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Welcome to a New Year

Readers and advertisers please note that all our telephone numbers and fax number have changed from 1st January 1999. Our masthead on page 4 has been revised and direct lines to all staff have been included.

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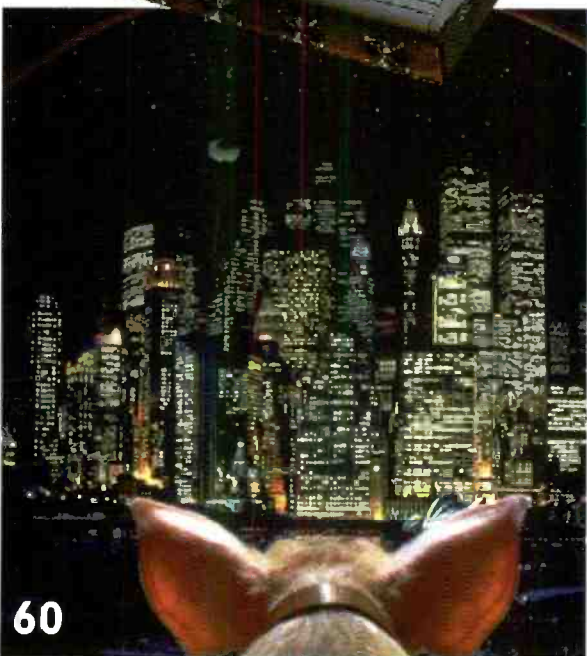
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The economies of fail

THERE ARE ECONOMIES AND THERE ARE FALSE ECONOMIES. False economies are ones that have a grounding of reason on the surface but overlook a deeper glaring flaw. They are frequently driven by those who have a mission and their own agenda, and who work this agenda within the constraints set by someone far higher up the chain of command.

Thus we see the economic restriction of farm crops in order to keep prices strong and stable while a large part of the world's population struggles to have enough to eat, we see cost-cutting and tightening-up in education condemn generations to ignorance and misinformation, and understaffing and lack of investment jeopardising people's safety.

On a more trivial level there are those who enjoy driving miles for those few gallons of cheaper petrol; who insist on taking a week off work to do jobs around the house that they're not very good at, and could have paid someone else to do in a day with the same materials; who spend a fortune on upgrading and customising a fairly ordinary plank of wood when the combined cost could have bought them the real Les Paul that they've always wanted anyway; and those who believe that TV sound can be done on the cheap.

Maybe my ears are beginning to fail me, but I'm finding it increasingly difficult to understand or hear a lot of what is said on television. The pattern is a familiar one—one man and his camera productions bring you yet another hideous five-part series on the lives and trepidations of the dustbin men; romance and weight-watching with the Idaho undertakers; undercover with the hookers of Murmansk; and the intrigue and flared tempers that characterise the build up to the annual North Chailey village summer stamp collectors' fair.

The pictures are cut adequately within the constraints of what was shot, but no amount of fader riding and wizardry, if indeed the production ever got out of the video edit suite, can compensate for the fact that there are simply not enough mics on the shoot and the one that there is is perched atop the hand-held. This renders a poor, but admittedly cheap, idea unwatchable for the price of a soundman on location. As the air hours mount up we will be treated to more of the same.

But maybe it is my hearing, and maybe that's a blessing.

Zenon Schoepe, executive editor

Higher resolution

SOMETIME OVER THE CHRISTMAS PERIOD, a child's dream came true. But it was not St Nicholas who made it so, it was TV presenter Gaby Roslin.

The setting was a kids' TV show in which contestants able to demonstrate intimate knowledge of their pop, sports or other idols and a passing acquaintance with Lady Luck, get to go behind the scenes at a concert or football match, party with the famous, or otherwise indulge themselves in their icon's celebrity. Imagine, then, a young girl winning the chance to meet pop stars Steps and discovering that she was also going to sing on their forthcoming album...

Steps, for those yet to read the interview on page 53, are producer Pete Waterman's latest chart success—and in this detail, the picture begins to make sense. Waterman, you may recall, was regularly accused of using recording studio 'tricks' in securing the success of Kyle Minogue and her PWL stablemates during the eighties. Now it seems he is literally prepared to take someone with no proven talent and put them in the pop charts.

Of course it is not that shocking in reality. There is no shortage of ways in which a girl's voice may be used on a record (ask Brian Eno), and the success of Steps' next disc is unlikely to rest upon her contribution. So why the fuss?

Kevin Hilton's comments on the media industry's deconstruction are well made (pp 91) but there's more. If, like me, you are inclined to relate part of the intrinsic value of a recording to the mystique behind its making, then to demonstrate that the charts are open to someone with no proven talent and no expressed wish to be a pop singer is to badly undermine your product. Pete Waterman would be justified in arguing that it demonstrates not only his ability as a producer, but his confidence, that he is prepared to take on such a task. But I remember the value of aspiration in my early musical days, and I remain to be convinced that anyone would choose a career based on such extremes of luck rather than skill, dedication and achievement.

Perhaps there's still time for a New Year's Resolution from the record industry—to re-establish its self respect?

Tim Goodyer, editor

Studio Sound

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

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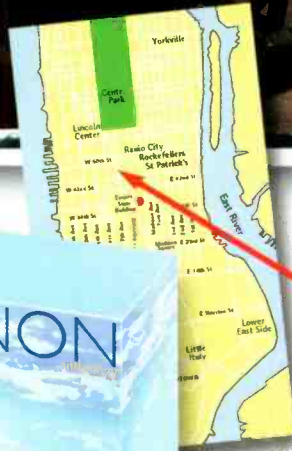
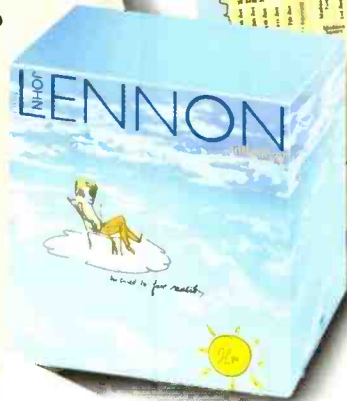
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Great Studios Of The World



PRODUCTION NOTES

Quad Recording's two SL 9000 J Series consoles were used to mix 'The John Lennon Anthology' for EMI/Capitol Records, as well as the 'Wonsaponatime' single disc of highlights from the set. Eob Stevens, who produced and mixed the set with Yoko Ono, says, "Yoko and I had heard the tapes on a variety of top line consoles of various vintages. Some of the consoles brought out detail and clarity; others brought out an appealing warmth. From the SSL J, we got both the exceptional clarity and classic warmth that we were looking for."



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**24-28
Midem 1999**

Palais de Festival,
Cannes, France.
Contact: Jane Garton
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Email: jane_garton@midem-
paris.ccmil.compuserve.com

February

**23-25
Internet Service
Provision 99**

RAI Centre, Amsterdam,
Netherlands.
Contact: The Conference desk
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Email: confdesk@firstconf.com
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**25-27
33rd SMPTE
Advanced Motion
Imaging Conference**

Omni Rosen Hotel, Orlando,
Florida, USA.
Contact: Linda Alexander
Tel: +1 914 761 1100.
Net: www.smppte.org

March

**3-7
MusikMesse
Prolight & Sound**

Frankfurt, Germany
Contact: Messe Frankfurt.
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**6-9
Middle East
Broadcast 99**

Bahrain International
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April

**10-12
16th International AES
Conference 'Special**

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**13-15
PLASA Light and
Sound Shanghai**

Intex Shanghai, 88
Loushanguan Road,
Shanghai, China.
Contact: Marcus Bernie,
P&O Events.
Tel: +44 171 370 8231.
Fax: +44 171 370 8143.

**17-22
NAB 99**

Las Vegas, Nevada, USA.
Tel: +1 202 429 4149.
Fax: +1 202 429 5343.
Net: www.nab.org/conventions

**21-22
ABTT's**

21st Trade Show
Royal Horticultural Halls,
London SW1.
Contact: Association of British
Theatre Technicians,
47 Bermondsey Street,
London SE1 3XT.
Tel: +44 171 403 3778.
Email: office@avtt.org.uk

May

**8-11
106th AES Convention**

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

**10-15
21st Montreux
International Television
Symposium and
Technical Exhibition**

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

**17-19
Cable & Satellite
Mediacast 99**

Earls Court 2, London, UK.
Contact: Reed Exhibitions.
Tel: +44 181 910 7717.
Net: www.cabsat.co.uk

**24-25
DVD Production
Europe 99**

The Conference Forum,
London, UK.
Contact: CCW.
UK Freephone:
+0800 917 3596
Tel: +44 1306 501 530.
Fax: +44 1306 500 9600.

**25-30
Expo Light & Sound 99**

Romexpo Exhibitions Centre,
Bucharest, Romania.
Contact: Romexpo.
Tel: +40 1 222 43 56.
Email: romexpo@ccir.ro
Net: www.ccir.ro/romexpo

June

**1-3
Showtech 99**

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

**10-15
Montreux
International Television
Symposium and
Exhibition**

Montreux, Switzerland.
Contact: WHD PR.
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Email: news@whdpr.com
Net: www.montreux.ch
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July

**8-10
11th PALA 99**

Singapore International
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ABC
ANNUAL BUREAU OF CIRCULATIONS
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Total average
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21,942
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DVD conference

UK: 'We are about a year behind. Not only does Europe need to catch up with the US but the choice of content and the way that it is used differs significantly for the European market,' says Tim Frost of the European DVD industry. In response, Frost is to chair DVD Production Europe 99, to take place in London during May. The conference is organised by *Studio Sound* publishing group Miller Freeman Entertainment UK,

following the successful DVD Production conference organised by Miller Freeman in Hollywood last August, and will cover technical aspects, authoring, content, computer and DVD-ROM applications, retailing and rental, and will focus on DVD Video supported by audio, business and games applications.

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▲ **Europe:** Mozart's *Magic Flute* is one of the opera productions currently being toured around Europe by Autograph Sound Recording. Sound design is venue specific and was handled by Autograph's Bobby Aitken, whose next project is the sound design for Raymond Gubbay's production of *Tosca* at London's Royal Albert Hall and Birmingham's National Indoor Arena. The European leg of the *Magic Flute*'s tour, meanwhile, is to be designed by Autograph's Terry Sanders and begins in Amsterdam before moving on to Frankfurt and Dortmund.

SATIS surround forum

France: The major conference event of the 1998 SATIS event was the 1st International Multichannel Sound Forum, organised jointly by SATIS and Radio France. *Studio Sound*, SSL, Dolby Laboratories and Cabasse also sponsored the event.

The 2-day Forum was intended to provide information and debate on multichannel sound, though it could be said that the emphasis was more on broadcast than record production. However, many of the observations are relevant to all types of multichannel audio production. The emergence of the 5.1-channel digital audio format has certainly galvanised the audio scene and though much needs to be done to provide universal consensus, the fact that we are talking about it and trying to clear the air of the folklore that already abounds can be viewed as positive. The programme was under the direction of audio consultant, Christian Hugonnet, who brought together a team of sound engineers from Radio France, NHK (Japan), Danmarks Radio and the IRT (Institut für Rundfunk Technik, Germany). The presentations included examples and trends from the different coun-

tries participating as well as technical standards laid down by the EBU-IRT and other broadcast organisations.

It was both pleasantly surprising and encouraging to see that broadcast is taking a serious interest in multichannel sound. Nevertheless, there were concerns from the floor during a debate as to whether the standards being recommended were too rigid, particularly the EBU loudspeaker configuration of 30° separation between LC and LR and 110° between C and LS, and C and RS. NHK has been engaged in multichannel production for HDTV over the last 10 years and could be said to have the most experience. The format used is discrete 4-channel (LCRS), but the release of DVD has stimulated demand for 5.1 and home theatre systems. Surprisingly, Danmarks Radio are ahead of their TV colleagues and have already broadcast in Dolby Stereo (Lt-Rt), with particular emphasis on classical concerts. Again, the potential demand for 5.1 is viewed as being positive. Radio France has made two drama productions in multichannel format—one in Dolby Stereo and the other in 5.1—plus orchestral productions. The station is also more flexible in

terms of loudspeaker positioning and feels that 'what sounds right for the production' is better than a fixed format.

Classical music was much to the forefront and a variety of microphone configurations were discussed. It was amusing to note that after MS microphone techniques were given the thumbs down from some people, the Danmarks Radio presentation used what could be called an MS Array for the main microphones and provided some of the most convincing results of the Forum.

Calibration levels were discussed and a good basis is felt to be a 30dB dynamic range of -21dB to +9dB. More than this appears to be excessive for the domestic environment. Reference levels for 0vu (+4dBu) as laid by the IRT are 78dBA per channel for a sum of 85dBA with all 5 channels.

The Forum was well attended and the presence of a lot of young people was noticeable—which is encouraging for the future. To give some matter for reflection, three types of surround were discussed: Direct (distance information), Reflections (space information), Ambient (envelopment). You can start experimenting now.

Terry Nelson



▲ **UK-Russia:** Satellite broadcasts of British horse and greyhound racing are being fed to Russian betting shops courtesy of Kingston Satellite Services, which already serves the BBC World Service and News International. George Walker's Cyprus-based Telesport is at the centre of the operation, offering multilingual audio from Telesport's London studio to accompany the television pictures which are further supplemented by text information such as rider details, track conditions, and, of course, betting odds. Over 300 tote terminals will be installed in Moscow, with plans to extend operation initially to St Petersburg, Volgograd, Nizhiny Novogorod and Rostov on Don, and then on to Yugoslavia, Azerbaijan, Kazakhstan and Estonia.

► **UK:** The APRS' attracted the cream of the British recording industry when it held its second annual Awards Dinner. Entitled 'Islands Under Storm', the evening saw Ivor Drawmer (pictured with wife Lynne) receive the APRS-Studio Sound Award for Technical Achievement, Jon Jacobs receive the APRS-SSL Award for Most Exciting New Production (*The Divine Comedy's Fin de Siecle*), and Adrian Kerridge receive a Lifetime's Service award celebrating some 40 years as a recording engineer and producer. Rounded out by a hearty dinner, a little light comedy and music, the evening established the Awards Dinner as a night to watch out for in 1999.



Westminster Media Forum

UK: When over 30 British politicians met with almost 100 major media players at the historic Gladstone Library of the Liberal Club in Whitehall for a debate described by Lord McNally as making 'the exchange between the industry and politicians profitable instead of simply confrontational' it was on the issues arising from digital broadcasting. The Westminster Forum opened with a keynote speech from the Rt Hon Chris Smith, Secretary for Culture, Media and Sport, and saw presentations from the likes of BBC chairman Sir Christopher Bland, ITN chief executive Stewart Purvis and head of BskyB news Nick Pollard and addressed digital broadcasting through sessions entitled 'Regulation in a Multichannel Environment', 'The Political and Social Implications of the Consumer: Setting the National News Agenda' and 'An Opposition Perspective'. The forum was decidedly more political than technical, but

contained much that informs the efforts of the broadcast industry—including proposed time scales for cessation of analogue broadcasting, regulation and copyright. Beyond these issues was a clear indication that the government is taking a positive and responsible stand on digital broadcasting, with assurances over issues ranging from its provision for the BBC to the importance attached to the rapidly changing nature of news programming. There was welcome recognition among the politicians of changing delivery forms—'sit-back' and 'sit-forward' programming and the 'me channel'—and increasing difficulties in regulation and copyright protection. Crucially, John Greenway, secretary of the All-Party Media Group, identified the importance of news broadcasting, as a true democracy requires an informed public—a sentiment that was endorsed by a number of speakers and not lost on those faced with the difficulties of managing a difficult and rapidly changing task.

Tim Goodyer

EuroSurround Forum

An initiative shared by the University of Surrey and Studio Sound to set up a UK surround sound discussion group to partner other European forums such as the German Surround Sound Forum is now welcoming subscribers. The move is aimed to assist discussion and the sharing of knowledge and standards to ease the introduction of new media such as DVD Audio and SACD, and will concentrate on music recording reproduction and broadcast, but will also extend to postproduction of television and film.

To subscribe to the mailing list you should send a message to lists@sumey.ac.uk containing the text: subscribe surround Your Name. Once you have subscribed, you can send contributions to surround@sumey.ac.uk and they will be received by everyone on the list. Please be prepared to contribute as this will be a combined effort—not a service—concerning technology and techniques that will help revitalise our industry.

▼ **US:** Home of the Boston Ballet in the city's theatre district, the Wang Centre recently enjoyed an upgrade to its sound facilities. The facility regularly hosts productions ranging from drama and dance to pop and film, and now uses a pair of Telex Merlin ISP-100 digital processors as the heart of its control. Following the example of its smaller sister, the 1,800-seat Shubert Theatre that was refurbished in 1997, the ISP-100s facilitate complete system reconfigurability including control over routing, crossover, delay and EQ and uses 20-bit A-D/D-A conversion with a quoted -104dB noise floor.



Studio Sound January 1999

■ Toranomon-based Japanese radio production facility FM Sounds Inc has taken delivery of a 56-channel, 20-fader Amek DMS console for on-air and off-line work. The desk has 12 dedicated EQ controllers and features multiple user password facilities to accommodate guest engineers. A further 64-channel, 28-fader DMS has been installed in Osaka's new Express Corporation studio. Specified to meet the facility's image creation and information brief, the DMS is 5.1-channel capable and incorporates Amek's Universal Switch Matrix for speaker switching. Also in the studio are Amek's System 9098 comp-limiter and dual mic preamps.

FM Sounds Inc, Japan.

Tel: +81 335 800 007.

Express Corporation, Japan.

Tel: +81 727 28 8888.

Amek, Japan.

Tel: +81 3 5707 0575.

■ American broadcasters that have made Euphonix a popular choice in recent months include Hollywood KCBS Channel 2, Denver KCNC CBS 4, San Diego KNSD TV NBC, Phoenix KNVX ABC and Philadelphia WTXF.

Euphonix, UK.

Tel: +44 171 602 4575.

■ London's Olympic Studios has opened its refurbished Studio 3 and a new mixing room called The Mix Suite. Studio 3 features a newly installed SSL SL4080G+ SE console, while the Sam Toyashima-designed Mix Suite features an SL4064G-series console.

Olympic Studios, UK.

Tel: +44 181 748 7961.

SSL, UK. Tel: +44 1865 842300.

■ New York's Image Group postproduction house is to update its three audio suites with the installation of two Fairlight MFX3 digital-audio workstations, a Fame mixing-editing system and Fairlight's MediaLink Windows NT-based server. The facility opened in 1994 and provides advanced post services to broadcasters and cable operators including MTV, Nickelodeon and the Arts & Entertainment Network through the audio suites, six online video suites and three Avid suites. Manhattan has also provided the setting for the largest single order to date for Soundtracs' DPC II console. Following the installation of a DPC II in one of the New York Media Group's facilities last year, four additional 60-channel, 32-fader DPC IIs are to be installed and a second facility, Lower East Side, is to install a 160-channel, 48-fader DPC II.

Image Group, US.

Tel: +1 212 592 0600.

New York Media Group, US.

Tel: +1 212 206 0020.

Fairlight, US.

Tel: +1 310 287 1400.

Soundtracs, US.

Tel: +1 516 333 8520.

■ German broadcaster WDR has ordered 50 Spondor 45BS 2-way active loudspeakers. The order will take WDR's usage of Spondor monitors to over 1,000, and follows an evaluation program stretching over a 12-month period. Further German take-up of Spondor comes from Cologne's Sound Studio N, and its choice of SA200s for close-field reference use. This too

follows a lengthy period of appraisal. Other broadcast activity in Germany has seen Mitteldeutscher Rundfunk install Alphaton MPV-33 and MPV-43 audio splitters at its new TV centre in Leipzig.

Sound Studio N, Germany.

Tel: +49 221 530 4061.

Spondor, UK. Tel: +44 1323 843474.

■ French television post house Duran has installed a Fairlight MFX3 Plus at its Paris base where it will work in conjunction with Digidesign systems and Akai DD1500s. The workstation forms the basis of Duran's staple of television drama work and was chosen in part for its ability to exchange files with a wide range of other systems, a major consideration given the growth in the TV drama market in France at the present time.

Duran, France.

Tel: +33 1 45 299 999.

Fairlight, France.

Tel: +33 1 46 10 5050.

■ British Maidstone Studios has become the first UK facility to install CD-Base sound effects database. The facility operates four edit suites and relies heavily on an effects library that had outgrown an older DOS-based library system. Evidence of new-found efficiency came when studio staff discovered they had over 5,000 car effects on their books without previously realising it.

CD-Base: www.cdbase.force9.co.uk

Nagra Kudelski, UK.

Tel: +44 1727 810002.

■ Scottish hire company, EFX, has taken the first Soundcraft Series Five monitor console to be delivered into the country. Already earning its keep, the desk has kept the company of Bonnie Raitt, Ladysmith, Black Mambazo and Roddy Frame as well as that of EFX's Series Five FOH console. In London, JHE has taken a further six SM-series monitor consoles, two of which were in time to see service on Jools Holland's *Christmas Hootenanny*.

Soundcraft, UK.

Tel: +44 1707 665000.

■ British television broadcaster BSKyB has taken delivery of two 48-fader Soundtracs DPC II digital consoles too to be installed in Isleworth facility. Due to be operational imminently, the consoles have been installed in two new dubbing suites.

Soundtracs, UK.

Tel: +44 181 388 5000.

■ Europe's first DVD-Audio production suite has been set up by the German Sonopress group at its facility near Birmingham, England. Based on Sonic Solutions' DVD A-V Workstation, the new DVD-Audio tools program will run in conjunction with Sonopress' existing DVD-Video authoring setup. Meanwhile, New York's Digi-Rom has added a DVD premastering-authoring suite to its CD/CD-ROM production operation. Using a predominantly custom design, the facility runs a multi-platform system based on a prototype MPEG2, Dolby Digital 5.1-channel encoding board and Intec Author Quick software.

Sonopress, UK.

Tel: +44 121 502 7800.

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TASCAM TM-D8000 digital mixing from the digital recording people

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- **Synchronization and control**; direct digital interfacing (TDIF, AES/EBU, S/PDIF) and full function transport control (TASCAM sync I/O, Sony P2, MMC) enable desk and recorders to operate seamlessly.
- **High resolution A/D converters**, high-performance mic-amps and balanced line inputs.
- **Programmable** level, EQ, pan, aux, solo/cue and dynamics' processing operate under snap-shot scene automation, with on-line dynamic automation software also available.

- **Full scale monitor and comms** facilities,

LCD console/channel status and parameter values display, and full analogue and digital I/O metering give the TM-D8000 an operational status superior to far more expensive analogue recording and post production consoles.

TASCAM DA38



TASCAM DA88



TASCAM DA98





1999 SSAIRA NOMINATIONS

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

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

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

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

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

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

The resulting nominations selection
Studio Sound January 1999

1. Large scale console:

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

2. Medium to small scale console:

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

3. Outboard dynamics:

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

4. Outboard preamp:

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

5. Outboard equaliser:

Graphic, shelf or parametric.

6. Outboard Reverb:

The final 'by function' category addresses reverb processing.

7. Combined outboard device:

Some units benefit from the combination of their processes.

8. Monitors:

Big or small, unbelievably impressive or unbelievably practical?

9. Microphones:

From unprecedently cheap to imitating yesterday's classics.

10. Convertors:

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

11. Audio editor:

Hardware or computer-based?

12. Audio recorder:

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

13. Desktop duplication:

The economies of rolling your own are now apparent.

14. Location-portable equipment:

Gear for guys on the move.

15. Comms:

Where would we be without fast modern communications tools?

16. Plug-ins:

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

17. Special category:

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

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

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

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

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

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

Pressure points

I READ YOUR EDITORIAL about review of products and the poor state of them and winced a little. However, I would like to try to defend the manufacturers as best I can by arguing a few points:

1. Magazines are usually the first to have products, usually a short (or sometimes long) time before customers have them, so it is unfortunately fairly likely that some part of the product-packaging-software may be incomplete.

2. Product development life-cycles are becoming shorter and shorter and so too is the time allowed to test and develop the product before production release. Unfortunately, this pressure can lead to errors (especially where complex software is concerned)—for example, whenever Corel release a new version of Coreldraw, I always wait until the next version is released before moving onto the previous version because I've found that particular product to be buggy).

3. As a magazine you are naturally keen to review the latest products and as a manufacturer, I am also keen for you to review them. However, this does put a pressure on the manufacturer to deliver a product which may not yet be in production, but which isn't quite yet out of R&D.

4. Certain areas of the broadcast industry have the luxury of being able to ship large volumes of products. Most companies in the industry don't though, and while I wouldn't describe them as 'coitage industries', they certainly don't have the resources of the Sonys of this world, to test and systematically debug the products to the extent that they would probably like.

In the end though, you are correct—you should be reviewing what the customer will receive and I'm sure that this isn't always the case. Product should work out of the box and you haven't found this to be the case. All I can suggest is that you're probably getting beta versions, or the fast pace of technological change means that you want to review products that simply aren't ready yet?

Did you also know that on the spine of *Studio Sound* it says 'October' instead of 'November'? See, we all make mistakes.

Marcus Brooke, Sonifex UK

Zenon Schoepe replies

I SEEM to have touched a nerve here as you were not alone in feeling inclined to respond to my observations. Others have allocated blame with 'relaxed' distributors not keeping their side of the bargain with lacklustre levels of support and an attitude that is totally obsessed and geared towards the business of shifting boxes. I'll deal with your points in turn.

1. When this is the case then we take

it into account but I wasn't only talking about products that are new to market. Indeed some of the worst offences have been committed by the manufacturers-distributors of products that are already shipping in quantity. We're not talking about hot off the production line here, we're talking about products you could walk in and buy. Lack of the relevant bits therefore seems doubly serious.

2. Product cycles are indeed getting shorter and part of this is due to the manufacturer's desire to keep on a roll with new product. I cannot accept that this fact in any way justifies the release of software before it is truly ready. They must simply 'allow' more time to test.

The interminable software revision cycle can be blamed in part on the fact that revisions not only add features but they also fix bugs that are present because the previous version was released before it had been adequately tested.

I also hold back on buying software until I judge it has stabilised but I still object to the unofficial beta testing agreement that everyone who buys a near first generation software-based product enters into when they think they are buying into new and exciting technology. The fact that we now seem resigned to this state of affairs does not make it right, we're spending money on this stuff.

I do not believe that absolutely bug-free software is achievable but by the same token I believe that between this elusive goal and what we are often expected to endure there lies a far more acceptable middle ground.

3. Manufacturers also put pressure on us and when we do look at equipment that is not complete for shipment we make its state of readiness clear in the article. Naturally, we do put pressure on manufacturers to get review equipment as soon as possible but there are no guns involved. Indeed I would say that the level of pressure we exert is commensurate with that exerted by the manufacturer's sales team on the potential buyer.

4. Point taken but by the same token the smaller companies also do not have the resources to endure any brand bad-naming that may result from premature product release. The smaller the company, and there are many in audio, the more fastidious it needs to be in the testing and preparation of its products.

Finally, you are correct in identifying the repeat of the October *Studio Sound* spine on the November issue. While this may look like an administrative error, the plain truth is that we had prepared the November spine, but had not completed testing it and therefore were not prepared to release it before it was completely and utterly rock solid and ready.

t.c. electronic
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The Engineering Group at TC Electronic was given carte blanche to create the optimal studio effects processor. Being musicians and studio engineers themselves, they have a feel for what is needed in modern high-grade processors. The library of effects includes: Reverb, Pitch Shift, Delay, Chorus, Ambience, Equalization, De-essing, Phasing, Compressor, Gates, Expansion, Limiting, and Stereo Enhancement.

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Setting the new industry standard with the VSS3 technology the M3000 is the best sounding, most versatile and easiest to use professional reverb today and well into the future. Combining the ultimate control of directivity in the early reflections with a transparent and harmonically magnificent tale, the art of reverberation is brought to at new and higher level.

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Want to breathe some fire into your music? Get ready for FireworX! An explosive Multi Effects Processor. The FireworX' broad palette of effects includes: Vocoder - Ring Modulation - Synth Generator - Formant Filter - Resonance Filter - Multitap Delay - Reverse Delay - Reverb - Dynamics - Chorus - Flange - Phase - Pitch Shift - Fractal Noise and more ...

Finalizer EXPRESS



STUDIO MASTERING PROCESSOR

The Finalizer Express is the fast and efficient way to turn your mix into a professional master! Based upon the TC Electronic Multi-Award winning Finalizer Mastering Technology, it delivers the finishing touches of clarity, warmth and punch to your mixes, putting the world of professional mastering within your reach.

Finalizer PLUS



STUDIO MASTERING PROCESSOR

The Finalizer Plus gives you the extensive and complete range of controls you need to add the finishing touches to your mix. Compared to the Finalizer Express the Finalizer Plus offers an even wider range controls allowing you to fine-tune every aspect of the mastering process.

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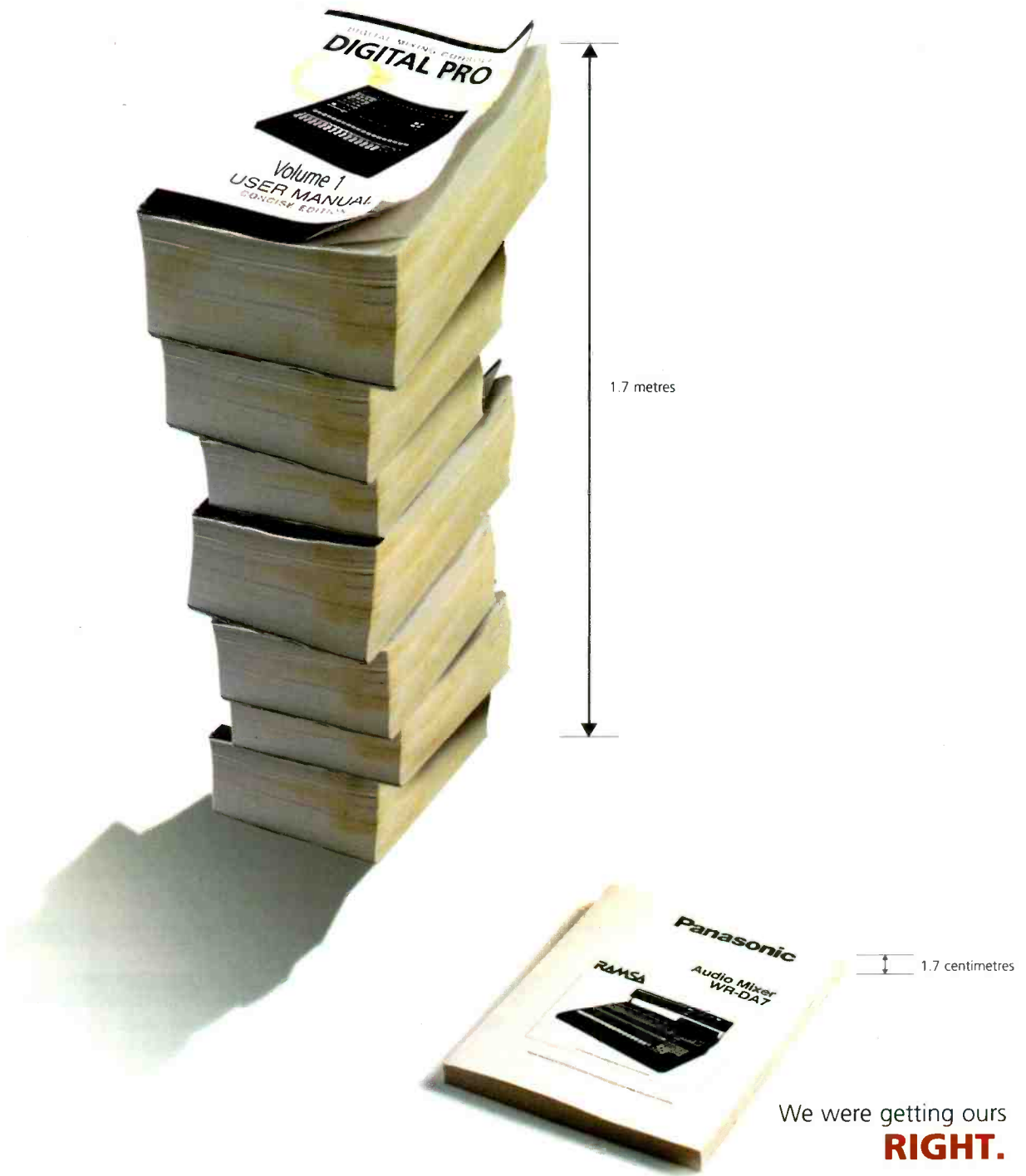
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Roland VS-1680

Filling out the high-end spot in Roland's VS digital workstation line, the VS-1680 needs to deliver power, flexibility and performance. **Rob James** gives it a thorough workout



ROLAND'S TRICK of personal workstations, the VS-840 is the jack, the VS-880 the queen, and the VS-1680 the king. It remains to be seen whether it is a winning hand, but the 1680 is certainly a big card.

Built to the same formula as the others, the VS-1680 is the most complete design to date—a hard-disk recorder giving 16 tracks on playback (data compressed) each encompassing 16 virtual tracks. A maximum of 8 simultaneous record tracks is coupled to a digital mixer and a maximum of 2 effects boards, while 8 scene memories are complemented by onboard dynamic automation. The expression 'fully loaded' springs to mind. All of this is packaged in a remarkably neat and reassuringly solid box with a 3-year guarantee as some measure of the build quality.

Rear-panel connections are sparse yet adequate for the primary applications. Analogue Inputs 1&2 are on balanced XLRs (switchable 48V phantom) while the remaining 6 analogue inputs are balanced jacks. Input 8 has an alternative guitar input that takes precedence. Analogue outputs for Monitor LR, Master, LR and Aux A LR & B LR are all on unbalanced phonos, the only digital I-O being SPDIF optical and coaxial. Apart from MIDI DINs and a 25-pin D-connector for SCSI, there is just the

IEC mains and a headphone jack that would be more useful on the front. The standard internal drive is a 2Gb IDE, and the small, reasonably quiet cooling fan can be disabled in software if using a mic in close proximity to the machine.

The control surface is divided into blocks, both physically and graphically; although there is a considerable amount of interaction between blocks in use. The Mixer section consists of 8 identical strips for inputs and Tracks 1-8 with a fader, STATUS key, TRACK SELECT and INPUT SELECT keys, and a pot for input gain with a peak LED. The next 4 strips are stereo and cover the digital input, direct stereo input (which can use any of the physical inputs) effect returns 1&3 and 2&4 or stereo Tracks 9&10, 11&12, 13&14 and 15&16. Although clearly designed to be used with stereo sources the pairs may be decoupled and addressed individually by the same fader. The track and input selection keys are labelled accordingly. Above these strips are the monitor and headphone volume pots. The last strip is the Master with a fader, a FADER-MUTE key that determines whether the faders are controlling inputs or track outputs, and EDIT SOLO, EZ ROTATING and AUTOMIX keys. In the Recorder section the screen dominates—a 320 x 240 matrix backlit LCD device, the same size as the screen on the Yamaha O2R, and its like. This large

The control surface is divided into blocks, both physically and graphically; although there is a considerable amount of interaction between blocks in use

and clearly legible screen helps to raise the machine above its siblings, and is the key to the whole edifice. The higher resolution allows the use of meaningful icons to supplement the usual text. Transport controls are along the bottom with blocks of keys for the locator functions, edit preview, LOOP, AUTO PUNCH UNDO and the dreaded SHIFT key. The right-hand side has the parameter wheel with associated ENTER and EXIT keys, cursor keys, varipitch and EXT SYNC keys. Many of the keys have shifted functions, some of which are graphically signalled by labels in boxes. Less obvious are some of the 'shortcuts' which use esoteric key combinations.

Roland terminology differs a little from other manufacturers. A block of audio recorded on disk is termed a Take. That which is usually known as a Cue or Event—the data, which determines >

moving ahead



POST PRODUCTION



MUSIC RECORDING



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- ▣ "We were so impressed with our first DPC-II installed in SuperDupe, we have just ordered our 8th." - Neil Karsh, New York Media Group
- ▣ "The DPC-II is no compromise but the best for both location recording and post." - Steve Williams, Sound Moves
- ▣ "With all new leading edge technology you look for 'how fast?' and 'how much?' Nothing comes close to our DPC-II's on either price or speed." - Scott Jackson, Magmasters
- ▣ "I wish we had a DPC-II in all our dubbing theatres." - Peter Brown, SD Post
- ▣ "The DPC-II's sonic performance, stability and comprehensive, yet user friendly, automation has proven to us that we made the right choice." - Rob Power, Salter Street
- ▣ DPC-II, rapidly becoming the de-facto standard for digital production consoles.

the installed DPC-II Digital Production Console



SOUNDTRACS

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Soundtracs (USA), 316 South Service Road, Melville, NY 11747-3201
 Telephone: +1 516 393 8520, Fax +1 516 3E3 910E, email: soundtracs@korgusa.com

< what part of a Take, will be played when and from where—is termed a Phrase. A project is a Song that will contain Takes referenced by Phrases in a Playlist. Events is used to cover the system pointers to Takes and automation changes. An important limitation is that the number of Events is limited to 18,000 per song. This may sound like a lot, but each record pass uses 2 and an automix marker can use up to 6. It is thus perfectly possible to run out of events even when the disk is far from full. There are housekeeping tricks to reclaim extra events if you are running short such as Song Optimise and erasure of unnecessary automation data.

The main screen manages to display all 16 Tracks, smoothly scrolling together with 16 virtual bar-graph meters for the Tracks, and a further 4 for Monitor and Master outputs. A large

time counter sits at the top, and Playlist information in the middle. This, together with the relevant track graphic going inverse video indicates the selected Track. If the WAVE key is pressed, a waveform window pops up with a zoomable waveform display. Scrubbing is of the 'constantly repeating short loop' variety. Hitting a TRACK or INPUT SELECT key brings up a window full of parameters associated with that mixer channel. Note 'mixer channel', because to all intents and purposes this is a 2-layer desk with inputs on one and tracks on the other.

Editing is basic but adequate. The waveform display offers better control than that seen on the VS-880. The man-

ual still cautions about edit accuracy in some modes, but the test unit performs better than the manual suggests.

Crossfade editing is, unfortunately, still missing. A useful addition is the ability to name musical phrases and multiply copy them, with quantisation if required.

A major advance over the 880 is in the EZ Routing functions. The earlier machine really can be nightmarish to get to grips with until you get the map in your head. This new function allows 29 user-routing setups to be stored and recalled

at will. Similarly the automation is far more visible and usable with off-line editing thrown in for good measure.

The mixer offers 2-band EQ on everything with the option of 16 3-band EQs on any of the Input or Track channels. Unfortunately, Roland has still not cured the snaps, crackles and pops that accompany vigorous twiddling of parameters during playback.

The comprehensive effects of the 880 are enhanced here with a new card, the VS8F2. This gives 2 stereo effects units. One card is normally supplied as standard, but there are slots and routing for a second. Certain effects are only available on one of the two processors on each card. The library of presets is an impressive 200-strong with a further 200 memories for user-patches. New discoveries include a more than passable pre-echo and a bunch of analogue-style phasers, flangers and choruses. Anyone seriously into effects needs at least one Roland unit in the armoury. They really do have a sound all of their own.

As with most units which try to do a great deal on a reasonable budget there are compromises. In this case most obvious is the traditional minimising of knobs and buttons. The result is, until you have a mental 3-dimensional map of how the architecture works and where everything is, the learning curve is 'ballistic'. There are 3 manuals, and they are not slim—Quick Start, the Owner's Manual and Appendices, supplemented by a Turbo Start sheet of A4 just to give you a quick 'win' audio out from one of the demo songs, and a quick canter through a few functions. I found the layout unhelpful. For example, the all-important index is half way through the Appendices. The manuals appear to originate in Japan with some interesting translations. I really think at this stage in the game there is little excuse for this sort of nonsense. On the other hand most of the information is in there, somewhere... There are a large number of shortcut functions, ways of doing things without going through the screen menus, and alter-

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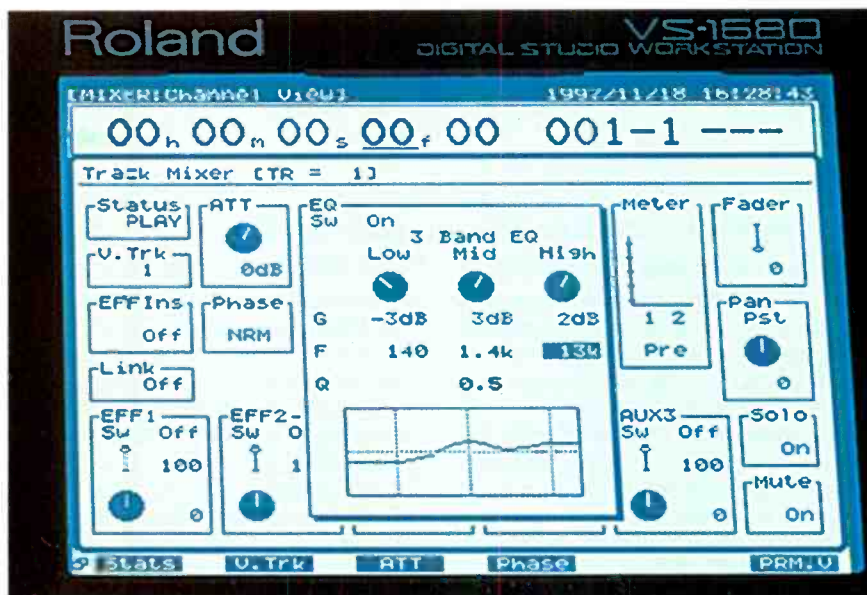
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native methods of achieving the same result, but these will take time to become instinctive. The MIDI implementation and documentation is particularly comprehensive and accompanied by some useful suggestions for operational setups with other equipment, sequencers in particular. Software is easily updated since the system resides in flash memory. Roland makes updates freely available on its Web site—a recent example adds CD-R backup to the VS-880. I also had the Roland VS-CDR drive for review. The setup and operation of this with the 1680 is simplicity itself. Subjectively, the drive seems a little slow when used with the 1680, but this is greatly outweighed by the convenience of being able to backup and restore complete songs with no bother onto this cheap and convenient medium, not to mention allowing short-run production of demo discs or whatever. Roland states the VS-CDR is the only drive that will work with the 1680. The drive is supplied with drivers for Windows 95, Windows NT and Mac operating systems and Adaptec software. This makes an attractive package for any 880 or 1680 owner who also uses a computer. The drive is actually a rewritable type, but Roland has not yet come up with software to enable this function to be used with the 1680.

Do not be fooled by the 24-bit hype. The internal processing of the unit uses 24 bits which gives a bit of headroom when using lots of EQ boost, and so on, but the audio is 16-bit linear in Mastering mode, which limits you to 8 playback tracks, or compressed to varying degrees in the others which give the full 16 tracks. (The converters are 20-bit jobs.) Roland is secretive about its compression; it sounds fine, but I am still not keen on using it for broadcast material.

The 880 has a good blend of features combined with reasonable ease of use. The 840 ups the ante in the ease of use stakes, but drops a lot of features. The 1680 has the routing 'smarts' of the 840, the features of the 880, and then some. This is somewhat offset because the huge feature set is driven from a very sparse complement of hardware controls. For anyone prepared to invest the time in exploring it, making its operation instinctive, and who wants an 'all in one box' digital studio, the VS-1680 is probably leading the present pack. I can also see it finding a home in specific professional environments such as video games houses and certain low budget, sound-for-picture applications. But the major attraction is just what can be achieved with the addition of an instrument, a mic and some means of monitoring. Once mastered, with a bit of thought and care, this setup is capable of turning out highly polished CD-Rs without getting in the way, physically or otherwise. ■



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Amptec Stone-D001

The frenzied activity surrounding development of small-scale digital desks has focused on general, rather than specialised applications. **Paul Shure** discovers the exception to that rule

IT IS TEMPTING to assume that there are now numerous digital equivalents for every analogue console application, but there are situations where this is not so. As if to prove the point, along comes a small digital console from a little Belgian company, almost unknown outside its own country, that does not fare very well on a cost comparison with the established Japanese small digital consoles. You would be entitled to think that they were on a major losing streak. But it is not that simple.

There are a host of mixing applications where what is really needed is a

of broadcast, classical and small-scale recording, and perhaps, theatrical work, Amptec has specified a fully modular console that parallels the facilities of the most common analogue consoles currently used in those fields in terms of channels, EQ, auxes and so on.

The company was started in 1990 by electronics engineer Bart Willems as a service and maintenance company, mainly working in the broadcast field. It quickly moved into customising and building equipment for installations, some of which became commercial products—such as the Yamaha 02R AES-SRC interface. It also has the Boul-

tal inputs—the latter being AES-EBU with a 20-bit sample-rate convertor on each input. The analogue inputs are followed by 24-bit, 128x oversampling A-D convertors, with all inputs feeding into 32-bit floating point DSP distributed throughout the console at module level. The internal word clock can operate at 44.1kHz or 48kHz, or lock to an external source. Each module has a direct digital output, and on mono modules that may be run in a clean feed mode.

It would be wrong to describe the input channels as totally knob-per-function, but they are very close, and if you can accept the philosophy of the control operation, it is probably as close to it as such a console need be. Firstly, there are dedicated buttons for all input functions such as line-mic select, phantom power, phase reverse, routing to eight groups, and two stereo master buses. You can select the module input feed from either the digital or analogue input or flip between them, the channel input gain being set by a single knob that sets and displays independent gain structures for the different inputs. Modules with up to four digital inputs are now available on the smaller Flinstone system and are being considered for use on new Stone modules.

Back on the control surface, every button is LED illuminated and all knobs have LED rings at their base to show set values. This is particularly important with the EQ section. Amptec chose to bring all three parametric EQ bands to the control surface at the same time, with access to each band's functions being through the knob. So turning the HF band knob alters the gain ± 15 dB at the frequency displayed in the nearby dedicated numeric display. Pushing the knob as you turn it allows control of the frequency turnover from 20Hz to 20kHz, while pushing it twice before turning selects Q control. A separate high-pass filter can be switched in circuit. Its value is set on a channel-by-channel basis through the central control menu; although this value can be indicated on the module itself.

The aux sends follow a similar operational style to the EQ. Here two knobs control four aux sends meaning that turning the upper knob sets the gain for Aux 1 while pushing the knob as you turn it sets Aux 2's level. A pair of the auxes can be set up as a stereo pair through the main menu, and in this case the knob sets the level for both sides of the stereo aux while pushing the knob prior to turning accesses pan control.



true digital equivalent of the analogue console. It may be the kind of application where multiple-functions-per-knob designs do not work very well or are too slow for real-time use—and there are plenty of them. Frequently these are applications where efficient, fast, ergonomic operation carries greater weight than cost savings over analogue consoles. In many cases such users may only be turning to a digital console because of the easier interface with other digital equipment and really still favour an analogue-type control surface. Such factors remove almost all of the digital consoles that you might perceive to fulfil small-to-medium-sized needs for such users.

The Amptec Stone-D001 takes a design route that aims to emulate an analogue console, but pragmatically uses digital control where there are advantages to be gained. With a target market

der range of large-format analogue consoles (derived from the Raindirk company which it acquired) and a smaller digital mix system currently under development known as Flinstone.

The Stone itself is offered in three frame types that encompass in-desk or on-desk use plus the Studio Frame—a larger free-standing unit with a meter-bridge as standard. There is a choice of three types of input module, and a large number of group-master modules with differing facilities. Using the same components, it is possible to create a console that goes from two or four inputs up to the largest module capacity of 28 mono or stereo inputs, has four stereo groups, two master bus outputs, four aux sends, moving faders, and multiple snapshot memory of all console functions.

Amptec's belief is that interconnection should be easy and to this end most modules have both analogue and digi-

The lower section of the module has the remaining functions you would expect to see—pan, mute and solo, plus a REM button whose function is programmable centrally. In broadcast applications this might be used to select remote fader start or cue for outboard signal sources, but it isn't confined to this. The faders themselves are good quality, touch sensitive, moving faders that can be grouped in various ways through the central menu section.

Aside from the mono input channel, stereo input modules are offered in versions with or without EQ, that are essentially the same as the mono channel, but with the obvious changes in pan-balance control, and the addition of a Width control mode on the BALANCE knob. Following the way that the DSP is configured, mono modules are always installed in pairs and these can be easily linked such that every adjustment on one module appears on the other—excepting the fader level, which is presently independent.

Input module types can be mixed as wished and selection of the remaining module types is also flexible. You must have the Master Control module plus a Monitor module, a Communications module, and a minimum of one Master Output module. If you have no use for auxes or the groups, those master modules can be left out and used to maximise inputs, but it will reduce flexibility. Whatever configuration is chosen, the software remains the same as it recognises the modules installed when configured.

Among this choice of modules there are group and master versions, with or without compressors. The compressor itself uses the dual-role knob concept to provide Threshold-Ratio and Release-Attack across two knobs in a fairly logical manner.

While it is possible to add meter bridges to any of the frame sizes, most of the non-input modules have 50-element stereo LED meters on them, to monitor dedicated levels in that module and so providing group and master output metering. The upper 10 segments of each meter are indicated as being in the province of the Dynamic Range Converter (DRC) feature of the console. Essentially this is an auto-ranging function within the DSP that rescales the digital output should any levels exceed the abilities of a standard 24-bit AES output with the intention of preventing overload. This is a fixed function that is always operational.

The master modules contain all the controls that you would expect to see on a well-configured analogue console—full talkback capabilities with routing, multiple monitor sources including five internal selections, level control for four separate speaker outputs, oscillator functions, master solo controls for AFL-PFL-SIP functions,

broadcast orientated on-air switch whose function can be centrally programmed, and an innovative combined studio playback level-source select control where turning the knob sets levels, while pushing it and turning selects the playback source.

All of the central console functions are arranged in three levels, all of which are initially accessed through the LCD window, the data wheel and cursor controls. At installation you would bring up the System Level to configure word-clock settings, digital converter operation, system level, meter calibration and other system functions, access to which would be password protected. Next would come User settings that are appropriate to specific users or jobs. These are readily accessible and include such features as the functions of the module REM switch and the ON-AIR button, the mono-stereo function of the aux sends, clean feed status, MS decode functions, time delay—all settable on a channel by channel basis.

Last comes the Scene Memory level. You can store snapshots of every console function and level in scene memories, recall and reset the console. On these pages it is possible to edit this function to exclude certain parameters or channels from being stored.

At present there is no automation available on the Stone, and; although there is provision for the inclusion of time code, it is not currently implemented, as it is not seen as important to the target user. That said, it would be possible to use external MIDI commands to trigger scene memories should the need arise. For the most part, users will probably be content manually recalling scene memories via the dedicated UP-DOWN and RECALL keys with their own scene number display, at the foot of the control module, completely independent of the main LCD screen.

All the scene memories and user-settings can be stored on a PCMCIA flash memory card, the console having no internal hard disk of its own. Data on the PCMCIA card including scene memories can be accessed directly from the card through the memory recall buttons as if were in the console's internal memory. The Stone's integral diskette drive is just for software updates.

One of the most useful facilities on the Stone is the set of 10 programmable function keys. These allow some of the higher function to be placed on dedicated buttons and enhance the power of control surface operation. The most obvious functions include specific scene memories, but perhaps more useful is the ability to display all the hidden functions of the control surface. Although no control has more than a single hidden function, if you wish to examine all the EQ values

of Q, or the width controls on the stereo input modules, right across the console, these can be brought up on a single F-key and adjusted without the need to push knobs before turning.

Amptec's origins show in the attention to professional reliability. Each frame size has a spare power supply capable of running the console in the event of failure. The distributed nature of the DSP means that a single module failure will not effect the rest of the console while the loss of the central computer will mean that the ability to alter settings will be lost, but audio will still pass. The console is equipped with four front-mounted fans that create a very slow movement of air through the tightly packed internal PCBs—but are inaudible in operation. It is worth noting however that the Stone is fairly heavy with even the smallest frame size, fully stuffed, weighing in at 68kg.

The company's other digital mixing console, Flinstone, is being developed in parallel with Stone and carries the same philosophy, but it is simpler and made to fit within a standard 19-inch rack format. It lacks moving faders, LCD, and several other facilities, but it is based on the same PCBs.

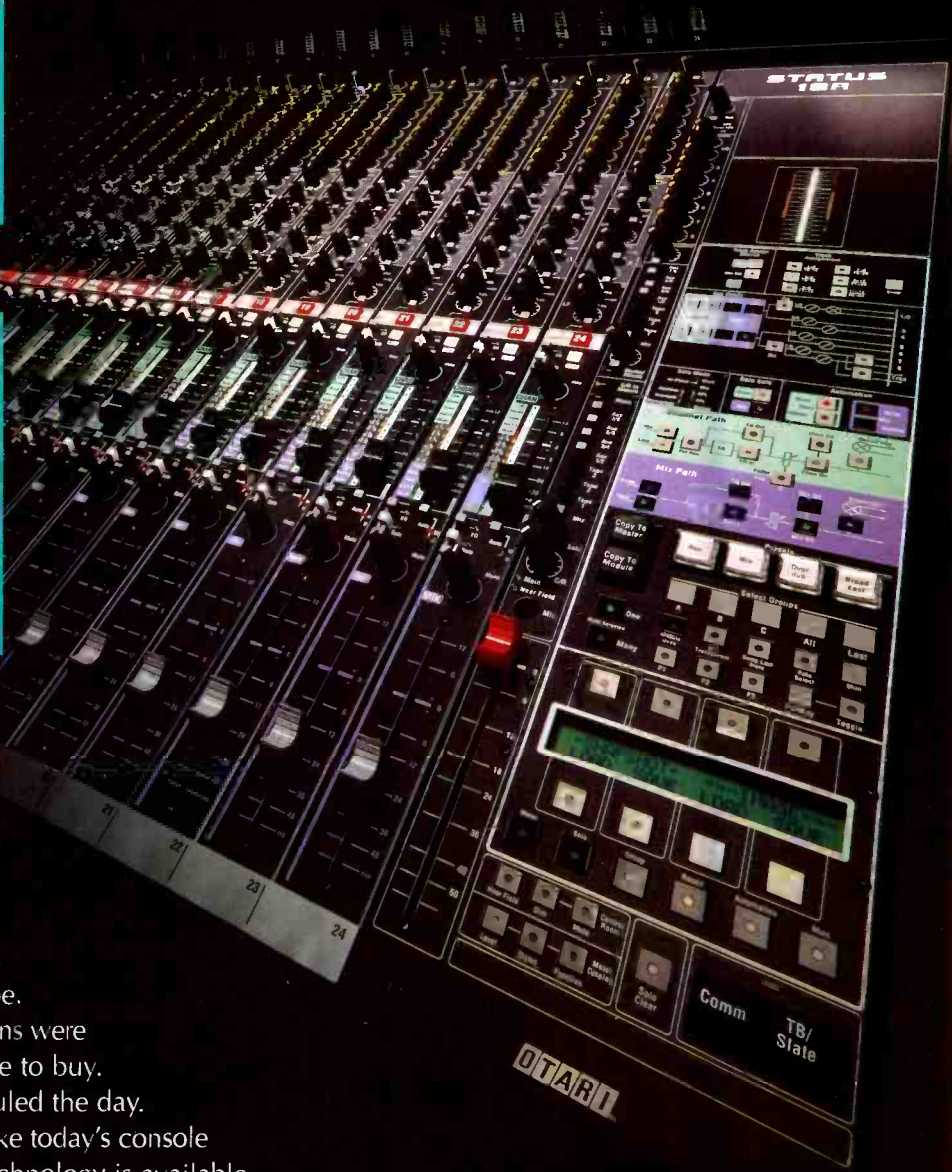
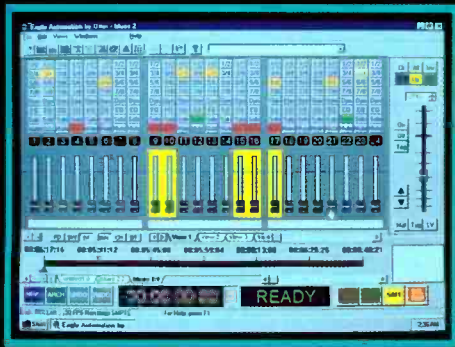
Sales of the Stone began in summer 1998 with an apparently promising response that includes several prestigious sales. Amptec has identified a clear market with the Stone. It is not aiming at the mainstream music recording market, but those areas where a small-to-medium-sized digital console with familiar analogue-type capabilities usefully supports real-time operation. The modular nature of the console and the way that Amptec has structured its operation means that it can be responsive to different user needs. While stopping short of customisation, many options and future possibilities in modules and software are in development. For example, a current omission is the lack of dedicated stereo returns but a forthcoming variant on the Aux module will correct this.

Amptec has opted to design a console that retains an analogue operational feel while not totally dismissing the advantages that a digital console can bring. The balance seems to be about right in terms of the speed of use in pressured situations being largely uncompromised by any doubling up on functions.

So while it may seem that the Stone is an odd beast, out of step with other small digital console manufacturer's ideas, it has a carefully targeted market area that, while not vast, knows

exactly what it needs to handle specific operational requirements. And for many, Amptec's Stone probably adds a digital option to what otherwise might remain a predominantly analogue market sector. ■

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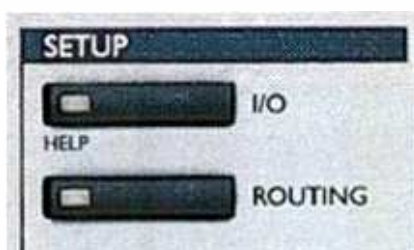
They tell us the M3000 produces the most dense and natural acoustic environment simulation ever. We ask **David Foister** to see if he agrees

NO MATTER WHAT other clever stuff you might have done, your success as a proponent of digital signal processing is measured ultimately by the quality of your reverberation. 'Twas ever thus, and today the giants of DSP are those that got their reverbs together best when it all began. Never mind chorus, flange, multi-tap delay, pitch shift and all the others we now take for granted; if your reverb does not transport us to another space then the rest counts for little. Curiously, tc electronic built its reputation on having the biggest and best delay lines when such things were news, and its reverbs came later; now it is out to remind us of how well it can do this most important job of all with the specialised M3000.

Reverb is not new to tc electronic, but a dedicated box like this is a break from the multi-effects platforms that the company pioneered and heralds the introduction of new proprietary reverb technology that tc electronic mysteriously calls VSS. Not wanting to turn its back on its roots, the M3000 also contains algorithms from its illustrious predecessors, but relies primarily on its new sounds. And it is a double whammy as the box contains two complete processing engines, operating entirely independently and in a variety of routing configurations.

Since each engine is a full-blown processor in its own right, this means that the M3000 is truly able to operate as two distinct effects units within the one box, without the compromises and trade-offs that usually implies. The only thing missing is separate outputs for the two processors, but in the conventional aux send and return configuration this is not a difficulty. In all other respects they act as two units, and nothing you can do on one undermines the other's capabilities.

The routing setups on offer encompass this dual stereo mode, with each of the two inputs feeding one of the engines; a Parallel mode where both inputs are fed to both engines to produce two stereo effects mixed together; a Serial mode where one engine follows the other and the effects are cascaded; Dual mono; a Linked mode that offers two identical mono processes ganged



together; and a Special Glide mode that allows presets to be crossfaded into each other; although in this mode only one engine can be used at a time. Parallel mode offers a particularly powerful function called Dynamic Morphing, where the process will cross over from one preset to another as the input signal crosses a user-definable threshold. The obvious use of this facility is to make the reverb character grow with the dynamic of a vocal line. The speed and direction of the morphing are selectable as are the relative outputs of the two effects in use.

Whichever of these configurations is selected, any of the preset programs can be used in either engine, with full editing facilities available on both. Factory presets number no less than 250, which as this is primarily reverb is a hell of a lot. A familiar tc electronic feature is the Wizard, and on the M3000 it operates a bit like a database for finding suitable sounds for the job in hand; tell it what sort of material you are working on, what sort of broad effect you are after, and it will offer a selection from the 250 that it thinks will cover the possibilities. There is also a sort of simple index found by holding down the RECALL button, serving as a reminder of the preset ranges that cover certain broad types of reverb.

Another impressive shortcut is a set

of four snapshot buttons next to the banks of engine control buttons. Any preset or any user edit can be stored under these buttons for instant recall, adding considerable flexibility to the usual arrangements for comparing edited versions with various originals.

Of course just saving and loading patches into the engines individually is only part of the story, and there is also a selection of 50 presets that set up the entire combination, with all the routing, all the effects parameters—the works. A nice touch for automation is that the two engines and the combination patches can be assigned to three separate MIDI channels for program recall. User memories offer the same capacity again, as individual presets or combinations, and the card slot can be used to store more still.

This might seem a little excessive for a unit that specialises in reverb, but a few moments playing with the sounds makes it apparent just how versatile it is and how useful that kind of storage could be. Its strongest card is its new VSS reverb system, with a wealth of programmable parameters and a no-holds-barred commitment to making it, as the box says, 'the best sounding, most versatile and easiest to use professional reverb today and well into the future.' Very bold, considering the competition, but there's no doubting its right to be taken seriously.

Part of what makes VSS different is its distinctive treatment of the reverberation as two sections, with more detailed control of the early reflections than normal and a strong emphasis on a natural-sounding tail. The early reflections come in no less than 11 types, mostly with name tags suggesting real room characters (Concert Hall, >



< Theatre, Studio), but also including Bath, Spread and Random. Whichever is chosen, there is still a huge range of possibilities available in terms of the tonal colour, the stereo image, and the size of the selected room type.

Surprisingly the characteristics of the main reverb tail have fewer generic types available, labelled Smooth, Natural and Alive—good names that put the thrust across well. Within each there is the usual range of parameters to tweak, including the expected diffusion and HF damping adjustments. Overall decay covers both parts of the reverb, but the reverb tail is divided into four bands with their own decay factors. This is made even more flexible by the facility to choose the crossover points between the bands.

Subtle modulation is provided for the reverberant effects, with slight spatial

The M3000 is to be regarded primarily as an unusually elaborate reverb unit, but it should not be thought that it can do nothing else

movement and gentle pitch-tonal modulation under very detailed control in order to help simulate various classic reverb types. This can be overdone, as the manual warns, just like adding chorus to some reverb algorithms. Some of these parameters are part of an Expert editing mode that has to be specially selected, much like the Lexicon system; tc electronic takes the idea a stage further by offering some global tonal parameters in Easy mode that do not exist in the Expert list. Virtually all

of the above is also available in gated mode, with every adjustment you could wish for.

There will be those who associate a company with certain reverb types, and tc electronic obviously wants to accommodate such affections as it retains reverb algorithms from earlier units. These comprise the CORE algorithm familiar from the M2000, and the Rev-3 setup from the M5000, both of which have the full range of adjustable parameters in place. The factory presets include a few representative samples of what these algorithms are good at, but tc electronic's confidence in its new technology is indicated by the overwhelming predominance of new effects using VSS.

It is obvious from what I have said as well as from tc electronic's literature that the M3000 is to be regarded primarily as an unusually elaborate reverb unit, but it should not be thought that it can do nothing else. On the contrary, each processing engine offers not just the three reverb algorithms, but a large selection of additional processes, all with at least the minimum of adjustable parameters. Thus we have chorus, flanging, phasing, pitch shifting, compression, expansion, straight delay, tremolo and even de-essing, many of which will prove especially useful on the input to a full-blown reverb program on the other engine. Several offer far more than might be expected: the pitch shifter has six simultaneous pitch-shifted outputs, each with pan and level controls, while the EQ has three fully parametric bands plus high and low shelving bands—again no trade-offs and no need to choose two bands when you really wanted four.

The back of the box carries everything you might expect plus one or two things more. Inputs and outputs are available in any combination of analogue and digital you could reasonably ask, including ADAT lightpipe. A sensible addition in view of its job is a wordclock input.

If the quality of the reverberation is the measure of the box then the M3000 can hold its head up in the best of company. The aim of providing unusually true and smooth reverberant tails appears to have been achieved, and the attention to detail in the all-important early part of the reverberation has paid off in a remarkably convincing set of presets. Hand in hand with this goes an editing access to the workings of the effects that is so straightforward as to shame some major competitors, adding up to a mightily powerful box. Ignore it at your peril. ■



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Paul Mac, Spirit 328 Preview, The Mix, April 1998



"The sonic quality of the 328 is outstanding, the console makes light work of digital interfacing. The built-in MIDI controllers allow manipulation of external hardware and software synths from the surface, giving total control where it counts."

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Alan Branch, Engineer and Producer

"The E-strip is a stroke of genius and gives substantially more hard control than it's immediate price competitor. Remember also that the TDIF and ADAT I-Os are standard."

Zenan Schoepe, 328 Preview, Studio Sound, Feb 1998

"There's a lot to like about the 328 and the design of the user interface sets the standard for ease of use in the small digital mixer market."

"Interfacing the console digitally to tape or disk recorders is pretty flexible - in fact I would suggest that the 328 is the present market leader in this respect."

Paul White, Sound on Sound Magazine, December 1998

"The 328 gives me the ability to control 16 digital streams from my Pro Tools* rig with the most intuitive user interface I have ever worked with."

Gaetan Schurrer, Producer and Programmer

"Spirit 328 does have a series of optional extras, although many features which would be an expensive option with other manufacturers are standard here."

Frank Wells, Audio Media, March 1998

"I must say that the board sounds fabulous. ...just taking the digital out from a CD player into the 328 gave the CD much greater depth and clarity than the CD's regular audio outs."

"The EQ was designed by Soundcraft co-founder Graham Blyth and modelled on the fabled warm musical British EQ. And to my ears, this is one of the most musical-sounding Digital EQ's I've ever heard. My first impression was that it is in the league as some dedicated software plug-ins. Every input has an E-strip - including the aux returns and internal effects."

"This mixer packs a mighty punch for \$5000. It sounds excellent, does an excellent job of untangling all the various digital formats in use, and has an excellent interface. A bold step forward in digital console design."

Christopher Ash, Recording Magazine, USA, August 1998



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Magtrax MusicBox

Burgeoning delivery formats and increased availability of high-spec, low-cost mixers are driving demand for comprehensive monitoring systems. **Rob James** auditions a controller

MUSICBOX is a recent entrant to the market for surround-sound monitoring controllers. As noted before, the need for such units is being driven by the availability of affordable consoles suitable for surround, and the burgeoning markets for surround mixes of DVD, DVD Audio, digital television, and computer and video console games. Magtrax, the company who manufacture this unit, has gained considerable experience in the field with its up-market, Ultima series of controllers found in a number of major film-dubbing theatres and broadcast installations. Through its close association with a film and television sound facility, Magtrax is well placed to field test products in real-world use and MusicBox demonstrates the involvement of experienced practitioners in its design.

The new unit is aimed at music studios making the transition to surround, and smaller sound-for-picture applications such as OB vans, multimedia producers and DVD production. The system consists of a 1U-high rackmounting

'mainframe' and a small remote controller. In the intended applications, space is likely to be at a premium and this is about as small as one could reasonably go without compromising the ergonomics.

All audio connections to the main-

The new unit is aimed at music studios making the transition to surround, and smaller sound-for-picture applications such as OB vans, multimedia producers and DVD production

frame are on D-sub's and are designed to make it possible to insert the unit between console and 8-track recorder. MusicBox then handles all the signal routing to the surround encoder-decoder and routes the appropriate signals to the monitors. Given this convenient approach I feel Magtrax may have

missed a trick. There is no meter output, which leaves users to roll their own using patching or Y cables or by using the console and recorder meters. In a major installation, the metering is often arranged with the option of following what is heard on the speakers or looking at a large variety of other sources. This would probably be inappropriate on this unit, but a simpler approach would be of considerable use and should lead to better operating practice.

Despite its diminutive appearance the remote is heavy and should survive in demanding environments. It has a 2-line, 80-character, back-lit display that is used to keep you informed, and for programming. All the keys are internally lit, small, square items. Necessarily so, given the size of the remote. These are supplemented by three LEDs, which indicate the matrix mode, and a knob controlling a shaft encoder for volume control and data entry. The eight green keys below the display function as individual output channel Cuts or Solos depending on mode. The last two also work in conjunction with the SETUP key



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to change monitor modes and options. Cut keys illuminate when the channel is cut enabling the operator to see at a glance if this is the reason for a disappearing signal. This may seem obvious, but a surprising number of consoles and other kit use the reverse logic, making it far more difficult to trace a problem quickly. The second row of keys contains DIM, PRE (preset), MONO, NEAR (close field), CUT, SOLO, TRIM and SETUP keys. Adjacent to the shaft encoder knob are

ALL CUT and REP (replay) keys. The latter toggles between DIRECT and REPLAY to allow film-style PEC-direct comparison checking. The knob visually obstructs the DIM and PRE keys, but this should not prove a major inconvenience. Ease of programming passes my usual 'average operator' test—you can work it out without recourse to the manual.

The number of surround modes is prodigious. Discrete LCRS, matrix LCRS, 5.1, 7.1 and virtual 7.1 are all supported.

There is also a System Bypass mode, which routes the console outputs from the stereo input to the main LR speakers. The matrix modes allow monitoring in the monitor path or recording, with the encoder in the record send and decoder in the return. Bypass removes the encoder and decoder for discrete mixing. It is also possible to route the encoded Lt, Rt (Left total and Right total) encoded signals to the close field or >



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◀ main left and right monitors for compatibility checking purposes.

Virtual 7.1 allows an approximation of a 7.1 mix to be monitored on a LR front and LR rear-only setup. The 5.1 and 7.1 modes allow you to specify whether subwoofer, centre and inner LR speakers are physically present. Where they are not the unit provides an approximation by downmixing onto the available speakers.

In all modes, with virtual or physical speakers, it is possible to 'collapse' or downmix to mono or stereo to check compatibility at the press of a single key. This downmixing is not as sophisticated as that provided in Dolby AC-3 or Dolby Surround encoder-decoders, but will be adequate for the occasional job in these formats. I would urge those contemplating regular work in surround to use the appropriate codecs and a full complement of speakers. It is worth remembering all Dolby Digital film tracks also require a Dolby Surround mix to maintain compatibility in cinemas not equipped with the appropriate decoder, and also as a fall back in the event of damage to the optical digital track.

Main monitor levels, dim levels, and so on, are programmable. The step size is selectable as 0.5dB, 1dB or 2dB increments. In every mode except Preset, grabbing the knob gives immediate level control. Preset is used to accurately set the main monitoring level to a predetermined level. It is essential to maintain a consistent monitoring level when mix-

ing for surround. The levels are shown in dBc and, so far as my level meter indicates, are accurate. Once a reference is established by adjusting the amplifier gain controls, at 85dBc other levels may be simply 'dialed in'. Individual outputs are trimmed to aid in system alignment by using the TRIM key in conjunction with the relevant CUT-SOLO key. Since many

Since many smaller rooms use near-fields as main monitors the NEAR key is programmable to simply collapse the mix onto the main left and right speakers. For real luxury I would like to see a programmable level for this as well

smaller rooms use near-fields as main monitors the NEAR key is programmable to simply collapse the mix onto the main left and right speakers. For real luxury I would like to see a programmable level for this as well. A nice touch allows inputs to be selected as LRC or LCRR, and so on. This allows conventional odd-even panners to be used for LR or centre-surround. I also like the idea of being able to interface to the console SOLO and DIM keys.

With surround-sound production more commonplace the only real answer is a purpose-designed system. Unbelievably, music scored specifically for film is still frequently recorded in straight stereo without any attempt at monitoring in surround. This leads to headaches for dubbing mixers and disappointment for composers, as the results are frequently very different from the intentions. MusicBox provides an affordable answer all the way from matrix LCRRS up to full-blown 7.1. It manages to do this without becoming too complex and offers a convenient solution for users of digital 8-track recorders. ■

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Acoustic Energy AE2 Pro

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 AE2 Pro. **Keith Holland** reports



THE Acoustic Energy AE2 Pro is a 3-way, passive loudspeaker using five drive-units. The low frequency output is shared between a horizontally-spaced pair of 130mm diameter, alloy ceramic coned drivers which operate up to 1.8kHz; the frequency range from 1.8kHz to 8kHz is shared between a vertically spaced pair of 25mm silk-dome drivers and the high frequencies are radiated from a third, similar driver. The crossover network is specified as having 2nd and 3rd order slopes. External dimensions of the AE2 Pro cabinet are 385mm wide by 235mm high by 330mm deep, and the front panel houses two bass reflex ports. Power handling is specified as 250W unclipped peak programme, giving a peak sound pressure level of 115dB at 1m with one loudspeaker driven.

Fig. 1 shows the on-axis frequency response and harmonic distortion at 90dB SPL for the AE2 Pro. Average sensitivity is about 89dB for 1W at 1m, and the response lies between ± 3 dB from 80Hz to 20kHz, which is a commendable result. The low-frequency roll-off can be seen to be roughly 3rd

Acoustic Energy,
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order, with the -10dB point at about 40Hz. Low frequency harmonic distortion is a bit disappointing, with the 2nd harmonic rising to -30dB (3%) at 60Hz; however, all harmonics are below -40dB (1%) for frequencies above 100Hz. Fig.5 shows the horizontal off-axis response. The dip in response between 1kHz and 2kHz is due to the horizontal spacing of the two bass drivers, and is inevitable with this type of driver layout. The directivity above 5kHz is very smooth, however, showing no sign of lobing or other irregularities. The vertical off-axis response (Fig.6) shows a similar dip between 3kHz and 9kHz, this time due to the spacing of the two upper-mid drivers. The step response of the AE2 Pro (Fig.3) shows a rapid rise and steady decay, which is characteristic of good driver time-alignment,

and the acoustic centre (Fig.2) is seen to shift to a maximum of under 2m behind the loudspeaker at very low frequencies, a demonstration of a benefit of the quasi 3rd order low-frequency roll-off adopted in this design. The power cepstrum (Fig.4) shows an absence of any strong

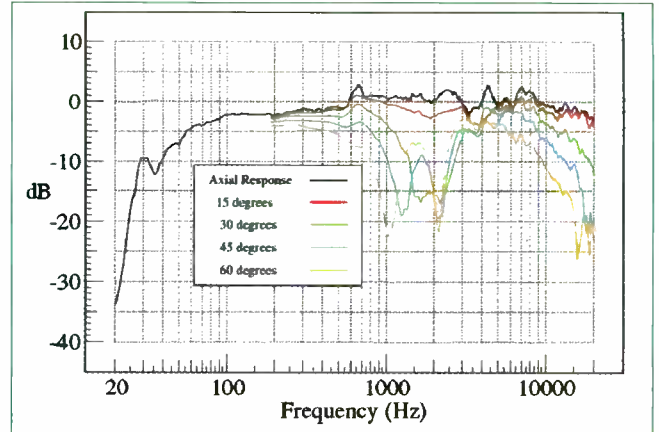


Fig.5: Horizontal directivity

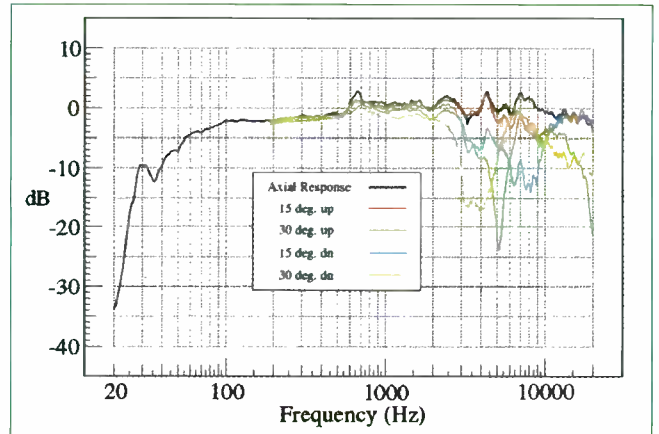


Fig.6: Vertical directivity

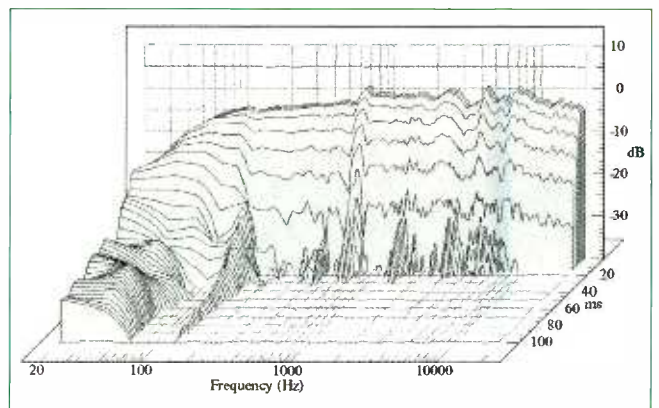


Fig.7: Waterfall chart

echoes; a fact that is borne out by the uniform on-axis frequency response. Fig.7 shows the waterfall plot for the AE2 Pro. The most notable features of this plot are the rapid initial decay of the low-frequency energy and a ringing at 140Hz. Overall, the AE2 Pro performs reasonably well. The on-axis frequency response and time-domain performance are very good, but the off-

axis response suffers due to the physical spacing of the drive-units. The loudspeaker thus represents a good example of the trade-off between the benefits of the use of multiple drive-units, and the spatial problems that this introduces; the design is expected to perform at its best in acoustically 'dead' control rooms where off-axis response is of limited importance. ■

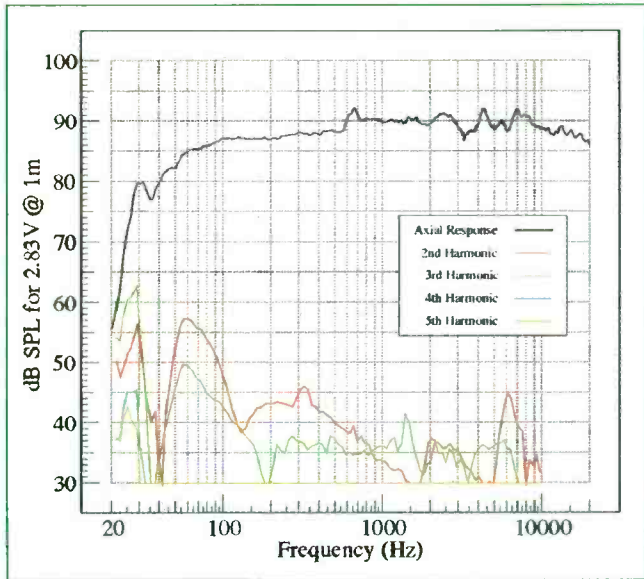


Fig. 1: On-axis response and distortion

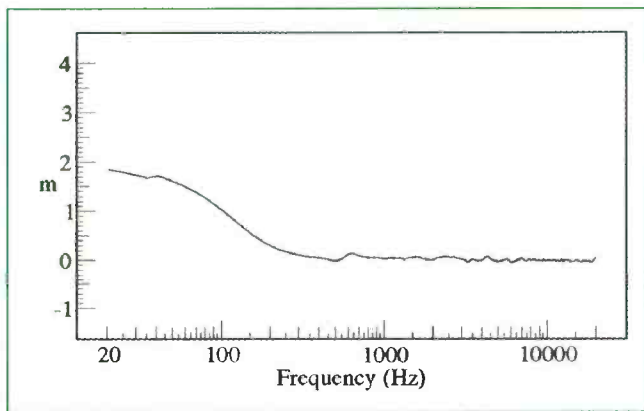


Fig. 2: Acoustic centre

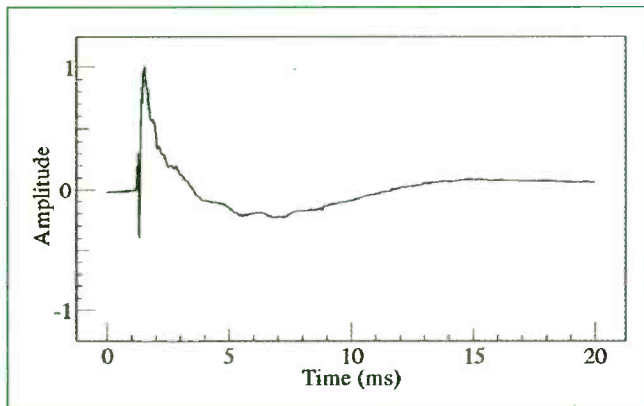


Fig. 3: Step response

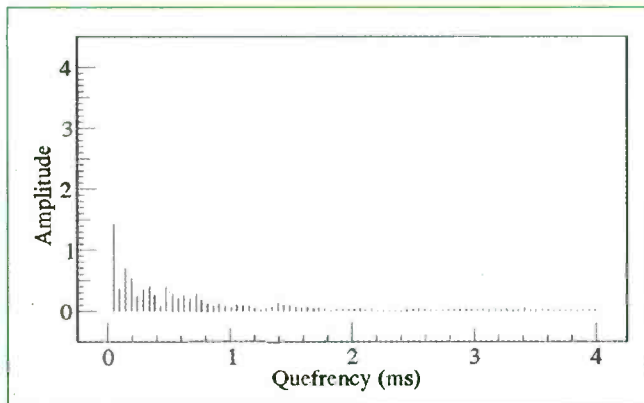
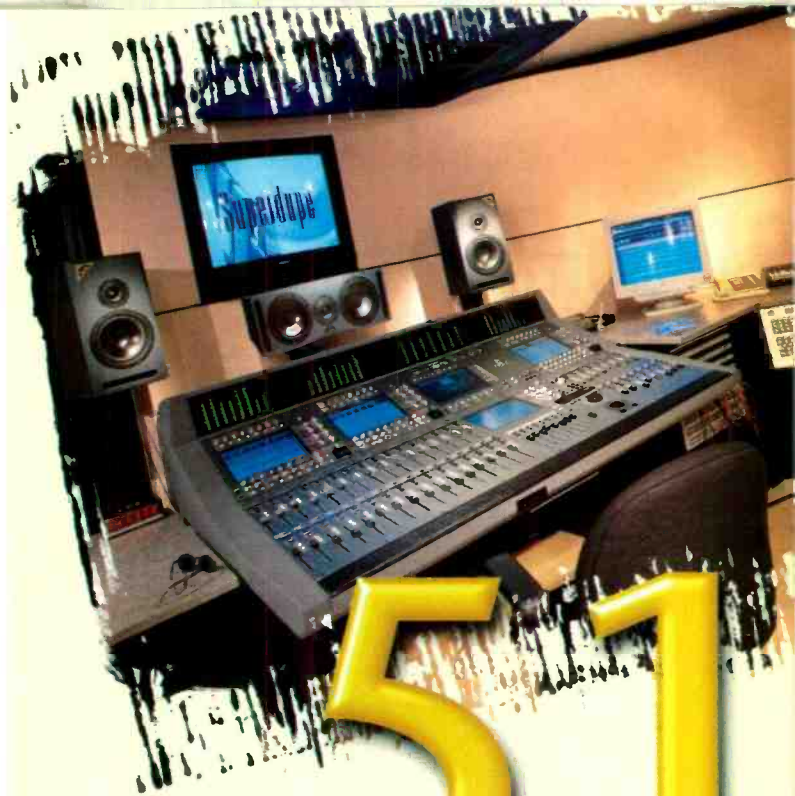


Fig. 4: Power cepstrum

Studio Sound January 1999



Superdupe dubbing suite,
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5.1

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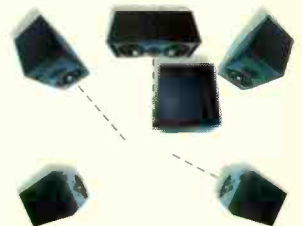
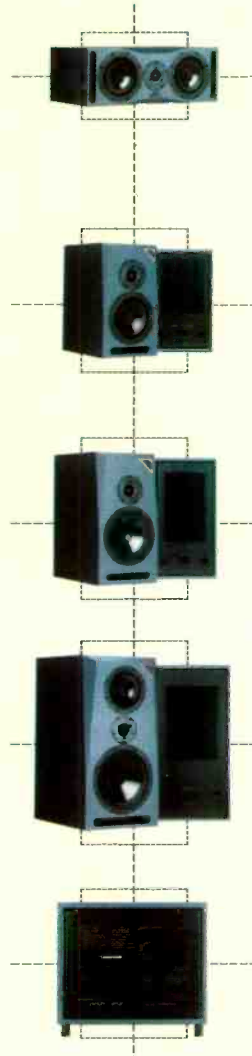
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NEW TECHNOLOGIES

Reporters portable

Flashman is a portable digital MPEG and linear audio recorder for reporters with an simple user-interface. The solid-state recorder uses CompactFlash Cards with a 128Mb card allowing more than 1 1/2 hours of mono audio in MP3 format. 96Mb cards have been announced for the beginning of 1999, and a continuous increase of this media is expected. Cards can be removed from the card slot and inserted in a note-book or PC.



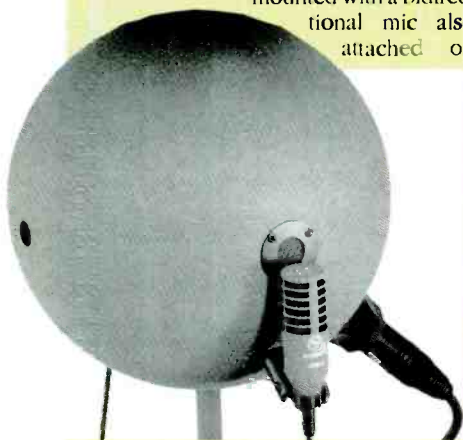
For instant editing and transmission.

The recording formats cover MPEG L2 and L3 as well as linear. Flashman provides recording and playback in stereo and mono, allows marks to be set during recording and playback, and has an additional serial interface for transfer to PC. Connectors include XLR-Mic, and additional stereo line and stereo mic inputs, SPDIF I-O and headphones output. Power comes from alkaline batteries giving more than 5 hours operation.

DCS, Germany, Tel: +49 811 55160.

Schoeps goes surround

Schoeps has introduced the KFM360 surround microphone that consists of a sphere into which two omni mics are flush mounted with a bidirectional mic also attached on



each side. As with MS dematrixing, on each side of the sphere a pair of virtual mics is obtained by the addition and subtraction of the signals and these virtual mics are symmetrical to the front and rear with polar pattern adjustable from omni to fig-8. >

Studio Sound January 1999

tc electronic Finalizer Express

tc electronic has given the power of its original digital dynamics processor to the masses. **Dave Foister** reports on the son of Finalizer

IT IS OFTEN TRUE that the more sophisticated and powerful a piece of equipment is, the more daunting it is, and the less likely it will be that some users will fully explore it. This may be the case with tc electronic's Finalizer, a comprehensive and versatile processor that has found favour in many mastering rooms, but needs time to get the best out of it. At the same time it is so powerful that a simplified version, besides being cheaper, would reach a bigger market of people who may currently be unaware of what it could do for them.

Hence the Finalizer Express. By removing some of the variables, automating others, and combining some parameters so as to simplify the setup, tc electronic has produced a box that looks almost analogue in its layout yet provides the fundamental elements of the full Finalizer in a much more intuitive form.

The original Finalizer has a whole string of processors in it, including 5-band EQ and stereo image adjustment, but what gives it its power to radically alter the perceived loudness without the expected side-effects is multi-band dynamics processing. Compression, limiting, expansion and gating take place inde-

pendently on three bands of the spectrum; the advantage, particularly with compression and limiting, is that a big peak in the bass, for instance, does not make the rest of the signal duck. A vocal can compress the mid band without making the cymbals ride up and down, and those same cymbals can crash away without making the bass pump.

each band's compressor will drive into the following limiter, making it possible to hit the limiter more or less hard, either across the whole range or on a band-by-band basis. Again this is not simple gain within the bands, but a control over how the dynamics will shape the spectrum. In conjunction with the rest of it this all makes for a hugely powerful system that can be as subtle or as brutal as required while always minimising the side-effects and responding quickly and intuitively to what you ask of it. A big downside is the absence of any kind of memories apart from the scribble charts in the manual. Do not be fooled by the presence of a card slot—this is only fitted to allow software upgrades to be loaded in. On the other hand, the streamlined range of facilities and the easily understood approach mean that unless absolute repeatability is required, a given setup can be closely reproduced very quickly just by the use of common sense.

stepped round with arrow cursor buttons, where the vertical axis is the attack and release time while the horizontal controls the degree of compression applied. Naturally the actual numerical setups represented by the 25 possible settings show far more variation than this would suggest; ratios, thresholds and time constants are rarely the same for the three bands, and the changes from one setting to the next often introduce different variations between the bands. In a sense this makes the Express's matrix a bit like an elaborate version of the old dbx compression. More slider, doing all kinds of subtle stuff transparently to the user while making the progression from one setting to the next audibly logical.

Three rotary controls determine how much



This, then, is the central concept that has been handed across to the Finalizer Express. Most of the other processes have been dispensed with, but the 3-band compression-limiting is retained, and the whole method of applying it has been dramatically simplified.

In the first place, the crossovers between the bands are fixed. Originally they were user-adjustable; although I would like to know how many users actually adjusted them. On the Express the Lows become Mid at 315Hz, and this hands over to High at 3.15kHz. These bands are fed through compression and limiting stages, and whereas the original allowed individual adjustment of all the standard parameters, the Express has adopted a remarkably simple and friendly approach where the user only knows what the numbers are doing by referring to a chart.

The assumption behind the system is that there are two essential variables at work in overall programme compression: speed and amount. The power of the 3-band compressor is therefore harnessed by a 5x5 LED matrix,

We must not forget the Normalizer, a gain makeup stage that attempts to keep the whole signal near the ceiling whatever else is happening. This and the main finalizer section each has its own soft clipper, switchable and indicated, separate from the main limiters.

This should be a winner. It gives you the bit that makes the Finalizer special on a plate, with a remarkable combination of control and simplicity that make the word Express seem highly appropriate. ■

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Sonifex Reds

Providing a one-box solution to interfacing problems is what the Reds are about. **Neil Hillman** takes three sisters

IT STARTED out in innocence, the way that most things do, I felt the need for something a little different in my life, so I wrote to, shall we say, a specialist magazine. 38 years young Male, happily married, but seeking that something special to give me an edge in life and a spring in my step, seeks a



loose arrangement to connect with willing accomplice(s)! You should be receptive to power, good looking, accomplished, enjoy music and the spoken word. Ideally you would be unattached but not averse to a fixed arrangement, attractive, professional, accomplished, elegant and discrete. Our relationship

will be based on mutual respect of our individual skills!!, business-like, but certainly no large fees should be involved. I am from Birmingham, but I have my health. Reply BOX 69 soon!!!

I posted the form with my VAT return, and a 'NO THANK YOU' reply to the time-share holiday I had apparently won (again).

What he actually delivered some days later was a large cardboard package housing three sisters from Sonifex's 'Redbox' range of connection equipment. Initially disappointed that the 'Redbox' address label hadn't involved Ginger Spice at all, the sight of the three devices beautifully finished in red, anodised aluminium—to Sonifex's usual high-quality standards—certainly lifted my otherwise downcast demeanour. While there are currently five models in the range, the dual microphone amplifier and the twin mono-stereo limiter remained at home, presumably to wash their hair. The Redbox range of connection equipment is designed for budget-applications in radio studios, TV studios, video and recording suites and have housings that enable the siting of the units either as free-standing, rack-mounted, or screwed to the underside of studio furniture.

The Sonifex RB-SM2 houses two indepen-

NEW TECHNOLOGIES

< Centre channel information is obtained from a Michael Gerzon matrix. The company has also previewed its VariMike 'variable mic' stereo system which has a patent pending. It consists of two DTM2 double transducer mics and a 24-bit DSP polar processor. This permits in three variable frequency bands, the polar patterns to be adjusted independently from each other in 12 steps from omni to fig-8. Aside from frequency response, a polar pattern's frequency dependence is a major contributor to a mic's sound. The VariMike is said to be able to simulate a variety of mics very closely, but it can also be adjusted to match the characteristics of a room. The DSP4 box has analogue and digital I-Os and permits postproduction adjustment of the four recorded mic signals.

Schoeps, Germany.
Tel: +49 7 21943 200.

Alesis/GT mics

Alesis has introduced four large diaphragm studio condenser mics as part of its new GT Electronics division. The AM51 and AM52 are Class A FETs and claim low distortion and self-noise and use 3-micron, gold evaporated mylar diaphragms. Both have switchable -10dB pads and a switchable roll-off at 80Hz. The AM51 is a fixed cardioid while the AM52 offers cardioid, omni and fig-8 patterns. The AM51 and

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Helstraat 25
 3500 Hasselt (Belgium)
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NEW TECHNOLOGIES

AM62 are valve condensers and use similar diaphragms that are precisely tensioned, and together with the internal polarisation voltage regulator boast a matched resonance that is said to be typically within 1dB between mics. Both have custom-designed dual-riode valves with the AM61 offering cardioid and the AM62 providing cardioid, hypercardioid, omni and fig-8 patterns. They come with a hard shell case, external PSUs, shock mount, hard mount and 6-pin cable.

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

MBHO mics

Notable inclusions in the MBHO mic range include the MBC608 switch selectable polar pattern large double diaphragm condenser. Patterns are cardioid omni and fig-8. The suspension is said to be resistant to external rumble. Much more diminutive in size is the MBC440 series of small condensers which include transformers. A feature is automatic current switching that renders the mic independent of operating voltage. A high pass filter and 10dB pad are available as options.

Sixpac, Germany.
Tel: +49 066 76 8266.

dent convertors which provide two fully buffered and balanced mono line-level outputs from two stereo inputs. Both inputs and outputs are on female and male XLR connectors respectively on an uncluttered rear panel, along with an IEC filtered mains input socket—all three units display an 'ON' LED—to power either the 115V or the 230V version. The inputs are electronically balanced, with an input impedance of 20kΩ, which may be wired unbalanced to accept the output from domestic equipment if required. The maximum input level is +28dBu. The outputs are electronically balanced with an output impedance of less than 50Ω. By grounding the non-phase signal, the outputs can be made unbalanced allowing for the feeding of both balanced and unbalanced equipment. The output gain may be adjusted from -8dB to +18dB either side of a nominal 0dB input using preset potentiometers accessed through the rear panel, enabling a normalised mono output to be taken from domestic stereo equipment feeds. Frequency response is quoted as 20Hz-20kHz. THD at 1kHz and +8dB is given as 0.01%, with a common mode rejection greater than 66dB. The noise figure is given as -100dB for unity gain referred to +8 dB.

The RB-BL2 is an unbalanced to balanced bidirectional convertor, interfacing domestic or semipro unbalanced equipment to balanced line levels or vice-versa. Again, all the connections are on the rear panel—XLR's for the balanced inputs and outputs and RCA phono sockets for the

unbalanced inputs and outputs. The balanced inputs have an impedance of 20kΩ and are routed to the less than 50Ω impedance phono outputs. The phono inputs have an impedance of 10kΩ. The output gain may be individually adjusted by means of the preset potentiometers accessible through the rear panel: the unbalanced gain range being 0dBu to -28dBu and the balanced range being -15dBu to +15dBu. Frequency response is as for the SM2, with a maximum input and output level of +28dBu.

The RB-DA6 is a 6-way stereo distribution amplifier that may be configured to either 1 stereo-in/6 stereo-out, or 1 mono-in/12 mono-out. The XLR inputs and outputs are balanced, although they may both be wired unbalanced, with each output individually buffered, so that a short-circuit on one output will not affect the others. The input gain controls are adjusted by recessed potentiometers accessible through the front panel for between -8dB and +18dB. The change-over switch for 1-12 mono/1-6 stereo is recessed on the front panel, operated by a ball-point pen or similar to prevent accidental operation. The DA6 shares the same figures for frequency response, maximum input and output levels, noise and common mode rejection as the SM2 and the BL2.

After the excitement of these three red heads, things moved on apace. If anyone needs to reach me I can be found in Tenerife with a very accommodating divorcee time-share representative. ■

CONTACT
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Dealer Inquiries
Welcome!

SPL Transient Designer

Rarely a manufacturer of the 'ordinary', SPL has put another spin on dynamics as **Dave Foister** discovers

NEVER let it be said that SPL is a dull company. There is almost nothing in its catalogue that is completely 'normal', and half of it is fairly off the wall. No surprise then that in the wake of the Spectralizer, the Level Maximizer and the Machine Head tape-saturation simulator we have the Transient Designer, a rather individual dynamics processor with aims and methods all its own.

To be precise it has four dynamics processors; such is the operational simplicity of this rather remarkable device that four of them sit happily in a 1-U high rack space. This is not one of SPL's all-digital fairy-dust boxes, but a bluntly analogue processor designed to do one of the standard jobs of a compressor with the minimum of fuss. Once you know this the name makes sense, describing with



commendable clarity its intended aim of manipulating the envelope of a sound, no more or less.

A compressor is often used to alter the front end of a sound, either to exaggerate its attack or to reduce it, and also is a convenient means of controlling the way a sound sustains. The Transient Designer has just two controls on each channel, marked up to do precisely those two things. It does nothing else—no overall level control, no limiting—but its approach to these two aspects is, perhaps, unique and certainly very powerful.

It all looks very simple. The back has XLR inputs and outputs for the four channels, and the front has rotary controls for Attack and Sustain, in-out switches and stereo links. That is the lot; but behind it all is a set of four envelope generators for each channel that allow the attack and sustain of the source sounds to be adjusted both up and down in terms of dB via the centre-detented controls. The key is the envelope follower circuitry that is used in conjunction with program-dependent envelopes to drive a VCA.

The Attack stage follows the envelope of the original sound, and also generates a second envelope with a substantially slower attack time. The trick is to take the difference between these two envelopes and use it in varying amounts, both positive and negative, to control a VCA. When the difference signal is applied in a positive direction the level is increased for the time between the real envelope and the slow one, effectively boosting the attack of the sound. Similarly if it is used in a negative direction level of the attack will be reduced.

The Sustain circuitry does the same at the other end. Again an envelope is generated that is longer and higher in amplitude than the real one, with its shape influenced by the peak level of the incoming signal. This, too, can be added to, or subtracted from, the original envelope to lift the sustain part of the sound or to reduce it. It sounds like of a sledgehammer to crack a nut, but the resulting effects, and the simplicity with which they can be adjusted, make it all worthwhile.

The results are quite spectacular. The obvious first candidate for treatment was drums, and here the control over the attack of a kick drum or toms was something I would have found hard to emulate with a conventional compressor. The amount of added bite could be precisely adjusted, all the way up to far

more than you could ever want. The unit can generate an extra 15dB on the attack, which in the case of a drum sound is likely to end up too hot to handle on most systems. In these cases it would be useful to have some sort of gain compensation on the unit.

This much could almost have been predicted, but the effects on other instruments were more of a surprise. Piano was a prime subject for experiment and a severe test, and on both counts the SPL was very impressive. A decent basic piano sound could be given real hard punch or smoothed out completely, or tailored to have any dynamic character in between.

Perhaps the biggest surprise was bass guitar, a sound that can test the attack behaviour of a lot of straightforward compressors and something that might have been expected to bewilder the Transient Designer. In fact it proved to be a real strength. The same raw bass sound could be treated very simply to produce a wide variety of effects without any additional processing; the attack was under full control to punch it through when required without a trace of distortion, and for the more open laid-back material the

sustain could be as long and smooth as needed and still sound completely natural. No doubt a noisy source would be made to pump a little with extreme settings, but with a reasonably clean original any side-effects were undetectable.

This is a deceptively powerful unit that will win SPL new admirers, achieving remarkable shortcuts to a whole palette of dynamic effects. Try one and you will want two. ■

Contact

SPL, Germany.
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Stirling Audio UK:
Tel: +44 171 624 6000.
USA: +1 516 293 3200.

NEW TECHNOLOGIES

More Meeks

Joe Meek's SC4 is an M&S compressor, adding a width control to the Joe Meek compression sound, and a claim to absolute image accuracy. The unit also has 24-bit 'any rate' converters that may run independently. The new, upgraded version of



the VCI, transformer mic preamp, mono photo-electric compressor and enhancer channel is the third generation of the Studio Channel and has many extra features, while maintaining the same price. The unit has a larger meter, phase reverse switch, an improved, smoother-sounding enhancer, and now has the same compressor slope settings as its big brother—the SC2 compressor. This is as well as a more 'chunky' looking front panel.

Joe Meek, UK. Tel: +44 1626 333948.

Lawo demos real-time ATM audio transfer

Lawo demonstrated the transfer of audio data in real-time via ATM network as a WAN link at the Tonmeisterstagung in Karlsruhe. The presentation of Lawo's mc2 technology was realised by Lawo (with two booths), Deutsche Telekom and Südwestrundfunk (SWR) with live transmissions from the radio house in Baden-Baden via WAN to the Congress Centre in Karlsruhe. Co-operating IBM-Switches 8265 in Baden-Baden and Karlsruhe, together with the sources, integrated mixing consoles, video cameras and peripherals and formed a DSN (Distributed Studio Network).

Control of the sources at the SWR in Baden-Baden and mixing of the transferred audio signals in real-time were carried out on a Lawo mc2 82 production console at one Lawo booth with the signals transferred to the other Lawo booth via DSN. A video camera filmed a monitor at SWR and video and audio signals were sent simultaneously via this network.

Apart from transferring audio and video signals all other services like file transfer, telephone, LAN and WAN can also be integrated in the DSN.

Lawo also showed its Diamond digital on-air console, that has been extended in functionality and now uses mc mechanicals. Signal processing and control surfaces are modular and complete setups with all audio parameters, assignments of console modules (sources to faders) and special functions may be stored and loaded from memory cards. The system can also be integrated with radio automation systems.

Lawo, Germany. Tel: +49 7222 10020 >



C-1 compressor

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

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

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

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adrian utley portishead



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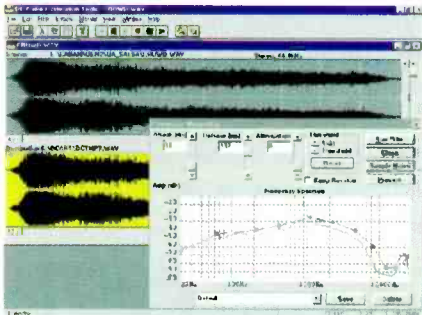
Tracer Diamond Cut 32

Another package to offer sound restoration and more on the PC. **Dave Foister** reaches for the 78s

THREE THINGS in life are certain: death, taxes and equipment getting cheaper. The black art of restoring damaged audio has been with us for long enough, but only recently have such things come within the reach of ordinary mortals. Doing your audio thing inside your PC has made many things possible, including now it would seem full restoration, using Diamond Cut Audio Restoration Tools 32 (DC-ART32) from Tracer Technologies. This package of 20 restoration and enhancement tools for around \$200 surely brings the bangs per buck factor to new heights.

Restoration, like the damage it is trying to undo, takes many forms, and DC-ART32 has a full range of tools to cover all the usual problems. It has an impulse noise filter to deal with clicks and crackles, a continuous noise filter to deal with hiss, and a full set of more straightforward filters—high pass, low pass, notch, and a dynamic noise filter. Both graphic and parametric equalisers are available, and these lead on into further processes for treatment rather than strict restoration. Thus there is a reverb processor, a valve simulator, a package of dynamics, and a speed-conversion processor with programmable variation while playing.

Strictly speaking this is not a real-time package. Only one of the processes can be used at a time, and its output is saved as a new file



for further treatment. However, each process has a **PREVIEW** button for real-time checking that will work with anything above a 486. The controls do not quite respond in real time, but the facility for making adjustments while listening to the results is obviously useful. Having established a workable setting, the process is done in non-real time, which on my Pentium 233 (quite basic these days) was much faster than straight playback. Even noise removal, the most complex process, took about a third of real time to run. The obvious disadvantages of the approach are that the processes can interact, the order of processes is important, and too much treatment at one stage can hamper a later process; with care, foresight and a read of the manual, however, most pitfalls can be easily avoided.

The screen display is very straightforward and helpful. A very obvious set of toolbars and

dropdowns, complete with pop-up help, provide access to all the system's functions in a very small area. The bulk of the screen is taken up with the waveform display, and this not only shows the effects of the restoration (particularly the removal of clicks), but allows simple cut-and-paste editing complete with crossfades. Zoom goes all the way down to sample level and can allow clicks and ticks to be dealt with manually if necessary.

But, of course, the power is in the automatic removal of such problems. In this respect the impulse filter is particularly impressive, working on the demo file of a snippet off a 78. Three adjustable parameters tailor the process to the nature of the clicks, and the result is total removal of all the clicks without apparently touching the musical signal.

The continuous noise filter works on the principle of identifying a portion of the unwanted noise and using it as a fingerprint to drive the process. A small sample is all that is needed, and the resulting curve is shown along with a calculated process curve to deal with it. The process uses a 2,000 point FFT to divide the spectrum into 1,000 bands, each of which is effectively then operated as a dynamic filter. The display allows a 10-point curve to be manipulated around the spectrum to fine-tune the result, and attack, release and attenuation adjustments determine how the results will then respond. As is to be expected, it is very easy to achieve undesirable digital warbling with this setup, and, indeed, the suggested settings on the demo material gave very unsatisfactory results at first. With further experimentation I was able to produce something much more usable, making a fair attempt at the most notoriously difficult component of restoration. CEDAR it ain't, not by a long way, but it is significantly better than some more expensive systems I have heard.

Other less obvious tools include a median filter for tackling small crackles, a comb filter for hum and related problems, and an average filter, which is similar to the median filter and deals with crackles and hiss in a more subtle way than a straight low-pass filter.

The enhancement processes are surprisingly sophisticated and effective. The reverb is very reasonable, with a good selection of algorithms and adjustments, and the EQs are fast and flexible. The valve stage goes so far as to offer eight different circuit topology simulations and four adjustable controls, while the dynamics offer compression, limiting, expansion and gating.

From this it may be seen that to push DC-ART32 simply as a restoration package is underselling it. It does a good job of the restoration side; although there are more powerful tools available, but to do it this well with the bonus of good additional treatments makes it a pretty good all-rounder with something for everyone. ■

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NEW TECHNOLOGIES

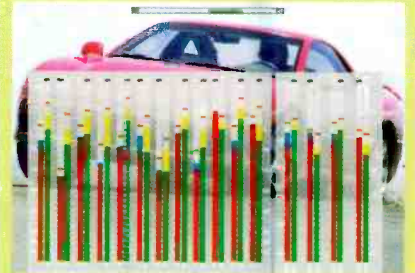
Pearl 4-channel mic

Pearl's DS60 condenser offers stereo recording in different modes and contains two rectangular dual-membrane capsules mounted one above the other and 90° apart. The phantom-powered mic is positioned differently for X-Y and MS recording, and the required mic pattern is chosen at the console. The preamp has four output channels, one for each cardioid membrane, connected via a 9-pin Lemo plug and 4-way splitter terminating in XLRs to the desk. Each capsule provides 180° coincident stereo and the operator decides how to use the signals—cardioid, fig-8, omni, X-Y, MS or Blumlein.

Pearl, Sweden. Tel: +46 42 58810

In-picture meter

Chromatec has introduced the AM32 in-picture multichannel audio meter that offers a variety of setup and display options fully customisable by the user to their own needs. Products from Wohler Technologies include a range of powered audio monitors which combine metering and self-powered high



quality drivers in rackmount units in 1-U high and 2-U high sizes. For example, the ATSC-DVB series of powered audio monitors are designed for monitoring six channels and handle analogue, AES-EBU and ATSC-MPEG inputs, while the VAMP-SDI permits the monitoring of audio and video (via built-in LCD) in one 2-U high rackmount.

Michael Stevens & Partners, UK.
Tel: +44 181 460 7299.

DSP matrix mixing

The Metro Audio PMZ88 programmable DSP matrix mixing zoner enables simple setup for installations such as bars, theatres, retail and leisure applications, and anywhere else with a requirement for selecting multiple high quality music sources and paging to multiple zones. It is also applicable to conferencing and multifunction venues needing to route multiple mics to multiple outputs. It provides 16 memory locations and offers 8 inputs to 8 outputs expandable to 16 x 16 with each pair selectable for stereo inputs and outputs. Parametric and graphic EQ, AGC, noise sensing, output limiting and output delays are accessed by a jog-dial and large LCD with password protection. The device uses 32-bit processing, high quality A-D and D-A converters with software stored on Flash memory that can be updated via RS232. Power is from an AC-DC external adaptor for 18-30V DC with 24V battery backup.

Metro Audic, UK. Tel: +44 1483 894122.

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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



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



A New Range of Connection Boxes



Redboxes are a range of budget connection equipment for use in a number of different project areas - television and radio stations, recording and video suites. There are currently five products in the range :

- RB-DA6** 6 way stereo, or 1 x 12 way mono distribution amplifier
- RB-MA2** Dual microphone amplifier
- RB-SM2** Dual stereo to mono converter
- RB-BL2** Balanced to unbalanced bi-directional converter
- RB-SL2** Twin mono, or stereo, limiter

The Redbox units are housed in red anodised aluminium boxes which can be screw mounted to any surface, or rack-mounted by adding the Redbox rack-mount front-panel kit. Each Redbox has an excellent technical specification, is fully CE compliant and comes complete with handbook and IEC mains lead.

See what all the fuss is about on Stand No's 1 to 4

SONIFEX

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E-Mail: sales@sonifex.co.uk Internet: <http://www.sonifex.co.uk>

www.americanradiohistory.com

How was it for you?

Their words and experience have helped guide you through 98, but how did they find it themselves? From future formats to pseudo-science, there has been much to digest. As a catalyst for your own thoughts, **Studio Sound's** editorial team reflect on the events and developments of the past 12 months, and offer a few observations for the year ahead...

Barry Fox: For me, 1998 will go down as the year when DTS continued to unsettle the DVD market. By promising DVD Videos with DTS soundtracks, and peppering hi-fi shows with demo discs, the company pressured hardware manufacturers into building DTS decoders into their surround amplifiers, because consumers were frightened to buy anything without the DTS logo. But by the end of the year we were still waiting for the commercial release of big name movies with DTS tracks.

On another front, DTS belligerently threatened the DVD Audio Working Group and Forum with legal action if they did not make DTS a mandatory part of the DVD-A standard. Then when the threat letter was leaked, DTS said it was not really threatening after all.

So the stage is set for 1999 to be make or break time for DTS. Will the company's investors pay whatever it takes to keep the ship afloat to tilt at Dolby? Or will the DTS logo on those amplifiers remain the only lasting memory of another failed attempt to stop a juggernaut? If so, it will join the Dolby FM switch setting on some old radio tuners, the piles of unplayable Betamax and V2000 tapes in cupboards around the world and the DCC decks gathering dust at the back of retail stockrooms.

Tim Goodyer: Maybe it is evolutionary. Maybe it is cyclic. Maybe it is even circumstantial. Whatever the reason, over recent years we have identified some Big Issues that we have to address. To date we have accepted high sampling rates, audio compression, digital broadcast, and, of course, the Millennium Bug as areas of consensual concern. What marks these subjects out from their lesser brethren is the immense potential they offer for debate, innovation, and, of course, sales.

Ninety-eight's comer to the Big Issue table was multichannel monitoring. If you need any convincing that this is big enough, observe the studied manner in which people are setting out their positions. While the sincere players have attempted to address the issues in a constructive manner, the more devious ones have been littering the field with diversionary devices of every kind—misinformation, disinformation and proprietary solutions are all being

offered with alarming sincerity. Best of all, some of the solutions appear to almost predate the problem.

That surround monitoring is going to play an important part in our future is assured. That it will be contentious, confusing and potentially costly, is equally so.

Rob James: The launch of DVD and Digital Television will eventually be seen as the most important events of 98 for this industry in the UK. DVD in both video and audio-only forms is the biggest opportunity for growth for years. Shame, then, the UK launches were such a shambles, more of a sneak out than a roll out.

My biggest disappointment is the continued non-appearance of any real rival to the Yamaha 02R. I had hopes for the Tascam, Panasonic and Spirit offerings, but none of them represent a real advance on Yamaha's magic mixer, and we are still waiting for the Mackie. Yamaha provided the most excitement with the DSP factory. This really is one to watch in the coming months.

This year has seen 'digital dubbers' become standard kit with Akai's DD-8 at last getting a bit of competition from DAR and Tascam, and maybe Sony. If proof were needed that film is finished as a postproduction medium I had it recently. A pile of Steenbeck film editing machines in a skip at a film school. They literally could not give them away.

George Shilling: Was that 1998? I thought we'd been blasted back to the seventies. Quadraphonic was re-promoted as 5.1-channel surround, (my first listen was disappointing, but I'll reserve judgement). And watch out, because before you know it, home taping will be killing music. Seen the TV adverts for Philips' CD Recorder? Widespread CD-R, MiniDisc or MP3 owner-

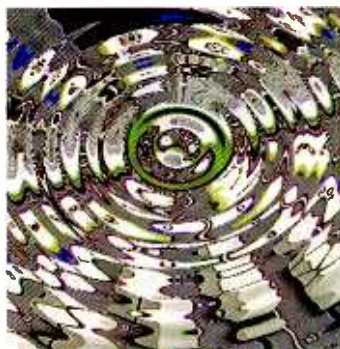
ship will definitely not spell the end of punters buying records, but let's hope the record companies agree. As well as 'new' new technologies, there have, in this last year, been some genuinely interesting new pro-audio developments in good old-fashioned studio equipment. New valve microphones and compressors which are genuinely useful and not just faddishly retro. Especially comforting was the revival of the British cottage pro-audio industry by the likes of Thermionic Culture and Joe-

meeek. It was a quiet summer, but as well as engineering some dance remixes I had fun recording bands with microphones capturing performances in such institutions as Rockfield and RAK—just like it was done in the 1970s, with not even a click-track in sight! And I had the honour of association

with a Brit Awards nominee, having engineered Bernard Butler's first album. So, if that was the seventies revival, let's now have the eighties. On second thoughts, let's not...

Simon Trask: This past year the MIDI + Audio software market has seen the arrival of increasingly powerful packages, the continued growth of the plug-ins market, and the advent of affordable but professional on-card effects and mixing solutions, notably Yamaha's DSP Factory. And in a year of current or brewing format wars, the emerging *de facto* standardisation on Steinberg's VST plug-in and ASIO audio streaming architectures by MIDI + Audio developers has been a rare outbreak of sanity.

One such format war is that brewing between next-generation audio disc technologies. This past year has seen the weaponry being designed, but 1999 will be showdown time between DVD-Audio and Super Audio CD. The days of recording and listening simplicity >



< with stereo 16-bit, 44.1kHz audio would appear to be numbered.

Then there is online audio and the battleground of online music distribution. Ironically, as the record and consumer electronics industries prepare to introduce high-density surround audio, the online world has seen a groundswell of popular support for MP3 and its 'near-CD'-quality perceptual audio compression. Superior compression formats beckon (MPEG AAC, NTT's TwinVQ), online bandwidth still restricts, walkman-style portable MP3 players are emerging, open music delivery systems are battling closed ones. The coming year promises interesting times all round.

Dave Foister: Is it too late for decent musical surround sound? With juggernauts rolling down the road that originated in the cinema, the music traffic seems likely to be the last to be considered. Since the technology and the market appear, in the broadest terms, to be driven almost entirely by home entertainment, this is, perhaps, not surprising. But surely, no one would pretend that a surround technology designed to make rockets fly behind your head is capable of retaining the subtle ambient nuances of a good musical recording.

The solution has been to hand for years—nay decades—and, although it

still struggles for credibility thanks to political and historical difficulties, flags are still flying for Ambisonics. Enthusiasts are bending with the wind, and G-Format is the latest suggestion to use the technology, decoding B-Format with-height surround to conventional 5.1 loudspeaker layouts. 1998 will have been a bad year's work if its possibilities are ignored despite the much-vaunted flexibility of the emerging media. If music deserves 24 bits and 96kHz, it surely also deserves to have the move to surround done properly, not merely to be dragged along by the hair with the movies.

John Watkinson: For me, 1998 gave healthy signs that some progress is being made in the constant battle between reality and myth. It was a good year for debunking and the favourable reaction to my best efforts has been most rewarding.

The following has become clear: One should be quite sure in one's mind whether the goal is accurate reproduction or the creation of an effect... people who monitor on poor quality speakers do not hear defects, and so do not fix them... time response is just as important as frequency

response and anything resonant or which pretends that a delay and a phase inversion are the same thing is fundamentally flawed... the passive loudspeaker driven by a wide-band power amplifier is a dinosaur... audio objectivists and audio subjectivists are holding the same stick where each believes the other has the wrong end... lossy audio compression (bit rate reduction) does not work very well in stereo and lossless schemes are preferable.

For 1999, you might like to ponder why we have objective units of frequency response and distortion, but we do not have an objective unit of stereophonic imaging accuracy.



Kevin Hilton: Digital television, digital radio and windscreen have been the overriding topics for broadcasters this year, or at least that is the way it has seemed. While the industry—in the most nebulous sense of the term—has pushed along

towards the future, the industry—in the individual, work-a-day sense—has been circumspect about what all this means and what it is for. The shift to digital TV has indeed meant more channels, but not necessarily more work or profits; there is a high demand for programming,



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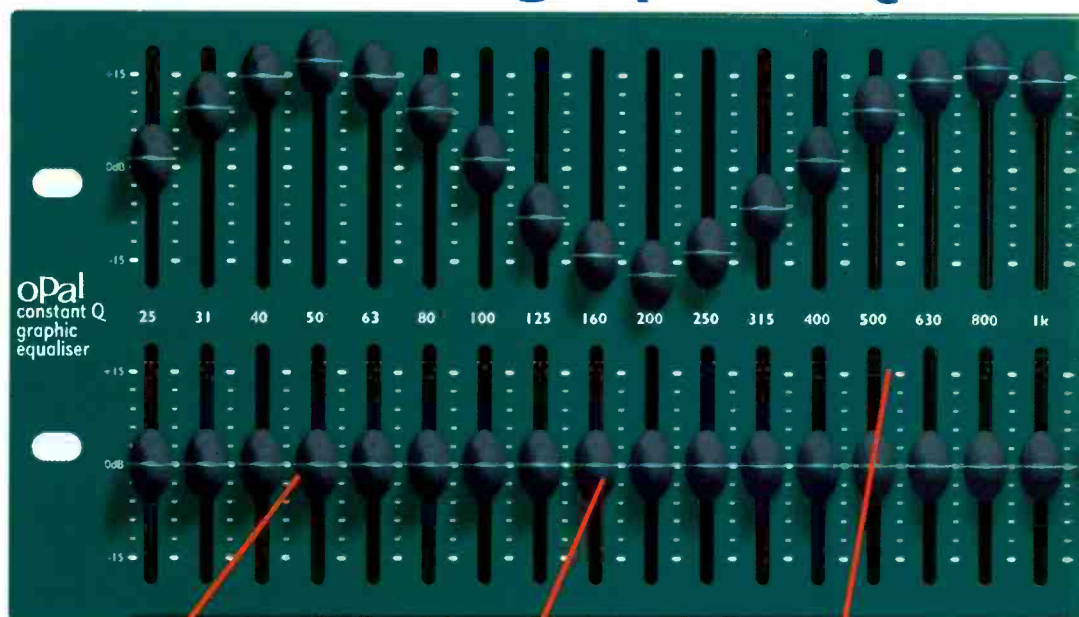
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but much of it is archive, replays of first runs or tightly budgeted.

Quality is an issue, but producers have angrily pointed out that they are being expected to produce to the same standards for the same money, if not less. As the year that it all happens, it has been an exciting one, but more in what has been promised, rather than what has actually occurred. The lag between the broadcasters and the domestic equipment manufacturers has brought about a situation where a lot is out there, but it is still beyond the reach of many. An elite is being created: it is no coincidence that the *New Oxford Dictionary of English* now features the word *digerati*.

Dan Daley: Time-Warner. Boeing-Lockheed. AOL-Netscape. MCA-PolyGram. The list goes on and on. The US corporate universe is in the throes of a massive consolidation, brought on by global competition and new technologies. And considering that the recording industry has increasingly become a cog in the entertainment business—America's largest export these days—recording studios are experiencing the same phenomenon. Two examples—the acquisition of Masterfonics by Emerald Recording, two of the largest players in the pivotal Nashville market; and the purchase of Sterling by London-based Metropolis—under-

score this trend. The spiralling costs of technology in the upper echelons of the industry even as it feels the continued sting of a proliferating and ever-more sophisticated lower end of project and personal studios ensures that this will be a critical trend to watch in the coming year.

Studios have been grasping at the 5.1 multichannel phenomenon, and the format does have considerable promise. However, the play that surround has received in trade publications shows that even the tech press can be trendy. The fact of the matter is that surround music has been something of a chimera to this point, pushed ahead largely by companies like DTS, which are pursuing larger corporate goals, and the fact that the DVD-Audio spec, a corporate political football if there ever was one, might not be released till mid-year, if then.

On the more positive side, the growing need for audio from an expanding media industry—try 150 cable channels per system in some places and a Hollywood factory churning out close to 1,000 films annually, plus an estimated 30,000-plus new recordings out last year—means an expanding market for sound. Good news for studios of all types. The adage 'May you live in interesting times' has never been more apt than now. But so is another one: 'Be careful what you wish for—

you might get it.'

Zenon Schoepe: I pounded my chest with guilt at the thought that I may have overreacted and severely underestimated the degree of 24-96 implementation in DAWs and digital desks. A year down the road I realise the full extent of the horror and still questions are met with the 'sure we could if we wanted to but nobody is asking for it' line. Such a conflict of talent, humility and farsightedness must be an unbearable burden.

For the last couple of years I have looked back 12 months at my estimate for the number of networks I would have expected to see running and earning money by December. This year again I am glad that I no longer bet on the matter.

We witnessed a typically curious mass emergence of multichannel mic systems which must be good news as without 5.1 at acquisition the whole thing starts to look decidedly man-made and virtual.

In 1998 I was reminded of how little the rest of the world's film industry has in common with the Hollywood machine... I was asked why the UK can not have a show like the French have in SATIS... and I was astounded that I was still meeting people who had not heard multichannel or high definition audio. ■

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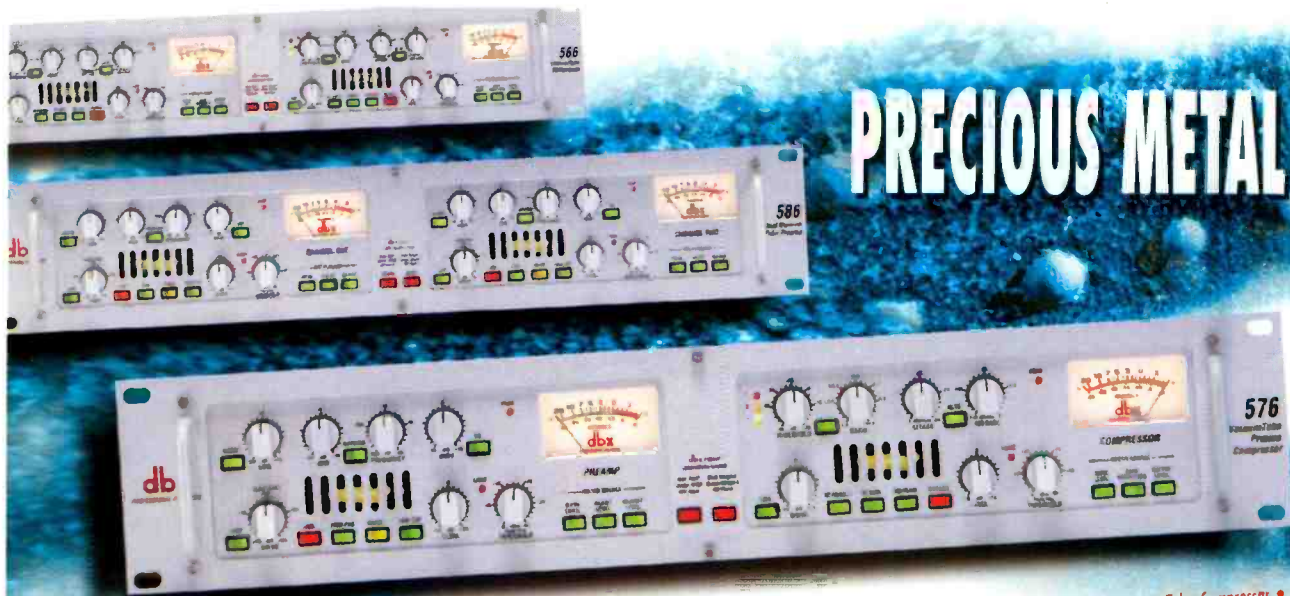
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A FEW YEARS AGO it was clear that digital-audio workstations were the future of recording. Today, with over 100,000 Digidesign workstations installed world wide, they're also very much the present.'

Snappy rhetoric aside, this quote from Digidesign's net site does point up a reality of today's world—namely the speed with which future technology becomes a present-day reality. The burgeoning market in plug-in effects software for recording and mastering applications is another example of rapid change from possibility to reality.

Today's computer-based, digital-audio recording landscape is a wide and varied one, but the concept of plug-in effects has taken root at all levels. The resulting technological and commercial reality has attracted companies with no background in hardware effects unit production such as DUY, as well as established effects unit manufacturers like Focusrite and Lexicon, who have realised that they need to cater to this new software-based market. While the latter have gravitated towards high-end systems in order to reach a professional market and utilise the sort of processing power required to deliver top-notch professional effects quality, the former typically support MIDI + Audio-based formats as well as Pro Tools TDM.

Effects plug-ins are hosted in one of two ways: on a plug-in DSP card or on the computer itself. The former approach uses the processing power of a collection of dedicated DSP chips (a 'DSP farm') while the latter relies on the native processing power of the host computer. This distinction serves as a handy dividing line between high-end computer-based DAWs, which typically opt for the add-on DSP approach, and the MIDI + Audio packages, which typically go native. Except that the reality is not quite so clear-cut, as the top-of-the-range Macintosh packages from MIDI + Audio companies like Emagic, Opcode and Steinberg have long supported Digidesign add-on hardware

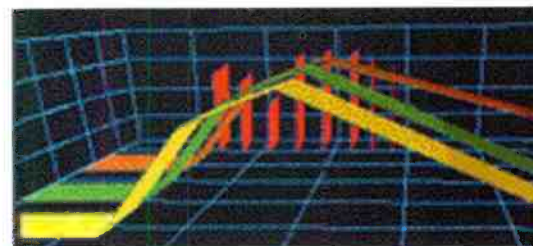
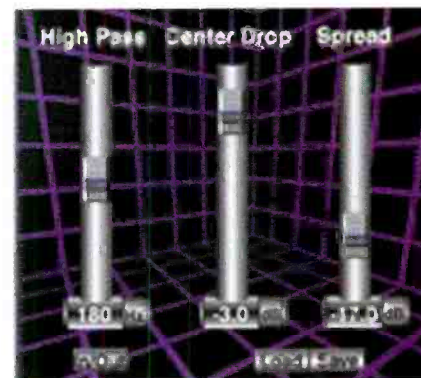
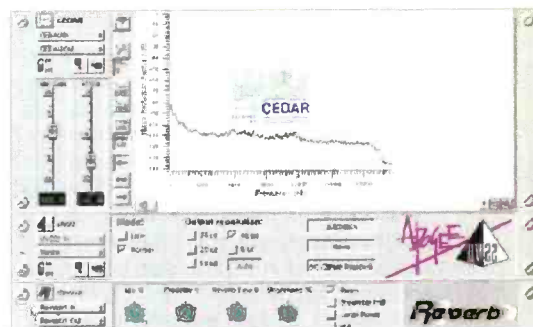
and the company's associated TDM plug-in effects architecture. However, Steinberg developed its now widely adopted VST (Virtual Studio Technology) plug-in architecture as a native format to give MIDI + Audio users effects processing without the need to buy expensive DSP-based hardware.

Since *Studio Sound* covered VST effects plug-ins last year, the VST architecture has further consolidated its position as *de facto* native plug-in standard, at least on the Mac platform, with both Emagic and Opcode opting to support VST in their latest software releases, while BIAS, which recently bought Deck from Macromedia, has

announced that it plans to implement VST support in v3.0 of the Mac-based multitrack recording software. In addition, Cakewalk has introduced VST support in its new Pro Audio 8 MIDI + Audio package for Windows. During the AudioX conference at this year's American AES Convention, Steinberg provided further encouragement of VST adoption by announcing that it would open up the host side of the VST plug-in architecture for any companies to implement support in their software free of license fees. This development is primarily aimed at developers on the Windows platform, here the technologically superior VST is pitted against Microsoft's widely used DirectX multimedia architecture.

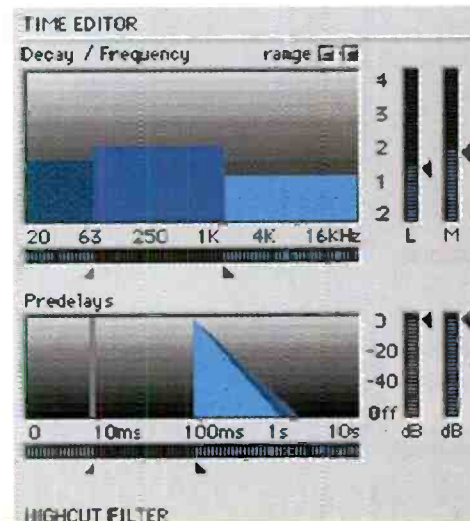
Exemplifying the high-end, DSP card-based approach to plug-ins is Sonic Solutions' Sonic HDSP Plug-in Processor, a PCI card for the company's SonicStudio audio production environment consisting of four 24-bit Motorola 56301 DSP processors and 1.5Mb of SRAM, designed specifically to run third-party plug-in effects from the member companies of Sonic's HDSP (High Density Signal Processing) Partners group. The group includes George Massenburg Labs, Pacific Microsonics, Metric Halo Labs, Weiss Engineering, Spatializer Audio Labs, and Z Systems Audio Engineering. >

The application of workstations has been greatly increased by the appearance of a universe of processor plug-ins. **Simon Trask** brings an update on what is available



Pulling in the plug-in

Studio Sound January 1999



< Illustrating that the plug-in concept can be applied advantageously to hardware too, Sonic recently opened up its SonicStudio DSP architecture to third-party digital convertor manufacturers.

The company that pioneered software effects plug-ins was Digidesign, back in the Sound Designer days. Today, the company has built up an enviable plug-ins base around Pro Tools, with plug-ins in both custom real-time (TDM) and file-based (AudioSuite) formats. TDM effects manipulate live audio streams in real time but do not change the actual data stored on disk, while AudioSuite effects are applied to 'stand-alone' audio files and change the actual file content. While AudioSuite processing is available on all Pro Tools systems (as no extra hardware is required), TDM processing is only available on Pro Tools III, Pro Tools 24, Pro Tools 24 MIX, and Pro Tools 24 MIXplus. TDM plug-ins running on Pro Tools v4 or higher systems can take advantage of TDM plug-in automation.

Up to the end of 1998, new buyers of the two systems received Focusrite's d2 and d3 (TDM equaliser and TDM and AudioSuite compressor-limiter) and tc Works' MegaReverb (TDM reverb) plug-ins free, while MIXplus purchasers also received Digidesign's DPP-1 (TDM pitch processor), D-Fx (AudioSuite reverb, delay, chorus and flanger), D-Fi (four TDM and AudioSuite effects offering bit-

reduction 'retro' effects) and Maxim (TDM peak limiter) plug-ins free. These are in addition to the standard DigiRack bundle of almost 20 EQ, delay, compressor, limiter, expander and gate plug-ins provided free on Pro Tools III, Pro Tools 24, Pro Tools 24 MIX and Pro Tools 24 MIXplus systems.

Pro Tools v4.3 software introduced two new features for enhancing use of plug-ins: the DSP Manager optimises the allocation of DSP processing to the plug-ins, while the MultiShell allows different types of plug-in to share the same chip (though not all plug-ins are Multi-Shell-compatible). Digidesign offers the DSP Farm card for Pro Tools III and Pro Tools 24 systems and the MIX Core-Farm card for Pro Tools 24 MIX and Pro Tools 24 MIXplus systems. However, hardware and software optimisation on the Core-Farm card allows up to three times the processing power on a MIX (single-card) and up to six times on a MIXplus (2-card) system compared to Pro Tools 24.

The number of instances of a plug-in which can be handled per chip varies from plug-in to plug-in. Taking the Focusrite d3 as an example, a single DSP chip can handle up to 14 mono and 12 stereo instances of the compressor-limiter on a Core-Farm card, while the Compressor + Limiter configuration can handle up to seven mono or seven stereo, with all six chips available for

use. For the tc electronic's Works MegaReverb it has two mono or two stereo per chip on up to three chips.

CEDAR Audio offers its de-hiss, de-click and de-crackle audio restoration tools in TDM form. Also available is a TDM plug-in version of Apogee's UV22 mastering tool (now handled by Steinberg), while Apex Systems has a TDM plug-in version of its classic Aural Exciter and Drawmer Dynamics offers a gate-compressor-limiter (complete with Side Chain Trigger functionality) and an expander-compressor-limiter. Line6 takes Pro Tools into the realm of guitar amps with its Amp Farm physically modelled tube amps TDM plug-in. The DUY plug-ins collection includes analogue tape and valve amp simulators, a spatial enhancer, a sound level maximiser, and a modular effects builder, while Arboretum Systems' HyperPrism collection provides 26 effects including reverbs, delays, ring mod, time stretching, pitch shifting, and sonic decimator. Altogether there are some 25 companies offering Pro Tools plug-ins.

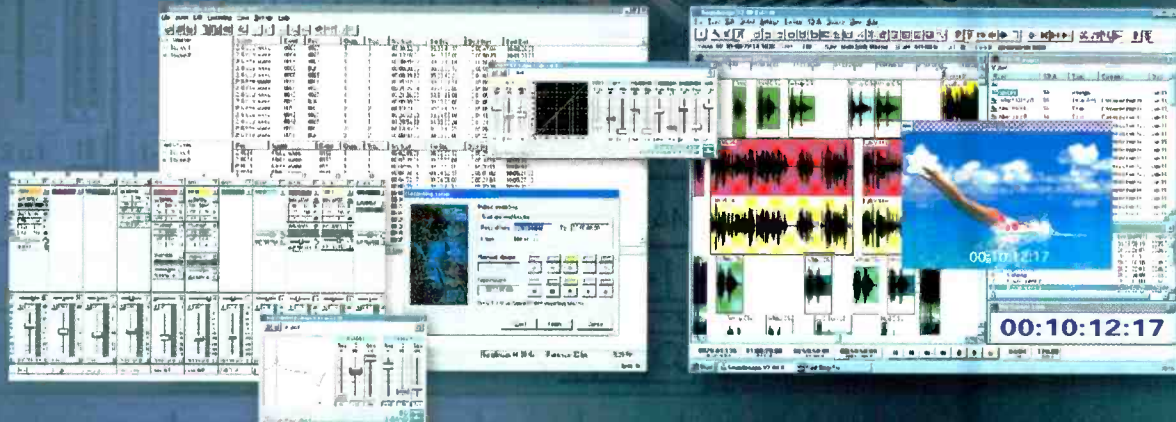
Plug-ins can also extend the functionality of a DAW into new areas. A good example is Liquid Audio's Liquifier Pro plug-in, which allows Pro Tools users to master for online music distribution and previewing in the market-leading Liquid Audio format. Meanwhile, Dolby takes Pro Tools >

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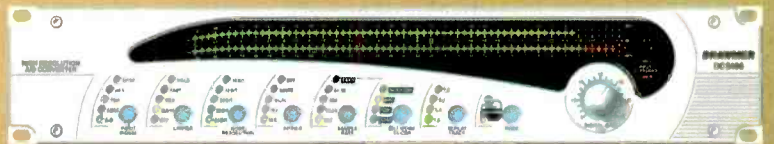
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into the realms of surround mixing with its Dolby Surround Tools encoder and decoder TDM plug-ins, while for 3-D (expanded stereo) audio processing Spatializer Audio Labs provides Spatializer PT3D in TDM and AudioSuite versions and Qsound Labs has QX-TDM.

Soundscape Digital's SSHDR1 also has a range of real-time and non-real-time plug-in effects running on card DSP. Plug-ins are available from Soundscape as well as tc electronics' Works and Wave Mechanics among others. For general use, Soundscape provides Time Module (time stretch, pitch shift, sample-rate conversion) and Audio Toolbox (chorus-flanger and dynamics processor), while from tc electronic's Works (the plug-ins subsidiary of tc electronic) come reverb and tc Dynamizer plug-ins, and from Wave Mechanics a reverb plug-in. For CD Mastering there's Soundscape's CD Writer and the PDAE CDR mastering software, while for sound-for-picture editing there are AVI Player, EDL Processor/Auto-conform, and RDC Software for remote control of ADAT, DA-88 or VCRs.

Another high-end DAW company that has implemented an architecture for third-party plug-ins is Studio Audio & Video, with its Windows-based SADiE and Octavia systems. CEDAR Audio has an enhanced version of DeNoise available as a plug-in for the SADiE 24-96 system. Available for SADiE and Octavia is

the Apogee UV22 Super CD Encoding plug-in and Studio Audio's Mastering Limiter. Other plug-ins available include stereo reverb, stereo width, and dither.

A more recent entry into the computer-based DAW market is Ensoniq with its PARIS PCI card-based multitrack recorder package for Macintosh and PC computers. PARIS implements high-quality on-card effects drawn from its own hardware effects units. Also available are four native PARIS plug-ins from Intelligent Devices: IQ-2 spectrum matcher, De-SERT noise remover, Marshall Time Modulator flanger and double-tracker, and The Mangler sound scrambler-distorter. However, the latest software release of PARIS, v1.8, also introduces support for VST (Mac and PC) and DirectX (PC) native plug-ins. PARIS points to a new trend, namely the integration of card-based and host-based effects support (previously an either-or choice) within digital-audio recording packages. This is being driven from two directions.

On the one hand, the PARIS approach of adding support for host-based plug-ins increases the flexibility, desirability and marketability of a high-end system which does not have a big plug-in effects base of its own (unlike Pro Tools). On the other hand, MIDI+ Audio packages can use the effects functionality of new sub-£1,000 PCI cards such as Yamaha's DSP Factory and

Creamware's Pulsar to take some of the processing strain off of the computer.

Emagic is talking in terms of DSP Factory support within Logic Audio before the end of the year, and Opcode are currently working with Yamaha on support within Vision. Cakewalk and Steinberg are leading the pack however, with support for DSP Factory (to be more specific, the DS2416 digital mixing card) within Pro Audio 7 and Cubase VST 3.6 respectively (both for the PC—Mac support is lagging behind). Steinberg's integration of DSP Factory's virtual 02R mixer and effects into the Cubase VST-24 environment exemplifies the new trend for combining internal and card-based capabilities. Steinberg have developed graphical mixer and effects editing windows which allow control of every parameter from within the Cubase environment, including automation of the mixer. What is more, any Cubase standard or group channel or VST effects return can be routed to any combination of inputs on the DS2416's virtual 02R via 24-bit signal paths.

Yamaha's mixer card, then, gives you the dual advantage of superior effects and a lightened processor load on your computer. So, instead of using up your computer's processing power on master reverb effects, you can let DSP Factory take the strain, leaving the host processor free to handle VST-based insert effects or more audio tracks. ■

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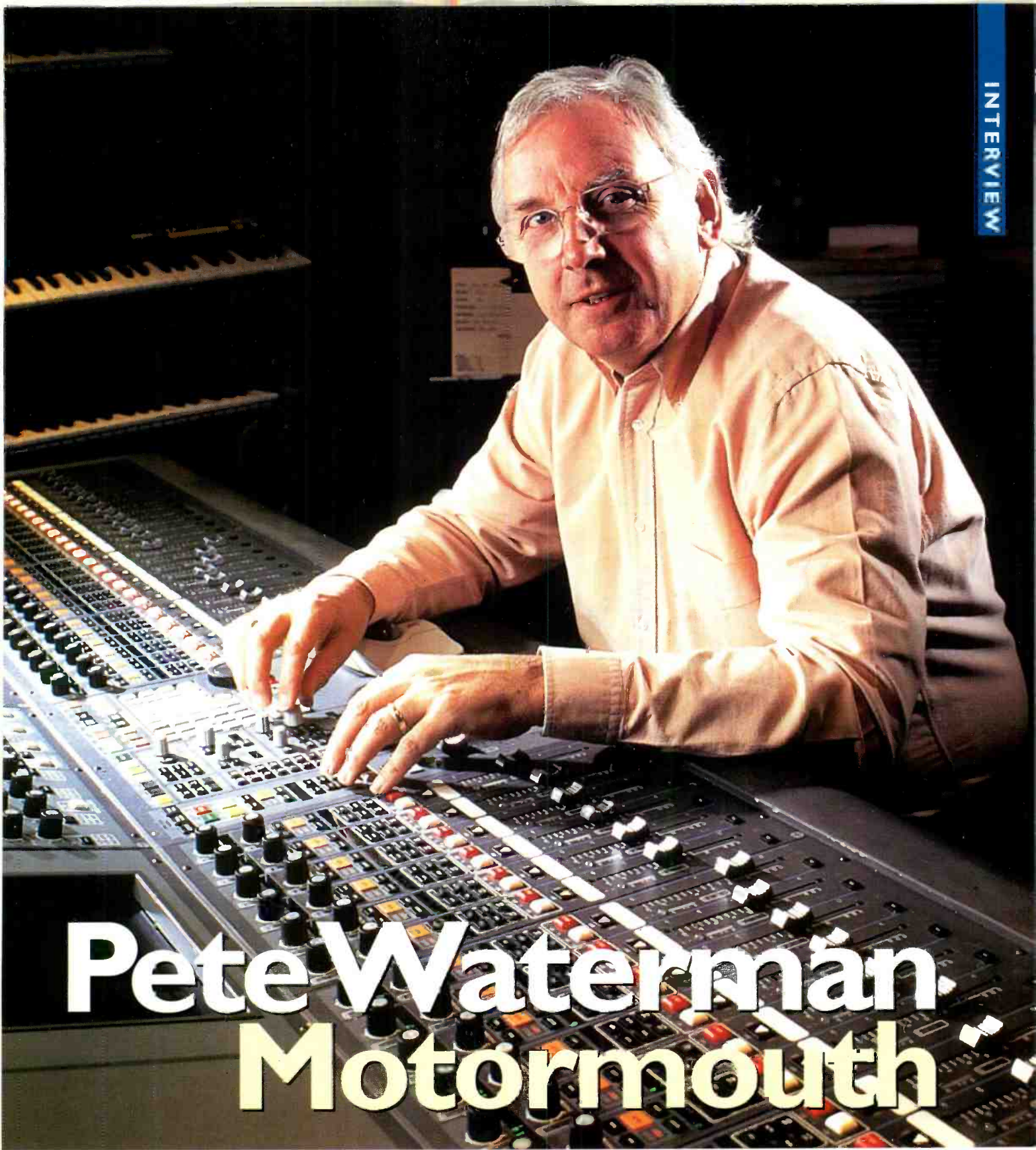
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Pete Waterman Motormouth

As he prepares to vacate the famous hit factory of the eighties, producer Pete Waterman has new premises and a new working strategy already in place. The Hitman makes no apologies to **Caroline Moss**

WHATEVER YOUR OPINION of him, Pete Waterman prides himself on being an iconoclast. 'Whether you want to pat me on the back or shoot me, I took studios out

Studio Sound January 1999

of the domain of the white-coated bloke,' he roars. 'I took away the idea that studios should be a stand-alone business and said that record producers should own their studios and be responsible for

their equipment, and the artist should not be charged with hiring all the equipment.'

As a producer, Waterman certainly changed the face of recording back in the early eighties. His all-inclusive production packages, which to his pride he has kept at the same rate for 15 years, are a lasting legacy to the record companies. And his enormous self-belief is undoubtedly one of the reasons he's managed to bounce back after spending the early nineties in a period of >

< frustration and inertia, culminating in the sale of his PWL label to Warners.

Late 1998 finds Waterman happily ensconced at PWL, the studio complex he built up 15 years ago in The Vineyard, south London, surrounded by his trademark train sets and arms collection. Today, he also has a successful Manchester studio complex in an old church that he bought sight unseen from Tony Wilson; a deal for his Eastern Bloc and Unity labels with Zomba Records; new London studios planned for the new year and his biggest stars since Kylie, Jason *et al*, Steps—whose debut album has sold a million and counting—together with a roster of new acts including Tina Cousins, guest vocalist on Sash's Top 5 hit 'Mysterious Times'.

The Pete Waterman of today is filled with energy and vitality, someone who's

(Twigg and Topham who, together with Waterman, form the TTW production team),' he says. 'In Manchester I've got the Work In Progress boys (Waterman himself, his son Paul and Steve Parker) who are at the top of division one. In 1999 I'm going to concentrate on Dan Sanders in Manchester, who's the most undiscovered talent in division two; I'll push him up so that Manchester becomes a good division one team.' Other members of his writing, engineering, production and maintenance staff include Andrew and Dan Frampton, Chris McDonnell and Rene Reichmann.

His own approach to technology is strangely contradictory; while appearing to despise anything of a technical nature, especially the technophiles he dubs 'nanowebbers', he simultaneously prides his organisation on its 'densely,

on in Manchester from London, where he spends most of the week. 'It's great because it's brought Manchester closer to the fold,' he enthuses. 'I can join in conversations and it means that whatever they're doing I can eavesdrop and give my opinion and hear it at full quality. For me it's a perfect way of working because you can't see anything, you have to use your hearing. I think it's the ultimate thing all mixing engineers should do, they should have the desk taken away from them. They shouldn't be allowed to see a desk. The amount of mixing that people do by watching the PPMs or the vu meters is staggering. I'm guilty of that myself—to see if an adjuster's actually worked you look at the meters, you don't let your ears tell you straight away. For the last three years I've taught myself not to look at meters, but to listen to whether it works. I've learned to trust my ears and ISDN is perfect for that. It also makes the mix engineer in Manchester far more aware that he can no longer just make it sound good in his room, he now has to think about the overall sound and not just the acoustics of one space. It means our engineers have now got used to working in a totally different way.'

While ISDN has obviously rocked Waterman's world, he's even more excited about his Libra, the console he chose after endless evaluations and, in his opinion, the deceptions of rival manufacturers. 'It was a very brave move to install the Libra in Manchester,' he says. 'I looked at every single digital console—and I'm able to buy exactly what I want—and everyone lied to me except for Neve. I told everyone what I wanted and they told me I could have it and it would cost £130,000, but what they don't tell you is it doesn't work without the other £180,000 worth of gear. It's meaningless. Those days of ridiculous investment in studio equipment are gone, and if the manufacturers think that is where their market is they'll all be as dead as Triumph motorbikes. Because what they have not woken up to is the fact the record industry is no longer prepared to pay £1,800 a day recording costs.'

'We've proved that by buying the Libra you can do exactly what the big consoles can do. It enables me to turn a profit on making a record; not a big profit, but if I'd invested £450,000 on a console I'd be making a loss. Even at my career level there's only a certain price you can charge for a single. My budgets aren't coming down, but they're not going up either, I still charge what I charged in 1983. How can you tell a client like Steps that the cost of a single is going to be between £25-30,000 per track? I don't care how good you're telling me a desk is, all I want is to be able to make a record and make a profit.'

One of the main problems with equipping a studio today, according to Waterman, is that console manufacturers >



'I still charge what I charged in 1983. How can you tell a client like Steps that the cost of a single is going to be between £25,000-£30,000 per track?'

learned a lesson or two over the last decade and has brought his business full circle. He's clear about his current role in the hit-making process, which is that of a record producer, not a studio owner or label executive. Today's PWL Empire consists of a tight-knit circle of engineers including his son Paul; a coterie of devoted support staff who've been behind him for 15 years; and his own determination to run a tight ship.

'Not that I'm a control freak, but every time I let something out of my control it falls apart,' he explains. 'You need somebody overseeing things, keeping it focused, particularly now when I'm being offered so much work I can hardly move.'

Waterman surrounds himself with staff whom he believes are genuine innovators. He talks about his engineers and producers with the strategy of a football manager. 'At the top of the premier division in London I've got Karl and Mark

technically packed studios with equipment up to the kazoo', that enable his engineers to create exactly the sound and feel he's after.

'Most engineers find the way I work a total anathema,' he barks. 'They don't understand it because we mix and match technologies and processes. I've no time for purists; they should put their fucking anoraks on and stand on Crewe station. I don't care what an engineer tells me. I want a hit and I'll do whatever it takes to get what I want.'

However, the two recent developments at PWL he's most excited about are technological innovations; the AMS Neve Libra digital mixing console installed two years ago at The Church's studio one, The Pulpit, and the ISDN link between the London and Manchester studios.

Regarding the latter, Waterman reckons he spends between 45 minutes and 1½ hours daily, listening to what's going

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are slow to grasp the huge gap between project studios and top end facilities.

'It's interesting, since we've had the Libra we've had upwards of a dozen big producers come and look at it, and they all work the way I work,' he says. 'There is no desk really available for the way we're working. We are all overengineered in the desk department and it keeps coming down to this whole argument about the digital quality. It's all bullshit. I've tried telling them what we want and they're not interested. The first thing they talk about is quality and I'm not interested in quality and neither are 95% of my customers. The kids that buy my records play them off tape recorders. They don't care if it sounds crackly, in fact we put crackles on the records now with Pro Tools. I talked to the guys at Neve about this, but they've got their Capricorn at the top end and they're not going to pitch a desk lower than the Libra. So it's the nearest thing to what I would class a sensible price range. It's still too expensive, but there's no £60,000 console that you can plug into Pro Tools and charge £15,000 for your hit singles.'

'The problem is whenever you talk to the desk manufacturers they think about a piano player, a drummer, a bass player,



Pete Waterman oversaw Kylie Minogue's eighties chart success before she assumed 'artistic control'

two guitarists and a vocalist. They never think about my world where we're running 48 channels of Pro Tools and 18 synthesizers live. We have 96 inputs and that's Chinese to them! I've always admired the way Trevor Horn works with his big live rooms—that's his thing and

he's brilliant at it—but I would be brave enough to say that more people world wide record like I do now. So why isn't there a desk which reflects this?'

Despite this beef, Waterman is unstinting in his praise for the Libra, which he describes as being as revolutionary as the SSL was when he discovered it. 'Let's get one thing straight, it's the best desk I've ever worked on,' he asserts. 'The price range kills every other desk. This year we've probably worked on records which have sold a total of 11 million and without the Libra I couldn't have done it, it's changed my life completely. AMS Neve are giving us updates constantly, the desk does more than it did when I bought it, it's fulfilled its role, and some, and it still gets better and better, it's phenomenal. We've had to add lots of things to it to get it where we wanted because what I wanted was a digital SSL. I'm quite happy with four faders because it makes me listen and not watch, but I know engineers like to see the faders go up and down, so we had 48 faders and they're £1,800 a fader, and we had to have lots more D-A converters because of the way we work. It's slightly more difficult than using a conventional SSL, but only slightly, so there's no quantum leap of skill between using the SSL >

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Mike Hedges



on BASF tape

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 **BASF**

◀ and the Neve; although there's a quantum leap when it comes to quality and permutations.

Such is the extent of Waterman's conversion to the Libra that a year ago he made the decision to carry out all mixing on it. 'This has now given me a problem because if I want to do a quick mix I have to get the tapes to Manchester and the boys have to go up and stay in a hotel,' he says. 'This is unfortunate for me, but fortunate for AMS Neve as it's almost certain the new studio's going to have to have another Libra. I didn't particularly want to do that because I'm trying desperately to bring the studios to a level I believe they should be at by not investing more in hardware but making the hardware better adapted to

now used for recording. But he hasn't forgotten the contribution SSL made to his career since he first came upon the desks in the early eighties.

'Luckily for me I met Pete Wandless who was then working for SSL and suggested I buy one. I had never heard of leasing, I bought everything cash. Pete told me I needed a 48-channel. I didn't have a clue what he was talking about, so I asked Mike Picking, the maintenance engineer at the Marquee where SAW were working, if it was a good desk. He said "Oh yeah, fantastic, it's what Trevor Horn's got". I remember it was about £230,000 so I said "Okay, I'll go and get the money out of the bank", and I've never seen anything like Pete Wandless' face in my life. Then I told him I wanted it in a flight case

so I could just take it into the studio and set it up and he sat me down and explained I'd need to have it installed, with a room for the computer, and so on.'

Waterman was persuaded to sort out some leasing and his first SSL was installed into The Vineyard in 1983. Now the lease is up on those premises and a purpose-built facility is being constructed opposite. How does he feel about leaving the old building behind? 'I do have regrets, but I'm never frightened of moving on,' he muses. 'Unlike these studios, which we inherited, the new facility will be completely purpose built, with a writing suite, a Libra studio and an SSL room, plus two cutting rooms.'

So the future is looking bright for Waterman, and it is obvious that he could have continued expounding his opinions for the rest of the day, but he had to leave to make a football match with Zomba director Steve Jenkins,

with whom he's had a working relationship for 28 years.

'We're great business partners and great mates; he gives me freedom to worry about making the records while he runs the record company,' he says. 'We have our board of directors meeting in the car on the way to the football and then listen to the product on the way back.'

And with this he's bounding out of his chair, eager to be off, issuing his staff with instructions vis-a-vis the Christmas decorations as he leaves the building. ■



Another of PWL's eighties successes was the big soul voice of Rick Astley

the marketplace at this moment in time. We've had to spend so much money over the past three years to catch up, go forward and take over again.'

PWL's three London studios are still equipped with SSLs, one of which will be installed in the new facility, but Waterman is keen to move away from them, believing they instil a 'very Stock Aitken Waterman sound' which he wants to escape from. To this end he made a £200,000 investment during 1997 in Pro Tools systems which are

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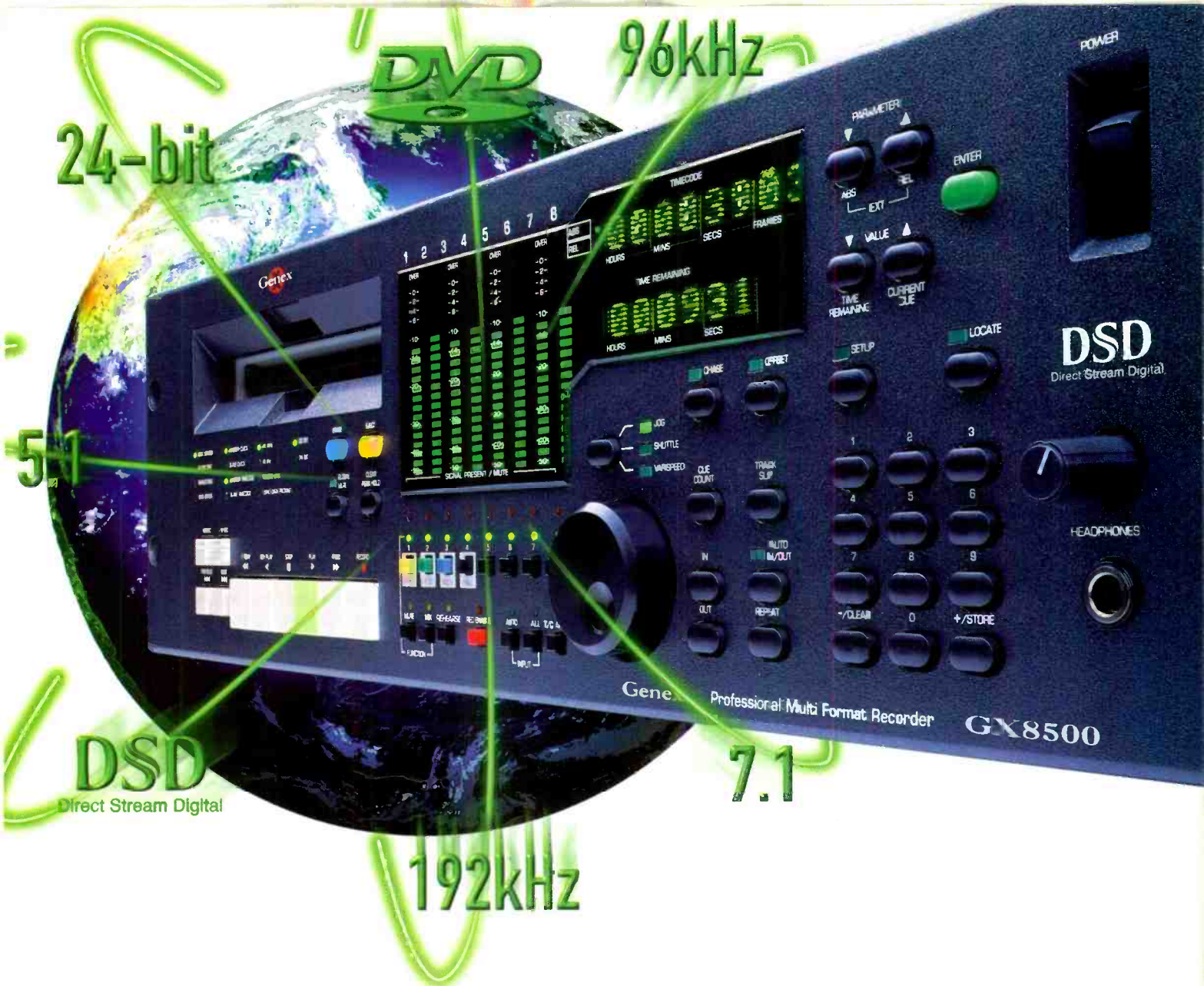
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THE FIRST HAZARD for the returning hero is fame,' states the narrator at the start of *Babe: Pig in the City*. In bringing our porky pal from the land Down Under back to the big screen, director George Miller—who produced and cowrote the original—seems to have pulled out all of the stops.

Accordingly, no fewer than 799 animals appear in the new *Babe*, which sees the champion shepherding pig attempting to save his and everyone else's bacon after Farmer Hoggett falls into a well and the farm is plunged into bankruptcy. Babe and Mrs Hoggett set out for the state fair in order to earn some much needed prize money, yet, when she is arrested *en route* for supposedly smuggling drugs, the two of them are stranded in a fictitious metropolis that incorporates such notable landmarks as the Statue of Liberty, the Sydney Opera House and the Hollywood sign. So it is that their less-than-child-like adventure begins, using four times as much animatronic and computer-generated special effects as the original movie, and, in so doing, nearly tripling the production costs.

'The whole film was a challenge,' says Steve Burgess, a highly experienced freelance engineer who took care of the Foley work at Sound Firm in Melbourne, while the actual filming took place at Twentieth Century Fox Studios in Sydney. 'I don't think I've ever worked on a film that was harder.

'A major reason was that it featured

hardly any people and there was no sync sound. We were often creating sounds that were bigger than the real-life sounds, and we were always trying to heighten the track, so nothing was straightforward.'

For its part, Sound Firm invested in a DSP Poststation system in early-1998, having evaluated editing alternatives such as Pro Tools, Fairlight and Sonic Solutions over an 18-month period. 'DSP were the most responsive in terms of addressing the needs of the whole facility,' says in-house engineer Ralph Ortner. 'We sometimes have up to ten editors with as many as four different projects running at the same time, and so it is important for us to be able to mix and match systems, make smaller or larger systems, transfer tracks to backup, get tracks from the editing stage down to the sound mixing stage.

'At the time that we approached DSP they hadn't completely solved a lot of those issues, but they were very open to input from us to help develop a systems approach to postproduction. We wanted something that wasn't just an editor, wasn't just a mixer, but started to bring those worlds together a bit more and made the transition between the two a lot easier. DSP are very progressive and what impressed me was their response to our needs. A lot of the computer editing systems have been designed by computer boffins without really understanding the postproduction process, but DSP spent a lot of time actu-

ally sitting and watching how we work in order to understand what we want. So, rather than us conforming to their particular software they ensured that their software would meet our needs.'

The result is a 4-station setup comprising a fully automated 32-track Poststation, with a control surface featuring touch-sensitive faders, an 18Gb local memory and NLV (Non-Linear Video); a 24-track desktop system with NLV that is used principally for Foley and ADR; a 16-track desktop system that is used for ADR as well as sound effects and dialogue editing; and an 8-track desktop system that is used for effects editing. A central server, the DSP Team, connects the four stations together, and has 36Gb of memory providing 4½ days of continuous recording.

'This means that for a particular project we can have somebody recording Foley on one system, another person recording ADR, someone doing sound effects editing, and still be mixing,' says Ortner. 'So, you can be doing pickups or changes as the project is progressing, instead of transferring to a backup tape, and then unloading from a machine and carrying across. It's really an integrated network, and that's been fantastic for the sort of high-end episodic television work that I've been mixing.'

'The DSP is a far easier system to use than Pro Tools,' adds Steve Burgess. 'I found Pro Tools to be a little too awkward for a studio setup when you're recording live. I mean, with the DSP sys-

Babe

Pig in the city



tem you literally have the 24 tracks in front of you running in time, and you're recording straight into that track as you would on a multi or any other system; it looks and works more like an old multitrack recorder. At the same time I suppose the other great advantage is the ability to splice, cut and move sounds very quickly and very easily.

'There again, when comparing the DSP to the Fairlight, the first time that I jumped on the DSP system I didn't like the way the recording function would happen on the cue-like start position. That's because I like to have the microphone open at different degrees depending on what we are doing. I phoned them up and said, "Look, this isn't the way I want it to operate", and the next morning when I walked into work there was an email with an attachment that provided me with a wider parameter of opening it earlier or shutting it or having it on the line. Generally their backup has been fantastic. Every time I've asked for something it pops up within a day, not weeks or months.

'A major part of what I like about the product is the NLV. With the hard disk drive I can scroll across and look at everything. It has a cueing system in it which gives you a lot of variables; you can have streamers, beats, counts, and everything changes according to the way you want it to function, and that's especially important when you're working with actors. Some actors might like a cue beat, some might not. They all have



their different tastes, and it's nice to be able to sit there and change things instead of getting into an argument with them. In fact, the system initially didn't have cue beats, so again I rang them up during the day and the next day I had an email with the appropriate software.'

For *Babe's* Foley work, Burgess was using the aforementioned 24-track desktop system, boasting 30Gb each of both audio and video memory, together with a Yamaha 02R. 'The DSP is absolutely fantastic for recording Foley,' he asserts. 'It's also great for ADR, and extremely handy in a mix room where you run it as your playback machine. We have a Harrison Series 12 here, and rather than use the 02R to do my mixdowns I lock the DSP up to the Harrison, and, if certain sounds are a little out of sync or there's something that I want to move or grab from somewhere else, I can even move it on the screen and continue to mix.'

Sound Firm's post work on *Babe: Pig in the City* started in July of 1998 and ended in November. Roger Savage took care of the rerecording, and, being that a large proportion of the voices was emanating from the mouths of animals, he certainly had more than enough looping to keep him busy. Nevertheless, given the nature of the animatronics work, it was very much a case of the digital effects people fitting the lip movements to the dialogue rather than the other way around.

'I think this film provides a benchmark for the future in terms of the ability to now change a dialogue line after the "actor" has been filmed,' says Savage. 'You change the line and then you change the mouth. I think that will eventually be applied a lot to live action with humans, because it will give the director the freedom to change lines without having to worry about how good the lip-syncing is.'

Steve Burgess, meanwhile, worked alongside Foley artist Gerry Long, while Craig Carter reconfirmed their Foley to the different versions and assistant Andrew Neil took care of backup support in order to keep everything running.

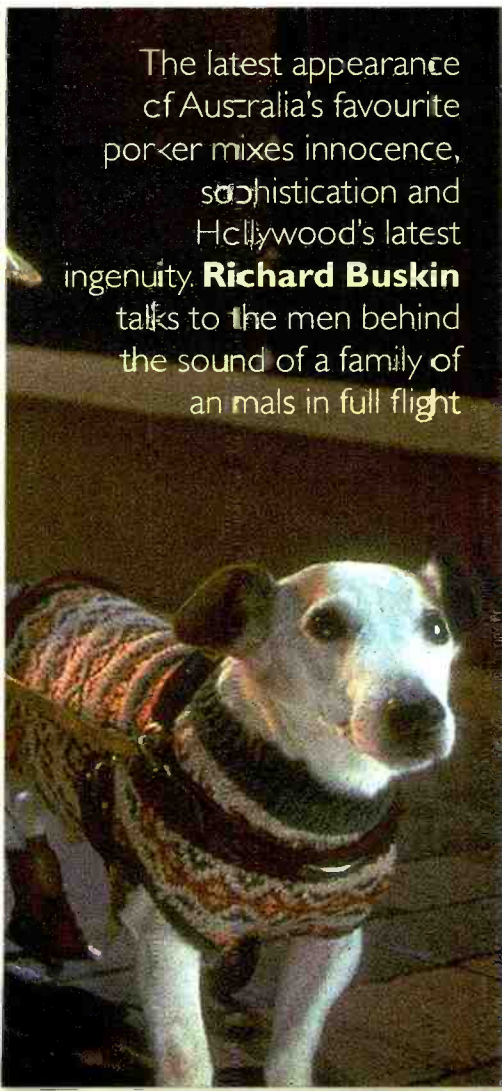
'*Babe's* Foley track required quite a

lot of detail in it, and we ended up recording about 3,500 clips of sound,' confirms Burgess. 'You see, we were looking at a film that had no sync track to it, and George's requirements amounted to a high degree of accuracy. A good example is the sound of the dogs' feet—because they are four-legged animals and they were running so fast, it was impossible to record all four feet at once and maintain a high degree of accuracy. So, what we did was record a guide track with Gerry just tapping his fingers in sync with the dogs' front feet, and a second track tapping his fingers to the back feet, and I then cut these two tracks on the DSP against the image, tightening them up and getting the rhythm right. I noticed that if you slide the front versus the back you can change the rhythm, and it was great with the DSP because I could easily toggle on the hard drive. We were literally cutting down to a half-frame accuracy or less.

NEXT WE would record the pads of the dogs' feet. George needed the dogs to feel heavy and big, and the sound to be strong, and in order to put that much weight into the sound we couldn't do it in sync at all, because it was way too fast. So, for the pads, we would do one track first using either sandbags or boxing gloves or sometimes Gerry running on the balls of his feet, and I'd feed him the guide track of the front feet that we had done with the finger-taps and he would then try to stay in sync with it. That, of course, was impossible, so we would always varispeed and then I'd cut those pads back in time to the guide track against the front feet and then against the back feet.

'On top of that, at times we wanted to get a fleshier sound, so in those cases we would use boxing gloves or even pads of hands to get some slap and put that up against the pads and the guide tracks. Then there would be another two tracks for the toenails, again doing back and front, so literally every time a dog moved we would have two guide tracks for the taps, two tracks for the heavy-type feet, two tracks of the fleshy-type >

The latest appearance of Australia's favourite porker mixes innocence, sophistication and Hollywood's latest ingenuity. **Richard Buskin** talks to the men behind the sound of a family of animals in full flight





< feet and two tracks of the toenails; eight tracks running every time a dog moved. What I found was that by varying the levels in association with each track we could get a lot of good motion in there, and we really needed to do that in order to get it to work. A lot of the time, when I couldn't get the weight that was required, I used the DSP's varispeed and then its Dilate function; I'd varispeed it and slow it down, and then dilate it back to its original length. I'd make each individual footstep a clip and then position it on top of the template.'

While the dogs' feet serve as an example of the degree of sync quality that was required, every single sound effect in the film necessitated an enormous amount of effort. Sample something seemingly as simple as the rattling sound of the dogs' chain—if Burgess and Long thought that a 12-foot chain with 12-inch links would suffice they were wrong; it actually sounded more like a crate of milk bottles.

'George really wanted to hear those links clunking together, but if you really grab a chain and move it there is not much attack in the signal on each link,' Burgess explains. So, what to do? Well, once again 16 tracks came in handy to create the desired effect courtesy of a hefty chain, some pulleys and winches all being ground together, along with a metal bar being run along a cast iron grate. On the other hand, the sound of the duck's feet were altogether easier to attain.

'All we used were two kids' flippers, and it was a one-element pass every time,' says Burgess. 'However, when the duck would fly away there were 500 wing-flaps left and right, and for that we had to cut every single wing-flap, each running five to ten frames in length, and checker-board them in order to be able to mix them. Again, at certain times we

would use two different types of feathers and vary the levels in order to help achieve the movement of the bird.

'Because we'd have three dogs running in a scene I'd end up using 32 tracks on the DSP just to create the dogs' feet. So on every spool I had three or four premixes to bring down, and we were averaging between 60 and 100 tracks per reel. That is far too difficult to mix all at once, especially with a Foley reel where you have a sound happening every two seconds or less. Eventually I supplied the final mixes on the dubbing stage with a 16-track split of the Foley.'

In the end, around 400 hours were spent on recording and between 150 to 200 hours on the mix. Roger Savage did the main mix on a Harrison console at the Sound Firm facility located on the Fox lot in Sydney, and the film was finalised there using various formats; DA-88, Akai and Sony digital dubbers, 2-inch multitrack and Pro Tools. Meanwhile, just to add to Steve Burgess' workload, there were also around 200 hours spent on reconforming.

'If we were locking off reels and finishing they would cut the picture again,' says Burgess. 'So we were consistently reconforming to the new pictures. I've never worked so many hours before on a film, but George Miller was adamant that he wanted the best possible results out of it... We were running Sony STD 9000 data backups, and at night I would have my assistant Andrew backup everything that I had done during the day while I would walk into the other room and keep mixing until 4 am. I tell you, I was averaging between 80 to 100 hours a week.

'On the first day of the mix George actually rang us here, and he just said, 'The work is absolutely bloody brilliant.' That was Reel 1, and after he'd said that I then had to keep the quality up there until the end. The pressure was really on.' ■



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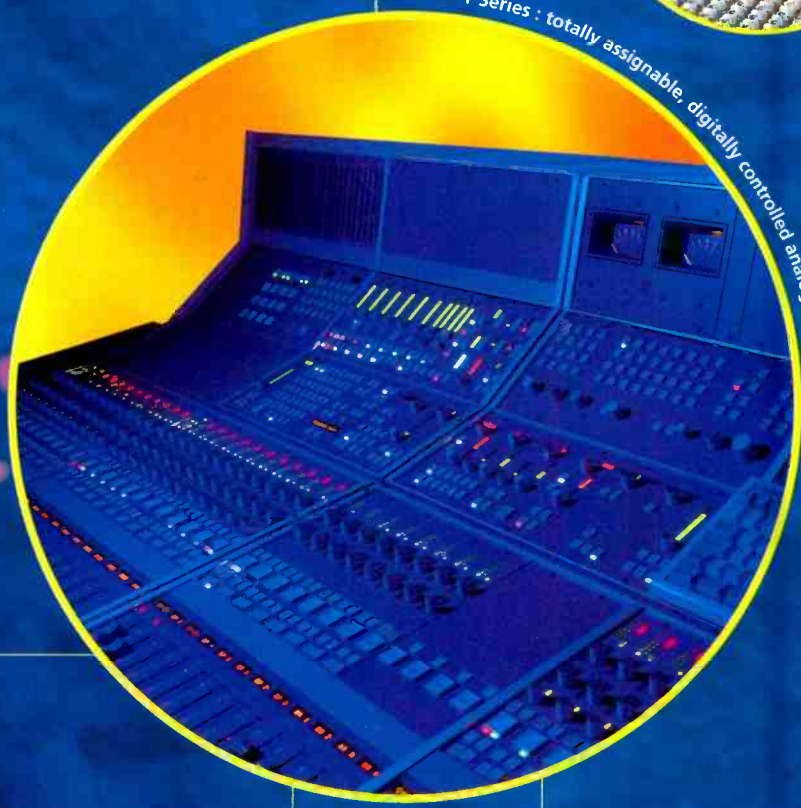
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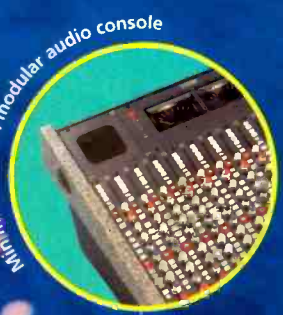
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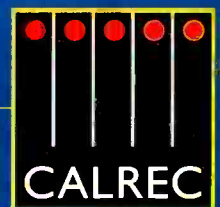
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IF GOING FOR GOLD is sport, then audio for the Ashes is a science. And it is a science that the team at the Nine Network in Australia has sought to perfect over the past 20 years. Among the early achievements of the then audio director Colin Stevenson, was the start of the art of stump miking.

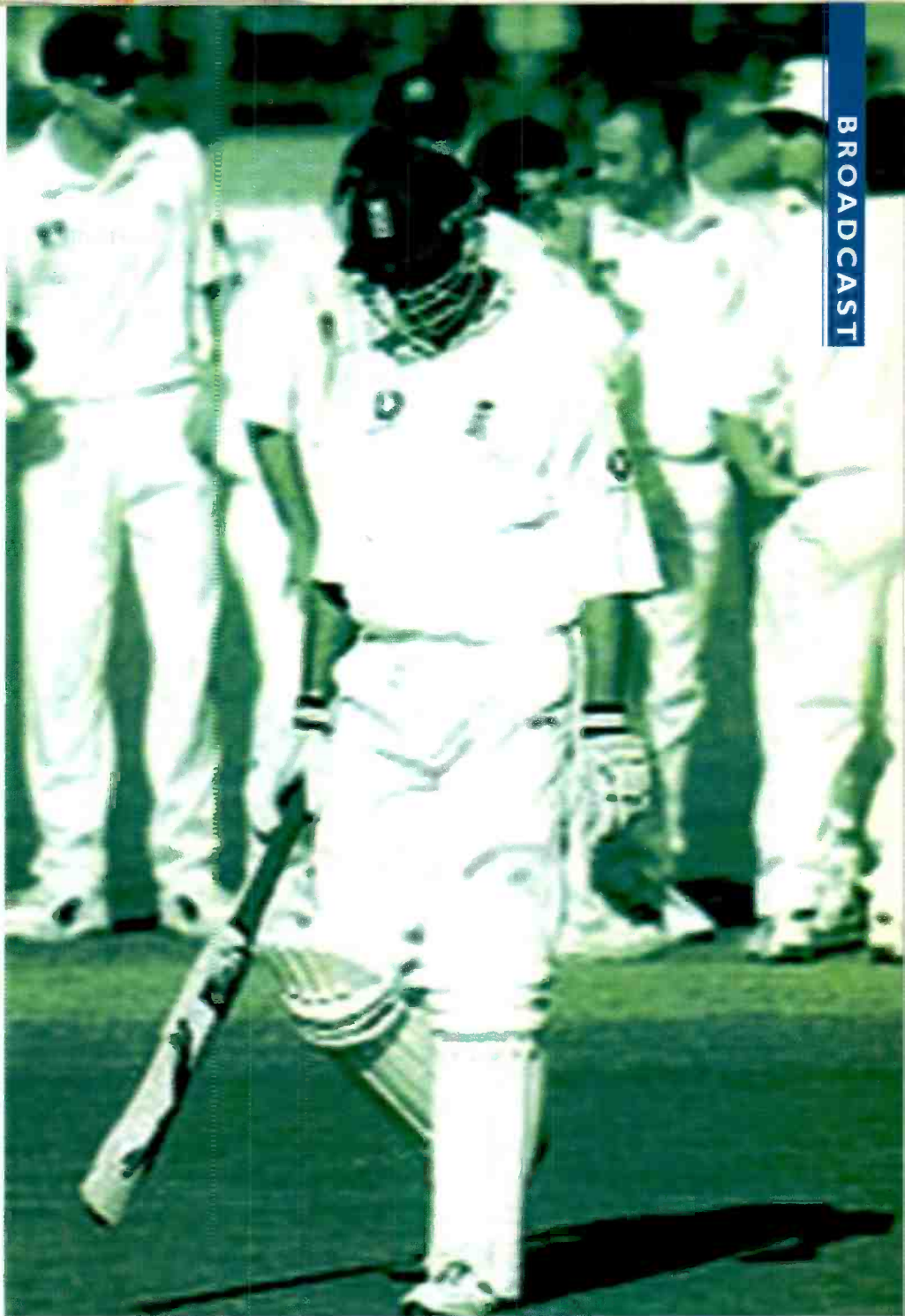
'We shoved a Sony ECM30 into a condom—a non-lubricated one,' he recalls, 'and tried to bury it near the stumps, but the groundsmen wouldn't hear of it.' The well-intentioned groundsmen were overruled by the commercial preferences of some network heavies and the broadcast techs were soon digging under a hot sun in a cloud of blow flies. 'A condom swelled up in the sun one day,' Stevenson continues, 'and Rod Marsh jumped on it. It nearly blew my headset off my head.'

Today, the stump mics are still Sonys, but now ECM77s, when on a line. Most stumps have conduits run to them these days, for stumpcam and audio purposes. No condom is used, as the pitch is covered whenever rain threatens.

For some time the Network Nine sound department experimented with transmitters in hollow stumps. This had a shaky start, when the first model was destroyed by the very first Test ball launched by Denis Lilley. The move to hollow stumps came about because national broadcaster ABC had reciprocal rights to broadcast the Ashes regionally and started installing multiple microphone systems. The groundsmen decided that too many holes were appearing in the pitch and digging was promptly banned. More recent hollow stump projects have given mixed results as the transmitters did not enjoy the experience when subjected to a direct strike, for some reason.

Today, the hollow-stump mic is pretty well standard issue in the world of cricket, but remain a poor second choice where ground mics could be used instead. These are placed on the ground just behind the stumps, and two are used if on a cable feed. Where cables are not available, Sennheiser 800MHz wireless lapel mics are used. These are powered with a Lithium battery, which is good for about six hours' use. Previously, a 200MHz wireless system had been used, but this had to be abandoned due to RF interference. Ground mics offer better pickup, catching pitch banter—observed as being somewhat 'blue' during the recent Perth Test—as well as the sound of stumps getting smashed by the ball at 50 miles per hour. 'The acoustics of the stumps aren't great,' comments Peter Fragar, Audio Director of ABC's outside broadcast.

Almost 48 inputs arrive at the Calrec Assignable Console in Fragar's OB Van One. Aside from the four stump mics, there are eight crowd effects mics (a mixture of Sennheiser 816s and 416s), the odd MS mic (like a Shure VP88, >



Stump up the volume

Ten pieces of wood connected by a chain and surrounded by a sea of grass—that's cricket. **Julius Grafton** discovers that deriving sound and vision from the edge of the field of an Ashes broadcast is more confounding still



< typically placed on the roof of the grandstands) plus a couple of dropper mics. In addition, there are outputs from nine video replay units, four studio lapel mics (ECM77s), three ribbon mics for

the commentators and a couple of SM63 interview mics. Some of the camera mics are also fed into the mix, and occasionally used.

The dropper mics gave rise to a mem-

orable incident several years ago at The Gabba in Brisbane. The game had settled down to a dull roar, and was into its third day—during a particularly dull period of play, an unauthorised commentary appeared at the mixing desk. The offending channel was quickly identified and a Policeman was dispatched to the appropriate mic position. He climbed onto the roof of one of the stands and arrested two Poms (as they call the English) who were using one of the dropper mics to add their own dubious commentary.

THE MAN mixing the stump mics has to mix the audio from the wicket such that the audience is not subjected to expletives or other inappropriate language. He also has to try to mix the levels so that the sound effects are somewhat in perspective. It's easy to imagine the difference in position of a wicket keeper keeping for a spin bowler and keeping for a fast bowler—about 20m, in fact. The AD searches for the return of the ball effects and the umpires calling the overs. He virtually plays his own game on the faders.

The Senior Audio Director mixes the rest of the coverage, including the slow-motion replays. Here, the trick is to search out the 'hits, snicks, and flicks' of the ball on bat and pad, while trying not to make the slow-motion audio sound as though it is grinding. The commentators have come to rely on the stump and replay FX substantially to assist with their commentary, as a ball passing the batsman at speed may often be heard rather than seen to have touched bat or glove. The public too benefit from the inclusion of this aspect of the audio coverage, not noticing its presence so much as being aware of its absence.

This Ashes series was played in Brisbane, Sydney, Perth, Adelaide and Melbourne at the height of summer—the weather typified by images of audience and players baking under a hot sun flaunted before the envious northern hemisphere. Meantime, those lucky enough to reside down under are contemplating cold grog and good food from the barbie.

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The Network Nine crew arrives at each ground a day prior to the match and puts in a whole shift setting up the van and the ground mics. These days many of the grounds are prewired, which saves a lot of time as the longest cable run can be 300m. The console takes a lot of time to set up as there may be up to ten on-site feeds in addition to all the multilateral feeds—so the matrix outputs and auxiliary sends are virtually all used up. The on-site feeds go to crew and studio foldback, and programme on the talkback.

Three crew and one communications crew member do the setup, then on the day, two audio directors and two assistants work on the coverage. One assistant works around the commentary booth and studio, some distance from the OB van, while the other is roving, being available for trouble shooting, pitch reports and interviews. The OB skills of the Network Nine crew are legendary, especially considering the conditions under which they work. If the climate is not extreme enough, then there is the Barmy Army to cope with—the English contingent that seems somewhat under the weather, often in more ways than one.

Regional coverage of the Ashes requires a lot of audio feeds alone, but international and radio feeds are also needed. To this end, a mix of crowd effects and the stumps is sent back to the studio in Sydney, for editing into the highlights cut. Radio gets a mix of stumps and crowd, less the replays. B-Sky-B in Europe takes the main composite mix and all pre-fader and post-fader splits covering less the local commentary. It also takes an independent split from the replays, which comes in stereo from up to nine video players.

Currently, the match audio is produced in stereo, but in 2001 the Australian networks will commence transmission in 5.1-channel surround, in readiness for HDTV.

'We are looking forward to mixing in 5.1' says Peter Fragar, 'and as an exercise we mixed the Grand Prix (held in Melbourne in 1998) in surround. Initially we'll go with the existing consoles, and add equipment to generate the

mixes—which will restrict us a bit. We've got a hell of a lot to do with monitoring and routing first'.

Among the new considerations for surround are the MS crowd mics. These

are ideal for surround as they produce out of phase signals from some areas in the pickup zone, and the surround decoder sends out of phase material to the rear as ambient sound. ■

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Following the success of *Jagged Little Pill* was a tall order for Alanis Morissette. Glen Ballard tells **Richard Buskin** about working with the *Supposed Former Infatuation Junkie*

ON ITS WAY to 25m sales, Alanis Morissette's debut album exposed a remarkable working relationship between the artist and producer. 'I don't want to get too intellectual about a second record, because I think that what was special about [*Jagged Little Pill*] was the fact that we were kind of channelling this wonderful energy,' Glen Ballard told *Studio Sound* in December 1996. 'We weren't trying to be trendy,' he asserted. 'we weren't trying to do anything other than what we do, and so every few months we've talked and tried to remind ourselves of what is important about how we made that first one. I certainly don't want to spend a year and a half in the studio, going over 10 or 12 songs, dotting every "i" and crossing every "t".'

Titled *Supposed Former Infatuation Junkie*, the new album presents the self-motivated Canadian artist in uncompromising mood, denying any notion that she and her coproducer are trying to clone the success formula. The sound is a little more intricate than the first time around while the lyrics fly thicker and faster than before, so does Ballard feel that the method of making the record tied in with his aforementioned intentions?

The Ballad of Infatuation

'I really do. We certainly made it very quickly. We spent 25 days together writing 25 songs and a lot of the recording was done during that time too. Then we spent two weeks with her band in the studio and another two weeks finishing it. So we did it in just under two months.'

'The only difference between this record and the first one is that from a lyrical standpoint she was exploring some different issues and different structures, and that was something which I think she had been thinking about over the last few years. So, the music sort of conforms to a lyrical excursion that she's taken which is much less structured and has a lot of words, but the process was essentially the same.'

A musician and engineer in addition to being a composer and producer, Glen

Ballard has worked with artists ranging from Michael Jackson, Aretha Franklin, and Natalie Cole to Aerosmith and Van Halen. In the process, he has earned several Grammy Awards, topped the pop, R&B, alternative, adult contemporary, country and jazz charts, and clocked up more than 100 million sales. Of course, a healthy chunk of these were accrued courtesy of *Jagged Little Pill*, the upshot of which was a slight change in the creative spin on *Supposed Former Infatuation Junkie*.

'In some cases she had somewhat complete lyrics,' Ballard recalls, 'but in most cases she just had journals of ideas—poems, fragments, observations, travelogues—and out of that wealth of material she sort of formed the words. So, in certain instances it >

< was a pretty complete lyric, but in most cases it was a matter of her processing that in a musical context. Without question the lyrics completely shaped the music, whereas that was probably a little less so on the first record.

'For my part I came in cold on the project. You know, I'm always trying to grow as a musician, I'm always listening to all kinds of music from all over the world and trying to get better, and some of those influences are probably reflected in what I was able to bring to the record to whatever degree. However, it was mostly about what she wanted to do lyrically and me trying to serve that, because I think she is all about what she has to say. My first job as a writer with her is to serve that interest, and as a producer it's to make it all kind of fit together.'

Ballard's home setup in Encino, California houses a Euphonix console, Sony analogue JH24 multitrack and numerous ADATs, in addition to an assortment of outboard gear and vintage mics, synths, guitars, drum machines, sequencers and a wide variety of other instruments.

'I've gotten some new guitars during the past year,' he says, 'and I've acquired a Korg Trinity synth which I love. You turn it on and everything in there is good. We're also always creating new samples—I do that on almost a daily basis—with drummers, with percussion, with guitars, backward loops; whatever we've got, we're always tinkering. So it's a matter of trying to create new sounds all of the time.'

Composing their material in this environment, Ballard's and Morissette's general approach was to start by finding a musical theme. This would amount to him running several such themes by her, and when one of them grabbed her attention they then both set about expanding it into a song.

'In most cases she'd hear some music that she liked, she'd sing something that she liked, she'd have a chord that she

liked, a sequence of notes, whatever, and once she found something that she felt good about she'd go into a trance and was really able to write lyrics on the spot,' Ballard explains. 'A lot of them were based on ideas that she'd been exploring, but at that point it was also really a kind of channelling, and a case of her getting lost in the music. We'd have a cassette machine rolling the whole time, and often we'd do stuff and say, "What did we just do?" You know, she'd sing a line that was incredible, I would do a chord change and I'd just be trying to channel with her.'

Ballard previously claimed to particularly enjoy working with new artists, for he is particularly adept at recognising talent at an early stage and providing it with the chance to blossom ('I take pride in doing that and I really enjoy it, because in every case I think that I learn as much from new artists as they do from me.') So, what was it like working with a former new artist-cum-infatuation junkie?

'Obviously she's no longer an unknown artist and there clearly is an expectation among millions of people who like her music,' he responds, 'but I have to say that Alanis was true to her artistic inspiration and she first really wanted to say something and not worry about that expectation, especially the commercial expectation. You know, could we sell 28 million records? If that had been the goal then we would have approached this whole thing differently. However, it wasn't her goal and it really wasn't my goal. She had made a startling kind of statement on her first record that really did define her as an artist in a certain way, but it would not be appropriate for me to keep her right there and say, "Okay, let's do something that is very similar to *Jagged Little Pill* so that we can sell 28 million records". That would have been the last thing that she would have responded to. She was really interested in trying to do what she does and to speak what's on her mind, so making this record was not unlike making a record with a new artist.'

'She was stretching so far lyrically that she was constantly exploring new avenues, as opposed to capitalising on her fame and recreating what she's done for the next 10 years of her career. You know, that's what a lot of people do, and so I think you have to know up front what the goals of the artist are. Her goal was not to do that and as a result it certainly wasn't unlike doing something really new, because she didn't want to write 'Ironic' sideways.'

'She's a very strong artist, and she's got a very clear idea of what she does and does not want to do and how she wants to represent herself, and I took my cue from her. It was also the case that she coproduced this record with me, and so her approach to it was different from exactly what I would have done had I been doing it on my own. There again, what I would have done without her influence is probably irrelevant. She as an artist wanted to have more of a contribution on the production side because I think she wanted to make sure that the musical expression was in sync with what she wanted to say, and I welcomed that and embraced it. To me it represented growth of an artist, and that's always good. The more she wants to express something the better, as far as I'm concerned, I'll try to enhance that, and on this record that was my job, no question.'

'Working with Alanis is always really quick. I mean, we go in the room and if we don't have a song by the end of the day we feel pretty bad. Usually the basic track—if not everything—has been recorded, and in almost every case her lead vocal is the finished version. She sings it once, maybe twice, and we've got it. She's the most extraordinary singer. We never comp the vocals and we only punch in maybe once or twice to change a word. She's so capable of singing a song that she's just written, on the spot, for real, forever, and she's fearless in doing that. It's truly remarkable.'

'On this record there are probably twice as many words, and so I'm >

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< always pushing the vocal up and she's always pulling it back, but to me it's like we're predicating everything on this and we certainly want to communicate that to the listener. She realises the value of clarity in the vocal, but I particularly like hearing what she has to say because that's what this is about and not having her voice out there would be missing the point.'

In terms of the overall sound, Morissette was constantly pushing for different colours and different flavours, and one of the results of this is that there are more keyboard parts on the new record than on its predecessor. The songs that she wrote alone were generally composed on a keyboard, and this suited Ballard just fine as, in spite of all of his guitar work on *Jagged Little Pill*, he is more usually a keyboard player. There again, having spent some time in India, Morissette also decided to incorporate some of that nation's musical textures into her current work. Hence the appearance of tablas, sitars, and so on.

'Whatever she wants to write about dictates to a certain degree where we want to go,' says Ballard. 'So, maybe there are more influences apparent on this record than on the first, but these came naturally in every case.'

'I love good grooves and we probably spent as much time messing with the drums as with anything else. When we put the band on we would usually then go into Pro Tools and tighten up the drums, even though Gary Novak keeps excellent time. With sequenced elements we would pull it into a little more precision, because I think at that point it takes up less room in the track and therefore leaves more space for the vocalist. That's something which we're pretty strict about, in that we want it to



be tight and we want some definition there, so we probably spent more time doing that than almost everything else on the record. It's a tedious process and I have a programmer named Shad Scott who spends a lot of time with the Pro Tools after the fact, pulling it all together. Actually a load of programming and recording in the initial phase of this I do myself, but Shad is more fluent with Pro Tools than I am and it's also a very time-intensive thing, so we would cut a drum track and he would spend a day tightening it up while we'd be on to the next thing.'

The band was recorded at Royaltone Studios in Hollywood, and the fact that the room there allowed for two guitarists, the bass player, the drummer and, when necessary, the singer to be separate while remaining in visual contact meant that most of the group performances could be retained intact.

'When Alanis and I are working together at my place I'm creating the track one component at a time and then she does her vocal,' says Ballard. 'However, once we get that process out of the way we go into the studio with those tracks, and the band played over about half of the tracks that we had. They've already got the lead vocal there, which is great, and so she doesn't have to sing it 20 times. We would adjust and do some arranging and so on, but it was

important to her that they had the same energy as they have on stage. That's always fun for me. We would do like one or two songs a day; they're all pros, they were prepared and we were ready to rock.'

After that it was back to Glen Ballard's studio for the mix, which, as with *Jagged Little Pill*, was taken care of by Chris Fogel, who also recorded the drums and various

band parts. 'All of the really difficult recording was left to him,' asserts Ballard. 'To record an ensemble is much harder than what I was doing, putting a synth part on tape and then another bass part. I don't have those kind of recording chops, and he gets one of the great drum sounds in the business, which is probably the hardest thing to do well.'

With his Capitol-based record company, Java, serving as his main focus, Glen Ballard's days and nights are taken up with film soundtrack work, as well as album projects with any number of artists signed to his label, one of whom just happens to be a certain Lisa-Marie Presley. 'I've been writing with her and we're developing the material for her record,' he says. 'We're taking it slowly, but she's really, really good.'

As for Alanis: 'Whenever she is ready the door is always open to her in my life. As I told her after the last record, "Just rattle my cage when you're ready". It took her about 18 months to two years but then she said, "I'm ready", and I respect that, because she goes off and does this whole other thing that is performing. She does it so beautifully, but it's a different energy, a different process, and I think she has to kind of give herself a bit of time after she's done that to find a different rhythm in her life where she feels like she can write.' ■

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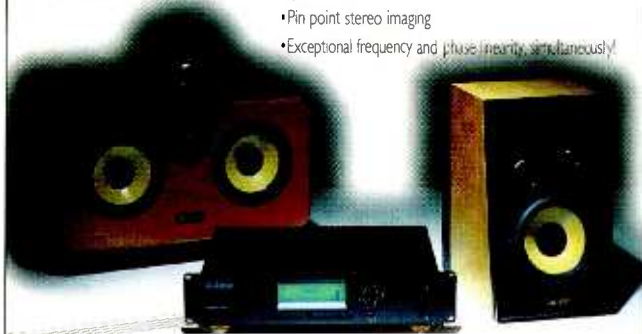
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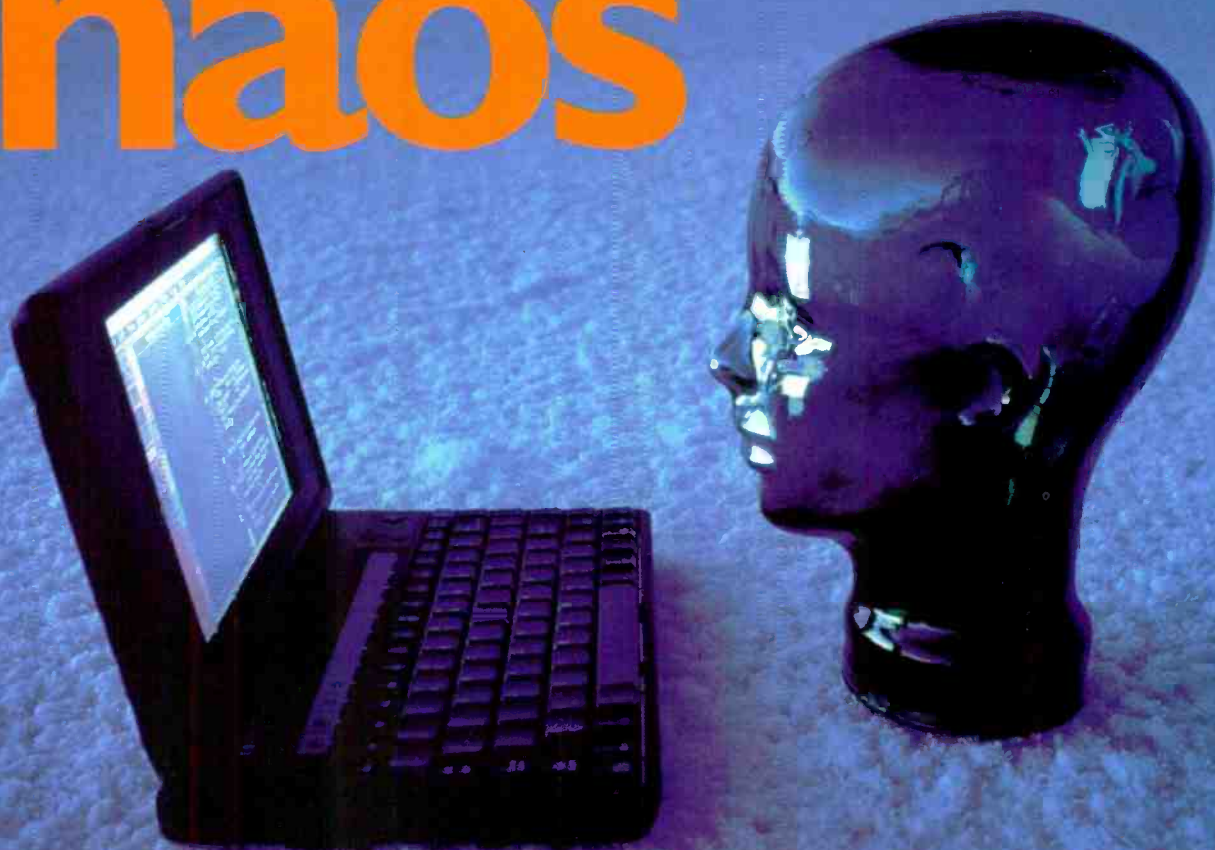
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Computing chaos



Investing in computer audio systems is a tricky game depending on a heady mixture of business and technology. **Martin Polon** probes the future for signs of progress and indications of choice times to invest

WHAT DOES future technology offer the computer? How might these enhancements—however implemented—improve the virtual studio? Is it possible to recognise the watersheds that invite sound investment in technology? The difficulty of answering these and similar arises from the pace of computer development—conversely, buying current technology gives a kind of freeze-frame of a work in progress.

One of the key issues is processing speed. Although raw speed does not necessarily improve functionality without reworking of the computer's hardware and software architecture, it is a significant issue. Millennium (Year 2000) problems notwithstanding, higher clock rates herald the most dramatic changes in computer design yet seen—they threaten to make real any

number of potential innovations. Shrinking microprocessors in size—one spin off—reduces heat and power consumption. Being able to place more semiconductor units in the same physical space, has seen unit speed increase from 200MHz to the edge of 400MHz this past year alone. By using better conducting metal substrates (such as copper) to mount and connect the various semiconductor components on the microprocessor chip, processor speed is also improved.

The use of enhanced Level 2 cache (providing the processor with a memory scratchpad) and operating at a speed either parallel to the processor itself or at half of the processor speed, has provided another avenue of increasing speed. Increasing the bit rate allows greater speed as well, by moving more data with the same number

of steps. Today's 32-bit processors are on the verge of being replaced by whole new families of 64-bit chips. Meanwhile, optimising new processors for specific operating systems is another way of increasing the overall speed of computation.

Let's look at the basic specifications of future microprocessors, most of which were discussed at several recent semiconductor industry seminars in Silicon Valley, California. We will focus on the G4 PowerPC chip from IBM-Motorola (with design input from Apple) and look at developments in the PC chip world, but the essential issues of moving forwards in microprocessors are essentially the same and more or less parallel regardless of platform. Major innovations such as chip die size reduction, increased transistor capacity per chip, improved multimedia >

< instruction sets, copper substrates, Level 2 cache size increases and closer proximity to the processor itself are all being applied to the design of future chips in both the Apple-IBM-Motorola (A-I-M) world and the Intel-Cyrix-AMD-Alpha universe.

When are the new chips going to be available? Conventional wisdom is that new chips from all makers including Intel but excluding the IA-64(128) family (code named Merced followed by McKinley), will be made in large enough quantities during 1999 for use in new computers. The Intel top of the line 64/128 bit Merced-McKinley chips have been placed back for release in mid-year 2000. Whether that really reflects on Intel's problems in manufacturing and delivering these new 'super' chips, or Microsoft's pressure on Intel to back-pedal until Microsoft is ready to write enhanced code (software) remains to be seen. Detailed readings of the transcripts of the US Justice Department's ongoing anti-monopoly hearings into Microsoft's business practices clearly suggest that Bill Gates has already produced what is called 'first silicon'—the first working model of the new G4 PowerPC chip. This alpha model came out of the lab during the summer of 1998 and Beta samples will have been made available to customers, including Apple Computer, by the time this report is written. The G4 processor is scheduled to go into full production by the middle of 1999 and be available in new Macs no later than the Fall of 1999. Similar timetables are working for Intel and its competitors as well.

IN THE never-ending quest for speed, chip designers feel obliged to derive dramatic changes in the new chips, with the goal of reducing power consumption and consequently heat becoming the highest priority. For example, the IBM-Motorola G4's core voltages will be somewhat less than 2V, a big improvement on the G3. The typical G4 power dissipation will be significantly less than 10W (8W?), assuming a clock speed of 400MHz. The G4 will have the same power-conservation modes of doze, nap and sleep now available on the G3.

The G4 chip will contain slightly less than 12 million transistors placed in a semiconductor 'die' less than 85mm square. This is just slightly larger than the current G3 chip used in all the Apple Macintosh computers now available. Analysts expect that the Motorola G4 will clock initially at speeds in the range of 400MHz (as far as performance and power-dissipation figures). But that initial speed will rise to as high a frequency as 1GHz as the G4 evolves. Intel is expected to match clock speed with the G4 in a kind of hop, skip and jump race as one chip maker pulls ahead of the other and then falls briefly behind.

Either the Merced and-or the McKinley chips could prove to be a more significant challenge to the G4 but these chips are 18 months away at best and much could happen to the G4 in the interim. As to die size and power dissipation, all chipmakers are working hard to reduce both and everybody in the industry is supported by the same semiconductor fabrication companies.

Intel's response has been to reduce manufacturing costs to reduce processor prices to its PC maker customers. Intel's strategy may be to 'lose' the very low-price, low-margin market, and focus on reducing size, costs, and heat while adding features on mid and top end microprocessors.

Intel's competitors, including but not limited to AMD, Centaur Technology, Cyrix, IBM, and Rise Technology, all have announced either new chips for 1999 or enhancements of current chips. Manufacturing advances will yield reduced size, costs (some predict under \$100 per chip), speeds starting at or in excess of 500MHz, larger than currently configured Level 1 cache and other enhancements.

Intel also is in danger from competition for the very high-end portion of its microprocessor line. With the IA-64 Merced and McKinley processors at least temporarily stalled, many users are awakening to the potential of Digital Equipment Company's (DEC) Alpha chip, the best-kept secret in the microprocessor Business. Digital and its Alpha chip—having been purchased by Compaq Computers—is now in a setting of both horizontal and vertical integration. The Alpha chip is now being manufactured by Intel (Intel having absorbed DEC's chip-making capability) marketed by Compaq and is the subject of a joint venture with Samsung. The newly announced Alpha chip 21364 is scheduled to ship in the year 2000 with a clock speed of 1GHz or more and could field an amazing 100 million transistors, of which at least two thirds will be devoted to upwards of 1Mb (and possibly as high as 2Mb) of integrated Level 2 cache. Also connected directly on the chip will be direct processor-to-processor interconnect facilities perhaps capable of transfer rates as high as 10Gb/s for multiprocessing systems. Current Alpha chips offer speeds in the range of 700MHz.

The Motorola G4 chips will be manufactured in a Motorola plant using the company's proprietary techniques (HIP5). The chip on its die of 0.20-micron size is reduced from the 0.25-micron manufacturing standard found with most processors in use today, and that reduced from the 0.30-micron process still prevalent at the beginning of 1998.

In redesigning the G4, the Motorola and IBM semiconductor manufacturers had to make choices as to what went >



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◀ on the chip and what remained off. Ideally, they were looking to 'size' the chip down while increasing the speed and decreasing the cost and power consumption. Depending on how the designers chose to manage the inevitable trade-offs, such 'process' reductions can make a chip smaller, cheaper, faster and less power-hungry.

The primary problem facing chip, and for that matter PC designers determined to keep the speed gains inherent in the new chips themselves, is the challenge of memory latency. Memory latency is essentially the issue of communicating between the high-speed microprocessor itself and its memory 'scratchpads'—the Level 1 and Level 2 caches.

Motorola-IBM, with the G4 and its 128-bit front-side and backside buses, illustrates one way to deal with the latency problem—albeit in a relatively

conventional manner with high-speed transfer buses. Some chip makers are actually bringing the Level 2 cache and its requisite memory controller onto the microprocessor itself (as in the new Alpha chip) enabling even faster transfers between processor and caches without conflict. The Motorola-IBM G4's isolated Level 1 32kb memory caches for instructions and data (the same as the G3) coexist with Level 2 cache capacity measured in increments of 512kb, 1Mb, or 2Mb (the G3 is limited to 1Mb).

BOTH INTEL and Motorola are segueing to copper interconnect technology to overcome potential future problems for speed on the current aluminium interconnect substrates technology. The G4 chip will be an early entrant for Motorola to mak-

ing production processors on copper. IBM, possibly the major innovator of copper, has already produced some commercially available chips on the orange metal. Changing to copper promise an unlimited future of chip development and further speed increases in chips built with advanced technology. The Motorola G4, includes a full instruction set of AltiVec multimedia commands.

The AltiVec part of the Motorola G4 chip (IBM has opted to decline offering separate multimedia instruction sets on its chips), includes two vector operations units, which can operate in parallel with the integer and floating-point arithmetic units. The Vector unit can perform arithmetic in as many as 16 operations in a single clock cycle. A single AltiVec instruction can perform bit manipulations equivalent to as many as 50 standard PowerPC instructions.

Needless to say, the G4, with its separate, isolated 128-bit register for vector data, offers significant improvements in audio, video and multimedia performance even above and beyond that which the new chip's speed offers. It is not clear at this time how much of that AltiVec capability Apple will offer on their future higher-end machines and via software rewrites—perhaps in the yet to be released OS X.

What does all this mean to the audio, video and multimedia professional thinking about a new computer? First, it means that computers bought during 1999 will have increasingly fast microprocessors starting at 400MHz clock speed and gradually working up to 1GHz or better during the next 12 or 18 months. Second, it means that PC makers (Apple and Intel) will be optimising the rest of their systems with 100MHz overall speed for system buses, fast RAM operating at 100MHz or better (up from current 70MHz), faster hard drives-memory controllers, and so on. Third, while it is true that true multi-tasking operating systems such as Windows NT 5.0 and the forthcoming release of Linux for either platform (in fact, any platform) could handle most aspects of the new speeds, (and so might Mac OS-X upon release mid-1999), the software optimisation issue will not soon go away and will work against speed advances being easily absorbed as they are released.

The bad news is that operating systems and application software including audio, video and multimedia software are going to have to be optimised for higher speeds, especially those over 500MHz, and that is not going to happen until the operating systems are upgraded. Current audio software will benefit from the higher speeds of the first of the new chips to hit the streets but as chip progress continues, that old axiom 'speed kills' will become fashionable again. ■

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IT MAY NOT BE HARD to spot Lou Gonzales in Manhattan. At six foot and dressed in a rhinestone-studded denim jacket, western shirt (preferably with pearl buttons), tight-fitting blue jeans, and Cuban-heel cowboy boots, he looks more Nashville than New York. Add a shock of white hair and a pair of rimless spectacles and he has the air of a wizened cowpuncher. Yet the only thing he has ever punched is millions of nail holes in the walls of scores of recording studios. Gonzales is a throwback to a time when studio owners were also engineers and also swung hammers, building their own facilities, and fixing their own equipment. Age indeterminate, he goes back far enough to have been in the business in New York when people actually built their equipment, too, cobbling consoles together from parts, achieving unique sounds from one-of-a-kind desks which made the studio business circa 1970 an industry of singular technologies.

Late last year saw Gonzales swinging a hammer again, preparing one of the five studios that now comprise Quad recording for the digital age with the installation of the first SSL Axiom-MT digital console in a music environment.

'I always figured that if I could run a piece of equipment, then anyone could, and that meant that people would use it,' he says. He took that same approach when he became the second New York studio to put in an SSL 9000j, and two years later the first in the US to put in a second one. Each move was calculated as a business proposition, but it does not take a deep scratch of the surface to see that Gonzales actually likes messing with sheet rock, concrete nails, hammers, tubes and diodes.

Gonzales got his start in the audio business as a disc jockey in the mid-sixties, spinning rock 'n' roll records on WGLI in Babylon, a suburb on Long Island about 40 miles from Manhattan, near where he grew up. He later switched over to WTUE, one of the first country-music-format stations in the New York metropolitan area, where he suspects he acquired his penchant for country. Working in radio earned him his first-class radio-telephone license, which enabled him to work both as a DJ and as the stations' technical engineer. This when the recording studio business was just a decade away from records being made at radio studios. The pioneers of independent recording studio in New York—people like Bob Lifton at Regent Sound, and Bob Goldman at Mira Studios—were beginning to steal music recording from the major label studios. It was, in fact, Goldman, who gave Gonzales his first studio job, though unintentionally. Gonzales was working at a Manhattan radio station, WADO, on East 42nd Street and sitting in his boss's office when the latter took a bathroom break. During that time, the

office phone rang and Gonzales answered it. Before he could say much more than 'Hello', an exasperated voice on the other end barked, 'We can't get the studio to work. You gotta send someone over right away'. Gonzales replied, 'No problem. I'll send my best man over', and walked into the world of recording studios both literally and figuratively.

Getting the console fixed earned Gonzales the role of chief engineer at Mira from that day on.

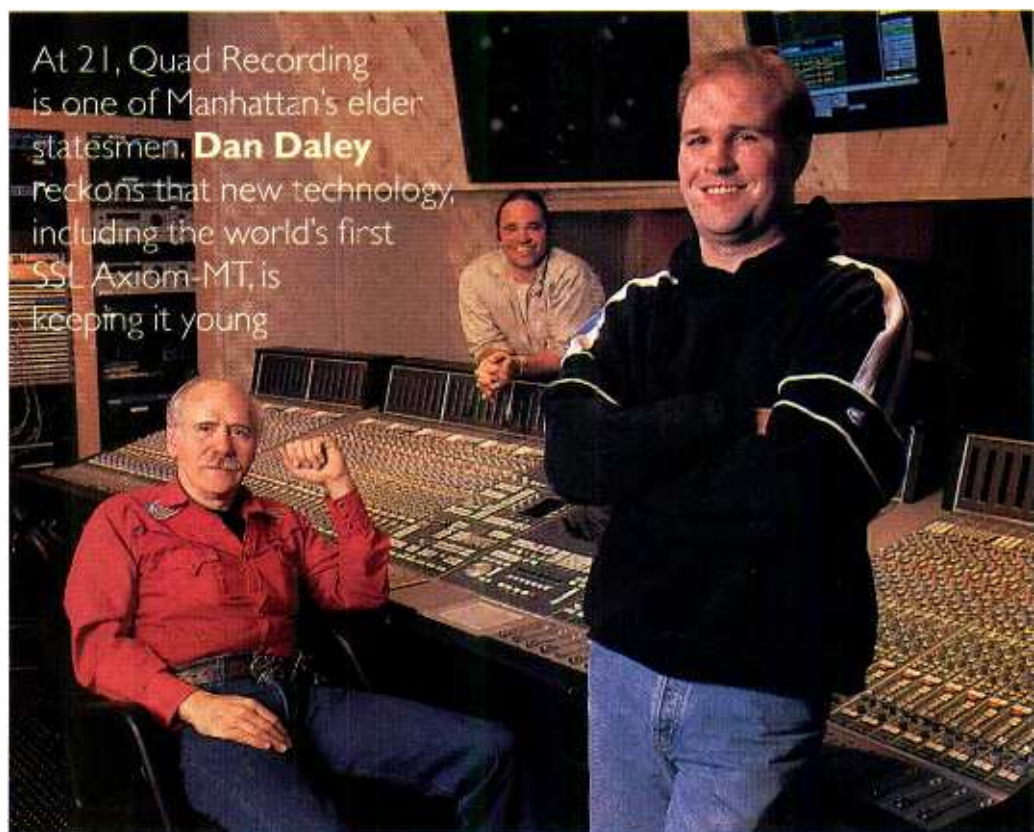
By 1970 he was chief engineer at The Hit Factory, when it was still owned by its founder, composer-producer Jerry Ragavoy. Gonzales started getting some music time at The Hit Factory as well as tech work. He recorded several tracks for, and mixed, The Band's eponymously titled second album, working first on a console built by Bob Lifton,

and later on one that Gonzales himself built from API components.

In 1973, Gonzales partnered with a local engineer to build a studio from scratch in Manhattan that would ultimately become Coordinated Sound. The pair split after a business disagreement and Gonzales went on to a similar situation with noted commercial jingle engineer Don Elliot after which he decided he did not like partnerships.

'In the old days, everyone had custom-made consoles, so you had to have staff engineers because they were the only ones who knew the consoles. And the staff engineers developed followings, which was what brought business into the studios.'

He also watched the demise of staff engineers from this vantage point, as the industry was shifting to off-the->



The Quad Squad

shelf console and equipment solutions. In fact, during a brief respite from freelancing at Advantage Sound, he was told by the owner that they could no longer afford to pay for staffers—the studio was entering bankruptcy. Gonzales' response was to negotiate a rate for his services, and a studio with his freelance clients, then negotiate a separate deal with the studio owners and keep the difference as profit, a methodology he says could often net him as much as \$50 per hour.

'That was good money in those days,' he says, adding, 'Sad thing is, it still is good money in the studio business.' But all this exposure to studios and partnerships simply made Gonzales more aware that he needed his own place where he could make his own rules, and in 1978 he started swinging hammers for himself, building the first studio of Quad at 723 Seventh Avenue in Manhattan, several blocks off Times Square and around the corner from the Music Row of New York. The single-room studio—still in operation and the first of five—was carved out of what had been a voice-over studio for film-sound facility Magno Sound. Gonzales literally ripped a hole in the wall between two rooms to construct a control room—and fitted it with what he could afford at the time, which was an API 16-channel console, and an Ampex MM-1000 16-track deck. His original clientele were culled from his free-



lance days, enough so that six months after opening he purchased another API desk and an 8-track MM-1000. He took the electronics out of the second multi-track, set them in a rack next to the 16-track deck for which he had custom headstack manufacturer Lipps make a set of 2-inch 24-track heads, and now he had a 24-track studio.

Quad Recording acquired a cachet in the 1980s among producers and musicians. While rock and pop moved towards self-contained bands, the bands were moving towards personal recording. R&B, on the other hand, still used studio musicians.

Quad expanded starting in the mid-eighties; ironically, a good chunk of that came when Gonzales took over two of Ragavoy's studios (which had been named Counterpoint Recording), rebuilding the rooms to his specifications. Another expansion came from a demo room opened at one point by Sam

Ash in the same building; yet another when Associated Studios went out of business. A fire in the 12th-floor studio in 1991 prompted another rebuild, and the studio has been in a state of constant renewal ever since.

Part of that ongoing construction flux is due to Gonzales' demand that Quad, which is comfortable, but hardly palatial, always remains on the cutting edge technologically. The first API, Harrison 3232C and Neve 8068 consoles (and a Trident Series 70 acquired in one of the take-overs in the course of expansion) gave way to a decided preference for SSL desks. Gonzales bought the first pre-owned SSL sold in the US, a 4000E-series bought from Ken-Don Recorders in Los Angeles, in 1983. A second one was purchased new a few years later. While Gonzales expresses a preference for SSLs, he was riding the crest of a marketing wave that saw advertising agencies choosing studios that had SSLs. While Quad did not specialise in jingles, SSL's proliferation in New York during this period fuelled Quad's growth. 'There was definitely a period when you had to have an SSL to be hot in New York,' he says. 'Although I don't know if having the SSL made you hot or if you had to be successful in the first place to be able to afford one.'

Gonzales bought the second SL9000j console in New York in 1994, and two years later bought a second after their

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growing number in the city was causing rates to drop. The thinking, he says, was that with two 9000s clients could move between studios seamlessly instead of having to wait for the one room to become available.

The move paid off, with Quad's bookings and revenues increasing significantly in the last year, with a particularly busy summer season. The same thinking goes for the decision, reached last August, to install the first SSL Axiom-MT digital desk to be sold into a music studio. (The first went into a broadcast truck on the West Coast.) While Gonzales has spent considerable time on the desk, testing it to his satisfaction, its installation is nonetheless a chess-like gambit in the competitive, high-stakes world of upper-tier recording facilities.

'On one hand, this is an economic business decision—you have to crunch numbers and weigh the cost against what you can bring in terms of new business and rates,' Gonzales explains. 'On the other hand, you've got to have a sense of whether engineers are going to like to work on this board. That was the same balanced approach I took when I bought my first 9000j console four years ago. You can't make a wise decision unless you consider both aspects. The first 9000j was a risk, too, but I believed in the console and it turned out to be the right decision.'

Last year Gonzales felt he had to make



the next move, and he believed it would have to be a digital one. Asked if the increasingly short periods that expensive platforms remain relatively exclusive is a problem, Gonzales replies, matter of factly, 'Nothing lasts as long as it used to. What gives me an edge is the control surface. The Axiom-MT is basically a digital 9000; the control surface is the same. That means I have a reliable, familiar control surface and one with a very short learning curve—I was running it by myself within 15 minutes. So there's no lost time educating engineers on how to run it.'

Thinking strategically, Gonzales made a 'very large number' of A-D converters part of the sale terms. These will allow him to run the console in the analogue domain, as a 'third 9000j' for clients who neither want nor need digital. That also

will allow him come pricing flexibility, as well, with the projected 20% premium he expects the Axiom-MT to be able to get initially from digital clients. Also, the console's digital nature meant not having to replace the existing air conditioning in Quad's Studio B, where the Axiom-MT would be replacing an older SSL 4000. The room, though, will be outfitted for 5.1 surround mixing capability, using the same DynaudioAcoustics M4-Plus monitors that Gonzales has added to two other studios at Quad.

'There's a million little and not-so-little things to consider in a move like this,' says Gonzales, who began this particular quest over a year ago. 'You can't just look at the sticker price. You can negotiate, sure, but you also have to look at all the angles in terms of what it's really going to cost and how you can maximise its ability to make money for the studio. This is not a simple equation. It just looks that way.'

Gonzales says he's been able to maintain his rate structure, based on the technology and on service, and his tightly booked schedule, and ability to afford new leading-edge consoles testifies to that.

But a hard-headed attitude towards finances contributes, as well. Which is why he's the one swinging the hammer instead of smoking the cigar. ■

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US: Merging into the future

The new year's message is for studios of the world to unite, they have nothing to lose but their shirts, writes **Dan Daley**

WE KNOW WELL that as the pro-audio industry becomes more reliant upon computers, it becomes more and more like the computer industry. When the price of RAM goes down, so does the price of products that use it, such as workstations. And there is every reason to think that similar links exist between studios and the rest of the world of business and technology. Certainly, the trend towards corporate consolidation seems to be well under way in the States in recent months.

As examples, there is the acquisition of Sterling Mastering by London-based Metropolis, and by the first of the year four significant Nashville facilities will likely have become two—Masterfonics, which had been in a reorganisational bankruptcy situation since the beginning of last year, was slated to be acquired by neighbouring Emerald Recording Studios; concurrently, Seventeen Grand Recording, which had the first dedicated 5.1 surround control room in Nashville, as well as the first viable Euphonix console in a commercial facility,

was angling to acquire most of the business and technology assets of nearby Love Shack Studios. Other, similar scenarios are potentially pending in other US cities. If you include how other studios are expanding by acquiring assets from other studios, such as the sale of Room With A View's 9000j console by Unique Recording when the former decided to get out of an increasingly unprofitable business market, then the consolidation picture becomes panoramic.

Consolidation taking place in the States among recording studios is a phenomenon long predicted and anticipated. It is a no-brainer to realise that the studio market had become over-saturated, and that the proliferation of personal recording technology was siphoning off too much of the work, particularly the overdub and demo projects that had historically been the bread-and-butter of studio revenues. But why now, and why so many seemingly at once?

The answer is the same as for when similar things happened in other industries in recent years here. A few years ago, the computer industry saw a wave of mergers.

Initially, they simply reflected the fact that that market had grown incredibly large incredibly quickly—simply a faster version of what has happened with studios. Consolidation, larger fish eating smaller ones, is a natural market reaction. Later on into this phenomenon, acquisitions became tactical defensive moves: you bought smaller companies either to prevent them from growing up to compete with you, to retain and build market share, and to enter new fields to add new revenue streams. Sound familiar, Metropolis?

THE REASONING behind the moves in Nashville—the US's most crowded studio market by far—makes tremendous sense. Without labouring what put Masterfonics into bankruptcy in the first place—which includes the construction of a multimillion-dollar tracking room four years ago in a rented structure—Emerald's purchase of the 2-location facility reinforces that studio's policy of spending as little as possible to gain as much as possible. Emerald eschewed the technology arms race and instead of putting in a new, expensive console or following the trendy 5.1 route, it pursued a wider market with a cost-effective B room and sought new revenues from joint ventures. This included leasing space to a postproduction company and gaining synergy from that, and establishing a radio broadcast business—a useful move in country music, which has over

Europe: Much ado

The pieces are all in place for 1999 to host a rerun of old format dramas, and to add a new chapter of its own writes **Barry Fox**

THE COMING YEAR looks likely to be an exciting one in Europe. Philips is launching a new CD recorder that is guaranteed to upset the record industry. Several companies will follow Diamond Multimedia's Rio with solid-state portables that download compressed audio from the Internet, for music playback on the move. Sony and Philips have said they will launch Super Audio CD (SACD), with DSD bitstream recording; they will also launch their DVD+RW erasable disc. Panasonic, Toshiba and Hitachi will be pushing DVD-Audio the 'official' Forum format. And the same companies will be promoting DVD-RAM, the 'official' Forum format for erasable disc. Pioneer backs DVD-A but remains out on a limb with DVD-RW, an erasable version of write-once DVD.

America's Hollywood studios are mounting a last-ditch effort to block the import of Region 1 DVDs into Europe, by trying to prosecute companies which dezone European Region 2 DVD players, and pressuring the computer companies into regionally coding PC DVD-ROM drives.

Meanwhile television in Europe is going

digital, with viewers in several countries (Germany, France, UK) receiving digital satellite signals and the UK first with a digital terrestrial service—a remarkable achievement. There are two terrestrial broadcast groups; the BBC and other existing analogue broadcasters are providing free-to-air programming, and OnDigital, a newly formed consortium of the Carlton and Granada media groups, is providing digital pay TV. If viewers subscribe to the pay service for one year, they get a set-top box for under £200, which is half the price asked if the box is used to receive only free-to-air programmes. There is nothing to stop the viewer buying a subscription for one year, to win the subsidy, and then watching only free programmes after the year is up.

The European approach to DTTV, as pioneered by the UK, is radically different from the North American policy. The US system is based on computer display standards, and intended primarily to deliver high-definition pictures. This obliges viewers to buy new receivers, costing several thousand dollars.

Europe tried HDTV in the early eighties, with the MAC system, and found that

viewers were reluctant to buy new sets. So Europe's digital TV system, developed by the Digital Video Broadcasting group, is based on existing 625-line standards. This is why viewers can simply connect a new digital set-top box between their existing aerial and TV set. The box then spends five minutes scanning the UHF bands for all available digital channels. I tried one and it found 36 channels with no trouble, some free-to-air and some pay. Small wonder that dealers in the UK now have long waiting lists for receivers. And hats off to Philips for being first to the market with boxes made at the Hasselt factory in Belgium that made the first CD players.

It is unlikely, though, that the record companies will be taking their hats off to Philips for being first with a dual-well, double-speed CD recorder. The CDR-765 also plays a remarkable trick. So remarkable, in fact, that some of Philips senior bosses did not know about it, or at least preferred not to know of it.

Like a twin-cassette deck, one CD well can play a CD at double speed while the other copies it onto a blank CD running at double speed, halving the time it takes to make a dub. In line with the so-called Athens agreement, reached 10 years ago when the music and electronics companies were arguing over DAT, the 765 has Serial Copy Management System circuitry to stop the recorder making a digital copy of a disc that is itself a copy.

Although SCMS does not stop someone making a series of identical digital dubs, onto a series of blank discs, it does stop

2,000 playlisted radio stations, more than any other music genre in the US. While the numbers are not public, and assuming it could come to favourable terms with Masterfonics' creditors, it is safe to say that Emerald was able to pick up a bargain, expanding its physical space and technology base at a fraction of what it otherwise would have cost. In the case of Seventeen Grand, owned by two canny Nashville studio veterans who had pursued a strategy of two high-end (Neve VR and Euphonix), their acquisition of Love Shack gives them the budget overdub room that their present facility could not physically accommodate.

The fact that both of these studios picked up new spaces that are not contiguous with their original facilities (in the case of Metropolis there's a small ocean in between) is an indication that the studio business is beginning to think outside the box more. If the personal studio phenomenon has given back anything to the traditional studio business that it decimated over the last decade, it is perhaps the ability to think of studios conceptually rather than as fixed, immutable ideas. The best businesses America has produced are ones that have been able to reinvent themselves periodically. Consolidation hurts, but what we are seeing here and elsewhere is more than likely the new foundations of a much healthier business overall.

people making up a neat digital compilation of favourite tracks on one blank—an erasable—and then making a clone copy of the finished mix.

ADUTCH reviewer who tried one of the first samples made a remarkable discovery: although the 765 dutifully refuses to make a digital copy of the compilation disc, it still sends an analogue signal between the two wells, converts it back into digital code and makes a copy.

Ten years ago, when SCMS was developed, the record companies had agreed to an extra generation of analogue dubbing, thinking that the loss of quality involved in digital-to-analogue-to-digital conversion would make it a non-starter in hi-fi terms. But the quality of convertor chips is now so good that the final CD sounds as near as makes no difference as clean as the digital original.

The feature is not advertised, and was not even mentioned when Philips announced the recorder. Company bosses seemed surprised at what their engineers had built into the recorder. Now someone outside the company has discovered it, Philips will never need to advertise the feature. Word of mouth will do the rest. But the launch has been held up while Philips checks and double checks with lawyers in case the IFPI or RIAA serves a writ as soon as it goes on sale. The last promised date was 'in time for Christmas'.

Here's one I unmade earlier...

Kevin Hilton takes Deconstructionism to pieces to find out how it works in the digital age

DECONSTRUCTIONISM is a peculiarly nineties phenomenon. The world appears to have reached such a level of sophistication—or, perhaps, boredom—that people, events and things are broken down into their component parts, examined, re-evaluated, and then put back together again in the hope that they will be better understood or seen in a different way to before. So heroes are now villains and villains, if not reborn as heroes, are regarded as less villainous.

The media has been a prime mover in this process, and, with the increasing need for things to deconstruct, has itself been pulled apart. Technology has had a role in this: look at the number of TV programmes where cameras and boom arms come into shot, floor managers or technicians are pulled onto the set by the wacky presenters or much of the action takes place in the gallery.

Like most trends, it is nothing new. Back in the fifties, George Burns and Gracie Allen unwittingly helped create today's deconstructed television by breaking the fourth wall; George would directly address the audience, taking away any pretence that what was going on was a representation of real life. This was television and Burns and Allen revelled in the whole unnaturalness of the medium.

These techniques have continued and evolved: through narrator John Newland walking in and out of the action during the pre-*Twilight Zone* supernatural series *One Step Beyond* to the eighties comedy *It's Garry Shandling's Show*, which resurrected the Burns and Allen gimmicks and exaggerated them. More recently, Shandling deconstructed that most flimsy of TV creatures, the chat show, under the guise of Larry Sanders.

Just about every aspect of television has done this. Having the newsroom as a backdrop during a bulletin is a common ploy to give the broadcasts even more immediacy and dynamism. Seeing people working away at computer terminals gives the impression that something is going on and that at any moment something BIG will break. This does have its problems, however. During the seventies, a production assistant at a UK-based news organisation worked out that by standing between two specific desks in the newsroom, she would be in clear view behind the newscaster during the main broadcast. Each night she would stop and stand on one leg; executives eventually realised and went back to having a plain background.

Until recently the hardware was merely a participant in all this. In the time of digital, Deconstructionism is increasingly being used to help pad out the long hours

on new channels. The 'making of...' film has always been a useful filler in late-night schedules that are aimed at security guards, insomniacs and the small, strange band of people who do want to watch this stuff and don't have a VCR. This has now been taken to its illogical extreme. Whole programmes, even channels, now take a 'behind the scenes look' at everything from how the news is prepared (interesting) to the making of gardening programmes (about as interesting as the shows they are about). Without this kind of material, channels like BBC Choice would have hardly anything to put on air.

This is not to say that there is not something intrinsically fascinating in finding out how a thing works or is done. A few years ago there was a fashion for demystifying magic (or, to be correct, conjuring, as true magic is a completely different matter from making people think you have just sawn another lady in half). There was a purpose to what the likes of Penn & Teller were doing. Sure, maybe they had not made it as straight magicians, but the acts of David Copperfield and others had reached such a level of smug artifice that they needed to be revealed as tricksters—skilled tricksters undoubtedly—but not shamans.

Critics said that the deconstruction of magic took away the romance and sense of wonder. To a certain extent this is true, but it replaces that feeling with admiration for the skill of how it is done. Deconstructing the magic of television is a different issue. Because technology is only explained in the very broadest terms, it can come across as showing off. 'This is kind of how it's done—you probably wouldn't understand the whole process, but aren't we clever for being able to do it?' Which is an extremely arrogant attitude.

The latest example of this is a demo tape used by digital compression specialist NDS for its new electronic newsgathering link, that can be used to send reports from inner city areas without the need for high powered, large antenna. One of the test sites was Australia's Channel 9, whose *Hey, Hey It's Saturday Night* show (dangerously close to *The Simpson's Saturday Night Craparama* parody) used the system to hook up with a reporter in the bustling market area of Melbourne. The comparison between the digital and analogue pictures was a no-contest in favour of the new format, but everything was barely explained and came across as exactly what it was, a way to fill up five minutes of air-time in a 2-hour show.

Which is not what technology, or Deconstructionism, should be about.

Without this kind of material, channels like BBC Choice would have hardly anything to put on air

The world beyond 20kHz

Using a study of the human hearing mechanism as his foundation, Earthworks' president **David E Blackmer** presents his arguments for, and his vision of, high-definition audio

THERE IS MUCH controversy about how we might move forward towards higher quality reproduction of sound. The compact-disc standard assumes that there is no useful information beyond 20kHz and therefore includes a brick-wall filter just above 20kHz. Many listeners hear a great difference when 20kHz band-limited audio signals are compared with wide band signals. A number of digital systems have been proposed which sample audio signals at 96kHz and above, and with up to 24 bits of quantisation.

Many engineers have been trained to believe that human hearing receives no meaningful input from frequency components above 20kHz. I have read many irate letters from such engineers insisting that information above 20kHz is clearly useless, and any attempts to include such information in audio signals is deceptive, wasteful and foolish, and that any right-minded audio engineer should realise that this 20kHz limitation has been known to be an absolute limitation for many decades. Those of us who are convinced that there is critically important audio information to at least 40kHz are viewed as misguided.

We must look at the mechanisms involved in hearing, and attempt to understand them. Through that understanding we can develop a model of the capabilities of the transduction and analysis systems in human audition and work toward new and better standards for audio system design.

What got me started in my quest to understand the capabilities of human hearing beyond 20kHz was an incident in the late eighties. I had just acquired a MLSSA system and was comparing

the sound and response of a group of high quality dome tweeters. The best of these had virtually identical frequency response to 20kHz, yet they sounded very different.

When I looked closely at their response beyond 20kHz they were visibly quite different. The metal-dome tweeters had an irregular picket fence of peaks and valleys in their amplitude response above 20kHz. The silk-dome tweeters exhibited a smooth fall off above 20kHz. The metal dome sounded harsh compared to the silk dome. How could this be? I cannot hear tones even to 20kHz, and yet the difference was audible and really quite drastic. Rather than denying what I clearly heard, I started looking for other explanations.

WHEN VIEWED FROM an evolutionary stand point, human hearing has become what it is because it is a survival tool. The human auditory sense is very effective at extracting every possible detail from the world around us so that we and our ancestors might avoid danger, find food, communicate, enjoy the sounds of nature, and appreciate the beauty of what we call music. Human hearing is generally, I believe, misunderstood to be primarily a frequency analysis system. The prevalent model of human hearing presumes that auditory perception is based on the brain's interpretation of the outputs of a frequency analysis system which is essentially a wide dynamic range comb filter, wherein the intensity of each frequency component is transmitted to the brain. This comb filter is certainly an important part of our sound analysis system, and what an amazing filter it is. Each frequency zone is tuned

sharply with a negative mechanical resistance system. Furthermore, the tuning Q of each filter element is adjusted in accordance with commands sent back to the cochlea by a series of pre-analysis centres (the cochlear nuclei) near the brain stem. A number of very fast transmission-rate nerve fibres connect the output of each hair cell to these cochlear nuclei. The human ability to interpret frequency information is amazing. Clearly, however, something is going on that cannot be explained entirely in terms of our ability to hear tones.

The inner ear is a complex device with incredible details in its construction. Acoustical pressure waves are converted into nerve pulses in the inner ear, specifically in the cochlea, which is a liquid filled spiral tube. The acoustic signal is received by the tympanic membrane where it is converted to mechanical forces which are transmitted to the oval window then into the cochlea where the pressure waves pass along the basilar membrane. This basilar membrane is an acoustically active transmission device. Along the basilar membrane are rows of two different types of hair cells, usually referred to as inner and outer.

The inner hair cells clearly relate to the frequency analysis system described above. Only about 3,000 of the 15,000 hair cells on the basilar membrane are involved in transducing frequency information using the outputs of this travelling wave filter. The outer hair cells clearly do something else, but what?

There are about 12,000 'outer' hair cells arranged in three or four rows. There are four times as many outer hair cells as inner hair cells(!) However, only about 20% of the total available nerve paths connect them to the brain. The outer hair cells are interconnected by nerve fibres in a distributed network. This array seems to act as a waveform analyser, a low-frequency transducer, and as a command centre for the super fast muscle fibres (actin) which amplify and sharpen the travelling waves which pass along the basilar membrane thereby producing the comb filter. It also has the ability to extract information and transmit it to the analysis centres in the olivary complex, and then on to the cortex of the brain where conscious awareness of sonic patterns takes place. The information from the outer hair cells, which seems to be more related to waveform than frequency, is certainly correlated with the frequency

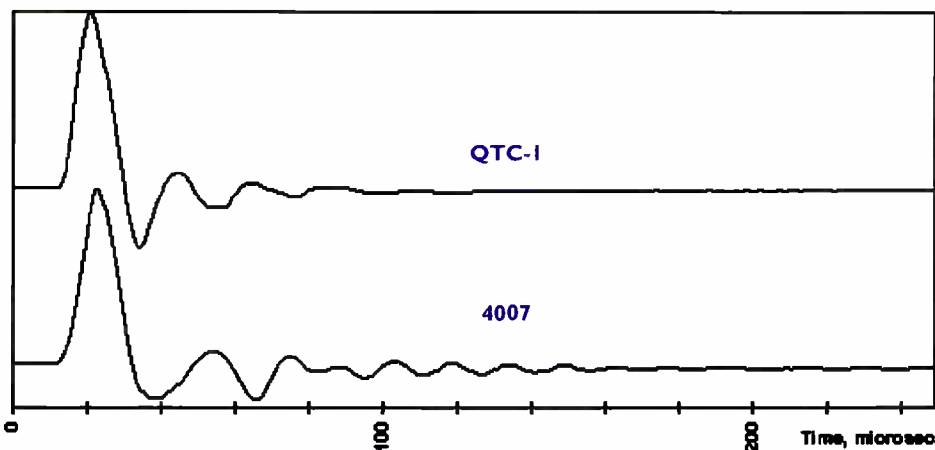


Fig. 1: Impulse responses of Earthworks QTC-1 and the B&K 4007

domain and other information in the brain to produce the auditory sense.

Our auditory analysis system is extraordinarily sensitive to boundaries (any significant initial or final event or point of change). One result of this boundary detection process is the much greater awareness of the initial sound in a complex series of sounds such as a reverberant sound field. This initial sound component is responsible for most of our sense of content, meaning, and frequency balance in a complex signal. The human auditory system is evidently sensitive to impulse information imbedded in the tones. My suspicion is that this sense is behind what is commonly referred to as 'air' in the high-end literature. It probably also relates to what we think of as 'texture' and 'timbre'—that which gives each sound its distinctive individual character. Whatever we call it, I suggest that impulse information is an important part of how humans hear.

All the output signals from the cochlea are transmitted on nerve fibres as pulse rate and pulse position modulated signals. These signals are used to transduce information about frequency, intensity, waveform, rate of change and time. The lower frequencies are transduced to nerve impulses in the auditory system in a surprising way. Hair cell output for the lower frequencies are transmitted primarily as groups of pulses which correspond strongly to the positive half of the acoustic pressure wave with few if any pulses being transmitted during the negative half of the pressure wave. Effectively, these nerve fibres transmit on the positive half wave only. This situation exists up to somewhat above 1kHz with discernable half wave peaks riding on top of the auditory nerve signal being clearly visible to at least 5kHz. There is a sharp boundary at the beginning and end of each positive pressure pulse group, approximately at the central axis of the pressure wave. This pulse group transduction with sharp boundaries at the axis is one of the important mechanisms which accounts for the time resolution of the human ear. In 1929 Von Bekesy published a measurement of the human sound position acuity which translates to a time resolution of better than 10 μ s between the ears. Nordmark, in a 1976 article, concluded that the interaural resolution is better than 2 μ s; interaural time resolution at 250Hz is said to be about 10 μ s which translates to better than 1° of phase at this frequency.

The human hearing system uses waveform as well as frequency to analyse signals. It is important to maintain accurate waveform up to the highest frequency region with accurate reproduction of details down to 5 μ s to 10 μ s. The accuracy of low frequency details is equally important. We find many low frequency sounds such as

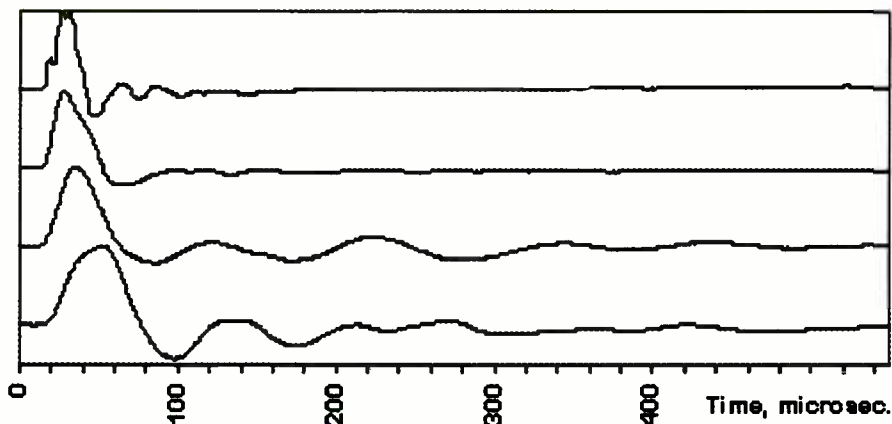


Fig. 2: Impulse responses of various mics

drums take on a remarkable strength and emotional impact when waveform is exactly reproduced. Please notice the exceptional drum sounds on The Dead Can Dance CD *Into the Labyrinth*. The drum sound seems to have a very low fundamental, maybe about 20Hz. We sampled the bitstream from this sound and found that the first positive waveform had twice the period of the subsequent 40Hz waveform. Apparently one half cycle of 20Hz was enough to cause the entire sound to seem to have a 20Hz fundamental.

The human auditory system, both inner and outer hair cells, can analyse hundreds of nearly simultaneous sound components, identifying the source location, frequency, time, intensity, and transient events in each of these many sounds simultaneously and develop a detailed spatial map of all these sounds with awareness of each sound source, its position, character, timbre, loudness, and all other identification labels which we can attach to sonic sources and events. I believe that this sound quality information includes waveform, embedded transient identification, and high frequency component identification to at least 40kHz (even if you can't 'hear' these frequencies in isolated form).

TO FULLY MEET the requirements of human auditory perception I believe that a sound system must cover the frequency range of about 15Hz to at least 40kHz (some say 80kHz or more) with over 120dB dynamic range to properly handle transient peaks and with a transient time accuracy of a few microseconds at high frequencies and 1°–2° phase accuracy down to 30Hz. This standard is beyond the capabilities of present day systems but it is most important that we understand the degradation of perceived sound quality that results from the compromises being made in the sound delivery systems now in use. The transducers are the most obvious problem areas, but the storage systems and all the electronics and interconnections are important as well.

Our goal at Earthworks is to produce audio tools which are far more accurate than the older equipment we grew up on. We are certainly pushing the envelope. For example, we specify our LAB102 preamp from 2Hz to 100kHz \pm 0.1dB. Some might believe that this wide range performance to be unimportant, but listen to the sound of the LAB102, it is true-to-life accurate. In fact the 1dB down points of the LAB preamp are 0.4Hz and 1.3MHz, but that is not the key to its accuracy. Its square wave rise time is one quarter of a microsecond. Its impulse response is practically perfect.

Microphones are the first link in the audio chain, translating the pressure waves in the air into electrical signals. Most of today's microphones are not very accurate. Very few have good frequency response over the entire 15Hz–40kHz range which I believe to be necessary for accurate sound. In most microphones the active acoustic device is a diaphragm that receives the acoustical waves, and like a drum head it will ring when struck. To make matters worse, the pickup capsule is usually housed in a cage with many internal resonances and reflections which further colour the sound. Directional microphones, because they achieve directionality by sampling the sound at multiple points, are by nature less accurate than omnis. The ringing, reflections and multiple paths to the diaphragm add up to excess phase. These microphones smear the signal in the time domain.

We have learned after many measurements and careful listening that the true impulse response of microphones is a better indicator of sound quality than is frequency amplitude response. Microphones with long and non-symmetrical impulse performance will be more coloured than those with short impulse tails. To illustrate this point we have carefully recorded a variety of sources using two different omni models (Earthworks QTC1 and another well-known model) both of which have flat frequency response to 40kHz within \pm 1dB. (Fig. 1: QTC1 vs 4007). When >

played back on high-quality speakers the sound of these two microphones is quite different. When played back on speakers with near-perfect impulse and step response, which we have in our lab, the difference is even more apparent. The only significant difference we have been able to identify between these two microphones is their impulse response.

We have developed a system for deriving a microphone's frequency response from its impulse response. After numerous comparisons between the results of our impulse conversion and the results of the more common substitution method we are convinced of the validity of this as a primary standard. You will see several examples of this in Fig. 2.

Viewing the waveform as impulse response is better for interpreting higher frequency information. Lower frequency information is more easily understood from inspecting the step-function response which is the mathematical integral of impulse response. Both curves contain all information about frequency and time response within the limits imposed by the time window, the sampling processes and noise.

The electronics in very high quality sound systems must also be exceptional. Distortion and transient intermodulation should be held to a few parts per million in each amplification stage, especially in systems with many amplifiers in each chain. In the internal circuit design of audio amplifiers it is especially important to separate the signal reference point in each stage from the power supply return currents which are usually terribly nonlinear. Difference input circuits on each stage should extract the true signal from the previous stage in the amplifier. Any overall feedback must reference from the output terminals and compare directly to the input terminals to prevent admixture of ground grunge and cross-talk with the signal. Failure to observe these rules results in a harsh 'transistor sound'. However, transistors can be used in a manner that results in an arbitrarily low distortion, intermodulation, power supply noise coupling, and whatever other errors we can name, and can therefore deliver perceptual perfection in audio signal amplification. (I use 'perceptual perfection' to mean a system or component so excellent that it has no error that could possibly be perceived by human hearing at its best.) My current design objective on amplifiers is to have all harmonic distortion including 19kHz and 20kHz twin-tone intermodulation products below 1 part per million and to have A-weighted noise at least 130dB below maximum sine wave output. I assume that a signal can go through many such amplifiers in a system with no detectable degradation in signal quality.

Many audio signal sources have extremely high transient peaks, often as

high as 20dB above the level read on a volume indicator. It is important to have some adequate measurement tool in an audio amplification system to measure peaks and to determine that they are being handled appropriately. Many of the available peak reading meters do not read true instantaneous peak levels, but respond to something closer to a 300 μ s to 1ms averaged peak approximation. All system components including power amplifiers and speakers should be designed to reproduce the original peaks accurately. Recording systems truncate peaks which are beyond their capability. Analogue tape recorders often have a smooth compression of peaks which is often regarded as less damaging to the sound.

MANY RECORDISTS even like this peak clipping and use it intentionally. Most digital recorders have a brick-wall effect in which any excess peaks are squared off with disastrous effects on tweeters, and listener's ears. Compressors and limiters are often used to smoothly reduce peaks which would otherwise be beyond the capability of the system. Such units with RMS level detectors usually sound better than those with average or quasi-peak detectors. Also, be careful to select signal processors for low distortion. If they are well designed, distortion will be very low when no gain change is required. Distortion during compression will be almost entirely third harmonic distortion which is not easily detected by the ear and which is usually acceptable when it can be heard.

A look at the specifications of some of the highly rated super-high end, 'no feedback', vacuum tube, power amplifiers reveals how much distortion is acceptable, or even preferable, to some excessively well-heeled audiophiles.

All connections between different parts of the electrical system must be designed to eliminate noise and signal errors due to power line ground currents, AC magnetic fields, RF pickup, crosstalk, and dielectric absorption effects in wire insulation. This is critical.

Loudspeakers are the other end of the audio system. They convert electrical signals into pressure waves in the air. Loudspeakers are usually even less accurate than microphones. Making a loudspeaker that meets the standard mentioned above is problematical. The ideal speaker is a point source. As yet no single driver exists that can accurately reproduce the entire 15Hz-40kHz range. All multidriver speaker systems involve

trade-offs and compromises.

We have built several experimental speaker systems which apply the same time-domain principles used in our Earthworks microphones. The results have been very promising. As we approach perfect impulse and step-function response something magical happens. The sound quality becomes life-like. In a live jazz sound-reinforcement situation using some of our experimental speakers and our SR71 mics the sound quality did not change with amplification. From the audience it sounded as if it was not being amplified at all even though we were acutely aware that the sound was louder. Even with quite a bit of gain it did not sound like it was going through loudspeakers.

Listening to some Bach choral music that we recorded with QTC1 microphones into a 96kHz sampling recorder, and played back through our engineering model speakers is a startling experience. The detail and imaging are stunning. You can hear left to right, front to back and top to bottom as if you are there in the room with the performers. It is exciting to find that we are making such good progress toward our goal.

I have heard that the Victor Talking Machine Company ran ads in the 1920s in which Enrico Caruso was quoted as saying that the Victrola was so good that its sound was indistinguishable from his own voice live. In the seventies Acoustic Research ran similar ads, with considerably more justification,

about live vs recorded string quartets. We have come a long way since then, but can we achieve perceptual perfection? I suspect that truly excellent sound, perhaps even perceptual perfection, especially in large spaces must await the development of a high accuracy, high power, direct radiating 40kHz tweeter system with inherently good impulse response, which is integrated into a system that gives good impulse and step-function response over the

entire listening area. As a point of reference you should assemble a test system with both microphones and speakers having excellent impulse and step response, hence nearly perfect frequency response, together with low-distortion amplifiers. Isn't such a system impossible?

It is not. Test it as a sound-reinforcement system and/or studio monitoring system with both voice and music sources. You, the engineers, the performers, and the audience will be amazed by the result. ■

If you would like more information, here are some books which anyone who is intensely involved in audio should own and reread many times:

An Introduction to the Physiology of Hearing, 2nd edition, James O. Pickles, Academic Press 1988 ISBN 0-12-554753-6 or ISBN 0-12-554754-4 pbk.
Spacial Hearing, revised edition, Jen Blauert, MIT Press 1997 ISBN 0-262-02413-6
Experiments in Hearing, Georg von Békésy, Acoustical Society of America ISBN 0-88316-630-6
Hearing, Gulick et al, Oxford University Press, 1989 ISBN 0-19-50307-3

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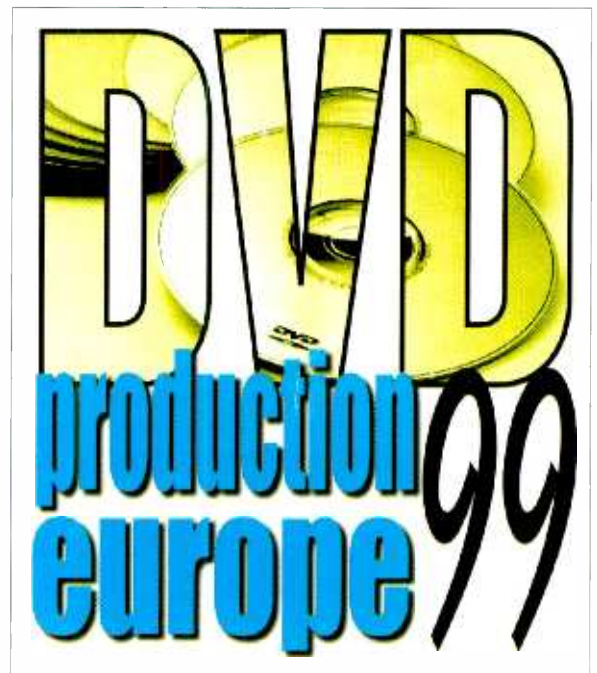
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Time constants

The ability to predict what electronic circuits will do is essential to designers the world over. **John Watkinson** extends his look at components by connecting them together

RESISTORS ARE ESSENTIALLY frequency independent in that the current flowing through them is always proportional to, and in phase with, the voltage. The power dissipated is the product of the current and voltage. In contrast, the current flowing through a capacitor is proportional to the rate of change of voltage, and so clearly it cannot be in phase with the voltage. The rate of change of voltage of a constant amplitude signal, also known as the differential or derivative

that waveform. The differential of a sine wave is a cosine wave whose amplitude is proportional to frequency. Doubling the frequency corresponds to one octave, whereas doubling the amplitude corresponds to 6dB, hence the well-know response slope of 6dB/octave which is equal to 20dB per decade.

In an earlier article the decibel was explained (*Studio Sound*, May 1997), and we saw that it is a logarithmic unit. If we want an insight into what is going on, using a logarithmic unit on one axis of a graph will turn proportional functions into curves unless the other axis is also logarithmic. Thus in audio we always use log-log graphs—logarithmic level in dB against logarithmic frequency in octave or decades. In this case 6dB/octave becomes a straight line.

Fig.1 shows that if we calculate the 'resistance' we find an expression with frequency in the denominator, indicating an inverse proportion to frequency, or -6db/octave as we might have guessed. We also find a sine function divided by a cosine function of the same frequency. What this means is that the current through a capacitor is leading the voltage with a 90° phase angle. The current and voltage are said to be in quadrature.

We cannot use the term resistance because this is only correct for in-phase currents and voltages. Instead we can use the old term 'reactance' or the more modern term 'impedance' which allow any phase angle between the current and voltage. Thus some impedances can be resistive, but resistors cannot be reactive. Mathematicians use the idiomatic term 'complex' to describe the behaviour of reactive circuits. This has nothing to do with how complicated things are, but indicates that complex arithmetic based on the imaginary square root of minus one can be used for analysis. On second thoughts, maybe it does mean how complicated things are.

The power dissipated in a device is given by the vector product of the current and the voltage. As the current through a capacitor is always at 90° to the voltage, the vector product is always zero, so an ideal capacitor cannot dissipate heat. It is only possible to dissipate power in the resistive part of impedance.

The old-fashioned term 'wattless current' is sometimes found to describe that component of a current which is in quadrature with the voltage.

If a resistor and a capacitor are put in series with an AC voltage source as shown in Fig.2, the same current must flow through both, so it is going to be interesting. The capacitor wants the current at 90° to the voltage, whereas the resistor wants the current in phase with the voltage. As there is only one current, the only possible solution is that the voltages across the two components must be in quadrature.

If we take the case where the impedance of the capacitor is numerically equal to the resistance, the voltage across both must be the same because we have a potential divider. However, these voltages must be at 90° phase to one another as Fig.2 also shows. The voltage across

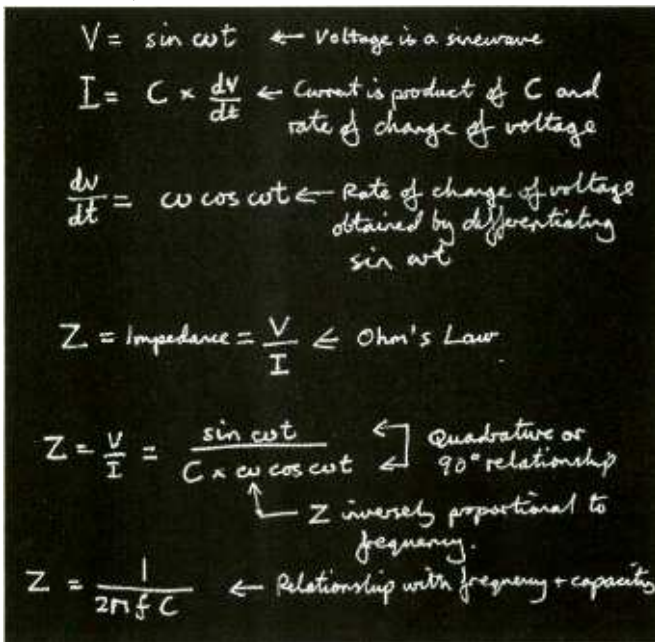


Fig. 1: Capacitors and impedance

of the signal voltage, is proportional to frequency making capacitors useful as elements in filters.

If from the signal waveform we calculate the waveform of the differential, a capacitor will react like a resistor to

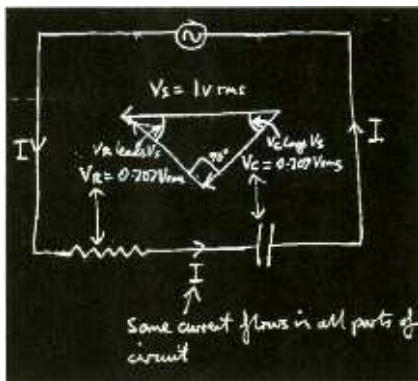


Fig.2: Simple R-C circuit. Vector sum of V_R and V_C equals applied voltage. Phasor diagram (centre) shows phase relationships

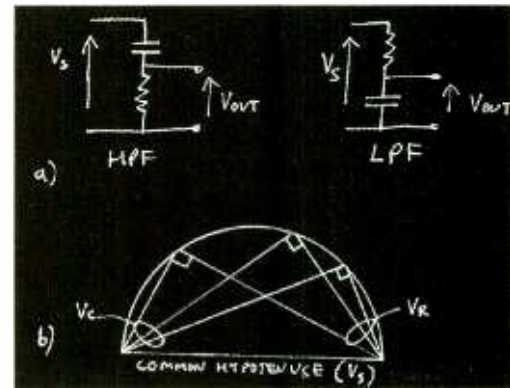


Fig.3: All right angled triangles on a common hypotenuse lie within a circle

each component is somewhat more than half the input voltage, so that the vector sum can equal the input.

Compared to a resistive divider, the voltages have increased by the square root of two, which happens to be twice the cosine of 45°. Thus if 1V rms is applied across the series pair, the voltage across each will be 0.707V rms. Compared to the applied voltage, the phases across the components will be 45° away, one leading and one lagging.

This situation can only arise at one frequency. At very low frequencies, the impedance of the capacitor is very high, so most of the applied voltage appears across it. At very high frequencies, the impedance of the capacitor is very low, so most of the applied voltage appears across the resistor.

Thus we have stumbled across the filter. Fig.3a shows that we can rearrange the circuit to take the output across the resistor, creating a high-pass filter, or across the capacitor, creating

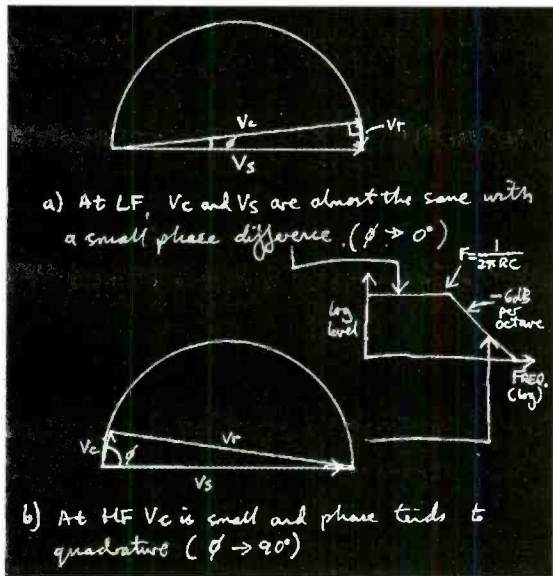


Fig. 4: LFP phasor diagrams

a low-pass filter.

Fig. 3b shows that the phase angle between the voltage across the resistor and the voltage across the capacitor must remain at 90°, and the voltage across the pair remains constant. Thus the phasor diagram will be any right-angled triangle with a constant hypotenuse. It will be seen that the third corner of all such triangles falls on a circle of which the hypotenuse is a radius.

This gives a neat graphical way of solving RC problems. Fig. 4 shows the example of a low-pass filter where the output is taken across the capacitor. At low frequencies, the impedance of the capacitor is so high that almost all of the input voltage appears across it. The output voltage is nearly in phase with the input, and almost independent of frequency. This is the passband. At high frequencies, the impedance of the capacitor is low and inversely proportional to frequency. This is the stopband where the output falls at 6dB per octave, and lags the input by nearly 90°.

The -3dB point is of importance in electronics because it represents the half power point and also, in a simple RC network, the frequency where half of the phase shift has taken place—the phase response is 45°. It is also the frequency where the impedances of the capacitor and the resistor have equal magnitudes. The frequency is easily found if the values of the resistor and the capacitor are known, but in practice all that matters is the product of the two, which is known as the time constant.

Fig. 4 shows that the -3dB frequency (in radians per second) is simply the reciprocal of the time constant RC. To convert this to hertz, simply multiply by 2π. To plot the response of an RC circuit, find the -3dB frequency, and the response will be flat on one side, and sloping at 6dB/octave on the other.

In the case of the simple RC low-pass filter, the response keeps going down forever at -6dB/octave. The response

may be only required to go down so far, and then level out to make a shelf filter. This is easily done with the configuration of Fig. 5a. Here it will be seen that an additional resistor R2 has been put in. The two resistors are in series and so the time constant will be (R1 + R2)C.

When the impedance of the capacitor gets very low at high frequency, the series combination of the capacitor and R2 cannot fall below the value of R2. As a result the frequency response levels out at frequency where the descending -6dB/octave curve intersects the level which would be obtained with R1 and R2 alone used as a potential divider.

If the two frequencies are well apart, the slope between will reach -6dB/octave. However, if the two frequencies are brought close together, the slope between will have a lower value and will tend to an s-curve. In a simple high-pass filter, the gain drops indefinitely as frequency reduces. This response can also be shelved by adding another resistor as is shown in Fig. 5b.

Filters of this kind only perform as advertised if two conditions are met. Firstly the output impedance of the signal source must be low so that it is essentially a voltage source. This is because the input impedance of these filters varies with frequency. Secondly the input impedance of the load must be high because the output impedance of these filters also varies with frequency.

If these conditions are not met, the expected result will not be obtained because the impedances of the source and load will affect the time constants. A solution is to use some of those funny triangles, which seem to be drawn all over analogue circuits.

It has been shown that it is possible to predict the performance of simple RC networks with no more abilities than to multiply by π or to draw a circle. Maybe this stuff isn't so complex after all. ■

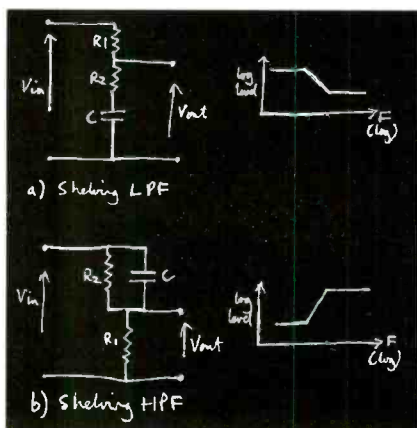


Fig. 5: Filters can be shelved by fitting an extra resistor to stop the impedance of the capacitor dominating the response

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Is all property theft?

A freelance sound recordist is having a spot of money-trouble with a client, so he visits a lawyer. 'How much do you charge for advice?' he asks. 'Five hundred pounds for three questions' says the lawyer. 'Wow, that's a bit steep isn't it?' cries **Neil Hillman**. 'Maybe—so what is your third question?' retorts the learned friend.

APOCRYPHAL, yes, but it can at times feel like there are many rivers to cross to recover money from a client who engages us and then steadfastly refuses to pay with fanciful excuses for the delay. There are several areas in the nature of freelance life that leave the location recordist exposed to financial risk—bookings can be relatively short-notice affairs secured by a telephone call, and, of course, at the end of the day the client goes away with the fruit of you and the cameraman's labours. While the location industry generally gets by in operating on this

For the Sound Recordist, the ideal contract would enable them as the owner to license the use of the soundtrack, in the case of a television programme, to one television broadcast with a continuing royalty for future repeats; for your client the ideal contract is often known as a 'buy-out'

'phone-call and handshake basis, it is a situation that gives rise for concern with Professor Anthony Arnall of the School of Law at Birmingham University who recommends that while the verbal engagement may be construed as a contract between you and your client, at the very least 'given the sometimes short-notice nature of the industry, a written confirmation faxed back to you with details of the booking and the agreed rate would take up very little of your clients time and certainly strengthen your position should a dispute arise that requires you to resort to legal proceedings'.

If you do find yourself in this position rest assured that you are not the only one having to pursue errant clients through the courts. Last year, the Broadcasting, Entertainment, Cinematograph and Theatre Union (BECTU) recovered well over £100,000 for its members ranging from low hundreds of pounds for a day or two's work up to thousands of

pounds for larger projects. 'A significant proportion of the Union's time is taken up by the recovery of fees owed to members' says Trish Lavelle, a National Official of BECTU. 'Our advice to members is to always obtain written confirmation of a booking, including details of agreed rates and hours, so that no misunderstanding can occur' she continues, 'and if a member is uneasy about some aspect of the job we are only a phone call away'.

But while it may not be possible for you to retain possession of your material physically—a Director will probably want to take those shot tapes straight away to begin editing—you do by default become the owner of something very precious indeed: the copyright on the soundtrack that you made, and, as Thomas Aldrich dryly observed from a time long before television—'The possession of gold has ruined fewer men than the lack of it.'

Copyright law can be complex, and it is a specialised legal area, but there are some basic principles that can be established. In Britain, the Copyright, Designs and Patents Act 1988 starts out by defining a number of categories of work that are afforded copyright protection. These are: original literary, dramatic, musical or artistic works; sound recordings, films, broadcasts or cable programmes and typographical arrangements of published editions. The act further strengthens your protection as a recordist by outlining that the principle of ownership of a sound recording rests with the person who facilitated the necessary arrangements for the recording to be made. In this instance, the copyright may be considered as property, to be sold, assigned or licensed like any other form of property. For the Sound Recordist, the ideal contract would enable them as the owner to license the use of the soundtrack in the case of a television programme to one television broadcast with a continuing royalty for future repeats;

for your client the ideal contract would enable them to acquire all rights and future uses to your intellectual property for one single payment, often known as a 'buy-out'. The reality would generally be a buy-out of your rights in

exchange for the settlement of your professional fees.

The good news is that the establishing of your copyright requires no effort on your part—for most European countries the action of recording the original work in any appropriate medium is sufficient for copyright to subsist in the work, without the need of formally registering your interest; although it is important to be aware that there are some specific differences between European copyright law and the 1976 Copyright Statute of the United States.

So why as location recording practitioners do we not have effective representation to collectively establish standard terms and conditions? Our studio colleagues in independent recording studios, through membership of either the Audio Post Production Studios organisation (APPS) or the Association of Professional Recording Studios (APRS) do, and have done just that. In their comprehensive standard studio booking terms and conditions, which are recommended for use by their member studios, they detail clearly and simply the booking formalities and recourse should fees not be met by clients. APRS Chief-Executive Mark Broad is keen to establish a clearer working relationship in wider areas of sound recording. 'There are clearly areas of common interest between APRS members, APPS members and the recordists' originating the soundtracks out on location. A sensible way forward for all of us could well involve the various professional audio groups coming together over issues of common concern—after all

while we have our own areas of interest and expertise, we do all belong to the same community. A unified, professional front can only enhance our individual efforts to promote a higher profile for audio within our own particular sector of the market'.

Maybe now the copyright symbol should find a way in to your work and on to your tape-boxes; but be

aware that nothing here should be regarded as constituting legal advice, and it certainly should not be relied upon as such.

Because that would, of course, cost you a lot more money. ■

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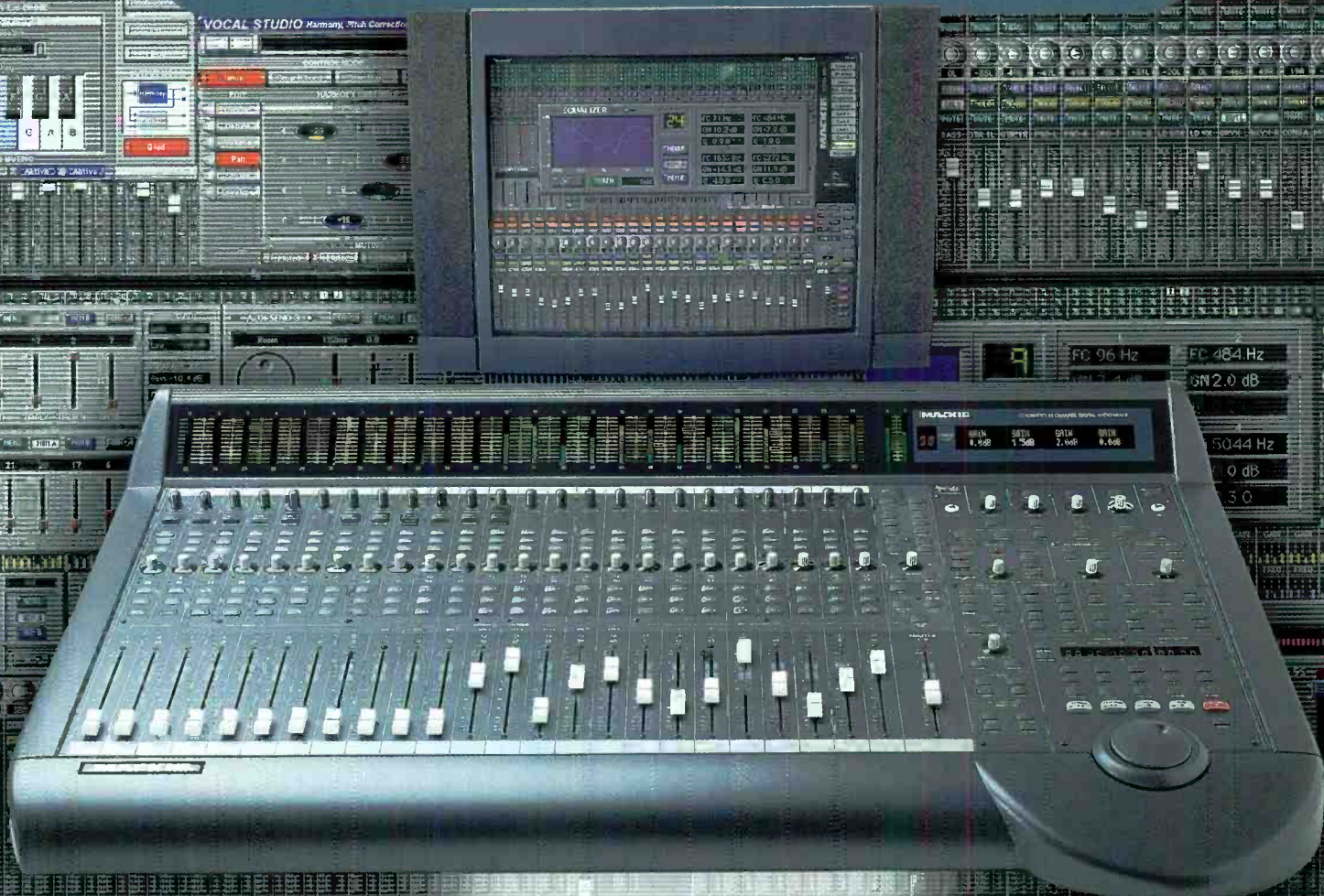
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