made further appearances since, with tapeless 8-track MDMs from the likes of Akai and EMU, RADAR remained the only one to provide the tapeless equivalent of a 24-track studio recorder in a single box until the announcement of the Euphonix R1.

Its resemblance to a computer is only passing, although the appearance has changed with the new version. The work is done in an anonymous black box, distinguished by a big blue illuminated Otari logo, and three media drives. Here is the first evidence of the new features of RADAR II: the original had three internal hard drives to handle the audio, while II has a single removable SCSI drive available in 9GB and 18GB versions. There's a floppy drive for software upgrades, and the software itself is now kept on a small internal hard drive rather than on the audio drives as before. The final slot is a built-in Exabyte drive—an Eliant 820, the current fast version—for project backups.

Operation is carried out from a dedicated remote panel, the RE-8, which carries transport controls, track arming buttons, scrub wheel, editing controls and many other functions directly accessed from the keys. The QWERTY keyboard is only there for naming projects and locators, and in a way it is a shame it takes up so much space as its dominance of the control surface car-

ries with it the suggestion that operation is more complex and computer-like than it actually is.

Above it, a new bank of keys brings some commonly used menu options to the surface, and has space for many more. Comparisons with the Fairlight MFX3 keyboard are unavoidable, and like the Fairlight the layout is clear and obvious. It is important to note, however, that the RADAR controller can be operated simply as it is, with no display screen, like a conventional multitrack. The 24-channel meter-bridge is standard, making the whole system complete and self-sufficient. There is a display screen, which makes editing more intuitive still, but there is nothing on the system that cannot be done without the screen. The controller is small enough to be mounted on a lightweight rack trolley, which makes it look all the more like a tape-machine remote.

**A**LL the expected functions are here on the RE-8, and many more besides. The transport controls are small, but clear and illuminated, and while it could be said that a random-access system does not need conventional transport controls it all helps to add the required familiarity. The 'wind' speed is fully adjustable, and a double-push on the buttons gives wind at three times the set speed. This kind of programmability extends to the initiation of record, which can be set to be either a single push on the RECORD button or a 2-button operation like most tape machines. Since the RECORD button has no protective fence around it, this sounds a little alarming until you remember one of the features made possible by the hard disk approach—Undo. A major point in disk's favour over tape is

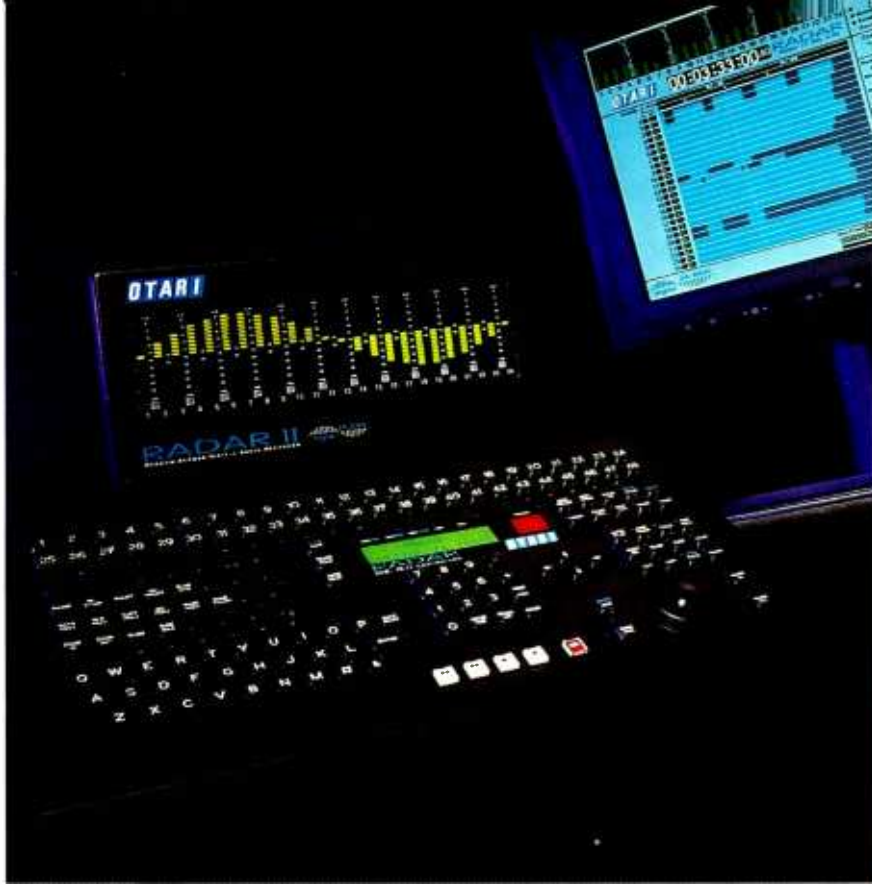
the ability to undo what you have done, whether by accident or design, and RADAR currently has one level of undo. This would allow an accidental recording to be deleted and the original restored, and also allows overdubs to be carried out on the same track without losing the previous version—if the new one is no better it can be thrown away and back comes the first one. Work is in progress to increase the Undo capabilities, perhaps to 10 levels. As it stands, the undo function applies equally to the machine's powerful editing functions.

There is a whole bank of keys dedicated to the editing possibilities, and the operation centres on two keys to mark the in and out points. These select points for automatic punching when that is needed, but also select a block of audio that will have other processes applied to it. The points can be entered on the fly or numerically, and in this context it is worth noting that the time display can operate in bars and beats, given a tempo map and a start point. It also offers frames or feet in addition to the conventional time read-out.

For precise identification of the required points there is a jog and shuttle wheel, which gives one of the best emulations of analogue rock and rolling I've heard, with a directness to the wheel's action that makes its use positive and reassuring. This is not a double-function wheel in the conventional sense, with a push-button action to switch between jog and shuttle; what it does is determined by which key is pressed before you grab it. This also means it is not live all the time but must be selected before use. A big bonus on RADAR is an on-board solo function, allowing any selection of tracks to be soloed to help identify edit points and



RAMON SZMICHOWSKI



problems. Obviously this mutes the rest of the outputs so can't be used like a console AFL system, but during track laying and editing it puts even more of the process under the hand on the recorder remote. It even offers three types of solo: momentary, additive, and interlocking.

Having selected a block of audio, the full range of editing functions is available on the dedicated keys. The block, comprising a chosen set of tracks from between the marked points, can be cut or copied on to a clipboard, which can itself be played for checking. The block can then be inserted elsewhere, used to replace existing audio elsewhere, thrown away, looped, and even reversed. Crossfades are fully adjustable and tracks can be slipped in time, forwards as well as backwards. All these actions can be carried out very quickly, and all can be undone. Nothing is destructive, although with only one level of undo it is possible to get so far away from your original edit that you will have trouble getting back, but the project management functions mean even this is no problem.

The system can handle up to 99 projects, each with 99 locator positions that can be marked up as easily as the edit in and out points, to bars and beats if appropriate, and named using the keyboard. The power of the system is that a project can be copied in its entirety, duplicating the complete EDL but not the audio tracks. Since nothing is destructive, like a conventional DAW, several completely different versions of the same piece can be created without ever losing any of the others and without having to copy any audio. There are already tales of people buying a RADAR system, hanging on to an exist-

ing DAW on the assumption they will be needing to fly stuff out to it for edits and spin it back in as with conventional tape, and then finding their DAWs have become redundant as RADAR can do it all with less fuss.

A good example of the kind of thing it can do is the idea of doing your mutes on the source tracks instead of on the console. Chunks of audio can be accurately identified and then 'erased' very quickly, without actually permanently removing anything; doing this on a copy of the project, coupled with the undo capability, makes it fast, flexible and safe, and probably more accurate than most console automation.

This kind of work is inevitably made easier by the flat colour-LCD display screen. Panels around its edge show various items of status information, such as sample rates, remaining space, and so on, and while all these can be viewed on the RE-8's display it is also useful to have them all visible at once. But the screen is mostly taken up with the tracks display, a powerful aid to managing the audio and editing functions. Audio on the 24 tracks is shown as pale blue strips which scroll across the screen; the current position is the centre, and contrasting shades show the area defined by the in and out points. Future plans include showing the audio waveforms in the blocks, but even without this facility, scrubbing and locating is very intuitive.

Audio can be shared between different projects, and even the process of copying a section from one and pasting it into another is quick and straightforward. The project management tools

are smart enough to flag the fact that you have done this, so that when the original project is deleted, the audio needed for the later one is retained.

The fact that RADAR II is 24-bit is an important reminder that this is not a system that appeals purely on the basis of operational convenience. The audio quality of RADAR has always been a source of some pride to Otari, with an enormous proportion of the cost of the original model accounted for by the converters. Crystal Semiconductors converters have been used from the outset, and according to Otari there are users who bought systems for the features and found they ousted their established multitracks on the basis of the sound as well. RADAR II builds on this reputation by incorporating 24-bit converters; although 16-bit operation is still selectable where appropriate.

The rear panel is crammed with connectors showing the unit's potential for interfacing with almost anything. Analogue and digital signal connections conform to Tascam formats, with TDM digital and balanced pro-level analogue on 25-pin D connectors, so a RADAR box can be hooked directly into a studio already wired for TDM machines. Any pair of channels can be assigned to AES-EBU and SPDIF connectors, and similarly signals coming in on these can be routed to any tracks.

The SCSI bus appears on the back for connection of further drives, and seamless recording across these is possible. Synchronisation handles all types of time code plus MTC and full 9-pin machine control. Chasing is simple and reliable; this isn't a lock-and-let-go system but chases code constantly, even apparently staying with dodgy sequencers without compromising performance. Word clock in and out are provided, alongside a video sync input complete with loop through and termination switch. This kind of detail shows that RADAR is intended to be a fully professional machine with applications just about anywhere multitrack recording is needed.

The success of this aim is shown by the variety of installations already using it; although the system's low profile remains a source of frustration to its adherents—there seems to be a reluctance to take it seriously in some areas, perhaps born of scepticism about whether it can actually do what it says. For myself, soon after I was introduced to it, I felt completely at home and started to realise that perhaps it offers the best of both worlds, combining the simplicity of tape with the power of hard disk. RADAR II may be the industry's best-kept secret, but there are an awful lot of facilities that would be doing themselves a favour by investigating it. ■

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# Merging Technologies Pyramix v2.0

Recently upgraded and supported by new ancillary products, the secret of the Pyramix is unravelling. **Terry Nelson** peers inside a box of Swiss tricks

**P**YRAMIX FIRST ATTRACTED attention some two years ago with the release of v1.0 software. Since then, the release of v2.0 software has built on the system's considerable power and flexibility, yet Pyramix falls into the 'best kept secret' category.

As previously reviewed, Pyramix is a complete virtual studio running on Windows 95 and NT (recommended), and comprises a flexible mixing console, an 8-track recorder, a pool of DSP units and a CD-R mastering facility to Red Book standard. It can either be supplied as a complete rackmount package with computer, or as the Kefren ISA card with the software on CD-ROM. In this case, I installed the Kefren card in a Pentium II (266MHz), and this was accomplished in the time it takes to open the computer case, plug the card into the socket and reassemble. Before loading the software, I recommend that you set your

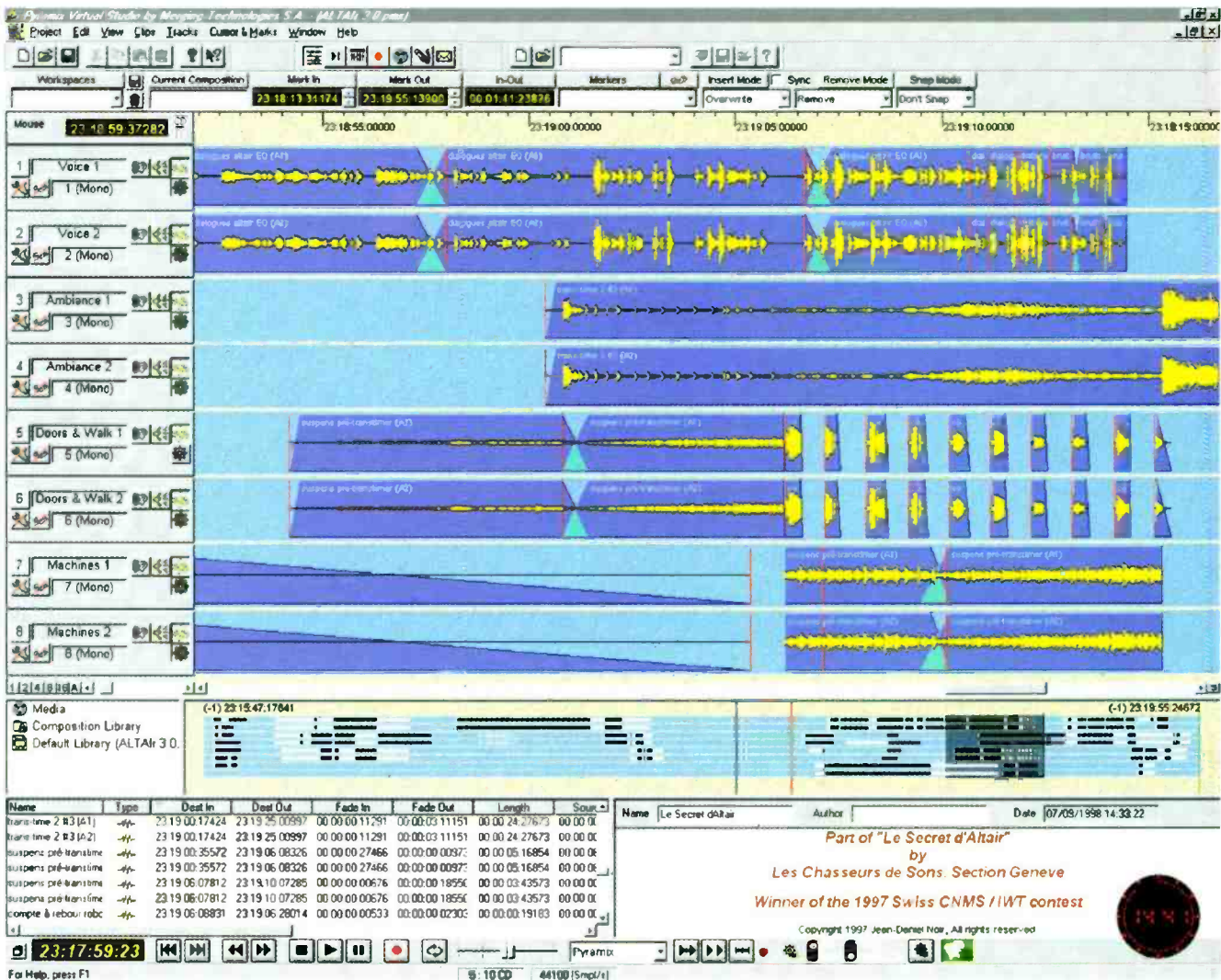
graphics to high resolution for viewing comfort. At that time the computer was running Windows 95 and has since upgraded to Windows 98 without any problems. Inserting the CD-ROM starts an auto-run procedure where you are asked what you want to install.

As well as the Pyramix software, you also get the operation manual, Acrobat Reader 3.01 and Internet Explorer. The user manual is well written and quite comprehensive. However, the Help File is also very clear and this would be sufficient in many cases.

As one of the advantages of being a fairly small company, Merging Technologies has a good dialogue with users, and much of the fine-tuning of the system is the result of feedback from customers using Pyramix on a day-to-day basis. Fairly obvious, you may think, but the turnaround time is often very fast, and this is illustrated by the fact that

I started with Pyramix earlier this year with v1.2, soon to be followed by v1.3, and now I am up to v2.0.

It is clear that the evolution of the system is resolutely towards AV applications and mastering as compared with the original 8-track studio-in-a-box approach. This is shown by the speed at which it is possible to carry out edits, the assembly of recorded material, with an easy operation. The first software releases allowed comprehensive recording and editing facilities, the latest version offers improvements including dynamic automation on all functions including EQs, pans and DSP effects. For example, a slight adjustment to the EQ of the music background during the voice-over of a commercial might just give that edge to the voice without having to juggle with levels. Another much-requested feature, crossfade editing, has been implemented and can be >

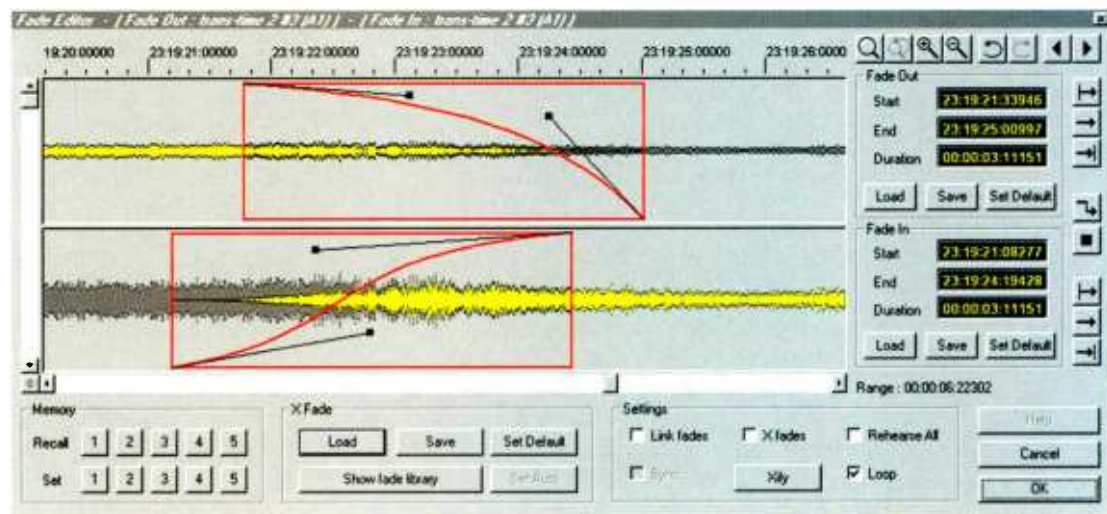


◀ likened to editing on two digital recorders where the final programme is compiled on the master recorder from the playback machine. This in effect doubles the track capacity for edits (for stereo edits, you are really using 4 tracks), and opens the door for some creative manipulation. However, the feature does not stop there, and there is a library file that permits the compilation of different kinds of crossfades—very handy when you are in a hurry and do not want to spend time programming fades.

There are several useful new functions concerning levels. For example, certain portions of programme material may be already mixed but need some adjustment in overall level. The por-

tion(s) can be marked and raised or lowered by the necessary amount.

tion(s) can be marked and raised or lowered by the necessary amount. A clip function allows you to see how near to zero level the signal is at its highest peak. If, for example, the loudest peak is -4.7dB, you could raise the overall level by 4.5dB in order to maximise the signal while secure in the knowledge that you will not clip. It is clear that this feature of gain adjustment could be a global to a whole project, if required, and not just to defined sections.



tion(s) can be marked and raised or lowered by the necessary amount.

Certain aspects of the information displayed on-screen have been refined, and among the more notable are active track display and what could be called the overall project display. With the former, it is now possible just to display the tracks with recorded material on the screen rather than a mixture of recorded and empty tracks. This helps clarity of working and avoids undue clutter. The lower edge of the main Pyramix edit screen shows the overall project in a condensed form, which allows zooming in on any point of the project without having to do much searching. This now displays in red the part of the project that is currently active on-screen, a small point, but very handy. Other display features include a fine zoom control that gives a resolution in fractions of a sample. Whereas

possible for the machine), is the sync delta display. This provides a visual display of when the system is coming into sync as well as any variations. The default setting is 8 frames, but a zoom function allows the display to be adjusted from numbers of frames to fractions of frames. Also useful is the ability to move the reference sync point of programme material. Suppose that you have fixed your sync reference to start the first cue for a commercial. You now decide that you want things to start earlier or later according to the picture cue by marking this point and making it the new reference sync position. To let you know when you are actually recording Merging Technologies has included an eye-catching on-air logo (complete with the graphic of a well-known microphone) to appear on the screen. Another small point but one to go down well with studio clientele

Projects can be saved to CD-R and this provides a neat way of playing back a completed project to a client at short notice. As well as the programme material, the CD-R also records all setup information which means that a project

can be quickly loaded and reworked with the minimum of setup time. Pyramix works with most popular CD-R recorders, and provides CD mastering facilities to Red Book standards. The same composition editor is used for marking CD start, stop and index points as for projects, and the real-time processing of the DSP facilities—together with the automation—provides a very complete mastering package. Depending on the final destination of the CD-R, useful features include setting pre and post roll (broadcasters may want 0 pre-roll whereas CD masters 40ms), digital copy inhibit, readout of track time or total CD play time elapsed, SRC for setting wordlength (multimedia productions), and import and export of various file formats.

In parallel with the development of the Pyramix software, Merging Technologies has developed a range of hardware and stand-alone products to complement the system. One of these is the new Keops PCI bus card. This supports 16 simultaneous hard tracks with 32kHz-96kHz operation. Version 2.0 Pyramix software already supports Keops, so upgrading from the Kefren card to Keops is plug 'n play.

The other two principal items are the DUA convertor-breakout box and the Sphinx modular convertor. The DUA has been designed as a dedicated A-D/D-A convertor for the Pyramix, and consists of the Adiana card, which contains all the necessary A-D/D-A and AES-EBU I-O circuitry, and plugs straight into an ISA bus PC slot. This is possibly the first time that an A-D/D-A

convertor is available to plug directly into the computer, due to the extremely hostile environment for audio (lots of 'dirt' flying around). The card features a dynamic range (or signal-to-noise ratio) of 100dB and this is improved by only 0.3dB when using it externally with the computer.

The DUA provides 4 analogue inputs for 20-bit A-D conversion and 6 analogue outputs of 20-bit D-A (outputs 5 and 6 being for a headphone), 2 AES-EBU inputs and outputs at 24 bits (which can also function in a dual mode for 96kHz), internal crystal lock and external AES-EBU and wordclock sync.

A IU-high breakout box completes

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the system by providing all inputs and outputs on XLRs plus headphone monitoring jack.

About to begin production is the Sphynx modular 24-bit high resolution digital audio interface. This is a 2U-high A-D/D-A converter that has the advantage of being a stand-alone system, and fully user-configurable depending on the modules installed. The basic configuration consists of 4 analogue inputs and outputs (24-bit up to 48kHz), CPU-PSU board, 2 optical ADAT inputs and outputs and an SPDIF I-O. Other modules available include 24-bit AES-EBU inputs and outputs plus 24-bit A-D and D-A inputs and outputs—either at 48kHz or 96kHz. A TDIF interface for Tascam DA-88 will also shortly be available.

The Sphynx can either be controlled remotely via the Pyramix software, when used as part of the system, or via the front panel when used as a stand-alone. In the first case, the converter is connected to the Kefren-Keops card via the ODI optical link.

The front panel consists, from left to right, of a mains switch; remote LED indicating remote control; a group of LEDs to indicate synchronisation status together with SELECT button; a second group of LEDs to indicate sample rate (32kHz, 44.1kHz, 48kHz) plus x1, x2, x4 indicators and SELECT button (selecting 48kHz and x2 will provide 96kHz operation); a third group of LEDs act as input level meters for the 8 channels showing signal present and overlevel; a fourth group of LEDs for the Monitor section plus SELECT button to switch either the inputs or outputs in pairs to the headphone output. A volume control and the associated headphone jack complete the panel.

The rear panel features 2 rows of 8 XLRs for line inputs 1-8 and line outputs 1-8. A clever use of the connectors is that, depending on the configuration of the unit, the odd number inputs-outputs may also be the AES-EBU inputs-outputs 1/2, 3/4, 5/6 and 7/8. Other connectors include an XLR for AES-EBU reference, three BNCs for video-word-clock (input-loop-output), two RCA sockets for SPDIF I-O and four optical connectors for the ODI A and B inputs and outputs. The panel is completed by two blank panels marked aux 1 and aux 2, which will be used for the TDIF interface when available.

The Pyramix Virtual Studio is certainly a system to be reckoned with and it is surprising that it has not got a higher profile in studios. This said, OEM use is quite extensive and this include all of the digital audio facilities in the video workstations from Softimage. If you are looking at digital workstations for your studio, to include Pyramix in your checklist. Merging Technologies is at the forefront of developments and next year will see some interesting new products. ■

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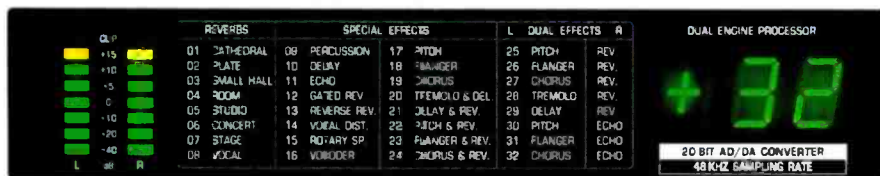
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# Midas Broadcast XL4

Live sound desks are frequently pressed into broadcast duties but few manufacturers have gone the extra mile to add the bits that can make the difference. **Zenon Schoepe** reports on the modification of an industry standard

**W**HILE BY NO MEANS A new product, the XL4 has fulfilled its expectations as the Midas flagship desk. The subtle broadcast variant of this console has now been in existence for around 18 months and has accounted for some 10% of the circa 160 XL4 user-base.

The fact that live consoles are regularly pressed into service in broadcast environments is not surprising given that the fundamental requirements of both applications major strongly on the objective of the stress-free single-take, be it for live transmission, live recording or live to the big black boxes. This is substantiated by the number of supposedly live rock'n'roll desks that emerge outside of FOH and monitor duties at live broadcast productions.

Midas argues that the three main requirements of broadcast and broadcast users remain sonic clarity, reliability and flexibility, albeit in slightly different priorities.

To trace the lineage of the XL4 you have to go back to the legendary XL3 which was an innovative mixer in not providing any audio subgroups as such, just 16 mix sends. Users still swear by this console, but the intention with the XL4 was to bring it more in line with more traditional consoles through the inclusion of aux sends and audio subgroups. In fact, you are offered 24 auxes and 16 audio subgroups. EQ on the XL4 is 4-band fully parametric rather than the slightly more restricted arrangement on the XL3, even though you rarely hear anyone moan about it.

A quick roundup of the XL4's CV is in order. It is a 45-bus desk with an additional 18 x 8 matrix comprising, 16 mono auxes, 16 audio subs, 4 stereo auxes, and stereo master, AFL and PFL buses. Inputs up to 48-channels are supplemented by an additional 16 aux line returns. Other additions over the XL3 include a direct output on each channel with a level control, and the meterbridge houses the mic pres fed by separate mic and line XLRs selected by an automated switch.

Indeed, automation on the XL4 is



a leap forward over what has been offered by the company before and includes a snapshot fired channel mic-line switch as already stated, phase reverse, EQ bypass, all aux cuts, insert, assign to stereo and mutes switch automation.

**T**HE AUTOMATION on the desk is the result of a collaboration with the UK's Outboard Electronics, a connection that started with the addition of automation to the XL3. According to Midas the XL4 was not originally intended to be automated; although a change of mind resulted in the fairly advanced level of automation that the desk now sports. Snapshot scene creation and recall is simple, governed by a plain-looking master panel.

Storage is to internal memory and removable PCMCIA card.

A neat inclusion in the fader-

panel section of channels is a collection of group-assign switches which can, via global mode switches located in the automation control panel, be used to assign audio subgroups (16), mute groups (8) or VCA groups (10).

It is interesting to note that the XL4 was not designed with the broadcast additions in mind, but the modifications were the result of requests from broadcast-orientated users who saw the potential of the board for their line of work. It is also significant that the knowledge gained in this exercise is likely to be applied in similar panels on existing and future consoles from the company as Midas has clearly spotted the potential of broadcast outside of its traditional live sound market. For example, a similar, but stripped down, variant of the XL4's broadcast comms module is planned for the >



◀ competitively priced XL200 desk.

In a nutshell, the differences between a live and broadcast XL4 are moving faders on all inputs and VCA groups, (the live version has them on the groups), machine starts as standard on every input, a full broadcast communications module for extra monitoring abilities, and the inclusion as standard of an audio-follows-video box that has 24 extra inputs allowing a director to choose a camera and automatically change a scene with programmable 1s to 10s crossfades on the XL4 making it particularly handy at dealing with live sport.

reverse phase, listen to both in mono, swap outputs over, dim them, mute L or R and A-B speaker destinations and a separate PFL output are supported. Meter outputs are provided and the talk mic can address external and internal with separate level controls. The oscillator has its own output.

Talk is to auxes, groups, matrix, mono master and LR. A Comms on switch directs to the comms I-O while a LINK switch connects the talk to the intercom in such a way that the talk mic, headphones and PFL speaker-output can send and receive Clearcom signals, and the headset.

The XL4 remains a handsome console. Midas has honed its console's brooding presence to perfection making it the definitive article for live-sound engineers to impress the girls with. As such it's going to be wasted sitting in a locked-up truck.

Front to back reach is substantially less than the far less well-featured XL200 due to the meterbridge preamp mounting. Pot access and switch visibility is superb and every control has the sort of 'buffered' and 'dampened' feel that accompanies quality and would shame many a fixed studio console.

The outline of the comms module features, and other broadcast bells and whistles, will mean more to some readers than others, but in no instance do they detract from the desk's fundamental soundness and suitability to its original application.

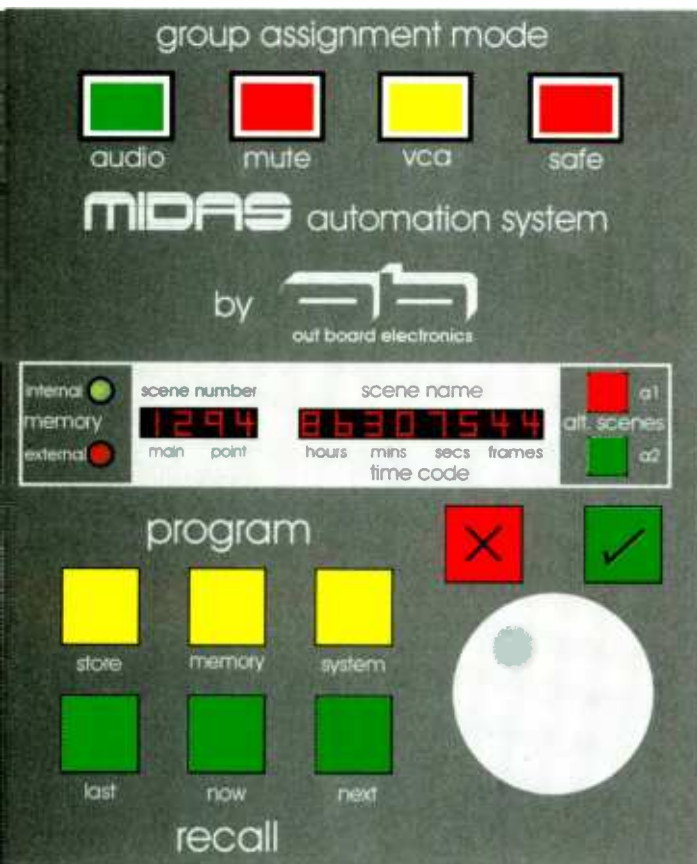
It is ridiculously simple to use. I'd challenge any manufacturer to put forward a desk with this degree of flex-

ibility that is this approachable. Only a novice would stumble at getting a bank load of levels to stereo, and even then, providing they had actually seen a mixing console before, they must learn quite quickly.

In live production, no matter how well rehearsed, you still fly by the seat of your pants and the last thing you want to encounter is surprises.

Here is an interesting statistic for you that puts the appeal of the Midas brand name into the context of

broadcast. Who, would you say, is the single biggest user of Midas consoles in the world? Probably one of the super-league sound companies based on one side of the Atlantic or the other, right? Wrong. It is Italian broadcaster RAI, which had 19 desks at the last count. That, I think, says quite a lot. ■



It might not seem like a lot, but these thoughtful additions may be enough to change the complexion of the XL4 from a supremely able, pure live-production console into a live-production desk with a practical broadcast-specific twist.

An ordinary XL4 can be converted to the full broadcast spec and off-the-shelf the broadcast version asks a circa 6% increase in price, but Midas is at pains to point out that not all channels need to run motorised faders in the same way that not all need to have remote starts, so savings can be made.

Outwardly, it is extremely difficult to spot a broadcast XL4 from a distance unless your eyesight is good enough to identify the presence of the expanded comms module. This module has two external inputs with level control and soloing works differently in that you can

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# Focusrite Blue 300

The appearance of the Blue 300 mastering controller prompts an alternative to the usual eclectic style of mastering suite. **Dave Foister** is in Blue heaven

**A** MASTERING ROOM is traditionally the most individual and diverse control room you are likely to find. While there are some things you expect to find in most, there are probably no two the same, partly because of differing markets, but mainly because a room reflects the individuality of its engineer. It is a bold move for a manufacturer to try to produce a whole suite of equipment to do the job, and perhaps an even bolder move for a facility to build a whole cutting room around the result. But when that manufacturer is Focusrite then the idea possibly makes more sense; and when the facility is Tape to Tape, with several highly specified rooms to choose from already, then a themed suite like this is an attractive concept that reinforces the high-end flexible image and could bring in clients.

If a single piece of Focusrite equipment is eye-catching then a console full of it has to be seen to be believed. Tape to Tape has a large room, conventionally laid out with no mixing console as such, but custom furniture fitted with rackmount bays filled with appropriate gear. The difference is that apart from the Neumann lathe controls, two DAT machines and two signal processors (a BSS de-esser and a Summit compressor, for the record) all the bays are filled with items from the Focusrite Blue range. In all there is 14U of Blue, and in the middle of it all is a blue oval that for once does not say Ford; it is the remote unit for the Blue 300 Mastering Controller.

The system makes sense because Focusrite has always taken care to address the mastering market. Its EQ and compression has just the right combination of control and sonic quality to make it attractive, and the Blue 315 EQ and Blue 330 compressor-limiter are specifically mastering versions, with stepped switched controls in place of pots for precise channel matching and repeatability. The recent addition of top-flight converters in both directions completes a set of equipment that is ideal for the application and provides virtually everything the transfer chain is likely to need, with impeccable credentials in

terms of its quality. The logical next step is to integrate the lot, with a central controller to select sources, insert processing and feed the monitors. This is what the Blue 300 does, with a clever combination of routing, switching and remote control. The last element in particular is intended to promote the idea of a complete Focusrite system; although the signal routing facilities could be used with any suitable equipment. The signals are handled by a 2U-high rack-mount box with enormous LED meters and a headphone socket, and control of the system lies with the oval desktop remote unit.

Despite its recent forays into digital, it is with analogue that the name of Focusrite is most closely connected, and all the signal handling through the Blue 300 itself is analogue. In the context of a cutting room this makes perfect sense, as the final output has to be an analogue signal to the cutter head. For other applications the only option with digital systems is conversion to analogue, processing and routing, then conversion back again, and Focusrite is one of an elite of companies that could ask us to do that and get away with it. For those who believe that EQ and compression can only be done properly in the analogue domain, and that Focusrite does both at least as well as anybody else, the Blue 300 is surely irresistible.

The central router has inputs for eight analogue sources, and there are separate signal paths to the record output and the monitors. The monitoring control is at least as comprehensive as the average mixer, with feeds for three sets of speakers (main, mid and mini), summed and differenced mono, polarity reverse, adjustable dim and mute. The LEVEL control is a rotary encoder with a big LED dB read-out for easy repeatability, and the three feeds have level trims under a panel on the main rack unit for matching their volumes.

Also hidden under the panel are level adjustments for the eight sources, which can be +4dB or -10dB and have gains set individually for precise matching. Thereafter the control panel has seamless switched attenuators for each input

with overall trim controls, and a Sum mode allows them to be mixed—a suggested application is adding reverb. For overall level control there is an optional master fader to be mounted separately in the console.

Although all the inputs are expected to be analogue, it is assumed that input 1 will be fed by a Focusrite Blue 260 D-A converter, and Tape to Tape has two of these. The suggested setup is to use one for the record chain and one for monitoring, but this is by no means compulsory. In between the two selector switch banks are six buttons marked DIGITAL, and these come into their own specifically in conjunction with Focusrite's own converter. The Blue 260 has four AES inputs plus a Toslink optical and an SPDIF coaxial, and any one can be selected from the front panel. The IC Controller goes one better by offering full remote control of source selection on this bank of six buttons. This means that six digital and seven ana-



logue sources can be selected from the oval remote, with fully independent switching of all 13 to both outputs.

The record signal path has two sets of analogue inserts, again switchable from the remote. In Focusrite's ideal world the first would have a 315 equaliser and the second a 330 compressor, to be switched in independently when needed, and indeed this is what Tape to Tape has. It has to be said in fairness that at present these are not actually hooked up to the 300; based on the 'if it ain't broke, don't fix it' philosophy, the record chain in the room is still handled by the original home-built set of big coloured push-buttons while the Focusrite handles the monitoring. Having said that, it's certainly envisaged that eventually the room will be using all the 300's facilities—there's no reason not to other than the time taken to rewire in what is evidently a very busy room. The result, in accordance with Focusrite's suggested layouts, would be an entirely Blue signal path, from analogue or digital source via Blue EQ and compression to analogue or digital destination. The system is >



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< completed by the Blue 245 A-D converter, a 20-bit unit with dithering down to 16 bits if required. Tape to Tape's engineers profess themselves entirely satisfied with the quality of both D-As and A-Ds—this in an environment where most rooms use Prism Sound.

Metering of the signals at various points is also controlled from the remote, with the chosen signal appearing on the main

rack box on the biggest pair of LED vis you are ever likely to see. These can show the recording or monitor signals, or tap in before or after either of the inserts, and the whole sensitivity can be switched to cope with high levels.

The only disadvantage of the eye-catching styling of the remote is that the control layout does not immediately yield its secrets. The divisions between sections are all at odd angles, and nothing is vertically aligned—knobs and switches are sometimes arranged in a curve and sometimes raked at an angle. There are patch-bay-style labelling strips below the selector buttons, but it takes a moment or two to get your bearings. Once you find your way around you notice a couple of extra details: the monitor source can be set to automatically follow the record selection, and conversely the record feed can be linked to the monitor switch bank. This leaves open the apparent possibility that a device could end up fed back to itself, which

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apart from the nasty noises can quickly destroy a cutter head, and it is not clear whether this danger has been dealt with. Particularly important is the lock button, used to disable all the functions that

could disrupt the signal passing through for recording—source selection, faders, trim and insert switching.

Andy Crump and Pete Norman, who share Tape to Tape's Focusrite room, are clearly very happy with what it does. When asked if he missed the variety of kit normally available for cutting, Crump's answer is an unqualified 'No'. There are no reservations about the signal integrity of anything in the chain, and no feeling of being limited by having just one compressor and one equaliser. Add the Mastering Controller and the integrated whole obviously works very well for them, and now that word is getting out that Tape to Tape has the room, there are indeed clients booking it just for the Focusrite kit. In all respects therefore the move has been a success, and no doubt we can expect to see the Blue 300 appearing at the heart of more and more suites like this. ■



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# Yamaha 01V

Yamaha has already defined price and performance expectations in digital mixing, but it is trying to do it all over again with a new addition to its family. **Zenon Schoepe** reports

IT IS IMPORTANT not to confuse the 01V with the Programmable Mixer 01, but by the same token it is important not to confuse it with the operational elegance of the 03D or 02R even though it shares their processing genes.

The feature list is predictably impressive given this desk's lineage, but it is yet another example of still further trimming of the original offering in order to create a new price point. Convertors are 20-bit with 32-bit internal processing and 44-bit EQ processing. Out of the box you are presented with 12 mic-line inputs with switchable phantom power in blocks of six, plus two stereo returns. However, a single rear-panel slot can take 8-channel TDIF, ADAT and AES-EBU flavour I-O interface cards with the inputs arriving at channels 17-24 and the outputs assigned for function within the desk. There is also a 4-channel analogue I-O option card, and for the record none of these cards are compatible with the 03D and 02R.

As a point of interest only channels 1-16 have access to full channel processing, option inputs have only 2-band EQ, for example, but to counter this it is possible to swap channels from the option interface with fully featured channels 1-8.

In terms of group buses the 01V has four and these can emerge via four so-called 'omni out' sockets or via a fitted

interface card. Omni outs can also be assigned to deliver aux outputs, extra stereo outs or as direct outputs from the first 16 channels.

Throw in two internal stereo returns from the two internal multi-effects processors with full EQ and routing and the self-contained nature of this desk cannot be denied.

Internal effects take in 42 presets and 57 user-locations while a total of 22 dynamics processors are arranged in 40 factory and 40 user-patches.

Onboard automation is restricted to 100 complete desk snapshots, but if its dynamic automation you want then it is to the sequencer and MIDI you must go. There is no surround or multichannel mixing capability and frankly there shouldn't be.

Channel faders—40—are 60mm motorised types with associated ON, SOLO and SELECT switches, the last of which assign the chosen channel to the adjustment of its internal parameters.

In terms of non-fader controls you get dedicated buttons for utility, MIDI, setup, view, dynamics, EQ-attenuation, phase reverse-delay, and pan-routing—some of which will be familiar to 03D and 02R users. Repeated pressing

of said buttons calls up successive screens which are adjusted via cursor movement and dial.

A cluster of fader mode buttons carry over the established practice of being able to set effects 1 and 2, aux 1, 2, 3 and 4 levels from the moving faders. The Option I-O key accesses the under layer of 8 inputs derived from the optional rear-panel interface board, if fitted, while the Remote key assigns the faders to internal and external MIDI data generation duties and can be used to create faders as group masters. All pretty established stuff this, at least in Yamaha's digital-desk land.

On the other side of the LCD a pot is dedicated to pan on the selected channel, while two more handle part of each band's fully parametric EQ. Annoying things include a noticeable

lag in the EQ curve display when administering tweaks—long enough on first encounter to make you wonder if there is something wrong. You also have to contend with the vagaries of doing EQ on two dedicated pots for frequency and boost, selecting bands is on dedicated keys, admittedly, while the data dial is used for Q value. You get used to this eventually, but the dial

has a peculiar resistive feel to it that is not helped by its size. It is much smaller than the dial found on the 02R, and this means you are turning it from closer to its axis with the usual mechanical laws applying. The dial performance is a pity as you have to use this control an awful lot.

I would have to wonder what I would have made of this box had I not already become well acquainted with the operation of the 02R and 03D before it. I am inclined to think I may have regarded it as something of a culture shock rather than regarding it first and foremost as a derivative of existing consoles, and therefore being a little too eager to explain things away.

However, Yamaha has the benefit of other mod-

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els in the series to its credit, and as such the 01V avoids many of the pitfalls that might have enticed it. If this was anyone else's first stab at a desk with this sort of power, for this sort of money, then I would suspect that it would have made its compromises in far less acceptable areas than Yamaha has here.

Once you are into its mind-set then operation becomes logical and predictable even though the business of actually administering an idea can be painfully protracted. You will know how to do everything on this desk fairly quickly, it is just that you are not exactly encouraged. For example, with the 01V I have realised why you would want to have EQ and dynamics memories because with them you shoot for the nearest approximation of what you want and alter as little as is possible rather than having to go through the convoluted business of starting from scratch each time.

**I**F ANYTHING you have to use an 01V to truly appreciate the 03D much in the same way that returning after a brief, yet intense, flirtation with an 03D to the welcoming and forgiving arms of the 02R makes you want to stay home a lot more often.


Indeed the biggest message the 01V delivers to me is the reminder of what a truly fantastic product the 02R still is so long after its launch.

Comparisons to the 03D and 02R are ultimately unfair as they occupy significantly higher price points. As such the 01V targets a different type of user, one that does not want to work to picture, nor mix in multichannel on a compact but intelligent work surface, rather it is someone for whom the fact that the desk is digital and can interface to digital multitracks cheaply and directly is the overriding concern. It has a killer little sub-mixer, perhaps for keyboard rigs or instances where things are preset, and the clever stuff is achieved predominantly on the faders instead of within the channel processing. It has a good little tool box, too, with coaxial digital I-Os, phono 2-track I-O, headphones, main stereo and monitor outputs, and the ability to cascade two desks digitally.

For the money it is quite phenomenal value and that is something that has to be restated repeatedly, and it is pro enough in the right hands to perform a useful role in the right job. It is not a toy.

By the same token I would not want to leave anyone thinking that the 01V is in some way the 03D trick all over again, but for less money. The 02R and 03D stand head and shoulders above the 01V in terms of operational ease and functionality. The 01V is a different proposition altogether, and, in my opinion, makes the original Programmable Mixer 01 obsolete despite the fact that the new model is more expensive.

They'll sell loads. ■




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# TraxData TraxCopier

The inclusion of a hopper for blanks once differentiated CD copiers according to price. **Tim Frost** continues our look at desktop roll-your-own CD writers.

**T**IME USED TO BE that CD-R copiers which included multi-disc feeder systems were quite expensive. In the last couple of years, though, the huge demand for desktop CD-R copiers has brought less expensive units to the marketplace. TraxData's TraxCopier is a case in point. Costing just under £6,000, this unit has a hopper system that can feed up to 150 blanks into the machine for unattended copying using its two CD-R drives.

Internally, the TraxCopier has two

hard-disk. The hard-disk can archive up to three CD images, any of which can be recalled from the menu and used as the master.

You do not have to tell the TraxCopier which format the CD is, as the TraxCopier will check for itself and make sure the copies follow the same standard. Most CD formats are covered; although we were warned that CD+G for Karaoke-style CDs is not supported.

The master is then ejected into the Accept hopper and the turntable feeds both drives with blanks, so that copies can be burned two at a time at 4x speed, taking around 20 minutes to copy two full discs. These are ejected into the Accept hopper when they are done and more blanks loaded, and so on, until either the number of copies programmed have been completed or the machine runs out of blanks.

Using its Batch Mode, the TraxCopier can also automatically copy from three different master CDs. This is done by loading the input hopper with the first master followed by some blanks, then the second master and some blanks, followed by the third master and blanks. In the copy process, the master is detected and copied to all the blanks until the next master is detected. The copier then automatically loads an image from this new master and copies it onto the next batch of blanks until it sees the next master, and so on.

Faulty discs are sent to the Reject hopper, but this function has to be treated with a certain amount of caution as CD writers do not have read-after-write ability and discs with faulty sectors in the middle of them will not be detected. Blanks will only appear in the Reject hopper if there was a problem with the initial interrogation of the blank disc, prior to writing to it.

If you need to be totally certain that all the copies are good, then there is a separate Compare function which takes the batch of copies and compares them

one by one with the master image from the hard-disk. The limiting factor in the batch process is set the capacity of the internal hard-disk as the master images are not erased during the batch process.

The setup menus give various options, including specifying read/write speeds. Write speeds can be reduced to 1x for those who are sensitive that it makes a difference when writing audio, but, of course, the copy process then takes four times longer.

The system coped well with all discs except for a non-conforming 78-(pressed) audio CD that caused the system to lock up; although the test CD disc seemed to copy OK. Issues handling new or modified disc formats can be solved in a later firmware revision. The TraxCopier can easily update firmware revisions directly from CDs sent out occasionally by TraxData; the machine does not have to get back to the distributor for updates.

For 'normal' audio, data, video CDs formatted with a mix of file types on them, the system copied everything smoothly—and quietly. Even so, there are still a few reservations about TraxCopier specifically in terms of a dio-music business setting. There, for example, no audio input or output functions, so all mastering and changing would have to be done on separate CD readers and writers.

It would also have been nice to have a way of feeding the master separately from the blank hopper. The TraxCopier could then be permanently loaded with blanks and copies of new masters off whenever they are needed—rather than having to always be putting a master at the bottom of a new pile of blanks. Lastly there is the general comparison between this type of hopper copier and a tower system with eight drives.

With two drives, TraxCopier will take hours to copy three discs, where an eight drive tower system will do the same in half the time.

The advantage of the TraxCopier is that the copy process can run completely unattended, where obviously some needs to remember to feed the copier with blanks every twenty minutes. So you pay your money, and takes your choice. ■



TraxData CD-R writers (modified Teac 55s), a 2.5Gb hard-drive and turntable robotics, all controlled by custom-built controller electronics with 4Mb of memory. The board appears to use a PC platform; although with custom processing.

The mechanics of the operation revolve (literally) around the disc turntable. This has three hoppers, the Input hopper for the master and the blanks, an Accept hopper for the finished copies and a Reject hopper for the duds.

Externally the TraxCopier is compact enough to sit on a desk, taking up roughly the same amount of room as a complete PC system. Its operation, as with many of these newer generations of copiers, is from a simple 6-button control pad that selects all the options from a menu driven 4-line LCD panel.

The normal operation is straightforward; load the input hopper with the master CD to be copied, followed by a pile of blanks. Selecting copy rotates the hopper so that the master is over the drive area, the drive tray is opened and the disc drops in and its 'image'—a bit-for-bit copy—is copied onto the

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# JBL LSR32

For methodology see *Studio Sound*, April 1998, page 14.  
 See it on the Internet website:  
[www.prostudio.com/studiosound/apr198/r\\_tannoy.html](http://www.prostudio.com/studiosound/apr198/r_tannoy.html)

*Studio Sound's* 'bench test' loudspeaker reviews continue with the LSR32. **Keith Holland** reports

**T**HE JBL LSR32 is a 3-way, passive loudspeaker comprising a 12-inch (300mm) low-frequency drive-unit with a carbon-fibre composite cone, a 5-inch (125mm) mid-range with a Kevlar composite cone and a 1-inch (25mm) high-frequency drive-unit with a damped titanium-composite dome that radiates through an elliptical, oblate, spheroidal horn. The LSR32 is the largest loudspeaker we have tested so far in this series, weighing in at 21.3kg and having external dimensions of 635mm x 394 mm x 292mm deep; the internal volume is specified as being



50 litres. The mid and high-frequency drive-units, along with the bass reflex port, are mounted on a square sub-baffle allowing rotation through 90° for either horizontal (landscape) or vertical (portrait) orientation; this review was conducted with the loudspeaker in the landscape orientation as supplied. The crossover network is specified as having 4th-order Linkwitz-Riley alignment with crossover frequencies of 250Hz and 2.2kHz. The manufacturer specifies a long-term maximum (IEC 265-5) power handling of 200W rms, that when coupled with the quoted sensitivity of 93dB SPL@1m for 2.83V input (which is confirmed in Fig.1), endows these loudspeakers with a (theoretical) maximum continuous output level of 116dB SPL each at 1m under free-field conditions.

Fig.1 shows the on-axis fre-

quency response of the loudspeaker. The response is held within  $\pm 2.5$ dB from 70Hz to 20kHz with -6dB at around 45Hz. This is a commendable result. The low frequency roll-off is seen to be fairly smooth and gradual, having an approximate 3rd-order slope. Fig.1 also shows the harmonic distortion performance. This result is remarkably good. At worst, the second harmonic distortion rises to -45dB (0.56%) at 60Hz, but has disappeared to -60dB (0.1%) by 200Hz, with 3rd harmonic distortion peaking at -40dB (1%) at 32Hz and remaining below -55dB (0.2%) at higher frequencies. This model displays the lowest harmonic distortion of any yet tested (at least at the test level of 90dB SPL @ 1m).

The horizontal off-axis responses (Fig.5) are fairly well controlled with some evidence of lobing (crossing-over of the plots) between 1kHz and 3kHz. Very little mid-frequency narrowing is evident though, due to the 3-way design. The vertical off-axis performance is dominated by a dip at the crossover frequency between the mid- and high-frequency drivers; this result is expected with spaced drivers. The waterfall plot (Fig.7) shows that the low frequencies decay fairly rapidly, due to the gentle low frequency roll-off, and that ringing at higher frequencies is confined to very minor problems at 300Hz, 800Hz and 1200Hz. The acoustic centre result (Fig.2) confirms the effect of the gentle roll-off; it shows a maximum group delay equivalent to a shift of the low-frequency source to only 2m behind the high-frequency source. The group delay in the lower-mid-frequency range (200Hz to 600Hz) is, however,

higher than that found in equivalent 2-way designs; a result that is confirmed by the step response chart (Fig.3), which shows that the transient

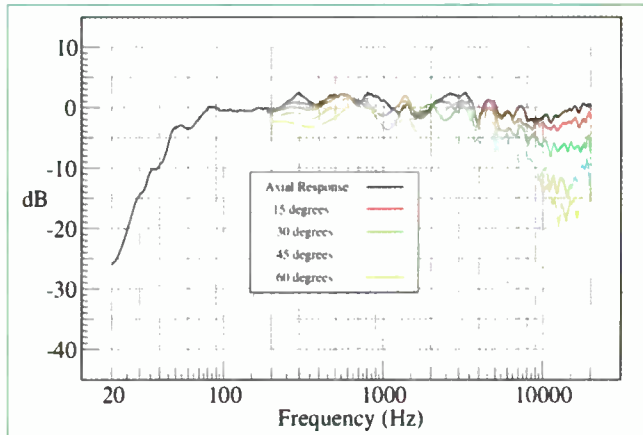


Fig.5: Horizontal directivity

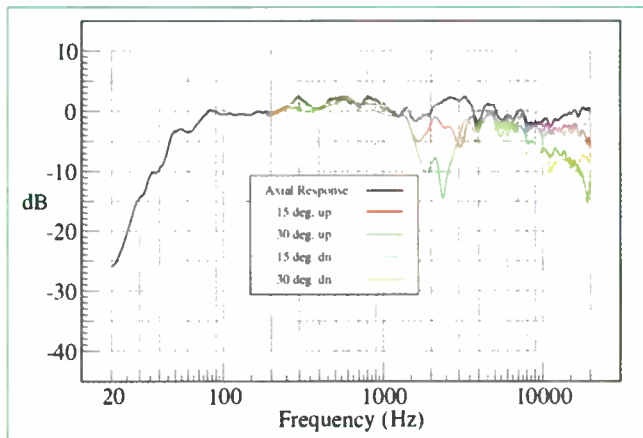


Fig.6: Vertical directivity

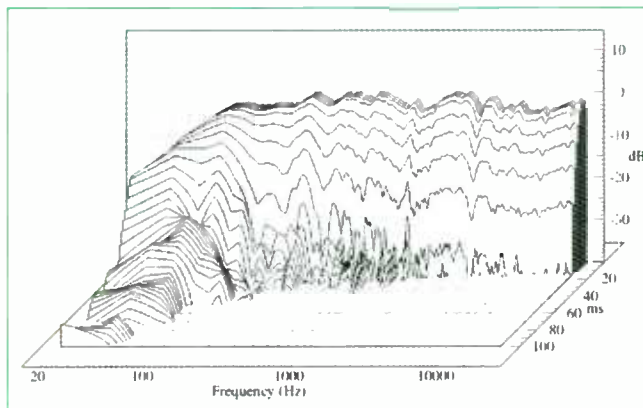


Fig.7: Waterfall chart

response occurs later in this frequency range than at higher frequencies. As expected from the flat on-axis frequency response, the power cepstrum (Fig.4) shows very little evidence, if any reflections, indicating that cabinet diffraction and cone break-up problems are minor.

Overall the JBL LSR32 is an impressive performer. The harmonic distortion is excellent, and the on-axis fre-

quency response is very flat. A mid-frequency group delay, possibly due to the high-order crossovers, spoils the step response somewhat, but otherwise there is little evidence of any problems with the design. The loudspeaker is also capable of high-output levels, but its large physical size must be borne in mind when comparing it with other loudspeakers in this series. ■

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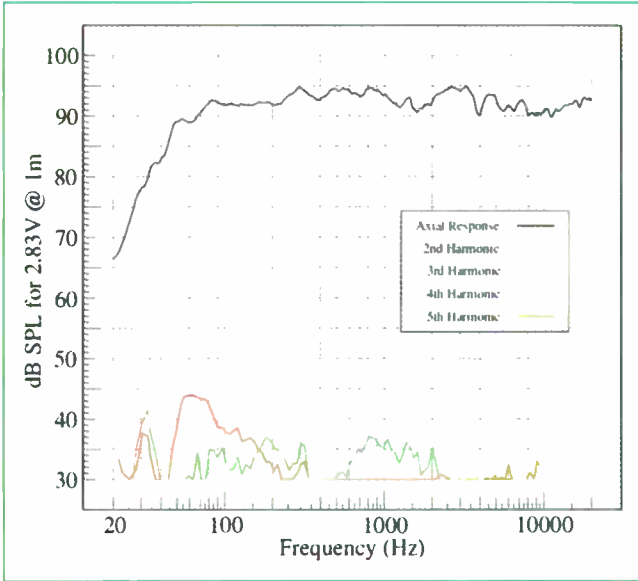


Fig. 1: On-axis response and distortion

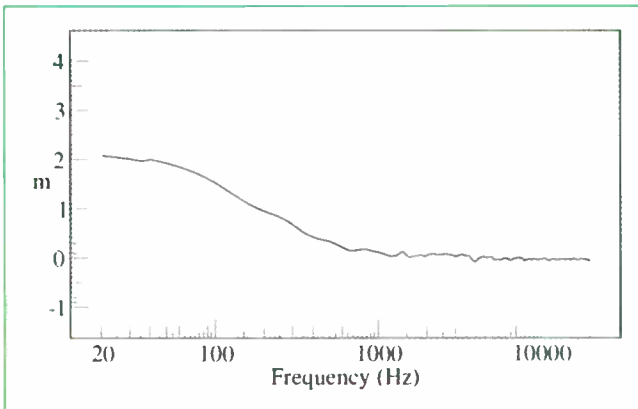


Fig. 2: Acoustic centre

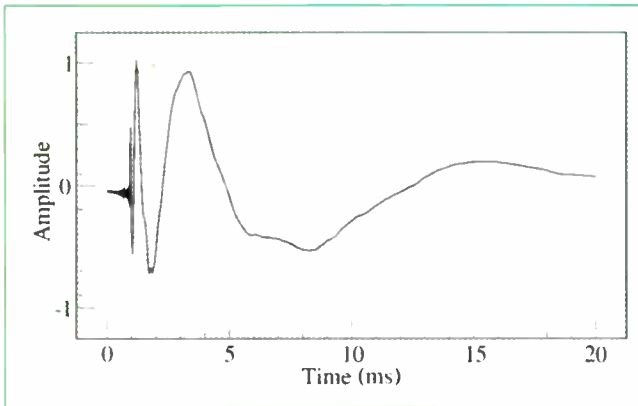


Fig. 3: Step response

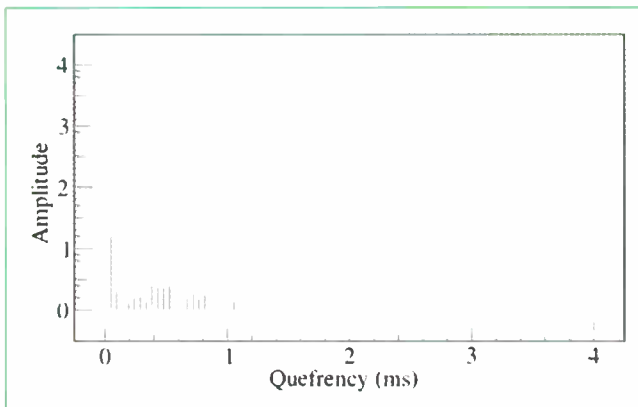


Fig. 4: Power cepstrum

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# Meyer HM-1S

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

See it on the Internet website:

[www.prostudio.com/studiosound/apr198/r\\_tannoy.html](http://www.prostudio.com/studiosound/apr198/r_tannoy.html)

In *Studio Sound's* 'bench test' loudspeaker review **Keith Holland** retests the Meyer HM-1S

**A** TEST OF THE MEYER HM-1S previously published in the June 1998 edition of *Studio Sound*, concluded that a severe dip in frequency response at 80Hz was probably due to a phase reversal in the crossover between the satellite loudspeaker and the sub-woofer. Meyer has since admitted that the test loudspeaker had been demonstrated, prior to being sent for review, in a situation that required the subwoofer to be placed away from the satellite loudspeakers. In this setup, the demonstrator found an improvement in response with the phase of the sub-woofer reversed, and re-wired the connecting

crossover package is built-in to the cabinet, but the 48V power supply is separate. The ported cabinet is relatively small, measuring 8.9 inches (226mm) wide by 9.7 inches (246mm) deep by 11.5 inches (292mm) high, and weighs 5kg. The drive-units are both magnetically shielded. The review system was supplied with an optional subwoofer that comprised a 10-inch (250mm) driver (not shielded).

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

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

Fig.1 shows the on-axis frequency response for the Meyer HM-1S with and without the optional subwoofer. The response lies between ±5dB limits from 40Hz to 20kHz with the subwoofer, and 80Hz to 20kHz without, except for a narrow dip of some 5dB at 7kHz. The low-frequency roll-off is very rapid, suggesting the use of a high-pass protection filter. The low-frequency harmonic distortion performance is unspectacular with a peak in second harmonic to -30dB (3%) at 50Hz and in third to -22dB (8%) at 40Hz. The levels of the harmonics fall rapidly above these frequencies to below -40dB (1%) from 80Hz upwards, except for a peak in third harmonic to -35dB (1.7%) at 700Hz. As before, the off-axis response measurements

(Fig.5) show very wide dispersion at high frequencies evident from the similarities between the on-axis, 15

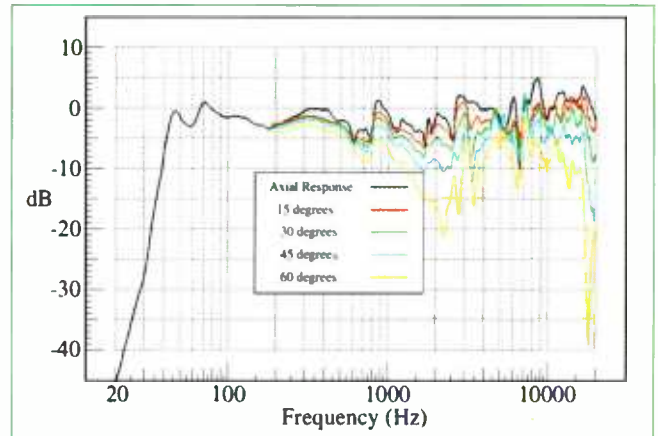


Fig.5: Directivity

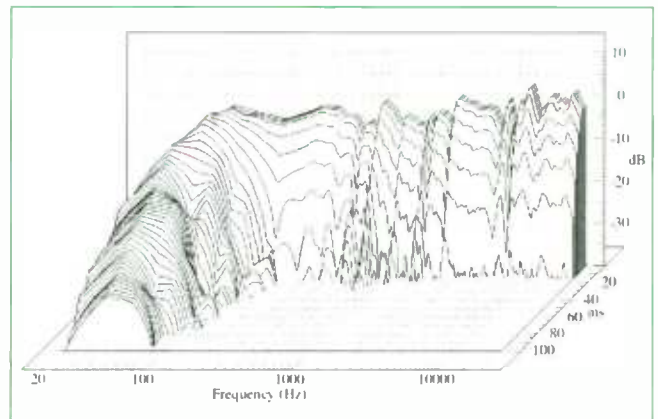


Fig.6: Waterfall chart

and 30 measurements. There are no significant peaks or dips in any of the off-axis response curves indicating a freedom from side-lobes in the polar pattern; although a narrowing of the directivity of the woofer can be seen at the high frequency end of its range between 1kHz and 3kHz. As the loudspeaker is a dual-concentric design, the directivity is the same in the vertical plane as it is in the horizontal plane.

Fig.3 is the step response of the loudspeaker with the sub-woofer. Again the HM-1S exhibits excellent time-alignment between the drivers with a sharp rise to the step and steady decay, although, as confirmed by the acoustic centre result (Fig.5), there is a delay of some 14ms in the low frequency energy, corresponding to a shift in acoustic centre of more than 4m behind the loudspeaker at low frequencies. This result

is an improvement, however, over that for the previous test with the phase-reversed subwoofer, being more similar to that without the subwoofer. The power cepstrum (Fig.1) shows some evidence of smeared reflections at 200µs and 700µs, but is otherwise fine and a slight improvement over that for the previously tested example. The waterfall plot (Fig.6), which has been introduced since the last test of the HM-1S, shows no serious ringing above 150Hz, with an even decay rate at all mid- and high frequencies, but the group delay at low frequencies is very pronounced.

As concluded in the last test, the Meyer HM-1S is a mixture of strengths and weaknesses. Amongst its strengths are excellent time alignment and high frequency directivity control, but this performance is let down by a ragged on-axis frequency response. ■



lead accordingly. The loudspeaker system was supplied for review with a 'hard-wired' connecting lead, which deterred the tester from altering the polarity when the dip in response was diagnosed. Meyer has admitted fault for the problem and *Studio Sound* has agreed to publish this retest of the HM-1S.

The Meyer HM-1S is a 2-way active loudspeaker comprising a 7-inch (178mm) graphite cone woofer and a concentrically-mounted 1-inch

(25mm) soft-dome tweeter that is loaded by a 100 constant directivity horn. The amplifier and electronic

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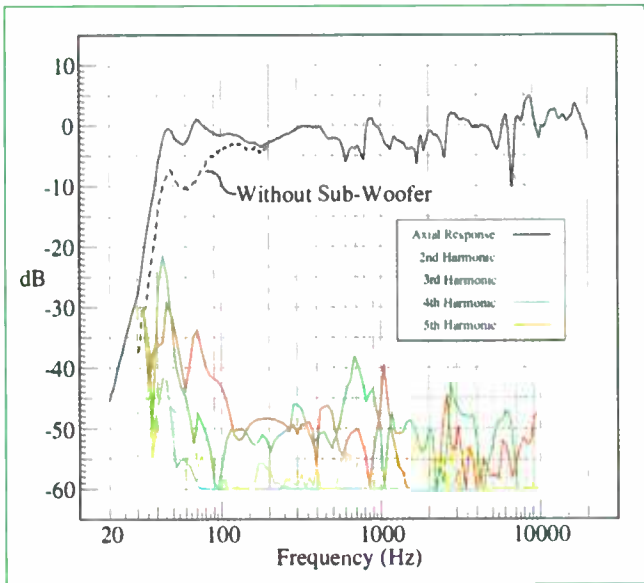


Fig. 1: On-axis response and distortion

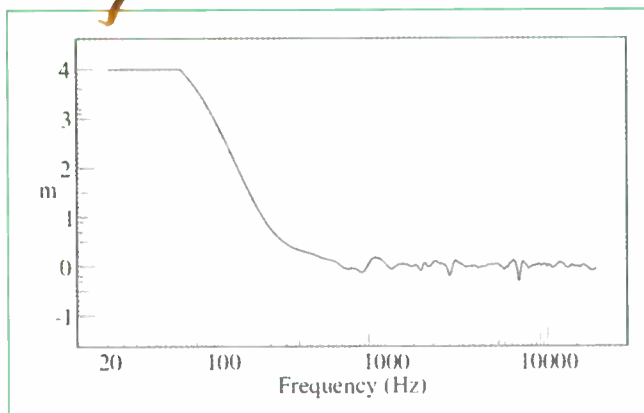


Fig. 2: Acoustic centre

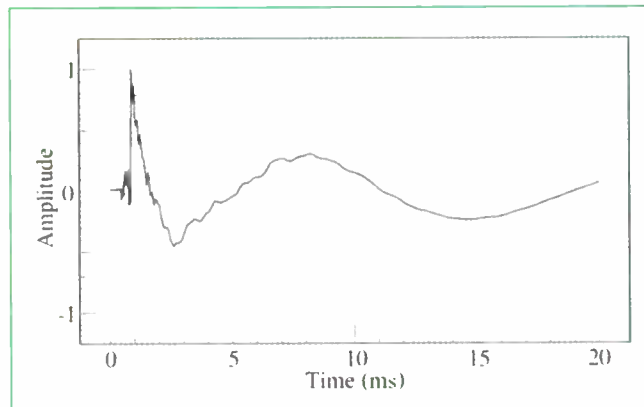


Fig. 3: Step response

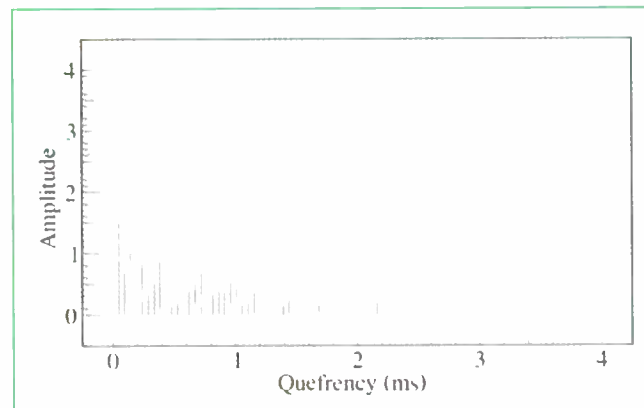
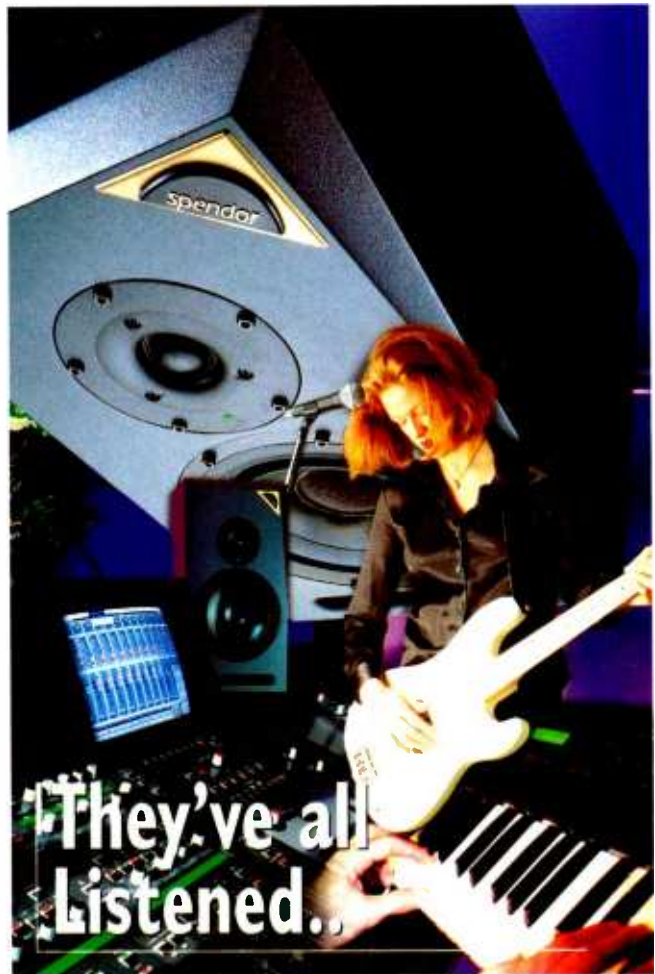


Fig. 4: Power cepstrum

Studio Sound October 1998



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## 24-96 master recorder and workstation

Mytek Digital has introduced the D-Master 9624 4-channel A-D and D-A mastering convertor integrated with a hard-disk recorder. Powered by the Crystal Semiconductor CS 5396 chip it is being billed as a \$5000(US) replacement for 1/2-inch tape.

Directed at recording studio mixing rooms, high-end mastering facilities, and remote live recording, the device includes audiophile grade A-D and D-A converters, several selectable sampling rates, noise shaping, headphone amplifier, external synchronisation and transport controls, and



SCSI interface for direct to hard disk or DVD-RAM recording.

The news coincides with a tie-up with Sonorus that uses Mytek's 8-channel 24-bit, 96kHz 8X96 series converters and Sonorus' Studi/o card in a new Mytek-Sonorus DAW 9624. This multichannel hardware package is capable of running various third-party 24-bit 96kHz software packages for Mac and PC. Depending on the software chosen, DAW 9624 can be configured as a general-purpose multichannel DAW, or CD-DVD mastering, Foley, or film-sound workstations. Current 24/96-capable software choices include Cubase VST/24, Samplitude 2496, SAWPro, Wavelab, Cakewalk 8, and such plug-ins as Waves NPP. DAW 9624 will run all 48kHz and 44.1kHz software as well. **Mytek, US.Tel: +1 212 274 9191.**

**Sonorus, US.Tel: +1 212 253 7700.**

## SPL-Brauner 3D recording

In a joint venture with mic manufacturer Brauner, SPL has launched the ATMOS 5.1 Surround recording mixer, which works in conjunction with Brauner's ASM5 adjustable Surround microphone. The ATMOS 5.1 Surround recording mixer features five high-precision microphone preamps providing up to 70dB of gain.

The circuit incorporates Lundahl input transformers as well as pads, phase reverse, phantom power, low-cut filters and switchable insert-tape returns. All switching uses high-quality switches, and relays with gold-plated contacts used throughout. Comprising a main unit, and a separate power supply, the mixer section occupies 5U of rack space with the PSU being just 1U. Mixing and 5.1 panning are possible from each >

Studio Sound October 1998

# San Francisco AES

Amid few product surprises, **Zenon Schoepe** tells of hard disk recording from Yamaha, and digital mixing from Tascam and Harrison

**D**espite the developing trend for spring releases, San Francisco did have new product to boast about, some of which will be of wide appeal.

Yamaha announced the sub-US\$3000 D24 24-bit, 96kHz digital recorder based around removable 3.5-inch magneto-optical disks. The machine offers 16-bit, 20-bit, 24-bit, 8-track simultaneous record and play capability at 44.1kHz and 48kHz, and 4-track record-play at 96kHz. Up to eight units can be synchronised together to create a larger system and delivery is expected to begin in the first quarter of next year.

The D24 is intended to serve as a multitrack recorder for music recording and mix-down, post audio applications for television and film, and live playback for theatre and other live-sound applications.

Editing options include copy, move, erase, delete and merge and tracks can be merged. Varispeed is  $\pm 6\%$ . Each track also includes 8 virtual tracks for a total of 64 while 8-track recording time is 15 minutes at 16-bit, 44.1kHz and 9 minutes at 24-bit, 48kHz on a 640Mb disk. Four-track recording time is 9 minutes at 24-bit, 96kHz and 512 songs



can be recorded on each disk. The machine can be connected to external hard drives via a SCSI-II connector.

The D24 syncs to MTC and SMPTE, video sync and word clock and is controlled via MMC, 9-pin or an optional remote.

Thoughtful features on a box of this nature are time compression-expansion (50%–200%) two tracks at a time and pitch can also be altered two tracks at a time without changing the tempo or duration of audio material.

The machine offers O1V-sized interface cards in ADAT, TDIF, AES-EBU and analogue formats.

Tascam bridged the gap between its TM-D1000 and TM-D8000 digital desks with the TM-D4000 model, the first to sport motorised faders and 100mm ones at that. Priced at US\$4,299 it is expected to hit the street in the first quarter of next year.

Essentially a stripped-down

TM-D8000, the desk has 32 mono and 2 stereo inputs, 8 buses and a channel strip that has 6 auxes, 4-band EQ and dynamics on each channel. Automation is restricted to snapshot onboard with full dynamics automation realised via a PC-based package.

Three expansion slots are available for interface cards to TDIF, AES-EBU, additional analogue and, for the first time, ADAT. These appear at channels 9 to 32 on the layered fader surface.

Standard features include machine control with jog-shuttle and record arming plus the ability to multichannel pan through the first six buses. Convertors are 24-bit and operation centres around an LCD, but with only four associated rotaries.

TM-D4000s can be cascaded, have onboard stereo digital effects, MIDI, and EQ and dynamics libraries.

Harrison showed it is long expected Digital Engine replacement rack for the analogue in its existing digitally controlled analogue systems. User interfaces remain unchanged and the technology applies to its Series 12 and MPC boards. Processing is courtesy of SHARC.

Harrison is promising 576 full channels, 1,344 inputs and 1,344 outputs, 136 console-wide summing buses and full monitoring capabilities. It stresses that processing is dedicated and not shared or allocated. Every channel has dynamics, 4-band parametric EQ, high and low-pass filters, 32 auxes and panning for all surround formats via 72 main recording buses and 24 reassign buses.

Control is via proprietary PCI-based I/O and comms systems and the company claims 'sub-millisecond' processing speed from any input to any output including conversions. As always promised by the company, the system will enable dig-

ital and analogue, mix and match, hybrid arrangements to be created.

Harrison claims the desk is 40-bit, 96kHz capable and expects to start shipping at the beginning of next year. ■



# Sennheiser Evolutions

Launched at Frankfurt as a complete product line,

**Dave Foister** asks if the dynamic has evolved

**O**F THE FEW classic dynamics, a good number of them have Sennheiser written on them. A whole new range from the company is therefore bound to be of interest, and the Evolutions have been arousing much curiosity.

The Evolution family comprises a mixture of new and updated models, harmonised in terms of finish to the same charcoal satin effect familiar from the current radios and others. All feel very light—you could be forgiven for thinking they were plastic; although they are in fact metal—but experience suggests that they will survive better than some heavier constructions encountered.

The vocal microphones in particular are no structural lightweights, having die-cast zinc housings with shock absorption built in. A feature shared by all is the use of Neodymium magnets, and this gives every



model the capacity to handle levels in excess of 150dB SPL. A surprising presence is the E604, an upgrade on the MD504 only recently introduced to such great acclaim (well I liked it). I didn't get sent one of those, but five of the rest of the set turned up for evaluation, covering the whole range from general-purpose microphones to vocal and bass specialists.

The most recognisable model is the E609, clearly descended from the highly popular MD409 and aimed at the same applications. The distinctive flat side-on body is retained, with the stem and its integral XLR now colour-matched to the main body, and the capsule has been updated incorporating a hum-bucking coil. The original was much in demand for jobs where a natural frequency response, and the ability to get in close were needed, and the E609 continues to excel in the same way. It is by far the smoothest of the lot, with a trace of brightness that is likely to be helpful rather than harsh, and plenty at the bottom. Its supercardioid pickup is reasonably consistent with frequency, and it looks set to be as good an all-rounder as its predecessor.

There is one surprise in the bunch and that

is the E602. You might guess from looking at its fat, squat body that it's meant for bass drum, bass guitar cabs and the like, but its behaviour is even more extreme than might be expected. There's no need to look at the frequency response plot to tell that there's a huge amount of tip-up at the top as well as at the bottom, with a big hole in the middle. The graph shows it to be no less than 10dB up at 701Hz and 12dB–14dB up at the top end, while the bottom extends all the way down to 20Hz (and you can feel it). This produces the same kind of effect as a hi-fi loudness control, making the right source sound bigger and fatter with no help from the console. It has an enormous bottom end with surprising clarity, and the exaggerated top gives it bags of punch and bite. For general use it comes across as very thin as there is so little body in the mid range, but in its intended role it has a powerful character all its own.

Also specialised but not to quite such a jaw-dropping extent are three hand-held vocal models. The entry-level end of the range is represented by the E825, another one I did not get to try, and next up is the cardioid E835. A lot of people are touting this as serious competition for the SM58, and its resemblance in terms of build and sound is clear. It has a typical vocal character, with a very flat response from the middle down, and a modest upper-end rise from around 4kHz. This translates into a good present sound, but not exaggerated enough to make it hard, and the character is retained off-axis with a commendably consistent polar pattern. It is also available with a lockable noiseless switch as the E835S.

Next up is the E845. Physically there's little to tell it apart from the 835, but it is altogether more even, with a more extended top end and a generally fuller sound. Its pattern is supercardioid, seemingly as smooth off-axis as the others. Top of the vocal range is the E855, only available unswitched. This, too, is supercardioid, and is the smoothest of the lot. It clearly is not truly flat, neither is it intended to be; it has in fact got a more pronounced HF lift than the 845 on paper, but as the frequency response does better at the extremes

this comes across as a clean bright presence without detracting from the overall openness of the microphone.

There is one more, the E608, claimed to be the world's smallest dynamic microphone and mounted on

a miniature gooseneck. This was not available to me, but if it shares the central characteristics of the rest of the range it should be quite a contender.

This is quite a family, with the courage to include extensive deliberate tailoring as well as the neutral models. All impress, and some can expect to join the 421, 441 and 409 as members of the elite. ■

**CONTACT**  
**Sennheiser,**  
**US tel: +1 860 434 9190.**  
**UK tel: +44 1494 551551.**  
**Germany and ROW**  
**Tel: +49 5130 6000.**

## NEW TECHNOLOGIES

< channel via a front-surround control, a ECR pan control and a divergence control. In the Subwoofer matrix, the sub signal can be selected from the front, surround, and centre signals, while in the External Mix matrix, a stereo mix can be fed to the front, centre and surround channels. Furthermore, the stereo soundstage from the front and surround channels can be widened using all-pass stereo spreading. Two phase meters are used to display LR and SR-SL correlation, and the monitor section allows each bus to be independently monitored. Brauner's ASM5 microphone system is based around five matched microphone heads, three of these are arranged as a Decca tree to handle the LCR recording.

A further two heads handle the surround information. In addition to supporting the INA 5 standard, the ASM5 allows continuous adjustment of the polar characteristic of each microphone from omnidirectional up to figure-of-eight. These adjustments are made directly from the ATMOS 5.1 Surround recording mixer. Furthermore the positions of the SL-SR microphone heads are variable up to 90° (±45°). The ASM5 includes 25m of 12-pair screened multicore cable to connect it to the SPL ATMOS 5.1 Surround recording mixer.

**SPL, Germany, Tel: +49 2163 98340.**

### Dual CD-R

With a UK price of less than £400 (inc VAT), the Philips CDR765 dual-deck audio CD recorder has a fully specified CD-R/CD-RW recorder-player transport, and a CD, CD-R, CD-RW, player transport in one unit allowing mastering and double-speed duplication.

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direct digital line recording, separate outputs for CD-R and CD decks, analogue and digital inputs, automatic or manual track numbering, CD synchronised auto start from all digital sources, 1-bit A-DC, and a remote control. Shipping is expected at the beginning of October.

**SRTL, UK, Tel: +44 1243 379834.**

### Sabine digital Graphi-Q

Sabine's Graphi-Q combines 31-band digital graphic EQ with 6dB and 12dB ranges and high and low-cut filters; FBX feedback extermination with 12 filters and automatic Turbo setup mode; a fully featured compressor-limiter; and 1s digital delay adjustable in 20ms increments. Operation is via traditional analogue faders >

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# Brauner Valvet

A new mic from this young but already respected manufacturer is to be welcomed. **Dave Foister** opens the box

**D**IRK BRAUNER'S microphones have made a splash, with the single VM1 model winning awards, and being acclaimed by no less a person than Bruce Swedien as 'phenomenal—it sounds like the best U47 that you've ever heard in your life'.

They are big and bold, with a precision build and the best kind of valve character, but the eye-catching image is modified somewhat in the new model, the Valvet. As might be guessed from the name, this, too, is a valve microphone, but it is smaller than many solid-state models, simpler in concept, and far less obtrusive—the only physical aspect that stands out is its unusual suspension cradle.

The Valvet is actually one of two new models that represent a certain scaling down of the original VM1. There is a new VM1u that replaces the VM1's continuously variable polar pattern with a choice of cardioid and omni, but can also be upgraded to a full-blown VM1 if required; and then there is the Valvet, offering the same rather unusual pairing of polar patterns in a very different package.

The enormous bomb-proof flight case gives a slightly misleading impression of the scale of the microphone. Inside is a thick wad of foam that cradles the microphone in its suspension mount and the power supply; in its lid is the Tuchel-terminated multicore cable, a bit stiff, but substantial and generous in length.



At one end of this is the power supply, a small, sparsely equipped, but clearly robust box. In line with the standard Brauner image it is bare silver metal throughout, and its front panel carries only three switches, for power on-off, polarity reverse, and polar pattern selection. The first is accompanied by a blue indicator LED (apparently Dirk hates red LEDs) and the last is a simple toggle between cardioid and omni. Clearly the circuitry takes some time to settle when this is changed as the manual says not to use the microphone for 30 seconds after switching it over. Evidently this is the month for dodgy German-English manuals; the few sheets explaining how the Valvet works are riddled with such remarks as: 'If there is a sparkling brizzeling noise at the start, do not care about it', which while quaint does not enhance credibility.

Fortunately, this does not really matter a toss as the microphone is so straightforward. The solid cylindrical body has no controls whatsoever, and looks a little like a scale model of a proper valve microphone. Its mounting assembly is remarkable in that it does not quite

encircle the microphone body; it is a C-shaped structure that grips the microphone essentially by the interference fit of its rubber suspension elements. Clearly the intention is that the two components should not routinely be separated, an idea of which I heartily approve. The mount's swivel is locked by means of the same lever-like handle as on the much heavier VM1, making it securely effective against droop. As with the bigger microphone, the manual carries a warning against over-tightening this handle as it could break under its own leverage. There is certainly no doubting its ability to support the Valvet, even though it is heavier than it looks.

The 1-inch dual-diaphragm capsule is clearly visible through the basket, and is likely to remain so as there is no foam windshield. The size of the body means that there must be plenty of socks that will fit it, but none is supplied by Brauner. It may simply be that there's enough internal wind protection—with the singer's performance I used it on I was not aware of any problems.

The only remaining adjustment is an earthing switch, an eminently sensible provision on a valve microphone. Like that on the VM1 this has three positions, allowing the audio ground to be shorted to mains earth, completely separated, or linked via a small capacitor. One of these options will surely cure any hum-loop problems.

If the size of the Valvet is scaled down from the VM1, the sound is not a proportional reduction. It is open and clear, and characterised by an unusual smoothness in the upper registers—less clinical than some solid-state microphones, but without the obvious presence lift exhibited by some valve designs. It has a pretty good bottom end too, and an off-axis response that sounds almost as flat as the front pickup, in cardioid as well as in omni. I especially enjoyed the VM1s as spaced omnis, and the Valvet appears to share the essential character. It is also extremely quiet, and only hums when the earth switch is in the wrong place. Its lack of a pad is the more surprising in view of its sensitivity, which is quite high, but even with the most powerful soprano I've recorded in a long time standing two feet away from it it never wavered.

The Valvet can only build on Brauner's existing reputation. Its laboratory appearance attracted comment from everybody who encountered it, and its performance matched up to expectations. It deserves to do well. ■

**Company:**  
Brauner, Germany.  
**Tel:** +49 2856 9270.  
**Fax:** +49 2856 9271

## NEW TECHNOLOGIES

< and pots; although all operation is digital. Running the device from a PC allows viewing and editing of frequency response curves and filters, the swapping of FBX filters to parametric, fine adjustment to EQ filter widths and attack, release and knee of the compressor, and unlimited storage of presets. PC control also allows eight Graphi-Qs to be run simultaneously.

**Sabine, US.Tel: +1 904 418 2000.**

### A&H digital

Allen & Heath has launched five new consoles including the digital ICON series DL1000, DP1000, and MixWizard series WZ12:2DX, WZ16:2DX and WZ14:4:2+.

The ICON series is a range of compact digital mixers for live-sound applications. The first two models in the series are the 10-input, 4-output DL1000, and a powered version, the DP1000, that comes complete with 600W into 4Ω stereo power amplifier. Both consoles will begin shipping in October, with prices starting at under £1,000 (UK). DP1000 and DL1000 offer 6 mic-line inputs with 4 sweep EQs with fully parametric mids, plus 2 dual stereo inputs that can double as mono mic inputs. In addition to the LR output, ICON consoles provide configurable AB amp outputs, plus monitor, aux and LR recording outs.

Target markets are performing artists and live-sound venues. These users can program



and recall settings in song patches, which can then be sequenced according to a playlist and triggered by footswitch, push-button or MIDI control. This preprogrammed sequence can be overridden when required. A special Pause patch sets levels and effects for between song announcements.

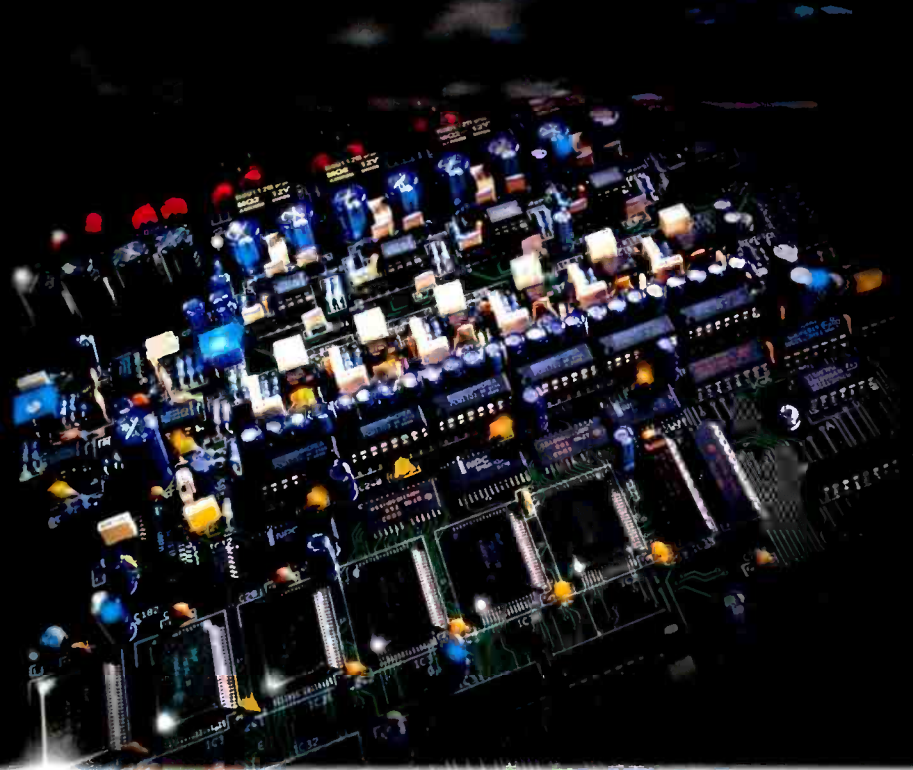
Key settings such as gain, levels and mutes are on dedicated controls for instant access, including 100mm faders for all inputs and main outputs. Other console settings are created and adjusted via a strip of rotary controls used in conjunction with a large backlit LCD screen. The consoles' onboard dual 10-band graphic and amplifier configurations are stored separately in venue memories. ICONs include two built-in effects processors plus noise gates and compressors.

**Allen & Heath, UK.Tel: +44 1326 372070.**

### Symetrix processors

Symetrix has released the 300 Series range of half rack-width boxes for the contractor and broadcast industries. These include the 301 mono compressor-limiter, the 302 dual mic preamp update on the popular >

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# Höf Höfex Spectral Exciter

The best efforts in the realm of excitation tells a lot about a company, as **Dave Foister** discovers

**E**NHANCERS come and exciters go, with varying degrees of success and credibility—not always hand in hand. Some specialise in them, some throw one into the catalogue for the sake of completeness, some do not wish to be associated with such things—and some are so out of the mainstream that you know sooner or later they are going to have one, and that it is going to be a little different.



Höf Audio belongs in the last category, by dint of its Dynamic Master, a comprehensive stereo dynamics processor with an approach all its own. This is now joined by the Höfex Spectral Exciter, a 2-channel enhancer package that adds a couple of new twists to the familiar parameters.

Operationally it is simple. The 1U box has XLRs in and out on the back, controls for the exciter functions on the front, and that is it—no level controls, no metering for instance, showing remarkable confidence in the user's ability to drive it properly. There is an Overload LED on each channel flashing at +18dBu, and this is placed after the processor to show its effect on the output level. It is worth noting that the Höfex is entirely analogue, so the lack of pinpoint level setting is, perhaps, less surprising.

The exciter itself comprises three separate circuits, with a fourth process available on the end having little to do with the central job. The most familiar element is the HF exciter, working with phase shifts and added harmonics to increase the perceived HF content without EQ. The actual processes involved in all this remain something of a mystery, partly because Höf does not want to give too much of its game away, and partly because the manual is written in such German-English that it is often hard to fathom what it is driving at. I am not much of a flag-waver for English as the global language, and I am certainly not saying I could do a better job of writing in German, but if a company is going to write an English manual it really ought to get it checked out by a native English speaker—this one is a classic example of how wrong they can get it.

Like many of these processors, the effect of the HF exciter is tailored by a Spectrum con-

trol, determining the frequency above which it will operate. The range is considerable, allowing a good variety of effects to be produced. The manual describes the results as 'soft as silk' and it is genuinely characterised by an unusual smoothness. It is possible to make the sound much brighter than would ever be needed, but it never seems to acquire the hardness that can often accompany this kind of treatment. Setting it up is helped by a global Solo function that removes the original signal from the output, leaving all the processing.

The high frequencies are further affected by a single control called Glitter, which turns out to be a very appropriate name. This too adds overtones to the original, working at the upper end of the range and, although it is similar to some settings of the exciter itself, there is enough of a difference to warrant its inclusion as a subtle adjunct to the main process.

Frequency response manipulation is completed by an LF exciter, again with a single control to adjust the amount of effect. This seems to attempt to add bass that is not there, working very low down indeed to give a big thumping bottom end that manages not to turn into a muddy mess. This is the only effect that significantly alters the levels, upping the output by as much as 8dB when cranked right up on a signal that already has plenty of bass.

The final process is not something you would normally find on an exciter, or anywhere else for that matter. Called REX (for Room Exciter), it tries to simulate the response of a room around the sound using reflections and phase manipulation. In fact the output of the circuit is completely out of phase across the two channels and extremely unpleasant to listen to on its own. The intention is that the Höfex should be put in solo mode, fed from an aux or subgroups, and the REX signal mixed back in as required—it has no adjustable parameters on the unit itself. The contributions of the main exciter circuits can then be adjusted in proportion. Used carefully this can give some interesting results, with a definite opening up of the stereo image and added liveness.

The approach of the Höfex is decidedly unusual, and with a manual that in one of its more lucid moments suggests that the treble of the source might be deliberately reduced so that the exciter can put it back again, is more likely to deter than attract. That would be unfortunate, as the Höfex is genuinely, smoothly different from the run of the mill. I have tried a few, and been less than impressed with several, but the Höfex would get plugged up more often than most. ■

## Contact

**UK: Max Audio**  
Durham Road, Ushaw Moor,  
Durham City DH7 7LF  
**Tel:** 0191 373 1333  
**Fax:** 0191 373 3507.

## NEW TECHNOLOGIES

< SX202, and the 303 stereo level matching bidirectional interface amp. Other units are the 304 2-in, 4-out headphones amp, 305 1-in, 4-out distribution amp with individual trim pots, and the 307 dual isolation transformer.

Traditional 1U rackmounts from the company now include the 581E distribution amp and the 565E dual compressor-limiter-expander. The former is a 4-in, 16 out device that accepts stereo audio feeds and other configurations via simple rewiring. The 565E offers two channels of simultaneous in-line processing with proprietary Dynamics Squared circuitry which claims to reduce distortion when automatic gain reduction is at a maximum.

**Symetrix, US. Tel: +1 425 787 3222.**

## Soundcraft Series 15 desk

Designed for on-air use, Soundcraft's Series 15 console comes from the same family as the Series 10 radio desk, but adds facilities for general production. Available in 16, 24 or 32 frame sizes, the desk is modular and has as standard 4 stereo groups, insert points and comprehensive monitoring.



Mono and stereo inputs are provided in broadcast and production versions and a choice of telco input modules is available from an option list that numbers 35 different module types.

**Soundcraft, UK. Tel: +44 1707 665000.**

## Barco monitor convertor

Barco's Uno processor reproduces digital video signals on a standard computer display (32kHz) or on an analogue RGB monitor (15kHz). In contrast to simple SDI-VGA



convertors the device maintains broadcast picture resolution, provides full colour matching capabilities and adds broadcast functionality to a standard computer display.

**Barco, Denmark. Tel: +45 39 170000.**

## Cinemix adds film panel

D&R has added a film-style master section option to its Cinemix console which can handle mono, stereo, LCRS and 5.1 channel formats. The new section offers discrete assignment of input signals to all individual buses and joysticks; bus formats are selectable between the aforemen- >

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# Power Technology DSP FX

**Rob James** tests the outboard plug-in that turns a personal computer into a dedicated effects processor

**A**FTER DSP FX plug-ins were recently reviewed, another package arrived from America containing one of the Power Technology processor cards, together with the latest version of software. The software has been revised to be more efficient. Indeed, Power Technology claims that on a Pentium II 300 a reverb now only uses 7% of the processing power and one user has already had a total of seven reverbs running during a 24-track mixdown. If you need a bunch of reverbs running simultaneously the economics of this approach start to really make sense.

This version adds hardware in the form of a half-length ISA card with a daughter-board piggy-backed on top (which I assume carries the optional AES-EBU digital interface circuitry). There are a couple of connectors on the card for Fx Link In and Fx Link Out. A triple DIP switch selects any of 8 I/O addresses for the card. If you have enough slots up to 8 cards may be installed in one PC. As I had

The algorithms employed are identical in the hardware and plug-in versions. However, unless you are on a very tight budget I think the hardware solution has a lot to commend it. The main advantage being there is no longer any need to concern yourself with how much processing power the effect is using since all the work is done by the onboard DSP. The PC is simply providing the interface and housekeeping of the presets. The quality of the effects is also high, and they all seemed to sound sweeter using the AES-EBU interface than my usual sound card. The 32-bit arithmetic appears to pay off as well, making internal overloads a little harder to reach if using extreme effects.

As with most effects units, hardware or software, it pays to experiment. Some very subtle effects can be achieved with patient tweaking, and, of course, these hard won presets can be named and saved for future reference. Microsoft-IBM .WAV files may be processed in real time by the DSP FX hardware and the Virtual Pack plug-ins. The other advantage is there is no need to concern yourself with how much processing power the effect is using since all the work is done by the onboard DSP. The PC is simply providing the interface and housekeeping of the presets. The Virtual Pack can be used for this purpose 'stand-alone'—that is, without using host editing software. Previews are achieved by simply not saving the output file.

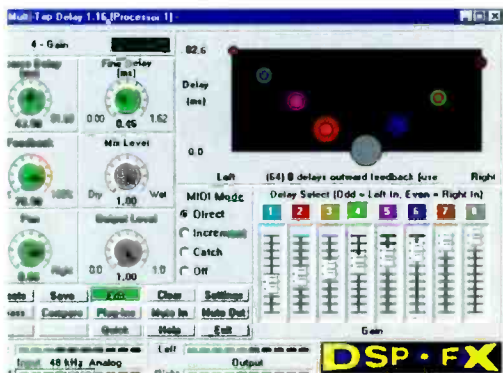
I would buy the plug-ins for the delay effects alone. The various Leslie speaker effects are also impressive. In fact, if the choice of effects on offer have a weakness it lies in the lack of novelty. The effects supplied are all competent and comprise what might be termed 'the standard effects rack kit', but perhaps they are not as superficially exciting as some of those offered by other manufacturers. However, the real novelty here is the use of a PC to host an effects rack. Even better, the PC does not need to be the latest Pentium II flying machine. Any reasonable PC with vacant ISA slots, and capable of running Windows 95 at a sensible speed will do. Last year's speed demon that can now be had for less than half its original price will do nicely.

If you can find a motherboard with enough slots to take the maximum 8 cards you will have a very serious effects processor.

If the company keeps the price reasonable, and continues to produce high-quality effects to add to the existing armoury

this is a very attractive way of acquiring a rack full of effects. If plug-ins are more suited to your way of working Power Technology has been running a special offer on the Virtual Pack that is almost too good to resist.

A free demo may be downloaded by pointing your web browser at [www.dspfx.com](http://www.dspfx.com). ■



previously suspected from the manual, installation is made much easier than usual by Power Technology's decision to avoid the use of interrupt requests (IRQs) and direct memory access (DMA) channels. The only configuration issue is memory address—in my machine the default hex 240 address was already in use by another sound card, but, thanks to intelligent board layout, the DIP switches are accessible without removing the card and it took but a moment to pick an unused memory address and change the card setting. Once installed, the external connections are four 1/2-inch jacks for -10dBv analogue in and out, and a 9-pin D-connector that either connects to an optional external +4dBu balanced 20-bit converter, or, if the AES-EBU option is fitted to a pair of XLRs for breakout.

The software installs without fuss using the usual Install Shield Wizard. The only item to watch out for is not to install the dongle driver when invited to do so. With the optional AES-EBU interface audio quality is subjectively high, much better than the on-board converters.

**Power Technology,**  
100 Northhill Drive,  
Building 24, Brisbane,  
CA 94005, US.  
**Tel:** +1 415 467 7886.  
**Fax:** +1 415 467 7386.  
**Email:** [dspfx@dspfx.com](mailto:dspfx@dspfx.com)

## NEW TECHNOLOGIES

< toned formats; access to group output buses for surround pan pots and input modules; access to group output buses for both joysticks; and an extensive selective muting system of individual channels.

The film master allows engineers to work on a maximum of four premixes—stems of six buses each simultaneously, and a stem-return module is available as an option. The monitoring matrix module is 24 x 2 x 6



allowing stem-premix returns to be fed into the console's control-room monitoring section. Using this module no inputs (traditionally the upper faders) need to be sacrificed for monitoring purposes.

The monitoring matrix module caters for four groups of six inputs each, and all four groups are fitted with bypassable level adjustment trimpots. All inputs are provided with Direct-Playback, mute and solo switches.

Described as the Airmix's little brother, the company's Airmate radio desk is designed for the self-op DJ.

The 19-inch frame is built up of eight triple input channels with one mic and two stereo-line inputs per channel. Each channel is additionally equipped with 3-band EQ and phantom power. A master section provides a clean feed output for interfacing with telephone hybrids with talkback.

**D&R, Netherlands. Tel: +31 294 418014.**

### Stramp boxes

Peter Struven has launched a number of sync boxes including the STRAMP SR-X (a countdown box for film and video post) and the STRAMP CP-3 (a SSL parallel to Sony serial converter with track select for SSL



4k, 5k and 6k series).

The STRAMP DA801 is a Sony 9-pin RS422 serial to Tascam 15-pin serial protocol converter that is suitable to use with the STRAMP ADR Superset, the STRAMP CP-3, and the STRAMP AVM, MC30X. Users can connect up to six Hi8 machines to >



# Mike Hedges



## on BASF tape

“When we changed to SM 911, 7 or 8 years ago, we got that sound back. It has a really good musical edge.

When **BASF SM 900 maxima** came out we started to use that on the 24 track – it gives me that sound I want.”

Producer of the **Brit Awards “Album of the Year” 1997 “Everything Must Go”** by the **Manic Street Preachers** and Winner of the **Music Week “Producer of the Year” 1997**, Mike Hedges has produced hits of artists such as **Texas, Everything But The Girl, Siouxsie and The Banshees, The Cure, The Beautiful South, Geneva** and **McAlmont and Butler**.

**EMTEC** Magnetics

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+44 01295-227838 or visit EMTEC Magnetics’  
web site at <http://www.emtec-magnetics.com>

[www.americanradiohistory.com](http://www.americanradiohistory.com)



SM 900 maxima is a high-output analogue tape designed specifically for multi-track recording and mastering, with extra wide dynamic range, low noise and low print through.



**BASF**

# Antares ATR-1 Auto-Tune

Tuning can often mar the perfect take when under detailed examination. **Dave Foister** tunes in, drops out and cheats

**T**HIS SHOULD have been another one for the April issue. It's a standing joke. Isn't it, along with the Better knob and the Funky control—have you got anything that can make me sing in tune? It's the recording equivalent of the philosopher's stone—a box that can correct vocal intonation in real time, surely too ridiculous to contemplate. Yet that's the aim of the ATR-1 Auto-Tune from Antares, a new hardware box derived from an already successful software plug-in.

The ATR-1 is a single channel processor with analogue in and out, and its sole function is to correct tuning on the fly. To do this it analyses any incoming periodic signal

(with a few milliseconds processing delay) without glitches and with a virtually immediate response—it only takes a few cycles for the unit to recognise the pitch and deal with it. There is a big LED display on the front that shows how much retuning is happening, and most of the time this is the only way you'd know it was working. If it starts dragging things into the wrong place because you're using the wrong scale, it's only the fact that it no longer makes musical sense that gives it away.

This takes a bit of getting used to, but it doesn't stop there. There are a few user controls to allow for different performance styles, particularly how the correction will deal with vibrato. A response-speed parameter allows short bends and vibrato to get through untouched, or if set faster it will virtually remove the vibrato. It's even possible to add vibrato in the same way as on a synthesiser, with variable rate, depth and delay. There is a sensitivity control for dealing with less than perfectly clean sources and signals with a lot of variation in the periodic repetition. Overall detune shifts the fundamental refer-

ence, useful in those countries that like their A at a rather brighter 442, for instance. It doesn't go far enough to allow for baroque pitch (A=415 or thereabouts) but it would be easy to work around this.

Complete setups can be stored for later recall, and a Song mode allows several settings to be chained together to be stepped through sequentially, with a footswitch or MIDI control, to accommodate key changes during a piece. MIDI notes can also be used to force the sound to a particular pitch.

One musical point kept bothering me: the ATR-1 only allows for equal temperament, that Western compromise designed to make it possible to build keyboard instruments. Most instruments capable of subtler distinctions will play (or sing) natural thirds, fifths and other intervals by inclination, and the ATR-1 will regard these as wrong and force them into equal temperament. The DX-7 II had various temperament options on it, and a souped-up ATR-2 might consider this as well. But then the kind of musicians that would resent being shoe-horned into 100-cent intervals are not the people you'd be using this on anyway.

It is astonishing that the ATR-1 works at all, and downright spooky that it does it so well. It can be caught out, and it needs more than just plugging in to get the best out of it; I'd need to play with it for quite some time before persuading myself to trust it live, but I have no doubt it could do it. What's next—a talent simulator? ■

—voice or solo monophonic instrument such as violin or saxophone—and compares the frequency with a fixed reference scale, correcting the note to the frequency it thinks it should be. Obviously for this to stand any chance at all it needs to know what notes it should be aiming for in a particular piece, and most of the user control is devoted to defining the scale for it to use. Thirteen of the 50 program memories come filled with the standard major scales plus a full chromatic scale, and these will do the job in a lot of cases.

The procedure when setting up a scale is to blank out notes that don't occur, and then the process will expect every incoming note to correspond to one of the allowed ones. If it does not, it gets corrected to the nearest note in the scale. Notes can also be bypassed so they'll be left alone. The ability to choose which notes to allow makes it possible to set up all kinds of modes and to accommodate jazz scales, blue notes, passing notes and anything else that doesn't conform to a straight major or minor scale. Even so, a lot of music, particularly on the jazz and classical side, refuses to be held bound by the idea that some notes are wrong, so the chromatic scale is likely to be the standard starting point in order to avoid perfectly good notes being dragged off by a semitone to fit the scale.

Because that, believe it or not, is what the ATR-1 is capable of doing. Presented with a reasonably clean monophonic line, it really is able to retune notes in real time (with a few

well. It can be caught out, and it needs more than just plugging in to get the best out of it; I'd need to play with it for quite some time before persuading myself to trust it live, but I have no doubt it could do it. What's next—a talent simulator? ■

## NEW TECHNOLOGIES

< the STRAMP DA801.

Audio Vertrieb Peter Struven, Germany.  
Tel: +49 4106 4094.

### Weiss EQ1-DS Mk2

Version 4.0 software for the Weiss EQ1-DS double sampling equaliser runs on a new SHARC DSP board which can replace the original DSP32C board. Mark 2 features include much higher parameter resolution: the centre frequency, boost-cut and Q now have 128-step resolution.

The centre frequency parameter is stepped in half-tone steps and includes 50Hz–60Hz frequencies with their harmonics for hum suppression. The boost-cut ranges from +18dB down to -39dB with 0.1dB resolution around 0, and the Q factor can be varied from 0.2 to a needle-sharp 650 notch.

Weiss, Switzerland. Tel: +41 1 940 2006.

### Cassette deck

Tascam has announced the 130 cassette deck offering 3-heads, 10% pitch control, Dolby B/C and HX Pro in a 3U-high rack-



mount. Connectors are unbalanced and the machine features automatic tape selection, auto monitoring and timer record and playback.

Tascam, US. Tel: +1 213 726 0303.

### Low-pro PMC

PMC has designed the new low-profile version of the IBIS for 5.1 channel work with mirrored pairs of speakers and centre chan-



nel singles. Options give 1.5dB and 3dB cuts on the HF and a matching sub bass is available.

PMC, UK. Tel: +44 1707 393002

### Short-Cut 99

360 Systems has announced the release next year of a powerful software update for its Short-Cut editor. Called Short-Cut 99, the 2-channel digital editor will support file interchange including .wav, .BWF and .AIFF while other features will include the generation of fade in and fade out, crossfade options and support for larger capacity >

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# StudioComm 68/69

Multichannel mixing can now be realised affordably, but monitoring control is different. **Rob James** reports

**O**VER RECENT YEARS the entry-level cost of mixing and recording in multi-channel surround formats has dropped to the point where it is a viable option for studios operating on (very) modest budgets. Anyone attempting to follow this path will, however, quickly become aware of a problem area, monitoring control.

For those in the market for 'big gun' consoles the position is easier but costly. The options are: to order a purpose-built 'film' console, to specify a custom console or to 'bolt on' complex additional monitoring facilities. The Studio Technologies StudioComm Model 68 Central Controller and Model 69 Control Console are designed to bring proper, affordable, surround monitoring facilities to small studios and tracklaying workstations.

On the front panel of the 1U-high Model 68 Central Controller a row of 16 multiturn trim pots enables input adjustment through a range of  $\pm 2\text{dB}$  over 15 turns. This allows for extremely



accurate level setting. Two LEDs indicate power on and data receive, and that is it.

Audio I-O uses three 25-pin D-connectors. These, usefully, follow the Tascam DA-88 conventions on the inputs, and loosely follow them on the outputs. A 9-pin D-connector joins the Model 69 remote controller, and a further 9-pin D-connector is provided for remote control via GPIs in the console. One of the GPIs can be used for forcing an input switch. This could, for example, be used for automatic PEC-Direct switching via a record tally. The others allow interfacing with talkback and so on.

The Model 69 control console is a small, neat, desktop mounting unit which connects through a 9-pin D-connector on the rear.

All the keys have associated indicator LEDs. The top row starts with a mode switch. This toggles the function of the CURTAINS and SUB output keys between MUTE and SOLO. The left four keys are input selects, surround A & B and stereo A & B. The right side is dominated by a large OUTPUT LEVEL knob. Associated keys select DIM, MUTE, REFERENCE level and SURROUND, L/R BYPASS toggle.

Everyone has their own preferences as to

how monitor controllers should operate. One of my pets is the action of mute-solo indicators. I expect the LEDs to light when outputs mute. I feel this is logical and makes it easier to work out why everything has suddenly gone rather quiet. The 69 mixes the logic in that the MUTE ALL indicator lights up when active, but the individual output MUTES are lit when not muted. In solo mode the solo'd output LED flashes, perfect! After a conversation with Studio Technologies the MUTE convention is to be changed so maybe my view makes sense.

I would have liked separate meter outputs and Studio Technologies tell me they will consider including them. A luxury addition would be the provision of parallel audio I-O sockets. This would make installation a doddle with desks with surround panning, but no surround monitor outputs.

The 69 console is highly configurable. A tiny recessed button on the rear enters the configuration mode. If only four output channels are required the spares can be disabled. Similarly, where inputs with less than six channels are used the redundant input channels can be disabled. REFERENCE and DIM levels are programmable. DIM can be 10, 15, 20 or 25dB down. A nice safety point is when dim is active, using the rotary control to change level causes dim to automatically turn off. Another sign of attention to detail which really appeals to me is the REF LED flashes when the level pot is at the preset level.

The output mode can be locked into surround only or left selectable via the key. Output muting may be selected to operate either via the output relays or the analogue input switches. The inclusion of relays is most welcome. Although a relatively costly option they provide the best protection against speaker damage during power up/down or interruption. I found a software bug that, in some circumstances, resulted in thumps at power up despite the relays. Studio Technologies assure me no units will ship until it is fixed.

The inputs keys allow film-style PEC-Direct switching or, by simply pressing two or more input select keys at once, inputs can be on top of each other.

The Model 68/69 would be ideal for a setup where 8-track recording is used for 6-channel surround. The extra tracks can be used for a stereo reduction M&E, or whatever, and the

L/R bypass input and remote bypass function enables easy co-existence with the monitoring on a stereo console. With very little work, the 68/69 can be integrated into an existing studio. They provide a simple, versatile, means of controlling surround monitoring with a enough extra facilities and programmability to grow with the studio, without changing the way stereo monitoring is done. I think this is a good thing. ■

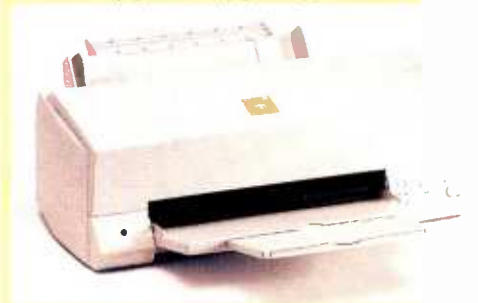
**Studio Technology,**  
5520W Touhy Ave,  
Skokie IL 60077 USA.  
Tel: +1 847 676 9177.  
Fax: +1 847 982 0747.  
Net: www.studio-tech.com

## NEW TECHNOLOGIES

< hard-disk storage.  
**360 Systems, US.Tel: +1 818 991 0360.**

### CD printers

The MediaForm CDP-CP2 inkjet printer offers 1440 x 720dpi printing, and is compatible with Windows and Mac systems complete with templates for the most popular desktop publishing packages.



The Perfect Image CDP-TTI printer uses low-cost thermal-transfer technology and will print a CD in 15 seconds. A ribbon saver feature extends ribbon life if printing does not occupy the full CD. Thermal transfer allows printing directly onto a standard CD-ROM surface without special printable surface CDs or adhesive labels.

**Magellan Group, UK.Tel: +44 1256 681 100.**

### Camcorder receiver

Described as the smallest diversity receiver and developed for the new generation of digital ENG camcorders, the Sennheiser EK 3041-U is weather-proof, the size of a cigarette packet, and slots into Sony SX, Philips LSDK120 and Ikegami HLV77 camcorders without additional cables or adaptors.

The unit has 23-channel switchable frequency operation within a 24MHz window and can be supplied for operation in the 450MHz-960MHz UHF bandwidth. It can be partnered with any current Sennheiser UHF transmitters including the SKM5000 and SKM3072 handheld and SK500 belt-pack.

**Sennheiser, UK.Tel: +44 1494 551531**

### Mastering bass limiter

The DBL 10 dynamic bass limiter is a 2-channel bass filter that limits excessive signals in the 0-800Hz region to protect cutter heads and converters from overload. It is designed predominantly at disc cutting and mastering.

At normal bass levels the filter is said to be completely transparent and bass limitation only occurs if peaks exceed the preset level. The rackmountable unit has indicators and selectors for sensitivity, attack and release on each channel.

**Etec, Denmark. Fax: +45 36 450925.** >

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**TASCAM**  
MMR-8

# Korg D8

With the latest in the line of personal digital multitrackers, Korg has entered the fray. **Rob James** says it is uncompressed yet compact

**T**HE KORG D8 JOINS the crowded portable personal multitracker market with rivals from Akai, Fostex, Roland, Tascam and Yamaha all vying for a piece of the action.

An immediate impression is made by the size of the D8. It is small. The power supply is a separate (non plugtop) brick that goes some way to explaining how this has been achieved.

In essence the D8 is an 8-track recorder-editor at 44.1kHz uncompressed with a 12-channel, 4 bus mixer, and an effects unit. A maximum of two tracks are recorded simultaneously with up to eight available at playback. The total of 12 mixer 'channels' is arrived at by adding the 8 playbacks and the four inputs.

Once recorded all processing is in the digital realm. Convertors are 18-bit linear and internal processing is 24-bit. The two ana-

EQ is 2-band on each channel, and offers  $\pm 15\text{dB}$  at 100Hz and 10kHz.

The scene memories provide a powerful automation tool. Unlike several of the D8's competitors scenes may be recalled on the fly at specific time points. Scenes are editable, but transition time is fixed.

Audio editing is basic, but fairly easy to use. The three locate markers are used to specify the in and out points and, where appropriate the locator specifies the new start point of the edited section. Editing may be performed on single tracks, adjacent pairs of tracks or the top or bottom group of four tracks.

A 2-channel internal multi-effects unit gives 50 types of effect with 38 possible chains of up to four processing blocks. 65 factory presets are provided together with a further 65 user-memories. The presets are broken down into functional and instrument groups which are further divided into 11 categories.

The effects may be applied to inputs during recording, fed from the effect send bus or inserted in the master stereo mix. The factory presets are OK. Nothing jumps out, but equally there is nothing less than adequate. The rotary speakers are above average, reverb will not win any prizes but then, a really decent reverb would cost several

logue inputs are balanced 1/4-inch jacks. Input 1 has switchable impedance to allow direct connection of a guitar. These jacks are located on the front edge of the unit, recessed with trim pots, the headphone output, and level control, and a footswitch socket. The headphone level is, unlike some, perfectly adequate. On the right-hand side of the unit is a SCSI socket for external storage. Removable drives are supported in software. The panel also houses optical S-PPDF I-O and phonos for analogue aux out and I-R aux in. The rear panel carries MIDI and output phonos. Songs can be backed up to DAT and restored using the optical I-O.

The work surface follows the conventional pattern for this type of device. Mixer section on the left with six mono strips which can be paired for stereo and one stereo strip plus master. Transport controls are bottom right and the house-keeping, effects, display, parameter wheel, locators and edit keys occupying the rest of the space. The display is reasonable, but not the best I have seen, and there is no back light or track display.

Up to 50 songs can be recorded per disk. The internal storage is a 1.4Gb hard disk that gives a total recording time of 34 minutes if all eight tracks are used. Twenty scenes, three locates and 100 marks are allowed per song,

times as much as this entire unit. I really did like the 'turntable' effect complete with 33 $\frac{1}{3}$ rpm click!

In operation the D8 is a mixed bag. The basic stuff is fairly quick to get to grips with. Songs are easy to load and save, and general navigation is good despite the lack of a time-line display. However, the effects editing takes a while to become instinctive, involving multiple key presses which are not particularly intuitive. As I have noted before the price you pay for a big feature set in a compact and cost-effective machine is the steepness of the learning curve.

The little Korg has much to commend it. If you are looking for the most compact 'do

**Contact**  
Korg UK,  
9 Newmarket Court,  
Milton Keynes  
MK10 0AU, UK.  
Tel: +44 1908 857 100.

everything multitracker' this one must be in the running. It also scores with scene memories which can be recalled against time. Another point in its favour is the absence of data compression which validates the possibility of using it for serious work.

There are now many broadly similar machines in this market. The differentiation is mostly subtle and it has never been more difficult to decide which one may be right for you. ■



## NEW TECHNOLOGIES

### HD playback

Denon has announced the DN-HD hard-disk replay system designed for background music applications. It features a 4.3Gb removable hard drive with security key, a single disc CD-ROM drive for data transfer, security checking, and a 233 MMX processor running management software under Windows 95.

Recording is through MPEG1 Layer 2 coding for 82 hours of mono playback with a built-in modem permitting remote interrogation and reprogramming while comms ports allow interfacing with other PC-based systems. The mono output is on balanced XLR, status reports are shown on a 2-line LCD while basic operation is via four front-panel buttons.

**Denon, UK. Tel: +44 1753 888447.**

### Millennium additions

New addition to the LA Audio Millennium series of processors is the DAX2 stereo 24-bit A-DC. Each channel has a level trim and 16-segment LED bar-graphs monitor the input signal with peak or VU ballistics. The digital output section has front-panel selection of AES-EBU or SPDIF and 44.1kHz or 48kHz sample rate. A dither switch is provided, and the device can be locked to external wordclock with LED status indication. Valves have been introduced to the range with the TCX2 dual compressor that can be stereo linked. It features active valve stages for the input and output gain make-up, the former having a 40dB range with two LEDs indicating the amount of valve effect being added.

The compressor has variable threshold and ratio, and variable-rate auto-sensing attack and release. Matters are concluded with LED metering, 20dB output valve gain amp and bypass.

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

### Improved TDK CD

TDK has improved its professional CD recording media with the introduction of the CD-R Studio Reflex disc. Suitable for high-speed duplication the discs are optimised for improved performance at real-time recording speeds. Extremely low error rates are claimed along with virtual elimination of the digital noise caused by the 'pit jitter' of poorly recorded discs. The discs incorporate a tough, ultra-pure resin coat-



ing that seals and protects them from excess heat and moisture resulting in a claimed life expectancy of more than 100 years. Smaller batch test sizes are now used and the labelling and information card have been redesigned.

**TDK, UK. Tel: +44 1737 773773.**



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The **Studer V-Eight** is an 8 channel 20 bit digital recorder based on the ADAT™ type II format, using S-VHS cassettes. The V-Eight is **100% compatible to all current ADAT formats** with over 100'000 units sold. The professional design and reliability will give you a cost effective, faithful workhorse for all professional audio recording applications. The V-Eight features a **professional S-VHS Tape Drive** for extremely fast

and gentle tape handling which leads to substantial time savings. The V-Eight also has the convenience of an **integrated TC generator and chase synchroniser**. Unique features are: **24 bit Studer converters** based on the legendary D-827 DASH recorder technology, to improve the sound of your recordings and an **On-board 9 channel monitor mixer** to make live recordings without a mixing console. ■

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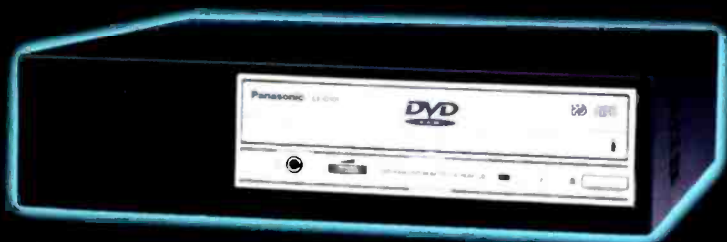
# Deva

location recording has come of age.



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DVD Location Disk Recorder (optional)

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Sometimes catching a take on location is a matter of life or death—and sometimes its worse. With a vested interest in preservation, **Neil Hillman** surveys the location recording scene

**T**RY NOT to dwell on my demise from this life; although events can overtake the conscious mind. That 'for it is not death or hardship that is a fearful thing, but the fear of death and hardship' was uttered by the ancient freelance Epictetus, counted for little when the trauma of my holiday accident unfolded. Certainly I rehearsed what my last words should be and what a suitable epitaph for my stone on headphone hill could be—something witty like Oscar Wilde's 'Either this wallpaper goes or I do' or a simple, moving inscription like that of delta-blues slide-guitarist of the 1930s, Blind Smashing-Pumpkin, 'Didn't wake up this morning'. I did in fact break my ankle, on holiday, in France, running along a cliff path.

I hobbled heroically home and surrounded by my caring and concerned family, I lay and waited for the ambulance ('caring and concerned' because my wife, rather too obviously given my condition, cared that her hair was okay for the dishy French paramedics). My children were more concerned that they would miss their outing to the Asterix adventure park.

At first I thought I was going to die. After 10 minutes I was afraid that I was not; but the administration of a suitable pain-relief injection soon had me drifting into the arms of Morpheus where a man will see his sordid, sinful deeds replayed so that for one last, delicious time he may savour the sweetness of forbidden fruit, stolen during the reproachful periods of his life. That's the theory anyway. What I got as an hallucinogenic experience turned into a narcotic nightmare—wrecked by the dilemma over which recorder, and on which format, my last words should be captured on.

StellaDAT II has a hewn-of-stone build quality, with 16-bit, 4-track recording at either 44.1kHz/48kHz or 2-track 96kHz and a lower power consumption than its rivals, but with a price to match its high pedigree. User-configurable setup software offers almost total access to the machine's variables via menus, and an onboard joystick. M-S monitoring and phantom power is offered, and along with the four inputs and outputs, the time code in and out, and two AES I-O pairs are all on XLR connectors; BNC connectors route sync in and out-word-

clock, two pairs of optical outputs are available and a 5-pin Hirose connector accepts Aaton time code. Almost all you could want in a DAT recorder is here—a heavyweight in terms of performance, price and, erm, weight.

The H11B PDR-1000 is available in either non-time-code or more bulky time-code versions, each offering +48V phantom power, -30dB pad and high-pass filters, while the new PDR 1000TC PLUS incorporates a master sync module and M-S headphone matrix. One of the claims of H11B is that none of these recorders have ever been back for head-drum replacement, even after 3,000 metered hours use on the road, which should say something about the ruggedness of the 4-head, 4-motor transport. The machine has balanced XLR line-mic pre-amp inputs, switchable AES-EBU or SPDIF digital in and out on XLR or RCA connectors, and, disappointingly, phono sockets for the stereo line-out signals.

**T**HE FOSTEX PD-4 with its unique anti-jam transport mechanism, and the digital video-friendly sampling frequency selector switch option of 48.048kHz, sets this machine apart from other location DAT recorders, but otherwise an equally comprehensive range of features are

present including full time-code capability. The Postex has three inputs and two outputs routed via a built-in mic-line mixer with 3-position pan pots and master output control, -15dB or -30dB attenuation pads per channel, +48V phantom power and continuously variable filtering. The six main user settings to configure the machine for individual recordist preferences are simple to execute and software upgradable while the 4-motor transport ensures reliability with the 4-head drum providing off-tape confidence monitoring.

The Sony TCD-D10 is built to the usual high standard that we have come to expect from Sony, with attention to small detail like providing a battery holder for 12 AA cells for dire emergency powering, it is a non-time-code 2-head recorder—hence no off-tape confidence monitoring—with a larger drum assembly than domestic recorders, secured behind a double cover. The balanced mic-line inputs are on XLR connectors with a switchable limiter, line outputs are on RCA phono plugs and AES-EBU digital I-O signals appear on a multiway connector. Preferred power is via Sony 6V domestic camcorder batteries that, it says here, can give a record time of two full hours. If DAT machines were cars, they >

# Location Recorders



**StellaDAT II—a heavyweight performer**

< would all return less than 10 miles to the gallon.

Tascam's DA-P1 rests at the budget end of the Pro-DAT market, but can still sit comfortably shoulder-to-shoulder in terms of quality with the Sony TCD-D10, selling at more than twice the price. Another 2-head, non-time-code machine, its balanced mic-line inputs are on XLR connectors with switchable +48V phantom power, while its line out and digital I/O SPDIF signals appear on RCA phono sockets. A robust, switchable limiter keeps the lid on heavy mods and the constantly updating headroom margin, shown on the backlit LCD in dBs, inspires some confidence in the absence of off-tape monitoring. Sampling rates are the normal 44.1kHz, 48kHz and 32kHz. The DA-P1 lacks the monitor speaker sported by the Sony TCD-D10, but by saving well over £1,500 (UK) you could go out and purchase the best headphones money can buy. Alternatively, stock-up on recorder batteries.

The Zaxcom Deva, when it was launched, created a huge amount of interest not least of all for being a hard-disk location recorder that was completely resistant to the bump and grind of location life thanks to a RAM store of

PCMCIA recorders, with 2-channel progressive-technology, are primarily aimed at newsgatherer-journalists, but (a source of frustration up to now, given the potential of this medium) have yet to court the film and television sector. They use removable PCMCIA cards that decrease the transfer time to a workstation and record either linear or compressed MPEG, or combinations of both, and byte-for-byte give the highest storage capacity at the lowest price. Simple cut-and-splice, non-destructive editors are also incorporated to allow the preparation of reports either to be played in live via on-board ISDN codecs or modem connectors, or given as a finished-edited '.wav' file on flashdisk to the studio.

**T**HE NAGRA Ares-C is a comprehensive MPEG recorder with balanced XLR outputs and line-microphone inputs offering +12V 'T', +12V and +48V phantom power, gangable input pots, standard Nagra filters of 'LFA', 'speech' and 'flat', and a truly straightforward editor with an in-built ISDN codec, or SMPTE-EBU time code.

Mandozzi's DART carries more than a passing resemblance to the Nagra Ares-C, with balanced XLR line-mic inputs with phantom power, XLR line outputs and XLR AES digital out, right down to the large single rotary function key enabling the machine to record or playback its linear audio. Where it differs noticeably from the Nagra is the consummate ease with which the machine can be configured to alter recording parameters such as mono or stereo, bandwidth and titling individual recorded tracks.

If the Ares-C is the nearest to looking like a conventional recorder, the Sonifex Courier is by far the best looking.

But its beauty is more than skin deep: this is a serious-minded tool, offering linear or MPEG compressed audio, balanced XLR line-mic inputs and line outputs, phantom power and LF filters plus 'off-disk' confidence monitoring with a reassuring 'record delay', dependant on which level of compression has been selected.

You/com's ReporterMate MTR 64 has two, balanced, line-mic inputs with phantom power, line out and AES-EBU digital in-out—all on XLR connectors—to access recording and playback of either MPEG or linear audio. The mixer offers gain compression, limiter, and a voice-over mixing function. With a dual

card slot, the PCMCIA cards may be 'hot-swapped' during recording.

The design of the Eela S30 Reportable betrays the extensive experience Eela has in the remote communications field, with the Reportable looking very similar to the company's telephone-mixer reporting products. With balanced XLR connectors for line-mic in and line out, but no digital output, the S30 records MPEG in a .wav format at a sample rate of 48kHz.

The Maycom Easycorder, like the Zaxcom Deva and the Eela S30, offers 'time-shift recording' which enables the machine to 'record-listen' before the RECORD button is pressed by means of a RAM store that, depending on the settings chosen, can store up to the previous one minute. Using either MPEG compression or linear .wav recording formats, the Easycorder offers XLR balanced line-mic inputs with +12V phantom power and XLR analogue outputs; two card slots and two integrated speakers.

If we are compressing audio, the Marantz PMD650 MiniDisc recorder has the location MD market to itself, all other 'professional' location MD recorders being taken from the domestic market and respectfully clothed into beefed-up bags, brackets and braces a la ASC's MD-Report, housing the domestic Sony MZ-R30 or the Denon DMP-R70. The Marantz, however, has been designed as a field acquisition tool, with balanced XLR line-mic inputs offering +48V phantom power, balanced digital output, limiter, built-in speaker and the ability to record through its line inputs from digital sources with sampling frequencies of 44.1 kHz, 48 kHz or 32kHz.

If you are still sold on open-reel recording the Nagra-D is arguably the most sophisticated location recorder available today—is like the Zaxcom Deva or the StellaDAT II, this offers 4-channel recording, but at 24 bits on its two AES digital inputs, with 18-bit or 20-bit sampling on the analogue inputs and assigned to 5-inch or 7-inch, open-reel, metal-oxide, 1/2-inch tape. Sampling frequencies of 32kHz, 44.1kHz, 48kHz, 64kHz, 88.2kHz and 96kHz cover most requirements, and with tape speeds of about 2 ips for 2-channel recording, and about 4 ips for 4-channel recording, a 5-inch spool can give two hours of recording, while a 7-inch spool can give a gargantuan four hours. The four analogue XLR inputs provide 'T' and +12V or +48V phantom power when switched from line to microphone inputs, and the 4-head arrangement allows read after write off-tape monitoring. Three additional longitudinal tracks of time code, control and cue add to the already comprehensive list of features that also include tape directory management, fault diagnosis, external control and PC interface. More transportable than portable, the Nagra-D brings an engineering elegance that falls intuitively to hand for those familiar with piloting the space shuttle. ■



**Nagra Ares-C—in-built ISDN codec, or SMPTE-EBU time code**

2:48 for recording and 88 for replay. Collating four tracks of audio onto a removable 2 1/2-inch IBM PC disk, the Deva also offers an inbuilt 4-channel mixer with assignable onboard equalisation and effects and, new for this season, the ability to interface with a sealed Panasonic DVD Ram drive. These slave recordings can be made on location simultaneously as the Deva's internal drive records, in an attempt to get around the sticky problem of recording media costs. With selectable sample rates of 48kHz, 48.048kHz or 47.952kHz, and supporting all time-code rates, its impressive. If only it looked less like a piece of test gear.



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The Whole Truth And Nothing But The Truth

# The Avengers



The film reviews have been damning, but the public has flocked to the cinemas regardless. **Rob James** investigates the quirky and shady regions of *The Avengers* sound world

**T**HE TELEVISION SERIES *The Avengers* began life as *Police Surgeon* with the late, great, Ian Hendry avenging his wife's murder. Patrick MacNee played a well-heeled, suave, debonair civil servant. When Hendry left to do a movie the series was renamed and the clipped tones of John Steed were joined by Honor Blackman as Cathy Gale. Blackman went on to do *Goldfinger* and Diana Rigg's Mrs Emma Peel took over as the series moved from black and white into colour, and brought dark catsuits and sharp brains. Rigg was succeeded by Linda Thorson, but MacNee remained until the series was dropped in 1969. It was revived as *The New Avengers* with Gareth Hunt and Joanna Lumley in support. In its time, *The Avengers* captured the imagination of audiences across the world.

Since every other similar UK TV series of any note seems to have spawned a movie—sometimes with dubious results—it is surprising it has taken until now for *The Avengers* to hit the big screen. But where the television plot lines tended toward the fantastic, and the movie is no exception both in plot and production, the director and dialogue writer seem to have missed the point. The TV series<sup>1</sup> were always tongue in cheek, but the characters had depth and there was real chemistry

between them. In the film the leading characters are flatter than a surface plate and even Sean Connery appears to be on auto-pilot. The only vaguely sympathetic acting comes from the minor characters including the transparent archivist, a cameo role for Patrick MacNee as I (for invisible?) Jones. The spectacular weather and other visual effects not to mention the slick and involving mix sadly cannot redeem the rest.

The early TV episodes were broadcast semi live, and as the series progressed so did the production methods leading later episodes to be shot on film. Given the intervening technical advances, the film was edited by Mick Audsley on Lightworks with the majority of sound postproduction undertaken at De Lane Lea in the heart of London's Soho. Adrian Rhodes began working on *The Avengers* in October 1997, initially as effects editor and is currently best known for his sound design work on the Wallace & Grommit animations. Director Nick Park and Rhodes were at the National Film and Television School together. The high profile of Wallace & Grommit has slightly obscured the rest of Rhodes work which includes, lead mixer on *The Full Monty* and Hanif Kureishi's *The Fanatic* and effects editor on the latest Bond epic *Tomorrow Never Dies*. Danny Longhurst was dialogue editor,

Ian Wilson did Foleys. The team shared two assistants, Guy Hake who, according to Rhodes, was also indispensable as the team 'boffin' and Mark Rose. This compact sound team illustrates the way digital tracklaying is revolutionising the business. If the tracklaying for a movie of this complexity is undertaken on 35mm magnetic film the number of people involved could be expected to at least double.

Location recording by Clive Winter was on a standard 1/4-inch Nagra job with time code; although the majority of the dialogue was replaced in ADR sessions due to the large number of special effects intensive shots which rendered much of the location sound unusable. The film rushes were transferred to Betacam, the sound synchronised and copied to the Beta tapes and sub-master DATs—all fairly routine stuff these days and caused few problems.

By November the first of many temp mixes took place in De Lane Lea's Studio 5. This is one of the smaller theatres in the complex, equipped with an AMS Logic 2 console. These mixes are produced for a variety of reasons: to get an idea of whether the film is working, to help determine what dialogue needs replacing and to assist in designing the track. The dialogues were prepared on a Waveframe then digitally bounced to DA-88 since this was a delivery require-

ment. The DA-88 tapes were digitally bounced to Akai for mixing. ADR recordings were made in London. Shepperton and New York recorded on whatever the individual ADR theatres usually employ and then loaded into the Waveframe for editing. Foleys were recorded, edited and delivered on Akai (a DRI6 in this case). Rhodes used his Spectral Synthesis Audio Engine for effects editing with the results digitally transferred to Akai for mixing.

It is generally considered undesirable to mix for cinema in a small theatre, but Adrian Rhodes reckons, 'We did the mix in Studio 5 because it was available and I am used to the Logic. But to be safe we did the SVA (Stereo Variable Area, a term used for a Dolby Stereo Matrix encoded master) in the much larger Studio 3, and then checked the mix on one of the screens at the Warner Village in Leicester Square. It was absolutely fine.' When Studio One at De Lane Lea was designed, the decision was made to eschew rows of magnetic film machines in favour of a bank of Akai DD8 digital dubbers. Akai machines are also used as recorders in the other studios.

There were several subsequent temp mixes as editing progressed. This would usually require a complete remix or copying and editing of premises but Rhodes found a better way. 'All the mixes were recorded onto Akai machines,' he explains, 'and we tried out the auto reconfirm that was introduced a while ago. It was a highly successful venture. Everything worked and we just had to fill the holes where new shots had been cut in.'

The effects gathering and creation started right at the beginning and continued throughout the postproduction period. 'Meanwhile I was adding to the effects,' Rhodes continues. 'I made heavy use of an E4 Emulator and SPL Vitaliser plus various Yamaha SPXs and Lexicons, but, really, it's just using a lot of imagination, you don't need to spend a fortune on toys to achieve results.'

'The SFX shots were perpetually changing, background lightning hits would happen in different places. Things come and go, and you have to keep updating. At least on *The Avengers* we did get to see all the shots, on *The Borrowers* some shots we never did see and just had to make the best guess.'

The mechanical bees effects were made from a variety of unlikely parts.

'An electric razor and an electric toothbrush, Doppler shifted and pitched with the E-mu, and I did find a simple way of achieving an organic bee sound using a helicopter and single engined plane up and past with some outboard pitch change courtesy of an Eventide. Mix that lot together and you get some organic mechanical bees.'

Many of the backgrounds are constructed from equally imaginative sources.

'I have a huge library of wind sounds,

mostly mouth produced. Your mouth is a very versatile instrument for effects work. I am also the voice of the Prime Minister. I did it for one of the temp mixes and they kept it in.'

The score was to have been composed by Michael Kamen, but, if Warners is to be believed, due to the complexity of the visual effects, the film was late and Kamen had another booking that prevented him completing *The Avengers*. As a result Joel McNeely is the man responsible for the mighty score with its occasional well handled 'homage' to the TV theme. The music recording took place at Abbey Road with Shawn Murphy engineering and some programming done in the US. The resulting material was presented for mixing on Pro Tools 24 with a Genex backup that, in the event was never required. It is an interesting sign of the times that there was insistence on staying 24 bit with the music. How long will it be before 96kHz sampling or maybe even 192kHz becomes a production requirement?

The final mix was originally booked into Shepperton Sound, but, again due to the delays, it was eventually decided Adrian Rhodes would co-mix the film in De Lane Lea's Studio 1 with Mike Prestwood-Smith who had recently joined De Lane Lea from Goldcrest and brought considerable Harrison and Synclavier experience to the party.

'Being a Logic user I found the Harrison Series Twelve quite difficult to start with,' Rhodes recalls, 'but the learning curve was really quick because ultimately, it is a pretty standard console. It's just the automation which is tricky >





< to begin with having learnt on a different desk with a processing pool rather than fully-loaded channel strips. 'There seems to be an automation mode on the Twelve to suit everybody.'

Standard maybe, but with a phenomenal number of inputs.

'When this desk was specified, 140 full channels seemed like overkill but on this film we used them all. On Reel 3, with the mechanical bees, and on the final reel we even had to use some pre-dub inputs as well. To make it as exciting as possible there are all the elements contributing, fire, wind and water.

'To leave things as open as possible the effects were premixed onto 32 tracks with monos, pan groups, two subs and two stereo surrounds. Foleys were mostly across 16 tracks, and there is a serious amount of Foley. This is a big effects movie.'

Dialogue premixes covered a further 16 tracks with monos, pan groups, split reverbs and subs with the music score coming direct from Pro Tools and 'source music' supplied on DA-88. The team used some fairly novel approaches to the final mix.

'We had the dream of doing a totally "virtual" mix, but the picture goalposts were moving to fast so we had to compromise. All the premixing and final mixing was recorded on Akai DD8s onto MO discs, so we never had to bother about disc clearing or archiving. The mixes were done "virtually" reel by reel. In other words, no audio actually gets recorded until the reel is complete then we transfer it to disk in one pass with the automation doing all the work. We even used the time-code automation of the Lexicon 300s to take care of reverb changes. It all behaved perfectly.'

The final mix was spread across three DD8s split into Dialogue Effects and Music each with LCR, Ls, Rs and S channels. The delivery requirements included mixes in Dolby SRD and the accompanying SVA, DTS and SDDS.

'We simply ignored the extra effects

channels,' says Rhodes. 'This is okay with the SDDS people and to do anything else would have required a substantial remix.'

As a matter of interest, both the DTS and SDDS mixes were supplied on DA-88 tapes lending more proof to the ubiquity of the format. I live in hope a more robust disk-based format will supersede it. Meanwhile there are interesting lessons to be learnt by other manufacturers. In particular the relatively easy interchange between US and other time-code formats is one of the reasons for its success.

And the mix is, indeed, remarkably dynamic, clean and punchy. Every word of the dialogue can be heard without the usual strain and sensible use of the available dynamic range has allowed for real shocks.

'There is a bit of a sense around at the moment that effects levels are getting too hot in all the digital formats at the expense of dialogue intelligibility and also safety. If the dialogue mix is right, using the available dynamic range is the key. Just because you can go loud doesn't mean you have to all the time. In fact, if you do, you lose impact.'

Rhodes regards the idea of working as effects editor and mixer on the same movie as 'a wonderful way to work, but uneconomic from a company point of view. But, if I am honest, I am a mixer at heart so that's what I now am.' After the recent change of ownership he is also a share holding director of De Lane Lea along with Paul Hamblin, Dave Old and Mike Solinger. They have some exciting development plans and it will be interesting to see them put into effect. The postproduction route(s) followed by *The Avengers* is a good indicator of where things are going. Virtual mixing is almost a reality and will open up a myriad of possibilities. Digital dubbing is coming of age. It is not only viable but offers huge advantages to facilities and producers alike, especially when the film is in an almost constant state of flux until the last minute. ■



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A star-studded career throughout the sixties, seventies and the eighties has failed to calm Jim Reeves' enthusiasm for music and recording. **Dan Daley** talks tunes and technology

**B**ORN IN WESTCHESTER, just north of New York City, in 1943, Jim Reeves comes with the kind of pedigree often found in engineers of his era. He moved, when he was four, to live with his aunt and uncle, virtually in the shadow of Manhattan's 59th Street Bridge, and attended piano lessons aged seven. By adolescence, his family were tolerating the technical curiosity that often developed others into the autodidact recording engineers of early rock 'n' roll. The piano became neglected for the musical mode of the era on the streets of New York: doo-wop under the street lamps.

'We were always getting buckets of water thrown on us from windows,' recalls Reeves, now able to laugh at the musical Philistines that once infested Manhattan. He found himself in good company—with his group the Melodies, he sang at club and school dances six

nights a week with rising stars like the Del Satins and the Companions (and doubling with an *a capella* jazz group Four Score), did orchestral dates at the Tuxedo Ballroom, and once even had a gig interrupted by an impromptu on-stage appearance by Johnny Mathis.

Reeves kept this up throughout high school, and upon switching from the Catholic Cardinal Hayes High to the more practical Brooklyn High School of Automotive Trades, he was able to put what he gleaned about electronics during years of teenage tinkering into practice. He built his own recording console and hooked it up to a pair of creaky, academic-grade Wollensak mono tape recorders, and a Shure SM58 perched on an equally creaky Atlas boom stand. 'I'd been fooling around for years putting together little mixers, but this was the first time I was able to actually machine something,' he recalls.

After graduation, he was working the cash register at his uncle's chemist shop on East 59th Street, slipping off when he could to the recording studio at Kapp Records, upstairs in the same building. Here chief engineer Grant Ellerbach showed young Reeves the ropes of real studios. Then, as he describes in the personal narrative style unique to native New Yorkers, 'Leo at the Dover Deli across the street says, "Let me introduce you to Dave. You want to know him?"

Dave Sarser was a violinist in the NBC Orchestra conducted by Arturo Toscanini, this being the days when broadcast networks still considered philharmonic orchestras to be the audio flagships of their ethereal empires. More importantly to Reeves, Sarser was also technologically inclined, having helped Les Paul put together his first 8-track recording system—assisting in the design of the first headstack and acting



as the liaison between Paul and Ampex, who constructed the towering early multitrack system.

'I had been trying to do sound-on-sound recording at home on the Wollensaks, so Sarsar became my guru, and you couldn't ask for anyone better considering what I was into,' says Reeves, who continues to stay in touch with his mentor via phone calls and e-mail. Sarsar helped Reeves get a job as a porter at Studio 3, the East Side facility owned by the legendary Skitch Henderson, who at the time was the band-leader on the original *Tonight Show*, then hosted by Jack Paar in the pre-Carson era.

While the proximity to clients like Ruby & The Romantics and Vladimir Horowitz fed Reeves' obsession, cleaning the studio's toilets did not let him get any hands-on recording experience. So he poked around at some of the burgeoning independent studios that were starting to dot Manhattan's West Side, where the Brill Building was the musical Mecca of the time. He struck pay-dirt at A1 Sound Studios, where owner Herb Abramson, who had been a partner with Ahmet Ertegun in the start of Atlantic Records, gave him the job as an engineer.

He was ostensibly to assist Abramson at sessions, though, Reeves remembers, 'He would keep saying, "You set up and get things started, I'll be along." It got to the point where I was doing the entire session and he was just showing up in time to collect the money. But that was fine. That's how I got the experience I was looking for. I also wound up doing sessions for lots of artists, including Ruby & The Romantics, and the Supremes, who came in to do songs on a memorial record for Sam Cooke, who had just been murdered. I remember we were recording to 3-track at the time, and the Supremes were incredible pros, but so nonchalant about it all—they sat on stools smoking cigarettes during the sessions, puffing away between lines of the songs, and never missing a cue. I had a Neumann U47 on each of the girls, and I put it up near the control room glass in the studio.

'It was a long, loft-like studio design, which a lot of the rooms were back in those days, and we had the band down at one end, and the brass at the other, and the vocals in the middle near the window. So you were getting these great reflections of the drums off the glass and into the vocal mics which gave the whole production a real sense of space and roominess. There was also a natural delay between the band and brass sections that affected the way people played their parts and the feel of the record.

'I was having a great time and learning a lot, too. Then Skitch found out I was doing engineering at another studio on the side and asked me why I did



**Beyond the studio: Reeves mixed live shows for The Doors and Jimi Hendrix and help design the sound system at the club where Cyndi Lauper first made her name**

not do some engineering for him.'

Reeves did, running sessions for some of the same artists he had once cleaned up after, including Benny Goodman (who had a habit of leaving his cigarettes burning on the lid of the classic Steinway given to Henderson by John Steinway himself). He also did numerous commercial jingles—productions for Henderson's commercial company, Clef Ten, were the studio's bread-and-butter clientele—including manning the desk as Sarah Vaughn sang the Tasty-Cakes jingle, and editing those jingles, which proved to be a baptism of fire.

'The Wollensak tape recorders were really not designed for editing,' he recalls. 'You had to hold your finger on the capstan to get the tape up against the heads and we were working down at 3 $\frac{1}{2}$  ips.'

All this was being done on the console that had been designed and built by Reeve's mentor, Dave Sarsar, which consisted of Altec line program amps on a panel purchased at auction fitted with Bradley 100k faders. 'It was a sort of broadcast design, which is where console design was really coming from in those days,' says Reeves. 'It had nine inputs and three channels out with a phantom centre because [mixing for] stereo was still being worked on at that time. It was a very cool-looking console.'

**R**eeves became itinerant, but never completely freelance starting in 1967, spending time on a sideline of designing and building modest home studios, such as for moguls-in-waiting Jeff Barry and Bert Burns. At one point between stints at Studio 3 he worked at Incredible Sound Studios, another of Manhattan's growing retinue of independent studios, where he did records with Irma Franklin, Freddy Scott and Johnny Nash, and some early work with Tommy James & The Shondells. He claims he gave James the idea for the psychedelically phased effect on >



< *Crystal Blue Persuasion* when he brought a Moog voltage switch into that studio one day to experiment with an early morphing effect between the guitar and vocal tracks. 'It was kind of like toggling between them, but it didn't really work,' he says. 'His next record was *Crystal Blue Persuasion*—which I didn't engineer—but that same idea was on that.'

Reeves ultimately bought Studio 3 from Skitch Henderson. However, his first stint at studio ownership did not end well. Reeves' partner in the venture, whom he declined to name, brought in what in genteel circles are referred to as 'unsavoury characters', more contemporaneously known as 'wise-guys', who in short order took over the business themselves.

Reeves did not register complaints with the Better Business Bureau. 'I was

more interested in staying alive,' he says. Studio 3 on East 57th Street was turned into an after-hours nightclub that was frequented by celebrities, including Judy Garland shortly before her death. Meanwhile, Reeves spent three months in the Caribbean recovering from the episode. It cost him his business and his domicile, since the studio also included a townhouse where Henderson had originally lived.

Returning to the US, he did some record productions but realised he needed a job with more definite prospects. Working with a band at Columbia Studios on West 52nd Street in late 1968, he became friendly with an engineer there—you had to be friendly with them, since at the time Columbia was a union house and union rules stipulated that only house engineers could so much as touch the

recording desks—who steered him towards Roy Friedman, the studio manager. Friedman gave Reeves a tape to edit as part of the studio's standard hiring test. The two met in one of the studio's numerous control rooms and chatted. A few moments later, Friedman readied to leave and let Reeves get on with the test, whereupon Reeves handed him back the tape with precise edits already done. 'I used to do a zillion edits a day for Skitch; I did them while I was on the phone. I could do them in my sleep,' he says. 'I just did the edits scrubbing at a low volume as we talked. He looked in his union book, found the highest-paying engineering job category, and gave it to me on the spot.'

At Columbia over the next four years, Reeves engineered hundreds of records as the label established itself as a leader in the burgeoning rock industry under Clive Davis' management. These included *Johnny Winter And...*; the Chambers Brothers' *New Generation*; the Brecker Brothers-Billy Cobham collaboration *Dreams*; Tom Rush's *Wrong End of the Rainbow*; and Bob Dylan's collaboration with now ex-Beatle George Harrison on what would become *Wallflowers*. He got to work with a litany of the best producers of the decade, including Roy Haller (Simon & Garfunkel) and Bob Gaudio, whose Four Seasons' records resonated in Reeves' doo-wop soul.

'Bob Gaudio was a great producer,' he says. 'He was the one who taught me how to record and produce a vocal take. He used a line-by-line approach with Frankie Vallie, and he knew how to cash in on every word. Before Frankie could do the next syllable, let alone the next word, of a line, Gaudio would stop him and coach him. Then we'd record it, punching in line by line, word by word. Later I used the same thing on Tiny Tim. You really did get a cohesive performance that way, and every word really counted. We used to go till 7am, doing vocals like that and then we'd walk over to Central Park and eat hot dogs for breakfast.'

Reeves facetiously recalls that in those days he was 'stuck with' Neumann U47s, U67s and U87s. 'I mean, that's all there were at these studios,' he says. 'They weren't considered vintage yet. They were what you used every day.' Still, he remained a fan of the Shure SM58, from which he often removed the ball and covered it with foam, allowing singers to get right on top of the capsule. He also refined his miking techniques during this period. 'I was always into close miking,' he says.

'I always thought, the sound is originating in the speaker, so why put the microphone far away? For guitar amps, I would put an SM58 right on the speaker, on-axis. I never liked the phase

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effects produced when you placed it off-axis to the speaker. Instead of EQ, I would just move it a little to the left or right to reduce the brilliance or sharpness of the sound.' On the Jam Factory album, he literally used no EQ at all on anything, relying solely on microphone choice and placement. 'You learn how things can EQ each other just by how they're all balanced together,' he explains. At Columbia, he had access to some very interesting consoles designed and built by the label's own engineering department on the seventh floor, though he was exposed to more of the off-the-shelf designs when working at A&R Studios, where Columbia sent its spillover work.

At Columbia, Reeves experienced a studio culture that is now only a memory, and not always a fond one, for him, anyway. The unions, in this case the International Brotherhood of Electrical Workers (IBEW), Local 1212, restricted how engineers worked and interfaced with producers. As mentioned earlier, the latter could not touch the consoles. '[The management] used to stare into the windows of the control rooms to check on you as you did sessions, to make sure you were complying with all the rules,' he says. And as engineers moved into production themselves, the studio culture reacted by restricting how they were credited. 'After Freddie Catero and Roy Hallee did the [first] Blood, Sweat & Tears record, Columbia got defensive about giving engineers any credits on records,' he remembers. 'Columbia was afraid of engineers getting too much control on the records. And if an engineer did get a credit, his name was in lower case. I always felt like I was just part of the machinery when I was there.'

Reeves found other outlets for his ambitions. While continuing to work at Columbia, he designed and ran the sound system for JPs, an Upper East Side club that quickly became the nexus of Manhattan's rock culture, drawing all the while on earlier live sound experience gained at Ondine's where he had mixed shows for Jimi Hendrix and the Doors. A while later, he was involved to a lesser degree in the creation of the sound system at the West 72nd Street club Traxx, of which JPs was a venture partner. While he was ultimately displeased with what he called an overly large sound system in the low-ceilinged space, the venue launched scores of artists, including Cyndi Lauper, Desmond Child and Manhattan Transfer, who liked Reeves' live sound work so much they took him on the road with them.

'It was also a great place to learn more about miking instruments,' he says. 'One thing I learned is that the way things sound is as much a function of who's playing as anything else. I got to work with drummers like Rick Marotta and Russ Kunkel there. I remember one

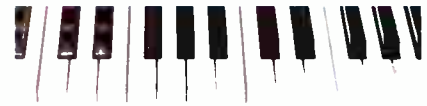
night Rick came in with a tiny drum kit. I mean, tiny—it fit into a regular suitcase. I thought it was a joke kit. Then he started playing and it sounded explosive. It had nothing to do with the microphones. It was the dynamics of his playing that made the sound.'

**R**eeves also did a dozen or so live records at the Fillmore East, including Sly Stone, Jessie Colin Young & The Youngblood, and Johnny Winter's classic live record there, done to an 8-track Ampex MM-1000 deck wheeled into the basement of the venue. During that record, Reeves stepped outside to take a break between shows and impresario Bill Graham's security team wouldn't let him back in. Finally, like more than a few devoted fans, he eventually found a way to sneak back in for the second show.

Reeves had also been doing sessions at the Record Plant, another independent studio that Columbia used for overflow. It was here that Reeves saw how much more evolved the culture of the independents had become. 'The Plant just blew my mind in 1973,' he exclaims, unselfconsciously using the vernacular of the era. 'Aesthetically, it was totally different from Columbia, which was more like a hospital in terms of vibe. The Plant had a Datamix console back then which had no monitor volume control, only a stereo master. But when you hit +2dB on the meters, you were in mixing heaven. And the monitoring was so much better than those nightmare Altec A7 speakers we had at Columbia.'

After leaving Columbia for good that year, Reeves worked at the Record Plant, where he engineered numerous period classics, including Greg >

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**Class of 67: Reeves at Incredible during a 4-track session with Freddy Scott**

< Allman's *Laid Back*, which spawned the Southern rock anthem 'Midnight Rider'. Reeves used the 'microphone against the control room window' effect again on Allman's vocals into an omni-patterned U67. But he went back to the basics for the strings, using Shure SM57s.

The Record Plant became his home base as he recorded an increasing number of live records outside of New York, then brought them back for sweetening and mixing. All along, he was experimenting with more offbeat microphone combinations, including using Sennheiser 441s for all the vocals on the Mott the Hoople live record.

Perhaps the most interesting of the live gigs that Reeves was invited on was the 1972 Presidential Inauguration Ball, which kicked off Richard Nixon's second, ill-fated presidency. Working for the Record Plant, Reeves recorded performances by country singer Ray Stevens and the Mike Curb Congregation. He also got to meet First Lady Pat Nixon. But the most memorable event for him was sitting by the console as actress, diva, Rat-Pack flirt Joey Heatherton ran back and forth from stage to dressing room doing numerous 30-second costume changes during a single number. "That," he says emphatically, "was fun to watch."

Reeves was in early on the short-lived Quad frenzy of the mid-1970s. Columbia Studios brought him back to do several remixes using the SQ 4-channel system, setting up one of its newest in-house console designs in Studio 409 for the project, a desk that offered one of the first solo-in-place functions, and four of his least favourite Altec A7 speakers. Columbia mandated that all the quad mixes were to be stereo compatible, but Reeves soon found that the inherent phase anomalies of Quad just got worse when you truncated a 4-channel mix to two channels. The first record to undergo the quad process was a Paul Revere & The Raiders remix, but it was the *Super Session* recording (Al Kooper, Steve Stills,

et al) which got the full treatment.

"On 'Season of the Witch' I wanted to be able to rotate the information symmetrically, and there was no way to do that precisely with the system the way that it was," Reeves states. "So I had to develop a 4-ganged joystick myself."

Reeves once again went to the Columbia Skunk Works on the seventh floor, where chief engineer Eric Porterfield made what Reeves had in mind and was able to achieve the desired effect. However, quad itself didn't fare as well, something that Reeves attributes to poor word of mouth about the format among both consumers and professionals.

"I enjoyed Quad, but I thought it was marketed badly," he says. "The press played up all the phase problems and said it was a novelty flying sound around four speakers. But they didn't say the same about stereo even though when it came in people were also doing hokey things like ping-ponging sound back and forth. I really believed it could work, but bad publicity killed it."

Reeves believes that current multi-channel formats will succeed where Quad failed because the companies behind it have learned the marketing lesson and are prepared to back that up with money.

The memories, both fond and not-so-fond, have not made Reeves into a museum piece by any means. Though out of the mainstream for a while after working in jingle production in New York for many years, he now runs his own studio and production company from a Chicago suburb, where he moved four years ago, revelling in the ADAT culture of local garage bands and the inexhaustible potential of the music business. And while he is still a bit bitter that credit has not always given where credit was due—he still smarts that his overdub and mix work on Lou Reed's *Berlin* album is not properly attributed—he doesn't let it slow him down. "I still just really, really like what I do," he says. ■

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# Africa's children

If television symbolises Western civilisation, radio is the lifeline of established and emergent society. **Kevin Hilton** charts changes at the Namibian Broadcasting Corporation

**B**ROADCASTING is schizophrenic; it has its traditions, with many of the techniques and sensibilities used today, going back to the earliest times of the medium; and its dedication to innovation, which drives it along and helps it progress and develop. As broadcasters start to come to terms with a near fully digital environment, this schizophrenia becomes more apparent: the need to move on, but the equally strong need to keep some of the old ways that have worked so well.

Radio in particular is experiencing such a transition. One broadcaster that is going through changes at present is the Namibian Broadcasting Corporation (NBC); although change has never been far away for either the broadcasting organisation or the country. Currently in the middle of a long-term refurbishment, this state public-service broadcaster is trading in its old reel-to-reel machines for Magneto-Optical (MO) player-recorders in a bid to maintain its reputation as one of the leading broadcasters in Africa.

Bordering Angola and Zambia to the north, Botswana and South Africa to the east and the Atlantic Ocean to the west, Namibia, like many African countries, or indeed, many countries in general, has a complicated, torrid history. The original inhabitants were the Damara people, but in 1884 the country was annexed by Germany, with the exception of the British-Cape Colony enclave of Walvis Bay, Namibia's major port, situated on the Atlantic coast. World War I saw occupation by South African forces, with Namibia being mandated to its neighbour in 1920, from which time it was known as South West Africa.

Being governed by South Africa meant that the first broadcasts in Namibia were under the auspices of the South African Broadcasting Corporation (SABC). The earliest transmissions were merely short-wave relays from South Africa that were then rebroadcast on FM. But as dedicated studios were built, local programming slowly took precedence over centrally generated material, with an independent South West Africa Broadcasting Corporation (SWABC) emerging out of the SABC around 1979.

The centre of operations is the capital, Windhoek, situated pretty much in the middle of the country. Programmes from here were broadcast in several languages: English, Afrikaans, German,

Damara-Nama and Herero; studios were later built in Oshakati to serve the Oshiwambo populated area in the north of the country in its own language. A station was also built in Rundu in the north on the border with Angola, serving the Kavango region, with another located in Katima Mulilo at the end of the Caprivi Strip in the extreme north-east of the country for the Lozi speaking population. (A Tswana service was added approximately two years ago, and there are now plans to institute a SAN or Bushman channel.)

Full independence for the Namibian people came in 1990; although South Africa continued to claim sovereignty



on the commercially important Walvis Bay area up until August 1993, when it finally waived its rights to the enclave. With the creation of a free Namibia, the SWABC changed its name to NBC and has continued to expand services to cater for its small, but wide-spread population (estimated at 1.7m). Although not as large as South Africa, the country is still immense, having an area of 824,300km<sup>2</sup>-318,262miles<sup>2</sup>. (To get an idea of the scale of NBC's operation, Katima Mulilo is 1200km from Windhoek, but is maintained by technicians from the capital.)

Main areas of the country are covered by FM transmissions; although, due to the large sparsely spread population, it is not possible to cover all areas and so new FM stations being implemented all the time. A MW transmitter is located at Tsumeb to serve areas not yet cov-

ered by FM, with two SW transmitters outside Windhoek. NBC employs approximately 500 people and has contribution centres in Otjiwarongo and Keetmanshoop, each with a small studio, while a new office has recently been opened in Walvis Bay.

The Windhoek broadcast centre houses around 20 studios, with four studios each in Oshakati, Rundu and Katima Mulilo. The majority of the Windhoek studios are straight on-air broadcast suites, with one being a music recording studio equipped with a 24-track Studer A827 and Dolby SR. The English language National Service is currently the only stereo channel in the country and runs on the Dalet hard disk-based automation system, with 18Gb of storage (mirrored) giving in the region of 180 hours of audio.

This shift to hard-disk equipment is

now becoming more general as NBC looks for replacements for its ageing stock of reel-to-reel tape machines. Phil Schmanan, responsible for the planning and implementation of projects at NBC, explains:

'We have been using Studer B67 and A807 and Revox PR99 tape machines. The Revoxes are mainly used for automated play-out in the evenings and weekends, while there are three A80s and an A827 in our music studio. In total, we have around 220 tape machines in use, most of which are B67s and they are getting really old. As we have seen that the main expense on these machines is mechanical part replacement, we decided to look for an alternative with minimal mechanics.'

The choice may have been new MO technology, but NBC decided to stick with Studer, buying 20 so far, with >



< plans to purchase 'lots more' over the next year. Schmamman says that an important factor in the choice of these units was the amount of audio that can be stored. "These machine use 2.6Gb drives, which give us around three

hours mono audio per side and around 1½ hours stereo per side," he says. "We also wanted to replace the automated play-outs done after hours. As most of our services are still mono, being able to put three hours of audio onto a disk

and then simply program a play-out sequence would work like a bomb."

As the new devices were intended as tape machine replacements, their linear recording capabilities, but with full editing facilities, were important to Schmamman. He adds that as the analogue I-O is now an optional feature, there is an indication as to how radio will be shaping up for the future. "Like all other Studer equipment, they're built to last. That is, like brick outhouses," he enthuses, "and we have had really excellent service from Studer and the South African agent, 8th Avenue Sound. This was an important factor in looking at a system."

In addition to tape machine duties, the MO units will be used for archiving purposes. Schmamman says that, as the devices have standard SCSI drives, they are essentially dedicated computers, making upgrades easy because they are software based. All the machines can be networked and have EBU sync, word-clock and video sync.

The MO recorders are part of a project to update NBC's radio studios, some of which, Schmamman admits, are getting old. The typical set-up is three to four tape machines, one Tascam 122 Mk II cassette deck, two Revox C221 CD players, two Technics SP10 Mk II turntables and Studer 169 or 269 consoles. A variety of other consoles are also used, including Soundtraes FMBs, while the Dalet equipped studios has RS (Radio Systems) desks. Dalet is installed in only two studios and is currently an isolated system; although this could change in the future.

"We would like to extend it to all the other services," says Schmamman, "but that all depends on money. A fully integrated system including our advertising department would, of course, be the ultimate. During the night, it is the only service running on all transmitters and our All Night Service runs off it fully automated."

NBC's refurbishment is an on-going project. The next big job is Main Control; tenders are out at the moment and Phil Schmamman and facilities manager Lutz von Dewitz visited IBC to see what was on offer. The long and ever developing history of NBC continues. ■

October 1998 **Studio Sound**



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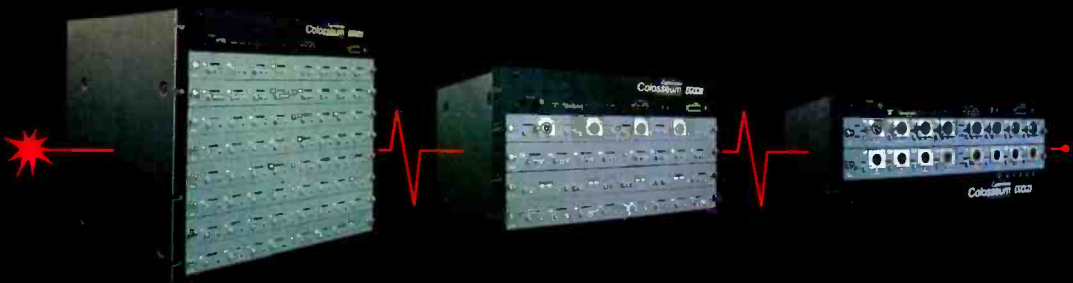
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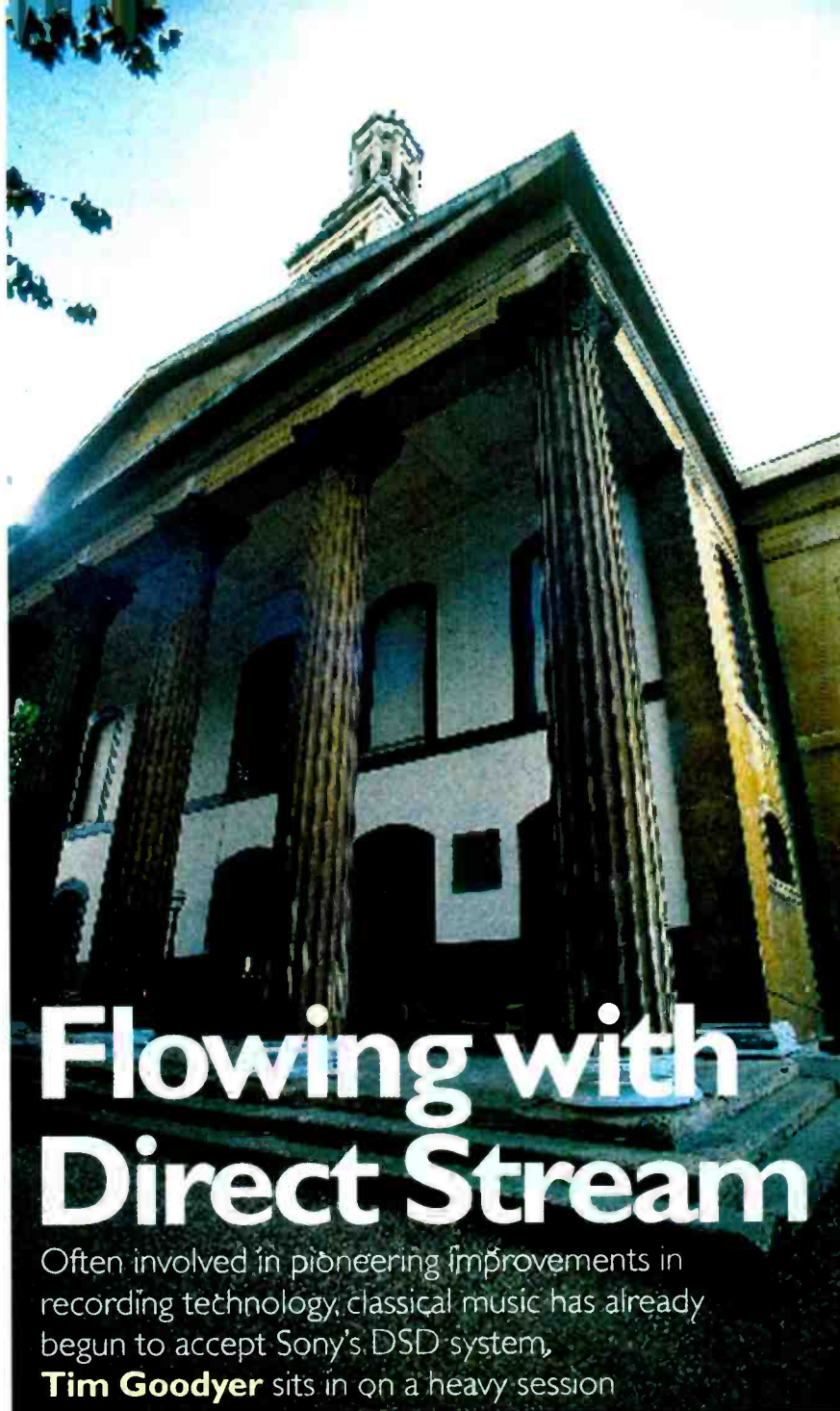
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**R**ENOWNED CLASSICAL recording engineer Tony Faulkner describes this as an 'ordinary day'. Certainly, the weather outside London's Henry Wood Hall is typically British, but the recording session inside contains a few surprises. The first is the ability of Marc-André Hamelin to turn fellow pianist Leopold Godowsky's absurdly difficult 'studies' on Chopin's études into phenomenal performances for release on the Hyperion label. The second is the equipment configuration; beyond a typically single pair of Neumann M250c mics, EAR valve preamps and dCS A-D converters sit three cascaded recording chains. One addresses a DAT machine for producer Andrew Keener to vet the recordings, another a Tascam DA-88 for standard CD release, and the third a prototype Sony DSD recording system. The setup is a variation on a theme that Faulkner has used on some 15 recordings over the last 12 months or so, most recently on a 4-CD set of Nicholas Medtner's piano sonata's which were also performed by Marc-André Hamelin.

'We have a policy of giving our clients the best quality we can get,' he says in explanation. 'so we've been creeping up to higher resolution and higher sampling rates over the last ten years. We're using DSD so that we can archive off the 2.8MHz bitstream, so we've got it in the stores for whatever high-resolution carriers come along.'

Part of this philosophy is evident in the use of 'classic' equipment like the old Neumann mics set in a simple configuration, and part of it in the use of a Prism MR20 24-bit splitter to turn the DA-88 into a 24-bit machine. The replay chain also speaks of quality with its EAR valve power amplifiers and Quad Pro 63 electrostatic speakers. But most obvious is the Direct Stream Digital hard-disk workstation, the Advanced Intelligent Tape backup system and other attendant boxes—the latest high-quality digital recording initiative to appear from Sony's R&D labs.

For the uninitiated, DSD captures a 1-bit datastream at a 2.8224MHz sample rate, avoiding the decimation and interpolation stages that hinder the use of higher sampling rates in 16-bit, 44.1kHz CD release, and lays claim to a DC to 100kHz frequency response. In addition to its applications in archiving, replication and distribution, it is part of a larger scheme hatched by Sony and Philips to replace conventional CD with Super Audio CD, a dual-layer 'hybrid' disc adding a DSD (Scarlet Book) layer to the familiar Red Book CD layer. If accepted, SACD will retain compatibility with 10bn CDs and 500-600 million CD players in existence, and offer a route forward for high-quality digital audio. Although still under development, both DSD and SACD are gathering significant support within the pro-



# Flowing with Direct Stream

Often involved in pioneering improvements in recording technology, classical music has already begun to accept Sony's DSD system, **Tim Goodyer** sits in on a heavy session

audio industry, with around ten record labels onboard and the first domestic SACD players scheduled for their Japanese launch in spring 1999.

At present DSD's appeal is primarily to the classical music fraternity—partly because of classical music's traditional pursuit of quality and partly due to limitations of the prototype equipment; although Faulkner is expecting to have a DSD-capable SADiE system within a few weeks. And with surround sound so clearly on the classical agenda, it is significant that the first multichannel DSD recorder will be introduced at the San Francisco AES. In the meantime, Faulkner has been enjoying the use of one of the eight prototype recording systems—only three of which are in Europe—assisting in its testing and contributing to the fledgling DSD catalogue. He terms it 'future proofing'.

'We did some of the first 96kHz recordings for Hyperion, but we didn't go with that because it seemed to me that going from 44.1kHz, 16-bit to 44.1kHz, 24-bit made more of a difference than going from 44kHz, 16-bit to 96kHz, 16-bit,' Faulkner says of the race to raise recording standards, 'and the complications in editing and sample-rate conversion just didn't make 96kHz viable. To my ears, sample-rate conversion degrades the sound to a lower standard than if you'd recorded at 44.1kHz to begin with. We live in a world where 44.1kHz is a very important delivery format and the DSD solution means you can downsample without any unpleasant surprises.'

One of the key elements determining the sampling rate for DSD was conversion to all likely release rates with minimal degradation. For 16-bit, >



◀ 44.1kHz CD, this involves the use of a 32,639-tap single-stage FIR filter and noise shaper in a process Sony has dubbed Super Bit Mapping Direct. To date, two downsampled DSD recordings have been made by PolyGram at Wisselord studios in The Netherlands whose engineers regarded it as superior to their parallel analogue and PCM recordings.

'We did listening tests in February in Scotland with the Scottish Chamber Orchestra where we ran 176kHz, 96kHz, 44.1kHz and DSD,' Faulkner offers. 'We had a whole day with the orchestra rehearsing so the producer and I had the mics up and we flipped from one to another. It was very interesting—there appeared to be definite "thumbprints" on each of the sounds. The main things you could spot were that the high-frequency reverb time appeared to be a lot different when you went from one sample rate to another. If you listened to 44.1kHz, 16-bit it sounded like a smaller hall with padding down the back as compared to 176kHz or DSD which rang on for at least another half second or so.'

'I don't think it's the extra bandwidth you're hearing, it's to do with the filters and the amount of information—it's as if you've got more pixels. I'd quite like to do some listening tests just with the filters so that I could be sure just what it is you're listening to. You could create an analogue filter with the same characteristics and see if they give the same effect on the sound.'

Faulkner expects today's recording to see its initial release from the 24-bit DA-88 tapes if the provisional release date is to be met, but believes that the vagaries of record company schedules could see it become one of the first DSD releases.

'To date none of our projects have been completely edited from cradle to grave on DSD. It's all archived off. We tend to do most projects on 176kHz, DSD or both. The advantage of 176kHz is that you can use ordinary PCM equipment—although it eats up a lot of chan-



nels and bandwidth—and you can edit it using existing technology. And if you want surround you just lock more machines up where with DSD it's a bit more awkward while we're waiting for the gear to be fine-tuned.'

Faulkner evidently expects the wait to be worthwhile since, on top of the innate increase in quality offered by DSD, he sees the restoration of the 'professional headroom' that CD took away. 'That he is relieved to have a higher-resolution system than the domestic standard is unsurprising, but his enthusiasm for its editing possibilities may surprise some classical purists.'

'If some postproduction is needed then we've got more resolution to play with' he agrees. 'As it happens we've never EQ'd or put echo on to anything of Marc's, but some artists like that; when we did Kissin's *Moonlight* CD last year he decided he wanted quite a lot of echo put on it and we were able to do it without losing the quality. If you start off with 16 bits at 44.1kHz and the producer says, "I want it compressed, then I want you to roll some bass off and put some echo on", by the time you've gone through all that digitally

you're probably down to a 12-bit recording and it sounds fairly crummy. If you start off with the highest practicable resolution, any meddling you have to do will have less effect on the transparency of the finished recording.'

'Half of this recording will be done in a different venue—it will be recorded in Bristol in October. If, when it's all put together, somebody says it sounds great, but the stuff in Henry Wood Hall sounds a bit more boomy, is there anything we can do? If taking half out at 60Hz and starting out with a high-resolution recording means that it won't collapse into a 10-bit recording then we can maintain the quality.'

With certain commentators targeting the limitations of the implementation of 16-bit, 44.1kHz digital audio over the value of higher-definition standards, it is interesting to note the comments of one of classical music's most successful practitioners. Having been closely involved with certain of the manufacturers seeking to maximise the performance of the existing CD standard, Faulkner is ready to welcome the completion of the SACD chain.

'The one thing that really interests me about SACD is that, when we do sessions for higher resolution than 44.1kHz, 16-bit and we go to all the trouble of editing it, what goes to the CD factory has to go through at least one generation of 16-bit,' he laments. 'I always wanted to be able to take the high-resolution player into the cutting room and cut directly from that, and the SACD package for the Red Book layer includes that very option so when they cut the Red Book layer they cut it from the high-resolution source material.'

Faulkner is further concerned over the mastering media currently in use. 'Digital tape is a lot more lossy than we're led to believe,' he complains. 'We've tried recording DSD using tape, and the amount of error concealment that goes on in a 24-track, ADAT, DA-88 or DAT is far higher than you'd think. And DSD is obviously very intolerant of that—either the data's right or it isn't, and as professionals we should be glad of that. That's one of the advantages to me of moving on to a new carrier—just getting away from error concealment will give a greater degree of listening pleasure.'

As Andrew Keener directs Marc-André Hamelin's prodigious performance of a left-hand only étude, and Tony Faulkner marks successive takes on his DSD workstation, it is easy to understand why they should be eager to see the back of the 16-bit, 44.1kHz CD standard. And it is difficult to see why they should not get it. Whether or not DSD and SACD are the answers to their needs remains to be seen, but with the weight of Sony and Philips behind them and the complicity of such talents, you would be ill advised to bet against them. ■

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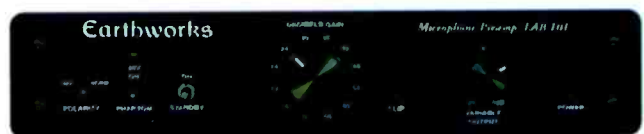
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UNTIL NOW I have avoided delving into the specific technology employed to achieve IT-style networking because I do not believe it is relevant or useful to professional audio. While there is a temptation for manufacturers to promote the relative merits of various technologies for connectivity, the important questions remain: what problems am I trying to solve; is networking going to solve them; what about likely future requirements; and what effect will my chosen solution have on the bottom line of my balance sheet? Yet I can no longer avoid looking into some of this technology since they all make great play of the particular networking architectures they employ.

Digidesign supports several different networking options based on Ethernet and Fibre Channel Technology, and Ethernet networks have been used quite extensively with Pro Tools systems. At first, Ethernet backbones were simply used as high-speed data conduits in order to copy audio from one Pro Tools station to another. With the release of Pro Tools v4.0, auditioning files across an AppleTalk network became possible with Pro Tools 24 and Pro Tools III systems. Network auditioning allows you to preview one or two channels of audio before importing a file directly into Pro Tools. In addition to Pro Tools' own audition and import functions, Gallery Software, a Digidesign Developer, offers SampleSearch, which allows you to search extensive storage devices, such as CD-ROM effects libraries, audition selected files, and import those files directly into a Pro Tools session.

Digidesign believes the future of digital audio networking lies in Fibre Channel solutions. Fibre Channel, or FCAL, (Fibre-Channel Arbitrated Loop) allows multiple Pro Tools clients to access the same audio files and/or session files simultaneously across a network. Centralised Fibre Channel storage, or Shared Storage Network (SNA) as it is sometimes called, eliminates the need to redigitise copies of audio for multiple Pro Tools users working in parallel on a project. Digidesign claims the benefits of this are immediate, especially for those companies that have short, mission-critical production cycles such as news, advertising and promotions. Fibre Channel also allows Pro Tools workstations and Media Composer systems to centralise audio file storage and use a single copy of a project on one storage subsystem, rather than multiple copies residing on local hard drives. Fibre Channel drives appear to a Pro Tools workstation as standard SCSI devices. Digidesign is currently testing the Avid MediaShare FC system with Pro Tools 24. In addition to Avid's storage division offering, third-party Fibre Channel solutions are also selling into

## Net gains: 3

In the third and final part of his evaluation of digital audio networking solutions, **Rob James** investigates the networking of software-host workstation systems

the Pro Tools community.

Fibre Channel offers several more advantages over local storage: administrative security, fast throughput, and hot swappable connections. File security allows an administrator to set the privileges for each individual user. As the user logs on, the administrator can control which volumes the individual user sees and the level of access (read-write privileges). In addition to access control some Fibre Channel solutions offer built in Project Management features as well as bandwidth limiters on larger networks. As previously noted, Fibre Channel's 1.3Gb/sec throughput capabilities allow Fibre Channel volumes to be used as on-line record-playback drives for Pro Tools 24 systems providing from 1-64 tracks of recording and playback. Furthermore, hot swappable connections allow drives or users to be added without bringing down a network.

Fibre Channel is still in the introductory stages, but, according to Digidesign, offers the promise of Fibre Channel switches (fabric switching), FCAL Bridges that will allow you to use existing storage media in a Fibre Channel environment, and the capability to bridge across different OS file architectures. Fibre-Channel also overcomes a Pro Tools limitation—in order for Pro Tools to use network volumes or centralised storage as a record-playback device, the volume must appear as a block level device when mounted on the Pro Tools workstation. Standard AppleTalk or Novell NFS volumes do not appear as block level devices. This means DAE (Digidesign Audio Engine) is unable to arrange the data in the

proper order for Pro Tools and subsequently prevents users from even attempting to use the volume as a playback device.

Merging Technologies has introduced a way of sharing material between their Pyramix workstations known as AudioShare. The approach is a 'serverless' one, that the company believes eliminates the biggest single expense and single biggest risk. The IT industry has always had two types of networking: networking that connects machines together and networking that connects devices (storage) to a single computer. The inter-machine networks (such as Ethernet) are suitable for a large number of users over a good distance (300 or more feet), and at good (for typical 'office' requirements) transfer rates (0.3Mb/s effective). The device connections, on the other hand, provide very fast transfer rates (greater than 20Mb/s), but over very short distances (six feet or so), and with only one computer attached. Another important distinction is that inter-computer networks made an assumption the media would often introduce errors and thus the protocol had to be robust to compensate which introduces processing and bandwidth overhead. Disk networks assume the media to be virtually error-free and can exploit a significantly leaner protocol, further increasing their speed.

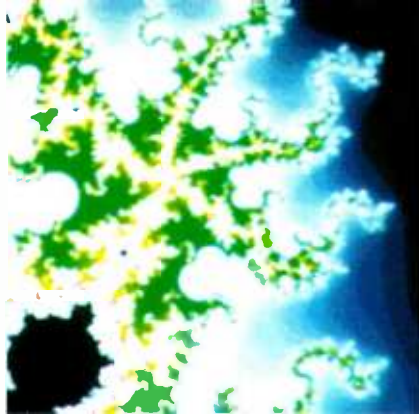
In the past year or so, a new disk-connection technology, Fibre Channel, has been introduced that offers increased distances (10km in glass), super-high data rates of 100Mb/s, and lightweight protocols. These components have finally become available as commodity items, and thus the price >

< is comparable to a regular DAW station's SCSI adaptor and drives. This sounds good, but there are problems which arrive with attaching several computers directly to the same set of storage. Computer operating systems were never designed for this type of topology: the assumption is that servers are attached to disks on one side and to other computers via networking on the other. Removing the server means there is no overall control and management.

In a regular server-based system, regardless of how many clients are connected, the entire disk I-O ultimately funnels through the single server and the single operating system. Thus, there are relatively few problems managing access to storage. In a 'shared-storage' system, the control of data flow from disk becomes critical, errors will result in the corruption of data. The fundamental reason is that each client host sees the entire network of storage as local, and thus opts to cache data freely. To the Data Processing (IT) community the complexity of solving this problem does not outweigh the benefits. However, for the audio-video industry, there is no suitable technology available.

What is needed is a layer of software that synchronises the access to storage between all the hosts involved. Given the existence of such software, it is possible to have very high-bandwidth access to a shared pool of storage, without having a 'master' server. Merging Technologies claims to have addressed these issues with AudioShare. It is a disk-sharing technology that allows several operators to use the same audio and is claimed to be less expensive than removable disks or other technologies. It enables disk sharing by making available, to each user, every storage device or devices selected on a per-workstation basis. Scaling is achieved by adding bandwidth, and to do so in a disk-sharing topology is generally a linear cost increment. The server-type approaches on the other hand can be extremely costly to scale. The use of a switch or multiple switches can increase the bandwidth or number of devices even further (up to 16 million devices). With a switch, the bandwidth is not shared and every I-O port of the switch has the full 100Mb bandwidth.

There are two typical modifications added when scaling is needed: the use of hardware-based RAID-3 storage and the deployment of Fibre Channel switches. Using external hardware RAID allows a set of drives to produce a steady stream of over 70Mb/s of data. This also lightens the load on the workstation CPUs and offers the added protection of parity storage (should one drive die, the others can recreate the missing data on the fly; thus, no real data loss is suffered). The cost of an external hardware RAID system is not really an issue; once an application-



In a regular server-based system, regardless of how many clients are connected, the entire disk I-O funnels through the single server and the single operating system

requires a couple hundred Gigabytes of storage or more, the cost of the RAID controller is quickly amortised over the cost of the drives and the enclosures.

The next way to add power to a scalable system is through a switch. A Fibre Channel switch allows any and all pairs of connections to be simultaneously active (as opposed to a hub where only a single conversation can take place at a time). A configuration that has three workstations and three data sources (three drive towers) could potentially have 300Mb/s of real performance. Certainly, separate drive towers can be software-stripped together to get even higher performance than a single drive system (140Mb/s and up). A single workstation will not need 140Mb/s of data, but the sum total of workstations accessing that material will demand such performance.

It is difficult to state specifically at which point a given approach would not work, and thus when to switch to a different topology. One site of 12 users may work perfectly well with the use of Fibre Channel hubs and software-stripped drives. Another site of eight users might need to use a switch instead of a hub. All of this depends largely on the expected number of simultaneous accesses. Facilities of different sizes and operational situations will benefit differently. Every facility will immediately derive some value from shared storage, and that value will grow rapidly as the facility learns how to exploit the technology and as the market develops new tools for it.

Studio Audio & Video's SASCIA network is claimed to be completely transparent to the users of multiple connected SADIes. Further, Studio Audio claim no knowledge of the IT side of networking is required to gain the benefits of the technology—a SADIe user can use a networked system as easily as a stand-alone unit with no addi- ➤



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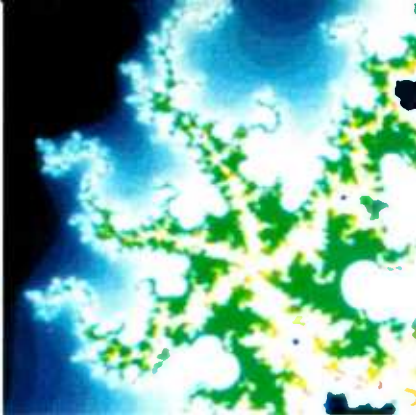
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ditional training. SA&V has clearly considered the management problem—for example, a user can start a project on one system and designate which other users should be allowed to contribute to or participate in this project. This selection can be made from a list of all potential users or from predefined teams of users. Once the project is started in this way, all other networked users are excluded from accessing the material contained within that project. Members can also be given different access privileges so that only a project leader or system administrator can delete source material for example.

When the user saves the current state of the project onto a network drive, all other members of the project can access the same edit lists, clipstores and audio material. Subsequent users may record more audio material onto different drives, but the project management software within SADIe will log only the relevant drives that contain the source material and give access to all the relevant edit lists. All audio can be replayed across the network in real time or can be copied to a local disk if more convenient. Projects can be nested within one another so that a number of contributors could all be working simultaneously on individual elements or scenes of a larger project.

Due to the scalable architecture employed with the SASCiA network, there is no theoretical limit to the number of SADIe users that can be on-line at any one time. The underlying design, using a 155Mbit/s ATM (Asynchronous Transfer Mode) fabric allows the network to grow almost *ad infinitum* by using multiple paths between crucial hubs. Each individual path can carry 80 to 100 channels of real-time 16-bit audio though the network is not limited to any particular sample rate or bit resolution, any part of the network infrastructure can carry over 100 channels of real-time 16-bit audio simultaneously.

In practice, the physical bandwidth limitations of the storage media



Due to the scalable architecture employed with the SASCiA network, there is no theoretical limit to the number of SADIe users that can be on-line at any one time

becomes the critical factor. If 30 users tried to access the same audio data from a single drive simultaneously, a single drive would be incapable of delivering the audio. In large installations the network may well require RAID drive arrays to support it and some clever administrative network management to ensure the bandwidth is not exceeded.

ATM is compatible with most of the telephone service providers which raises the possibility of opening up wide area networks using SASCiA.

These particular manufacturers are not alone among the PC-Mac hosted DAWs in offering networking solutions, they were just the most forthcoming with information. That said, what characterises their proposals and differentiates them somewhat from the majority of 'hardware' DAW manufacturers is this: the emphasis placed on the particular technologies and topologies employed. I can only repeat my warnings about the seduction of elegant technology, I admit to having been guilty in the past and even now I am having great difficulty restraining myself from com-

ing down on the side of a particular technology.

The important elements of all these solutions are the ones which takes up the least space in the manufacturers proposals—the real world capabilities and management and security strategies. This is a little ironic as the basic networking hardware and software is available 'off the shelf' and is not proprietary to the DAW maker. There is, in fact, nothing stopping anybody 'rolling their own' networking solution for most of the PC-Mac based DAWs, and many people do just that with results that vary from solid and useful to flaky and dangerous.

The clever bit is the design of software which integrates the networking into the whole philosophy of the particular DAW and from there to the production process. Not forgetting all the security and administration issues. If you are seriously considering a networking solution to an existing problem it is these areas you need to concentrate on. It is going to be unnecessarily difficult for specifiers to arrive at the right decisions for their particular needs until all the manufacturers can present networking in the same way as other audio and video products—relating what they are offering to real-world processes or suggesting new ones. The facility manager should be able to concentrate on the design and integration of such processes to improve quality, efficiency, convenience and perceived value. It would be most helpful if the emphasis moved away from the underlying technology to avoid 'blinding the users with science'.

Networking is, potentially, the most significant development to arrive in the audio and video market for many years. Unfortunately, like the Internet it is shrouded in mystery, hype and sheer bull. The real promise of both still exists more 'in potential' than in reality. As some early adopters have discovered it is possible to waste a vast amount of time and money for little real benefit. ■

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# White Island

Sun, sea, surf, radio. **Kevin Hilton** reports on BBC Radio 1's largest ever outside broadcast at multiple venues throughout the sensational, party island of Ibiza

**I**BIZA IS ONE OF THE MOST widely recognised names in modern cultural society. It conjures up images of hedonism, excess and all-night partying, bound together by the leading DJs currently working on the club scene. It is a focal point for all serious clubbers, particularly those from the UK, and, as if to underline this, BBC Radio 1FM broadcast much of its live output from the White Island, as it is known, over the cusp weekend between July and August. It was the biggest outside broadcast the station had undertaken at multiple venues so far away from home, and ensured Ibiza maintained a high profile over the summer season.

This profile went through the roof when, at the end of August, the British consul on the island, Michael Birkett, resigned his post, saying he was ashamed of his country's tourists. The newspapers in the UK leapt on the story, but it has to be remembered that Ibiza has had numerous incarnations during its history and currently there are two

very distinct sides to the White Island's nightlife. Situated off the western coast of Spain, Ibiza is one of the autonomous Balearic Islands—with Majorca, Minorca, Cabrera and Formentera—and was originally a Moorish kingdom.

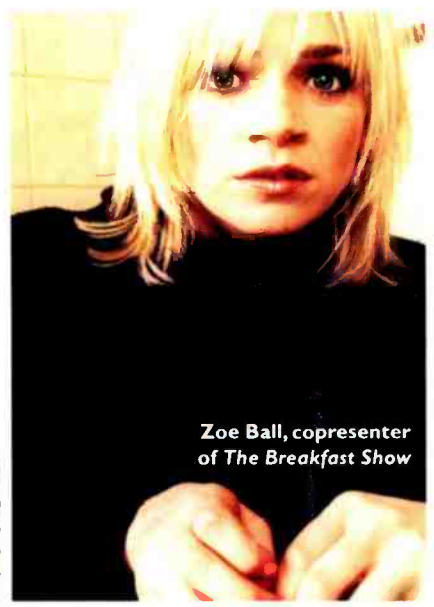
Under General Franco's benign leadership, the island was forcibly developed: concrete boxes masquerading as hotels were built, together with airports, and the package holiday boom began. Of the 1.3 million people who visited Ibiza and Formentera in 1986, around half were British. This is one side of the modern Ibiza: drunken tourists wandering around the West End of San Antonio, a former fishing village, shouting, vomiting and annoying the locals. The other side was created in the eastern districts of San Antonio during 1987 with the arrival of DJs Paul Oakenfold, Danny Rampling and Nicky Holloway, who helped pioneer the new dance boom, attracting in excess of one million people—again half of whom are Brits—to come and dance all night, drink water and take E.

The Ibizan club season now runs from the end of June to mid August and the music has entered the mainstream, with early pioneer Danny Rampling a key part of RI's new line-up. The station made its first trip to the island two years ago, when it broadcast for a total of ten hours over 2½ days, a schedule it repeated in 1997. This year it was extended to a full 3-day weekend, cramming in 43½ hours of live broadcasts from four venues: three of Ibiza's leading clubs, and a spe-

cially constructed studio in a villa overlooking San Antonio.

But first the BBC Resources OB team had to get there. While clubbers, DJs and musicians can travel light and fly into Ibiza, heavy radio equipment has to go by road.

A convoy of three vehicles—a B-Type OB truck, with a 40-channel Calrec GP desk pulling a trailer, a mobile VSAT unit mounted on a Peugeot van and a Peugeot Boxer full of equipment—left London on Saturday 25th July, driving down through France, reaching Barcelona on the Monday to catch the ferry for Ibiza on Tuesday.



Zoe Ball, copresenter of *The Breakfast Show*

PHOTO: GILL FLETT



Kevin Greening presenting *The Breakfast Show* from the terrace of a villa in a secret location. Using a Denon DN961FA CD player and a Denon DN981 Minidisc player

Despite the high-tech holiday image of the place, some elements of the Ibizan way of life are still stuck in the pre-Franco redevelopment days. The crossing was made on what Richard Earle, the sound supervisor who co-ordinated the OB, working with executive producer Pat Connor, describes as 'a crate'. To while away the 9½-hour journey, Earle and his colleagues were entertained by videos of *Back to the Future* (in Spanish) and a poorly tracking copy of *Jurassic Park*. >



Lisa l'Anson, presenter of Ibiza Weekend

PHOTO: MARC VAN LINGEN

< This translated itself into other, more immediate problems once the BBC team arrived on the White Island and made their way to the villa. 'The biggest problem on Ibiza is the poor conditions of the roads,' explains Earle. 'Once you're off the main routes, you're faced by cart tracks and our driver, Paul McCann, had problems finding a place to park the B-Type.' On the Wednesday, technical shortcomings came to the fore: although VSAT was the preferred method of getting signals back to London, ISDN was necessary as a backup, and for any transmissions that were not using the satellite.

'We cruised round the venues, checking that everything was okay,' says Earle, 'and although we had one ISDN 2 connection at the villa studio, one at Cafe Mambo and two at Bar M [which had been ordered independently by the owner], we didn't have what we had asked the promoter, Manumission, for at Privilege—Spanish Telecom had run

The poolside live-performance area with the back view of Shovel from M People about to contribute to *The Breakfast Show*

out of ISDN on the island.'

With live broadcasts set to start with Jo Whiley's Friday midday show, the remainder of Wednesday was spent rigging Bar M, with the villa studio constructed on the Thursday. In temperatures of between 35 C and 36 C, the crew unloaded 2½ tonnes of equipment to create a continuity suite, DJ and performance areas and an edit room. 'I think that each of us drank two or three litres of water,' laughs Earle. 'Everything takes so much longer in those conditions, but we fixed the VSAT link for the villa and put everything else in place. We had an ISDN connection there, but we wanted to save money on international calls by using VSAT, which was on our own link.'

This villa is often rented out as two buildings, as one section built on top of the other. The upper portion includes the terrace and swimming pool, where a customised 16-channel submixer of the main DJ desk was built. Like the majority of BBCOBs gear, the consoles were Glen Sound, in this case augmented by an SPX 1000, a rack of BSS compressors, foldback, and some PA

gear. This played host to Hinda Hicks on the Saturday, and the Lighthouse Family on the Sunday. Also on Saturday, Jocelyn Brown sang live to backing tracks at Cafe Mambo during Danny Rampling's show. The pool area provided an obvious backdrop to Zoe Ball and Kevin Greening's Breakfast Show, with lots of wild and wacky stuff of people being thrown into the water.

The main continuity studio, run by sound supervisor Stuart Veasey, with Kevin Long, was built in the lounge of the lower part of the villa, with the main DJ desk out on the covered balcony, overlooking what Earle remembers to be a 'fabulous view of San Antonio.' The continuity suite housed two 360 Systems Short-Cut editors, both with external MO drives on a SCSI connection. These 540Mb devices give 20 minutes of storage and enabled material to be moved around, not only between these two units, but also a third Short-Cut in an edit suite, set up in one of the bedrooms.

This room was further equipped with a SADIe hard-disk recorder-editor, that offered V.3 software, but Earle >



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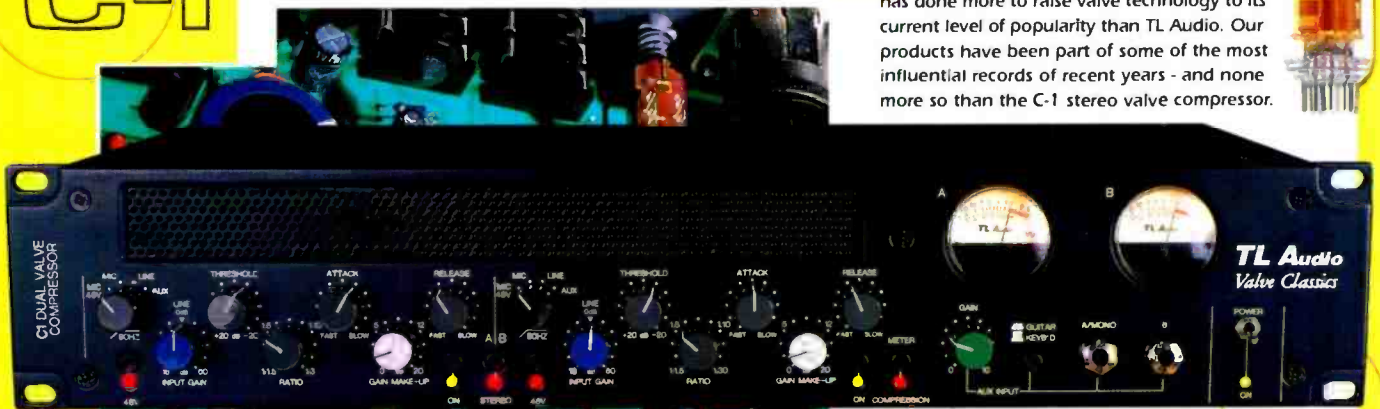
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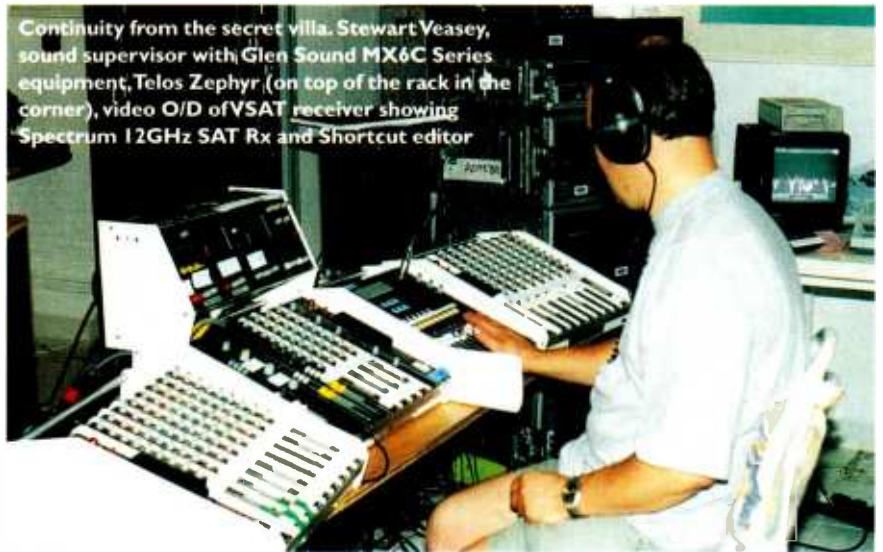
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< comments that most of the crew using it prefer V.2. MiniDisc and DAT machines were also installed, with microphones set up in the second bedroom for any necessary voice work. R1's current affairs programme, *Newsbeat*, and magazine show *The Net* took feeds from this facility, receiving material either by VSAT or ISDN.

All ISDN connections were through Telos Zephyr codecs using stereo Layer 3 MPEG compression. 'This is perfectly adequate for R1,' observes Earle, 'as we can get away with 128k.' ISDN digital 'phones were also used, with analogue converters, enabling the B-channel of an ISDN line to become an ordinary telephone connection, used for both conventional telephony and Internet communication for laptop computers. Aside from its backup function, ISDN was primarily used to receive cues from London during programme junctions, as the VSAT operates with a 1.5s delay.

All day-time programmes came from the villa, which was kept as a secret location. After 4pm, the emphasis was on location broadcasts from around the island at the three featured clubs: Cafe Mambo, Privilege (which many still call by its former name of Ku) and Bar M. At the last venue, splits were taken from the existing club mixer for transmission, while the desk itself was augmented with 'broadcast bolt-ons': CD, MD and a DJ mixer. In the evenings, Privilege-Ku becomes Manumission, named after the promotion company that organises club nights there. There are two rooms, one that can hold 6,000 people and features a swimming pool, the other a smaller space for chilling out, where Annie Nightingale hosted her ambient trip-hop show.

Earle and senior sound supervisor Steve Richards split the main desk here and installed MD players for jingles and a microphone, as there are usually no speech interruptions during a club DJ's set. A control room was built in what is normally the T-shirt franchise shop,



enabling R1 idents and any announcements to be mixed in without them being heard in the club itself.

At the smallest of the venues, Bar M, the DJ booth is not visible to the crowd, so it was moved to a balcony so that the DJs could get a good look at their audience and the audience could debate whether they, like most DJs, have good faces for radio or not. Moving the equipment outside was a good plan while everything was Mediterranean, but it was just before Judge Jules' *Dance Anthems* show on Sunday afternoon that the weather, which had been perfect up till then, finally broke. The skies darkened, leading many among the BBC crew to believe that the end of the world was nigh. As rain and gales lashed the White Island, the technicians only had two hours in which to re-rig and move the DJ desk back inside.

This was one of only four glitches during the whole weekend, two of which were technical, the other one artist-related. The first break in transmission came on Friday at the villa when the VSAT over-heated and momentarily shut down. There was a slight gap but everything was switched over to ISDN

in ten seconds, re-establishing the connection with London. At Cafe Mambo, the club's lights went down, which tripped out the breakers in the broadcast racks for around 20 seconds. The dead air was covered by the 'shadow DJ' back in London, who put on a filler track, from which the DJ in Ibiza just picked up from at the end as though nothing had happened.

The only other emergency was when Lisa F'Anson did not make it for her show, with Emma B having to step in.

After the rigours of the weekend — 'A bit more sleep would have been good,' Earle jokes — the Resources crew had the prospect of the ferry journey back to the mainland and then the drive up through France to London. On the journey back, they reflected that things had gone well, considering the number of hours they had broadcast. And the farewell meeting with the mayor and deputy mayor of San Antonio had gone well too. 'We had been worried about that but they were pleased,' concludes Richard Earle. Something that, if he had known about it, might have convinced Michael Birkett to stay on at his post as British consul. ■

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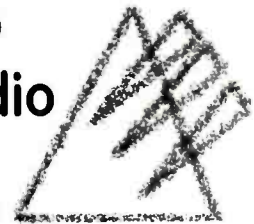
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**A** FEW YEARS AGO the ability to dial-up a high-quality sound circuit as easily as a telephone would have seemed incredible but it is now commonplace in broadcasting, and other areas of the audio industry are also finding further applications for this facility. This series looks at the telecommunications and audio developments that made it possible, the uses our industry is making of it and what users need to look for in products on the market.

Until about 1991, the opportunities for sending high-quality audio over distances were meagre. A 15kHz international analogue circuit could sometimes be booked in advance with BT in the UK, but this required a good deal of notice, was expensive, and was only available between sites already equipped with permanent wide-band local ends from a telephone exchange. Nationally, wide-bandwidth circuits were used by broadcasters to link their own studio centres and transmitters on a permanent basis, and frequently used outside broadcast sites had them. To bring in speech contributions from abroad the crackly old phone line was the principle means. The basic problem was that it was mostly radio that wanted to send high-quality audio over distances, and it was not worth the world's telecommunications providers putting facilities in place for such a small amount of traffic.

From the middle eighties the telecommunications infrastructure went digital. Thus between exchanges and switching centres all traffic went over high-capacity bearer circuits known by the then, Post Office as the Integrated Digital Network (IDN). At that stage it became possible for customers to lease a permanent 64 kilobits per second (kb/s) circuit known as a Kilostream between two sites. But this was not of much immediate use for sound transmission as digital audio then required over 1 Megabits per second of bandwidth using the linear coding techniques in use. Back in 1962 the first standards for digital telephony were set and decided on the use of 64 kb/s for the basic channel because at that time, using linear coding, this provided the 3.4 kHz that is adequate for phone calls—this standard being known as ITU-T G.711.

Then, in 1987 the French firm AETA released a coder-decoder unit that allowed 2-way 7 kHz transmission on a 64 kb/s circuit and they called it an audio codec. The 2 to 1 data-reduction system

References to the use of ISDN in audio operations are now commonplace: references on how it is actually done are not. **Jeff Cohen** begins an instructional series

it used is known as G.722, and is an international standard that had been developed in the US to permit high-quality phone calls for such applications as audio conferencing. The BBC immediately tried out connecting a pair of codecs at each end of a kilostream line between London and Sydney. It worked, and the World Service could then be fed to stations in Australia at a reasonable cost. And in the reverse direction news reports could be filed to London. It is a requirement of telecommunications, as opposed to broadcasting facilities that they are fully 2-way (duplex).

Permanent point-to-point digital circuits have some uses in the industry, but what was really wanted was a telecommunications service that could offer on-demand digital connections. This would support sound link-ups as and when required between any sites. It emerged that something known as the Integrated Services Digital Network (ISDN) was planned to do exactly this, but there was a lot of scepticism in the telecommunications industry that many customers would use such a service, and this led to all manner of alternative names such as 'Innovations Subscribers Don't Need'. Fortunately these voices were not given credence, in 1990 some trial ISDN lines were installed in the UK and broadcasters were among the first to try them out with the couple of makes of G.722 codec that were on the market.

So the marriage of data-reduction audio codecs and telecommunications services such as ISDN has produced the ability to dial-up audio circuits that can convey good stereo sound. But, as with

all things digital, there are complex matters that have to be addressed, and systems and standards can be involved.

ISDN is marketed widely and is the fastest growing telecommunications service in the UK, for example. It is fortunate that we can now get high-quality sound transmission using a general-purpose telecommunications service that is readily available. Put simplistically, ISDN can be regarded as being a conventional telephone system, but without the usual digital-to-analogue conversion that goes on at the telephone exchange for standard analogue phone lines. In this way it provides end-to-end digital calls between two ISDN subscribers, but can also support calls to standard analogue telephone lines. However, ISDN is more involved and a lot of work was required to design a sophisticated service that would yield the utmost from the old-fashioned copper cable that gives a customer's premises access to the telecommunications network.

ISDN is available in two varieties: Basic Rate Access (BRA), and Primary Rate Access (PRA). The majority of use is made of BRA (known by BT as ISDN2) which is delivered on the standard pair of copper wires that is normally used for analogue telephony and it supports two channels of communication at 64kb/s each. These may be dialled-up separately as calls to different places or, if required, both to the same one and the bandwidth combined to produce 128kb/s. The 64kb/s data streams are referred to as B channels, and in addition there is another channel of >

# Audio Over ISDN

< communication with the telecoms network operating at 16kb/s which carries the user's commands (dial-up, number called, hang-up, and so on) and it returns signals from the network (call connected, number busy, network congestion...). The D channel will also signal to the network what type of equipment is connected to the line. Thus when a special ISDN 'digital telephone' tries to call an old-fashioned analogue one the network permits a connection that allows normal phone speech quality—a voice call. But when an audio codec or other device requiring an end-to-end digital connection dials up what is known as a 'data call', the network will only permit a connection if it sees data equipment at the other end. In addition, some quite complex things are going on behind the scenes which involve defining different categories of

call, and ways of ensuring a call is answered by a particular device on the line when it arrives (fax machine, PC, video-conferencing equipment or audio codec. When ordering a line the telecoms provider will ask the customer about various features and supplementary services that may be required, but, in the main, the equipment used in our applications does not require them.

The equipment a customer uses to communicate with an ISDN line (the equivalent of the telephone instrument on an analogue line) is known as a Terminal Adaptor (TA), and these days they are generally built into audio codec equipment. One complication is that the protocols used by the D channel to communicate with the telecoms network vary slightly around the world. So when taking a codec abroad you need to first check that your equipment will work

there. Britain in line with most of the world uses a standard called Euro-ISDN, but North America, Japan, and Australia have several systems of their own. However, you can now often request Euro-ISDN to be provided and this is the case in Japan. Furthermore, the TAs in many codecs permit switching between national network protocols.

In a studio centre where many ISDN lines are needed, it may be practical and economic to use Primary Rate Access (or ISDN 30) which, as its name suggests, supports up to 30 B channels and is delivered over a coaxial cable, fibre-optic or microwave link. Thirty is the maximum number of channels supported on such a 2Mbit/s line but if you need less than 30 the customer can usually specify the actual quantity required and only rent this number, thus reducing the cost. The minimum normally being six channels.

An audio codec cannot be plugged into a Primary Rate line, but there are several different ways to work with PRA.

The first is to use a small ISDN telephone exchange that provides Basic Rate Access at each extension and this can also be used to derive ordinary analogue telephone lines. The alternative is use a special Primary Rate TA that provides variable bandwidth from 64kb/s to 1920kb/s by setting up multiple calls—a technique known as I-Muxing.

So the basic requirements to dial up high-quality sound are to connect together an ISDN line, a Terminal Adaptor and an Audio Codec. If the TA had not been built into the codec a data connection would have been required between them. There are various standards for data connections and these are usually provided by way of familiar D connectors you see at the back of computers as well as a few other multi-pin types. The principle data connection standards used with codecs are V.35 in North America and X.21 elsewhere. In most situations it is not necessary to know anything about these except where required to purchase the appropriate cable. Even where codecs come ready equipped with TAs they may also have a data connector at the back to allow for situations where the internal TA cannot be used. For instance when in a country using a D channel protocol not supported by your TA. In which case a locally procured stand-alone TA may be needed. It may be that ISDN is not available and some other type of digital line is provided. In all these cases it will be necessary to have an appropriate data cable.

ISDN is now operating in 55 countries around the world and is becoming commonplace. For instance, in Germany ISDN has become the normal way to provide premises with more than one telephone line. The use of ISDN to access the Internet has brought down its cost and increased its availability, but

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in some countries it is still only available in big cities. To be truly independent and transmit high-quality audio from literally anywhere on Earth there is the option to buy or rent a digital satellite telephone that permits data calls and plug this into the data connector of the codec. The Inmarsat system allows calls to be made which then connect on to ISDN lines, and radio news broadcasters use this facility a great deal. This portability comes at a cost that is its per-minute call charge of about £6, but the freedom it brings and not having to arrange lines can make it worthwhile.

Sending a fax is easy, and you know you can dial up and be compatible with any other fax machine in the world. So it would have been marvellous if audio codec technology had provided the facility for any studio to dial up any other studio's number listed in an 'ISDN directory' and send high-quality stereo audio to each other. Unfortunately, there is no such universal compatibility due to there being several standards for data-reduced audio and a few other technical parameters. So you have to check out the other end first of all so you know something about the equipment they have and way it is configured.

The term 'compression' is often loosely used to describe the process used to reduce bandwidth, but this implies that like a sponge when the process is completed (and the sponge is no longer compressed) you return to having the original. But with sound you are left with a small proportion of the original that provides the human ear with the illusion of sounding like the original. A more accurate term is 'data reduction' and it is the one used here.

The first audio data reduction standard of G.722 is still commonly used for news and sports contributions, but in the field of music, and for stereo, there are four principle systems.

MPEG is well known as a family of standards for audio-visual applications that was set by the Moving Picture Experts Group of the International Standards Organisation (ISO). It is the basis of digital TV and video over the Internet, but audio was the committee's first objective and MPEG1 was set in 1992 after trials hosted by Swedish Radio in Stockholm. Later augmented by MPEG2 which widened the range of data rates.

MPEG audio comes in three types known as Layers. Layer 1 coding being intended for use with data rates over 384kb/s, Layer 2 for 128kb/s to 384kb/s and Layer 3 below 128kb/s. However, improvements in the technology have allowed each Layer to now work with lower data rates than originally intended.

An ISDN2 line provides up to two 64kb/s circuits so the most common requirement is for audio coding at 128kb/s. This is achieved by both Layer 2 and Layer 3 coding. Layer 3 is somewhat more complex than layer 2 and

thus suffers from a processing delay of about 0.25s that can be problematic in some applications such as live interviews. Layer 2's delay being about 80ms.

There are two proprietary coding schemes in widespread use, Dolby and apt. Dolby offers two types AC-2 and a later refinement AC-3 which like MPEG Layer 3 offers improved performance at lower data rates and gives 15kHz audio bandwidth in mono at 64kb/s. The aptX-100 scheme offers mono 15kHz bandwidth at 128kb/s or stereo at 256kb/s. The apt system is different from MPEG and Dolby in not being based on psychoacoustic data reduction principles which exploit the way it is possible to fool the human auditory system using certain tricks. For instance we cannot hear quiet sounds close in frequency to loud sounds so they may be removed and we do not perceive

the difference. The apt system is based on Adaptive Differential Pulse Code Modulation (ADPCM) which is a purely engineering process. The significance of this difference in approach is in the contentious matter of signal degradation through cascading data-reduction processes. The experts disagree on this subject and practical trials seem to have produced differing results, but some claim that psychoacoustic methods are less resilient to repeated recoding.

By using multiple simultaneous ISDN calls it is possible to code at up to 384kb/s (three ISDN2 lines) with the equipment on the market, and experts agree, the higher the data rate the better the quality on a single or multiple pass.

In the next article the more practical aspects of using this technology will be explored and the features to look out for in purchasing equipment. ■

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# Team tactics



Studio A

**I**F FRITZ LANG had lived to require *fin-de-siecle* audio postproduction, he would have felt quite at home having it done at Geising-Team. The Mannheim-Industrial interior design of this Munich facility celebrates its first decade in business this year doing television, cinematic commercials, and promos for a range of clients, including international agencies such as BBDO, and film studios Disney, Columbia and Deutsche Condor, and large-screen filmmaker IMAX (for which Geising-Team did almost all of the German synchronisations and the latest German mix of the film *Mount Everest*). The facility is appropriately Spartan in appearance, but with a distinctly Bavarian tinge: exposed ducting and *faux* cinderblock walls are introduced by a streamlined lobby-cum-kitchen where the aroma of whatever eclectic dishes the staff chef has dreamt up leads clients to the modest doorway and minimalist signage that might otherwise look like any other discreet, upscale boutique catering to the

The successful Munich-based Geising-Team celebrated its 10th anniversary recently.

**Dan Daley** visits an all-Fairlight postproduction facility grown on commercials

affluent denizens of the tree-lined Rahlstedt neighbourhood.

Inside, in contrast to the exposed ducts and concrete motif, a more familial atmosphere presides: two or three (no one seems quite sure how many exactly) local, friendly mutts lay quietly on the floor or cavort across the hardwood floor in play. It is not what you might expect walking into a leading-edge audio postproduction facility, but, says co-owner and chief engineer Thomas Froschmaier, it takes more than it once did to stay competitive these days.

'The clients have become quite

sophisticated,' he observes. So has Geising-Team, which has won a single-spaced page's worth of national and international commercial awards, including a Gold at the International Advertising Film Festival. Named after the studio's previous location, in that section of Munich before it moved to its current site two years ago, the postproduction and sound design facility is on its fifth Fairlight MFX3plus workstation. Just adding its second system a few years ago immediately underscored the need to network the facility's audio systems, he says, a need that has grown as the studio has. Froschmaier is awaiting the impending release later this year of Fairlight's MediaLink Windows-NT-based central server system, that was being beta-tested in two studios in Tokyo and Los Angeles over the summer. In the meantime, he and his crew of mixers and editors use wired access to a central machine room (quite literally central: it stands like a blockhouse in the centre of the facility's main floor)

October 1998 **Studio Sound**

which houses the Fairlight engines, Beta-SP and digital Betacam video decks and a complex patch bay that allows routing of the large sound effects library the studio has built up, comprised of outside and in-house effects sources.

While there is networking between each studio for a client booking database, Geising-Team has a not-uncommon methodology for databasing audio: daily backups of each workstation and a once-a-week archiving sweep of the five Fairlight hard drives. When projects need retrieval for updating, they use what US facilities have come to call the SneakerNet: assistants hurrying between studios with files on drives for uploading. 'We could always get 20Gb more hard drive space for each machine,' Froschmaier remarks. 'But I think we prefer to wait for the Medialink.'

While individual mixer-client relationships are important, Froschmaier says they do not take on the cult status that is common in Hollywood film post and New York commercial post facilities, where clients have been known to follow mixers from one house to another in mid-project. Rather, the 'team' in Geising-Team is the attraction,

with the facility's five virtually identical audio suites (one of which, Studio A, is a large film mixing studio equipped for matrixed Dolby Stereo and Dolby Digital; audio suite Studio E is equipped with Dolby Surround) allowing projects to move seamlessly between rooms, with the same acoustics and workstations in each one. Two Mackie 32-bus consoles work with a Yamaha O2R desk, an Amek Big, and a heavily modified Soundcraft TS-24 (referring to the desk's various homemade EQ and bus mods, he jokingly calls it 'more of a 'Handcraft' console') with PicMix modular monitor matrix, is a carry-over from the previous facility.

'Some clients have a personal preference for certain mixers,' he says, 'but mostly they want to know that the project is proceeding steadily and properly. They don't need surprises—that's another reason we chose to have all the same workstations—we get the highest level of compatibility you can get that way.' Monitoring is also common in all rooms—Genelec S30 speakers, with JBL cinematic speakers in the film mixing studio—and it is not unusual for the same project to be undergoing multiple aspects, such as sound effects and dialogue editing,

simultaneously. The Fairlight's inclusion of OMF file interchange also allows it to work with Mona Davis, a Digidesign Pro Tools-equipped commercial music production company that camps out in the building as Geising-Team's symbiotic tenant, developing music and effects which help attract new business to the post facility and which provides Geising-Team with another service to offer its clients. Says Froschmaier: 'We always have additional producers or directors and others in our productions, who help the clients to realise their creative ideas, while the sound engineer is able to concentrate on technical things. Those producers are an important part of the team and the studio-client relationship.'

Froschmaier is quite content working in a 16-bit environment, which he says is more than sufficient for television and film commercial work. 'You still have a 96dB dynamic range and you're only using 10dB of it in commercials half the time,' he notes. 'I don't see us switching to 20 bits when it becomes available. Though, perhaps, for cinema commercials it might become something that producers will want.'

Another network that Geising-Team plugs into is digital telephone line >



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< remote work. Using its apt system, Froschmaier says that increasing amounts of the studio's work are done in conjunction with other German post houses, sending celebrity voice-overs back and forth for regional spot work. There is, he adds, enough work to go around in the country that competition, while present, is more collegial than cut-throat, a reflection of how the expansion of European broadcast and cable networks has spawned a boon in post-production to meet its growing content demands. Froschmaier, who started the business 10 years ago with his partner, producer Olaf Mierau, adds that when the studio changed location two years ago, it was to accommodate what was then a 100% increase in business, a trend that has not stopped as the facility has grown to five rooms. However, Germany is not the extent of the company's ambitions: Froschmaier says they plan to found US division, GT Sound-Munich, as a joint venture together with Los Angeles company: Alexander Bubenheim, MAID Music, sometime around the end of the year.

But Froschmaier still believes that there is far more headroom in German audio post still to come, particularly from a new generation of independent filmmakers, some of whom Geising-Team works with in conjunction with a nearby school of visual arts. 'Film is becoming more of a factor in the German entertainment industry, particularly independent films done by young German directors,' he observes. 'Combined with how much commercial work is now being done for cinema, I expect that there's a lot more growing to do for us in the future.' ■

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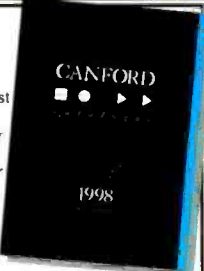
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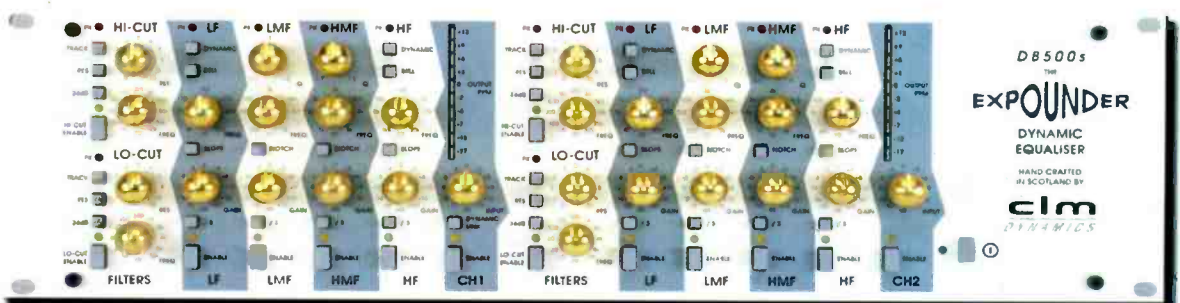
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## US: Hot 'Lanta

Atlanta, often overlooked as a US musical stronghold, could soon lead the way due to a new style of A&R writes **Dan Daley**

**T**HEY DON'T TEACH geography in American schools anymore, which is why most US kids could not find France on a map in a well-lit room. But there are some subtleties of geography that cause understandable mistakes. Last month I wrote about how Nashville is changing, and those not familiar with the South-east region often lump Nashville and Atlanta into the same category. To set the record straight, Atlanta is a city of 3½ million people (versus Nashville's half-million or so) located 250 miles south-east of Nashville and an entire universe away. The two share nothing but relative proximity—not culture; not heritage; not music; certainly not cuisine, of which Atlanta has much and Nashville little.

But they do share opposite ends of a perceptual spectrum. While Nashville labours under the misconceptions associated with country music—lack of shoes, teeth and so on—the city is at least regarded as having a music business to go with its music. Atlanta, on the other hand, has long been characterised as a city full of music, and no music business to go with it. Let us put that misconception to rest, because as Nashville's hyper-inflated star painfully condenses back to realistic proportions, Atlanta's has the opportunity to rise to its true potential.

Atlanta has always been a music city, though it might have acted as the mothership more than the cradle over the years. When the Muscle Shoals sound waxed in the sixties, it drew as much from Atlanta as from Nashville in terms of money and musicianship. One of the capitals of Black cosmopolitanism in the US, Atlanta retained an African-American gravitational core even as Blacks and Black music moved north to New York, Chicago and Detroit in the sixties and seventies. It is worth noting that, while New York has been the pulse centre of Hip Hop, and LA pretty much took over Rap when that genre went Hollywood in the nineties, Atlanta never stopped being the *de facto* capital of R&B. Bobby Brown, Whitney Houston, Jermaine Jackson and others record there regularly, making records that define contemporary R&B.

Atlanta was also the map identifier to the world for its southern neighbour Macon back in the seventies when Southern Rock ruled the charts and airwaves. Bands like the Allmans, 38 Special and Lynard Skynrd used the region as their stomping grounds, and rock continues to be represented in the area by acts like REM and Matchbox 20. In short, Atlanta has managed to hold onto a very diverse spectrum of American musical styles for decades. Its tree trimmed with a few glit-

tery baubles from the world of Pop, most notably Sir Reginald Dwight, who owns a football team in Manchester and lives in the Buckhead trendy neighbourhood.

Now, let's get down to business. The reigning canard is that Atlanta has music but no music business, right? The industry remains hunkered down in New York and Los Angeles, with country music running its own business operations more or less autonomously in Nashville. This is true, but only if you overlook a fundamental change that the larger music industry has undergone in recent years: there are no more A&R departments, except in name. American major record labels rarely develop their own new talent anymore; instead, they use 'cheque-book' A&R: find a hot producer or DJ-remixer, give him a half-million bucks and let him bring back four or five records for you to market and distribute. If this relationship proves successful, give him his own label and fund it. Voilà—instant A&R.

Accepting this as the new model of A&R, then Atlanta is ready to lead the pack. Over recent years, it has attracted a surprisingly deep and very successful collection of the very sort of producer-auteurs, including R&B hit-makers Jermaine Jackson and Dallas Austin, as well as rockmeisters like remixer Brendan O'Brien (Foo Fighters, Pearl Jam) and Matt Serletic (Matchbox 20, Collective Soul).

What does this bode for Atlanta's studio community? One of the by-products of Atlanta's development is that it now hosts what is likely the world's largest collection of upscale personal studios, many of which are in the high-priced gated communities of Atlanta's elite and which thus like to keep low profiles.

## Europe: Digital duelling

DVD Audio has encouraged discussion writes **Barry Fox**

**W**HEN MICHAEL GERZON DIED in May 1996, his partner on many projects, Peter Craven, predicted: 'What Michael was doing now, the world will want in 30 years time'. Gerzon worked with Craven and Peter Fellgett on Ambisonics. The system was mishandled by Britain's NRDC quango, now the British Technology Group, and is now largely forgotten. But it will be rediscovered, as DVD Audio creates the storage space needed for surround with height.

Again with Peter Craven, Gerzon wrote the theory for noise shaping. His last work was for the voluntary industry group, the Acoustic Renaissance for Audio. Recent events ensure that his theories on lossless compression will steer the future of audio in the next century.

Shortly before Gerzon died, Bob Stuart of British hi-fi specialist Meridian, and the ARA, set up a small spin-off company with Gerzon and Craven. They had filed their first patent application on lossless packing a year earlier, so luckily all the seminal work had been done when Gerzon died. Stuart had already seen the potential value of their technology.

Earlier this year, after meetings at the Stereophile show in the USA, Dolby agreed to licence the system and Stuart suggested

Meridian Lossless Packing, or MLP, to Working Group 4 of the DVD Forum. WG-4 has been setting the standard for DVD Audio.

The record companies had specified 74 minutes and 6-channel surround at 96kHz sampling with 24-bit linear coding. The only way to achieve this is with compression. When WG-4 discovered that the compression could be lossless, with nothing thrown away, it wrote MLP into the standard.

The breakthrough came when Michael Gerzon saw that the audio waveform can be predicted, much like the prediction process in MPEG video compression. There are still some errors, so the coder also sends a signal which identifies the difference between the predicted and actual waveforms. This can save at least 50% of the bits. The saving is greater when the sampling rate is higher because there is less useful data in the bit-stream for audio over 20 kHz. MLP extends DVD-Audio playing time to 89 minutes for 6 channel surround, 230 minutes for 2 channel stereo, and 125 minutes at 192kHz.

MLP could also expand the capacity of a conventional CD, to store 4 channels or 24-bit code. But this is unlikely because it would break the CD Red Book standard. The real

value of MLP is for new formats, like DVD-Audio, which are not yet on the market. MLP would also be ideal for solid-state recording.

The decision by WG-4 has gone down like a lead balloon with DTS, the Californian company that has been lobbying the DVD Forum to make a variation of its cinema system mandatory for DVD-Audio. WG-4 rejected the DTS proposal when it adopted MLP.

DTS' vice-chairman and chief executive officer, Dan Slusser, wrote a letter to Bike Suzuki, of JVC, in his role as Chairman of the DVD Working Group 4.

'The standard as adopted now is based on clearly improper and false assumptions, procedures and information', wrote Slusser. 'We have retained a prominent law firm to review the procedures... and they have concluded that DTS has substantial legal claims, including anti-trust claims, with appropriate treble damages and injunctive relief which result from the actions of WG-4 in selecting only the Dolby/Meridian system as the mandatory standard'.

DTS wants to become 'part of the mandatory standard and included in all of the hardware from day one', and believes it could 'secure an injunction and ultimately prevail in a court of law'.

'We have no desire to participate in litigation,' says Slusser, 'however, if it becomes our only option I would then have no other real choice'.



Serlitic is in the process of building a fairly massive facility, but one intended primarily for his own personal use. L A Reid continues to operate La Coco, though its future is reportedly tentative. A string of poor business decisions by bad boy Bobby Brown put his Bosstown studio into bankruptcy, from which it was promptly bought out by Ocean Way's Allen Sides and House of Blues' Gary Belz, who were still uncertain whether they would operate it as a studio or simply flip it for the real estate and equipment value. Some studios, such as Triclops, have retreated from commercial ventures, citing an uncertain market. Others though, such as Tree Studios, have expanded dramatically—owner Paul Diaz has built the first world-class room Atlanta has seen in decades, with an SSL-G plus—or are planning to, such as Purple Dragon (a favourite haunt of the aforementioned Sir Reginald).

In short, Atlanta's studios are in limbo as the business of music evolves around them. The very producers who now act as surrogate A&R departments tend to build their own facilities. But personal studios can't handle every contingency, especially for live recording. And Atlanta's rising profile will very likely bring in other journeyman artists and producers who will use Atlanta's commercial rooms. If the new music business paradigm holds true, Atlanta will not turn out to be merely a stop along the finicky route of pop culture, like Minneapolis and Seattle were. And while studios will always be risky business, considering how well Atlanta's evolution is dovetailing with that of the entertainment business, the odds look better all the time.

The DTS move has gone down like another lead balloon with WG-4 and DVD Forum. Bike Suzuki very quickly replied in reasoned, but very firm tones, copying the putdown across the audio industry, to Universal (which backs DTS) to Panasonic (which has so far supported the system), and to the RIAA in New York, along with Koji Hase, of Toshiba, Chairman of the DVD Forum.

Suzuki says that WG-4 has also taken its own legal advice and is confident that the Group's standardisation procedures have been perfectly proper and there 'are no anti-trust problems'. The DVD audio specification will 'fully accommodate DTS, as well as competing technologies, as an optional feature'.

Suzuki reminds DTS that it 'voiced strong complaints' to the WG-4's work only after 'objective evaluations resulted in the selection of MLP over DTS'.

WG-4 chose MLP because it met the recording industry's demand for 74 minutes in all modes and 'objective and mathematical measurements clearly showed' that MLP coding and decoding gave an exact match with uncompressed audio and 'the biggest safety margins in the format and on playing time'.

DTS had rallied support from three prominent engineers. But WG-4 was not impressed. Their concerns, says Suzuki pointedly, are based on a 'misunderstanding' which may have resulted from the 'sample letter your company sent them'.

## Pardon? Eh?

Communication between Europe and the US is about language and technology. **Kevin Hilton** attempts to eavesdrop

AS EVERY ONE KNOWS somebody once said that Britain and America were two nations divided by a common language. Unfortunately, everybody thinks that this was someone other than George Bernard Shaw, who, in fact, it was. In terms of broadcasting technology, this prescient observation could now be reworked as Europe and America being two states divided by a common technical language. Both are moving towards digital, but with differing standards, agendas and timetables, issues that, seemingly, are enforcing differences and a lack of understanding, reinforced by existing national prejudices.

To many Europeans, the US appears introspective and unwilling to acknowledge that anything else is happening beyond its boundaries (unless those events immediately affect Americans). All countries have a tendency for this—something that was sent up years ago on a UK satire show, with a news reader delivering details of a bomb explosion in which no Britons were involved and listing the other nationalities in order of importance—but America almost has the freehold on it. It should be pointed out, unlike many Europeans, that I like America (or at least bits of it), so this is not merely Yank-bashing, but the view was confirmed for me when I returned to London from the IBC in Amsterdam.

As I was leaving the plane, I found myself walking behind two men who were obviously involved in the American broadcasting business and had been at the show, with a stop-over in the UK before returning to the US. They were glad to be heading back home and were disappointed with IBC, saying that there was nothing new there, and that it was purely a local show. Matters were not helped, they said, because of the language problem. Of all the places you can go in Europe, and complain about difficulties with the language, the Netherlands is not one of them. As English comedian Eddie Izzard said, in Amsterdam they speak four languages and they take drugs, whereas in Britain (and possibly America), they speak one language—just about—and don't take drugs (at least not officially).

Over at the show I had walked into the press room and seen two journo's I know—one French, the other Dutch—talking. When I joined them, the local hack bemoaned the fact that he was at an exhibition in his homeland, yet he was compelled to speak English. As I said to him, this was the cost of an event organised by a British-based organisation in another country. But

for the IBC to be an international show, as the name implies, and as the organisers intend, then English probably is the safest common language.

What puzzles me further about the view of the two Americans is that IBC is patently not a local show: it is growing, and attracts all the major manufacturers from all around the world; although, for the audio community, it is becoming less and less a viable proposition. Sure, NAB is a major showcase—and it is held in the US—but companies, even American ones, choose to make significant announcements in Amsterdam. Not everyone makes it over to NAB, and so IBC is an obvious European, if not world, launch site.

If my fellow travellers felt that IBC is parochial, then what would they make of the ITS in Montreux? The Swiss-based show has often been criticised for the expense of the local hotels, which are often in short supply, as well as other logistical difficulties. Now the event is to go annual from next year, putting the emphasis on papers, keynote lectures and discussions.

Naturally there will be the exhibition; the Symposium Management's new director, Chris Zoebeli, explained, 'This provides an enormous opportunity to create an annual exhibition for high-end broadcast solutions where emerging technologies can be unveiled to the industry as a whole.'

Broadcasters need such forums; how many exhibitions they need is another issue.

There has to be a chance to see what the whole market is doing and that often means getting on a plane to see what people outside your state line are up to. Europe is certainly aware of what the US is doing. Just before IBC, Bill Cullen, chairman of London video post house M2, commented to me, 'It will be interesting to see how many products have a sticker saying HD ready.' They did not blot out the sun, but there were certainly enough around for them to be noticeable.

Europe is still not convinced about high definition, but, as America moves towards it, there is the realisation that they should at least know what is going on. It is the same with AC-3 and MPEG Surround; the latter is meant to be the European standard, but final decisions have yet to be taken, which means that people have to know about the Dolby contender in case, like DPI, it establishes itself by default.

Regardless of any nationalistic feelings, America and Europe need to know what the other is up to. Perhaps we should try to develop a kind of technological Esperanto.

To many Europeans, the US appears introspective and unwilling to acknowledge that anything else is happening beyond its boundaries

# DSD: where are we now?

**David Walstra** of European Sony explores the potential impact of Direct Stream Digital and its associated music carrier format, Super Audio Compact Disc, on the audio business

**I**N THE EARLY 1980s, while working as an electronics engineer at Polygram's engineering department, I was involved with the introduction of the Compact Disc. During the recording sessions in the Concertgebouw in Amsterdam, we would have an early model PCM digital-audio signal processor recording the orchestral sessions in parallel to the standard analogue machines. The engineer with the PCM recorder was allowed to be there, as long as he did not make too much noise or sit in anybody's way. His supporters were in the minority—not many there believed that CD had any future at all. Let alone PCM. That came much later.

In November 1997, I found myself in a very similar situation, this time in one of the control rooms of the Henry Wood Hall in London, recording a session with an experimental DSD recorder, in parallel to the now accepted PCM equipment. I tried hard not to sit in anyone's way, and I doubt anyone but the recording engineer Tony Faulkner thought the experimental kit made any sense. That is, not until we played back some of the DSD recording to the performing musicians.

Since those early eighties, Pulse Code Modulation or PCM-based equipment, has made a tremendous contribution to the recording industry. Recently, with bit rates increasing, significant sound quality improvements could be achieved. However, the improvements are becoming smaller and smaller. For engineers at Philips and Sony, it became clear that a new encoding technique would, perhaps, offer greater improvement over a longer term. The search was for an encoding technique that would enable us to capture sound in its most pristine way, and encode it in a manner that would produce the absolute bare minimum loss of sound quality due to down stream signal processing or encoding.

**T**HE MAJORITY of today's analog-to-digital converters are based on delta-sigma conversion, operating at several MHz levels. However, in today's PCM world, after the analogue

signal is encoded at this high sample rate, the signal is then down-sampled to the conventional multibit word lengths of 16-bit to 24-bit and sample rate of 44.1kHz or 48 kHz.

This is usually done by multistage or 'cascaded' decimation digital filters. In D-A converters, the multibit PCM signal is oversampled by using multistage interpolation filters. (In conventional 44.1kHz sampling, 'brick wall' filters must pass 20kHz audio). Given that the signal started as a heavily oversampled digital signal, one has to ask the question why filter and decimate? Why not use the delta-sigma signal directly. This is the essence of the principle (motivation) of DSD.

An increase of sampling frequency eases the need for 'brick wall' filters, but the need for filtering remains. Simply increasing the sampling rate does not do away with the requirement for multistage decimation and interpolation.

There is a long and honourable tradition where production equipment usually is of higher calibre than the final distribution format

Thus, the solution was sought away from multibit PCM. DSD eliminates, to a great extent, the sound quality degradation inherent to the filtering processes in PCM by simply bypassing the multistage filtering all together. As in conventional PCM systems, the audio signal is first converted to digital by an oversampling delta sigma modulator. However, unlike PCM,

where the delta-sigma signal is decimated, Direct Stream Digital records the 1-bit pulses directly.

The resulting pulse train is resistant to distortion, noise, wow and flutter of recording media and other transmission channels.

In 1995, a number of pioneering engineers at Sony under the leadership of Ayataka Nishio, developed and hand built the world's first professional DSD recorder. (*AES preprint 4564 (1-7)*), 1-bit, 2-channel recording system, Ayataka Nishio, *et al*). The engineers took this to top recording studios in Tokyo, New York, LA, Nashville and London to demonstrate their design and collect feedback from the industry's golden ears. It took more than two years to arrive at a design that started to show the potential sound quality of DSD. By

1997, based on the initial design of the DSD recorder, more units were built and used operationally in recording projects around the world.

Limited to a 'straight 2-channel' recording, many recording sessions were made and experience was carefully gathered and documented. This exercise not only provided the DSD engineers with priceless feedback regarding the DSD recording system, it also demonstrated its potential during recording sessions. Numerous projects have been recorded in DSD, many of which will serve as part of the launch catalogue of SACD software titles in 1999.

**H**AVING TRANSFERRED the key enabling technologies from the central R&D labs in Tokyo to the product development divisions last year, Sony is now in the process of developing a range of pro-audio equipment based on DSD. At the recent 104th AES Convention in Amsterdam, a range of experimental DSD production tools were demonstrated at the SACD format stand, jointly manned by Philips and Sony engineers. A wide-band microphone prototype, designed to capture much of the 100kHz bandwidth, the experimental stereo DSD recorder and a DSD editor, based on a Sonic Solutions editing workstation (*AES preprint*

## Super Audio Compact Disc

SONY AND PHILIPS's proposal for the next generation of digital audio carrier is called Super Audio Compact Disc, or SACD. The SACD format is described in the so-called 'Scarlet book', of which version 0.9 has been distributed to its licensees. Version 1.0 is expected by the end of this year.

The three main features of the SACD are the highest possible audio quality stereo as well as multichannel sound reproduction, forward and backward compatibility with the Compact Disc and effective antipiracy and copy management.

The audio characteristics are achieved using DSD. Based on delta-sigma encoding, a 1-bit signal is recorded on the SACD. Using a 64x 44.1kHz DSD encoding, the SACD offers a frequency range from DC to 100kHz, with a dynamic range of 120dB for the audio bandwidth up to 20kHz. This is offered not only for the stereo signal, but also for each of the six channels of the multichannel

4476, Digital Signal processing in Direct Stream Digital editing system, Ayataka Nishio *et al*) were demonstrated.

On 26th September this year, at the 105th AES in San Francisco, Bob Doris, president of Sonic Solutions announced that his company is now 'ready for business' with the DSD editor. The show also saw the UK-based digital recorder company Genex, introducing the world's first commercially available DSD multichannel recorder.

Designed by Oxford-based senior scientist Peter Easty, a 'proof of principle' digital-audio mixer was demonstrated at a private showing of DSD technology at Abbey Road studios in February this year. A more mature, still experimental DSD console was demonstrated at the 105th AES Convention. This was a fully functional 8-channel DSD mixer, with 5-band parametric equaliser, 24dB/octave LF and HF filters, adjustable delay. All processing and interpolation is done at 2,822.4MHz. Through this development, Peter and his team have shown that DSD mixing technology is a reality.

A Sony developed conversion system called Super Bit Mapping Direct, allows for DSD recorded audio signals to be down converted to CD format by using a single stage digital-audio filter. SBM-Direct is able to convert much of the high sound quality of the DSD signal into the PCM domain. This means that having used SBM-D, a normal CD sounds notably better when played on a normal CD player. A real-time SBM-D convertor was demonstrated at the 105th AES Convention in San Francisco.

Also at this show, Sony demonstrated a functional DSD authoring system, as

well as DSD watermarking processors, which record the visible and invisible watermark information on to SACD, key elements for an antipiracy and copy management system.

In short, the full chain of professional audio production equipment, from wide-band microphone in the recording studio, through digital recorder, mixer and editor, to authoring tools for the mastering and replication have been demonstrated in various stages of development, leaving little doubt about Philips' and Sony's commitment to develop and introduce DSD and SACD.

**D**UE TO its reduced processing level, DSD may need less hardware and thereby less power. Downsizing of hardware design will become possible. This is attractive, especially for portable applications.

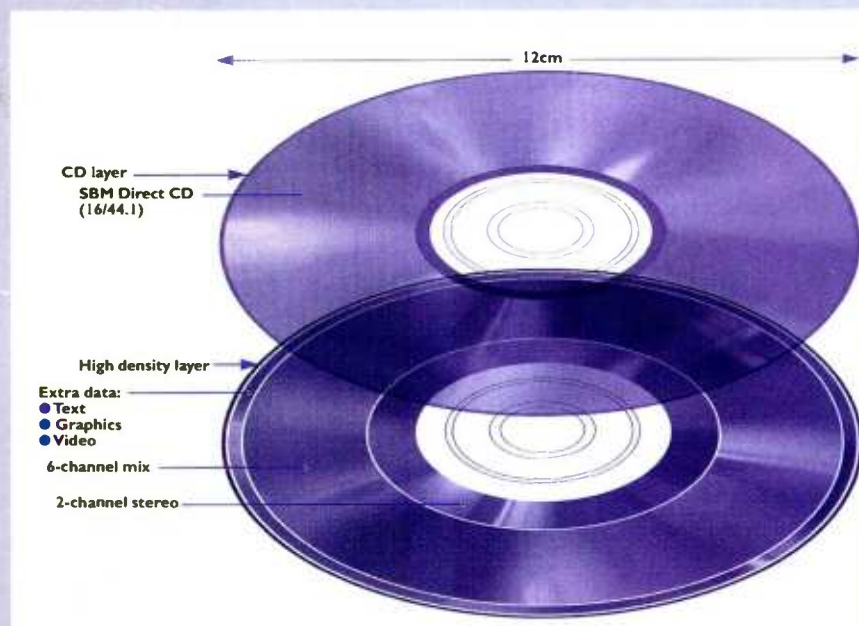
Current DSD recording systems run at 64x 44.1kHz. This sampling frequency provides very reasonable performance in terms of bandwidth and dynamic range. There is a long and honourable tradition where production equipment usually is of higher calibre than the final distribution format. In this case SACD is specified at 64x 44.1kHz, so it is quite feasible that future DSD systems may be based on higher sampling rates, in order to provide an extra reserve in dynamic range and noise floor. However, even if the sampling rate stays the same, a DSD format has potential for improvement by changing the noise-shaping filter in the recorder stage. However, unlike a PCM digital format, such a change does not require changes in the replay equipment. In other words, you can play-

back the new recordings on older playback machines and still get an improvement in quality.

The SACD offers 6 audio channels at full 'Scarlet book' specification. It will take quite some time before we are fully able to make proper use of the capability to reproduce full quality surround with SACD. Producing 5.1 sound mixes for video is not quite the same as recording a 5.1 mix for a classical recording session in a concert hall. To put it simply, the objective of the former mix is to most efficiently support the images provided by the video, the objective of the latter is to most efficiently reproduce the orchestra's musical performance in the listener's home. Much is to be learned and developed in multichannel recording techniques, which is why it may take a few years to fully exploit the multichannel capability of the SACD.

DSD provides the advantages of analogue and digital technologies. Being digital, it allows numerical representation, which, like in the PCM world degradation-free recording on tape and disc. We also believe that DSD is the most 'analogue' representation of the original sound and allows potentially the 'cleanest' conversion back to analogue.

Over the last five years, DSD has been successfully developed from a laboratory recorder to a first-generation experimental production system, allowing the music industry to experience it at first hand, and further develop its inherent potential. Commercial DSD products have been introduced, which no doubt will speed up the acceptance of DSD in the professional audio domain. The future should be interesting. ■



mix, which is recorded separately on the SACD.

The high-density layer contains the stereo and the multichannel data, as well

as an area that is reserved for text, graphics or video signals.

Forward and backward compatibility of SACD with today's 600 million CD

players around the world, is achieved using a hybrid disc that has a Red Book specification CD layer on top of the semi-transmissive high density layer. The only difference with a normal CD layer is that the CD substrate is half the normal thickness, allowing for the high-density layer to make up for the normal 1.2 mm thickness of the hybrid disc.

Physical and signal watermarking technologies enable the SACD system to offer effective antipiracy tools, that cannot be copied by any known piracy method today. Watermarking also allows for embedding signals on the SACD, which contain copy-management data, allowing for a range of management solutions to be implemented, from simple serial to intelligent destination related copy management.

A Philips-developed lossless coding system allows highly efficient bit-rate reduction. (*AES preprint 4563 (1-6)*, Fons Breukers *et al*).

Sony has announced the introduction of SACD into the European and US market by autumn 1999. The first introduction of SACD players, in Japan, is scheduled for Spring 1999.

# Resistance is useful

Audio circuitry is only as good as the components used to construct it. This month **John Watkinson** looks at resistors and resistance

**R**ESISTANCE IS THE property of electrical materials which tend to obstruct the flow of current. Fig.1 shows that this can be good or bad, depending on the application. Where the goal is to deliver power, resistance is a nuisance to be minimised and then tolerated, but there are plenty of applications where it is essential, for example in terminating a transmission line.

Georg Simon Ohm was the first to quantify the linear relationship between current (I), voltage (V) and resistance (R). Fig.2 shows Ohm's Law expressed in various ways. The most famous analogy with electrical resistance is the dreaded garden hose resisting the flow of water—if not taken too far, the analogy has some

uses. Certainly it illustrates that the resistance increases proportionally with length and goes down in inverse proportion to area. The behaviour of the material in question is called resistivity. Fig.2 also shows that the actual resistance is obtained by multiplying the resistivity by the length and dividing by the area. It follows that the units of resistivity must be ohm-centimetres.

The case of a thin conductive film is interesting. These are found in the construction of some types of resistor, in EMC screens and electrostatic speaker diaphragms. Here the film thickness is constant so the resistance increases with length, but goes down with width. Consequently, the resistance of a square of the material is constant and inde-

pendent of the dimension. Thus film resistivity is measured in ohms per square.

Resistance in power delivery is wasteful and so the most efficient way to deliver power is to minimise the current. Fig.3 shows that the power is the product of the current and the voltage across the load. Some power is lost in the resistance of the wiring which also causes a voltage drop. At Fig.3a a low voltage has been used and the power loss is significant. At Fig.3b a high voltage has been used and the power loss has been dramatically reduced. This is why electricity distribution uses such high voltages. It is cheaper to invest in the insulation needed to carry a high voltage than to thicken the conductors to carry a high current.

Sometimes the effect of a resistance is experienced when there is no physical resistor present. This will be noticed on power sources such as batteries and transformers. Fig.4 shows a dry battery off-load so that its terminal voltage is maximum. However, as soon as a current is drawn, the terminal voltage falls. This is because of the internal resistance of the device. Dry batteries have significant internal resistance and so are not good for producing high power as much of the power will be dissipated inside the cells. Lead-acid and Nickel-Cadmium batteries have much lower internal resistance. This makes them more efficient on high power loads, but also means that more care is needed. A car battery can easily melt a spanner placed across its terminals. Putting a NiCad battery for a DAT machine in the same pocket as your car keys can result in smoking trousers.

Many beginners in electronics are puzzled by the fact that resistors are only available in peculiar values rather than in a simple round number of ohms. The reasoning behind

this is actually quite logical. Manufacturers can only make a finite number of different values. Suppose that these were available in from  $10\Omega$  to  $100\Omega$  in steps of  $10\Omega$  so that there was a choice of  $10\Omega$ ,  $20\Omega$ ,  $30\Omega$ , and so on. If my  $10\Omega$  resistor is too small, my only choice is to double it by using a  $20\Omega$ . However, if my  $90\Omega$  resistor is too small, I can choose  $100\Omega$  which gives an increase of a few percent.

Thus uniformly spaced resistance values give steps which are too coarse at one end of the range and too fine at the other. The concept of preferred values redresses the balance. For example the E12 range would have  $10\Omega$ ,  $12\Omega$ ,  $15\Omega$ ,  $18\Omega$ ,  $22\Omega$ ,  $27\Omega$ ,  $33\Omega$ ,  $39\Omega$ ,  $47\Omega$ ,  $56\Omega$ ,  $68\Omega$ ,  $82\Omega$  in a decade, making 12 values, hence E12. You can pick any adjacent pair of these values and the high one will always be 20% greater than the low one. You can also plot the logarithm of these values and find that it produces a uniform progression.

Resistors are mass produced and so will suffer from tolerances. These vary from 10% for the most unpretentious product to 0.05% for critical applications. Where there are wide tolerances, having a large number of preferred values is meaningless. For example the 10% down on  $82\Omega$  is  $74\Omega$  which is also 10% up on  $68\Omega$ .

If the E12 scale does not give enough choice, the E24 or even higher scales can be used. E24 gives 24 preferred values per decade which are 10% spaced. The tolerance of these E24 resistors must be tightened to 5% or better.

Part of a designer's day is to do a worst case calculation to see what will happen when all components fitted are at the least favourable extreme of tolerance. If there is a problem, a redesign will be needed with more accurate parts. Interestingly the distribution of 10% resistor values is not necessarily Gaussian. Manufacturers make loads of

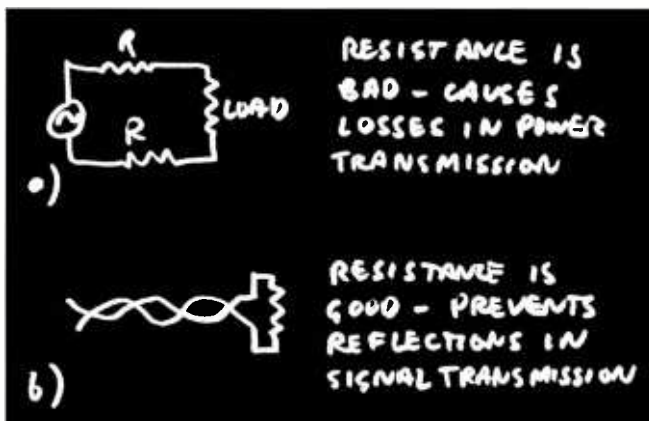


Fig.1: Resistance—Good or bad?

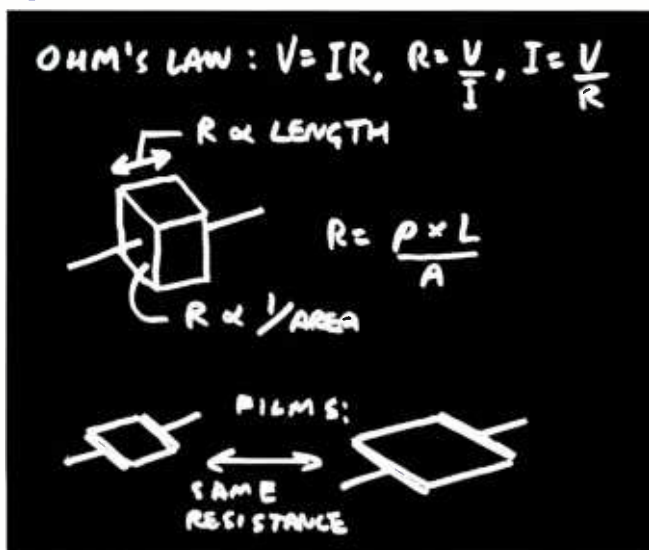


Fig.2: Ohm's Law expressed

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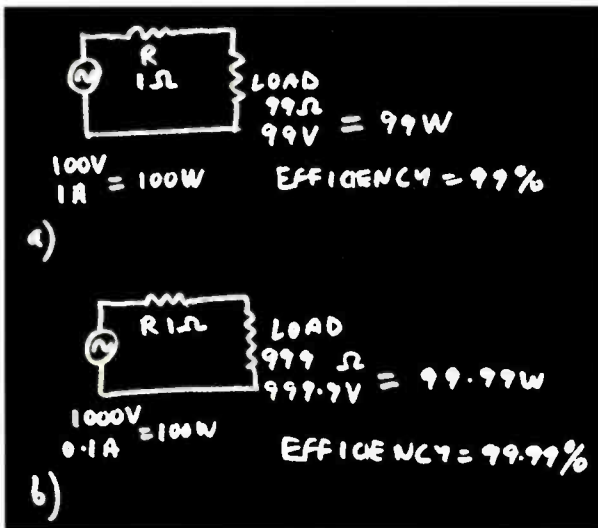


Fig.3: Power is the current and voltage across the load

resistors and then test them. The ones that are close are sold as 5%, whereas the ones between 5% and 10% are sold for less. Thus the chances of a 10% resistor being less than 5% in error are slim.

Resistance can be deliberately employed to waste power. This is the principle of the electric fire—which is simply a resistor in a box. All resistors develop heat in service; what matters is whether the amount is significant. The power dissipated is simply the product of the current and the voltage, and the units are watts. In audio control circuits such as preamps and equalisers, the amount of power dissipated is negligible and the resistors concerned can be very small. In a dummy load used for testing audio amplifiers, a considerable amount of heat may be created and a suitably high dissipation resistor must be used. Dissipation can be increased by raising the surface area and the temperature. Thus a high power resistor must be one that is capable of working at high temperature. In general high temperatures are bad news. Temperature cycling causes expansion and contraction, stressing lead seals. When lead seals fail,

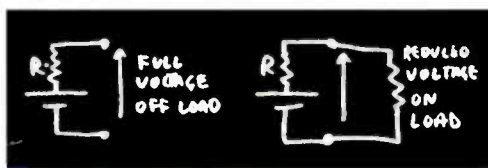


Fig.4: Dry battery loading

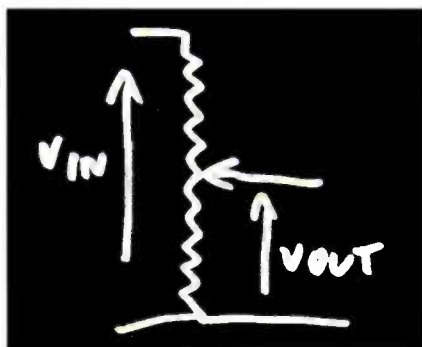


Fig.5: Potential divider made variable with slider

atmospheric pollutants can penetrate the element and corrode it. There is no alternative to the dummy load, but in many electronic designs, high dissipation can be avoided by suitable technique. In a studio, every Watt of power wasted in an inefficient device has to be paid for in a raised electricity bill, and then another Watt is used to power the air conditioner to remove the first watt.

This principle is also employed in the audio fader or volume control. Fig. 5 shows that if a volt-

age is applied across a uniformly resistive element, the voltage drops smoothly across the length. A sliding contact can be fitted to turn a resistor into a potential divider or potentiometer. A conventional potentiometer has a linear relationship between the position of the sliding contact and the output. This is great for radio control joysticks, but for audio level control this is no good because the human hearing system has a logarithmic response to level. For audio level controls the resistive element is made non-uniform so that the relationship between the signal out and the position of the slider is logarithmic. This is sometimes called an audio taper.

Resistors used to be made of a solid carbon compound, but more recently these have been replaced for audio purposes by those where the element is a carbon film on a ceramic substrate. These produce less noise. Unfortunately there is no such thing as a resistor without noise. All devices capable of dissipating electrical power act as noise sources as a function of their temperature. The higher the resistance, the more noise is present. This is physics at work and the skilled designer knows how to select resistor values which minimise noise build-up in a circuit.

Apart from noise, film resistors are quite benign from an audio standpoint. They may come with some free inductance and capacitance, but this is mostly negligible.

They are perfectly linear and phase linear, and so are incapable of producing any harmonic distortion. This is bad news for the audiophiles who desperately want to incorporate the most expensive components in a unit in order to 'improve' it, but good news for professional designers who can outperform audiophile equipment with ordinary components.

In practice, resistors don't have a sound and even considering the issue is a waste of time, deflecting thought away from areas where some improvement is possible. ■

# Looking for a wizard of an OS

Mac OS is user-friendly yet delicate, Windows NT robust yet arcane. **Simon Croft** scans the horizon for a system that gives media professionals the environment they need.

**L**IKE IT or not, computer operating systems have become a big issue in the audio community. As mainstream business computers become ever more powerful, but remain static in price, their allure as a cost-effective platform for audio recording, editing and mixing is hard to ignore.

Such is the range of functions you can perform—recording, editing, processing and mixing—your computer is likely to become the heart of your audio system, if you choose to go that route. But a computer is a complex device, and when you buy one you also take on some of the responsibility for configuring and maintaining it. If you happen to work in an organisation with dedicated IT support, the never-ending stream of software upgrades and new peripherals may pass you by—but someone has to install them.

Hopefully, the vast majority of your time will be spent on billable activity, so it is of paramount importance that the working environment offered by your computer is an efficient one. This involves not only the usability of the graphical interface but also how good the system is at handling and processing multiple streams of audio. Today's OS vary in their resilience, but none of them are as reliable as a dedicated hardware solution.

Arguably the most reliable is Windows NT, which broadcasters in particular tend to favour for networked media. But NT is in no way a 'Plug and Play' system, making it less suitable for self-op applications.

Arguably the most 'user-friendly' OS is still Apple's, soon to reach 8.5. For years, Apple users have argued that their OS is vastly superior to anything from the Wintel camp. Actually, this is not true. Apple has the easiest Graphical User-Interface, but the underlying OS is ageing fast in an environment where the demands placed on it are growing exponentially.

Windows 95/98 has a similar problem, in that it was not designed with high-bandwidth and real-time throughput in mind. Because additional layers of software are needed for the old OS to support new functions, a lot of the potential power of faster processors is lost in the increasing inefficiencies of the system.

These were some of the stumbling blocks that led former president of Apple's product division, Jean-Louis Gassée to form

Be Inc in 1990. The company's web site ([www.be.com](http://www.be.com)) makes an eloquent case for a completely new OS. Better still, it offers BeOS Release 3.1 for Intel and PowerPCs at just under \$100. Technically, BeOS appears to be excellent, but sadly that's where the good news ends.

So far Be Inc has failed to attract major audio, video or graphics software developers, and even Be's web site warns, 'This release is still definitely for "geeks, enthusiasts and the curious" only.' Ironically, this is the problem Apple faced when it bought Steve Jobs' company NeXT in an attempt to get a new OS 'off the shelf'. Apple, which had also considered buying Be Inc to the

It is paramount that the environment is efficient. This involves not only the usability of the graphical interface but also how good the system is at handling and processing multiple streams of audio

same ends, now had the building blocks. But, by all accounts, it would have taken years for developers to create new versions of their applications. This stalled the whole project.

However, Apple could still turn out to be the cavalry. By the Summer of 1999, it aims to release OSX (pronounced 10). This is a completely new OS, not just a system update. It promises enormous speed and stability improvements through features including pre-emptive multitasking, protected memory and a high performance kernel.

In practical terms, this should mean that when an application crashes, it won't take the whole system with it. Likewise, the system should handle the use of simultaneous programs without the kind of 'stop/go' performance associated with the current co-operative multitasking. Long-term Apple watchers might be forgiven for an acute attack of *déjà vu* at this point, given the number of abandoned projects and botched fixes associated with Apple OS in recent years. But this time, it looks as if things are going to be different. Crucially, Apple reckons that existing applications will need minor updates, not complete rewrites to run on the new OS. It says most applications are 90% compliant already.

It is also continuing to develop OS8, which is set to reach 8.6 by the time OSX is launched. This 'everyone comes with us' approach is light-years ahead of its previous proposal: essentially an emulator running under the new OS.

Above all, Apple is the company with the most to gain from a media-orientated OS.

Microsoft already has 95% of the market and, although you can place WAV files in a spreadsheet, most corporate users are pretty underwhelmed if their new machine arrives with a pair of speakers. By contrast, nearly all Apple's business users are in some form of electronic media: publishing, graphic design, web site development and, yes, running Digidesign's Pro Tools.

Interestingly, Digidesign has just announced that Pro Tools will now be available in Windows NT and Apple versions. For Digidesign, this makes good business sense. But before Apple users consider migrating, they could be advised to see if X hits the spot. ■

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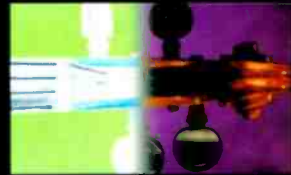
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