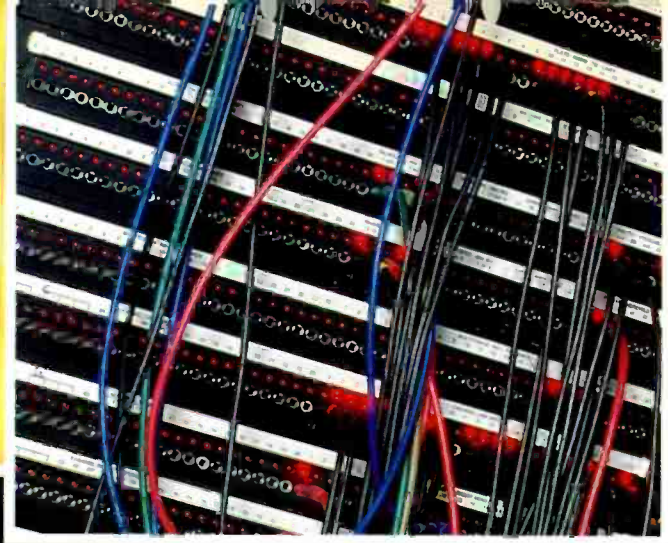


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FOR RECORDING, POSTPRODUCTION AND BROADCAST



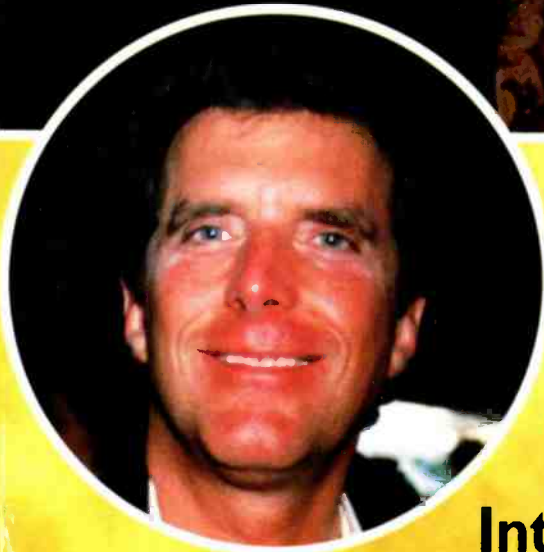
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Marantz CDR630
Sony MDS-DRE1
Drawmer MX50
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Akai DD8 plus
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Shure KSM32
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ELIZABETH

Questions of balance



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8 Editorial
On kit, competence, and operating systems

10 Soundings
Professional audio, post and broadcast news

12 World Events
Essential dates for the pro-audio events calendar

14 Letters
Perusing the pro-audio post bag

REVIEWS

17 Akai DD8 Plus
Exclusive: An update for the digital dubber

20 Sony MDS-DRE1
Exclusive: Mighty MiniDisc recorder

22 Studer A5
The definitive loudspeaker review

25 Neotek MicMax
Exclusive: Maximising the mic preamp lifer

26 SPL Qure
Curious EQ and processing from Germany

28 Marantz CDR630
Exclusive: Ravishing CD-R recording

30 Otari CDP-50
Exclusive: Desktop CD replication system

32 Deltron AIR Patch Recall
Exclusive: automating the studio patchbay

34 Drawmer MX50
Exclusive: Rediscovering de-essing

36 Shure KSM32
Exclusive: a condenser from the dynamic experts

38 Hooter Sound B1
Exclusive: Mic preamp and dynamics

FEATURES

41 Replication: CD-R survey
All that's on the market for short-run CD manufacture

47 Interview: Ron Nevison
Rock of ages

57 Interview: Shawn Murphy
Scoring in the cinema

61 Broadcast: Swiss Radio
Digitising drama production

64 Postproduction: Elizabeth
A renaissance for film sound

69 Recording The Warehouse
Bryan Adams's studio

81 Horizons: ISDN Audio
Pursuing the problem

85 Facility: Great Linford Manor
Historic recording venue

90 Facility: Sony Music Studios
Manhattan studio multiplex

COMMENT

100 Comment
From our UK and US correspondents

101 Broadcast
Waking from the digital dream

106 Open mic
Can digital broadcasting deliver quality?

TECHNOLOGY

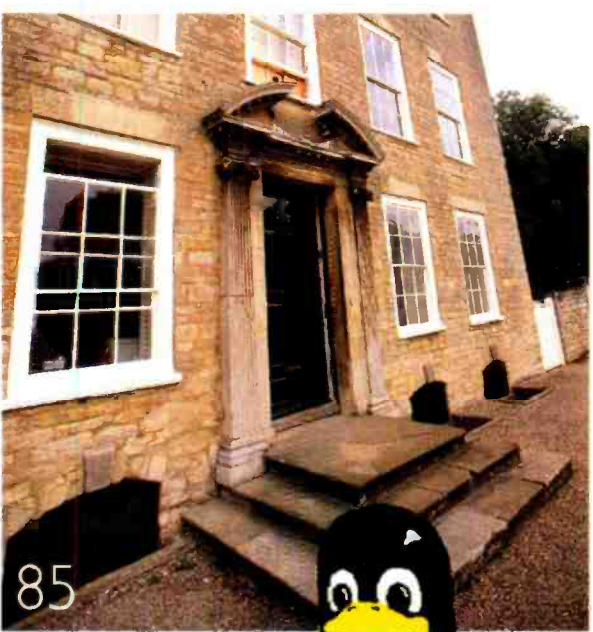
102 Linux
The operating system to kill Microsoft?

104 Dr John
The capacitor

69



28



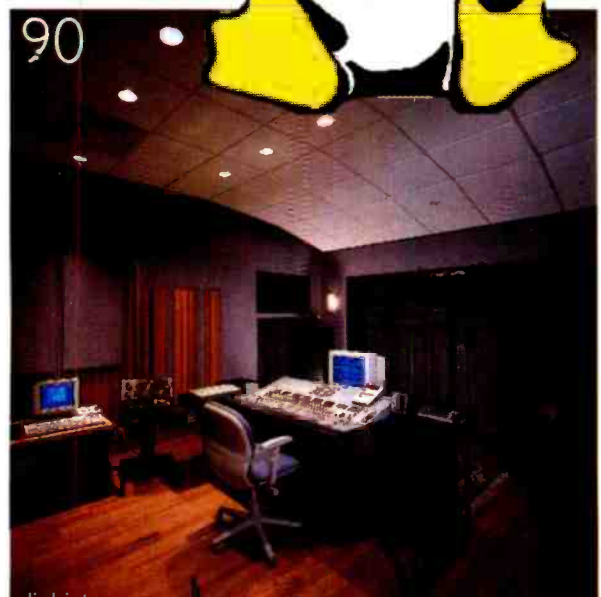
85

25



102

90



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Incompetent or just relaxed?

IT WAS AN OFF-THE-CUFF REMARK that I unusually did not challenge but the intimation was that *Studio Sound* enjoys kid-gloved personal delivery of equipment for review backed up by rapid response support that is unrepresentative of the sort of treatment ordinary customers enjoy. I did not disagree because I believe it is obviously in the interest of the manufacturers for this to be the case. However, the reality is somewhat sadder and serves to illustrate a worrying degree of complacency on the part of some manufacturers that must give an insight in to their attitude to their customers.

You might be surprised to learn that in the last half year equipment has arrived for review that has been damaged in transit; incorrectly adjusted for local power supply; with manuals in the wrong language; with manuals that barely qualify as manuals; without manuals altogether; without essential and part-of-the-package interconnecting leads; with the right software but for the wrong operating system; without the software full stop; with a software version earlier than the one stipulated as a condition for undertaking the review; uncalibrated and clearly off its best; a bit beaten up and clearly well used; with a display that does not work; with mechanical parts that are misaligned; with serious faults; and plain old broken and useless.

When we mention this as part of the review the manufacturer frequently takes exception. Yet you've got to wonder what they expect.

My suspicious mind always suspects hot-rodding purely for the purposes of the review sample. I've never knowingly encountered an example of this, but I have failed to get audio in and out of a unit more times than I can now remember and my reviewers will tell you similar stories. You probably can as well.

If these are yet more examples of that easy-going 'cottage industry' attitude that is frequently used to explain things away then you can keep it. Let's hope it's just pure harmless incompetence.

Zenon Schoepe, executive editor

Hard on software

ANYONE WHO KNOWS the background to the Internet will tell you that it was a visionary exercise on the part of Tim Berners-Lee. They will not only be talking about its technical conception but about the political management that made it successful without becoming a proprietary system. Similar accolades also surround the GNU/Linux operating system—a 'free' OS that will run on anything from an Atari or Amiga to a Dec Alpha Sun Sparcstation and is poised to challenge Microsoft's domination of commercial computing. GNU, with its recursive 'GNU is Not Unix' acronym, began life in the early eighties as a child of MIT Artificial Intelligence Laboratory maverick Richard Stallman. His aim, then and now, was to challenge corporate control of computing. The Linux (Linus' Unix) kernel followed in the early nineties when Finnish scientist Linus Torvalds used the internet to recruit programmers interested in developing a similarly free (or 'open source') alternative to the Unix operating system. Today GNU/Linux offers a powerful platform upon which users ranging from hackers to the stock-market are prepared to stake their reputations.

The key is the fact that all GNU/Linux source code is in the public domain and is open to development by any interested parties—with the proviso that their work is made public. The development team is therefore huge and altruistically motivated. Consequently Linux costs very little to buy in to; it is not cluttered with excessive facilities; its speed and stability are not compromised by unwanted facilities; and it does not tie you to a single manufacturer's vision of computing or its pricing policies. Instead it offers a viable alternative to programs such as Windows—because it rarely crashes, it can be readily customised and it is astonishingly cost-effective. Unable to use its usual business tactics, Bill Gates' company has made the unprecedented move of releasing sections of Windows source code to encourage out-of-house development, as has Netscape with its Communicator browser. And right now, around half of all Web sites have been written on Apache—also open-source software.

The whole Linux story is too long to tell here, but whether you're looking for social comment or simply an alternative to Windows, it bears studying—you might start at page 102, www.linux.org, www.kernel.org and www.apache.org

Tim Goodyer, editor

Studio Sound

Incorporating Broadcast Engineering
November 1998, Vol 40, No 11, ISSN 0144 5944

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November 1998 **Studio Sound**

Great Studios Of The World



PRODUCTION NOTES

Combining poignant elegantly crafted lyrics with irresistible pop melodies, the release of a new Beautiful South album is always an eagerly anticipated event. The latest, 'Quench' was recorded and mixed at London's Whitfield Street Studios on an SL 9000 console with producer Jon Kelly.

"Whitfield Street is a great studio to work in and the SL 9000 is a great console to work on," says Jon. "It sounds excellent and the automation is perfect for the way we work."



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105th AES Convention

US: This year's American AES Convention found San Francisco shrouded in mist rather than bathed in sunshine. But if the weather was dull, the Convention was not, with plenty of people in attendance and much for them to see and do including the usual papers, technical sessions and facility tours. Of note among the deluge of new equipment launches were Euphonix' R1 hard-disk recorder, Shure's KSM32 condenser mic, Quantegy's GP9 analogue mastering tape and Emtec's pre-formatted ADAT tape. Surrounding events included the launch of the Analog Option Coalition, SPARS celebrating its 20th anniversary, the 1st anniversary (and new board of directors with Ed Cherney at its head) of the Music Producers Guild of the Americas, the announcement of a development agreement between WaveFrame and Emu-Ensoniq to incorporate Emu's Post Card into Ensoniq's Audio Production Suite, and the presentation of CEDAR's Awards.

Tim Goodyer



▲ **Taiwan:** Promise Productions' new SSL SL4000 G+ SE console sits 12 stories up, overlooking Taipei. Formerly the city's Wings Studio which had seen success with Chen Shu Hua, Jacky Chan and Sandy Lam, Promise represents a new start under the guidance of owner Jonathan Lee who enlisted Studio 440's George Long to assist in its redesign. Other equipment selections include 5.1-channel monitoring from Genelec and Yamaha, and both analogue and digital multitrack machines. Promise Productions, tel: +886 2 2720 5718.

▼ **US:** Following on where last year's Analog Reality Check left off, Analog Option Coalition was launched at this year's American AES Convention. The panel included producer-engineer Joe Chiccarelli, Ocean Way's Allen Sides, mastering engineer Bernie Grundman, Gateway Mastering's Bob Ludwig, chairman Bruce Borgerson, Quantegy's Steve Smith, Emtec's Gerd Cyrener and Studer's Bruno Hochstrasser who introduced the Coalition and discussed their concerns over the future of analogue recording. The discussion was then opened to members of an invited audience, but the real push was to garner support for the fledgling body in order that it might best serve the interests of those anxious about analogue's future. Wavelength, tel: +1 541 488 5542.



SBES

UK: Continuing to enjoy its two-day status, this year's Sound and Broadcasting Equipment Show attracted a healthy cross-section of British broadcasters, manufacturers and students to Birmingham's National Exhibition Centre.

A programme of seminars again accompanied the Hall 19 walkabout, reflecting the changing concerns of broadcasters, while the bar performed its traditional role as a meeting and debating point. Genuinely new equipment was thin on the floor (although there were opportunities to preview and pass comment upon items in advanced stages of R&D). The general consensus was that SBES remains an important part of the British broadcasters' calendar with at least one instance of a late booking finding a full exhibition. Personally, I still feel SBES worked better as a one-day show, free from the effort and expense of larger stands and overnight stays, and focused on its core business. But perhaps I'm in the minority.

Tim Goodyer

▲ **UK:** Abbey Road Studios has bought a Sony PCM-3348HR digital multitrack for use in several 'high profile but as yet undisclosed projects'. Alongside these, the 48-track high-resolution machine will be used in the facility's Penthouse Studio (pictured) for remastering some of its multitrack analogue archives. Abbey Road, tel: +44 171 266 7000.



▼ **Belgium:** Brussels' Sonix Studio has recently installed a new 32-channel D&R Orion X console. The newly built facility is hoping to attract clients as diverse as ad agencies and rock bands. Sonix Studio, tel: +32 7552 3372.



Derek Faraday remembered

UK: Beginning in 1932 with the BBC, the career of Derek Faraday saw him set up Star Sound Studios and be instrumental in setting up the Association of Professional Recording Studios, of which he was still vice president at the time of his death.

His claim to the first use of magnetic tape in Britain, his involvement in writing the first BBC training manual on mag tape, and his part in planning the launch of local broadcasting established a reputation that made him a regular expert witness. He died on 29th September 1998.



SATIS buzzing

France: The activity at Paris' annual SATIS exhibition was boosted this year by the inclusion of the First International Multichannel Surround Sound Forum. This was organised in co-operation with Radio France and supported by *Studio Sound* magazine, SSL, Dolby and Cabasse.

Initiatives aside, what still impresses about this show is the high level of enthusiasm evident and the manner in which recording, post, broadcast and sound reinforcement audio disciplines co-exist with the greater picture and lighting related manufacturers' activities. This is despite the fact that we are told that such a co-existence cannot work in other territories.

Held in a new hall, it presents the picture of a strong and resolute industry even though the French market suffers its own particular problems. Above all else, SATIS is an obvious focal point for the country's professionals, and national events like this should be encouraged as they serve as a technological lifeline to the great majority who are unable to travel abroad for the big international events. If only there was a show like this in the UK.

Zenon Schoepe

▼ **UK:** London's Royal Festival Hall recently hosted a concert involving two orchestras totalling some 104 musicians to perform a programme comprising a tribute to George Gershwin and the first public performance of Laurie Johnson's piece, *Synthesis*. Caught on two Sony 3348 machines running BASF 931 and a Tascam DA-88 by Adrian Kerridge, the Royal Philharmonic Orchestra met the London Big Band to deliver Johnson's symphony for classical and jazz orchestras. The recording is to be mixed on the Capricorn console at CTS Studio 2 for stereo and 5.1-release.

▲ **UK:** The second oldest Cathedral in the UK has updated its acquaintance with technology recently through the installation of two new sound systems. Serving the nave and choir of Rochester Cathedral separately, the total of 25 Meyer speakers are driven by QSC US A900 amplifiers controlled by Meyer electronic and Klark Teknik EQs. They are linked by an EMO switching unit and make Rochester one of the first UK ecclesiastical buildings to have such a system

Montreux Symposium

Switzerland: Starting next year, the Montreux International Television Symposium and Technical Exhibition will be known more simply as the Montreux Symposium, held annually.

Continuing with its format of exhibition, papers, discussions and lectures but with renewed focus on technological change and industry issues.

Next year's Symposium will be held between 10th and 15th June and highlight HDTV, interactive media, the convergence of television and computing and digital transmission. Net: www.montreux.ch/symposia

■ France's Marcadet studio has invested in a Sony PCM-3348HR multitrack machine, accepting 24-bit working as an emergent international standard. Located in the Plaine St Denis, Marcadet is one of France's largest recording facilities. Mega Studios is to install an SSL Axiom-MT digital console to accompany the two SL9000J analogue consoles already installed at its Paris HQ. The new desk will be used for mixing and will share DiskTrack and VisionTrack with an SL9080 over Ethernet. French national broadcaster FR3 has ordered an SSL Aysis Air console in a new mobile being readied for its eastern production centre in Alsace. The mobile will also use SSL's RIO fibre-optic remote system.

Marcadet, France.

Tel: +33 1 49 46 2121.

Mega, France. Tel: +33 1 41 38 0708.

Sony, The Netherlands.

Tel: +31 20 44 99 305.

SSL, UK. Tel: +44 1865 842300.

■ London post facility. The Mill, has recently recommitted to Quantegy as sole supplier of recording media. The decision, which sees Transco remain as distributor, follows 'extensive testing' of digital Beta media and the prior 6-month arrangement with Quantegy-Transco.

Quantegy, Europe.

Tel: +31 24 372 7402.

■ New York's new Sound Lounge post facility is set to open with three Fairlight equipped suites. MFX3s and DaD digital dubbers have been chosen by Tom Jucarone and Peter Holcomb to handle its target of advertising workload. A further MFX3 has been installed at Howard Schwartz Recording as part of its expansion and renovation, stating its OMF capabilities as a major consideration in its selection. Chung King Studios, meanwhile, has commissioned Munro Associates to design the acoustics and monitoring for its new Euphonix CS3000-equipped 5.1 mix room. Elsewhere in Manhattan, the Effanel mobile has installed Spondor SA500 active monitors in its L7 vehicle. The Capricorn-equipped mobile is renowned for its work on the Grammys, and MTV's Awards and Unplugged sessions.

Howard Schwartz Recording, US.

Tel: +1 212 687 4180.

Chung King, US. Tel: +1 212 463 9200.

Effanel, US. Tel: +1 212 807 1100.

Fairlight, US. Tel: +1 213 460 4884.

Fax: +1 213 460 6120.

Munro Associates, UK.

Tel: +44 171 403 3808.

Spondor, UK. Tel: +44 1323 843474.

■ Antwerp's Peeters Productions has taken delivery of an apt VWorldnet system making it the first Belgian facility to offer ISDN to its post, casting and voice-over clientele. Denmark's Pro-Video has also ordered six apt Worldnet systems for various Scandinavian postproduction facilities. The systems use apt-X coding and comprise DSM100 audio transceivers and Pro-Link ISDN managers.

apt, UK. Tel: +44 1232 371110.

■ Canada's Modulations post house has installed its ninth Fairlight MFX3 Plus, three of which are used for dialogue and ADR editing, three for sound effects editing, two for Foley and ADR recording, and one for transfer work. Elsewhere in Montreal, film and TV facility Studio Marko has installed an Adgil Director surround monitor

switching systems and the Audiobec audio manufacturing facility has installed a CEDAR Windows system. This includes a ProDSP/C console, 4 ProDSP/E expansion boards, and Declick, Decrackle, Noise Reduction, Phase Correction and Dynamics & IIR EQ software. Equipped for 5.1 surround and 24-96 working, Audiobec is currently restoring a series of classical and jazz recordings. Studio Marko, meanwhile, is expected to install two more Directors, each being a 32:6 matrix capable of handling 5.1-surround.

Audiobec, Canada. Tel: +1 514 384 6667.

Sascom, US. Tel: +1 905 469 8080.

HNB, Canada. Tel: +1 416 867 9000.

■ German public service broadcasters SDR and SWF merger into SWR has also seen the commissioning of a new OB vehicle, F1. The truck is equipped with a 48-fader Stage Tec Cantus desk and Nexus Switcher-router and will handle a total of 200 analogue inputs (68 via Stage Tec's new 28-bit converter), 144 analogue outputs, and 40 AES-EBU interfaces. Germany's Leipzig-based MDR public broadcaster, meanwhile, has purchased an Urban Audicy workstation for its commercial music station, Life. This brings the station's quota of Audicys to four; the new unit being used for on-air promos, station idents and programme editing.

MDR Horfunk, Germany.

Tel: +49 341 300 5320.

Stage Tec, Germany.

Tel: +49 7654 91040.

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

■ Spain has a new post facility in Barcelona's Digit Sound Studios. Part of the established Sonygraf operation, the six-room facility is designed by Joan Font and will open with an 80-input D&R Cinemix console and a STEMS monitoring matrix and dynamics, an Akai DDB, and a Tascam DA-98 for the main mixing stage.

D&R, The Netherlands.

Tel: +31 294 41 8014.

■ Hollywood's Skywalker Sound has purchased 39 Tascam MMR-8 and MMP-16s as part of its move into digital dubbing. Already using WaveFrame and Pro Tools systems, the compatibility of the Tascam machines was an important consideration. Meanwhile, Future Disc Systems is to extend its Sonic Solutions system to include Kevin Grey's studio, Studio 5. The 6-room music mastering facility is 20/24-bit capable and specialises in working with Pacific Microsonics HDCCD processing system.

Skywalker Sound, US.

Tel: +1 415 662 1000.

Future Disc Systems, US.

Tel: +1 323 876 8733.

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

Sonic Solutions, US.

Tel: +1 415 893 8000.

■ Scottish TV has ordered a Calrec C2 console to be installed in a new small studio. The 36-channel analogue desk will see service in Studio D where it will be used on the daily news programme Scotland Today and Scotsport.

Calrec Audio. Tel: +44 1422 842159.

■ Warsaw's Studio Sonica has taken delivery of a DAR Sabre Plus editing console, the first to be accepted in Poland. The facility specialises in all aspects of audio and video postproduction, and has used the Sabre Plus on Warner's *Magic Sword—The Quest for Camelot*.

DAR, UK. Tel: +44 1372 742848.



November

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 1203 426 471.
Email: appledtpr@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

6-9

Middle East Broadcast 99

Fourth International Exhibition for the radio, television, broadcasting and programming industry, Bahrain International Exhibition Centre
Contact: Overseas Exhibition Services, 11 Manchester Square, London W1M 5AB
Tel: +44 171 862 2043.
Fax: +44 171 862 2049.
Email: idroberts@montnet.com

April

10-12

16th International AES Conference 'Spacial Sound Reproduction'

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

21-22

ABTT's 21st Trade Show

Royal Horticultural Halls, London SW1.
Contact: Association of British Theatre Technicians, 47 Bermondsey Street, London SE1 3XT.
Tel: +44 171 403 3778.
Fax: +44 171 378 6170.
Email: office@avtt.org.uk

May

8-11

106th AES Convention

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

10-15

21st Montreux International Television Symposium and Technical Exhibition

Montreux, Switzerland.

Contact: Patricia Savioz.
Tel: +41 21 963 32 20.
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 Exhibitors.
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.
Email: info@point.proms.co.uk
Net: www.i-way.co.uk/~dmc/v/sbes.htm

22-24

Messe Frankfurt

Trade exhibition and convention for audiovisual system installation
CMF, Ludwig-Erhard-Anlege 160327 Frankfurt
Contact: Metin Ergül
Tel: +49 69 7575 6130.
Fax: +49 69 7575 6613.
Email: metin.ergul@messefrankfurt.com

June 2000

6-9

Broadcast Asia 2000, Cablesat 2000 and Professional Audio Technology 2000

Suntec Centre, Singapore.
Contact: Singapore Exhibition Services.
Tel: +65 338 4747.
Fax: +65 339 5651.
Email: info@sesmontnet.com
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UK contact: Overseas Exhibition Services.
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Net: www.montnet.com

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Fax: +359.2.946.12.90

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Fax: +7.095.956.6881

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Fax: +49.6074.891530

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Animal instinct

INTERESTING MICKIE MOST article in your August issue. But I doubt if Mickie brought The Animals down from Liverpool.

**Mick Sharp,
Newcastle upon
Tyne, UK.**

Evil thoughts

I WAS INTERESTED to read the letter from Andy Jackson (*Studio Sound*, August 1998) concerning the potential pitfalls for engineers who are going to be mixing music in 5.1 for release on DVD. Apart from both a patronising and insulting attitude towards 'Joe Punter' as he deems to call the general public that ultimately pay his wages, Mr Jackson is missing a vital point: the use of DVD in the home will be driven by home theatre. There are over 50 million home theatre systems currently installed around the world and the owners of these systems have, by default, had to tackle the inherent problems of type and placement of their surround speakers.

Anyone out shopping in the audio chain stores for a new television or hi-fi will have difficulty in purchasing anything that does not have centre and surround speakers. It is but a short step from these Pro Logic matrix systems to a fully fledged discrete 6-channel setup for DVD and the learning curve is the same. Every DVD player that I have used has parameters to program the type and placement of the speakers. And while home users may not be audio engineers, their dedication to audio quality, as exemplified by the amount of money they are willing to spend on its reproduction, gives them the right to set up their systems in the way that they see fit.

At Hear No Evil we have been mixing music in matrix formats for nearly 10 years, and in 5.1 for the last year. We have made mistakes and learnt from them, we have listened to other people's mistakes and learnt from them too. There will always be good mixes and there will always be bad mixes, however the line between them is a subjective one and only by listening and

experimenting will we all get better at what we do. To cop out by merely placing relatively unimportant audio material in the surrounds is to deny and frustrate those of us that

are fighting to raise the Plimsoll Line of 5.1 excellence. As engineers mixing in 5.1 it is up to us to supply the consumer with well mixed final product and we should be always mixing up to a standard and not down from it.

I have spoken to far more 'Joe Punters' who are

knowledgeable about surround than studio engineers. It would seem to me that this is one case where the consumer is light years ahead of the professionals and there is a lot of catching up for people like Mr Jackson to do.

Steve Parr, Hear No Evil, UK.

Duke box jury

IN THE ARTICLE on Craig Leon (*Studio Sound*, September 1998), Mr Leon mentions the 'storehouse of information to draw on' that we possess in the nineties. This is the first I've heard someone other than myself express this viewpoint. I actually enjoy listening to popular music on the radio again, now that we've gotten past the need to make everything sound 'modern' by over-processing it with grainy digital effects. However, I think there is still room for more of the sounds of the past to join the sounds of the present. Just because we can make a clean, wide-bandwidth sound doesn't mean we have to.

Along with some of today's ultra-clean, accurate recordings (which sound fantastic), I also enjoy listening to recordings made in decades past—not just for the music but for the sound. Take Genesis' *Duke* album for instance. This recording

has a misty, murky removed sort of sound that does wonders for the emotional feeling of the songs. It's a bit like an impressionist painting.

It will be a continued breath of fresh air to hear more and more of the sounds that were invented in the old days exist side by side with the sounds we are inventing in the new days.

Dane Tate, Tulsa, OK, US.



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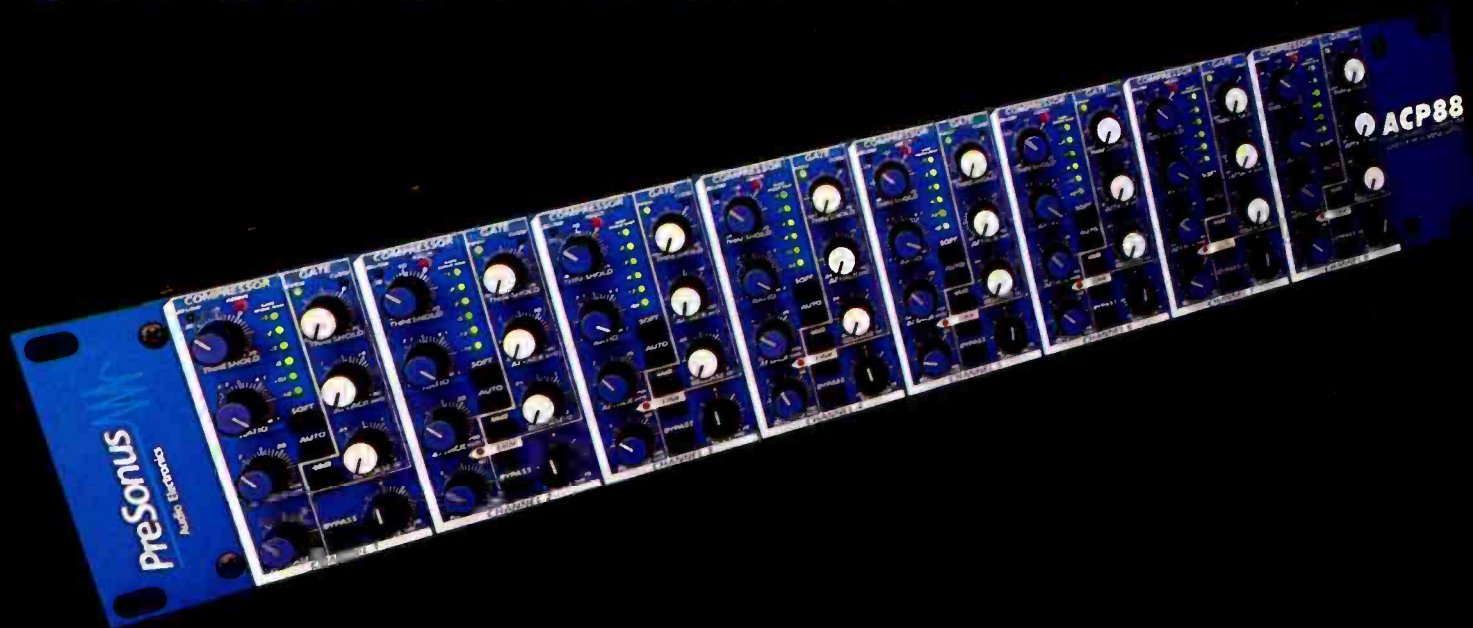
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PreSonus
[audio electronics]

Akai DD8 Plus, RC-15 and Trim Page

The latest update of Akai's popular DD8 raises the stakes for digital dubbers in every respect from operation to compatibility. **Rob James** puts it through its paces

THE ARRIVAL of the DD8 Plus takes Akai up a gear in the digital dubber race. While retaining all the virtues of the earlier DD8, the Plus version has a few new tricks up its sleeve. The first and most obvious of these are the high-bit and increased sampling rate options.

Taking bit rates first, it is now possible to record 24-bit linear, 20-bit linear, 20-bit packed or 16-bit linear PCM formats. Most 20-bit recorders actually record at 24 bits with the 4 least significant bits being discarded. This is, of course, wasteful of storage space. Akai has also included the 20-bit packed format, which really does only record 20 bits, to make the most of the available storage without any data compression. With the wide dynamic range available on delivery formats such as Dolby Digital, dynamic range has been seen as an issue with 16-bit recorders. As and when required, the Plus is also capable of recording at 88.2kHz and 96kHz sampling rates using AES-EBU channels in pairs for I-O.

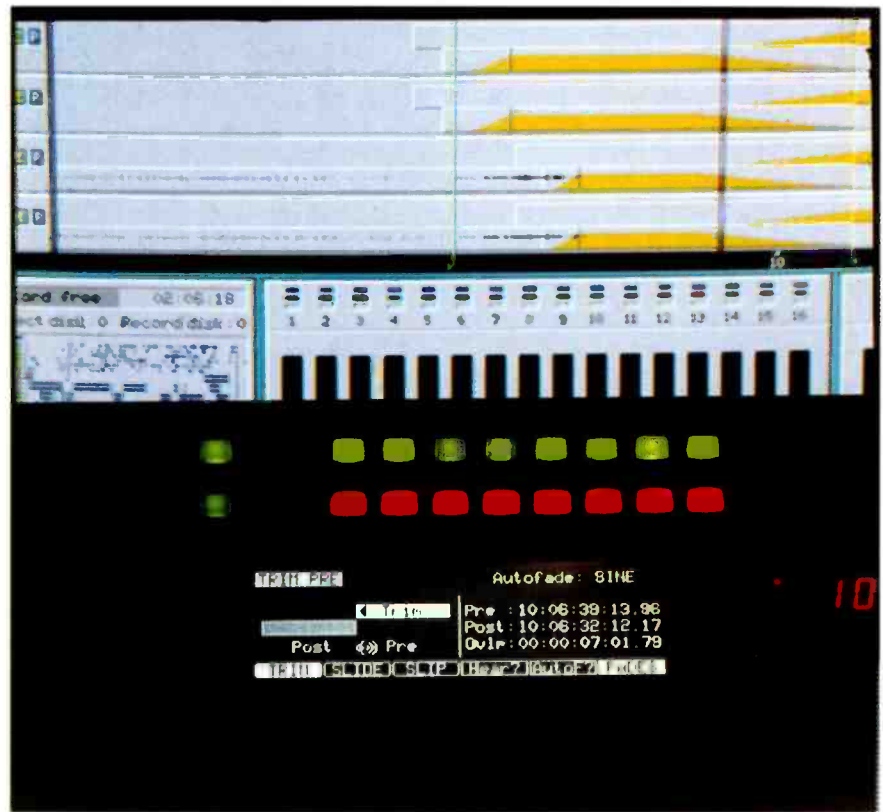
The optional interface boards available for the DD8 Plus are the same as for the DD8 with the odd exception: the networking connection is now standard and does not require a card slot; and the AES board now accommodates up to 24-bit signals (the earlier version may be modified to the new spec). The A-D converters always were 24-bit 128x oversampling types. This means if you wish to upgrade a DD8 to plus spec, the only new hardware required is a processor board. Less obvious tricks appear in the area of file exchange.

Akai users have for some time enjoyed file exchange capabilities with

Avid AudioVision via OMF and Digidesign Pro Tools. These capabilities have been extended in the Plus to include Fairlight's DAD format, Waveframe and Tascam MMR-8 formats. Akai is also promising to support the AES-31 format within a 'very short time' of it being ratified. I played about with files generated by all the supported systems and there is no doubt, provided the recommendations are adhered to, they all work. It is suggested an empty disk be

used when exporting projects. I attempted to try this out with some machines at the National Film and TV school, but in the time available, I fell at the first hurdle—the review machine has a 2.6Gb LIMDOW MO drive and a pair of Rorke Data type removable Winchester caddies. Unfortunately, none of the relevant target machines had either of the matching receptacles.

I suspect the best bet for casual export is an external drive. Akai use >



< the lowest common denominator Centronics (Amphenol) SCSI connector and, if the target machine does not have one, adaptors are readily available. Obviously, if import/export is to be a regular feature of a facility's activities more sophisticated arrangements may be made. The machine can also be used to convert between formats (see sidebar)

For dubbing, the best combination of storage options appears to be to record to the internal Winchester while mixing and copy the result to MO. This gives all the speed and capacity advantages of the hard disk while mixing combined with the security of a removable backup.

The last trick is the big one. Akai is introducing a new machine, the DD16, that is a 16-output player only. The DD8 Plus can be converted, with suitable out-

put cards, into a DD-16. This requires the lid to be removed, but should considerably enhance the attraction of the machine to facilities with varying requirements.

Despite the generous dimensions of film mixing consoles, panel space for machine control is at a premium. Until the introduction of the RC-15 there were three options for remote controlling the DD8—the RS422 9-pin; a custom control using the comprehensive GPIO facilities; and the large (and relatively expensive) DL-1500 control surface. Recognising these options did not suit everybody, Akai has introduced the neat little RC-15. This has only transport controls (including sync reverse), 8 function keys and a jog-shuttle wheel. The unit is built like a tank with high-quality, illuminated keys which should stand up to the most

ham-fisted operators' attentions. Although supplied as a stand-alone unit the RC-15 is designed to be integrated into a console panel if required. It connects to the DD8 via a single 9-pin D-connector that carries control signals and the power for the lamps. Alternatively, the RC-15 can be connected to a DL-1500 in daisy-chain fashion. For dubbing the RC-15 is used and when editing or housekeeping is called for the DL-1500 can be pressed into service. The RC-15 functions are programmable with a variety of possible options. Record, for example, may be set to require REC and PLAY or just REC. The function keys could be used to control the record status of the individual tracks either as track arms or punch-ins. Another possibility when combined with the DL-1500 and GPIO record control, is to use the function

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File compatibility Source to destination

Pro to Akai
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Akai to Pro Tools
 (Converts an Akai Project to a Pro Tools 4/24 Session)

OMF to Akai
 (Converts an OMF composition to an Akai project)

OMF to Pro Tools
 (Converts an OMF composition to a Pro Tools 24 session)

Waveframe to Akai
 (Converts a Waveframe/MMR-8 project to an Akai project)

Waveframe to Pro Tools
 (Converts a Waveframe/MMR-8 project to a Pro Tools 4/24 session)

Fairlight (MDL) to Akai
 (Converts a Fairlight MDL file into an Akai project)

Fairlight (MDL) to Pro Tools
 (Converts a Fairlight MDL file into a Pro Tools 4/24 session)

Akai to Akai-Fairlight
 (Converts an Akai project to a Fairlight file on Akai disk)

Pro Tools to Akai-Fairlight
 (Converts a Pro Tools 4/24 session file to a Fairlight file on Akai disk)

Waveframe to Akai-Fairlight
 (Converts a Waveframe project to a Fairlight file on Akai disk)

OMF to Akai-Fairlight
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keys to select which machine's tracks are viewed on the VGA display. It is possible to connect two DL-1500s and associated RC-15s together with a bunch of DD8 Pluses and/or other Akai machines to the same AkaiNet. This allows the sophisticated control required by 2-man film operation.

The highest compliment I can pay Akai for its film dubbing solution is that it succeeds in providing the same degree of control and tactile 'feel' as the best analogue film dubbers. This translates to instant comfort for anyone used to 'the old way' of doing things combined with all the advantages of digital recording over analogue film. The DD8 Plus ramps up and down almost exactly like a film machine, and provides high-quality scrub and 'chatter' audio at up to 5x play speed in either direction. And you can bang this machine in and out of record as fast and as often as you like. There need be no more drop-outs, no more bad changeovers (punch-ins) unless it is your fault for not matching levels and no more biasing up on every roll of film. Anybody who has grown up tolerating the transport dynamics of most DAWs should try one of these to see what they are missing. With 24-bit recording the dynamic range is now more than adequate for film mixing.

Akai has also done a great deal to ameliorate another criticism of digital dubbers, lack of file compatibility between manufacturers. Akai has always been better than most manufacturers at delivering software updates on time, even early, with one dishonourable exception. The DD-1500 Trim functions have always attracted criticism, particularly the lack of crossfades within tracks and the number of key presses required. Akai has long promised an update. The good news is, it has been worth the wait. I have been playing with a beta version of the enhanced Trim software. It should be released by the time you read this.

A LOT OF workstations offer superficially similar editing functionality. It is a sign of the maturity of the technology that, for intensive work, it is the speed and ease of use for specific tasks, which are now the issue rather than a huge feature count. From what I have seen so far Akai will have a strong claim to having the fastest dialogue editing machine going. The software has been developed in close liaison with practising editors and is clear and logical. Key presses are kept to a minimum. The options and 'smarts' are limited to the ones you really need and will use all the time without cluttering the interface with a lot of features which will be seldom if ever used. For example, once trim is selected, the outgoing or incoming audio or the central edit point

can each be adjusted with a choice of equal power, linear or logarithmic, automatic or manual crossfades. You also have the option to trim the cue, slip the source audio leaving the cue where it is, slip the cue or slip the track. The ability to slip the source audio is particularly useful where you hit an unfortunate moment in a short cue (like a bit of fill-in atmosphere) which is referencing along source file. Once happy with an edit you can jump to the next without leaving trim. Indeed, you can also jump to the nearest edit on a different track or tracks if required. While trimming, one key press determines whether you hear the outgoing or incoming audio regardless of which is being trimmed. The PLAY TO, FROM and

OVER keys will also be useful.

There is always a trade-off between a shallow learning curve and ultimate speed of operation with an experienced editor. I think Akai has the balance better than most. These powerful tools are quite easy to learn without being totally intuitive and once learnt will enable the editor to be highly productive.

The same editing software will also appear for the DD8/DD8 Plus with DL-1500 for applications

where this is appropriate.

By remaining focused on the applications for these products Akai has avoided the trap of overloading them with features. What the units do, they do well, what they don't do you almost certainly don't need. ■

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Sony MDS-DRE1

Aimed at the DJ but certain to have applications elsewhere, Sony's new MD machine is sophisticated and stylish. **Dave Foister** explores its use in pro audio

THE FACT that MiniDisc has been brought back from the brink of oblivion and is belatedly starting to take off in the domestic market can be attributed in no small way to the success it has achieved in pro circles. Initial misgivings about data compression were outweighed by the sheer convenience of the medium, and in areas like sound effects and radio it has become standard equipment. DJs, too, will have seen the appeal, Sony, keen to make them feel wanted, has come up with the MDS-DRE1, specifically aimed at live DJ operation, but with features that will undoubtedly have uses elsewhere.

DRE stands for Digital Remix Enabler, and the intentions are clear from both the prominence of certain controls and the overall styling. When I opened the box I was quite unprepared for the sight that confronted me, challenging the idea that equipment needs to be dull. This is a design to draw the eye, but more importantly to present essential controls in such a way that the machine can effectively be 'played' by the operator.

All the controls are on the top, with the disc slot hidden on the front edge. There is a big display area at the top, but the most obvious things on the panel are a huge wheel and eight big pads, both of these have functions that are immediately obvious; although the degrees of subtlety afforded by both are not. The pads are clearly for playing tracks, and, although the idea of ready access to several tracks at once is not new, the layout and flexibility possibly are.

The basic setup is simple. When a disc is put in the slot, the machine reads the TOC in the usual way and then puts its tracks under the eight pads ready for quick access. There are four banks of these, stepped through with an adjacent button and shown in the display, so that up to 32 tracks can be accessed extremely quickly indeed. The access time is just as fast as you would expect from MiniDisc, and you might have thought that would be fine for most purposes. Where even more speed is needed, or where the beginning of a track is not what is required, other modes come into operation.

One of these uses an idea sometimes seen on CD players, where the machine will cue to the start of actual audio at the beginning of a track, not the point where the flag says it should be. CD flags are often several frames early, and

presumably the same goes for pre-recorded MiniDiscs, and the difference when that button is hit can be significant. Extra subtlety is added here as there is a parameter in the Setup menu for determining the level to be regarded as silence, and how close to the start of audio the machine will cue itself.

For really fast starts the MDS-DRE1 has a Hot Start function. Up to eight tracks can be programmed in sequence to appear under the pads, and the machine apparently spends a short time loading the start of each into memory so that when the pad is hit, the track starts immediately. Selection of the eight tracks is controlled, like several other functions, by a rotary encoder called AMS, which under normal circumstances is used to choose a track to play as an alternative to the pads. Once the pads are loaded, playback of the chosen tracks really is instant, to the extent that they can be played with the fingers like a sampler.

So far we have not used the big wheel, and it should be pointed out straight

away that despite appearances this cannot be used for scratching effects. During playback it can be grabbed and moved to affect the playback speed, but it is primarily there for finding cue points in either of two ways. If the unit is in Pause, it will scrub the audio in the expected way, but the quality of the scrub is a bit disappointing, more like the jerky scrub on a typical DAT machine than the smoothness you might expect from an MO or hard-disk system. It is not easy to control and hard to hear what is going on. On the other hand, the Cue mode is more like the systems used to rehearse HD markers on DAT and other machines; a point is selected and the following 3s are repeated while the cue point is adjusted with the wheel. This method is much easier, and once a point is found it is stored with the track that contains it. The AMS knob can be set to access these points rather than the track starts if required, and even more usefully the cue point of a particular track can be



put under its associated pad instead of the track start. There is a green LED above each pad to show that there is a track corresponding to it, and this turns red when the pad is set to play from the Cue rather than the start.

Several other functions are provided specifically with the DJ in mind, but with other applications as well. Looping a section of a track is very straightforward; hit the LOOP IN button at the start and the LOOP OUT at the end of the section to be looped (up to a maximum of 20s) and the unit immediately loops the chosen bit, glitchlessly and as seamlessly as your button bashing allows. The points can not be edited, but for these purposes catching the points on the fly is easy, and the chosen loop points are stored in memory for later recall even when the loop is stopped.

Two sliders are provided under the right hand for tempo and pitch; note that these are separate controls, giving away the fact that either can be altered without affecting the other. There is a good range available on both; although for safety I would have liked to see the facility to lock them out as they are a bit vulnerable to accidental operation, and the only indication that they are set 'off' is a rather gentle detent in the middle.

The machine has one very curious function that doubtless has its uses; although offhand I can't think of many. Besides its conventional recording facil-

ities, it has a feature called Back Track Recording, allowing it to record and playback at the same time. One suggestion is the recording of material from a CD while another track is playing back, ready for subsequent playback, and another is recording a mix of the track being played with other components—a kind of grown up sound on sound facility, but without the destruction of the original track. Details of how this is achieved are not given, but the new material is recorded on to a blank portion of the disc. The fact that various control operations—using the pads, the dial and the Loop function for instance—slow the process down and risk aborting it altogether suggests that there is a big RAM buffer in there somewhere and the same head is doing both jobs.

With all the special stuff the MDS-DRE1 can do, it is almost a surprise to find it also has all the other features offered by the MiniDisc format. Full editing facilities are provided, with the ability to divide and join tracks, and for this, surprisingly, the edit points are found using the AMS knob rather than the big scrub wheel. The whole process is adjustable, from the length of the portion the system repeats when finding the cut to the increments the knob advances in, and there is an Undo function. Track

and disc names are catered for, both writing and reading, and shown clearly in the big display window. The usual selection of procedures for programming sequences of tracks, repeating, and single play modes are provided.

One slightly disappointing aspect from the professional point of view is the provision of inputs and outputs. There is no digital out (ins are on SPDIF phono and optical) and the analogue connections are only on -10dB phonos. Maybe in the situations its intended for this is all it needs, but with the plastic cabinet and the emphasis on styling it rather undermines any pro aspirations it has. I was also surprised by how low the headphone output was—if ever a machine needed plenty of oomph this is it.

On the other hand the facilities, wherever they were intended for, clearly have a lot of potential in a variety of pro uses, and the controls look to be capable of withstanding a reasonable amount of punishment. Besides this, the sound quality is up to what can be expected of a modern MD player. Odd as it is, the layout lends itself to easy operation and allows complete access to anything of any importance, and the result is a machine that some people in some areas will find warrants closer inspection than the appearance might suggest. ■

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Studer A5

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

See it on the Internet website:

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

Studio Sound's 'bench test' loudspeaker reviews continue with the A5. **Keith Holland** reports

THE STUDER A5 is a 3-way active loudspeaker comprising a 250mm bass driver, a 120mm cone mid-range, and a 25mm dome tweeter that radiates through a shallow (15mm deep) axi-symmetric horn. The power amplifiers and crossover network are built-in to the cabinet which has external dimensions of 590mm by 320mm by 375mm deep. In the review sample, the drivers were arranged vertically on the front baffle, but the mid- and high-frequency drivers are mounted in a square sub-baffle that looks as though it can be rotated through 90° for horizontal



(landscape) or vertical (portrait) orientation. Along the bottom of the front baffle is a slot-shaped bass reflex port. Signal input is via an XLR-type socket on the rear panel where there are controls for sensitivity and HF roll-off. The A5 appears to be well built and is heavy for its size. No documentation, except for a frequency response plot, was supplied with the review sample, so figures for maximum sound pressure level are not available.

The on-axis frequency response for the Studer A5 is shown in Fig.1. It can be seen that the response is the

flattest of all of the loudspeakers tested so far in this series, lying between ± 2 dB from 45Hz to 20kHz, with the -6dB point at 38Hz; a remarkable result. The low frequency roll-off appears to be 6th order which suggests the employment of a high-pass protection (subsonic) filter. The harmonic distortion performance is good, with both second and third harmonics peaking at -40dB (1%) at around 50Hz. The horizontal off-axis response (Fig.5) is very smooth with no evidence of lobing, mid-range narrowing or other response anomalies up to 17kHz, where there is a null in the response at 60°. The very smooth and gradual narrowing of the polar pattern with increasing frequency exhibited by this loudspeaker is a characteristic that is considered by many to be optimum for many monitoring applications. The vertical directivity (Fig.6) is also well controlled except for the tell-tale dip at the crossover between the mid and high-frequency drivers; an unavoidable consequence of the use of non-coaxial drivers. The step response (Fig.3) suggests that the high-frequency driver may be phase-reversed compared to the mid- and low-frequency drivers. This compromise is necessary with some crossover designs to maintain a flat frequency response (for example with second-order networks) and its audibility or otherwise is still the subject of debate. The acoustic centre result

(Fig.2) shows that the low frequencies are delayed by an equivalent distance of over 3m compared to the mid and high frequencies, due to the combination of a ported cabinet and a high-pass protection filter giving a 6th order roll-off. The waterfall plot (Fig.7) confirms the low frequency group delay and

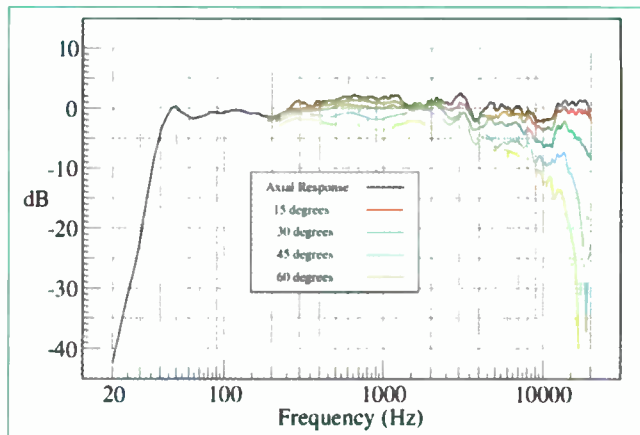


Fig.5: Horizontal directivity

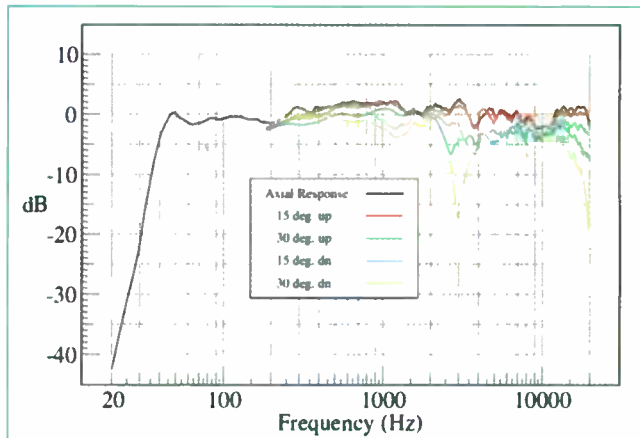


Fig.6: Vertical directivity

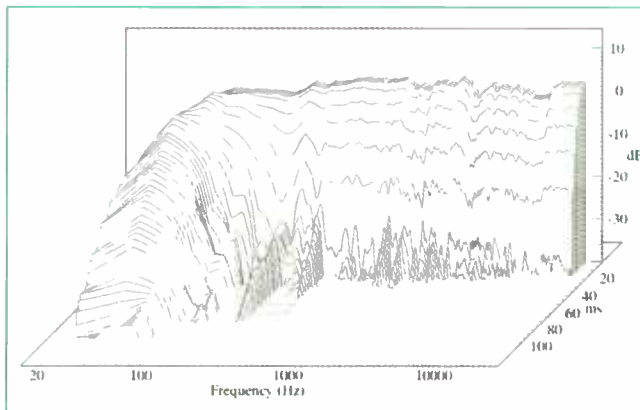


Fig.7: Waterfall chart

shows evidence of some minor ringing at 220Hz and 400Hz; at higher frequencies the decay is very rapid. Finally, the power cepstrum (Fig.4) shows little evidence of reflexions, save a minor echo at about 200 μ s; a confirmation of the flat frequency response. Overall, the A5 is a very impressive performer. The on-axis frequency response is extremely flat, and the directivity

is very well controlled. Harmonic distortion and time-domain performance is good except for the LF group delay which seems characteristic of many monitor loudspeakers. Have any readers carried out experiments (controlled or otherwise) into the audibility of high-pass (subsonic) protection filters? If so, we would be interested to hear from you. ■

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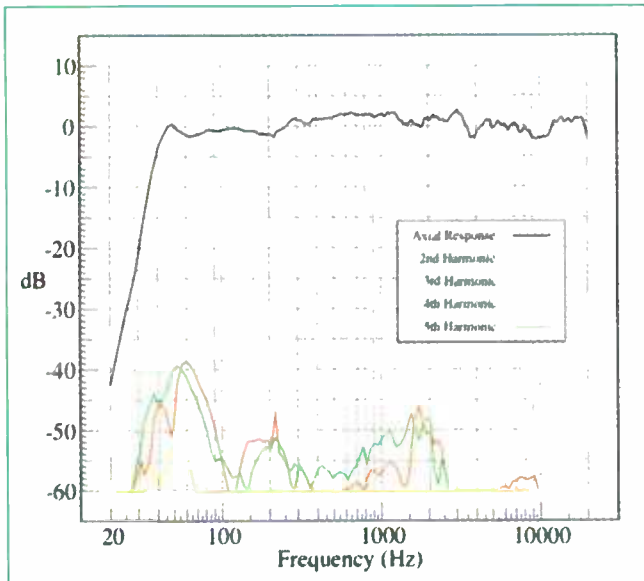


Fig. 1: On-axis response and distortion

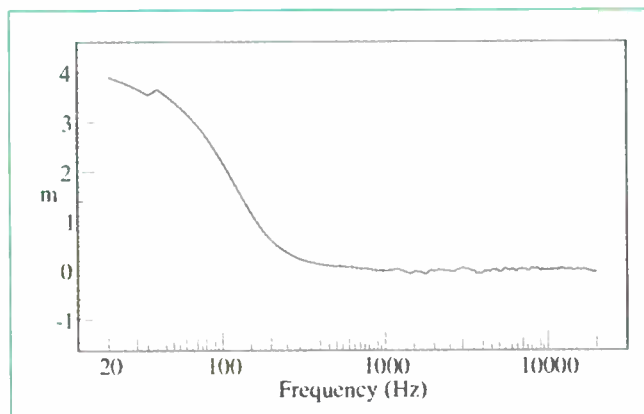


Fig 2: Acoustic centre

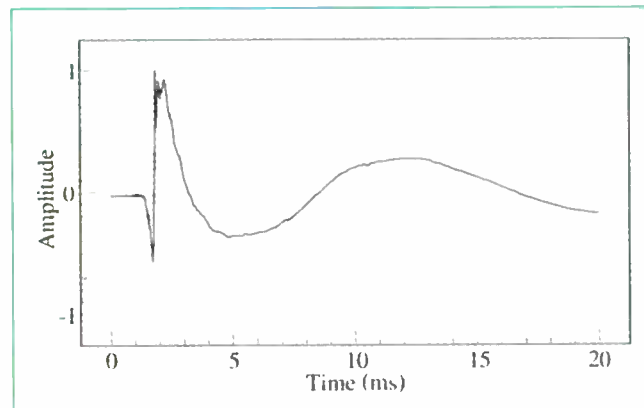


Fig.3: Step response

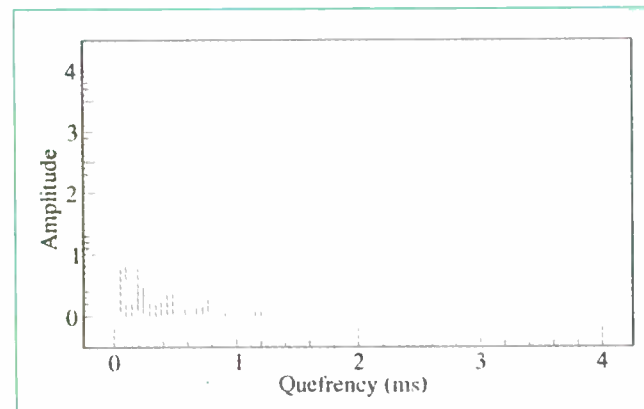
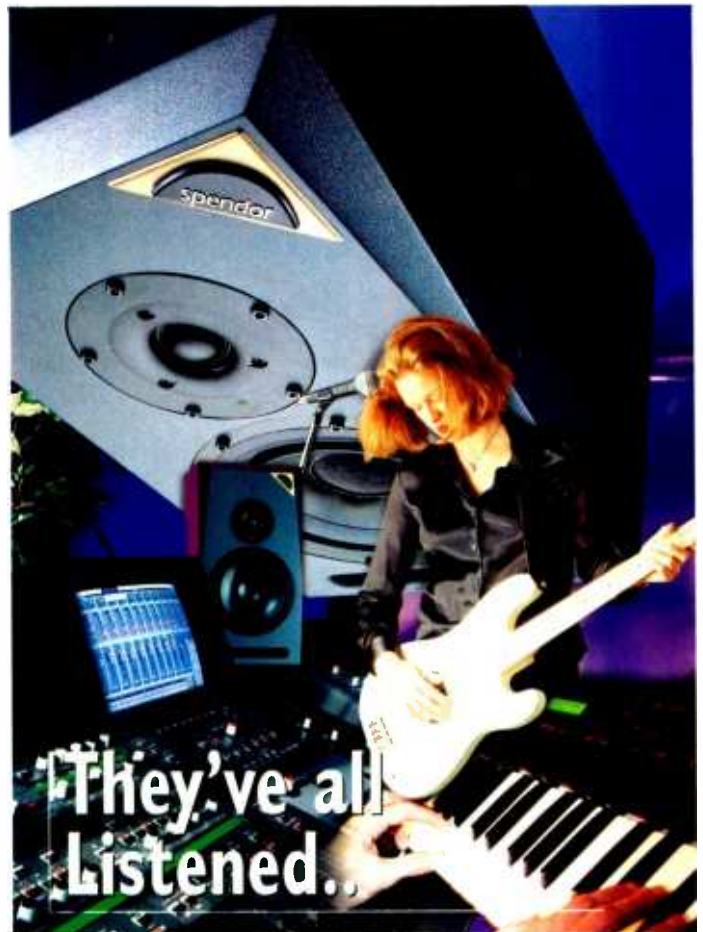


Fig.4: Power cepstrum



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CD Quantegy GP9

Quantegy has introduced GP9 Grand Master Platinum analogue mastering in response to requests for tape that is 'fatter, hotter and clearer' according to the company. GP9 boasts extended high and low frequency response, higher pigment-to-binder ratio, improved calendaring and optimal flexibility. The metal reel that houses the tape has thicker flanges, a solid back flange and is coloured red. The tape is available in TapeCare box or standard Tyvek. The company has also released



recordable MiniDisc media and claims its CD-R media is the most archivably stable available due to its commitment to using gold. **Quantegy, Europe. Tel: +31 24372 7402.**

Hafler smaller monitors

Based on the larger established TRM8 monitor, Hafler's TRM6 2-way, biamped active speaker is being offered at \$1,399 a pair. The monitor is magnetically shielded and based on Hafler Diamond series amp technology with a claimed free-field response of 55Hz–21kHz ±2dB. The speaker incorporates a 1-inch soft-dome tweeter and 5½-inch polypropylene woofer. The front panel has power, clip and thermal LED indicators while the rear houses XLR and phono inputs with DIP switching of balanced operation, input sensitivity, tweeter-woofer mut-



ing, and bass and treble shelving. The model is complemented by the TRM10S powered subwoofer using a 10-inch driver.

Hafler, US. Tel: +1 602 967 3565.

Millennia's Twin

Millennia Media has launched two 'Twin Topology' products as a merging of >

Studio Sound November 1998

Neotek MicMax

There's no shortage of expensive hype in the mic preamp market, but **Dave Foister** finds a basic product that sounds as clean as it looks

IT WAS ONCE GIVEN barely a second thought, yet now it is, perhaps, the most hotly-contested area of our market. The apparently mundane job of amplifying a microphone signal to bring it up to a more robust line level has become the domain of some of the most esoteric products in the business (with prices to match), and while some preamps entice with extra bits like A-Ds, EQ and dynamics, others ask us to buy them purely because they do better a job that once was taken for granted. To win our favour they need to persuade us either that they are spotlessly clean or that they have a character that once was treasured, but has since been lost. The former tack is indicated by the use of words like audiophile, reference and precision, and new in this corner is the MicMax Precision Microphone Preamplifier from Neotek.

In the bid for attention we must not forget the importance of appearance, and here Neotek has managed to find a new look—no mean feat in the face of the multicoloured stylists' triumphs now so commonplace. The 1U-high front panel is finished in what looks like the kind of white enamel used on washing machines, with three black panels recessed into cutouts. One of these carries the ON-OFF switch and the logo, while the other two handle the two preamplifiers themselves.

By and large the facilities on offer are no more than the essential functions of the mic pre's job. There are no fancy extras (with the exception of one small detail) but everything necessary for the basics is there, albeit presented in a slightly unusual way. Push-buttons are provided for phantom power, phase reverse, a 20dB pad, and a 80Hz high-pass filter, and also—this is the unusual bit—for impedance selection. The default input impedance is 1.5kΩ, but the switches allow this to be changed to 500Ω or 10kΩ. This last I found particularly useful with a Soundfield ST250, whose output can not decide whether it is at line or microphone level, and whose sound opened up perceptibly when terminated with the higher impedance. I had nothing to hand to experiment with the lower setting, but the problems of low impedance microphones driving into standard modern preamplifiers are familiar enough, and no doubt this would go some way to solving them.

The most distinctive characteristic of the MicMax is the means of adjusting the gain.

There is just the one pot on each preamp, and this does no more than fine trim the gain by 5dB either way. Coarse adjustment is on a pair of nudge buttons accompanied by a large 2-digit display, switching quietly in 5dB increments from 20 to 65dB. The display is virtually invisible when the unit is powered off, and the big bright numbers come as something of a surprise when it is switched on. Beside them, and also unsuspected until they spring into life, are a pair of output level meters using LED bar graphs. There is no peak hold and no calibration other than turning red at the top, but they are useful nonetheless.

The displays have the usual decimal dot after the second digit, and here it is used to show when phantom power is switched on. Everything else is only visible by means of the button positions, and as the buttons are black on a recessed black background the settings are not always obvious. By contrast, the gain settings are visible from the other side of the room, and this is useful as they need to be checked from time to time. Despite the digital control, the settings are not memorised when the power is removed, so the gain always comes on at its minimum of 20dB. This may be a deliberate move to avoid nasty surprises if somebody is shouting into the microphone when it comes back on, but is in my view a retrograde step. When a session

spreads over more than a day you expect to be able to walk back in and pick up where you left off, and one would have thought the days of having to log equipment settings were long gone.

But this is a trivial inconvenience as the MicMax is unquestionably a fine preamplifier. It is quiet, neutral and open, and its ability to deal with high levels is illustrated by its +30dBu output headroom. The output is available balanced on XLRs or unbalanced on jacks, although the only input is the microphone XLR—there are no special instrument or line inputs. This places it firmly in the category of purist direct microphone to recorder paths, and this is how I used it for the most part, gaining a clear advantage over the console pres.

The MicMax avoids the elitist pitfall of putting so few facilities on the preamp that it is only any use under ideal circumstances, but also shuns the frills that distract from the central purpose. Its useful twists make it easy to set up for optimum results, and its quality makes it a serious contender. ■

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SPL Qure

Are your vocals woolly, is your mix going soft? **George Shilling** discovers a sound enhancing German cure

ESENTIALLY, SPL's exotically named Qure is a dual-channel parametric equaliser. Housed in a smart 2U-high box, each of its channels offers full 3-band parametric EQ, high-pass and low-pass filters, input and output Gain controls, and Qure controls. Rear panel layout is good, with both XLRs and jack connectors, and additional inverted legending for anyone peering over the top while patching. A GROUND-LIFT button and a voltage selector are adjacent to the IEC Mains-socket.

The channels are arranged side-by-side, but much panel space is given over to large grilles showing off two glowing Sovtek 12AX7 valves—it's pretty, but the space could have been used to improve the layout. On powering up, an unnecessary WARM UP LED glows until the READY LED kicks in after a minute or so, this slow voltage build-up is claimed to lengthen valve life. Each of the three EQ bands has an ON switch, and there is a combined ON switch for the two filters. The red switch at the far right-hand-side labelled MASTER is an overall bypass, activating both channels simultaneously with a satisfying relay click. With MASTER in and all other buttons out, there is a noticeable warming of the sound, as the valve circuitry and associated GAIN controls become active. Even with the GAINS set at zero, there is a small level boost, which will undoubtedly enhance your signal.

Confronted with a sea of 28 identical black knobs, the layout is initially confusing. These very smart knobs unfortunately have no pointers along their rather deep sides, therefore accurately lining-up with the legending is slightly tricky, despite the detents intended to make recalling settings easier. The FREQUENCY knobs each have 31 steps, which slightly impedes smooth sweeping, whereas the OUTPUT GAIN has only a centre detent, making accurate recall difficult. On each channel, INPUT GAIN (-12dB to +18dB) is at top left, with OUTPUT GAIN (-7dB to +4dB) at bottom right. The middle three columns of knobs on each channel are the parametric controls, with FREQUENCY at the top, BANDWIDTH in the middle and BOOST-CUT at the bottom. Frequency ranges are marked as 15Hz-365Hz, 0.2kHz-5.0kHz and 1.0kHz-21kHz. Bandwidths (BWs) are marked 0.5 to 5, and Boost-Cuts are marked

±15dB, except for the mid band, which has the same +15dB boost, but up to -36dB cut. LF Cut is 40Hz-200Hz, HF Cut extends downwards: 20kHz-2.5kHz. These are both 2nd-order Butterworth filters. The EQ uses proportional Q, where the amplitude of the processed frequency band is reduced as the bandwidth broadens. This means that a maximum 15dB boost can actually be between 12dB and 16dB at the centre frequency, and the quoted 36dB mid-range cut can be as little as 22dB with the broadest bandwidth. Different technologies (valve, transistor...) are used for each band. This can lead to 'worst of all worlds' degradation, particularly with regard to phase accuracy.

The QURE control itself is marked from Min/0 to Max/20 and accompanied by QURE ON and SHIFT QURE buttons. Switching on the Qure section introduces a coil-condenser-resistor filter network into the tube output stage. Adjusting the QURE knob changes the frequency response and is claimed alters phase response, although without an oscilloscope it is impossible to assess technically what is happening. The manual claims a 'sonic blur' reduces 'digital harshness', particularly on vocals.

While SPL's Qure arrived working and with a manual, the manual was in German. It is forgivable because this is a new model, but what is unforgivable was that two calls to the distributor failed to elicit one. Even the manual on SPL's otherwise excellent Web site refused to download. It was eventually

e-mailed, accompanied, of course, by an apologetic telephone call from Germany and was good, if a little dry.

In operation, style has edged out functionality by a small margin. That is a shame, because audio performance is excellent, with quoted frequency response 10Hz to 100kHz and good S-N ratio. The Qure effect is fairly subtle, sounding at maximum much like the application of several dBs of mid-hi boost (or mid boost in Shift Qure mode). It perceptibly reduces woolliness, and

when processing a mix enhances vocal clarity. Switching in the process makes the signal louder by several dBs. The effect is rarely offensive, and less irritating than some enhancers. While the Qure is the focus of the box, the EQ is definitely no afterthought and this unusual unit is a must-try. ■

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NEW TECHNOLOGIES

class-A valve and class-A solid-state circuitry in the NSEQ2 stereo EQ and TCL2 stereo compressor-limiter. In both cases a front-panel switch selects either of the two circuitries. These topologies are entirely transformerless, high voltage and described as minimalist. The NSEQ2 has only one



active stage in the signal path compared to other designs that can combine from three to seven amp stages. The compressor also employs only one active stage. The solid-state aspects of both units consists of discrete JFET amps and the company will also be providing these JFET amps as the next generation of 990 Jensen and 2520 API plug-in compatible modules. Twin Topology products have new cosmetics which include illuminated push-buttons, hand-machined aluminium knobs, and extruded and radiused engraved face plate.

Millennia Media, US.Tel: +1 530 647 0750.

Apogee Solution

Apogee has previewed the project studio targeted Solution Series with the Rosetta AD as the first product in the line. The device has analogue inputs along with AES-EBU, ADAT, TDIIF and SPDIF interfaces



with bar-graph meters and large 'over' LEDs. Soft Limit is included together with UV22HR, a high resolution version of UV22 used to reduce word lengths. Shipping is expected before the end of the year. Apogee Electronics' DA2000 is a 20-bit D-A featuring six digital inputs—four AES-EBU and two SPDIF—with direct front panel selection, signal present indicators and input sampling rates of 32kHz, 44.1kHz and 48kHz. It also includes the company's UV22 super CD encoding system.

Apogee Electronics, US.
Tel: +1 310 915 1000.

M&K bass control

Designed for multichannel material, the Miller & Kreissel LFE4 studio bass management controller accepts full range inputs from the LCR, LS, and RS channels plus an input for the LFE channel and then provides an 80Hz high-pass filter for the five main channels and redirects the bass content >

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Marantz CDR630

Long heralded as the pro digital playback medium, CD-R machines are starting to drop in price. **Zenon Schoepe** reports

NOW HERE is an interesting little box if ever there was one. You must have been cooped up in solitary confinement for the last year if you have failed to notice the rapidly escalating take up of CD-R as a personal distribution media. Depending on who you ask, you will be told that the personally burnt CD-R is a replacement for the cassette, DAT and/or MD the last two of which, lest we forget, were replacements for something else themselves. It is the now completely wearable cost of the CD-R blank that has precipitated this action and you know that acceptance is at hand when you start to hear the media manufacturers trying to score points off each other.

The issue is no longer whether CD-R is good enough, it is a case of who can differentiate themselves as better within an established market. Throw in the interesting development of the rewritable CD-R as the answer to the last real objection to the one-take platter and it would seem that the circle is complete.

However, it is not just the drop in cost of the media or the drop in price and increase in choice of desktop CD duplicator machines (see page 41, this issue), a new generation of audio targeted CD-R recorders is attacking the market with this Marantz CDR630 responsible for making a lot of people sit up and listen with its sub £800(UK) tag. Similarly priced products are now being promised from other manufacturers. Marked with large 'professional' legending and sporting broadcast-style multi-coloured buttons this 2U-high Marantz beige unit handles the original CD-R audio and the new rewritable formats; although the manual does point out that 'an increasing number of players and recorders will be suitable for these discs in the future', in the case of the latter:



Control layout is straightforward, but then it should be as the machine includes few true Luxe features. Dedicated buttons take care of STOP, PLAY, PAUSE (also adds 3-second silence), track INCREMENT and DECREMENT, RECORD, FINALISE, and ERASE (last track or the whole disc in the case of rewritable media). CD sync handles the business of block recording a selection of tracks and digital I-Os provided are optical and SPDIF phono. Analogue inputs arrive at

-10dB/+4dB switchable XLRs with paralleled phonos. Analogue output is only available on phono. I might have been prepared to have traded these for grown-up outputs and passed on the XLR inputs as I believe most of this box's target market are likely to have assembled at least in part on a digital source. A reasonably sized display works in conjunction with buttons that select auto or manual track marking, input selection, and what the display shows and the whole lot is capped off with a fine headphones circuit and a nice stereo record level pot. A sample-rate convertor can be bypassed.

An infrared remote duplicates most front panel functions and adds direct numeric track access. It is fine for playback purposes but it just does not feel positive or substantial enough to trust it for recording. The rewritable erase processes require some nifty finger work if you are not to select the wrong mode. Erase last track asks you to hit ERASE and then hit RECORD within 2s while erasing the disc asks you to hit ERASE twice within 2s and then hit RECORD within 2s.

Getting this about face would be serious. I'll say right away that a long-term assessment of a CD-R machine's ability to continue to do what it is supposed to do are beyond the scope of an appraisal like this. CD players are not above misbehaviour with inexplicable jumps and clicks with hard use and meagre servicing, and it would be foolish to think that CD-R machines are somehow spared these vagaries. Certain early generation recorders did develop bad reputations eventually, and listening to the rumour mill is often the best way to be forewarned. However, the CDR630 seems almost too good to be true. It is outrageous value for money. The price is amazing, the performance solid, and it handles CDR-RW in to the bargain plus it will play these back should your existing machinery not be able to. The CDR630 works best in instances where you have prepared your master well and are just looking for a

machine to burn it on. Little things like the fixed duration silence record, non-peakhold metering and fixed threshold automatic incrementing position it at the entry level of CD-R machines, but then that is what it is. By the same token it makes it about as simple to operate as they come. If you have not got a CD-R machine already then it is probably time you did. Start looking here. ■

Marantz,
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Netherlands
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Fax: +31 40 2735578
Marantz UK,
Tel: +44 1932 854544

NEW TECHNOLOGIES

< to one of more subwoofers. It also provides an 80Hz low-pass filter for the subwoofer feed with 125Hz low-pass filter for the LFE channel, and ensures the proper relationship between the LFE and the other channels for the encoding format. The unit can also be used for stereo mixes and 7.1 formats can be supported.

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

tc electronics M3000

tc electronics has released the M3000 studio-effects processor containing several new algorithms, including 'advanced' reverbs, and is said to sit directly beneath the flagship M5000 processor. The dual engine true stereo unit features 24-bit converters and covers reverb, delay, chorus, flange, tremolo, dynamic EQ, pitch, phasing, soft compression, gating, expansion and limiting. Presets can be stored in internal RAM or external PCMCIA cards while connectors cover AES-EBU, SPDIF, TDIF, ADAT, MIDI and analogue I-O plus a pedal input. The news coincides with the showing of the Finalizer Express, a cost-effective version of the Finalizer Plus mastering processor and the MegaVerb TDM plug-in which is based on M5000 core technology.

TC, Denmark. Tel: +45 8621 7599.

Studer V-Twenty4

Studer has packaged together three of its V-Eight ADAT Type II machines into a 24-track system run by the Cockpit remote control and branded it as the V-Twenty4. New C4AD plug-in cards for the D19m modular audio convertor system allow it to operate at 24-bit A-D with the C4DA returning the same bit-length signal back to analogue. The new remote preamp for the D19m rack allows 1dB gain adjustment with phantom power, filter, mute and limiter under serial control. Meanwhile, Version 1.1 software for the D950

desk adds VCA-style control grouping of all functions, dithering capability on any selected output, full copying of module parameters to other modules and the saving and loading of multiple channel strips.

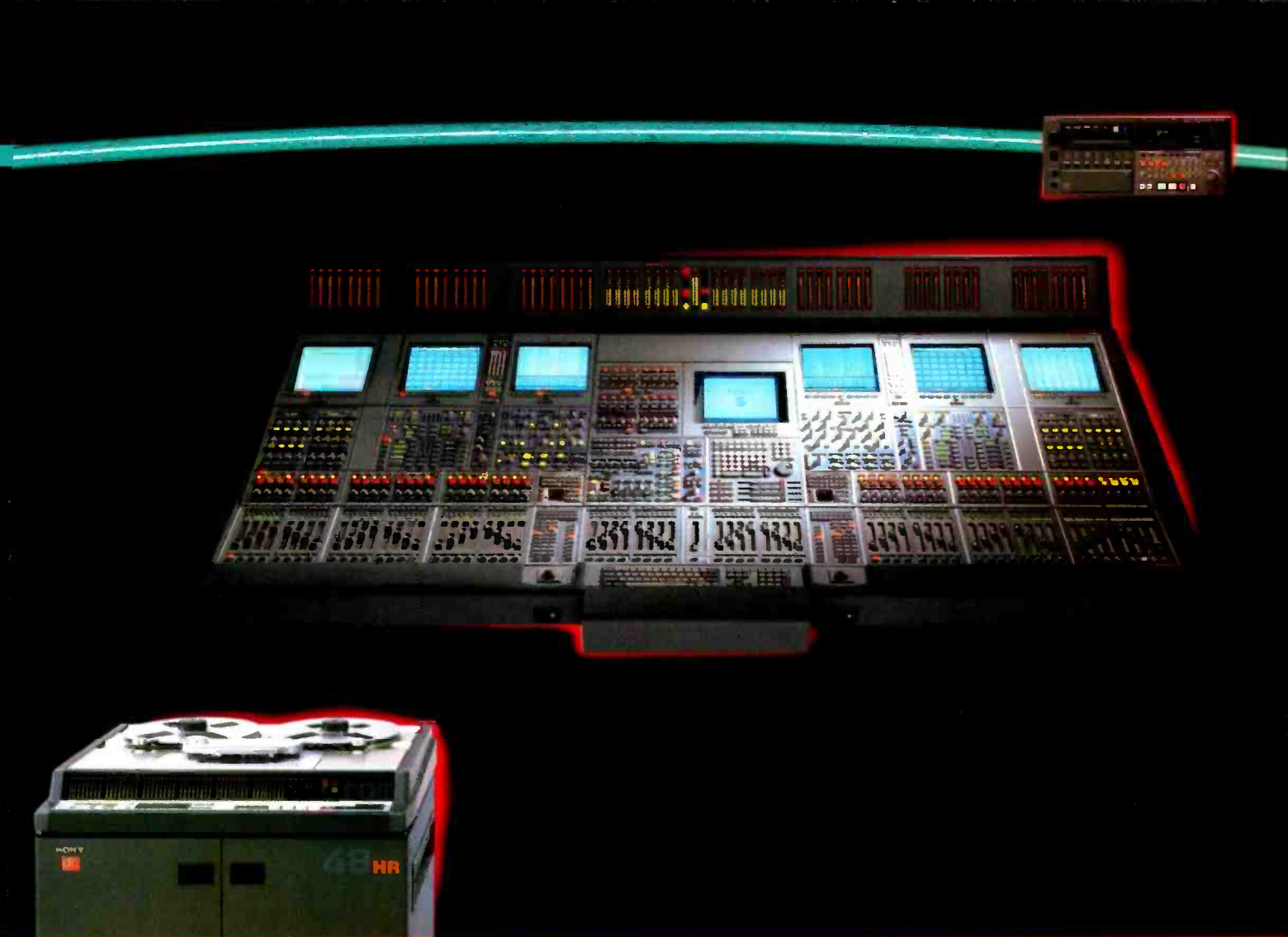
Studer, US. Tel: +1 408 542 8880.

Summit-Rupert collaborate

The result of much speculation in the last year, Summit Audio finally showed the fruits of its collaboration with Rupert Neve, the designer, at



the San Francisco AES. The MPE200 dual channel mic preamp and 4-band EQ is the >



OXF-R3 from Sony. Expanding the horizons of audio technology.

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Otari CDP-50

New to the CD duplication course, Otari has opened with a PC-controlled mid-market model. **Tim Frost** takes it for a spin

NEVER A COMPANY to see a niche opportunity go by, Otari has entered the CD duplicator business with the launch of the CDP-50. The new machine is of the automated variety of CD copiers, similar in concept to the TraxCopier (*Studio Sound*, October 1998), in that the master disc and discs from a stack of blank media are automatically loaded into the CD reader-writer using robotics, copied and then put onto a stack of finished discs. Unlike a tower system which has to be manually fed with new discs every 20 minutes, automated duplicators are ideal for unattended copying of discs, say overnight, where the copier can get on with the job and have all the discs copied by the next morning.

Although they share common basic principles of operation, each automated copier differs in the way that it implements the disc handling and more importantly, the user-interface. Otari has taken a retro approach, abandoning the general trend towards totally all-in-one units with their own small set of



buttons and a small LCD screen. Instead it has gone for full-blown Windows operation requiring the use of a monitor (not supplied) and either an external mouse or the finger-pad built into the front fascia of the unit.

Inside the Otari's case are the essentials of a standard Pentium 166 PC with a hard disk, and the now ubiquitous Teac 55 SCSI writer. The configuration includes rear connectors for SCSI, VGA display, serial port, PS/2 keyboard and PS/2 mouse and a diskette drive.

The robotic arm uses suction to pick up the top disc from the left spindle and place it in the open CD-R writer tray.

The tray closes and the Teac CD-R reads the disc (if it is the master) and puts its image onto hard disk. The arm then takes the disc out, puts it in the finished spindle and starts feeding the drive with blanks. This type of robotic control has two distinct pluses. For a

start, it is very quiet—the CDP-50 can hardly be heard in action—and because the arm takes the discs from the top of the input pile (rather than from the bottom as with the TraxCopier), you can put a new master on the top of a pile of blank CD-Rs, instruct it to make a few copies and then leave the

rest of the blanks in the machine.

Instead of custom building the electronics and duplication software, Otari has opted to take standard PC architecture. Microsoft's Windows 95 GUI and existing DupliDisc CD-R duplicator software from Padus and packaged it together. The means, inevitably that it is not as straightforward to use for the basic run-of-the-mill copying as duplicators with simple dedicated control panels. On the other hand, a monitor and a standard Windows interface makes it easier to navigate around the more detailed setup options than paging through a 4-line LCD screen.

The Otari will auto-detect the disc type being copied and users can select read and write speeds. Typically for audio these should be set to 1x or 2x for read and 4x for write. The disc image written to the hard disk can also be bit-for-bit checked against the master to ensure it is 100% correct and copies can be verified against the disc image. One nice touch is that the CDP-50 can be instructed to just check occasional copies. The software also keeps a log of each of the duplication actions, so that users can check the on-screen log to see if the duplication process went smoothly.

Like most automated copiers, the CDP-50 also operates in batch mode so that a number of masters can be loaded within the blank media spindle. The Otari will copy the first master onto the following blanks, until it encounters the next master, which it will then copy onto the following blanks until it encounters the next master, and so on. So, completely unattended, the CDP-50 can make single copies of 25 different discs—good for making archive copies.

At £5,000 (UK) without a monitor, the Otari is part of the new generation of moderate-cost automated duplicators. It has the advantages of using a monitor and Windows interface when changing parameters; although this advantage is offset by the greater complexity on simple everyday duplication. But perhaps an important factor to consider

with this system is the throughput it can achieve. With only one writer, the Otari can deliver three full discs an hour. While that is a commendable three dozen discs in a 12-hour period (and with no-one having to keep reloading it with blanks) it is not going to meet a rush job.

There is one other plus point for the Otari within the studio business, and that is the brand-name itself. It generates a certain amount of confidence that a CD-R duplicator—new to most music users—comes from a manufacturer that's been in the music industry and duplication business for decades. ■

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NEW TECHNOLOGIES

< first in the new Element 78 product line and is digitally controlled with the implementation of storage and reset from 25 memory locations with MIDI control. Each channel consists of a mic preamp with high-and-low pass filter sections and fully parametric 4-band EQ, but not valves. The MPE200 has class-A discrete transistor analogue amps with coarse and fine gain controls for each section, phase invert, instrumentation-type input amps, large dynamic range, floating and balanced output transformers, and traditional analogue style controls with numeric read-outs.

Summit Audio, US.Tel: +1 831 464 2448.

Dual CL1B

Tube Tech has combined two mono CL1B compressors into a single unit to give the dual channel CL2A opto compressor. Enhancements over the original unit include



5kΩ input impedance and the two channels can be linked for stereo operation and multiple units can be side-chain linked. Features include variable or fixed attack and release times, a valve push-pull amp, clickless relays for switching the compressors in and out of circuit, and balanced floating inputs and outputs.

Lydkraft, Denmark.Tel: +45 387 10021.

Sony real reverb

Sony's DRES777 24-bit sampling reverberator is claimed to generate reverberation based on actual acoustic environments. The box is said to be able to sample and recreate reverb from plates, for example, which can then be optimised for low noise. It offers surround or 96kHz expansion capability, although out of the box it sup-



ports mono in, stereo out at 48kHz. The DABKS703 expansion DSP board permits the selection of 2-in, 2-out stereo at up to 96kHz or 4-channel surround. Expected to start shipping in the spring of next year prices will start at \$5000 US.

Sony, Europe.Tel: +44 1256 355 011.

Neumann tube

The M147 Tube mic from Neumann (\$1,995 US) has at its heart the K47 capsule made famous in the U47 and U47 FET. The supercardioid boast, low self-noise for a valve mic, according to the company, and can handle a claimed 130dB SPL without distortion. The mic employs a modern valve complemented by a transformerless >

Now shipping



COURIER

The portable hard-disk recorder

V1.0 now shipping

Courier is the breakthrough in portable digital audio recording that journalists and sound recordists have been waiting for - V1.0 software is now in production.

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Editing is easy

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So much power and so light-weight

Courier uses standard camcorder batteries or AA cells, and comes with a power supply/charger that can be used in any country. It's light in weight 1.5kg (3lb), so it's not going to be a burden in daily use, and has professional XLR connectors..

Free software for life

You also get free software upgrades, available from our website, for the lifetime of the product. So, you can upgrade your own machine to the latest versions of software which will include complex editing and transfer of audio data over telephone line and ISDN line (optional).



It's easy to see why the Courier has won awards for it's design, being selected as a Millennium Product by the Design Council and winning the 'Pick Hit' award at last years' NAB show.



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Deltron AIR Patch Recall

As automation and recall systems become commonplace in the recording studio, the search develops for new things to automate.

Dave Foister follows a trail to the patchbay

AUTOMATION and recall are now so much the norm that it is easy to believe that everything we do can have such technology applied to it. In doing this we forget the glaringly obvious omission, the one central and basic area that retains archaic technology and relies on woodware for recall. That area is the patchbay.

Every session relies to some degree on patching. No matter how digital, no matter how automated, there is always a need for physical hook-up of analogue signals between boxes, and this hook-up must be reproduced exactly for the setup to be replicated. While putting together the Lyndhurst building AIR Studios saw the potential for a recallable patchbay, and the resulting design by Tom Schlum and construction by Deltron Components Ltd is now installed in three AIR rooms and also on offer as a commercial product.

Of course crosspoint matrix switching is commonplace, but for the environment of top-flight music recording it was felt to pose too great a threat to the audio integrity. The only implementation that would have satisfied the requirements would have meant a high-quality relay at every intersection, and this would have been prohibitively expensive. Instead, a system was devised using traditional passive patchbay components and patchcords but with electronics in place to scan the whole bay and record what it finds on a connected computer. The computer can be pretty basic by today's standards—the one you are about to junk would do—and it is linked to the patchbay by a single parallel cable. There is no attempt to use the electronics to make the connections; the idea, like the concept of many console recall systems, is to prompt the user to put the cords in the right places to reproduce the original patch.



The patch panels use standard Bantam jacks, but with only two rows in 2U of rack space. There is a strip for conventional written labelling, and between this and the jacks themselves is a row of LEDs mounted on a PCB running the length of the strip. When the computer is told to scan the patchbay, a small DC voltage is applied through a low value resistor (shunted to AC with a capacitor) to the ground connections of all the jacks in turn, and where current flows the system knows there is a patchcord in place. It then detects the other end of the connection by finding the other end of the current flow. The scanning process is quite spectac-

ular as the LEDs light in rapid sequence to show its progress—for clients impressed by flashing lights it is worth the money for this alone. In this way it can find the two ends of every cord in the patchbay and log them on the PC. The software allows every in and out to be named on the PC, and the system will even note where a patch disappears to a piece of equipment not connected to the main patchbay. This can be annotated on the computer to complete the picture.

When the patch is to be reproduced, the system uses the same flashing LEDs to show, in turn, where the cords were connected. Both ends of the patch will light until the cord is replaced, and when all the cords are in place the computer reports that the patch is complete. AIR reckons the whole process saves around 60% of the time taken to patch a control room, and there are other clear advantages: the risk of putting a plug in the wrong hole is far smaller when the hole is flashing at you than when you're trying to read the patch off a piece of paper, and at a pinch the patch can be assembled by someone who does not know one end of a patchcord from another, never mind what and where all the

signals are. AIR also uses templates as starting points for different types of commonly encountered sessions, another useful time saver.

It is possible to transfer patches between rooms, with the obvious proviso that the room setup must be similar. The system will also produce a print-out that could be taken to a non-recallable room to help continue work elsewhere.

It is important to realise that the system only does anything when told to scan or recall the patchbay, and at all other times is completely inert. While scanning it injects a small amount of noise into the system, particularly down unbalanced connections, but is silent during normal use.

There may be little appeal in broadcast, where the switched matrix provides the necessary instant reconfigurability, but for session use it would seem to be ideal. The patch is a one-off setup that may be added to or modified, but never needs to be radically altered at the push of a button, and this simple means of recording and reproducing it is really all that is needed. It seems to me that this system, offered as one of the

patchbay options on a large-scale console, would complete the picture and bring the patchbay into line with the rest of the studio's technology. ■

Deltron Components,
Atlas Works, Atlas Road,
London NW10 6DN.
Tel: +44 181 965 4222.

NEW TECHNOLOGIES

< output circuit for what the manufacturer describes as 'a more controlled, uncoloured audio signal from capsule to output'. Shipping will start in December.

Neumann, Germany. Tel: +49 304 1 772424.

Pocket generator

Minirator MR1 is the first of a new generation of pocket-size audio tools from Neutrik



and is an analogue audio generator. The lightweight and battery-powered instrument provides sinusoidal signals over the 20Hz–20kHz band at levels from -76dBu to +6dB including sweep at various speeds. A dedicated polarity test signal is included and pink and white noise signals have low crest factors and high repetition rates.

Neutrik, Liechtenstein. Tel: +41 237 2424.

Alesis effects

Heralded as Alesis' flagship processor, the Q20 20-bit master effects stereo unit combines ADAT and SPDIF digital interfaces, XLR and jack analogue I-Os and an integral PSU. Signal flow can be designed by the user using an LCD with 'virtual' patch cables connecting from more than 50 effects types for each of the eight available blocks. There are 300 programs in the Q20, 100 of which are factory presets while the rest are available for user storage.

Alesis, US. Tel: +1 310 255 3495.

GL2200 live desk

Allen & Heath has added to its sound reinforcement console range with the introduction of the GL2200—a 4-bus mixer available in 12, 16, 24 and 32-channel configurations. Based on the established GL2000, the new model adds channel direct outputs, mutes on groups, stereo returns and main outputs, a 12V lamp connector and an improved power supply. Other additions include an oscillator, pink noise generator and talkback routing.

A&H, UK. Tel: +44 1326 372070.

Fostex DAT upgrades

Fostex has announced that its D15 DAT >

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Drawmer MX50

Bringing its considerable experience to bear on traditional elements of signal processing, Drawmer's de-esser makes an unusual proportion. **Dave Foister** explores empowerment

THE DEDICATED de-esser is something of a rarity these days. Most compressors with side-chain access tell you how to do it in their manuals, and the programmable dynamics processors include it among their algorithms, but there are few boxes that set out to do this and nothing else. If anybody's going to provide one it is surely going to be a dynamics specialist, and who better than Drawmer?

The new Drawmer digital processors may be sexier news, but the MX50 is no less interesting for that. Two complete channels of sophisticated de-essing are provided, and this in itself is important when many more general-purpose units have to tie up both channels to do some of the things this can do.

The principle is simple and familiar enough, particularly in the basic mode of operation. Here the whole signal passes through a gain control element, but the side-chain that determines the gain reduction is fed with a filtered version of the input signal. A single control for the cut-off frequency of

a single steep high-pass filter decides how much of the upper end of the spectrum the VCA will respond to, and can be swept between 800Hz and 8kHz. The de-ess control then adjusts the gain reduction to be applied, up to a maximum of 20dB, and an LED meter shows how hard it is actually working. There is no threshold control, as the unit uses floating threshold circuitry that tracks the level of the input signal and de-esses as effectively on quiet passages as on loud ones.

In the case of a sibilant vocal, this is often quite sufficient, and is after all the normal way of doing it with a compressor and an equaliser patched into its side-chain. Sometimes the fact that the gain of the whole signal is being reduced can become too obvious, as the body of the sound starts to pump a little, and if the process is applied to a more broad-band sound such as drums, where it might be desirable to reduce the splashiness of cymbals, the problem is much worse. Here the thing just starts to sound like excessive compression, and another approach is needed.



NEW TECHNOLOGIES

◀ machine and Version 1.12 software is now compatible with Avid systems to give an inexpensive way to put an EDL call sheet of cues and cuts through the machine and batch digitise the data without the use



of a 4-head postproduction time-code machine. The company has also upgraded the software of the PD4 portable DAT machine to Version 2.30 at no cost to the owner. Off-tape confidence monitoring at the mixer is now possible and users have more user-bit functions to work with plus additional jam sync capabilities. Building on the success of its FD4 digital multi-tracker, Fostex has unveiled the FD8 8-track recorder. Storage is uncompressed 44.1kHz, 16-bit linear and the user is free to choose media. The machine accommodates 16 additional virtual tracks and any 8 can be played back simultaneously. An increased recording time mode called Advanced Digital Audio Acoustic Coding was codeveloped by Fostex and Matsushita



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NEW TECHNOLOGIES

to yield 20 minutes of 8-track recording from a 230Mb drive. The FD8 has an ADAT optical interface and copy, paste, move, and erase editing. A rudimentary mixing section is included in a unit that is expected to ask \$899 US.

Fostex, US.Tel: +1562 921 1112.

Lucid convertors

The AD9624 A-D and DA9624 D-A from Lucid Technology are 2-channel 24-bit, 96kHz convertors at \$899 and \$749 US respectively. The A-D accepts analogue inputs and digital outputs flow simultaneously through AES-3, SPDIF and TOS-LINK with 16-bit noise shaping on the first two.



The A-D effectively works on the reverse of these connectors.

LucidTechnology, US.Tel:+1 425 742 1518.

More H Series

Incorporating valve amplification, the Demeter H Series parametric EQ incorporates a solid-state parametric circuit that controls the gain of the tube at selected frequencies. It features 3-band stereo operation linkable to 6-band mono continuously variable frequency, Q, and up to >

Split band de-essing is often offered on dynamics-based multi-effects boxes, and indeed Drawmer's own M500 is a good example. With this technique the band above the chosen frequency is processed through a VCA while the band below passes through unaffected. This is clearly the way to avoid the overall pumping described above, but can be complex to set up and as mentioned can require both channels of a stereo processor. On the MX50 this mode is simply selected with a switch, and is available independently on both channels. The difference, on sounds that give problems with the full-band configuration, is immediate and startling. The manual warns that the phase shifting caused by the filter can be more audible this way, and on some material this started to show up, but this is a subtle by-product and a small price to pay for the facility to de-ess as effectively as this.

So well does it do the job that it is easy to overdo the effect and introduce a slight lisping quality, still without affecting the lower part of the spectrum. This is easily avoided, but even so there can be a tendency for the result to sound a little dull as all the frequencies above the offending area are reduced. Drawmer, of course, has an answer for this in the form of a switch marked AIR, a word that in other contexts can suggest some kind of harmonics generator or extreme HF EQ. Here it does neither, but alters both the side-chain signal and the final output to

retain the top end better. A 12kHz low-pass filter is introduced into the side chain so that the VCA ignores extreme HF, and a matching high-pass filter is introduced into a separate signal path to the output. Thus the final output consists of a mix of three signals: unprocessed lows and mids, processed sibilance that is now driven from a restricted band of frequencies, and unprocessed highs—a 3-way split I have not seen before, yet very easy to set up. So much so that this will generally be the default configuration for most jobs, without a doubt.

Stereo operation is provided for, but on the assumption that the sibilant problem may well be on one side only, both channels' controls must still be adjusted: the stereo link simply ensures that the image will not move around during processing.

In familiar Drawmer style, the manual contains a commendably clear explanation of what's going on, a comprehensive block diagram to clarify the various modes of operation, and several helpful suggestions, such

as the possibility of de-essing a reverb send from a topky vocal track so as to avoid kicking the reverb into excessive brightness.

This all adds up to a very powerful tool for doing an apparently simple job very well indeed, with unusual and useful complexity harnessed to a very straightforward front panel. Sometimes you just cannot beat a dedicated box. ■

COMMENT

**Drawmer, Charlotte St
Business Centre,
Wakefield WF1 1UH, UK.
Tel: +44 1924 378 669.
Fax: +44 1924 290460.**



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Shure KSM32

Breaking its established line in dynamic microphones, Shure has delivered a side-fire condenser. **Dave Foister** finds it a home

CHALLENGE YOU to name a Shure condenser microphone. There have been one or two for sure, but if ever a company was identified with a particular technology it is Shure and the dynamic microphone, of which I am sure you could name plenty. But apparently the upturn in the fortunes of the studio microphone has attracted Shure along with so many others, and this brings us the new KSM32.

Other than the badge on the front there is little to identify this as a Shure. Its curvaceous champagne-bronzed body has little in common with the familiar dynamics, and the fact that it is a side-firing design with all the trappings of a top-end studio condenser would put Shure low on the list of likely originators if you had to guess. On the other hand, the whole kit appears to possess the characteristic Shure ruggedness of build, and while it might not like being swung round by its cable it looks reasonably bomb-proof.



The outfit supplied to me came in a similarly indestructible flightcase, and comprised the microphone in a little velvety pouch, a swivel standmount and a suspension mount. There is another kit available without the suspension mount, and the microphone itself is also available in charcoal for situations where lower visibility is desirable. All the fittings are black, and although there is no dedicated windshield (the internal wind screening is felt to be sufficient for most applications), there is a thread adaptor supplied as standard: things are indeed looking up.

Both standmounts attach to the microphone body in the same way, using a screw-in collar at the base much like some of the big Neumanns. Both have a locking clamp and are certainly up to the job of supporting the KSM32; although at 490g it is not the heaviest microphone in the cupboard. The suspension mount holds the middle of the microphone body firmly in a felt-lined ring as well as fixing to the base, and isolates it well from vibration. Even with the more basic swivel adaptor resistance to shocks is pretty good thanks to internal shock mounting of the capsule.

The suspension mount avoids obscuring both the Shure badge on the front and the

control switches on the back. There are two of these: although neither is for adjusting the polar pattern; this is a single-diaphragm design with just cardioid on offer. What's left then is a pad, providing 15dB of attenuation, and a 2-position high-pass FILTER switch. The pad is unquestionably a necessary addition here, as without it the KSM32 can get unhappy with the kind of levels coming from an enthusiastic singer. With it switched in there's no problem. The BASS CUT switch is slightly unusual in having two settings that are not the normal variations on a theme: most have either two cutoff frequencies or two slopes, while this has a useful combination of the two. For rumble problems it can be set to roll off 18dB per octave below 80Hz—extreme but low enough to leave most of the signal alone—while for proximity effect compensation it can roll off a much gentler 6dB per octave below the higher frequency of 1.5kHz.

The KSM32 is, of course, phantom powered in the usual way, but while it is happiest with 48V it will apparently work with as little as 11V, an unusual and potentially useful attribute for a microphone of this type. In keeping with its aspirations it is a transformerless design.

If Shure has set out to place this microphone in a quite separate pigeon-hole from the ubiquitous stage dynamics then it has done a pretty good job. The frequency response is much flatter than might have been expected given Shure's fondness for deliberate presence lift. The published graph shows a few slight kinks from about 6kHz upwards, but it never deviates more than 3dB from the otherwise ruler-straight line. The specs also show an unusually consistent cardioid pattern at all frequencies, the only significant variations being a back lobe at 10kHz and a narrowed front at 15kHz—very respectable indeed.

This is all translated very well in the sound of the KSM32. It is a very smooth microphone, with an impressive top end that goes further than might be expected from a design of this type, perhaps reflecting the fact that the capsule is a little smaller than the 1-inch often found in side-fire condensers. This does not appear to have affected the bass response, however, which lacks little and remains smooth all the way down. There's plenty of bite retained in sounds possessing it to begin with, but never added hardness, and never any

sacrifice of fullness and roundness. Its overall performance marks it out as an ideal all-rounder, making no attempt to impose a character of its own but making a pretty good fist of voices, brass, strings and anything else you care to throw at it. It's a genuine alternative to many more established models, and given the chance could become as familiar a workhorse, particularly given Shure's legendary ruggedness, as any of them. ■

Shure Brothers,
222 Hartrey, Evanston
IL60202-3696, US.
Tel: +1 847 866 2200.
UK: HW International.
Tel: +44 181 808 2222.

NEW TECHNOLOGIES

< 15dB of boost or cut, input bypass and gain control with overload indicator. TRS and XLR connectors are provided for I-Os. As with all H series units the power supply is fully regulated. Suggested retail price is \$1,295 US. The H series Tube Direct Box Line Driver can be used as both line-level direct instrument input or as a line driver to add warmth to line-level digital interfaces. Features include 27MΩ input impedance, two independent channels with separate 1/4 inch inputs, ground lift, phase invert, unity gain (+6dB with balanced out) and a tube driven boost mode with 20dB of boost controlled by a continuously variable volume control and a unity gain output impedance tube driven output to drive external instrument amplifiers or effects. Suggested retail price is \$899 US.

Cemeter, US.Tel: +1 818-994 7658.

VSO for analogue machines

ATR Service Company has introduced the VS20 high resolution variable speed oscillator that is compatible with any analogue recorder using the 9.6kHz servo reference frequency. The device allows speed varia-



tions of 0.01% accuracy with repeatable results within 25ppm. Speed variation is shown on a large 5-digit LED display. Other products from the company include transformerless I-O modules and HDV2 valve reproduce amps for Ampex ATR102 recorders, complete ATR100 restorations and the MM1200 11+2 wide track multitrack headstack. The company has also boosted the performance of the ATR102 by doubling track width through a 1-inch 2-track modification. This, it claims, lowers the noise floor by 6dB per channel and removes the need for the use of noise reduction at 15ips.

ATR, US.Tel: +1 650 574 1165.

CHD-1 goes THX

Meyer Sound's HD-1 High Definition studio monitor, has been THX approved for use in the new THX Certification Program, THX PM3, which includes multichannel mixing and monitoring rooms. The monitors were released in 1989 and are used by George Duke, Roger Nichols, Tuck & Patti, Rob Eaton, Walter Becker, Record Plant Remote, and Effanel Music.

Meyer Sound, US.Tel: +1 510 486 1166.

Sound FX on the web

US feature film sound design team Sound Dogs has posted a large portion of its sound effects library and the Sound Ideas sound library on its web site (www.sounddogs.com) for purchase and use royalty-free by others. The sound database has sounds by category, subcategory, unique quality, >

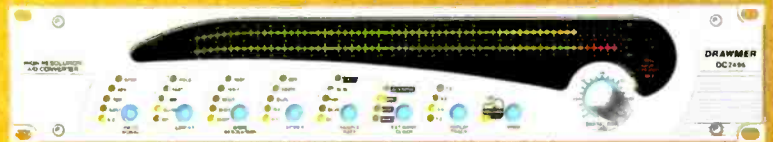
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Hooter Sound B1

Providing an analogue front-end for computer-based digital systems is a challenge **Dave Foister** looks at a bright yellow solution

TED FLETCHER is not one to miss an opportunity. With computers bringing recording possibilities into more homes than ever before, a market has offered itself in extra bits to service these activities at a rather higher level than the basic equipment will allow. This has brought us things like widespread adoption of multichannel digital audio interfacing, SPDIF on sound cards, and the growing recognition that the analogue signal path has plenty of room for improvement. While the voice channel has become a familiar concept (with JoeMeek enthusiastically involved there too) most of them remain out of the reach of the simple set up. Who better than Fletcher to simplify the idea even further and offer a decent preamp with dynamic processing with the obvious intention of raising the quality at entry level.

The result is the Hooter Sound B1, a startling yellow half-width box with black knobs controlling a simple yet effective signal path in a commendably straightforward way. The no-nonsense approach extends to the equally bright manual, explaining what the B1 does in layman's terms and making it easy to get results. The pro may find it a little basic, but



this should not stand in the way of checking it out as it has a surprising amount to offer.

Its central function is a proper microphone preamp, with balanced input and full 48V phantom. The phantom is even switchable, but the switch is hidden away on the back and therefore awkward if it is in a rack. The preamp's only other control is for its gain, with a good range and a simple LED output level meter.

Both the other functions have in-out switches, so in its simplest form the preamp just runs straight through via an output attenuator (and even a MUTE switch) to the unbalanced output jacks. There are two of these, labelled Line and Monitor, but they carry the same signal at all times.

Heard like this the B1 is very impressive, with a clean open sound that belies its modest paper specification. It is not going to offer any competition to the esoteric specialists we normally look at here, but it is comparable to a modest console preamp and that surely is its aim. But there is more to come; it may have no filters, never mind EQ, deny-

ing it the right to be called a voice channel, but it does have a compressor, a limiter and a gate squeezed into its small profile, all effective and so simple as to almost set themselves up. It also has an additional jack input for line levels and instruments, offering itself as a front end in all kinds of situations.

Note that the B1 makes no pretence at emulating the JoeMeek compressors—this is a VCA compressor pure and simple, with not an optocoupler in sight. Where it scores is in its extreme simplicity, with just two controls to cover everything.

Its ratio is variable from 1:1 to 8:1, but its attack is not adjustable; the release time is variable on an arbitrary scale of 1 to 5. The fact that it copes so well regardless suggests to me that there is some programme dependence built into the time constants; although the manual does not mention it. However it works, it makes a very good job of dealing with percussive sounds as well as more sustained ones, with little tendency to pump even when deliberately set inappropriately. The reason that there is no gain make-up control is that it happens automatically, which is a real bonus for the novice and pretty handy for the rest of us

as well. Turning up the ratio just makes the whole sound thicker and louder, which after all is usually exactly what's required.

The compressor section includes a peak limiter with no adjustable parameters at all and not separately switchable. It limits at 14:1 when the signal reaches +10dBu, and the knee from com-

pression to limiting is soft enough to make it a very benign limiter indeed. A flashing red LED shows its operation, even when the section is bypassed.

This is followed by the simplest gate you will ever see, with an on-off switch, a Threshold knob, and nothing else. Again no timing details are given other than to say that the attack is fast, but it is so straightforward to get good results that it must be smarter than it looks, with a forgiving release. There are plenty of gates and expanders stuck on as

afterthoughts to more grown-up compressors than this, and I have to say this is a good deal more useful than some of those.

The Hooter B1 is quite a treat, offering real quality and control to those who might never have encountered it before and in the process making itself potentially very useful much further up the food chain. It is quick and dirty yet clean at the same time, and live or in the studio, large or small, it could be worth keeping a few around to provide the quick fix when the serious stuff is all committed. And with that colour you'll never lose it. ■

Hooter Sound
Quay House, Quay
Road, Newton Abbott,
Devon, TQ12 2BU, UK.
Tel: +44 1626 333 948.

NEW TECHNOLOGIES

< and file name, and each sound is generally tagged with a one-paragraph description, where and at what time of year the sound was recorded, and its length. The price of sounds is determined by a combination of sound quality, 24-bit/16-bit/8-bit depths and 48, 44.1, 22.05, and 11kHz sampling rates are available in .AIFF, .AU, .WAV, and others.

Sound Dogs, US. Tel: +1 310-244-7988

APT adds

APT has demonstrated its Broadcast Communications Frame and Broadcast Network Transceiver. The former is an apt-based codec designed for direct dial ISDN and permanent link T1, E1, satellite and microwave and facilitates transmission bandwidths up to 15kHz stereo. It also features an integral X.21 DTE interface and is capable of operating four ISDN B channels with an integral terminal adaptor and comes with analogue and AES-E3U I-Os and sample-rate converter. The Broadcast Network transceiver NCXL384D is targeted at fixed digital links and caters for 22kHz stereo. Features include integral backup circuitry and an aux data capability.

APT. Tel: +44 1232 371110

Genelec's digital 1029A

The 2029A Digital Stereo Monitoring System is based on the Model 1029A 2-way, analog active monitor speaker and supports the same modes of operation, including use with a subwoofer. The 2029A consists of one right master speaker and one left slave speaker; stereo level adjustment is controlled by a single volume knob on the right master speaker. The monitor is designed to accept SPDIF signals with word lengths up to 24-bits digital or analogue inputs built into one of the speaker system's enclosures. A built-in D-A converter has an interpolator which increases the internal sampling



rate to 128X and yields a dynamic range of better than 101dB. Suggested Professional price for the system is \$1,325 US. The 1034B Active Monitoring System is a 3-way design for large control rooms in free-standing or flush mounted form. Featuring two 12-inch low-frequency drivers, a 5-inch mid, and a 1-inch high-frequency tweeter assembly, the 1034B can produce peak levels in excess of 125dB SPL @ 1m. Features include bass, mid-range and treble controls, Genelec's DCW and the ability to be used in vertical and horizontal orientations by rotating the DCW unit.

Genelec, Finland: +358 17 813311

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AT THIS POINT in its history, the only drawback to CD-R is the copying process. The cheap route to CD-R duplication is to use a PC with a CD-R writer, transferring the contents of the master to a hard-disk and then making copies one by one. With drives under £300 (UK) and usable on any cheap PC capable of running Windows 95, it is a sometimes effective, but always clumsy, solution.

The more discs that need to be copied, the less practical it becomes and PC copying is often unreliable with the vagaries of Windows and multitasking operations kicking in and destroying the copy process.

The real solution for duplicating CD-Rs is with a dedicated CD-R duplicator. With the massive rise in activity in CD-R over the last two years, copiers have come down dramatically in price and size, and improved in convenience, ease of use and reliability. Now there is a substantial range of copiers in the £1,000-£10,000 price band that give studios and publishers a range of alternatives to meet their own particular duplication needs—and once you have used a copier its unlikely you will ever want to go back to a PC-based system. Unlike PC copying, the dedicated copier does the job at a couple of button pushes. They should never generate buffer under-runs and the other complications that Windows generates to ensure that you spend time and money on failed copies. The work in making these stand-alone systems more compact also means that even the biggest take up no more room than a PC system. There are over a dozen companies now producing CD duplicators, from Alea to Otari, and nearly all have ranges that offer similar functionality and features.

The duplicators they supply fall into two distinct types, the tower and the autoloader. Tower systems mount a stack of CD reader-writers into a single case together with the copier's processor and control system (usually based around a PC architecture) and a hard disk. Tower systems offer the most scalable approach to CD-R duplicators. The smallest systems have just a CD reader and a single CD-R drive. This makes for copying convenience, rather than opening the door to large quantity duplication.

The bigger stand-alone systems come with eight drives or more, that can all be copying simultaneously—generating dozens of copies every hour. The alternative to the CD tower is the autoloading duplicator. These mostly look more like large, and strangely shaped microwave oven, that open up to expose a spindle that holds a large number of blank discs, anything from 50 to 150, and the copier's robotics that feeds the inter-



Do you copy?

CD-R is a cheap and universal medium for handling audio in a professional environment. **Tim Frost** examines the opportunities presented by CD-R copiers

nal drives with discs from the spindle. Not all autoloaders use spindles and robotic arms, some are similar to diskette duplicators using a chute to deliver the discs into the writer.

Since these machines normally have just one or two CD-R writers built into them, they cannot copy at the rate of a large tower. But then they do not need to be regularly fed with new blanks, so they can be loaded up, switched on and left to it, overnight if necessary.

The key to the newer generations of duplicators is the sheer ease of use. Most are operated from a set of six or eight buttons on the unit itself, that pages through instructions shown on an LCD screen. Operators need to know nothing about the technicalities of CD format, they only have to follow the instructions on the LCD; broadly the aim has been to make CD duplication as simple as operating a photocopier.

There are some basic functions that are common to nearly all duplicators. The first is the ability to automatically check what disc format the master is, verify that the disc complies to the format and setting itself up correctly for copying the disc. There are nearly two dozen variations on the CD, from the original CD-Audio to a range of video and data formats and the copies must follow the original format exactly. Most duplicators will handle the core formats: CD-DA, CD-i Video-CD, Enhanced-CD (pre-gap and CD-Extra) CD-ROM (Mode 1 & 2), Mac HFS, ISO-9660, Hybrid, CD-ROM XA (Form 1&2) and write in Track-at-

Once, Disc-at-Once and multisession modes. More exotic formats such as CD+G and the games console discs are less often supported.

All but the lowest cost one-to-one duplicators have a built-in hard disk of at least 1Gb that is used to capture an image of the source disc. Transferring the image of CD to hard disk speeds up the duplication process, as the duplicator does not have to read from the relatively slow CD-ROM drive for each further copy cycle and the verified hard-disk image is a more reliable source than CD.

A number of duplicator-publisher systems can be networked with computer systems. These are used to make CD-ROM discs using files downloaded from a main server. This is normally used for delivering computer-readable invoices for example, where the server automatically downloads all the invoice files to CD-Rs to be posted to individual customers. In audio applications, most duplicators can quite happily be stand-alone units, where everything you need is built into the one box. The more sophisticated tower systems also offer communication with the outside world in the form of a network adaptor to enable several tower systems to be linked together so that larger numbers of discs can be simultaneously copied.

This also can allow connection to external sources so that a disc image can be transferred directly from a PC or an audio workstation. Duplicators can check for various problems during the duplication process to try and ensure that the copies work. During the

< automatic selection of disc format, the duplicator should check that the disc conforms to the format's specification.

After the image of the disc has been transferred to hard disk, it can be checked against the original to verify that it is an exact bit-for-bit copy.

Duplicators then offer the option of a test-run. This puts the duplicator through the complete copy process, taking data from the master image and feeding it into the CD writer, but with its laser set to read power only. This may seem a bizarre function, but the idea is to check the whole write process for data bottlenecks, without actually wasting a disc. The test mode is only occasionally worth using on a duplicator, when a major parameter such as read or write speeds have been changed, for example.

The one test that is really needed—an immediate read-after-write to check what has been fed to the laser has actually recorded properly—is not available on CD-R. So the only way to be 100% certain that the copy is perfect is to do a final bit-for-bit verify of the copy against the master image. While all this verification gives confidence that the copies are perfect, it all takes time—you can copy another disc or batch of discs in the time it takes to verify a single copy. For that reason, most trust to the quality of the duplicator and the media and forget the test processes

unless something dramatic has altered, such as a change of media or duplication parameters.

Verification ensures that the disc is digitally perfect, that all the right numbers are in the right places on the disc, but it does not check on the small variables in CD performance that can alter the sound on the disc. In principle, a bit-for-bit copy should perform identically to the original so there should be no sonic differences between the master and the copy on any of these systems. However, a quantity of read errors and jitter, while not great enough to stop the disc playing or be seen as a data error, can affect the sound of the disc. Providing the master is read carefully into the copier's hard disk (single speed rather than 12x) then given good media the copy should be indistinguishable from the original.

Setting the system to higher read speeds can generate problems, both in getting the audio off the disc without errors and in creating sync problems within the duplicator as it tries to buffer audio being drawn off the disc faster than it can handle.

With the current range of drives and media, it is unlikely that write speed will have any effect on the copy's performance—sonic or otherwise. The real key to the quality of the discs produced will be in the mastering of the original CD-R, usually done on a dedicated pro-

fessional CD-R recorder such as those from Sony, Marantz or HHB.

There are a couple of other points to note when looking at a duplicator for audio work. The first is to ensure that the audio gets through the duplicator without hitting transfer problems that cause clicks on the audio track, especially when using high-speed read and write operations. Also, if the duplication work involves an amount of compiling tracks from a number of separate CDs or CD-Rs then some readers may not be able to be frame-accurate when starting from pause and it may be better to input the audio from an external professional audio player. The other feature to check is the ability of the system to transfer ISRC codes. This has been a problem in the past, although many manufacturers are now making a point that their machines do transfer all the Q subcodes fully and correctly.

Having been professional enough to use a copier to produce the disc it is a bit of waste to just write on the disc with a pen—after all if you have been as professional as to use a duplicator—flaunt it.

Discs can be well presented by using CD-R labels or printing directly onto the surface of the disc. There are a couple of ranges of CD-R labels—PressIT and Neato are the most visible on the market—and both come in packs including printing software and an >

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< applicator. The labels are run through an ordinary inkjet or laser printer and then manually applied to the disc. Although its still looks like a label, the image quality on photo-quality inkjets can impress. There have been questions as to the safety of using labels, but for short to medium term use, (a few years) they are unlikely to cause any problems. The adhesive does not damage the disc surface and the addition of the paper does not unbalance the disc in the drive.

The ultimate option is to use a dedicated disc printer. These use existing printer engines, but with modified feeders to take CD-Rs instead of paper. Many of the major brand CD-Rs are now available with special printable surfaces for inkjet or thermal printing and the resulting quality can equal, or exceed, full colour printing on manufactured CDs. Printers can be stand-alone, printing discs as a separate process or built in-line with an automated duplicator.

The overall future for CD-R duplication is looking healthy. Prices will drop further and the units are getting smarter, with more audio-specific functions and designed for the studio environment. As they also get faster with 8x writers that can copy a full CD in under 10 minutes the argument in favour of moving to CD-R and using a duplicator to do the work gets stronger and stronger. ■

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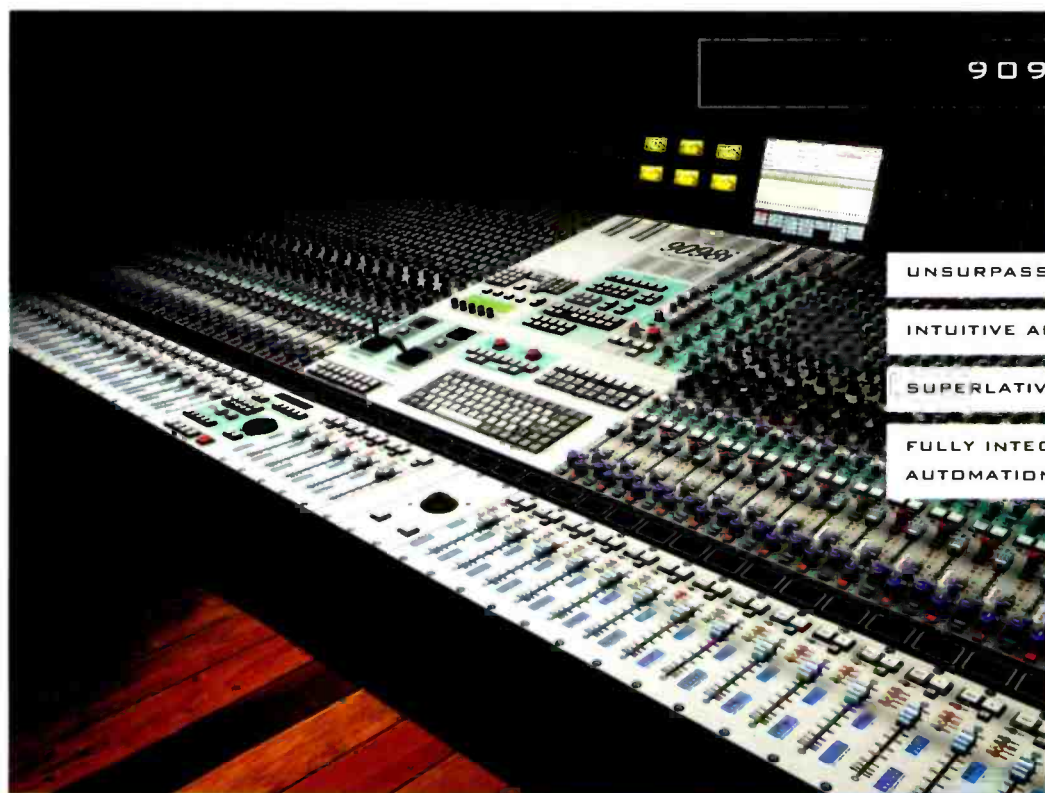
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REGARDLESS of how long their careers, most successful producers can pinpoint the moment when they made the transition from engineer to producer. Not so Ron Nevison.

'In a very real sense, that never took place for me,' he says, speaking from his Los Angeles home as he prepares to begin working on Candlebox's third album. 'I was working as an engineer on major records, but they were bands or artists that produced themselves. Bad Company produced their own records and so did Led Zeppelin. When I recorded The Who, Pete Townshend was essentially the producer. I was producing smaller acts in between those engineering projects, but really, there was no point at which I made a transition. I've been doing it that way ever since, even as a producer.'

Nevison's career is a long and a full one. It includes engineering *Quadraphenia* and the Tommy film soundtrack for the The Who, *Physical Graffiti* for Led Zeppelin, the Rolling Stones' *Love You Live*, and all of the classic Bad Company albums: *Bad Company*, *Straight Shooter* and *Run With The Pack*. As a producer-engineer, his output has been even more prodigious: Grand Funk Railroad, Heart, Bad English, Chicago, Meatloaf, Ozzy Osbourne, Jefferson Airplane and Starship, Thin Lizzy, Survivor, UFO and Dave Mason—and that barely covers half his oeuvre.

Born in Philadelphia when the city was on the cusp of becoming a major R&B centre, Nevison learned audio the hard way, singing in local bands and later humping speakers for Festival Group Sound in the late 1960s. He toured with the Airplane, Traffic and Derek & The Dominoes, and quickly moved up the live-sound ladder from monitors to FOH. It was while travelling with Traffic and Steve Winwood's manager, Chris Blackwell, when studio doors first opened for Nevison.

'Chris and I were together one day in Ohio or somewhere and I mentioned to him that I was getting burnt out on the road, and that I really wanted to work in the studio,' recalls Nevison. 'He had Island Studios on Basing Street in London and he said, 'Anytime you want it, you've got it.' About a year later I took him up, starting out at about £5 a week. I had toured with many of the big English bands, so I knew them and had friends in London.'

Not long afterward, Nevison joined Pete Townshend's fledgling studio design and building company, Trackplan, which was intended to build personal studios for musicians. 'Pete, who had always had his own studio, also got together with a company called Alice, which was making mixers, with the idea to build a mixer and an 8-track deck all in one unit, and make it affordable for musicians,' says Nevison, a prescient piece of opportunism that

From production to touring and back again, Ron Nevison's career has been as convoluted as it has been eventful.

Dan Daley tries to unravel the strands

Ron Nevison

foreshadowed the Tascam systems of the 1980s. 'We built studios for Cat Stevens and Roger Daltrey and others.'

This led to Nevison meeting Ronnie Lane, bassist for the Faces, a band whose own career was doing well in the wake of recently departed lead singer Rod Stewart's nascent solo career. 'It seems Ronnie always wanted a mobile studio in an Airstream trailer [a classic 1950s post-modern American all-aluminium streamlined design] and when they got off an American tour, he brought one back with him, and I got the commission to do the job making it into a studio. He wanted a proper mobile studio, too. We got a Helios console, which I was familiar with because Olympic had one at the time, and an 8-track Studer deck and JBL monitors. And it got some notice right away. At the time, in 1973, Pete was getting ready to do *Quadraphenia*, and The Who were building their own studio, Rampart, in Battersea. But the studio wasn't ready

yet so they asked me if I would bring the mobile studio to cut basic tracks there. We upgraded the mobile unit from 8 to 16 tracks with an extra 8 modules and a 2-inch headstack. Then we rolled it over to Rampart.

It took a year to finally finish that album.' It was an all-consuming project for Nevison. For starters, Townshend wanted sound effects—the *Quadraphenia* operatic concept was that instead of its central figure, Jimmy, being schizophrenic, he was quadraphrenic, with each of the four personalities representing the four members of The Who.

'There was no such thing as stereo sound effects libraries back then, much less quadraphonic ones,' Nevison remembers. 'All the BBC libraries were mono. I was spending my weekends with a Nagra recorder at the beach setting up four U87s at low tide on the beach in Cornwall getting quadraphonic sea effects, and things like thunder and rain, and train whistles in >



1972: demonstrating Trackplan's 'Alive Stancoil' mixing console at a trade show

< stations. There was also a lot of synthesiser work on that record, and Pete would take the tapes home and do all of that himself.'

The recording projects took over eight months to complete. And then came the disappointing reality of a quadraphonic mix in the early 1970s. 'We were using something called a QS system—whatever system the parent [record] company had decided to go with' says Nevison. 'We didn't realise how bad quad really was until we went to mix. After passing it through the encoder, the front to back separation was like 3dB. It was like a huge mono system. And the only way to get discrete quad playback was to put it out on 8-track tape. We tried to fold the 4-channel into two but wound up with phase problems.'

Quadruphenia came out as a stereo mix, but the experience certainly hasn't put Nevison off on multichannel audio, and he's looking forward to doing 5.1 surround mixes on future projects. His other Who project was the audio for the film version of the group's first rock opera, *Tommy*, for which all the songs were re-recorded using various sets of musicians (not just The Who) to accommodate the collection of guest artists appearing in the film, including Elton John, who turned 'Pinball Wizard' from a guitar anthem into a piano-driven romp. It was also one of the few times that Nevison worked directly with a specific producer, in this case Gus Dudgeon, who produced John's track.

Led Zeppelin's *Physical Graffiti*, recorded in 1974, became Nevison's project after the band had heard the

work he'd done with the Lane's mobile unit. They wanted to record *Physical Graffiti* at the big, empty house at Headley Grange, where they had done its predecessor, *Houses of the Holy*, using the Rolling Stones' mobile unit as a control room.

'**P**HYSICAL *Graffiti* was a double album, but they had half of it already done from things left over from *Houses of the Holy*,' recalls Nevison. He tracked all of the new songs for the double disk, and he says he pretty much followed the recording setups that Zeppelin had established for themselves over the course of several records. 'I only used two microphones on John [Bonham]'s kit—a pair of U87s, set up on the second floor looking down on the kit about 10ft above them. John was adamant about not having microphones near his drums. I wanted to put some back-up microphones behind the kit, but he wouldn't let me. Still, the kick and the snare come through large. It's all in how he played, the acoustics of the room—which had a wonderful stone floor and mahogany walls, but not so big that you couldn't contain the sound—and the drums themselves. It would be impossible to recreate that sound again without all of those components. I brought a couple of things to the drum sounds, though: on 'Kashmir,' I ran one of the two 87s through an Eventide phaser and recorded that to a third track, and if you listen to the song you can tell we ended up using that.' But before he could get to overdubs, Nevison had to honour his com-

mitment to finish the *Tommy* film project, so the band went to Olympic Studios, where they finished the overdubs and mixed using, among others, Keith Harwood.

Enter Bad Company, with whom Nevison created some of the most classic of classic rock records, including 'Can't Get Enough' and 'Feel Like Makin' Love.'

'It was a pure band sound,' says Nevison, happily remembering it. 'Andy Frazer was the main writer in Free and Paul [Rodgers] had all these ballads that he had been saving up but that didn't work for the band. At first, Nevison and the band tried to use Headley Grange to track. Mick Ralphs had been with Ian Hunter in Mott the Hoople and had the rock background, so between them they had all these songs saved up waiting to happen. Add a great rhythm section and you had a hell of a record.'

They used Headley Grange for the tracking room, though Nevison used a different, smaller room for the drummer and more conventional miking technique, although Nevison had the opportunity to do more experimental placements than with the super-minimalist Bonham. 'We didn't use baffles for anyone,' he says.

'We just put everyone in different rooms. We were not necessarily going for the best sound but the best feel.' Using the mobile control room again, 80% of the band's eponymously titled first record was done at the Grange >

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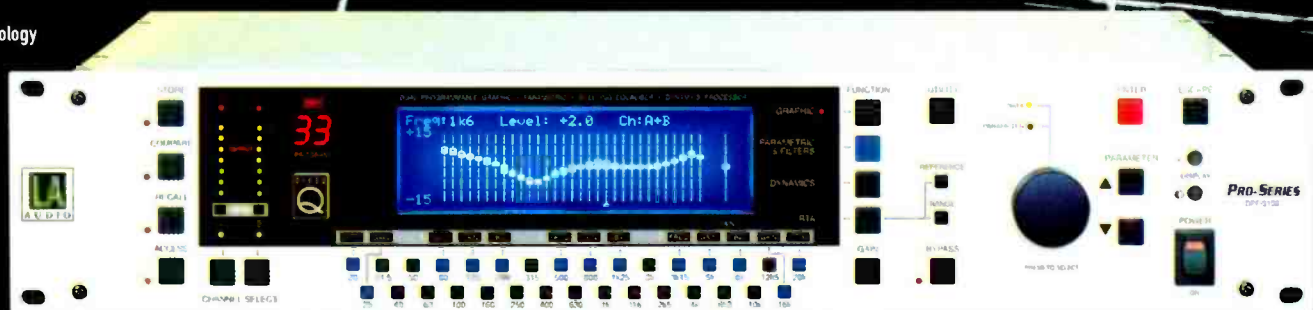
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1978: celebrating with Record Plant owner Chris Stone

house in less than two weeks, with Nevison and the self-produced band moving to Olympic for some horn and background vocal overdubs and mixing. 'I did one remix of 'Movin' On' at Pete [Townshend's] studio in Goring, though, he adds.

The second record, *Straight Shooter*, was done at Clearwell Castle, again using Lane's mobile unit. The castle was open to the public during summers and rented out to rock bands in winter, and Nevison recalls that while it sounded great, it was constantly cold.

'All our rooms were always cold and we had a little electric heater to try to heat the whole recording space,' he laughs. 'But Peter Frampton called me later and asked which rooms I used for what. That's how good it sounded.' The record was mixed in the warmer climes of Air Studios. The third Bad Company record, *Running with the Pack*, was done in the south of France; the band had become so successful that they had joined many of their affluent rock compatriots as tax exiles, staying in the UK no more than 63 days a year. Lane didn't want his mobile rig leaving the country, so Nevison arranged for the Stones' mobile truck to be shipped to Golfjuan, near Antibes, and the Stones' management company rented the band a villa nearby that would serve as home and studio. But when the truck arrived, it couldn't negotiate the narrow, winding lanes of the region, so they rented another villa in Grasse to record in and used the first one as home.

Then the record was delayed nearly three weeks when drummer Simon Kirke fell off a motorbike and skinned himself rather badly. 'The south of France is not too bad a place to have to wait around,' smiles Nevison.

In 1975, before that record was mixed, Nevison had decided to move back, the States and located in Los Angeles. He had intended to mix the record at Record

Plant, where he had taken the position of chief engineer. The band came over and mixing started, but—and Nevison says he's baffled by it to this day—the band and he had a falling out and they took the tapes elsewhere and had them mixed by Eddie Kramer. 'I was disappointed,' says Nevison. 'I came in one day and they were just gone. And when I heard the mixes, I was also disappointed: the vocal and snare weren't in your face anymore. A lot of singers don't like their own voice, even though everyone else thinks it's great. So they have a tendency to want to cover it up with effects. I'd always kept the vocal up and it worked. But I was honoured to have worked with them on their best stuff.'

If there was a transition to production, it was during this early period in LA. The first US project was the mixing of the live UFO album, which brought together Nevison's long experience as a live sound mixer, studio engineer and musical visionary. Aptly enough, he also named the record; while noshing in a local bistro between sessions at the Record Plant, he heard Frank Sinatra's 'Strangers in the Night' come on the jukebox. 'I thought to myself, what a perfect name for a live record: *Strangers in the Night*,' he says. 'And that was that.'

His first coproduction was with Dave Mason on *Let It Flow*, whom Nevison had met months earlier when he was asked to mix a live Mason record that Bruce Botnick had produced. He knew he was back in the USA when told that the mix would take place on a 110ft former minesweeper—outfitted by Record Plant with tape decks and an API console and little in the way of outboard gear—parked at an island off the coast of Ensenada in Baja Mexico.

'We swam during the day and mixed at night, and because it was a live record we didn't add much at all to the sounds,' he says. 'So they rightfully named it *Certified Live*.' *Let It Flow*, in 1977. >

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1988: at Olympic Studios

Nevison's career had grown so much that he took on management, in this case Michael Lippman, one of the first managers to specialise in producers and engineers as clients. Two clients he was sent to meet on the same day in San Francisco were Santana and the Jefferson Starship (sans Grace Slick at this point). 'The limo dropped me at SIR where Santana was rehearsing, and it was like I wasn't even there as far as the band was concerned. It was like, 'Here's the guy Bill Graham sent over.'

They had their backs to me, rehearsing, most of the time I was there. Then we drove over to [Starship bassist] Paul Kantner's house and it was the complete opposite: they were waiting for me, greeted me warmly and I felt an immediate attachment to the band. It was the perfect time to be with them. I thought, They had a new lead singer [Mickey Thomas] and [drummer] Ainsley Dunbar was also in the band, and Paul had a ton of great material waiting.' It was only in retrospect that Nevison realised that, a decade earlier, he had been lugging monitors around the Jefferson Airplane's stages on tour when was doing live sound gigs. 'It was interesting to come back as their producer 10 years later,' he recalls. 'Sometimes it's very difficult for some people to accept you in a more elevated role >

< Nevison's studio production with Mason, produced the classic 'We Just Disagree,' which has some of the best recorded acoustic guitars ever on a hit record. Mason and co-writer Jim Kreigeer 'were using Ovation guitars—one was a 6-string and the other a 12-string—so I combined the output of the pickups with a microphone on each and mixed them together. The whole record was two acoustics, a bass and drums, and a

little piano and organ. It was simple, but it was such a great song,' Nevison says.

OTHER productions followed, including the Babys, whose second and third records, 1977's *Broken Heart* and 1978's *Head First*. Nevison produced and engineered, and he stayed with a reformed version of the group—Bad English—for their *Backlash* LP. But by the late 1970s,

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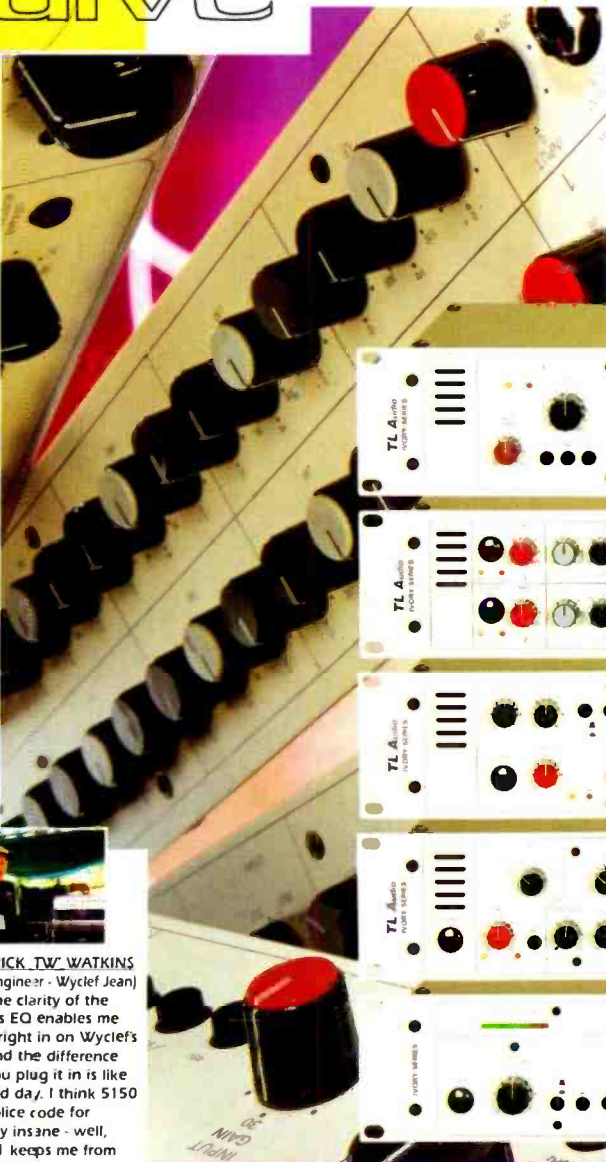


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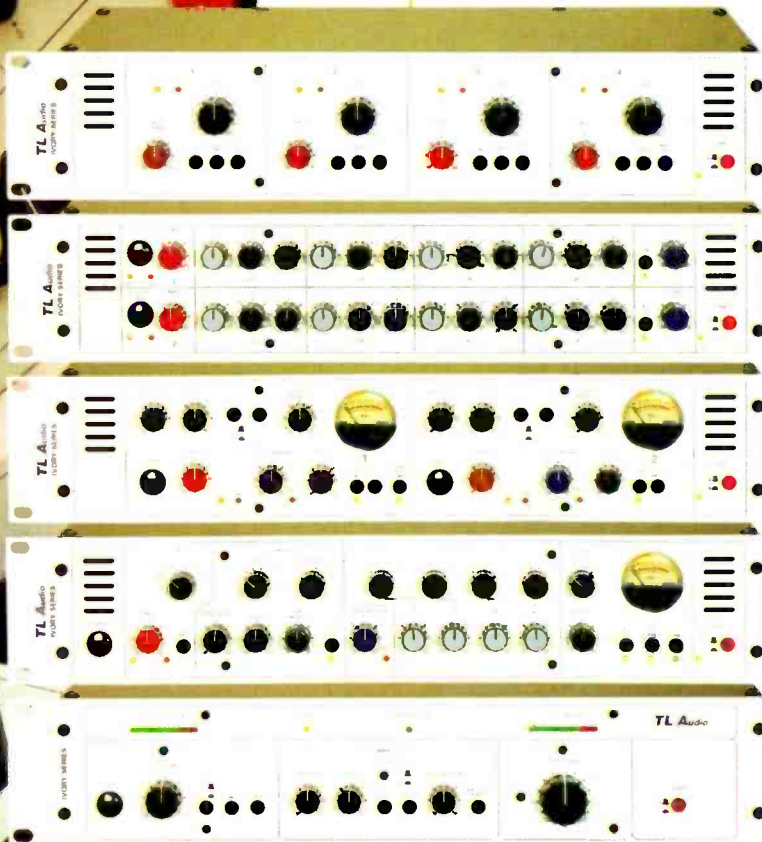
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◀ than when they met you the first time. It was only Paul that I had met before—he was the only original member left—but it all went fine.”

HE DID three records with the Starship between 1981 and 1984: *Freedom at Point Zero*, which produced the hit single ‘Jane’, *Modern Times* and *Nuclear Furniture*, and there was an interesting anecdote that crosses over from his work with them to his work with Heart a few years later in 1985. ‘Lippman was also managing [Elton John’s lyricist] Bernie Taupin, and as I was getting on a plane and he gave me a tape with two songs on it,’ says Nevison. ‘One was “These Dreams” and the other was “We Built This City”. I loved “These Dreams” but on the other I said, No way. That wasn’t an image I wanted for Heart or any other rock band.’

Ironically, the next incarnation of the Starship, this time with Slick back on board, chose the song for the *Spitfire* album and, in the opinion of Nevison and many others at the time, got a hit single out of it but essentially destroyed their credibility as a rock band at the same time.

‘That’s why choosing an outside song for a band is so critical,’ he says. ‘It has to be something that fits the band’s concept and image.’

‘These Dreams,’ of course, wound up as one of the mega-hits on Heart’s ninth and eponymously titled album, the first of two that Nevison would produce and which brought the band back from the precipice of mid-life crisis. After a tremendous start, the band underwent line-up changes and their 1982 and 1983 releases stilled in comparison to their million-sellers like 1997’s ‘Barracuda’. Both records failed to even make gold, and even the Rolling Stone Encyclopedia of rock & roll states that Heart was ‘at a career crossroads’.

‘Heart started out with the same combination that Bad Company had at the beginning: a great rock band that also did great power ballads,’ in Nevi-

1981: at Record Plant, working with Jefferson Starship

son’s analysis. ‘When Howie [Leese] and Nancy [Wilson] took over the guitars, they had basically eliminated the guys who had written the cool riffs, like “Barracuda”.’

They were good writers, but they did not have the riffs anymore. The sisters [Ann and Nancy] never really wanted that level of success, and they had been moving back to the folk stuff like Dog & Butterfly. [A&R man] Don Grierson at Capitol signed them and gave Nevison the mandate to make commercial records. ‘These Dreams’ and three other singles from that record were Top 10 hits and generated five million unit sales of Heart.

Basic tracks were recorded at Record Plant in LA, after which they moved to the Plant in Sausalito for overdubs and mixing on the studio’s API console. ‘In those days the console didn’t matter,’ says Nevison. ‘We could have 97 channels of API and two channels of Neve on a sidecar and do all the overdubs through the Neve. Song choice, mic choice and mic placement is what recording is all about.’

I kept on doing this band the way I had done all the others—as a band tracking, then usually keeping only the drums or bass and drums and overdubbing everything else. It’s easier to work one-on-one with a musician.’

At the time of Bad Animals, Nevison had bought his own Mitsubishi X-850 32-track digital deck, and though he still preferred to record tracks analogue, he found that he liked the ability to comp guitars and vocals on digital without losing generations. But there were still the random acts that made the magic. On ‘These Dreams’ Ann Wilson sang the guide vocal but had a head cold, causing her voice to crack on the high notes. ‘But when she did the final vocal a while later, I listened again to the guide vocal—I never erase anything until I know I have something better—and I found I loved the way those cracks sounded,’ says Nevison. ‘So I comped them in with the lead vocal. We had a break for Christmas and Nancy came back and I had to talk the girls into keeping the cracks. In the end they really helped make it a great vocal performance.’

Nevison, like many other classic rock producers, went through a dry spell in the early 1990s as alternative rock produced a crop of new young bands and producers. ‘No one understood why these groups were having success without having singles,’ he muses. ‘So the record companies didn’t want to mess with it and were going with the guys who produced their demos. They didn’t think they needed experienced producers. Now it’s turning around because you need hits again.’ ■



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MOST STUDENTS take a part-time job to help pay their way through college or university. The majority of such jobs are purely expedient, and the student would probably pray that they didn't end up doing it full-time. Shawn Murphy may have originally intended to be a historian, but what he did on the side to finance his education has ultimately led to him being regarded as one of the leading film-score mixers of his generation.

From the way he tells it, he was like most young people—doing what he enjoyed and what interested him, and seeing where it led. Where it took him was working with Steven Spielberg, such leading composers as James Horner and John Williams, and sharing an Oscar for *Jurassic Park*. 'It's one of those cases where my secondary interests over-rode what my major studies were,' he muses. During the mid 1960s, Murphy went to San Francisco State College to study history; although few realised that this was his major. 'There was a minor emphasis on music,' he says, 'but I spent so much time in the film, theatre and film departments that a lot of people have the idea that I was on a major course of study in those areas as well, but it wasn't the case. I studied history, but I was also a musician, playing brass instruments for many, many years, something, like history, that I did out of enjoyment.'

Listening to Murphy recount his college days, it is almost inconceivable to think that he did graduate in history, what with being a technical engineer at local SF radio stations—after gaining his FCC licence very early on—and working at American Conservatory Theatre, and other venues as a sound designer and technician. 'I had the lucky circumstance of winding up in SF at the end of 1965 and staying through 1972, which could not have been a better time in the history of the musical world,' he laughs. 'One of the radio stations I worked for was a classical station that did a lot of remote recording and this predated any interest I had in film scoring, but it turned out to be very good training because it got you used to going into a strange venue, listening to it, listening to the orchestra and quickly coming up with a sound that was presentable.'

Going on to a Master's degree in theatre technology at Stanford University, Murphy graduated again in 1971/2. While entering the real world was now a reality, he did not completely leave academia, taking a teaching position at the California Institute of the Arts in Los Angeles; although, understandably, he was loathe to leave San Francisco. Budget cuts forced him to leave teaching and, as he says, he wound up as a sound designer at Disneyland, working on parades and special events. With Disney, movies and television are never far away and Murphy found himself

working with outside production staff, which ultimately prompted his move to Wally Heider Recording, again in LA.

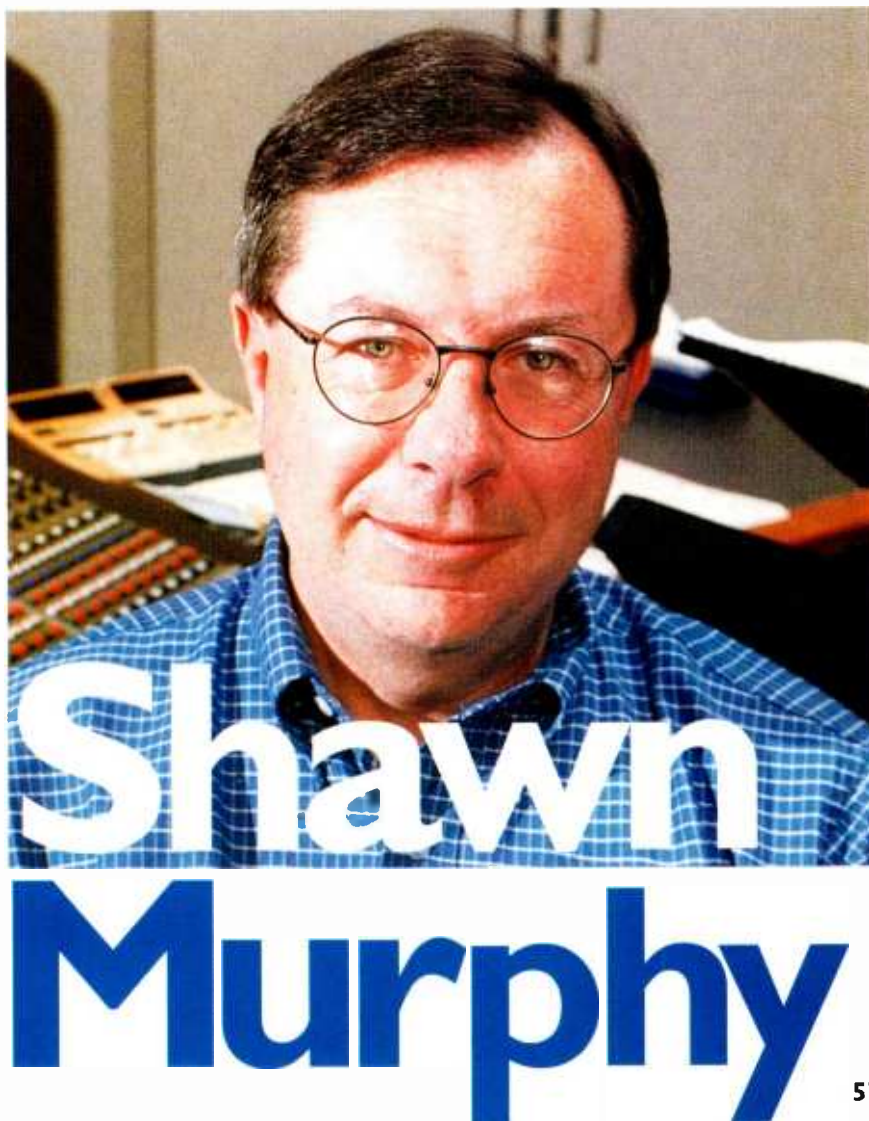
With its remote TV facility, Heider's gave Murphy the opportunity to work on NBC's *Saturday Night Live* during its classic late seventies period and coverage of the Academy Awards ceremonies. But another side of the business—recording music, dialogue and narration for movies—gave him his first exposure to film scores, laying groundwork for another change in direction that was soon to come. Before this came a stint at CBS and a return to Disney, working primarily for the group's television and musical theme park divisions, with films creeping in around 1981.

MURPHY'S list of movie credits is an impressive one, but he admits that its early entries are selective. 'I would say that my first feature film credits, ones that were of any substance, were in 1982,' he says, continuing with a laugh. 'There were others probably before that but they're

things that we may not want to put on the resumé—we've all got things like that in our past. These were the kind of things that gave you the experience you need as you move on.'

The project that led Murphy into film work and away from street parades was the digital rescore of *Fantasia* in January-February 1982. This was followed by his first original major project, working with James Horner on *Something Wicked This Way Comes*. He views the move from music recording to film scoring as evolutionary. 'Learning technology and techniques that are the same and different simultaneously,' he puts it. 'Often the terminology is different and the level of complexity changes, as opposed to the physical business of making things sound good. Much of the equipment is the same, the main difference being that you're dealing more with sprocketed film machinery; although that's less true than it was 15 years ago. It winds up being a real interesting learning process for the first year or two in film.'

Comfortably spanning the divide between film and music Shawn Murphy is regarded as a leading film-score mixer of his generation. **Kevin Hilton** takes notes



◀ While film itself creates a language barrier, there is still the universal language of music, which Murphy feels helped him in the transition. 'Having a good musical vocabulary actually helps you in all phases of sound mixing, whether it involves music or not,' he says. 'It trains your ear to listen and gives you some cues and vocabulary. And, of course, there is the ability to read music and discuss music in relatively complex technical terms with musical people; that opens a lot of doors in terms of putting people at ease, assuring them that you're not just a technician who has no idea of what they're trying to achieve. I would say that engineers being able to read music ought to be compulsory, and those of us that do read find it much easier to communicate and achieve what the composer or producer is looking for in musical and dramatic terms.'

Murphy left Disney to go freelance in 1986, and soon after started to work on the films of Steven Spielberg. While he has worked on a number of this producer-director's projects, he says, 'A scoring mixer is almost always involved with a project because of a composer; although it is sometimes because of a studio or music department.' It was in this way he came to work on *Empire of the Sun*, Spielberg's 1987 adaptation of J.G. Ballard's semi-autobiographical novel: 'Sometimes composers ask you to go on and work on the final dub as well and I had

'The ability to read and discuss music in relatively complex technical terms with musical people; that opens a lot of doors, putting people at ease, and assuring them that you're not just a technician'



worked with James Horner on a number of occasions where that had occurred, and then I worked with John Williams on *Empire of the Sun*, which had also been a case where he had asked whether I could go on and work on the dub.'

AT ITS MOST BASIC level, the dubbing process brings together dialogue, music and sound effects in such a way that each plays its part. Murphy acknowledges this fundamental description, but elaborates, 'What you're interested in doing is telling the story in the most effective manner with sound, and supporting it with a mix of effects and music. It's a process of choices; every inch of the way you're making a hundred choices as to what is the emphasis, and somehow you have to come up with an effective sound mix that is supportive of that. Sometimes there are diverse opinions, when a director may have it one way, the producer may have it another, and sometimes even a star is allowed to intervene or make suggestions on a sound mix, and it is your job is to reconcile this. Sometimes it can be fun and very interesting, and sometimes not so much fun—but that's the job.'

Murphy's credits are wide ranging, yet several names, arguably the leaders in contemporary film music, recur. James Horner (*Willow*, *Braveheart*) is the most numerous, punctuated by John Williams (*Schindler's List*, *Jurassic Park*), John Barry (*Chaplin*, *Indecent Proposal*), Danny Elfman (*Batman*, *The Nightmare before Christmas*), and more recent names, Joel McNeely (*Terminal Velocity*), *The Avengers*), John Debney (*Liar Liar*) and David Arnold (*Godzilla*). 'That's the great part of the job,' he says, 'it's always changing. You have this great history and dramatic talent of a John Barry, or a John Williams, or James Horner and then you have the people who are equally interesting and fabulous but just coming into the business.'

New composers will always be coming into the business, but, given economics, it is unlikely that many new studios will open specifically for film-score work. Murphy identifies a small hub of studios in LA, the real centre of the industry, with Todd-AO, the old MGM stage, Paramount and the re-opened Fox lot. Also on the circuit are New York and London (Abbey Road, CTS, AIR Lyndhurst and Whitfield Street), with the newly refitted stage at Skywalker Ranch just outside San Francisco now on the market. 'They're all very good, and vary in sonic character quite a lot,' Murphy observes. 'Sometimes we'll choose a stage based on the type of score because acoustics is always a key factor. Sometimes it is based on schedule, and sometimes we don't choose because it's so busy we just take what we can get.'

In terms of mixing consoles, Murphy views it as an AMS Neve or SSL world, with the 9000 Series becoming more widespread in LA at present. 'The 9000 has become a presence; prior to that time Neve—V3, VR and VX—with Flying Faders or GML automation had been the single highest presence. I think that they're both terrific boards, I would say, not to ruffle too many feathers, that I'm very happy with the 9000 sonically, but I have been less pleased with the automation; the old stand-by automation for all film scoring is Flying Faders.'

All consoles now have to offer surround-sound monitoring, with the move from matrixed systems into 5.1 or even 7.1 soundtracks. Murphy says that the shift away from 4-2-4 matrix working has made life easier, but that there are still things to consider in the new discreet channel world. 'Most of us have concluded that a 5.1 mix suits us for almost all applications; you can take a 5.1 mix and turn it into a 7.1 mix by spreading. You can drop it down to a 4-2-4 if you're careful, because most of us, in our heads, adapted mic techniques, and spacing, and delays that work for 4-2-4. In most cases, for orchestral music, that makes a very nice sounding CD mix (although occasionally we do separate mixes for CD release). This means you can do all those mixes at the same time, because you rarely have the time to go back and do separate mixes, nor do they dub separate versions. In a practical sense we wind up saying that 5.1 is our best common denominator and best sound.'

With the standard use of surround, the audio aspects of a movie are now regarded as much a story-telling device as the cinematography or the acting, something acknowledged by the Academy of Motion Picture Arts and Sciences. Murphy has been nominated twice for an Oscar: the first, along with others, for *Indiana Jones and the Last Crusade*, the second for *Jurassic Park*, which he won (with Gary Summers, Gary Rydstrom and Ron Judkins). Murphy calls himself 'a very lucky guy' for winning a statuette on his second nomination, and laughs heartily when reminded that he picked up an award before his director, Steven Spielberg.

Upcoming movies that Murphy has scored include the Kurt Russell science fiction action flick *Soldier*, with music by Joel McNeely, and *A Civil Action*, which sees him working again with Danny Elfman. But, like the movie *Top Tens*, this year has been dominated by *Saving Private Ryan*, Spielberg's new take on the war film. Next year's Oscars are likely to surrender to this work, but, as with all things, Murphy is modest about any further awards, saying just, 'We'll see', and citing sound designer Gary Rydstrom as the real audio star. Just like the rest of his career, he is happy to let things happen. ■

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The prospect of digitising the radio production process faces broadcasters world wide. While most err on the side of caution, **Zenon Schoepe** reports on one with ambition

LIFE CAN BE DIFFICULT for a broadcaster whose country is small and whose population divided geographically and by language. Add to these obstacles enough mountains to make a traditional approach to radio transmission a non-starter, and Switzerland emerges as a country faced with very specific problems, which it resolves in some clever ways. For example, some 90% of the population is addressed at home via a long established cable network.

DRS has the responsibility for taking care of radio for the German language speaking population and is one of the many sections of the country's holding broadcasting organisation, SRG. This body embraces TV and radio parts for the German, French and Italian speaking populations, plus 1% who still speak an old Roman tongue.

While this all undoubtedly adds to the rich tapestry of Swiss national uniqueness, it also means that the license fee is divided among these language-specific service providers despite their requirement to produce rich and varied output. DRS broadcasts DRS1 (popular), DRS2 (culture) and DRS3, which is a youth-orientated channel transmitted through the Austrian Digital Radio network, plus the Music Wave 531 channel broadcast in AM and carrying mostly Swiss country music. An additional 'young' audience channel is in the application process. The broadcaster has its three main studio complexes located in Zurich, Bern and Basle, and this spread is due to historical and political reasons. Despite the country being small it is actually governed in a manner not dissimilar to the

States in America. These Swiss Cantons are mostly independent and have their own ways of operating and broadcasters fit into this. However, DRS is currently in the process of concentrating different programmes in different areas and studios. Zurich takes care of the transmission of DRS1, a small contribution to DRS2 which is centred in Basle, a 50-50 split with Basle on DRS3 and the entirety of MW 531 plus local news contribution to the network.

Drama production is a particular strength of the Zurich studios but, significantly, the city's radio broadcaster no longer keeps its own orchestra and consequently does little music production; although it retains a medium-sized concert hall and has plans pending for its continued use. Zurich is also the OB van centre of the country and there is a high degree of autonomy between each region's radio and TV operations.

On the transmission side, DRS has a remote controlled master control room, that is controlled by each studio's control room via matrixing systems. There are four digital multifunctional (DJ or technician operated) control rooms with studios that are mainly used for transmission but are also pressed into service for production duties. Central to the arrangement is a Studer D941 digital desk package ordered in 1993 as one of the few solutions to digitising control room and transmission areas. The station's automation system is Dacor. Four pre-production rooms use Media Engineering Memix digitally controlled analogue desks which were built to DRS' specifications yet none of this alludes to the fact that the Zurich operation is in a state of major reorganisation, refitting and rebuilding. A substantial amount of space is being realised in one of the wings of the complex, much of which is actually listed, with new studios being built and operations being transferred.

Zurich now has the distinction of housing two Fairlight FAME systems and Sonic Solutions CD-R mastering as some of the many moves being made towards the goal of digitising from origin to trans-

mission. It is an issue that all broadcasters have to face up to eventually and while the creation of a master long-term plan for a station is vital, the method in which the established exiting process is to be updated, hybridised or simply replaced that gives the headaches. Digitisation of the programme production process is an obvious candidate for conversion, but normally it is the editing and recording aspects that are addressed first.

What makes DRS' move such a bold one is that it has adopted a system popularly known in sound-for-picture work and used as the answer to complete digitisation of radio programme production.

'We have to do this step by step,' says Thomas Wochner, head of technical planning at DRS in Zurich, 'and we have to live with the problems of changing.'

Four FAMEs were ordered at the same time two years ago with the Zurich duo supported by single systems in Bern and Basle. All were installed in early summer and drama production is the forte of the systems in Zurich and Basle. DRS had no experience of Fairlight prior to the order selection process and Wochner states that after careful weighing up of its requirements it emerged as the prime contender, despite the fact that the system is more usually associated with sound-for-picture work.

'We don't have a lot of money, but we had to decide whether we should opt for a very simple and affordable DAW with an "ordinary" mixing desk or go for something different,' he continues. 'At that time there were no "useful" digital mixers available in the price range we were looking in. We needed digital mixing and editing and for the money the FAME offered us both and, most importantly, they were integrated. We were very interested in Digidesign Pro Tools with the ProControl, but we didn't believe that it would be available in the timescale we had, and, as it happens, we were right. SADIIE and Merging Technologies' Pyramix were also in the running, but didn't provide the integrated mixing we wanted.'

It is clear that once DRS had investigated FAME its promise had set a >

< precedent for everything else that it then looked at. And they're not small systems at 24-fader desks each and Wöchner admits that he placed orders on the strength of a prototype.

'It then became a simple matter of waiting to discover whether our decision had been right or wrong,' he laughs. 'The timescale was right for us, the old equipment had to go as we were building new control rooms as part of the expansion of the complex here in Zurich.'

Training was a real issue as DRS drama production was not only moving from analogue to digital it was also moving from stereo working practices to multitrack. 'We had to change the attitude of the operators because of the two steps involved here,' claims Wöchner. 'It's a major upheaval. The only thing that did not alter was the window between the control room and the actors on the other side. All of sudden they weren't opening a fader to start a tape machine anymore, everything could be on the Fairlight multitrack and they could move things around easily.'

Barbara Gysi, chief of the production area in Zurich and of the Fairlights, believes that changing the operators' minds to think in multitrack terms was perhaps the biggest obstacle. While standard DRS practice had always dictated that all engineers should spend time working on all aspects of the station's output from assisting at live broadcasting to drama post, the arrival of the FAMES has necessitated the creation of specialists who major on the operation of the system.

'Our operators were not used to working with computers,' adds Gysi. 'If something unexpected happened, they immediately became unsure of themselves and it took time to develop the more relaxed attitude that those who are used to working with computers have. The timescale also dictated that operators only had two weeks training and two weeks of playing with the system. That's not a lot of time for people starting from scratch and there were bugs in the system and we got into that dreadful situation where the operators didn't know if they had done something wrong or if it was the system.'

In terms of productivity, Gysi reckons that the programming structure has changed to producing far more programmes in Zurich than it did a few years ago making it difficult to compare precisely previous practices to the use of the new technology. 'But I would say that we need about the same time for a production now that we did working analogue but we're still spending a lot of time copying analogue tapes to the hard disk,' she explains.

'Wöchner says that this is a problem in changing formats and acknowledges need for an off-line-style DAW that could be used to input material for passing on to the FAMES for editing and comple-

tion. For Wöchner, this is part of his vision for digitising DRS and he has plans for networking throughout the production chain along with interfacing with the compressed audio data network run by the news offices.

Gysi believes work on the FAME is more satisfying creatively. However, the days are long and the schedules are regularly tight enough to demand the completion of a one-hour programme in four hours. Original station output is very high.

'The amazing thing is that it can be done in this sort of time, the mix automation is fantastic,' she says. 'What we can't afford to have is problems with the system because any amount of time lost is critical and the next producer for the next programme is waiting outside in the corridor.'

The analogue way of working on radio dramas at DRS had always involved two technicians whereas the new system has allowed the entire production to be placed in the hands of one sound engineer. 'This is all still very new to us and the pressure is higher on the operators since we've been using the FAME,' observes Gysi who adds that two-operator working had amounted to a less intense atmosphere. 'Our days are now longer, not because of the FAME but because of the changing of the internal structure here. Another point that is not often mentioned is that when you work with a DAW you have many more possibilities and the opportunity to try things and if you're not careful you start to play with the system. That's great for creativity but you have to remind the operators to not forget about the time.'

Interestingly, all four of DRS' FAMES are identical in configuration and size and projects have been moved between the two systems in Zurich, for example, one of which enjoys a larger recording space. 'We have already gone to Basle where the FAME has a better drama studio area associated with it for recording more complex programmes and brought the work back to Zurich for editing and mixing,' says Wöchner.

DRS' commitment to a more elaborate and integrated solution to its production needs may well be the smarter move. Not only does its choice have strong networking promise it also has the potential benefit of Fairlight's activity in interchange circles, both of which make the purchases healthily open enough for future twists and turns. Most importantly perhaps, DRS has also got in early with its own technical revolution at operator level and has had to crash-course its way through this and new higher throughput programming demands. The onus on the operators seems almost too

much to bear, yet they are surviving and seemingly flourishing as a result. When it all settles down DRS will emerge as an extremely sophisticated, skilled and slick operation. ■

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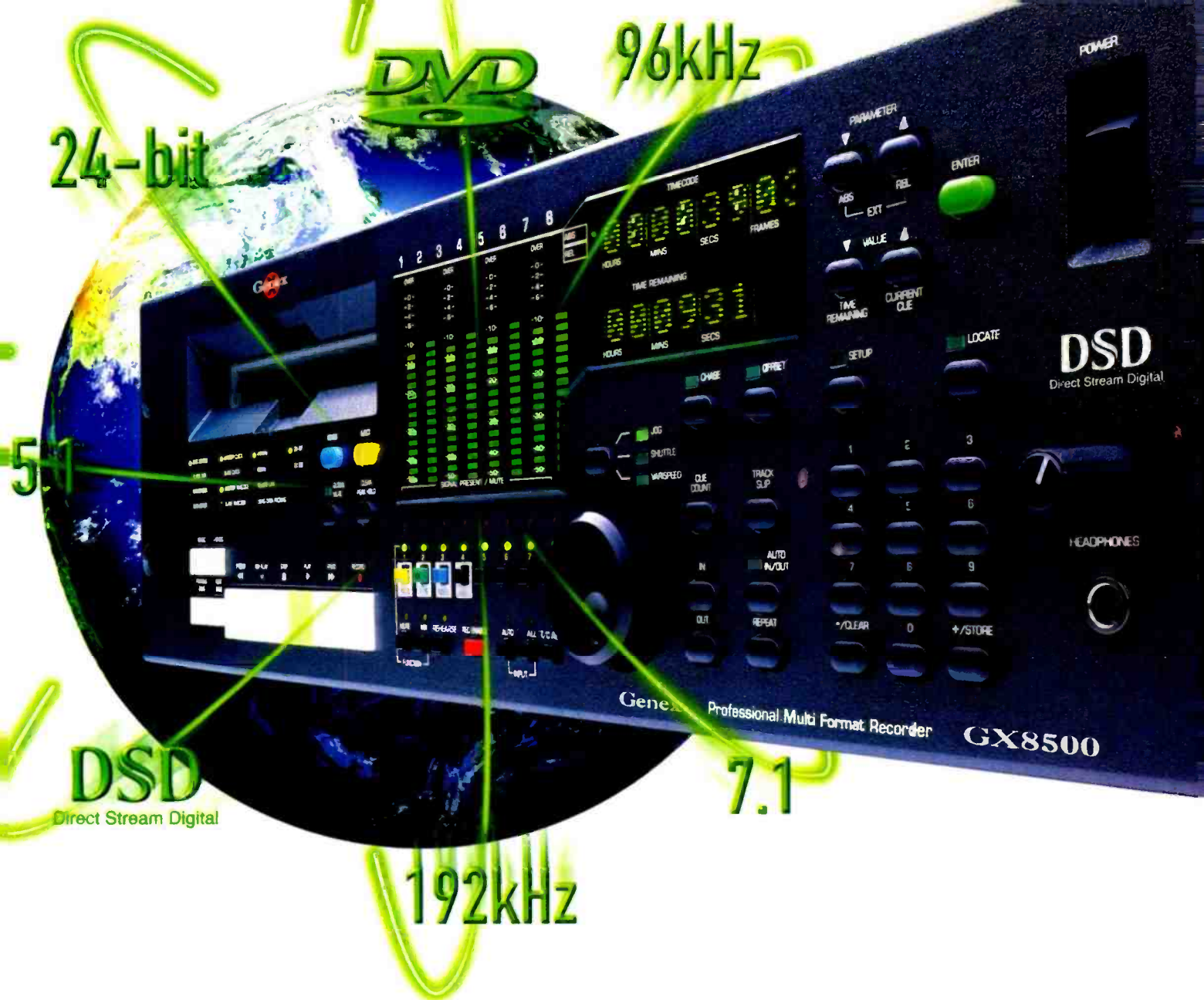
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Caught between the constraints of history and the self-interest of modernity a director wrestles with the tensions of period cinema.

Kevin Hilton investigates the sound behind the throne

Elizabeth

A question of balance

HISTORICAL DRAMA has been a mainstay of the cinema since its creation now a century ago. Film makers love ready-made stories and history is packed with them; although the pressures of condensing real events into those dramatic 90 minutes to two hours usually make the celluloid versions more an entertainment than an education. As well as this balance, movie directors know that they are attempting to recreate the past using modern technology; their dilemma is whether to underplay the hardware or use it to its full extent.

Elizabeth is an example of the latter approach. It is costume drama yet the filming technique is unquestionably modern, making much use of moving cameras, extreme angles, jump cuts and digital audio. Dramatic, even sledgehammer use of sound is commonplace in the standard Hollywood blockbuster; an historical movie would normally feature clever yet almost imperceptible sound design—footsteps, ticking clocks,

whispering corridors—rather than anything brash. *Elizabeth* is different: a full orchestra with choir fights against thundering hoofs, roaring flames that shoot through the cinema; traditional instruments vie with synthesisers; all the while an unsettling wind cries outside the echoing chambers.

As directed by Shekhar Kapur, the Indian director best known in the West for the controversial *Bandit Queen*, the story of the Virgin Queen's ascension to the throne of England and early reign is a mixture of dark intrigue and a bright youthfulness that gives way to staid duty. Kapur has said that he much admires Baz Luhrmann's updating of *Romeo and Juliet*, set in present-day Miami and shot with all the cinematic techniques available to a director, some of which Kapur saw as reminiscent of Indian cinema. *Elizabeth* may not be as brash as that Australian director's movie but it does share its visual zest, perhaps no accident as Gill Bilcock edited both.

The visual style in many respects dictated how the movie would sound. Mark Auguste, the supervising sound editor, says that while Kapur gave him pretty much an open brief, the pictures influenced the noises. 'Shekhar was very good, he didn't interfere at all,' he recalls. 'All he asked was for it not to be subtle, which is great for a sound editor. He talked more on a philosophical level, saying quite early on that he wanted it to be like an opera, so he was very broad with his ideas. He gave me total freedom and when I played him some of my early ideas, he expanded on them. In some ways the cutting of the film dictated how the sound would be. It's a modern cut with a constantly moving camera and that in a way made it very obvious what I had to do.'

Elizabeth's music score similarly fed off the images and provided another link back to both Baz Luhrmann and Australia, something reinforced by the casting of Cate Blanchett as Elizabeth and



Geoffrey Rush as her ruthlessly loyal spy-master, Francis Walsingham. Composer and producer David Hirschfelder—who has had a long association with John Farnham and scored both *Strictly Ballroom* and *Shine* (the story of pianist David Helfgott, starring Geoffrey Rush)—was sent the script last year and met Kapur in London a day later.

"I actually came up with a piece from reading it through," he told journalist Paul Tonks, "but other than that there was no preparation. So I was really on the spot when they asked what I had in mind. I was saying all sorts, like period music, violins and some antiphonal styles reminiscent of the period mixed with modern styles. Shekhar saw right through it and described the scene from the end of the film where Elizabeth emerges with her powdered face and the wig. He described it very poetically and I heard three boy sopranos singing these notes: 3-note chords and a simple melody."

Studio Sound November 1998

I heard them so clearly and said, "Shekhar, I wish there was a piano here". He said, "There's one over there," so in a public place I left my eggs on toast and played for him. He said, "I like those notes," and I got the job."

Music editor Mike Higham, who worked with Hirschfelder at the composer's own studio and Allan Eatons, an established film music studio in Melbourne, confirms the director's spontaneous way of working. "Shekhar wanted a lot of choir-oriented stuff," he says. "A phrase he kept using was that he wanted a "mad monk" sound: he's an interesting guy, but I never quite understood him for the first three or four months of the postproduction process. A lot of film critics say that he works on the chaos theory and you have to go through the chaos to find out what he really wants."

Both elements, which were worked on independently, saw the coming together of ancient and modern: period music alongside a modern orchestra with synthesizers and guitars overlaid; and modern sound effects, some processed through DSPs and samplers, placed under historical locations.

Auguste says that Kapur wanted powerful sounds that would emphasise the cutting. The effects also change during the movie, depending on the events being portrayed or the characters featured. In some respects, certain sounds are used like themes, just as a recurring music figure is identified with a mood or person. At the start of the film, there is much juxtaposition between the zealous, dangerous character of Queen Mary I ('Bloody Mary', played here by Kathy Burke) and the girlish figure of her half-sister Elizabeth, who is shown dancing in bright summer fields. 'The early scenes with Mary use a lot more low frequency and help build up this darker atmosphere,' explains Auguste. 'It's a very dark film overall but in terms of Mary we used a lot of sub-frequencies and room ambience, with interior backgrounds shot in cathedrals that were dark, some of which were manipulated by me to give the feeling we were aiming for.'

Scenes were shot on a mixture of sound stages at Shepperton Studios and real locations, including Haddon Hall in Derbyshire (which doubled as Hatfield House, Princess Elizabeth's home), Alnwick Castle, Warkworth Castle (doubling as the Tower of London) and Durham Cathedral. Ambient recordings were made at Liverpool Cathedral, which were sampled and played through a keyboard, with the pitch kept low and another ambient added to it. Auguste explains, "I played the two together, one much lower than the other, giving some very deep low-frequency rumbles. There were even darker sounds used for the dungeon sequences, but once we were out of that, it lightens up." >



< A sequence that is blatantly modern is Elizabeth preparing to face Parliament, knowing that her continuing reign depends on winning out. Sharp cuts of Cate Blanchett are interspersed with shots of the government chamber, as the lords and bishops enter to argue against the Bill of Uniformity. 'The brief was to be adventurous,' says Auguste, 'almost to "suck" Elizabeth into Parliament. It was also quite a good example of where David Hirschfelder and myself amalgamated our efforts well. Even though we were working totally separately, we were working towards the same sort of ideas. There were many places where that happened, so we were on the same wavelength about how to present the sound.' However, Auguste adds, being given the freedom on this scene did make its own problems. 'The Parliament scene was quite a maddening one to do because

the dialogue is so important, inter-cutting images of Parliament, and doors opening, and not trying to make it obvious, the kind of trailer sounds approach with whooshes and bangs. What we came up with is more subtle, getting the same effect and enveloping the audience in what is happening.'

Location sound was recorded on time-coded DAT by David Stephenson and then downloaded from a cutting room Sony PCM-7040 into an Avid PCI AudioVision. With the pictures edited on a Lightworks nonlinear system and the sound effects and dialogue on the AudioVision, an EDL was made, with an autoconform of the original material. The edit was originally based at De Lane Lea in London and then, after the third preview, when the picture was locked, work moved to Shepperton's Theatre 1 for the dub. Mark Taylor and

Mike Dowson dubbed the SRD soundtrack on the room's Trident console, taking material directly from hard disk and mixing to 24-track Sony DASH.


Little dialogue replacement was necessary, as the location recordings were clean, with lines being rerecorded either to change a performance or to make identifying characters easier in some of the more complex scenes. 'There were some lines, especially early on in the sequences with Mary I and her courtier, the Earl of Sussex, that were replaced,' comments Auguste. 'That came out of some of the preview screenings, which said that we needed to make clear who some of the characters were, so we worked quite hard on that. The original recordings did help and that does make a difference.'

Surround sound is another modern movie-making technique, but Auguste says that it was not over-used on *Elizabeth*. 'Generally, background sounds are laid with similar sounding noises and spot effects are placed on top. We didn't go too mad with the surround but in certain cases we did fly things around the room, for example right at the start of the film with the burning of the martyrs, putting the flames over people's heads. As ever we were fighting the music in those dramatic scenes, although it's a pleasurable fight. There's always the problem of getting through because there is so much mid-range, which can get swallowed up. I think I still lost a bit this time,' he laughs.

The orchestral score was played by a combination of specially selected musicians from the Melbourne Symphony Orchestra and a group of instrumentalists who are described as 'more fringe' in style. The number of instruments varied between 50 and 76, the maximum number of players that could fit into Allan Eatons, which David Hirschfelder describes as being like 'a comfortable old shoe'. The main reason in using this studio rather than one in London was to be in his own environment (*Shine* was recorded here), working with a familiar team. Robin Gray recorded and mixed the orchestral sessions, some of which involved a 26-voice choir. Also involved on the sessions was Hirschfelder's own engineer, Chris Scallan.

THE MAIN orchestra was recorded on 24-track analogue, which was later mixed down to a Dolby LCR mix on Tascam DA-88. Music editor Mike Higham explains that in addition to the main orchestra, Hirschfelder wanted to use synthesisers, guitars and other modern sounds. 'All the synths were running live, virtual MIDI from computers and that was locking up as we were doing the cue,' he says. 'We then took that away to David's own studio in the evening after we'd finished at Allan Eatons; we were having three calls a day and then I'd go through

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96 Linkwitz-Riley

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36 Butterworth

42 Butterworth

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everything at David's place and compile it. We'd tried to do about three takes of each cue, so if a French horn was out of tune, I could just edit another take into it."

Editing was done on a 24-bit Digi-design Pro Tools, a system that Higham has used extensively for both film (*The Matchmaker* and currently a version of Oscar Wilde's *An Ideal Husband*) and music (The Spice Girls and Eric Clapton's *Pilgrim*) sessions. The Dolby mix of the orchestra was transferred to Pro Tools, allowing Higham and Hirschfelder to overdub and work on the whole score. "In the evenings, once David had finished what he was working on, he would come over to the little studio I was working at and do some overdubs directly into Pro Tools," recalls Higham. "These would be synths, guitars and last minute vocals. Meanwhile, the orchestrator [Sam Schwartz] was getting things tweaked for the next day. It was a bit like a production line. Manic, absolutely manic. We were there for about 10 days in all."

AS ELEMENTS were being added late in the schedule, it was decided to record some of the choir parts directly into Pro Tools. Notably this happened with the music for the final scene, where a new arrangement of Mozart's Requiem is used to accompany the sequence where Elizabeth decides to remain a virgin and assumes the famous mask-like image. "It was a lot quicker to go directly into Pro Tools," says Higham, "and as I'd compiled the main orchestral work and because it was the master, rather than dumping back to analogue and losing a generation, it was decided to keep it in the digital domain. We set up a soprano, alto, tenor, bass mic positioning with a couple of overheads and a centre mic and we recorded all the choir [from the Australian Opera] straight into the computer."

Higham left Australia with around 30Gb of material loaded onto hard disk and booked into the 5.1 room at Metropolis in the Chiswick area of West London. "Because the orchestral work was already done—it was a left and right mix—we had to amalgamate that with all the last minute synth, guitar and vocal overdubs that David was doing and then there was all the choir work," explains Higham. "We wanted to premix that to picture and I had to do my job as well as editing the music to the latest cut of the picture. The new overdubs had to be balanced together, so from all that we created a 32-track submix in Pro Tools."

This submix was then taken to Shepperton Theatre 1, where Mike Dowson was dubbing the music to picture. Higham notes that with the 24 inputs and outputs on the Pro Tools (arranged as three 8-8-8s), these can be mixed down to eight faders. "I gave these to Mike and he just grouped the bank of

eight faders together as left-centre-right information, and the other stuff would maybe be overdubs. It meant that Mike could keep all the faders in a line and all the internal mixing was still happening in Pro Tools. If Shekhar suddenly said, "I'm not sure about that guitar at the start of the love theme. I don't want it for the first 20 seconds of the cue", I was able to just mute it out because I hadn't committed to it in the mix."

Higham says that one of the problems of film working is that the different mixers and editors involved are not sure exactly what the result of their individual work will be until the final dubbing stage. "It's always terrible in film because the only time you get to hear the music against the effects for real is in the dub, by which time it's too late. It was great for me because I could still do complex editing at a late stage, fac-

ing things up or down or moving them, doing stuff that really mattered and using the choir to cover up the edit, making it sound a bit more musical. This meant that we had the 32-tracks online at the sound stage all the time, which was a first for Mike Dowson. I've done it a couple of times but never with that amount of information."

The modern treatment of the story does not jar; if anything, it gives a freshness and a vitality that could be said to match Elizabethan times. Even the appearance of former Manchester United star Eric Cantona—as Monsieur de Foix, the French ambassador—does not detract from the story or the setting (something helped by the fact that he does not give a bad performance). The only real criticism of *Elizabeth* is its re-writing of history for dramatic purposes. But this is the movies after all. ■

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Now making its mark on the international recording scene, Vancouver's Warehouse began as the exclusive studio of Bryan Adams. **Terry Nelson** discovers what's in store

CANADA is one of the unsung resorts of international music. Artists such as Celine Dion, Rush (still going after all these years), Alanah Myles, Jane Siberry, and producer and artist Daniel Lanois challenge the national stereotype with their talent and success. The country also has a tradition of quality recording facilities—Toronto's Metalsound run by Triumph's vocalist-drummer Gil Moore, for example. And an early ambassador of mobile excellence was Guy Charbonneau's Le Mobile, which has toured throughout North America.

Recently Bryan Adams has brought another studio to the territory, The Warehouse, located near Vancouver's harbour area. The facility has been open officially since the beginning of 1998 without a quiet moment since. I first visited The Warehouse in October 1997 when building was nearing completion and I returned this year to find an operational complex.

"I've had a studio in my house at Vancouver with an SSL G-Series since 1987," Adams explains. "The idea of building something unique that I could use and that could be available to others came from the over-abundance of gear from

the fifties, sixties and seventies that I had collected. I could not fit it all in my house anymore.

"I talked to Ron Vermeulen who helped me get the house studio built, and we decided that it could be done provided we had the right space. The "right space" fell into my lap in 1989 when I bought this burnt out, rat-



infested shell of a warehouse. The ironic thing is that the bidding was against a parking lot company and it turned out we had not only bought a cool place, but it happened to be the oldest brick building in the city and it was once the first City Hall. We had no idea until we went to the archives and found out.

"There is nothing like it in Canada and

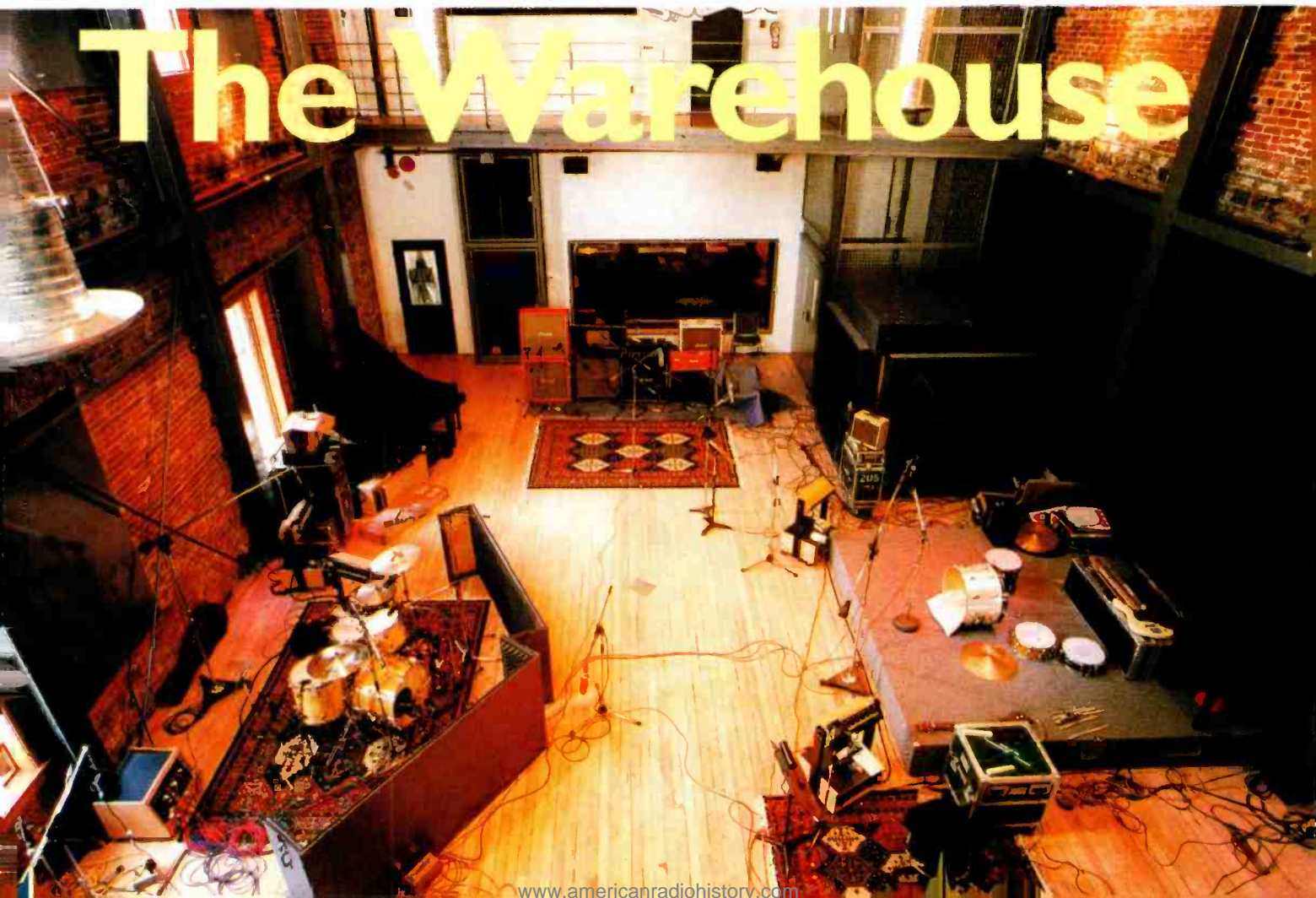
the only studios that I have seen or worked in that come up to its standard are Air Studios in London, and A&M Studios in Los Angeles."

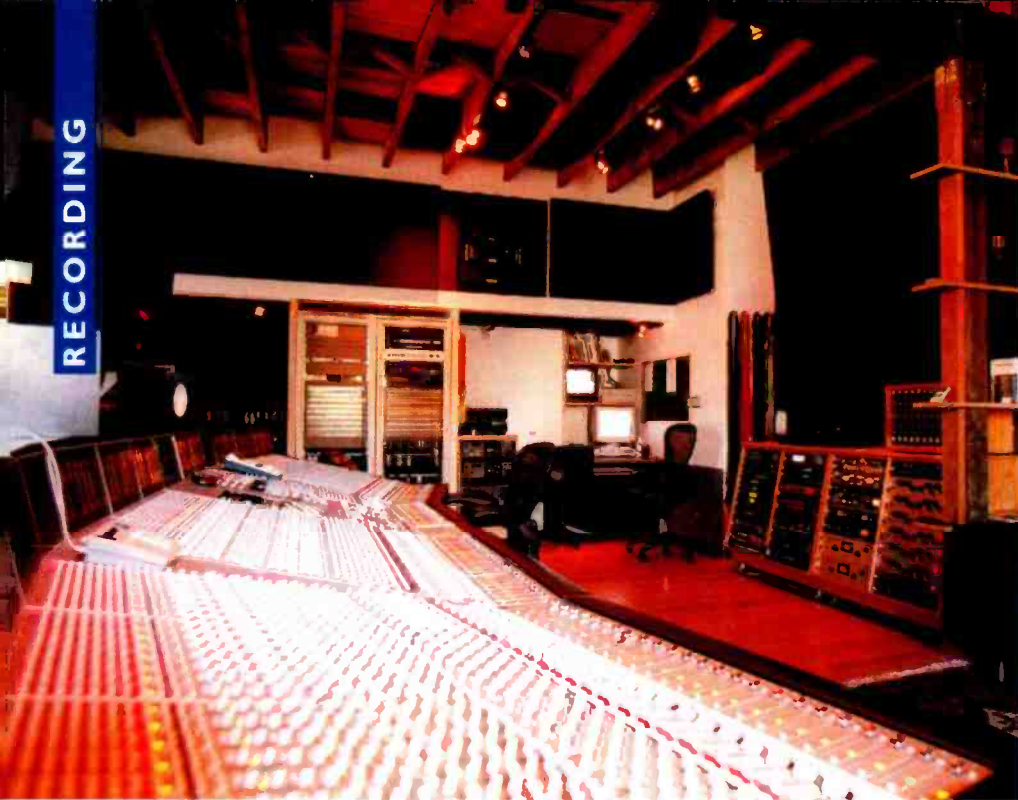
Built in 1886 after a fire that devastated the city, the studio premises were originally the city's first warehouse. The historical association comes through strongly in the studio's atmosphere and the facility further benefits from being on the fringe of an area known as Gastown, the old town, which is now the centre of restoration and redevelopment, offering a variety of restaurants, cafés, shops and other distractions. Those in search of more earthy pursuits need only walk a block or two in the other direction.

From outside there is nothing to indicate the present function of the building. Inside, there is an immediate atmosphere of space and airiness throughout the whole complex. My first impression was of an open-plan office, endorsed by the open metal stairs that link the two floors.

The ground floor has a reception, offices, workshop, preproduction studio (the Pro Tools room) and general storage (including Adams' stage gear). On the first floor, the stairs emerge into a large lounge-kitchen area and >

The Warehouse





< natural daylight—you do not feel that you are in a studio. The tracking studio, which is reached via a small corridor off the lounge is also here. Entering the studio, the first thing that hits you is its large size and airy space. You also understand why the studio is called The Warehouse: the ceiling is two storeys high, the walls bare brick, the floor wooden planking, the air condi-

tioning exposed. The illusion is furthered by dummy bales, which can be left lying in the upper gallery if required. A closer look, however, reveals concessions to studio acoustics.

The inner wall carries eight motorised curtains, which can be raised or lowered to vary reverb time with click stops so that settings can be 'recalled'. The far end of the room features a floor-to-

ceiling glass partition with three iso rooms inside for increased separation. There is also a gallery for the roof which energetic engineers can reach by climbing up a ladder. The remaining facilities include a large mobile drum riser and the service lift in one corner.

'As you can tell,' says Warehouse technical director Ron Vermeulen, 'when the room is empty it is very live and some people might wonder if the drapes can make much of a difference. However, the moment the floor is occupied by a band's gear, the response gets damped down quite a lot.'

Even with the room empty, lowering and raising the curtains does make a noticeable difference to the room acoustic. In the control room, the vast size again is a noticeable.

VERMEULEN ran his own facility, Little Mountain, for 13 years before joining Adams full time as technical director. His career spans engineering, maintenance, technical engineering, studio planning and coordination.

Designed by Vermeulen, the tracking control room addresses several issues.

'First of all, this was designed from the outset as a tracking studio,' the designer begins. 'Mixing is done upstairs. Recording today means having musicians in the control room and I wanted to make sure that there was >

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< enough space for the production team, the musicians and maybe some guests who need to listen in.

'The left side is what I call the technical area and this houses all the multitrack machines, an assistant engineer's desk for all the housekeeping that has to be done nowadays, and the amp racks for the monitoring. The right side is for the artists and guests.'

The rear of the room contains a large podium that slants across the room, providing a couch area in one corner for listeners plus somewhere to put amplifiers and other equipment, for musicians working in the control room. Tie-lines allow speaker cabinets to be placed out in the studio area where they belong.

The action revolves around one of the three custom Neve A6630 consoles that

were first built for Air Studios—the one in the studio having been bought from Atlantic Studios in New York. The console is particularly well-featured for the time of its construction, and has remote preamplifiers that can be located close to the microphones and operated from the desk. (There is no doubt that it sounds better by putting the preamps by the microphones—you get much more transparency.) Vermeulen is proud of the console and the modifications that have been made—while retaining its original look and circuitry, it has been brought up to date in various ways, including SSL-style RECORD ARM and CUT switches over the fader bank, two machine control panels, and dual LEDs at the 'EQ ON' switch indicating channel overload.

'That came from a comment made by Bob Clearmountain,' Vermeulen explains. 'It is difficult to overload the console, but it can be done and Bob wanted a visual indication such as an overload LED.'

The console has also been expanded from the original 48 channels to 58 with what Vermeulen calls 'Sneve' modules.

'The metalwork is Neve-style, but the modules house SSL G-series preamps with E-series EQs. We call them 31242 modules as opposed to the Neve 31106.'

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'THE PROJECT BEGAN in the summer of 1995, when Ron Vermeulen approached us to design, build, and install the monitor system,' says Jeff Berryman, technical director, of Jason Sound Industries, the sound reinforcement company that has toured with Bryan Adams since 1980.

'Although I had been designing JSl's touring loudspeaker systems since 1974, I had not previously been involved a serious studio monitor project. Nevertheless, I felt we had the tools and technologies to do the job, as long as we understood the functional requirements. To this end, we approached the project as a collaboration, with Ron Vermeulen involved at all stages. Somewhere along the way, the monitor concept acquired the name Ronmon.

'As always with high-output systems, we approached the design as a power, bandwidth, directivity challenge, not just a matter of achieving good low-level on-axis frequency response. At an early stage, we developed several hypothetical configurations with different trade-offs of acoustic output, frequency response flatness, directivity, size, and appearance. Eventually, Ron and his colleagues selected the highest-output option.

'The final Ronmon configuration uses four 12-inch loudspeakers in a tight square convex array designed to provide the required coverage and minimise diffraction effects. Each 12-inch driver is in a separate tuned cavity. The convex shape of the overall array leads to a cabinet with very few right angles, which gives it high rigidity and helped reduce internal standing waves.

'The mid-high frequency module is nestled in the notch between the bottom 12s. The module is removable, so that different upper-range transducer sets can be fitted to suit different clients' tastes. At present, The Warehouse owns a 2-way soft-dome module, and a single-way horn-loaded module. Most work has been done with the soft-dome module.

'There are tapered fairings that blend the non-rectangular angles of the box into the surrounding surfaces. There are three complete units to provide full LCR monitoring ability. The overall ensemble is large and distinctive, but not prepossessing. To us, the look is intuitively compatible with the sound.

'There is one subwoofer system for each monitor. Each subwoofer is mounted in the

soffit, immediately behind its respective monitor, with the low-frequency loudspeaker and port facing down. In the beginning, we had thought to give the basic monitors enough bass output to make use of the subwoofers optional. However, after evaluating a number of 12-inch woofers we concluded that the required midrange speed and musicality could only be provided by midrange-optimised 12-inch transducers. At that point, the subwoofers became full-time members of the system, with a crossover frequency of 90Hz.

'The subwoofer systems are 18-inch loudspeakers in fourth-order ported enclosures. Transducers and tuning were chosen for tight transient response and high linearity at high output, rather than extreme low-frequency response. The system's 3dB-down low-frequency point is approximately 36Hz.

'Although the soffit's construction is extremely robust, we felt that it was wise to implement extra protection against bass vibration transmission to the surrounding building. In each subwoofer enclosure, additional mass (1-inch steel plate) is added to yield a total weight of approximately 300lb. The weighted enclosures are mounted free-standing inside the soffit, resting only on high-loss rubber shockmounts attached to the steel soffit frame.

'In approaching the crossover design, we knew that many studio monitor systems used passive crossovers. However, our sound-reinforcement experience had given us a great appreciation for precision digital active crossovers. After some discussion, Ron agreed to let us use active digital crossovers throughout. In the final 4-way design, the digital crossovers optimise frequency and time response, protect the drivers from overload, and provide all room-tuning equalisation. Because they are programmable, they have allowed the development of separate crossover programs for each type of high-mid module. The separate powering of each frequency band has allowed The Warehouse to select power amplifiers optimised for the particular frequencies and transducers involved.

'Ron and his colleagues were very pleased with the initial result. In the following few weeks, a number of producers, engineers, and musicians auditioned the system. Reactions were uniformly favourable, and a few suggestions were collected. Ron then applied a few final room treatments, and we did a second tuning. Since that time, the system has been unchanged.'

effects sends, while Sends 1&2 are pre for Cue sends.'

All the outboard racks in the tracking control room are mobile and can be pushed to one side to allow plenty of space for musicians to play behind the console. To illustrate the point, Vermeulen points out that Adams often sings sitting in the couch section without headphones and using the main monitors.

Three (LCR) monitors are built into soffits over the control-room window. Coverage of the room is excellent, with very little difference in frequency >

< across the main LR buses, which, while having Neve styling, contains the boards from the SSL master compressor.

In its original form, the console featured 12 groups and a 32-track monitor section. As 48-track machines are quite common today, an elegant solution to monitoring had to be found if input channels were not to be used. This resulted in another modification.

'If you put all of the auxiliary sends on a channel into Post,' Vermeulen reveals, 'Sends 7&8 become level and pan controls for the corresponding track number with Sends 3-6 being post-



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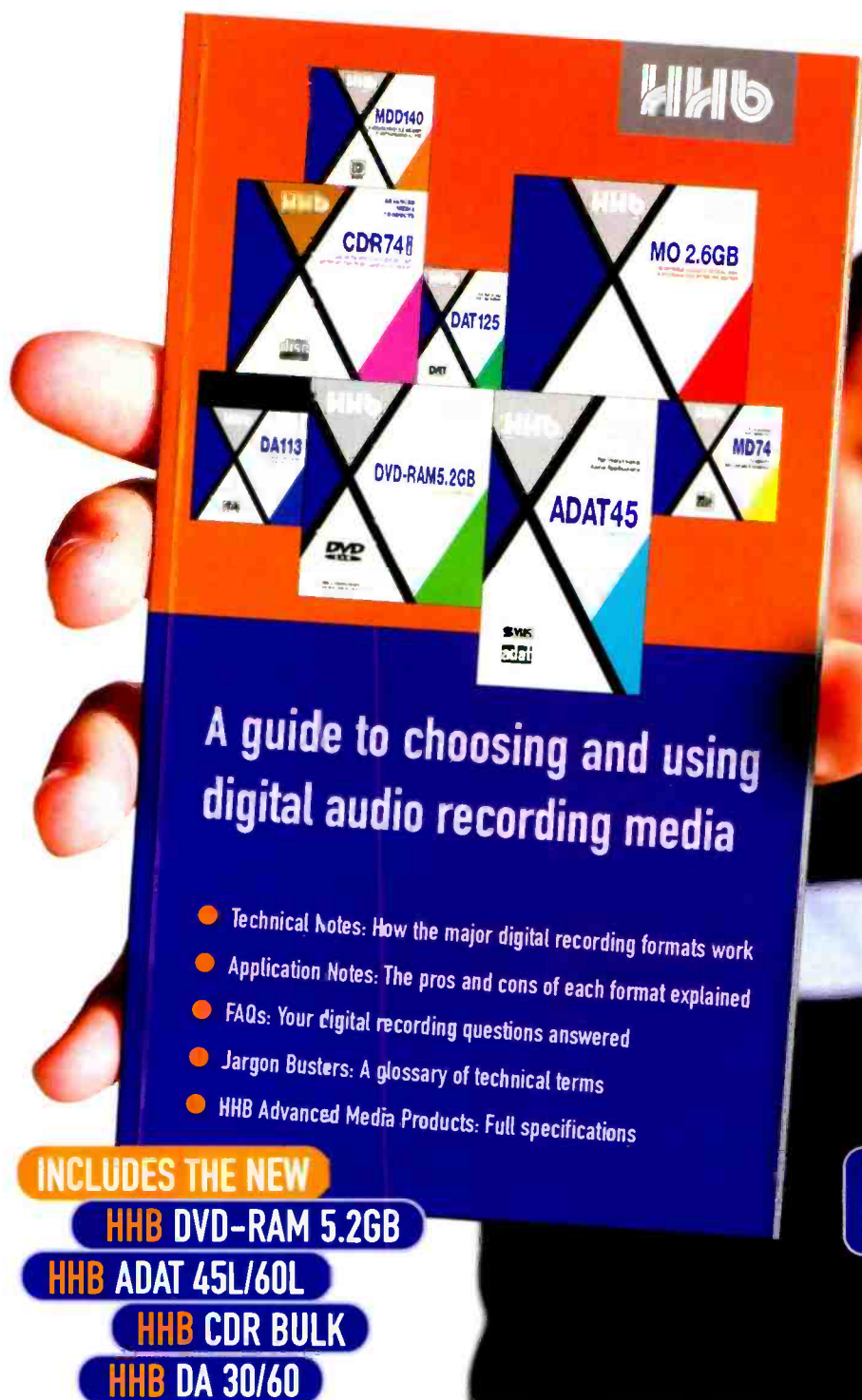
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< response or imaging between the console position and podium seating.

"This control room is large," Vermeulen agrees, "so we needed a monitor system that would fill it evenly and not just at the console position. We talked the situation over with Jeff Berryman (see sidebar) and came up with this design."

Conspicuous by their absence are the surround speakers.

"We have found that the LCR is sufficient as mixing is meant to be done upstairs," Vermeulen counters. "So far, there has been no call for surrounds."

Upstairs, the mix room shares the same elegant simplicity as the rest of the building, with a polished wood floor, a mixture of bare red bricks and acoustic panels, together with wooden ceiling beams. Its 80-channel SSL 9000-series console is accompanied by an impressive selection of vintage and new outboard equipment, again in rolling racks. Monitoring is free-standing and selected on a project-by-project basis.

"We have a wide selection of speakers," Vermeulen explains, "though the latest powered KRK E8s are proving

very popular. We have heavy stands for placing the speakers and this includes for 5.1 mixing."

The studio's collection of outboard has been amassed over the years. Gems include racks of Pultecs and Teletronix compressors, together with the almost obligatory Fairchild 670 and others.

The ground floor is the site for Editing and Copying Rooms. The Editing Room operates a 24-track Pro Tools-Yamaha 02R system with AES-EBU inputs.

"The room is tie-lined to the other studios so that projects can be sent down here for editing and then sent back again as required," says Vermeulen. "The room can also be used as a project studio in its own right and is very popular. A pair of Otari UFC format converters ensures that everything stays in the digital domain—AES-EBU, SDIF, TDIF—and they really do work extremely well."

Along with its generous outboard resources, The Warehouse possesses a wide selection of microphones, ranging from pre-war Neumanns to more modern models. It is interesting to note how certain microphones come into favour—Vermeulen believes that the Coles 4038 ribbon microphone is "definitely the only thing for rock vocals".

Adams' interest in microphones is underlined by a floor-to-ceiling display case behind the studio reception desk, that houses some of his collection for decorative purposes. >

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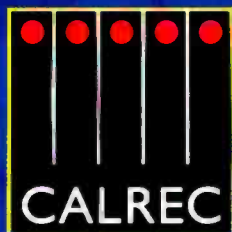
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◀ 'I'm a singer—what else am I gonna collect?' he demands. 'Seriously, I was bored on tour waiting for the gigs night after night, day after day, so my tour manager and I went on a rampage of flea marketing. We hit every flea market from Glasgow to Paris and from Los Angeles to New York City—everywhere. I went to auctions and shops, wherever I might find a microphone. There are over 400 pieces in the collection now.'

Such is the reputation of Adams' collection, donations have been made by individuals and organisations alike. The BBC, for example, has contributed several of the classic announcer's microphones.

Adams clearly regards his studio as a rock 'n' roll venture, with the emphasis on music, musicians and personal relationships. 'We aren't a post place, we are a recording studio for making

Contact

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music,' he says. 'If you are going to make music, you need to feel good in order to make it. The type of music is not really important, but you do have to be in a place that has the atmosphere to make you want to work and be creative. The Warehouse had to resemble a place where people could get together and make music rather than imposing the constraints of a typical recording studio. You do what you want to do and there just happens to be equipment around that lets you get it recorded at the same time.'

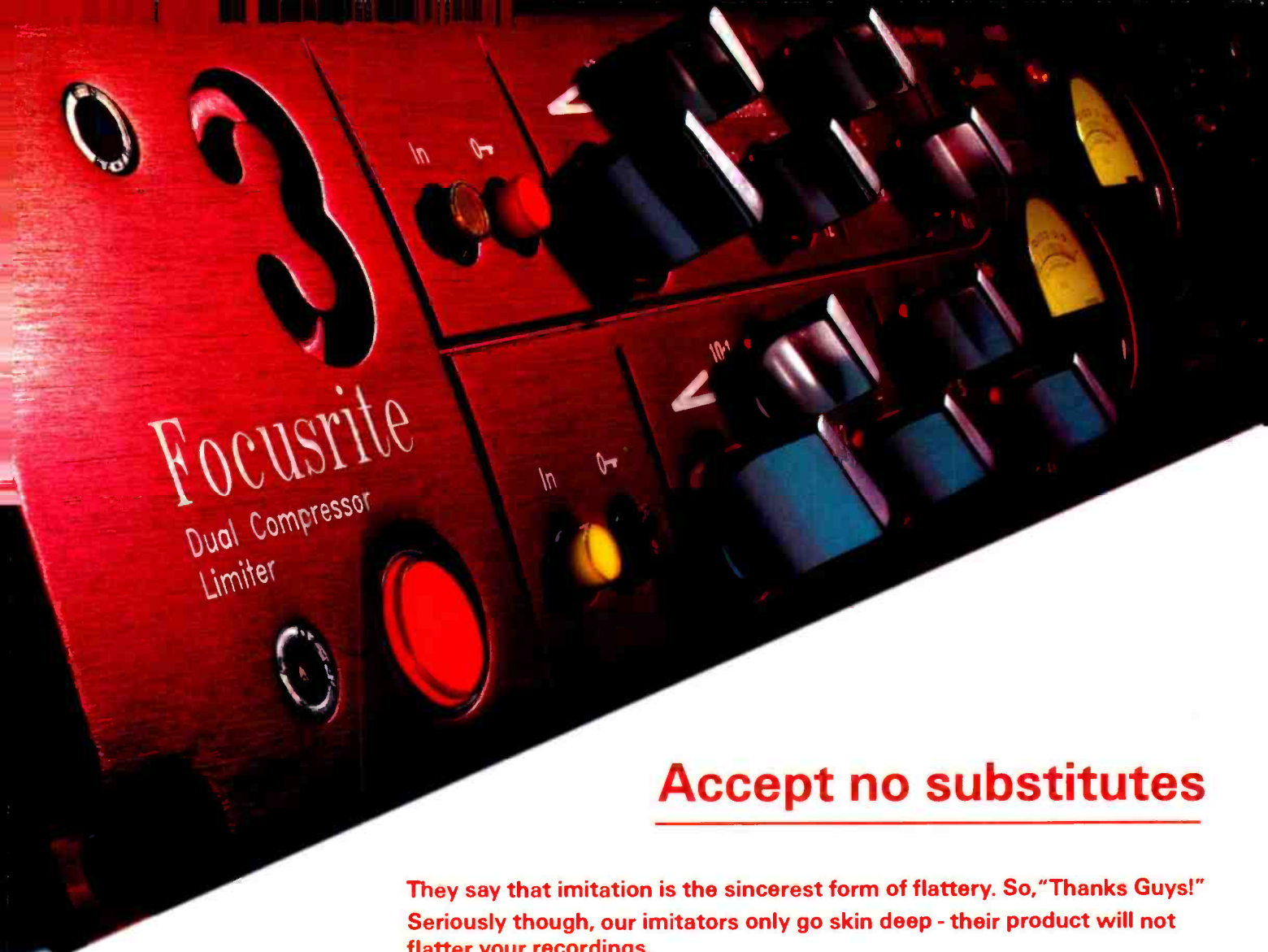
The Warehouse is a front-line studio and is making a name for itself on the North American and international recording scenes. It has innovative ideas and an atmosphere rarely achieved elsewhere. Besides, what other recording facility offers sea and ski within 90 minutes of the console? ■

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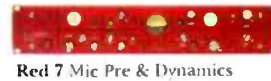
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In part two of this instructional series on ISDN, **Jeff Cohen** investigates audio stereotypes and hi-tech alternatives to the telephone network and the motorcycle courier

MOVING ON from last month's primer on the technological basis of ISDN and bit-reduced audio coding, we can look at the many and varied applications for dial-up sound and the equipment and operational issues that arise.

Users of ISDN for sound transmission in our industry mainly fall into two groups. For some, dial-up audio is something of a dream come true. In the past they had probably battled desperately to get any kind of circuit that provided better than telephone quality, such as trying to book satellite TV sound circuits and the like, but often ending up paying a lot for lines that did not materialise when they were needed. On the other hand there were those who did not know things could be done differently and were quite content travelling long distances to a radio studio to present a radio programme, thought it normal to wait days to receive a DAT of a studio session from another part of the world, and the possibility of a recording session with musicians located on different continents was too incredible to contemplate. For this group the new technology has been a new and unforeseen tool that has transformed the way they work.

I have to confess to falling firmly in the first group, having worked extensively in radio news. The telephone had been the principle method of making audio contributions, which was very limiting. Taped reports could be sent by airfreight but this took a day or two and was thus restricted to non-topical material. Wide-band audio lines were rarely available as they took a great deal of advance notice to be booked the arrangements having mainly been put in place for events such as concerts and sporting events that are planned well ahead of time—and they were pretty expensive. So the ability to dual-up a high-quality audio circuit generated a great deal of excitement. The first BBC bureau to get ISDN was Tokyo, and immediately there was a great deal more work there as programme producers in the UK realised they could get live interviews and topical reports in studio quality. Due to time differences, many foreign correspondents prefer to work from their homes and around the world these were soon equipped with codecs. Later word began to spread that ISDN meant homeworking was possible in the UK as well. It proved worthwhile to

Audio Over ISDN



equip the homes of many presenters and interviewees such as Jonathan Dimbleby who did not relish travelling to Broadcasting House on a Saturday for the *Any Answers* programme following a long journey back from the *Any Questions* venue the night before. So a line was put in his home and a second data channel carries information about callers to the programme, which appears, on his PC screen. Similarly at Classic FM Quentin Howard saw the opportunity to avoid a long journey to the studio and presents a programme from home.

Broadcasters generally use ISDN for *ad hoc* studio link-ups and it has largely replaced the permanent music line networks that were used for inter-regional traffic. The BBC previously had lines in and out of London from regional centres, so if Edinburgh wanted to take a concert from York it was fed via London. ISDN means that all working is now point to point, and this greatly reduced the work of regional control rooms. Most radio Outside Broadcasts (OBs) are now conveyed via ISDN and lines are maintained at frequently used sites. BT itself assists broadcasters by keeping ISDN lines at some venues ready for immediate takeover when needed.

It is not just broadcasters and the audio industry that have discovered the advantages of ISDN, however. Book publishers used to make the authors of their new releases travel around the country for several days doing interviews with numerous local radio stations. Now the publishers have an ISDN codec in their offices and armed with a list of ISDN numbers they arrange to call up the stations in turn. Politicians, company spokespeople and others who frequently make news also now have them in their offices, as they believe that sounding better than the plain old telephone quality adds to their impact. This is particularly so when there are several participants in a discussion and the others are all in studio quality.

The non-broadcast users of codecs soon learnt that while the BBC used G.722 audio encoding for mono speech, the independent radio sector was using apt-X, so there was pressure on codec manufacturers to produce multistandard units. Similarly in the music recording industry, ISDN has been embraced for linking up studios—musicians in different parts of the world could play together, mixes could be heard by producers on another continent, and artists on the other side of the world could >

be auditioned at a local studio. But again the issue of different coding standards was an obstacle. In this field, three coding standards are in use: MPEG Layer 2 and Layer 3, apt-X and Dolby AC2 & AC3.

Dolby decided a couple of years ago to make their codecs dual-standard and included MPEG as well as their own proprietary coding. As a general rule you would choose to buy a codec incorporating the coding system(s) in use by those with whom you wish to communicate. But for independent studios that want to be able to get any ISDN work that's going, the only option is to invest in codecs for all the coding systems likely to be encountered at the other end. A number of directories are available which list the codecs used by studios around the world.

Unfortunately audio coding is not the

only possible incompatibility as even if both ends are using the same type (for instance MPEG), just dialling up without prior consultation can result in nothing but silence. Some of the technical issues are not too much of a problem—such as sampling frequency. Some manufacturers have chosen sampling frequencies not used by others, but most codecs offer enough range that there is sufficient overlap so with a bit of prior discussion with the other end you can settle on one common to both—such as 48kHz.

There are also different 'modes' of coding to choose between, such as independent or joint stereo. Here, there is an improvement in sound quality by a pooling of all the bits as some sounds are common to left and right, and one side may be less complex to code at any particular instance and the bits utilised where they are of most value. Some

makes of codec automatically detect the distant encoder's operating parameters and adjust their decoding accordingly; this normally includes its mode. However, attempts by manufacturers to come up with elaborate automated detecting of coding systems and all their parameters have failed to come up with something that works very satisfactorily. These have tended to be problematic and users have found it more successful to switch off such functions and manually make the right settings based on pre-arranged parameters.

An important area of incompatibility concerns the combination of ISDN channels to produce higher bandwidths—known as channel aggregation. Each ISDN B channel is 64kb/s (kilobits per second) but full-bandwidth stereo audio requires 128kb/s to 384kb/s, so 'inverse multiplexing' is used to create the required bandwidth. This is also an issue in other applications for ISDN such as video-conferencing and computer data links—so general standards have been developed by the telecommunications industry, but in the audio industry (an early adopter of ISDN) a different set of standards was already being put in place.

The telecommunications industry's approach has been to create the required bandwidth in a separate inverse multiplexing unit (or I-Mux) and then feed this into the applications device (in our case the codec). The standard is known as BONDING (Bandwidth On-Demand Interoperability Group) and has been adopted by Dolby for its audio codecs. I-Muxes offer several possible modes of operation so some details need to be communicated when establishing a link.

The MPEG audio codec industry approach was to build on existing audio-visual communications protocols and this has resulted in a standard known as J.52, which is now built into most MPEG codecs. This is carried out within the codec and is an integral part of it. J.52 had a very difficult birth and it took a long time for different manufacturers implementations to inter-work in a satisfactory way, but an industry working group was formed that largely sorted the problems. The standard was originally put together by talented but not impractical engineers as it offered both codec designers and users far too many options. The solution was to have a set of functions that all designers would include in their implementations, and some initial defaults that would be invoked unless the user requests a change.

Channel aggregation introduces a lot of factors that need to be dealt with—for instance: What is to be the total operating bandwidth (this being set by the user and generally 128kb/s, 256kb/s or 384kb/s)? In what order are the B channels to be re-assembled at the other end? Are all the channels in time



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Fostex



D-90 features..

- 8 track digital multitrack with no compression
- 8 track simultaneous recording / playback
- 44- or 48kHz (selectable)
- Copy, paste, move & erase editing with undo & redo
- ADAT™ Digital Interface (simultaneous 8 channel)
- ±6% pitch control with no loss in audio quality
- MTC & Fostex Exclusive Message for controlling transport from external MIDI device, e.g. sequencer
- Approx. 30 mins recording to 1.3GB drive @ 44.1kHz
- 9 'Virtual reels' ■ Versatile chase mode
- Tempo mapping - create up to 64 tempo & signature changes per song
- Midi clock with song position pointer
- Analogue & Digital I/O (S/P-DIF & ADAT interface)
- SCSI-2 interface option for fast backup of sessions



D-160 features..

- 16 track digital multitrack with no compression
- 8 further 'ghost tracks' for additional takes
- ADAT™ Digital Interface (simultaneous 16 channel)
- ±6% pitch control with no loss in audio quality
- SCSI-2 interface as standard for fast back-up
- 44.1kHz & 48kHz sample frequencies
- Up to 99 'Virtual reels'
- Tempo mapping - create up to 64 tempo & signature changes per song
- Midi clock with song position pointer
- MMC & FEX implemented for external MIDI control
- Copy, paste, move & erase editing with undo & redo
- Analogue & Digital I/O (S/P-DIF & ADAT interface)
- Optional LTC Timecode board with Word & Video sync
- Balanced I/O option (+4dBu I/Os on D-sub 25-pin)

Digital Multitrack Recording - you have a difficult choice

Choosing to go digital is fast becoming one of the easier equipment decisions you have to make

But choosing the right digital multitrack can be a little more taxing as you have to be sure your chosen recorder excels in four critical areas: audio quality, expansion, synchronisation and editing

Both the Fostex D-90 and D-160 offer industry standards in digital recording. Using both 18-bit & 20-bit converters, they provide for CD-quality audio with a choice of 44.1kHz & 48kHz sample rates

And being Fostex, the audio remains uncompressed meaning no compromises.

An ingenious caddy-held hard drive system means that increasing recording

time is simply a matter of popping in a larger hard drive

SCSI back-up of recording sessions is available too.

Sync facilities are as you would expect from Fostex. Both models are equipped with the ability to chase to incoming MTC, MTC plus S/P-DIF or ADAT™ (optical), or run free after MTC lock

In addition, timecode sync facilities can be added to the D-160 via an optional board

Finally, being non-linear machines, full copy, paste, move and erase (with undo & redo) editing is available across all tracks.

So maybe the choice isn't so difficult after all

At least you know it'll be a Fostex

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synchronisation at the start of the connection (for instance some may be coming internationally via satellite and others via cable links)? Is monitoring of synchronisation required after the initial connection and during the entire call? If a channel is lost what should be done - realign at a lower bandwidth or wait until the channel has been re-established? Where is the bandwidth used for management of the I-muxing to come from (one of the B channels, a bit from each one or a separate management channel)?

As you can imagine, there can be many menus to go through and set up the required parameters.

A common requirement is for MPEG coding at 128kb/s joint stereo - as this is accommodated on a single ISDN line. An early codec manufacturer (CCS-Musicam) developed a very basic proprietary aggregation scheme for this particular application and it has now been generally adopted as an industry standard. It has no options to set and it is thus not very sophisticated but in the majority of situations is perfectly adequate.

The aggregation standards take account of the possibility of channels unexpectedly dropping out because, very annoyingly, ISDN does do this from time to time. You only have to listen to the Today programme on Radio 4 to sometimes hear interviewees suddenly disappear with trace. You have to bear in mind that unlike an analogue telephone line that holds the call simply by the exchange detecting a low resistance on the line, a digital connection is dependent on a correct stream of bits but there can sometimes be errors and corruption of them. In a BBC test room we were once able to repeatedly lose a connection by turning a particular light switch off and on. So, if your equipment is prone to drop calls of its own accord it may be worth checking for sources of interference and possibly screening

the ISDN line cables.

Data-reduced audio coding introduces delays and in some applications these may have to be taken into consideration. As a guide here are typical delays in a single pass of coding and decoding: G.722 10ms; apt-x 4ms; MPEG Layer 2 100ms; MPEG Layer 3 200ms. In practice figures do vary for different sampling frequencies and among different manufacturers, and you must double the figure for round-trip delay.

For the majority of outside broadcasts (such as concerts) these orders of delay are not a problem. In interactive situations such as interviews, mix-minus or clean feed will be necessary but skilled presenters, especially those who are used to satellite link-ups, tend to get used to anticipating an interviewee's answer finishing so minimising any

gaps. Special precautions and facilities are necessary in complex link-ups of musicians playing together in different studios. Care is necessary when phone calls are included in a studio mix as a perfect clean-feed (mix-minus) may not be possible. Some echo problems have been traced to acoustic factors such as leaky headphones and have highlighted the fact that when ISDN is substituted for short distance analogue lines it may be necessary to review other equipment in use.

Despite the complexities, a great deal of use is being of ISDN codecs and in the event of problems manufacturers and dealers provide a high level of support to their clients. Codec design is constantly improving and some manufacturers offer the ability to download new software via ISDN or the Internet. ■

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LYDKRAFT

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DK 2720 Vanløse • DENMARK

Principal Coding Systems

Speech - mono

| SYSTEM | Bit-rate | Bandwidth | Modes |
|----------------|----------|-----------|-------|
| G.722 | 64kb/s | 7.5kHz | Mono |
| G.722* | 128kb/s | 15kHz | Mono |
| apt-X | 64kb/s | 7.5kHz | Mono |
| apt-X | 128kb/s | 15kHz | Mono |
| MPEG 2 Layer 2 | 64kb/s | 12kHz | Mono |
| MPEG 2 Layer 3 | 64kb/s | 15kHz | Mono |

Speech - stereo

MPEG 1-2 Layer 2 128kb/s 15kHz Ind

Stereo/Joint St/Dual Mono

MPEG 1-2 Layer 3 128kb/s 20kHz Ind

Stereo/Joint St/Dual Mono

apt-X 128kb/s 15kHz Stereo

Music - stereo

MPEG 1-2 Layer 2 192kb/s-384kb/s 20kHz

Ind Stereo/Joint St/Dual Mono

MPEG 1-2 Layer 3 128kb/s-384 20kHz Ind

Stereo/Joint St/Dual Mono

apt-X 256kb/s 20kHz Stereo

Dolby AC-2 256kb/s 20kHz Stereo

* Proprietary versions made separately by
Comrex and AETA (not mutually compatible)

Precision Digital Performance

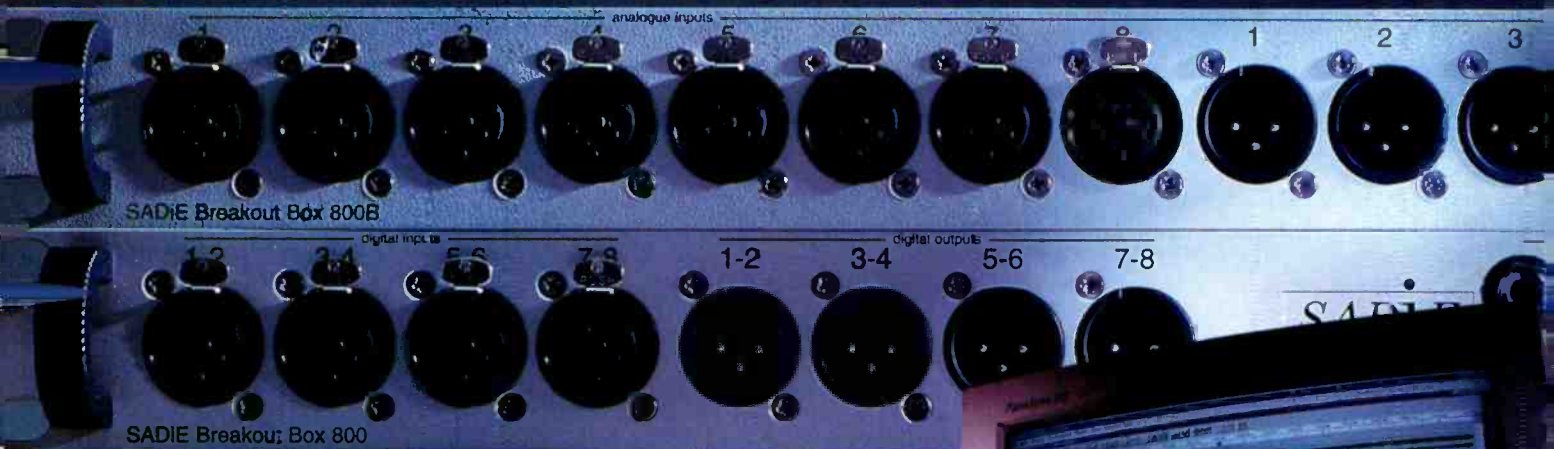
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Adapting a 300-year-old interior to conform to modern acoustic performance is no easy task. But then, few of Great Linford Manor's qualities are everyday, as

Tim Goodyer discovers

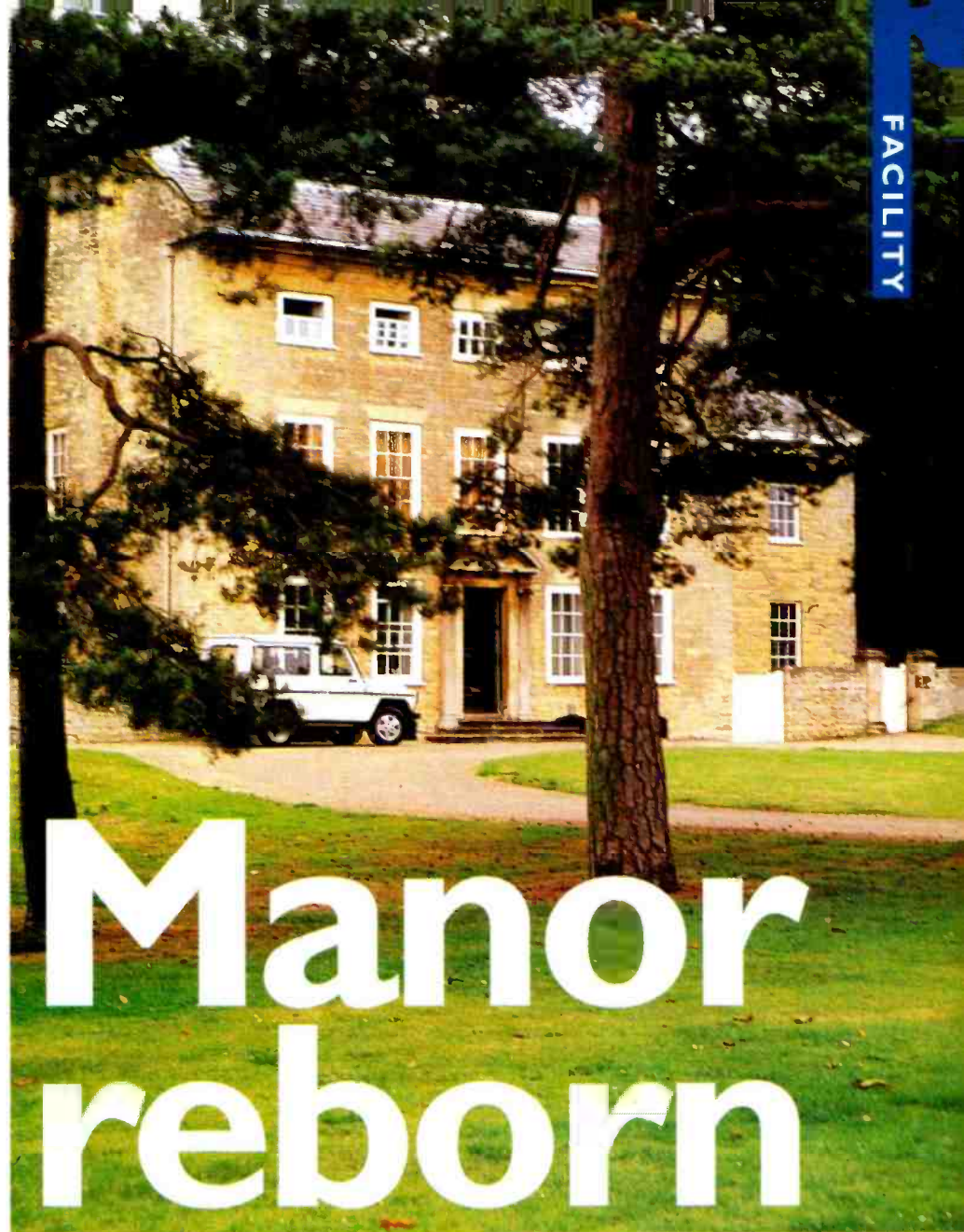
I CAN'T WAIT any longer, Tim. Come and see this room,' says the animated character who had greeted me at the front door only minutes earlier. The enthusiasm exuded by Pete Winkleman, as they say, is infectious—yet it is neither contrived nor misplaced, as the reworked control room at Great Linford Recording Studios is now unique.

Adjacent to the magnificent ballroom live area, the control room has been transformed from the claustrophobic cell that earlier hosted the sessions for successful albums by Jamiroquai and Skunk Anansie, and singles by Reef, Supergrass and Babylon Zoo, and now reflects the 300-year history of the manor house. An SSL 4056 console and familiar studio decor have been replaced by a massive vintage Neve desk and the original wooden wall panels recovered from the building's loft. The useful floor space has been dramatically increased and the feel of the Manor's heritage has been restored. It is quite a turnaround from the 1993 vintage studio Winkleman took on, and required nerve as well as vision and funding.

Among Winkleman's many claims for his studio are a role in the Profumo Affair and that his is only the third family name to appear on the Manor's deeds. He's also quite pleased with the job Roger Qusted and John Kingham's Acoustic Architecture did in reconciling the requirements of a working studio with the character of its setting.

'The control room wasn't initially a major worry,' Winkleman recalls, 'although we certainly made it a problem when we put a desk of that size in there. It was on investigating what had been done to the room that made me excited about the opportunity to change it. I grew to feel that if you come to Great Linford Manor where you're in a country house you needed to be aware of that from the control room. That's where you spend most of your time when you're working on a project, and the fact that the ballroom is one of the best live rooms in the country is irrelevant if it doesn't maintain the atmosphere. I suppose I'm a little bit angry that it was ever built like that because it seemed to really miss the point...

I spoke to various people about changing the studio and the kinds of conversation I was having about con-



Manor reborn

servatories and extensions to the back of the house just weren't what I wanted to do. Roger's vision of the original panelled drawing room was exactly what was required but the brilliance was in being able to make it work. Obviously you've got loads of wood panels bouncing sound around and vibrating and it could have been a nightmare.'

'When I came up, Pete was holding the last bit of ceiling up,' says Qusted with a grin. Removing much of the isolation and remounting the Qusted monitors on esoteric hi-fi stands gave the additional floor space to accommodate

the desk and additional bodies, and the ceiling was fitted with a large broadband absorber. The main acoustic control was achieved with the room's wall panels.

'Local craftsmen took all the panels and they were all stripped down, taken apart and reglued so that they didn't rattle,' Qusted explains. 'The wall was then battened out into sealed compartments and some damping put in to widen the bandwidth and then the panels—which were all irregular sizes—were mounted onto a rubber gasket that can be tensioned and tuned, and replaced at angles to break up the walls. The absorber consists of a new framework filled with mineral wool and faced with the original panels or panels made from old wood from the attic.'

'Old wood that hasn't been varnished is quite absorbent at high frequencies,' he continues. 'If you build something like that from scratch today you have a problem with the wood finish. So although it was less predictable, it has turned out very well because of the imperfections.' Winkleman's enthusiasm and Qusted's confidence are >

Peter Winkleman





only 45 minutes from London. And we can do things like the football match last night. It went on until nobody could see any more.'

'Of course, if the setting proves to be too much of a distraction... I have a loud-hailer so that I can round up the band when I need them,' comes Sheldon's reassurance. 'The setting and the desk evidently outweigh any inconvenience.'

Boasting 56 input channels, 24 buses, 4 types of EQ, copious metering facilities, 68 channels of Flying Fader automation, and a history that almost defies belief, it's the star of the room.

'After we put the desk together, I was amazed to find out just how bloody reliable it is,' Winkleman says. 'And because nothing disappears into an IC or PCB, you can follow the signal everywhere and it's easy to maintain. All the parts are still available, some from specialist companies like Phoenix Audio, and we're fortunate to have our tech, Blake Devitt, based here.'

Looking to the future, Winkleman is preparing to move Devitt out of the space beneath the studio in order to build a number of new iso booths.

'The terrible thing about running a recording studio,' he begins, 'is that once something is right, it puts pressure onto other things to be as good. So the iso rooms that weren't important before are very important now, and we hope to have them >

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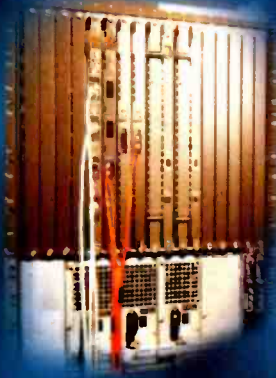
< borne out by producer Chris Sheldon. 'I used the room before it was rebuilt and it's a massive improvement,' he offers. 'I remember the desk being similar, but the control room was very narrow, you could lean on the back wall and put your feet on the desk.'

It's really comfortable, the monitoring's much better... Everything about the place is much better.

'Small control rooms are okay for mixing, but this is primarily a recording room so I've got five musicians hanging around all of whom want to be in the control room with me. The way the studio is now, you feel like you're in the depths of the countryside, but you're



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The Neve at Great Linford

'THE SSL went to Bunk Junk and Genius and we brought in the Harrison console that Robin Miller used to own,' recalls Pete Winkleman. 'Then I bought the first EMI Neve from the Pink Museum in Liverpool. It was one of six, four of which were made in 1974 and two in 1975, and had been made for EMI Holland, I think.'

'This desk is made from the two that were built in 1975. I bought it blind through Peter Duncan who told me about "some weird old Neve somewhere in Germany", but it sounded like an EMI Neve rather than an 8048 or 68. Jeff Tanner from Phoenix Audio did the design and re-engineering and did it so well that you can't tell that it wasn't built that way in the first place.'

'A classic Neve was once described to me as being like a guitar player using a late-fifties Gibson or a pre-CBS Strat through a late-sixties or early-seventies Marshall—the remainder of that recording channel is a Neve 1081, 1073... And using this desk can inspire people if they feel they're getting something special out of the moment that they don't normally get when they're playing.'

'We do very little mixing here. The irony of it is, though, that you would be absolutely shocked at how much better the monitor mixes can be than the finished records. I agree that we're not set up to be a mixing studio but there are people who want the sound of the desk and are prepared to go through the nuances of mixing on an old desk. There are

downsides—everything is real time, there is audio going through the wires connecting every switch so you do get little crackles and things that don't matter when you're recording and that you might not notice while you're actually doing the mix. You've got those problems when you're working with old equipment but we've had projects—even some dance projects—here specifically to get that "seventies sound" as they like to describe it, into the mix. But I do like to think of Great Linford Manor as a performance-orientated tracking studio; we're a recording studio, we're where those things happen that make a record great.'

'We all listen back to music that was made in the sixties and seventies when there wasn't the technology to get everything "just perfect", and something about some of those records makes them better. In the long run I think we'll have more people experiment with mixing in this type of room rather than fewer people because there is a danger of music becoming too similar if it's all produced in the same kind of environment.'

'Subsequently we have located the Paris and Abbey Road EMI Neves in the States and brought them home. The Abbey Road desk we got going and put in Battery Studios for a time and is stored there now and the Paris desk is in bits. From them we will re-engineer a 96-channel (72-channel, 24 plug-in monitor), 16-foot-six Neve. It might end up in here but we're not certain yet.'

sorted before the start of next year.

'It will be better for guitars when they've got the rooms downstairs,' Sheldon agrees. 'For me, the main ballroom is one of the best drum rooms in England and with the new booths, there won't be anything you can't do here.'

Other plans will see mics like the Neumann M49 and U47 added to the equipment list (because they are part of the same evolutionary era as the console) along with modern alternatives such as the M149 and AKG's Solid Tube. 'I'm also keeping my eye on Pro Tools,' Winkleman reveals, 'because of its use by musicians.'

If it is the patronage of musicians that ties odd characters to the Manor today, it is worth remembering that it was not always so.

'We reckon that the house is on all the main Buckinghamshire Ley lines,' Winkleman laughs. 'Apparently it

is the reason that Sir William Pritchard moved the manor house over here from the other side of the road in the late 17th century. And mad Thomas Uthwatt, who built the ballroom, also built the stable blocks with stone mullion windows about where the manor house used to be, just so that he could look at them. Those are great stories, the stories of the extravagance of the past...'

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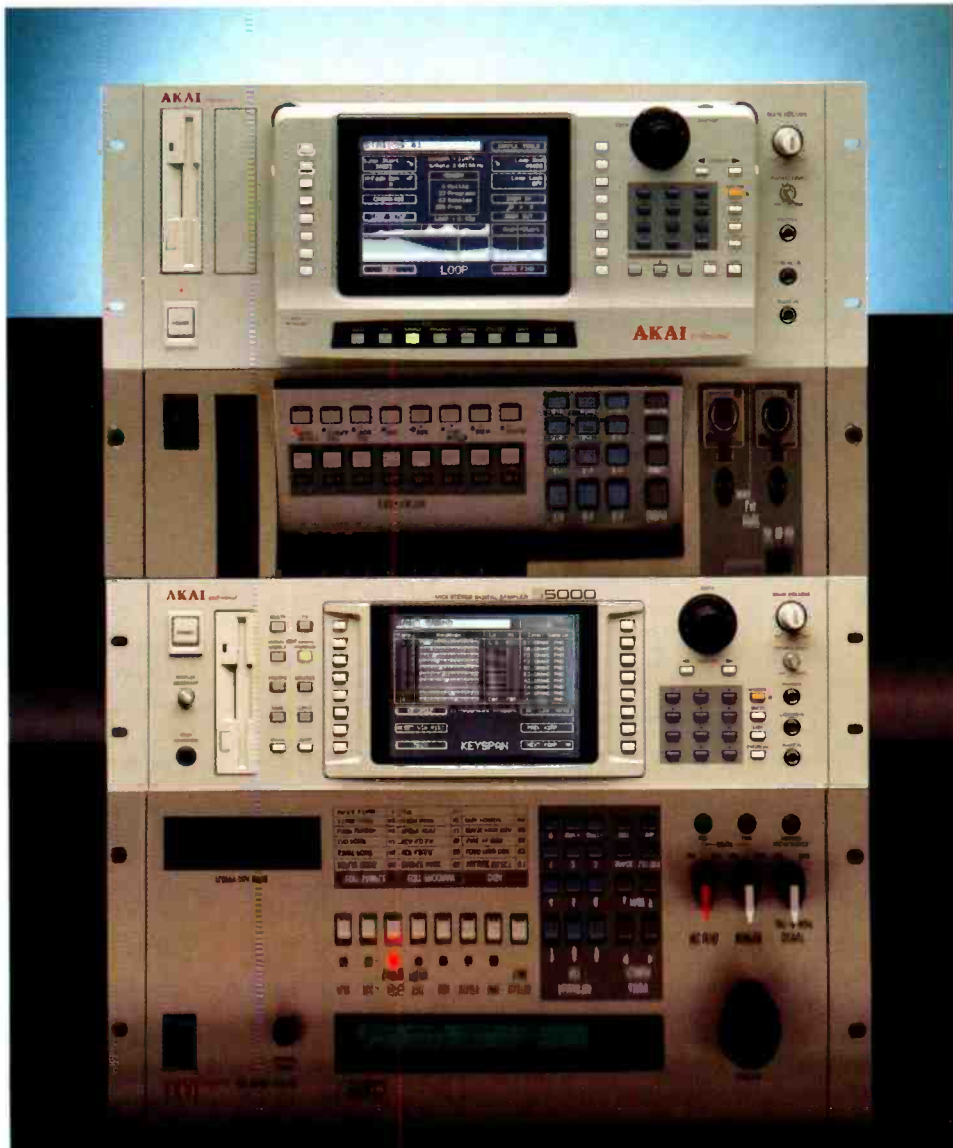
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Ease of use. Both models have a large 6" graphic display with all common user-needed data such as number of items loaded and available memory space shown in the centre of the screen but unique to the S6000 is the seductive removable front panel. 16 function keys read against on-screen parameter boxes and with a large data wheel for adjustment give a 'Touch and Tweak' system that virtually eliminates the dreaded cursor trawl. Extensive use of graphics, icons, pop-up windows, progress displays, drop down menus and the inclusion of a PS2 port for ASCII keyboard attachment for naming give a computer like familiarity. And for more intricate operation we added a 'Window' function to allow power users deep level access to the sampler's heart.

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Sony Music



TOO MANY audio people believe they are losing the war with picture people. They are consistently bettered in every area from budgets to glamour, and their repeated claims to meeting greater technical demands readily sound incredible. Too many, but not all—and certainly not those involved in New York City's Sony Music Studio complex. Here audio has displaced picture from much of its earlier real estate and has subsumed Hollywood's history into its own.

In a chapter that the studio's David Smith summarises as 'Hollywood on the Hudson—the Hudson stayed but Hollywood didn't', Manhattan was home to the 20th Century Fox, Columbia Pictures (part of which was earlier Screen Gems) and Pathé. The soundstage itself dates back to 1927, and was used to shoot and archive the Movie-tone news before being acquired by Sony in 1992. Centred on the soundstage and its associated operational buildings, the 100,000ft² Sony Music Studios now operates 24 audio studios and 18 video rooms, serving its recording, mastering and remastering needs

Once described as Hollywood on the Hudson, **Tim Goodyer** documents developments at one of New York's finest facilities

alongside those of picture—as images are increasingly an inseparable part of music projects.

To this end there are three digital inter-format online editing suites, a Flame graphics setup, and extensive Avid offline capability. Currently two rooms causing considerable excitement on the third floor—the newly refurbished Capricorn room and the unfinished Oxford room. Sony's music labels cover the high-profile Columbia, Epic and Sony Classical imprints along with Legacy and a Special Projects division, all headquartered on Madison and 56th Street. 'Special Projects is a custom operation for people who want to do things based on our archive,' Smith says. 'We assemble the masters, prepare the artwork, do the pressing, handle the replication, and you get finished CDs that

you sell. It's a very lucrative and very busy area. Legacy is primarily catalogue and is concerned with figuring out which way to handle and release jazz and pop stuff that has been in the archive a long, long time. We have people combing through a facility Iron Mountain, which is an iron mine in Poughkeepsie where we keep the bulk of our archive, which at last count was about 350,000 reels of tape and 90,000 discs.

'Remastering is primarily catalogue reissue where you pull it out of the vault and master it a second time. This time you have a better tape recorder, better A-D convertor, better signal processing, better analogue electronics, maybe better ears, maybe worse ears... There are times when stuff is remixed from scratch, but for the most part you are working with two tracks. Sometimes you discover stuff that's never been mixed before which we just have with a Janis Joplin recording that was 4-track and a Santana recording that was 8-track. Mastering is something that's never been mastered before. Certain rooms are dedicated to mastering, and others wander back and forth between mastering and remastering.

'We have 12 remastering studios,' Smith says. 'Two studios do nothing but prepare plant masters because we serve four plants in the US and some in Europe. In the area of audio-for-video postproduction, there are two main studios and three small prep areas, and for video there is a main shooting stage, an insert stage, four editing rooms and a central machine cluster.'

The last major event saw Sony's classical recording operation, SCPI (Sony Classical Productions Inc), incorporated into the complex, bringing David Smith, VP of engineering, with it. Currently the reconstruction of one of the remastering rooms is top of the agenda. The new room will contain a Sony Oxford, following temporary installation of the first OXF-R3 seen outside of its UK Entsham R&D site in 1995.

'The music studios are extremely dissimilar,' Smith says. 'They are primarily mixing studios due to the fact that we are both a record label and an equipment manufacturer. What we do to compensate is to lay back in the recording area so as not to pose a threat to ourselves or to appear to have an unfair advantage over the other studios.'

Studio A has a 96-input SSL 4096 G+ console and is the largest of the control rooms. Studio B has a 72-input VRSP console and is the only room that has a dedicated full-size recording space. It also has two iso booths hooked onto a smaller control room. Studio C has a 72-input SSL 9000j and is an identical control room to B, but with no recording space. Studio D is a self-contained studio with a 1971 vintage Neve 8078 that has previously seen service with Ronnie Milsap, A&R

Recording and a studio on Long Island.

The room was originally built as a copy of the Power Station's Studio A in an adjacent building owned by MCA, but as a result of substandard construction was abandoned until Sony bought it up. Studio F has Mutt Lange's old 72-input SSL 6072 console and, as the smallest studio, has only a vocal booth attached to it. Located in the basement it is heavily isolated from the rest of the building because of the levels of sound favoured by the 'urban' artists with whom it has found favour. All five rooms share Boxer monitors—the first four are T5s and the urban room has a phenomenal pair of T4s loaded with 10 8-inch drivers capable of 'moving your hair' and 'flapping your trousers'.

'The bulk are mixing studios with small ancillary recording spaces hooked on and one with a fairly large ancillary recording space,' Smith says. 'Bear in mind, however, that the insert areas and the main soundstage, the Fox stage, can be wired to any one of the control rooms. This is frequently done not only when music television is shot but also when we are pursuing motion picture scoring—which is difficult in New York because Los Angeles is king. London does too good a job, and we have the most expensive real estate. A lot of aircraft take off from Los Angeles and land in London with music composers and producers on them, and we're trying to get a few of them to land here—which we are doing.'

Room 311, the new Oxford room, marks the latest involvement of designer Neil Grant in Sony's New York studios. Most recently he had been called in to help resolve some of the issues arising from Room 307 containing the Capricorn.

'It's not the biggest room we've done in that building but it is the most current, and it's certainly the most complex,' says Grant. 'In that building, we're locked in to refurbishing little rectangular boxes that have to work at a number of different levels. We're having to take account of greater numbers of people with more equipment configurations, and the acoustics have become more complex, and more detailed, than in larger and more conventional control rooms.'

'It's very difficult to generate a good, dense, diffuse soundfield,' he continues. 'Once you've dealt with the early reflections in the room, it's a fine balance between creating a dead box and a bathroom. Low-frequency control is achieved with staggered panels down the sides of the room, and everywhere there is a boundary in the isolation shell, we're blocking in and controlling its behaviour. We're also using new panels like the RPG BAD panel that combines absorption with the ability to scatter a percentage of the incident sound on the panel such that we can have a relatively live rear end to the

room feeding the diffuser array that is also providing mid and low-frequency absorption. It's no longer the case that a room is half absorbent and half live—it's become very sophisticated.'

Before the arrival of the Oxford, the studio had used custom Daniel Weiss desks and an AMS Neve Capricorn, and arrived at specific reasons for its installation.

The Capricorn was purchased and installed for two reasons. One was the ascent of surround sound, and the other was DVD Video, itself a surround-sound format as it had the most sophisticated surround and automation capabilities available at that point. The studios had also outgrown the custom 24-input, GML equipped Daniel Weiss desk that had served classical for about three years.

'The nature of projects today, especially in classical, mandates that you work on a large-form desk and the only ones we had prior to this were analogue,' Smith says. 'I will and won't argue for digital recording and for digital processing, but I will argue for digital mixing. A digital mixing bus is like a large adding machine—nothing in is nothing out; something in is something out. An analogue mixing bus cannot make that claim—nothing in is always something out and something in is something plus out. A digital mixing bus, especially if you're going from a digital source to a digital destination, is very difficult to beat. Operationally, the studio management needs to get classical projects away from the Capricorn so that it can be used for television, since TV is postproduced on an analogue desk and the competition is using digital desks. The Capricorn is also intended to be used for multimedia work, but the classical guys are hogging it. The solution is the Oxford.'

'My perception is that the Oxford had about a five-year jump on that and it has scalability that the Capricorn does not,' Smith says. 'The Capricorn runs on a variant of DOS. The Capricorn bottlenecks sometimes. These are not complaints, these are observations. The Oxford is a monster Dec Alpha running under Unix—a different animal. It has more computing power, more scalability. It's not a step forward, it's a progression.'

But there's considerably more to the Oxford room than the Oxford. A new studio ignores surround sound considerations at its commercial peril. 'The OXF-R3 is going into a dedicated classical stereo and surround sound room where we're going to try to learn from the conceptual errors we made in the Capricorn room,' says Smith. 'The loudspeaker configuration in the Capricorn room is a fixed ITU configuration. This is not going to be the case in the Oxford room because we're watching the evolution of a music standard for surround sound. It looks at present like being a star—two triangles sitting on top of >



< each other with variable overlap. Another consideration is that it will alternate between stereo and 5.1 so there is the ability to reposition speakers and remove the centre speaker if necessary—these are all question marks as far as the future is concerned. Neil is going to try to position the speakers as he sees fit sonically, mathematically and aesthetically. However, the room is going to be finished ceiling first, then walls and a cursory floor. The loudspeakers are going to go in before the desk and then they are going to fight it out and go back to Neil to see what he found. Then there's going to be this meeting some place in the centre.'

But if the importance of surround monitoring is in no doubt, its implementation is clearly a matter for considerable debate. 'My original drawings showed a full surround system based on LCR, two rear duopoles and a sub-

woofer,' Grant counters. 'Sony were indecisive about what direction to follow to the extent that the surrounds were removed entirely and they are now going to experiment themselves. They can have direct radiators as they have in the Capricorn room and we've used in Strongroom in London, for example. They do, however, cause problems with the area that you can work within.'

'A dipole or duopole speaker will improve the situation considerably, but the virtual source is something that the people have yet to be convinced of.' Looking to the future, Smith talks about 'having to look at a 96kHz capable console'. The names currently in the frame include AMS Neve Otari and Soundtracs but the decision is a way off. More specifically, the studio operation is preparing to support DVD Audio and the joint DSD-SACD standard for which

it expects to be using the Sony Pictures DADR device. Smith is already exploring the 'Eastry-Sleight environment' which will allow multiplexing DSD data onto existing recorders.

'I'm getting happier with digital,' he says. 'In terms of life-like reproduction and low-level resolution, linearly quantised digital audio at the existing sampling rate still leaves a bit to be desired. Making the word longer helps a tremendous amount; doubling the sampling rate just about puts it over the top. Listening to analogue versus 192kHz and 176kHz I wound up picking 192kHz and 176kHz over analogue. Current sampling rates and standards are primarily low resolution, although it's come a long way.'

'There are things you can do in digital that are almost impossible in analogue. But one must never ever lose sight of analogue because as the digital gets better, the analogue that precedes it must be improved.' Ain't it so. ■

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Neil Grant on the design evolution

'YOU CAN TRACE an evolutionary path back to Don Davies in the late 1970s and the Live End-Dead End room, through its dramatic development in the early and mid eighties by people including myself and Peter D'Antonio into what was called the RFZ room and on to the more sophisticated environments of the last seven or eight years.'

'In 1992, HGA finished the first classical rooms at SCPI that were very straightforward and very successful. One was a straightforward digital mastering room and the other was a multitrack room; the digital mastering room had a Daniel Weiss desk and the multitrack room had a stripped-down Amek and a PCM-3348. They used a conventional narrow-bandwidth diffuser from RPG, and broadband absorption to control early lateral and contra-lateral reflections.'

'In 1995 HGA were asked to design the room in which the Oxford was going to be beta tested [now Studio G], and there the diffusion is one order more sophisticated. You start to see breaks in the ceiling and improved low-frequency control because we're using the ceiling structure to

control low frequencies, and learning to increase the bandwidth of the frequencies to control and absorb. The room also is stepped, and that stepping provides further low-frequency control.'

'In 1997 I got involved in the control room for Studio C which represents the next step. Not only are the front wall diffusers diffractal devices, but the back wall is modulated into a diffuser sequence, and the diffuser had been wrapped round into the ceiling so the rear-wall junction was providing low-frequency diffusion and very-low-frequency absorption. I also got rid of the air conditioning grills and the conventional lighting, considerations that both contribute to the mood of the room and eliminate elements that support high-frequency reflections. It's always nice in design to get to do more than one job—the front ceiling is a plenum for the air conditioning, a diffuser for the air conditioning, it contains the lighting and is a low-frequency absorber. And you get a very clean, simple structure. It's a very efficient section of the room.'

'When you're locked into a rectangle, you need to control low frequencies laterally,

longitudinally and vertically, and control reflections as well so you start to see these staggered structures which not only break up the room laterally but provide lateral low-frequency absorption.'

'The rooms at The Hit Factory and Battery are state of the art for the early nineties and what is in Room 311 is the next logical step in this evolution, and especially of small rooms. This has only been possible within the last 24 months—I was talking to RPG about this panel 18 months ago and it's only been manufactured for the last 10 months. That is largely as a result of the work we'd done at Sony where I was saying, "there isn't a device to address this particular problem".'

'In Room 311 you're seeing a plinth to provide low-frequency absorption at the junction between the floor and the walls, staggered surfaces to break up the sidewalls and provide absorption left-to-right, the air conditioning extract is now hidden in the rear wall diffusers.'

'Now the logical progression is to integrate the surround system into the room—I'm quite comfortable with how I'd like to do that.'

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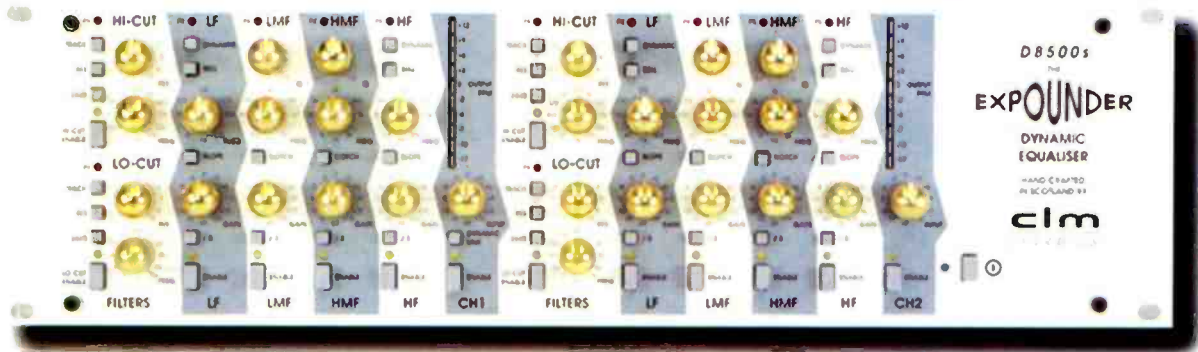
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Black boxes, white faces

Dispensing with discrimination is a slow and painful business, and even when it is done, its legacy lingers writes **Dan Daley**

AMERICANS ARE FOND of conspiracy theories, perhaps even more so now that we no longer have Soviet troops hiding under our beds. But anyone looking for a conspiracy as to why the AES Convention is such a lily-white affair will have to keep looking. There is no conspiracy. There are barely even any legitimate reasons.

It is a reasonable question to ask, though, considering the fact that African-Americans consistently account for over 20% of the Top 100 charts. Black Americans have made their mark on engineering and production, as well as on song-writing, musicianship and performing. They also do this well beyond their proportion of the US population, which is still below 15%. But when it comes to the pro-audio manufacturing realm and commercial studio ownership (private studios are another matter completely), the disparity begs to be addressed.

Asking the question of a few people at the AES Convention produced few insights other than, 'Never thought much about it'. One of the theories put forth was the Geek Factor, wherein an inherent amount of soul pre-empts the kind of Dilbert-esque social awkwardness required to worship solder-

ing irons. But one quickly realises that going towards one set of stereotypes is just as foolish as going towards another.

Asking the question of one of the few highly visible African-American engineers in the US drew an equally mystified reaction, though one with more visceral implicit consequences. 'It's not a conspiracy, but the industry seems oblivious to what Blacks mean in this industry,' observed Tony Shepperd, whose credits include Whitney Houston, Al Jarreau and Madonna. 'On my first session in Nashville, the studio manager said to me, "Don't go through that door. That's the control room. The singers go through this door". I'm Black, so he assumed I was a singer.'

THIS SORT of thing makes me wonder if there is a separate water fountain or bathroom for singers, as well. But Shepperd says this obtuseness, while occasionally humorous, can be as bad as the old days of segregation. 'Try getting an endorsement if you're Black,' he says. 'I record one of the most amazing vocal groups in the world, Take 6, and you'd think they of all people would warrant a microphone endorsement. No way. If you look at the ads in the trade magazines,

enshrined in law. Consequently, Philips sees the CDR765 as the battlefield and the company's lawyers are trying to sort out what it can say in adverts, press releases and brochures, and what reviewers and writers can say about home recording onto blank CDs. In the meantime, Philips has issued a holding statement.

'Philips is satisfied that the equipment does not contravene any laws relating to the infringement of copyright. Philips has not authorised and does not authorise consumers to infringe copyright.'

The odd thing is that no one at the IFPI meeting mentioned MiniDisc. They are, I suspect, blissfully unaware of what the hardware companies would like to achieve with MD—to replace cassette tape and kill off CD-R. There are already signs that the major electronic chain stores are pushing the format.

Sharp is Sony's biggest ally on MiniDisc and makes a range of very sexy MD portables. During a recent visit to Sharp in Japan, company President Katsuhiko Machida informed the press that slow sales outside Japan are due to the high price of MD hardware. 'But the trend is down,' says Machida. 'I hope that MD will be accepted in the US in the near future. It is already being accepted in Europe.'

The party of press then sat open-mouthed as one of Sharp's top executives, Masamitsu Akamatsu, vice president of the International Business Group, blamed

you begin to wonder if Blacks even exist.'

However, some of these musings took me back about five years and 2,000 miles to the Motown Museum in Detroit. The museum is located in the same house where Motown impresario Berry Gordy bought and started the business in 1958. His sister Esther lovingly recreated the three levels of the structure in amazing detail, each floor representing a moment in time during Motown's formative years, including the Berry family living quarters on the top floor and the studio, circa 1965, in the basement. (The emotional result is quite compelling and shows the Rock & Roll Hall of Fame up for what it is: an unholy marketing alliance between the forces of Disney and Budweiser.)

But what struck me then and struck me during these conversations again with equal force was, when I asked the curator why the Motown engineering staff itself remained virtually all white during those years, he replied that, once a Black artist or anyone connected with the organisation began to move up in it, they inevitably gravitated towards record production, such as Smokey Robinson, the first Motown artist Berry let produce his own records. But not to engineering; at least not to the point that also included engineering other people's records.

That's not an answer, but it is, perhaps, a useful clue. Motown's records formed the foundation for the soundtrack to *The Big Chill*, that pivotal bit of Baby Boomer angst from 15 or so years ago. But as that generation contemplated its cinematic navel so piously, it did so without taking into

Europe: Business is war

New format skirmishes have broken out in territory held by CD-R and DVD Audio while MD is massing its forces for a new push, writes **Barry Fox**

AT A RECENT IFPI board meeting in London, new chairman Jay Berman, director general Nick Garnett, and Larry Kenswell, executive vice president, lambasted Philips for launching the CDR765 dual-deck CD recorder that dubs discs at double speed. 'We are very concerned about the lack of consultation,' they said. 'A condition of the Athens agreement on copyright was that manufacturers should consult with the record industry in a "timely manner and at the earliest appropriate stage of development".'

Philips' lawyers quickly went into a huddle, after reminding that the Athens agreement was only a statement of intent, signed by the hardware and software companies at the time of the DAT launch; it was never

MD's poor showing outside Japan on the fact that there is no CD rental. 'Here in Japan CD rental costs ¥150 a night (less than \$1). I can buy a blank MD for ¥500, so the total cost to me is ¥650, compared to \$20 or \$30 if I buy a CD. By renting and recording I save \$20. I already have a collection of around a hundred MDs, so I have saved \$2,000. This is the typical way to enjoy music in Japan, while saving money.'

'My son lives in Los Angeles, where there are no CD rental shops. But he exchanges with friends, and copies them onto MD, so rental is free.'

Akamatsu's description of how MD is used in Japan certainly explains why MD is so successful in Japan—and why the IFPI is making a big mistake setting their sights only on CD-R.

MEANWHILE the DVD Audio saga continues, with DTS spokesman David Delgrosso now attacking Dolby-licensed Meridian Lossless Packing, and Bob Stuart of Meridian countering.

Delgrosso says that MLP destroys backward compatibility and accuses MLP of offering only inaudible advantages over DTS. He argues that 5.1-channel 24-bit/96kHz MLP audio track, leaves no room for a 2-channel LPCM 24-96 version. Instead, the player would use a 'Smart Content' program to deliver a stereo downmix to the analogue outputs. This he says will offend artists and producers.

account a certain 10% or so of the population whose own perception of the America Dream was quite different. Thus, looking out over the sea of attendees at AES, I am reminded that we've come far from being the society of exclusion that we once were, but we have become a society of inclusion. Somebody please give Take 6 a microphone.

One other show-floor note is also one that walks precariously down the Puritanical lines laid down by Political Correctness, a concept born in the Bay Area. But its turning of the tables is too delicious to overlook. It seems that the female receptionists at the welcome stand at the front of a booth owned by an unnamed Extremely Large Manufacturer of Professional Audio Equipment upholstered the inside of their stand with Post-Its, each with Olympic-like performance numbers like 3.4, 5.7, 7.5 and so on from 0 to 10. And whenever a male approached the stand—particularly, one would think, the guys who pound up and not-so-discreetly give these girls the once-over themselves before demanding to talk to Someone Really Important—the young ladies did their own personal evaluations of the fellow by very discreetly pointing to a number and, one supposed, arriving at an average score. Since for the most part women evaluate men by very different criteria than men do women, I can't imagine how my gender did as a group.

But next time you are wandering around the White Male bastion of pro-audio, remember to be polite. And straighten your tie.

Bob Stuart of Meridian brands this 'dis-information'. 'The issue of non-backward-compatibility between DVD Audio and DVD Video is a fact, but it is not a fact that MLP is the cause. MLP is never included on a DVD Video disc. The DTS system permitted as an option on DVD Video is rate-limited to 1.5Mb/s and as such does not deliver the 24-96 performance implied in Delgrosso's comment.

'There has never been a listening comparison between MLP and DTS. Had there been, it would actually have been a test of DTS, since MLP returns the original data intact.

'Downmix in DVD Audio is provided to cope with the circumstance where either the content provider or the artist do not wish to make or pay for a separate artistic 2-channel mix. If a content provider wishes to provide a different 2-channel version, he can place both on the disc. If there is an issue of quality or playing time, then using MLP for both the 2-channel and multichannel mixes allow higher sampling rates, greater bit depth and adequate playing time.

'Yes, there is no room to include a 2-channel linear PCM 24-96 version on the same side of the disc. But there is room to deliver the same thing using MLP.

'A single layer can hold up to 74 minutes each of 5.1-96-24 plus 2-96-24 of typical material if both are encoded with MLP.'

Digital impotence

The idea that more of the same is always better is being applied to digital TV. **Kevin Hilton** finds yet more channels to surf

IT WAS ONE of those beer-fuelled conversations that nonetheless held some truth. Back in 1979, my companions and I recalled, Roger Waters wrote the line 'I got 13 channels of shit on the TV to choose from' for the Pink Floyd album *The Wall*; by 1992 this had risen by 44, as Bruce Springsteen noted in *57 Channels (And Nothin' On)*. Now, in the wake of the digital explosion of both satellite and terrestrial television, how could a socially aware lyricist encapsulate the situation? The best we could come up with was 'There are 200 channels but I'm still going down the pub'.

This is the year it all happens. Some countries are ahead of others; France has enjoyed the delights of digital satellite through Canal+ for most of 1998, with the UK only catching up during October as Sky Digital finally launched after a number of postponements. Sky ignored this and commissioned a series of expensive commercials for terrestrial TV. These used the old advertising trick of the tease: for weeks, such phrases as 'I want more control' and 'I've got so much more to give' were flashed up between other commercials without explanation. When the full spots were screened, television sets were shown in hospital wards or perching on the edge of cliffs, obviously in a state of some distress because they felt they were not giving as much as they knew they could. The cure for their lack of self-esteem is, of course, for their owners to buy both a set-top box and a new dish. In this way, ran the ads, 'All TVs, great and small, will be able to achieve their full potential.'

The big sell is understandable; satellite is still a small part of the delivery equation. At the digital terrestrial seminar held during IBC, the bulk of the audience, 72% of whom were Europeans (16% Asian, 4% 'others'), voted that they believed terrestrial will be the most important format in their country within five years. Only 15% were of the opinion that satellite would have the edge, while 20% saw cable as the dominant system. As the moderator pointed out, this was preaching to the converted, but it does give an indication that, despite, or even because of, digital, things are going to stay earth-bound. But not buried in the earth.

Unless you live in the Netherlands or parts of the Irish Republic. The Digital Television Action Group (DigiTAG) naively went looking in Amsterdam for a set-top aerial for its IBC demos of DTT and

seemed surprised that one couldn't be found. However, operators believe that other delivery media could be used on top of cable to give the extra services promised by digital. The most obvious of these is interactivity; although only 48% of the seminar audience saw this as a key element of DTT. The designated speakers agreed that interactive features were important, but that the crucial task was to establish DTT as purely a television service before getting too clever.

Per Mellberg of Terracom in Sweden said, 'It's quite important to take these services on board a terrestrial platform, even if they do not play an important part in the early days. They could be a driving force for the more traditional services.' Peter Marshall, of the UK's Digital TV Group, added, 'A lot of it at the moment are half baked thoughts; it is a new industry that needs to be developed with some care.'

What everybody seems to appreciate is that coverage and receivers will be what DTT stands or falls on. Peter Marshall said that the excitement felt in the industry should be telegraphed to the public, many of whom know something is going on, but not what they should be doing about it.

For all the broadcasters' fancy advertising, the message is not getting across, and, if anything, this appears to be alienating the viewers, who do not appear to understand that, ultimately, they do not have a choice in this

For all the broadcasters' fancy advertising, the message is not getting across and, if anything, this appears to be alienating the viewers, who do not appear to understand that, ultimately, they do not have a choice in this.

To this end, portability is seen as a deciding factor, giving viewers the opportunity to make all the sets in their house digital through the use of cheap 'filler' aerials.

Another issue is mobile DTT and a colleague expressed surprise that this only had 27% in favour during the seminar's straw poll. Germany is the country pushing ahead with this technology and what were hailed as 'impressive demonstrations' were staged during IBC, with the news that Volkswagen, Daimler-Benz and others are involved in a project to develop this. This was backed up at the London Motor Show, where several new models were introduced with built-in TV sets (albeit ones that work only when the car is stationary).

Perhaps the most telling vote held at the DTT seminar was on the number of services: the audience did not believe that DTT will need to provide more than 30 in each country.

Thirty—that makes for a better scanning lyric. Perhaps we should have stuck with that.

Linux—why it is important

As computer-based audio becomes more commonplace, the fragility of most operating systems increasingly threatens your sanity. **Martin Polon** investigates the Linux alternative

A COMPUTER brings with it many frustrations. The source of most of these frustrations is bugs in the computer's operating system. When running properly, an OS turns its host computer from a paperweight into a sophisticated calculating and computational machine that today can perform most if not all of the functions of a recording studio in virtual reality.

The concept of computer bugs takes us back to computers developed by IBM and Remington Rand for the US Army Air Forces and the US Navy at the close of World War II. These machines were based on relays and electronic valves, and would frequently 'crash' and sometimes 'burn' (literally) as cockroaches, beetles and even large flies would get caught in the relays and short-out power supplies. Hence the term, 'bug'.

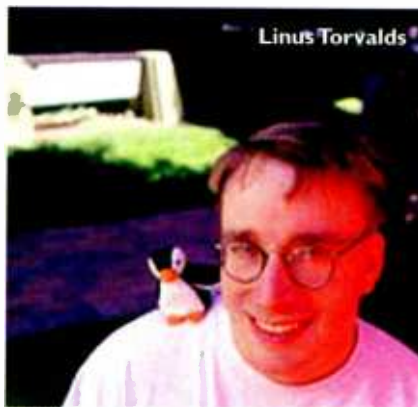
Commercial operating systems (such as those from IBM and Microsoft) are expensive to develop and generally lack customer support from their originators. Instead, support falls to those who write the secondary software—the applications that perform the 'work'. These people try to be all things to all users, but while they do liaise with the OS originators, there are limits to their resources. Then there are the charges that both the OS originators and some of the application makers have begun to level for phone support.

Support is made important by the fact that operating systems frequently contain bugs and even updates are buggy—witness Microsoft's Windows 95 segueing to Windows 98. The ultimate problem faced by audio users, however, is that the power necessary to perform 'virtual' studio is absent from most operating systems. Microsoft promises that Windows NT 5.0 will have the power needed and will arrive at the end of 1998, while Mac OS X (System 10) is slated to arrive in 1999 with the 'power', but the question remains when in 1999.

For audio, video and multimedia—as well as for other business communities and savvy users—a suitable OS may be a Unix OS derivative called Linux. Linux is the free, widely available, openly developed, POSIX-based operating system that offers true multitasking, demand loading, virtual and protected memory, multiuser functionality, shared libraries, proper memory management, true TCP/IP networking and Internet access, and other features consistent with Unix-type systems. Linux is becoming the tool of choice for running high value, fully-functional Unix workstations with appli-

cations ranging from such diverse applications as audio recording studio evolutions, broadcast applications, Internet Servers, office systems, radio astronomy and reliable workgroup computing. And Linux is here.

The Unix that Linux is descended from—invented in the late sixties for a then-small computer—is, perhaps, the longest-lived operating system on record. Originally designed as a single-user version of an system called Multics (hence Unix), it has gathered considerable support from users of powerful workstations and server systems. Current versions of Unix include AIX, AT&T Unix, A UX, FreeBSD, Irix, Linux, SCO Unix, and Solaris, to name a few. It appears as if the reoccurring reports of Unix's demise at the hands of Windows



NT, are greatly exaggerated, as Mark Twain might have said. In current release after current release, Unix keeps adding features and hardware coverage to each hardware platform, with several versions of Unix available.

A young student of the University of Helsinki, Linus Torvalds, initially created Linux as a hobby project in his spare time. Interested in Minix, a code-reduced Unix system, he decided to develop a new operating system that would out perform Minix. He began work in the early nineties, and the first full release of the Linux Kernel (1.0) was in 1994. The current full-featured Kernel version is 2.0, and continues in development with several updates that are available for public use. Linux is developed under the GNU General Public License, and its source code is freely available to everyone. Linux and its various distributions are not always free, but are usually quite inexpensive.

The GNU-Linux OS runs on virtually all platforms available today—ARM (Advanced RISC Machine), DEC Alpha,

DEC VAX, Intel 80X8X PC, Intel Pentium II PC, Java Code, Mac PowerPC, MIPS, Motorola 68XXX Macs, non-Mac Power PC, and Spare plus others. It is also important to note that Linux and most, if not all, of its applications are Year 2000 (Y2K) compliant.

Apple Computer is very involved with Linux. The company is actively supporting a Linux project with The Open Group-Research Institute to port Linux, to a variety of Power Macintosh platforms. MkLinux operates on The Open Group Mach (PMKL1) microkernel, the OS running native on the PowerPC microprocessor. MkLinux is available to Apple users via CD-ROM and by FTP. Apple's MkLinux FTP site (ftp.mklinux.apple.com) offers the current release and updates, plus the latest works-in-progress. Prime Time Freeware (PTF) working with Apple, has produced the reference release ('MkLinux: Microkernel Linux for the Power Macintosh') and assisted with the production and distribution of other CD-ROM releases of MkLinux. MkLinux Developer Release 3 (DR3) from Apple, is Apple Computer's Mach 3-based version of the GNU-Linux operating system. Versions of MkLinux run on the Intel, PA-RISC, and PowerPC architectures.

With DR3, MkLinux's binary executables are quite compatible with other PowerPC Linux implementations (such as Linux PPC). It is also important to note that MkLinux file systems are compatible with other (for example, Intel-based) Linux file systems in terms of byte-order. Also, MkLinux DR3 supports dynamic shared libraries, for greatly reduced disk and RAM storage, and faster program loading. In addition, Linux will emulate numerous other systems including Amiga, most models of Atari, Commodore, DOS, Intel microprocessors, Java executables, Mac operating systems, Microsoft Windows 3.1 and 95/98, Nintendo Super Entertainment Systems, Sinclair ZX and X Windows among others.

Linux is also truly user-friendly when operating within a partition with other operating systems. When any user runs more than one operating system on a PC machine, the drive has to be partitioned or separate external drives must be used. Linux will not in general damage the partition(s) for the other system(s), can recognise the other file system(s) and its installer LiLo will load IBM's OS2, DOS and Windows in addition to the various versions of Linux one might run on a Mac or on an Intel PC.

Development on Linux will soon be

eased by the release by Metroworks a cross-platform developers tool version of CodeWarrior, to be hosted on the Linux operating system targeting Linux desktop development on x86- and PowerPC-based personal computers. The CodeWarrior development tools for Linux will include a project manager, editors, browsers, compilers and debuggers and will support development for C/C++ and Java. Linux support will be included at no additional cost in Metroworks' award-winning CodeWarrior Professional tools that currently support development for Windows and Mac OS.

Linux truly multitasks or allows one or more program to run independently and without conflict of any other program at that time running. Microsoft and Apple claim their co-operative multitasking does the same thing, but, in reality, they hardly measure up to the pre-emptive multitasking of Linux. In a pre-emptive multitask system, a program is given a set number of clock cycles, then it is pre-empted, and another program has the system for a given number of clock cycles. Linux is pre-emptive from top to bottom and does not allow any one program to hang up any other, or hang up the whole system. The only other pre-emptive multitasking operating system is Windows NT, which is frequently compromised by bugs in the current v4.0. Linux is also two to three times faster than NT.

APPL E and Microsoft essentially task switch only. One program may be opened while another is running and the operating system sometimes stops responding in mounting (identifying) a CD, a floppy drive or some other external drive. That's the fault of co-operative multitasking (such as that provided by the Mac OS or Windows) which will give an application control of the PC until that application relinquishes it. In processing a specific unit of code to accomplish a specific task, the application can hang up the operating system, and deny all other programs that are open or that are being opened the option of having operating time on the system.

In contrast, Linux is virtually crash proof. Reports of its running without crashes routinely are measured in years rather than minutes or days. A Linux system that is properly installed, configured and run, will almost never crash, assuming that the hardware it is installed on is of good quality. If the Linux operating system does not crash itself due to some fatal hardware flaw or software installation error, there is nothing that will bring it down. One Linux user likened it to his days in Vietnam flying in Medivac choppers—"using Linux is like my sitting in an armoured titanium bathtub of a seat with a bullet-proof Kevlar vest pushed under me. In both cases, I didn't get any bullets or haemorrhoids".

The presence of true memory protection, ongoing instruction monitoring, and other such devices built into the Linux kernel, provide the necessary stability. The only way a user will ever see the General Protection Fault error message is a massive failure of your computer's RAM.

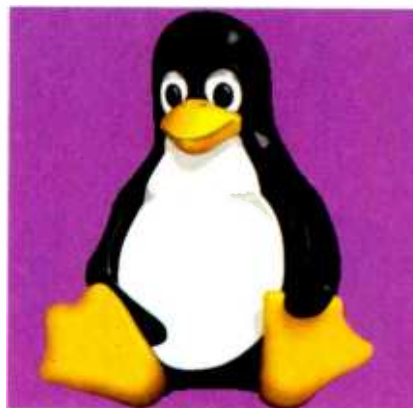
As to operating system size, a charge against Linux that is frequently made by the system's critics, Linux is about the same size (100Mb to 200Mb) in terms of the amount of hard drive space used as Windows 95. This is when Linux is installed completely with its Kernel, utilities, developable software and all of its attendant lights, bells and whistles. However, Linux will more or less remain in that size range while Windows 95 will continue to grow.

As to other operating systems and RAM use, DOS is obviously smaller than Linux but the Mac OS is similar to Linux as is Window 3.1. Windows 95-98 far exceeds the RAM requirement of Linux by in excess of 4Mb and Windows NT can be double this or more.

Linux installs with a GUI (Graphic User Interface) as do its competitors, but it offers so many options unavailable on any other operating system that the process of installation and configuration is no walk in the park. Partitioning and the use of root directories can also be very off-putting to the uninitiated. But nobody working professionally with audio should be that computer naive as to not be able to work with Linux.

It offers enhanced computing power now and the ability to tap in to the future of multiprocessing and/or the power of 1999's next generation chips. The power of PowerPC G4 chips from IBM and Motorola for the Mac (with 128-bit frontside and backside plus up to 2Mb level two caches) and Intel's next generation 128-bit Merced and McKinley chips with similar power plus copper substrate all around will task existing mainstream operating systems to their limit. Linux has the power to easily take advantage of these new chips with far less disruptive rewriting of code.

As to the direct application of Linux to studio and other audio applications, both in the United Kingdom as well the United States and elsewhere, there is already a host of supporters who are writing freeware for Linux. Specific applications for Linux are already available that will serve nicely working as browsing software (Netscape Communicator), digital synthesisers, multitrack hard-disk recorders, software for music notation, audio editing suites, recording programs, word processing, DSP processing and others. Rumours circulate in profligate abundance about software from the SGI and Windows 95-NT platforms being ported to Linux. All in all, Linux is beginning to look like the 'little engine that could' in the face of huge competition. ■



LINUX PENGUINS BY LARRY EWING

Capacitors

Behind the black panel lies science, not black magic. **John Watkinson** continues his explanation of electronic components by considering capacitors

CAPACITORS ENJOY a fair number of uses in audio circuitry. Fig.1 shows some of them. The simplistic view of a capacitor is that it is a kind of storage device and the use of the term 'reservoir' for a capacitor in a power supply is illustrative of that view. Fig.1a shows a reservoir capacitor

preventing variations in power supply voltage in an amplifier from disturbing the input stages by holding the local voltage constant.

Fig.1d shows a coupling capacitor that is allowing the AC component (the audio signal)

to leave an amplifier while preventing the DC component causing a steady current flow in the load. This is also called a blocking capacitor. Effectively the DC voltage across the capacitor remains constant, so if the voltage on one plate is varied by an audio signal, the variations will be transmitted to the other plate.

Smoothing, coupling and decoupling have in common the fact that the capacitor is generously sized so that its effect dominates at all important frequencies. Where a capacitor is not used in this regime, the result is a frequency-dependent circuit called a filter or an equaliser. Fig.2a shows that a series capacitor results in a high-pass filter whereas a parallel capacitor results in a low-pass filter. Note the similarity between the high-pass filter and the coupling capacitor, and between the low-pass filter and the decoupling capacitor. In effect coupling and decoupling circuits are filters where the response changes at only a few Hertz and remains constant above in the audible frequency band.

So much for applications; but what is a capacitor? Fig.3 shows that the simplest capacitor is simply a pair of parallel plates with an air space between them. The symbol for a capacitor is directly derived from



Fig.3: What is a capacitor?

this. In an uncharged capacitor, the number of loose electrons on each plate is the same and so there is no net voltage across the plates. When a capacitor is 'charged', electrons are driven from one plate to the other, so that the overall amount of charge does not change, but the distribution does. The difference in charge on the two plates results in a voltage difference.

Electrons in a conductor repel each other and end up uniformly distributed. When we upset this balance we have to supply energy. This energy is used squeezing the electrons together on one plate. The air space acts as an insulator preventing the electrons from assuming an even distribution. If a current path is provided between the plates, the electrons will flow down it until balance is regained. This current is evidence of the energy stored in a charged capacitor.

IT SHOULD be evident that a capacitor does not store electrons, it stores charge because the same number of electrons is present whether the capacitor is charged or not. Charge exists when the distribution of electrons is not uniform. Clearly if we keep stuffing charge into a capacitor, the voltage will rise so far that the insulation is overcome and the capacitor breaks down. Hence all practical capacitors have a voltage rating which should be higher than the in-service voltage to leave a safety margin.

The capacitance of the air spaced plate construction is not very high and greater capacity per unit volume can be obtained by using a dielectric material or insulator between the plates which makes capacitors much smaller. This has some side effects too, because dielectrics suffer losses at high frequencies which turns some of the stored energy into heat. Some of the signal is lost, and the heat can do damage.

One reason that there are zillions of different types of capacitor is that different dielectrics offer a different balance of cost, size stability and loss. The oldest dielectric materials include air,

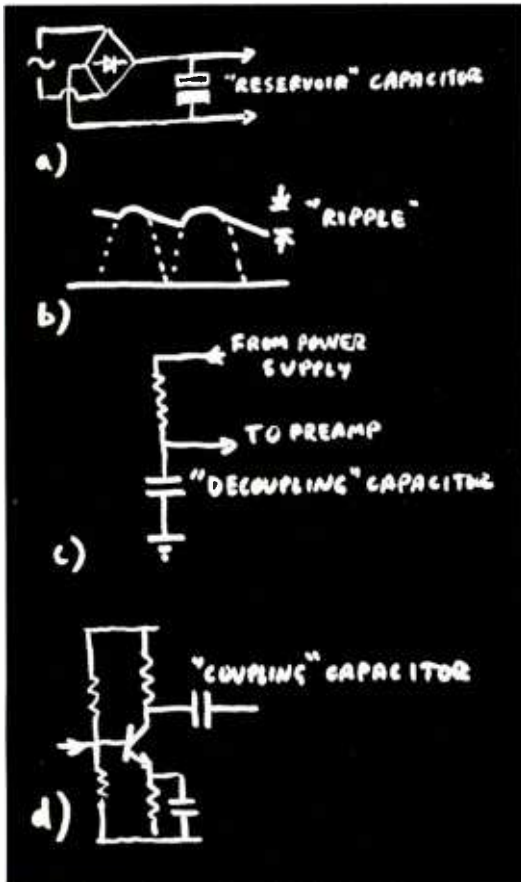


Fig.1: Applications

connected to a bridge rectifier. When the rectified AC voltage exceeds the capacitor voltage the diodes conduct and charge up the capacitor. Otherwise the capacitor discharges into the load to maintain the supply voltage. The voltage fluctuations are called ripple, shown in Fig.1b, and the act of reducing the ripple is called 'smoothing'.

Smoothing illustrates the characteristic of capacitors which is that they tend to keep the voltage across themselves constant in the short term. There are two polarised (did I really write that?) uses of capacitors in signal circuitry. One is to prevent signals in one part of the circuit interfering with others and this is called decoupling. The other is to deliberately connect signals from one part to another, known as coupling. Fig.1c shows a decoupling capacitor that is

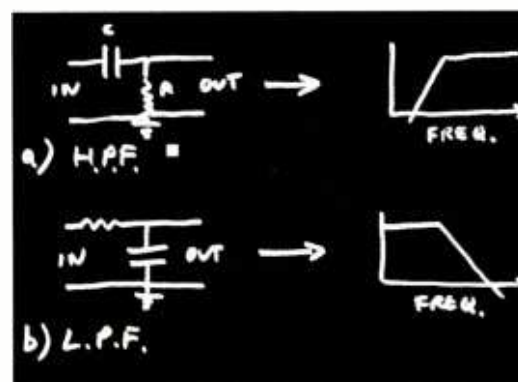


Fig.2: Simple filters

< mica and paper, with more recent synthetic materials such as polyester, polycarbonate, polypropylene, polystyrene and ceramics. Polyester capacitors are compact, but lossy, and may have poor temperature stability. Polycarbonate is more stable and has lower loss, but polypropylene has the lowest loss, making it suitable for arduous applications such as switched mode power supplies.

One way of making a capacitor is to make a sandwich of plastic film and metal and then to roll it into a cylinder to save space. If the connections are made at only one point on the film, the rolled-up signal path makes an inductor that appears in series with the capacitor; not much use for decoupling a high-speed logic gate or preventing oscillation in a high gain-bandwidth



Fig. 4: Dielectric relaxation

product operational amplifier where low inductance designs are required. A better construction bonds the whole of the spiral into one electrode at each end.

A dielectric is seldom a perfect insulator; it still has a tiny but finite conductivity. After a capacitor has been charged for a long time, some of the charge can burrow into the dielectric. If the capacitor is discharged by shorting the plates temporarily, only the charge on the plates will be lost. After a short time, the voltage on the plates will start to climb again as the charge works its way out of the dielectric. As Fig. 4 shows, this is called dielectric relaxation.

VARIOUS MODELS of dielectric relaxation exist and these show that it is perfectly linear. In other words an analogue audio signal cannot suffer harmonic distortion because of it, despite what you may read in hi-fi magazines and other fictional works. Pulse circuits used in sample-and-hold stages in digital audio are another matter. Here polypropylene and polystyrene capacitors are preferred.

Where higher capacities are required, the solid dielectric capacitor gives way to the electrolytic. These store energy in reversible chemical reactions and can be thought of as high-speed rechargeable batteries. Like batteries, electrolytic capacitors need to be permanently polarised one way, and suffer leakage or slow self-discharge. The voltage may rise and fall, but it must never reverse polarity or the capacitor may be damaged. A reversed electrolytic evolves hydrogen gas, and large units can make a surprisingly powerful explosion in case of a failure. Often a pressure vent is fitted to make them go with a whimper instead.

In most applications, such as smooth-

ing, coupling and decoupling, the constant polarisation is guaranteed and the leakage is not an issue. If polarisation is not always achieved, special 'reversible' electrolytics are available consisting of two capacitors in series. Not the sort of thing to put a high-quality audio signal through.

Chemical reactions take a finite time and the electrolytic only works over a limited frequency range. In effect the component comes with a free series inductor. Thus it may become effectively open circuit at RF. This is known as the 'mother-in-law effect' where an undesirable component comes along with the wanted part. In high quality products electrolytics will frequently be found bypassed with solid dielectric capacitors to maintain decoupling at all frequencies.

When used in reservoir applications, the ESR or equivalent series resistance of an electrolytic is important, because it can dissipate heat and limits the current rating. This is a particular problem in switching supplies. ESR can increase dramatically under freezing conditions. An amplifier which has been unpowered and stored at low temperatures may need to 'warm up' before it meets specification.

The unit of capacity is the farad, named after Michael Faraday. Fig. 5 shows the connection between charge, voltage and capacity. In practice the farad is a colossal unit and for everyday electronic purposes the microfarad (µF), nanofarad (nF) and picofarad (pF) are used. A smoothing capacitor might have a capacity of around 10,000µF. Coupling capacitors may be 10-100µF.

Capacitors are imperfect devices and the choice of type is basically one of selecting the capacitor with the deficiency which is least relevant to the application. For example tolerance and temperature drift do not matter at all in decoupling, whereas in timing and filter circuits they are paramount. ESR does not matter much in signal circuits, but becomes an issue in power supplies.

Finally, ageing has to be considered. Solid capacitors are effectively everlasting unless their encapsulation is poor, allowing contaminants to enter causing internal corrosion. Electrolytics are not ageless. They can age in storage or in service and elevated temperatures accelerate the ageing. ■

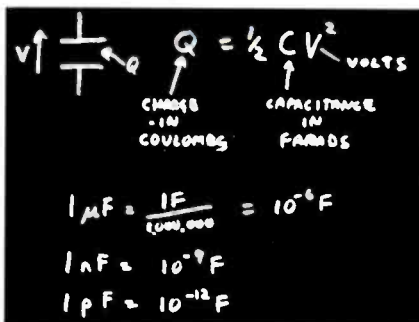


Fig. 5: Charge, voltage and capacity

Advertisers Index

| | |
|---------------------------------|----------------|
| Alice Soundtech..... | 68 |
| Amek..... | 46 |
| Amptec..... | 76 |
| AMS Neve..... | IFC |
| Aphex Systems..... | OBC |
| Audio Ltd..... | 60 |
| Behringer..... | 6,7 |
| Beyerdynamic Bound Insert | 18,19 |
| Calrec..... | 77 |
| Copy Pro..... | 45 |
| Creamware..... | 67 |
| D&R Electronica..... | 33 |
| Denon..... | 87 |
| DPA Mics..... | 18 |
| Drawmer..... | 37 |
| Emtec..... | 56 |
| Euphonix..... | 4,5 |
| Fletcher Electro Acoustics..... | 92 |
| Focusrite..... | 79 |
| Genelec..... | 73 |
| Grace..... | 68 |
| HHB..... | 51, 55, 63, 75 |
| HW(QSC) Bound Insert..... | 67/68 |
| LA Audio..... | 49 |
| LA Audio..... | 70 |
| Lab Gruppen..... | 66 |
| Lawo..... | 86 |
| LSK..... | 45 |
| Lydkraft..... | 83 |
| Mackie Designs..... | 107 |
| Magellan..... | 42 |
| Mandozzi..... | 88 |
| Manley Labs..... | 72 |
| Maxell..... | 24 |
| Media Form..... | 44 |
| Microboards..... | 21 |
| Microtech Gefell..... | 82 |
| Munro Assoc..... | 19 |
| Mytek..... | 93 |
| Neato..... | 45 |
| Otari..... | 71 |
| Pearl Mics..... | 68 |
| Preco Bound Insert..... | 67,68 |
| Presonus..... | 16 |
| Protape Bound Insert..... | 18,19 |
| Richmond Film Services..... | 87 |
| SCV Bound Insert..... | 83,84 |
| Sonifex..... | 31 |
| Sony..... | 29 |
| Sound Technology/Alesis..... | 13 |
| Soundcraft..... | 39 |
| Soundtracs..... | 27 |
| Spendor..... | 23 |
| SSL..... | 9 |
| Stirling Audio/SPL..... | 34,35 |
| Studio Spares Bound Insert | 83,84 |
| Tascam..... | 59 |
| tc electronic..... | 15 |
| TL Audio..... | 53 |
| Total Audio Solutions..... | 87,88 |
| Trax Data..... | 43 |
| Unity Audio..... | 52 |
| Westlake Audio..... | 80 |
| Whirlwind..... | 106 |

The Emperor's finest clobber

The spattering of promised new digital television channels should see a return quality programming, muses **Neil Hillman**

THIS AUTUMN we have witnessed the birth of probably the greatest single change to the broadcast television industry. The advent of digital TV bringing the prospect of hundreds of new channels to an ever-hungry viewing public, sitting and salivating in anticipation of devouring the increasing ogle-hours on offer. Or so we are lead to believe. That there will be far-reaching changes in the way that these programmes are delivered and consumed is evident, but it is the commercial climate in which these delicacies will be prepared that will alter this, and this gives hope to all of us plying our craft-skills in a forlorn attempt to uphold standards in an increasingly unappreciative market.

While the greatest overhaul of broadcasting in Britain coincides with a premeditated dumbing down of its general products, has there ever been a time when the viewing public were more literate and informed, or less tolerant of poor quality? Given that their expectations have been driven high by the excellence available to them through the music and movie industries it is an inevitability. In an environment where the standing of a production company, producer or director is measured by the ability to deliver programming within tightening straightjacket budgets—irrespective of the technical quality and content—it could well be the mighty sword of profit that puts an end to a decade of diminished discernment. As the smart money positions digital broadcast alongside film and music as the high-quality, high-grossing products for personal entertainment, recognising that unfettered from the stodgy table d'hôte of the established programme outlets, a fresher à la carte menu will be welcomed by viewers, while providing good returns on investments in quality and content for programme producers.

For the consumer this will inevitably involve more expense; although this has not been perceived as being detrimental to the prospects of such products where many millions of pounds are predicted to enter the television economy as the license-fee culture is gradually realigned to that of a monthly subscription fee or pay-per-view. Ask yourself this—how much would you pay to watch the badly framed, badly exposed

domestic digi-handi-camcorder pictures married to loose and sloppy sound produced by wonderfully cost-effective yet technically inadequate production staff served up so regularly on television?

By far the biggest change for independent productions will come with the introduction for the first time in Britain of value-pricing, where a programme may be sold for its value to a channel wishing to carry that production—or to advertisers—rather than the

A tight budget does not mean making a programme badly. the absence of ability certainly does. my hope is that these programmes will disappear

present broadcast commissioning system of remuneration at a cost of production plus a profit margin of 10% or so. The inevitable knock-on effect will be to create higher levels of profit for acclaimed high value productions at the expense of middling and bottom of the pile programmes that in the past have either been subsidised or made with untenably low production values. Given that working within a tight budget

does not mean making a programme badly—the absence of creativity and technical ability certainly does—my hope is that these programmes will disappear from our screens sooner rather than later.

With the number of channels on offer and the myriad output, viewers will also become more brand-orientated and look for particular programmes by name rather than the way they might at present examine existing terrestrial channels.

The introduction of television search-engines and browsers will reinforce programme branding. This may be construed as bad news for the present broadcasters whose current high state of awareness in viewers minds and their lucrative position as gatekeepers at the entrance to the all-powerful television transmitter will come under threat as it becomes possible for a direct financial link to be established between an individual programme producer distributing his product directly to the viewer who wishes to purchase just the content, not the distribution system. In this new world, those broadcasters who are not making programmes to sell on could be the ones least likely to survive.

The money should make its way through to other contributors of the finished product too. The increased appetite for quality programmes in the broadest sense will give rise to the time-honoured conditions of supply and demand, where the finite number of talented people will experience a greater call on their time and services and so they will be able to command a greater share of the increased profits available to the originators of the successful programmes. Funding for the relentless development of new dramas or sit-coms will require a reinvestment regime that if managed prudently would become self-financing in a short period of time.

In my dictionary, 'digit' sits between 'digest': to prepare food for assimilation; reduce to convenient form a periodical synopsis of news' and 'dignity': 'worthiness; a holder of high office'—where television has come from, and where it conceivably could go. While the king of entertainment may well soon be dead, there is an heir in that bloodline. So long live the king! May we not rush to resume normal service. ■

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