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# Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE  
FOR RECORDING, POSTPRODUCTION AND BROADCAST



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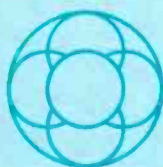
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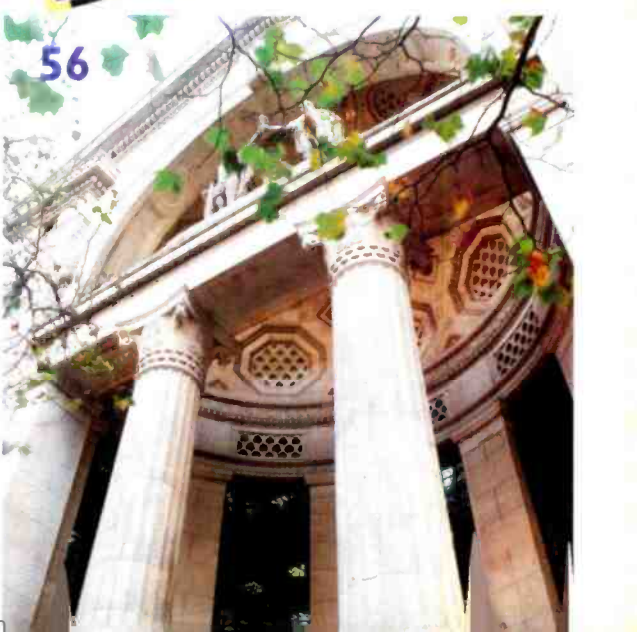
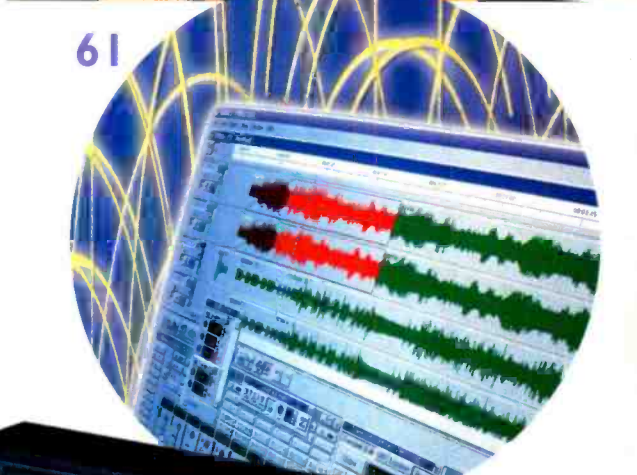
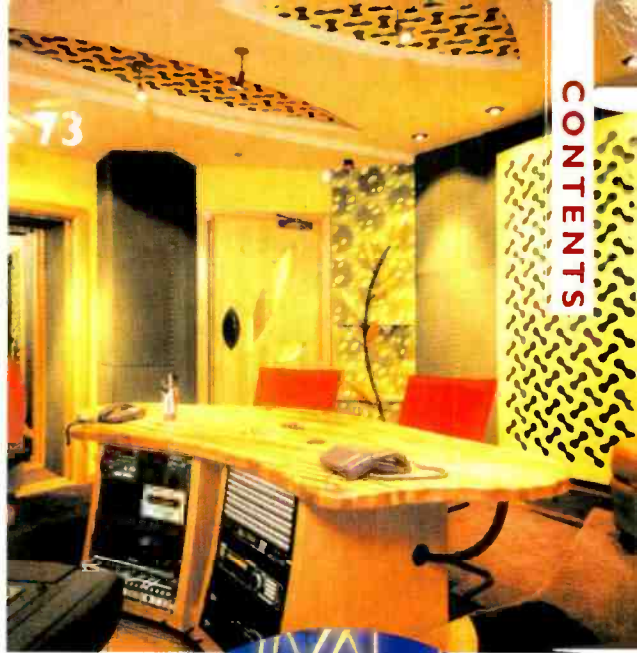
Effanel Music's Randy Ezratty (top) and John Harris

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## In praise of better sleep

THE YOUNG SHOP ASSISTANT was visibly shaken and put out when I interrupted his carefully scripted attempt to sell me an extended warranty and service backup scheme mid way through sentence two with an unequivocal 'no thanks'. Pausing to assess the situation, his retry was cut short less politely. While struggling through the door with the brand new domestic appliance guilt got the better of me and I questioned my attitude and realised it was again an audio thing.

Not for me the luxury and convenience of the washing machine repair man at our beck and call or the video repair man who might have been able to sort out that confounded video machine a year and several video tapes ago. Three hours after the basic warranty runs out I'll be the one on my back under the sink wasting time acknowledging, yet again, that my mechanical aptitude is limited at best and pawing through the Yellow Pages looking for a slightly less exorbitant fix-it man.

Yet the concept of extended warranty and paid for service support is completely abhorrent to the majority of audio purchasing decisions. Buy a seriously big desk and you will be expected to pay for it, and will expect to pay for it, but the enormous market beneath responds in much the same way as I did to the domestic appliance salesman even if the facility to buy into such a scheme existed. This is historical but it is also tragic.

Equipment is becoming consistently cheaper, but there will come a point beyond which it will not dip. How will manufacturers then make profit? The answer ultimately must lie in the last remaining revenue stream—extended warranty and service-support contracts. There is already talk of large multi-nationals aiming to recoup substantial proportions of their future pro-audio income on such schemes much as they already do in the consumer sectors that they also operate in. It is inevitable, and when viewed in context it should also be welcomed as it will permit the status quo to be maintained.

What needs to change is an increase in the sort of audio service and support infrastructure required to implement such a plan. Most importantly buyers must change their attitudes to buying audio gear. Digital may give the perceived impression of being more reliable, but if we put away our irrelevant token-gesture soldering irons wouldn't we all sleep a little better in the knowledge that we are covered no matter what?

**Zenon Schoepe, executive editor**

## The stone tapes

A LOCK OF HAIR, that's all it is. But to its owner it represents the most precious of memories. The intangible locked up with the tangible as its key—a memento of events and emotions that defy any formal representation.

So it is with recording studios, the tangible setting for the intangible events involved in making recordings of music—sometimes classic recordings. It was exactly this relationship that prompted Stan Miller to comment, 'There's still magic in these rooms,' of the newly refurbished Criteria complex in Miami in last month's *Studio Sound*. Troy Germano went a little further: 'There will be a lot of new people come here who won't necessarily know the studio's history but if the walls could talk...'

And they're not alone in this belief. I've heard much the same sentiments expressed in the infamous reverberation chambers at Capitol studios and at Sunset Sound in LA, all across America, through Europe and beyond.

If studios can represent moments of artistic creation, guitars, it seems, can embody anything from the inspiration behind a song to the entire career of an artist. As a result, collectable guitars change hands for terrifying amounts of money and sometimes, sadly, find themselves trading the limelight for the subdued light and the security of bank vaults.

So where does this history lesson leave today's musician? Will Fatboy Slim's house be the first to earn a blue plaque from British Heritage to mark the importance of its bedroom studio? Whose Pro Tools system will be the first into a bank vault? And whose mouse collection will be the first to include those used by Kraftwerk, Coldcut and The Artful Dodger?

If there is any significant link between events and the location of their happening, if there is any merit in the belief of many studio staff, it may be that the real estate under recording studios, film lots and concert halls is another potential casualty of technological advance.

**Tim Goodyer, editor**

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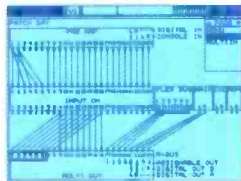


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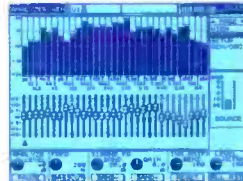
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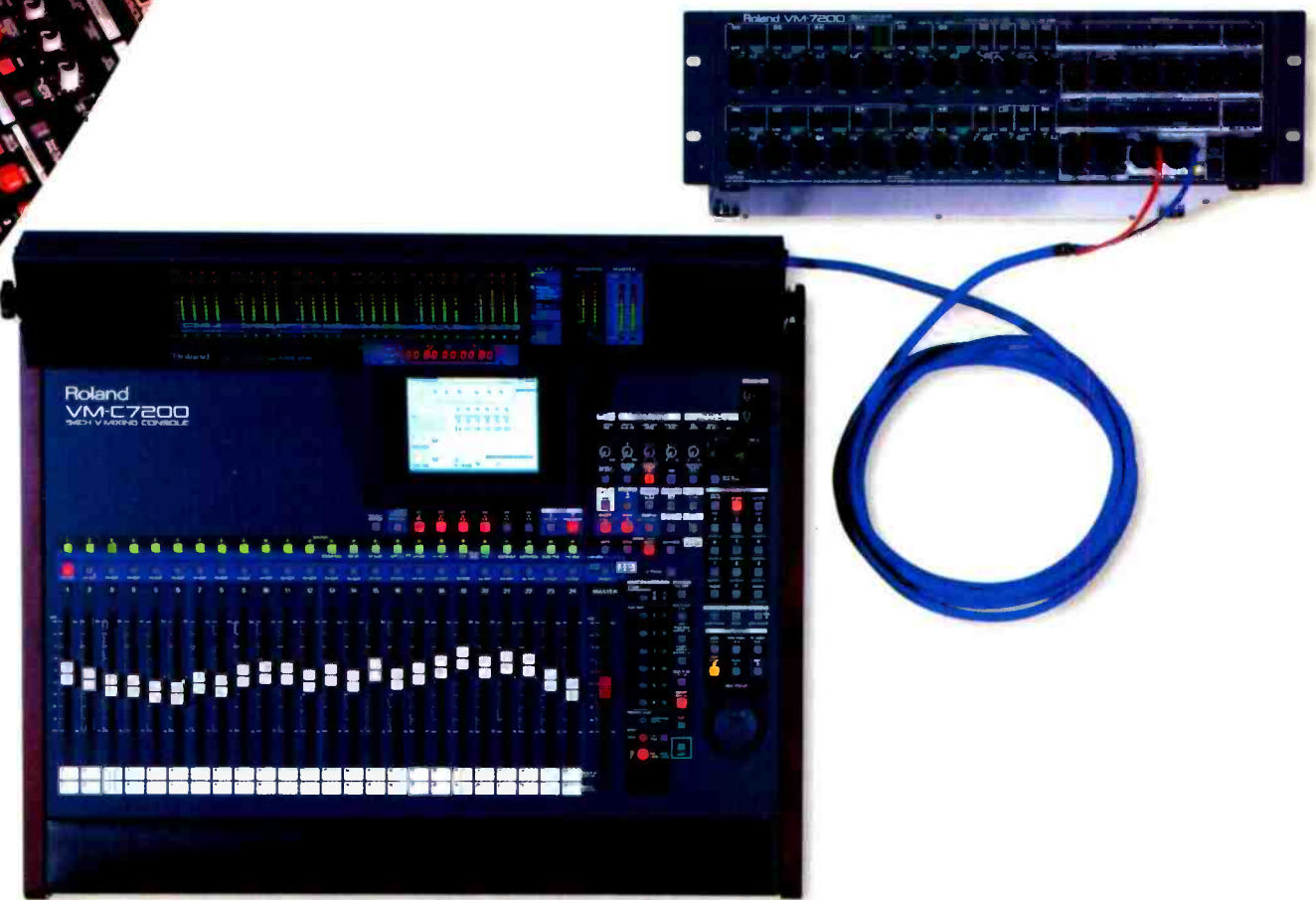


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■ NEWYORK-BASED mobile, Effanel Music, has purchased a second AMS Neve Capricorn digital console for in-studio use. The 72-fader, 256-path Capricorn will allow Effanel to mix two projects simultaneously and to post and perform 5.1 mixes of live events recorded initially on Effanel's remote. On the truck's impressive CV are four Grammy telecasts. Meanwhile, the British Visions digital OB operation has ordered a 60-channel Calrec S2, bringing the number of Calrec consoles installed in Visions OB Trucks to 5. The console is for a new 20ft OB truck with expanding sides. Wide Screen 1, which will broadcast Test Cricket for Channel 4 and various other sports and entertainment shows.

**Effanel, US. Tel: +1 212 807 1100.**  
**AMS Neve, UK. Tel: +44 1282 457011.**  
**Calrec Audio, UK. Tel: +44 1422 842159.**

■ TOKYO'S Pro-cen Studios has installed a Martinsound MultiMax monitor control system in its MA3 digital audio editing suite, where it is used with Genelec 1032A main monitor and 1029A surround speakers. Pro-cen Studios features 3 video editing and 3 surround mixing suites, and offers foreign language dubbing and subtitling facilities, together with post-production, recording and mixing in Dolby Digital 5.1 and Dolby Surround formats. The studio released 100 foreign language movies dubbed for the Japanese theatrical, video and TV markets last year. Also in Tokyo, the award-winning Studio Ghibli is using a MultiMAX and remote controller in the production of animation feature films for theatrical release. The renowned studio, established in 1985 by Hayao Miyazaki, is best known for Mononoke Hime released in 1997 and distributed world wide by Disney. Tokyo's Memory-Tech Corporation, manufacturer of CD, DVD and other optical disc media, has also purchased a MultiMAX and remote for its audio studio in the Minato-ku district.

**Pro-cen, Japan. Tel: +81 3 3404 4880.**  
**Martinsound, US.**  
**Tel: +1 800 582 3555.**

**Studio System Lab, Japan.**  
**Email: ssl@ear.ne.jp**

■ The Austrian Broadcasting Corporation's HITRADIO has installed 12 Orban OPTIMOD-FM 8200s to address phase limitation and overshoot problems experienced with the earlier system. The installation forms part of the Corporation's technical specification for HITRADIO's new nationwide audio distribution network. The station boasts 2.9 million listeners and provides coverage from its studios in Vienna.

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

■ New York's Sony Mastering has installed a PMC BB5-XBD active monitoring system powered by PMC-Bryston amplification, having a claimed usable frequency response from 17Hz -25kHz. The system was chosen by award-winning mastering engineer Vlado Meller, known for his work with artists as diverse as The Red Hot Chili Peppers and Barbra Streisand. Meanwhile New York's Howard Schwartz Recording has completed Studio #13 with a voice-over booth

designed by studio bauton and built by Acoustic Systems.

**Sony Mastering, US.**

**Tel: +1 212 833 4186.**

**Howard Schwartz, US.**

**Tel: +1 212 687 4180.**

**PMC, UK. Tel: +44 1707 393002.**

**Acoustic Systems, US.**

**Net: www.acousticsystems.com**

■ Swedish recording operation, B'hus Studios, has installed new Quedsted Q412 monitors in its 96-fader Euphonix CS3000-equipped main control room. Based in Gothenburg, B'hus has a 20-year track record that includes the legendary ABBA.

**Quedsted, UK. Tel: +44 181 566 2488.**

■ The BBC World Service has recently purchased a larger number of Deskmate and Deskmate Lite's from Clyde Broadcast, providing monitoring and talkback facilities, 4-channel mixing, two multi-input selector channels, a high quality mic amp channel and one for the DAW playback from beneath a DAW monitor. BBC World Service is using Deskmates in a number of Pilot projects to evaluate digital audio production systems. BBC Bristol, meanwhile, has specified 10 Sony Freedom camera radio mic kits, comprising WRT-805A belt-pack transmitters, WRR-805 camera receivers and ECM 44-BC lavalier microphones. The Sony kit was devised as a one-stop package for busy ENG and location users.

**Clyde Broadcast, UK.**

**Tel: +44 141 952 7950.**

**Total Audio Solutions, UK.**

**Tel: +44 1527 880051.**

■ Spain's Classic New, the audio post-production division of the Telson Group, has installed three Fairlight Prodigy systems in new Madrid audio post suites in Madrid. The new integrated digital mixing-editing systems are linked by Fairlight's MediaLink with the parent company's six Fairlight MFX3-plus workstations. Two further suites are under construction which will be used to create commercial spots used on broadcast television and cinemas.

**Fairlight, UK. Tel: +44 171 267 3323.**

■ Paris-based postproduction house Blue Sound has purchased a 64-channel SSL Axiom-MT digital. The new console will replace an SL4000 desk. Bluewater specialises in post work for commercials and musical soundtracks.

**Blue Sound, France.**

**Tel: +33 1 42 70 06 73.**

**SSL, France. Tel: +33 1 3460 4666.**

■ Italian state broadcaster, RAI, has purchased eight Soundcraft B800 modular broadcast audio mixers for installation in Outside Broadcast Vehicles attached to RAI's regional TV stations throughout the country. Seven identical 56-input consoles are being used in RAI trucks for live transmission of a wide range of productions. The remaining B800 is for permanent installation in a radio news studio in Rome. RAI is also equipping a dedicated radio OB vehicle with a Soundcraft B400.

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



▲ UK: Virgin Radio has upgraded its headphones to beyerdynamic DT 150s finished in a distinctive shade of orange to fit in with the company's Ginger Media image. The story started with owner Chris Evans (second from left between Dan McGrath, John Revell and Holly Samos) looking around the studio for a product to attract sponsorship. He picked out the beyerdynamic DT 100 headphones being used for the morning show, broadcast the challenge on air and was inundated with headphones for consideration. Evans exclaimed 'delight' at the DT 150s and ordered pairs for the rest of the crew.

## Tom Holman writes...

**World:** 5.1 Surround Sound, subtitled 'Up and Running', is Tom Holman's latest foray into print. The book sets out to cover the entire subject of multichannel surround from a practical perspective and largely succeeds. Apart from the nuts and bolts, enough theory and debate is provided to keep any practitioner or sound student happy. Recognising many aspects of surround such as panning are the subject of heated debate, Holman (the TH in THX) presents the arguments in a clear and concise manner mostly without judgement. He also explodes a few myths. Clearly an enthusiast for his subject he does not presume limitless equipment budgets and provides many useful hints and tips for using existing stereo consoles to produce viable surround. The style is readable and there are some good anecdotes.

Holman has a rare gift for simple explanation of complex concepts. I have read many sound textbooks but this volume has clarified things I never fully grasped before. 5.1 Surround Sound should be the first port of call if you are new to the subject and will provide a good source of reference for anyone already involved.

**Rob James**



◀ US: LA's The Complex, founded by George Massenberg, has installed a 24-channel Fairlight MFX3plus system as part of its move into postproduction. It has already racked up credits for a wide range of productions including *The Simpsons*, *King of the Hill*, *Dilbert* and *La Femme Nikita*, along with feature film work on productions including *Nuremberg* and *Requiem for a Dream*.

## CTS leaves Wembley

**UK:** CTS Studios announced that the company's Wembley site is to close on 24th June, as a result of the redevelopment of Wembley Stadium and the surrounding area. CTS Studios as a company will continue to trade. Chairman Adrian Kerridge commented: 'It is with sadness that we have been forced to move from our Wembley site, which we have occupied since 1972. We have been left with no choice—being adjacent to the stadium, there is no way that we can continue recording once the building work commences, so we are taking positive action now. We will be retaining the majority of the studios' equipment, pending finalisation of further plans. We are actively pursuing alternative arrangements to fulfil existing commitments.'

CTS Studios' 44-year history includes Oscar successes such as *The Cider House Rules*, as well as *Shakespeare in Love*, *Four Weddings and a Funeral*, *The Full Monty* and many classic Bond movies. With the studios' client list featuring many of the US and Europe's best-known composers, film production companies and record labels, the closure of the Wembley site represents the end of a long and successful era.

◀ US: LA's The Complex, founded by George Massenberg, has installed a 24-channel Fairlight MFX3plus system as part of its move into postproduction. It has already racked up credits for a wide range of productions including



## Dolby's AAC support

**US:** Dolby Labs has announced the launch of a technical marketing programme in support of the new audio compression standard known as AAC, Advanced Audio Coding. AAC is the latest audio coder standardised by the International Organisation for Standardisation (ISO) as part of the MPEG specification. Compared to MPEG Layer-3 (MP3), AAC provides higher quality music reproduction at lower bit rates, and in addition can accommodate up to 48 audio channels. Widely viewed as the successor to MP3, AAC technology is being adopted in applications ranging from electronic music distribution, digital radio in the US and Japan, and digital television in Japan.

'AAC is a product of the combined efforts of several organisations including AT&T, Dolby Laboratories, Fraunhofer Institute for Integrated Circuits, and Sony Corporation, and will be available to third parties on reasonable and nondiscriminatory terms. In order to streamline the licensing process, Dolby is to administer an AAC licensing programme.

'We believe that AAC will make better progress with a significant technical marketing effort,' said Ramzi Haidamus, Dolby Labs' Technical-Business Strategist.

'With over 400 customers world wide, spanning a broad range of audio markets, Dolby is in a unique position to reach both hardware manufacturers and content developers to present the advantages of AAC over competing formats.'

Dolby is also developing a website dedicated to AAC technology, its applications, at:

**Dolby:** [www.aac-audio.com](http://www.aac-audio.com).

**AT&T:** [www.att.com](http://www.att.com)

**Dolby:** [www.dolby.com](http://www.dolby.com)

**Fraunhofer Institute:**

[www.iis.fhg.de/amm](http://www.iis.fhg.de/amm)

## AMS Neve Grammy

**US:** AMS Neve picked up a Technical Grammy recently in Los Angeles for pioneering a new level of recording quality and ease of operation taking digital recording to new heights. Managing Director, Mark Crabtree, spoke at the ceremony: 'All 280 of us at AMS Neve are very dedicated to providing you, the industry leaders, with the best creative tools possible. Thank you for working with us over four decades. Over those 40 years, technology has changed a great deal, but we still have the same two ears and pair of hands.'

'What has changed is the imagination, the creativity—and our part of it—the tools. Maybe it's



**▲ UK:** Murray Watts' imaginative yet faithful adaptation of Luke's Gospel into an animated feature film carries a score from Anne Dudley recorded by the late Paul Hulme, performed by the BBC Welsh Orchestra and recorded to 24-track analogue tape at London's Angel Studios. A second 24-track featured Anne Dudley's keyboard work. The anticipated success of *The Miracle Maker* will see it keeping the company of TV productions including *Shakespeare*, *The Animated Tales*; *Testament*, *The Bible In Animation* and *The Canterbury Tales*, all masterminded by Christopher Grace of SAC.

because the ears and hands haven't changed that most of the equipment ever made by AMS Neve is still in action today. I think that's remarkable in an era of disposable technology. Knowing that whatever they design is likely still to be in use on exciting projects in 10 and 20 years time is a great motivator for our designers.'

## CEDAR awards

**World:** CEDAR Audio's third consecutive awards will run this year, five recognising outstanding contributions in the field of audio restoration. Nominations are invited for work representing CD Remastering from a Modern Recording (post 1949); CD Remastering from a Vintage Recording (pre 1950); Remastering of a Film Soundtrack; Audio Restoration for Broadcast Use; and Audio Restoration for Forensic Use. A further award will be made to one of its dealers recognising 'exceptional performance over the past 12 months'.

Nominations for The 2000 CEDAR Awards are invited from all interested parties, and candidates may propose themselves without prejudicing their chance of success. Clive Osborn will be overseeing the nomination process, and he will be pleased to answer all questions relating to the awards. The closing date for nominations to arrive at CEDAR Audio is 30th June 2000. For further information, and to register nominations, contact:

**Net:** [www.cedar-audio.com](http://www.cedar-audio.com)

## Radio alliance

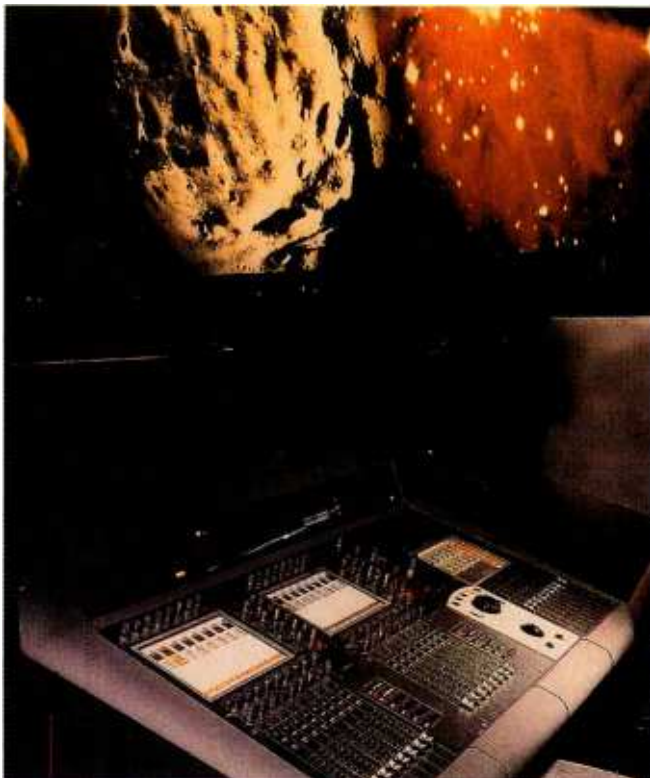
**Finland:** Jutel Oy, a leader in digital broadcasting system software, and IBM today announced they have broadened their existing relationship and tightly integrated their solutions to result in a com-

plete radio-station management and services solution for the broadcasting industry. Under the agreement, IBM will market and distribute Jutel's RadioMan as part of its overall media asset management portfolio in Europe, Middle East and Africa (EMEA) with plans to enter markets world wide in the future. RadioMan is a scalable system that integrates and controls the management of radio stations including scheduling and programme planning, content production, versioning and broadcasting of programmes for multiple new media channels including Digital Audio Broadcasting, satellite, the web, WAP (Wireless Application Protocol) and future mobile systems. It is also integrated with IBM's announced Content Manager solution, an integral part of IBM's media asset management architecture.

'RadioMan best-of-breed solution is a welcomed addition to IBM as it complements our suite of media asset management products,' said Steve Canepa, vice president marketing, IBM Global Media and Entertainment Industry. 'We're pleased to further expand our alliance with Jutel and look forward to our continued relationship.'

Jutel and IBM have worked together since 1995 and during the past two years have implemented the RadioMan solution at a number of BBC local radio stations in the UK such as BBC Radio Nottingham. Most recently, they have successfully bid to provide the network audio system, using RadioMan, for the whole of BBC Wales. Past joint projects between Jutel and IBM also include RTE in Ireland, YLE in Finland, SR in Sweden and several other national broadcasters.

**Net:** [www.radioman.fi](http://www.radioman.fi)



**▲ France:** The Paris Planetarium has become the first European site for Soundtracs' DS-3 digital console. In addition to producing programme material for the facility, the desk will be used for mixing live presentations synced to multi-projector presentations, up to 20 of which take place each day.

Studio Sound [www.prostudio.com/studiosound](http://www.prostudio.com/studiosound)



## Once bitten, twice shy?

IN RESPONSE to Graham Hinton's uncalled-for aspersion-casting in the March 2000 issue (*Sound Bitten 2*), I must say that I don't ever recall spelling Colin Sanders' name incorrectly during my tenure as editor of your august organ. In fact, I am not at all sure that, in those days before spell-checking or easily accessible computers, our error rate was any higher than it is now.

If it was, of course, then, er I suppose I shall have to claim that in those days we were like *The Grauniad*—the best publication in the business even if our proffredding wasn't as good as it could have been... :-)

**Richard Elen, *Studio Sound* editor, 1980–84.**

## Tim Goodyer replies

IT'S CERTAINLY TRUE that many of the best reads have suffered inappropriately at the hands of the spelling error goblin. Take CEDAR's Gordon Reid, for example, I clearly remember misspelling him myself some years back. Then there is the Focusrite 'Reed' range, commonly misspelt as 'Red' not least by Focusrite itself (I seem to recall Chairman Mao's Little Reed Bok suffering a similar indignity—was it this that inspired the 'Not the Right Red' advertising campaign?). Happily *Studio Sound* has never been a horticultural or ornithological title otherwise *Emberiza schoeniclus*, *Typha latifolia*, *Glyceria maxima* and *Panurus biarmicus* would undoubtedly have overtaxed the spell checkers and fuelled the letters page on a regular basis. Quite the red rag, you'll surely agree.

So common is the confusion surrounding the use of the words 'read' 'reed' and 'red', in fact, that the phenomenon is commonly termed Red Spot in both proofreading and teenage hygiene circles.

## Heads case

I MUST MAKE some observations following the 'Masterclass' article on tape heads in the March edition of *Studio Sound*.

I have been in the recording head design and manufacturing business for



In vis-on not sound, DPA's 3541 mic

40 years and therefore have much experience. I agree with the article that the heads are the most expensive part of the recorder, and they are the most delicate and important. The article recommended that methylated spirit should be used to clean the heads. This may be satisfactory for Studer manufactured heads, but it is not a chemical that I would ever use to clean a head due to its impurities and additives. Pure isopropyl alcohol (IPA) should only be used. Different head manufacturers use a variety of adhesives (to bind the delicate parts of a head). These include epoxy resins, polyester resins and butyl rubber. These adhesives can easily be attacked and softened by solvents, thus causing either movement of head parts, or oozing, which attracts oxide from precious tapes. IPA used with care is safe.

The article stated that heads for A80 Mk.I, Mk.II and A800 Mk.I are no longer

available. This may be so from Studer but compatible heads are available from myself at Summertone.

Studer heads give a long working life—even the so-called 'soft' heads. Performance drops off when too much wear causes excessive contact with the head surface, thus giving intimate gap contact problems. These can be overcome and the heads brought back to their original performance by reprofiling and resurfacing (lapping). The original head profile needs to be regained to restore the correct frequency response both at the high frequency end (gap contact) and the low frequency end (contour effect).

Would-be purchasers of older machinery need not be put off. Summertone provides a full reprofile and relap service including a condition report, together with the supply of replacement heads at reasonable prices.

**Terry Summers, Summertone Ltd, UK. Tel: +44 1923 263220.**

## Quiet as mics

I WOULD LIKE to thank George Shilling for his observation in his review of the DPA 3541, however I would like to make a couple of comments to the written part.

We have seen a number of people (not George), even other reviewers, talking about 'going into the mic input of a console' with this low noise product—the 3541. This is a mistake. Make sure you go into the line input with attenuation possibility, as you rarely need amplification. The noise you hear when using the mic input is not coming from the mic or high-voltage preamp but the console mic pre.

George writes about unscrewing the grid on the 3541. Do not worry about this as it is not possible to take it off. The first models made for review made this possible but none made afterwards.

The 3541 is very popular already and I understand the excitement in the words from George. Thank you *Studio Sound* and George Shilling.

**Morten Stove, DPA Microphones, Denmark**

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6-9

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8-9

**AES UK Conference**  
**Moving Audio:**  
**pro-audio networking**  
**and transfer**  
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Contact: AES.  
Tel: +44 1628 663 725  
Fax: +44 1628 667 002.  
Email: uk@aes.org  
Net: www.aes.org/sections/uk

8-9

**TV 2000**  
Budapest, Hungary.  
Contact: Scientific Association  
of Infocommunications.  
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Fax: +36 1 353 0451.  
Email: hte@mtesz.hu  
Net: www.mtesz.hu/hte

16-17

**Broadband**  
**Wireless Access**  
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Park Lane, London, UK.  
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Tel: +44 (0)20 7453 5495.  
Fax: +44 (0)20 7636 1976.  
Email: cust.serv@bcuk.co.uk  
Net: www.ibctelecoms.com/bwa

18-21

**CALM Expo 2000**  
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IIR Exhibitions  
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Fax: +65 227 0688  
Email: jchin@iirx.com.sg

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Fax: +44 (0)20 7375 7576.  
Email: confdesk@firstconf.com  
Net: www.firstconf.com/ddimeuro

22-23

**DVD Europe 2000**  
Shaw Park Plaza Hotel, Euston,  
London, UK.  
Contact: Miller Freeman Enter-  
tainment, David Roberts  
Tel: +44 (0)20 7940 8561.  
Email: david.roberts@unmf.com  
Net: www.prostudio.com/dvd

23-25

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Fax: +36 1 353 0451.  
Email: hte@mtesz.hu  
Net: www.mtesz.hu/hte.

June

3-6

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Rimini Trade Fair Centre,  
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Fiera di Rimini.  
Tel: +39 541 711 711.  
Net: www.fierarimini.it

6-9

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**Cablesat 2000 and**  
**Professional Audio**  
**Technology 2000**  
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6-9

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7-9

**PLASA Light and**  
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Contact: P&O Events.

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Email: shanghai@eco.co.uk

9-18

**Synthèse 2000**  
**International Festival**  
**of Music and Creations**  
**Electronic**  
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Electroacoustique de Bourges.  
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Fax: +33 2 48 20 45 51.  
Email: ime-bourges@gmef.fr  
Net: www.gmef.fr

13

**Lecture:**  
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**Control Networks**  
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Contact: AES.  
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Fax: +44 01628 667 002.  
Email: uk@aes.org

13-15

**ICCE 2000:**  
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**Conference on**  
**Consumer Electronics**  
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5855 West Century Boulevard,  
Los Angeles, California, USA.  
Contact: Diane D Williams,  
Institute of Electrical and  
Electronics Engineers.  
Tel: +1 716 392 3862.  
Email: d.williams@ieeee.org  
Net: www.icce.org

20-22

**Pro AV Africa**  
Contact: FEI.  
Tel: 0118 977 0611

22-23

**Broadcast Content**  
**Management 2000**  
The British Library Conference  
Centre, London, UK.  
Contact: Miller Freeman  
Entertainment, David Roberts  
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Email: david.roberts@unmf.com

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## 2000 SSAIRA WINNERS

**A**FTER MONTHS of nominating, voting and counting, the results of the 2000 *Studio Sound* Audio Industry Recognition Awards are in. As in earlier years' awards, these recognise excellence and achievement on the part of audio equipment manufacturers as expressed by the readers of *Studio Sound*.

Also as in previous years, the Awards are broken down into categories to enable like equipment to go head to head for recognition. Unlike previous years awards, however, the awards ceremony itself was not held at the European AES Convention (due to its early appearance) and will take place in London during May. Those of you who have attended earlier presentations will no doubt remember Champagne and Kenneth Ersgaard's poor jokes. In the mean time, you will find the winners and runners up listed here in full, and more information will follow on the *Studio Sound* website, [www.prostudio.com/studiosound](http://www.prostudio.com/studiosound)

Congratulations to all the winners, you will receive invitations to the presentation soon. Commiserations to everyone else—until next year. ■

## W I N N E R S

### 1 Large scale console

**Category Winner**  
Euphonix System 5

**Runner-up**  
AMS Neve Libra Post

### 2 Medium-Small scale console

**Category Winner**  
TL Audio VTC

**Runner-up**  
Mackie D8b

### 3 Outboard dynamics

**Category Winner**  
TL Audio Valve Classic CI

**Runner-up**  
Avalon 747SP

### 4 Outboard preamp

**Category Winner**  
Aphex 1100

**Runner-up**  
TL Audio Valve Classic PA-I

### 5 Outboard equaliser

**Category Winner**  
Focusrite ISA430

**Runner-up**  
TL Audio Valve Classic EQ-2

### 6 Outboard reverb

**Category Winner**  
Eventide Orville

**Runner-up**  
Roland SRV3030

### 7 Combined outboard device

**Category Winner**  
Jünger Accent I

**Runner-up**  
Focusrite ISA430

### 8 Monitors

**Category Winner**  
Genelec 1036A

**Runner-up**  
HHb Circle 3

### 9 Microphone

**Category Winner**  
Neumann Series 180

**Runner-up**  
DPA 354I

### 10 Convertors

**Category Winner**  
Weiss SFC2 SRC

**Runner-up**  
Prism Sound ADA8

### 11 Audio editor

**Category Winner**  
Digidesign Pro Tools v5.0

**Runner-up**  
Soundscape R.Ed

### 12 Audio recorder

**Category Winner**  
Soundscape R.Ed

**Runner-up**  
Euphonix R.I

### 14 Location portable equipment

**Category Winner**  
Marantz PMD650

**Runner-up**  
Cooper Sound CS208

### 15 Plug-in

**Category Winner**  
CEDAR Declick 96 (SADiE)

**Runner-up**  
Steinberg TL Audio EQ-I

### 16 Special category

**Category Winner**  
CEDAR BRX+ debuzzer

**Runner-up**  
CEDAR AZX+ azimuth corrector



# digital confidence

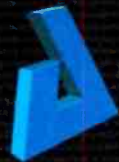
In today's rapidly evolving media landscape confidence in new technology has to be earned. With the abundance of equipment being introduced, can you depend on your supplier, the product, reliability, the life-span? Can you know if you've allowed for all the possibilities of new mix formats, digital input/output configurations and new standards of automation which may appear without warning?

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- ◆ Interactive touch screens
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- ◆ Four band parametric equalisers
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# DS-3

digital production console

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



# Alesis ML-9600 MasterLink

Alesis' entry to the mastering business finds it with a powerful and convenient stand-alone solution. **Dave Foister** keeps it company

**T**HE ALESIS PHILOSOPHY: (a) come up with something nobody else is doing; (b) do it cheaper than they would have done even if they'd thought of it. Either is tough—both at once takes some doing, but Alesis has managed it several times. Now comes another candidate.

It's not immediately obvious what the ML-9600 is or does or why; once it becomes clear, the name makes perfect sense. In a way this is the missing link for mastering project studio work to CD in the absence of a computer-based system, and comes loaded with extras and surprises. At its heart it's a self-contained hard-disk recording system, with deceptively simple editing and signal processing, geared specifically towards the compilation of separate existing tracks into a finished whole. Its onboard nonremovable hard drive has to be in excess of 3Gb as it has a capacity of over five hours stereo at standard CD resolution.

This large amount of storage means the MasterLink can handle several projects at the same time, in the form of multiple playlists. The procedure for producing and manipulating these playlists is quick and simple, allowing raw material to be assembled into finished product very rapidly and intuitively. This is suggested by the simple front-panel layout, that handles the entire process via some obviously labelled buttons, a few simple menus and a relatively straightforward display. The overall impression is almost simple enough that at a distance you could easily mistake it for a rather elaborate CD player. It will play conventional CDs, and load tracks from them into playlists, but it's also a recorder, and one with a distinct twist at that.

The 96 in the MasterLink's name hints that the recording system handles 24-96 audio, but what comes as a surprise is that it can also record this on to CD using a proprietary

format closely linked with AIFF: the resulting discs can be read on CD-ROM drives by AIFF-compatible software. More on this later; for now it's important to know that the hard drive can record audio at any standard sampling rate all the way up to 96kHz and using 16, 20 or 24 bits.

Both analogue and digital inputs and outputs are provided, and, along with the facility to read CDs directly, this covers all the likely options. Audio is recorded as tracks within a chosen playlist, although the tracks are in turn pointers to audio files, and all these elements can be named. Data entry for names as well as everything else on the unit is by means of four cursor keys—there's not a wheel or rotary encoder in sight, although sometimes I wished there was.

The basic process is simple. The tracks are recorded into the MasterLink one by one, and then placed in the desired sequence in the playlist. Their start points can be adjusted so as to alter the spacing between them, although the spacing is not adjusted directly. The easiest method seems to be to butt a pair of tracks up, then adjust the start time of the second one to a later point until the gap is right.

This is made considerably more precise and controllable if the tracks are trimmed first, and for this purpose basic editing functions are provided. All you can do is edit the start and end points of a tracks to top and tail it, but quite good scrubbing is available via a pair of buttons marked SCAN. The scrub speed is preprogrammed in a series of steps that gradually increase the longer you hold the button down, so pinpoint precision is not really possible, but the slowest speed allows the start and end points to be identified quite clearly. I wouldn't want to try musical editing on this system, but that's not what it's meant for; I was, however, able to splice together two movements of a piano sonata with an almost

seamless join during the intervening atmosphere. I say almost seamless because at high listening levels a slight momentary dip in the background noise was detectable, but there were no clicks or other obvious intrusions.

The trimming process brings up the difference between a track and an audio file, although the difference seems so slight and unclear that I ended up slightly puzzled about it. In particular, adjusting the start and end points as described above seemed to make no difference to how the playlist played them out; I had to use the Crop function to get the tracks the way I wanted them. Crop is a process that deletes the audio outside your chosen marks from the source audio file, and is destructive—I would have expected it to leave the original file intact. What the system does allow is for more than one track to use the same audio file, but with different DSP treatments, removing the need to duplicate the audio when trying different versions. A track can also appear in more than one playlist, again with different processing.

Having trimmed the tracks, it's useful, even in the most pristine environment, to add a fade in and fade out. I did notice an occasional click as the system stopped playing a track, and even a tiny fade will eliminate this. The two fades are separately adjustable, in 1/10th second increments, and three fade shapes are independently selectable for the two ends—linear and two log curves, one of which starts slowly and finishes quickly while the other does the opposite. It's a simple yet useful choice and covers most eventualities.

The other basic function in the playlist is gain adjustment, a manual setting that can help match up consecutive tracks. There's no automated help with this gain setting, but there's plenty available within the DSP functions. If all that's wanted is to even out a few level discrepancies this adjustment is quite sufficient.

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48 BIT 96 KHZ

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At this stage you have your basic playlist ready to go. It can be played using conventional transport controls just like a CD, with track skip buttons and searching. The Scan buttons work here as well, but this time at a set speed faster than normal play, just like a CD player. If this level of simple compilation is all that's needed, you can reach this stage very quickly and proceed to burn a CD. If you want to actually process the audio a little, there's a whole palette of DSP treatments for the purpose.

In fact there's pretty much a whole basic mastering suite built into the MasterLink. Four distinct DSP blocks are available in a fixed configuration to provide EQ and dynamic control, and it's important to note that all processing is applied on an individual track-by-track basis, so that each can have a completely different treatment if you want. The first is a compressor, not multi-band like we've come to expect in a mastering processor these days, but reasonably sophisticated nonetheless, and with its functions tailored specifically to its role. Its threshold is set relative to full scale, and ratios up to 20:1 in very fine increments are available. The make-up gain can be anything up to a massive 65dB, and attack and release times are fully variable, although without any automatic settings. The compression can be keyed from both channels summed or from just one, and gain reduction and level can be shown on the meters simultaneously. Level detection can be switched between peak and RMS, and perhaps most importantly four degrees of soft knee are provided along with the straight hard knee.

The compressor is followed by a 3-band parametric EQ. Its outer bands can be switched to shelving, with a fixed slope, but adjustable frequencies, and all bands have good Q ranges and the complete spectrum of frequency adjustment. Next comes a brick-wall limiter, with the obvious mastering advantage offered by its DSP nature of being a look-ahead limiter, spotting peaks before they arrive and dealing with them with no overshoot. The threshold is adjustable down from full scale, and the limiter automatically applies gain make up equal to the threshold value so that the limited peaks hit full scale again. The user can then decide to scale this

down slightly so as to keep peaks a fraction of a dB below the maximum.

In case squeezing it with a limiter isn't appropriate, but manual adjustment of the level to maximise its loudness is too laborious, the last DSP block is a Normalizer. This automatically scans a track for its highest point—faster than real time—then scales the whole track so that the biggest peak hits full scale. There's no user adjustment for this, but it does show you how much gain it's applied on the display.

There would be little point putting these processors into the MasterLink unless they did their job—we're putting together a finished product and it's too late for token gestures. In fact they do the job very well. The

compressor is versatile and highly controllable; the EQ is smooth and helpful, although in both these cases the fine parameter adjustment on offer actually makes it slower to scroll through than might be considered strictly necessary—do we really need 0.01dB precision? The scroll speed accelerates in the usual way, which is fine except it's impossible not to overshoot—in the usual way.

All in all it's as good a user-interface as you can hope for with buttons alone. The limiter and normalizer effectively run themselves, and both do a good job, in their separate ways, of raising the level to the maximum without risk. Burning the CD itself is a fully automatic process, and the MasterLink does the job in two stages. First it has to render the playlist, which means copying the entire thing via the DSP to a special 17th playlist on the hard drive reserved for this purpose. If there is no processing on any of the tracks, you can skip this stage, but for these purposes the fades in and out count as DSP and have to be ren-



dered. The good news is (a) the unit then proceeds to burn the CD immediately without any further intervention, and (b) the rendering only has to be done once—further copies can be made from the rendered playlist.

If the job in hand has been recorded at greater than CD specification, it's now possible to make an archive copy up to full 24-96 spec on a CD, using Alesis' CD24 system mentioned earlier. The book reckons most audio software will read the files on them, and, of course, the MasterLink itself will play them back. Any combination of sampling rate and word length is possible, but even 16/44.1 has a slight trade-off in that the CD-ROM format has more correction headroom, reducing the capacity to 64.4 minutes on a standard 650MB

CD blank. Full 24-96 gives 19.7 minutes, and there's actually no saving going 20-bit, although the on-board hard drive does treat them differently and saves space accordingly.

Anyone who wishes they could do their own CD compilation using the kind of facilities they've seen on full computer-based systems like SADiE, Sonic and Sound Designer will recognise that the ML-9600 can do a large part of the basic job of such a system in a very handy package, and do it much faster than many of the entry-level PC audio packages. It's impressively easy to use—I got it out of the box and started work straight away,

getting a 6-track CD prepared and burnt in not much more time than it would have taken on SADiE. This didn't need much in the way of DSP, but exploring this afterwards quickly showed how powerful and accessible this was too. This is indeed a useful link in the production and in-house mastering chain, and won't be missing from many of its target studios for long. ■

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# Sony DMX-R100

Few would have suspected that Sony would weigh into the affordable digital desk rumble with a contender. **Zenon Schoepe** assesses the combatant's form



**UNSUSPECTING STAR** of the last European AES, Sony's newest digital desk introduction surprised many by its looks, feature-set and, of course, its proposed price. While the company made much of any reflected glory it could garner from its flagship Oxford digital desk few were left in any doubt that Sony had decided to go mass market in a manner that hadn't been predicted. The end of June should see the completed desk shipping at a price of around 20,000 Euros. It's a price that will place the DMX-R100 above the area of most affordable digital desk activity, but the console does try to carve its own way in the market with a bullet-point check list that makes interesting reading.

Multichannel format and double sample rate able, it is fully automated with touch-sensitive faders, has audio matrices and is fully self-contained with a touchscreen, and well-equipped and well-planned-out master assignable section.

I've been conscious of a number of conflicting threads on just how much 'Oxford' there is in the R100, so to put the record straight this desk was designed in Japan by the same team that looked after the company's CD mastering, DASH machine, time-code DAT, and other technologies. However, they were also responsible for translating the Oxford's UK originated designs into a physical manifestation. Therefore many of the engineers who 'productised' the R3 Oxford designed the guts of the R100, although there was UK Oxford input into the console layout right down to the choice of knobs and switches.

Consequently, there are similarities in

operational principles and methods between the two desks, although it has to be said that these are also very much in tune with many of the operational modes found in other brand digital desks particularly in the middle to low market area. Operation focuses on a largish assignable section with a layout that can be identified very roughly in the far more all-encompassing Oxford board.

The R100 uses a computer that runs QNX which is similar to the Unix that the Oxford runs on, but rather than using the Sony-designed Oxford chip it is SHARC-based.

Two variable controls are provided per strip, a fader and a pan control, and solo operates in a similar way to that on the Oxford as does the automation.

The R100 is available in one size with the only options available being in back-panel interface cards. There are 18 mono full-processing channels, 8 multitrack buses, eight aux sends and a stereo bus plus eight additional channels, marked up as aux returns, that are devoid of EQ and dynamics. The 18 input channels also have direct outputs.

There are seven types of card option for the four slots in the back and these are an 8-channel analogue line input, 8-channel analogue line output, 8-channel AES-EBU I-O card, 8-channel sampling-rate convertor digital input card, 8-channel TRS jack insert board, an ADAT I-O card and TDIF I-O card. And the quoted 20,000 Euro price refers to a board with its four option slots filled.

The desk is said to be targeted at professional project studios in music production and sound-design applications, but also serves as a general

purpose mixer that will no doubt be able to fulfil duties as part of Sony's many systems sales.

Multichannel (5.1) working employs the recording buses and presses the touchscreen into excellent use as you use your finger on the screen as the pan control moving between speaker icons. Alternatively a mouse or trackball can be connected to the back of the desk and used for this purpose as well as serving as an additional selector tool to touchscreen activation.

The desk surface is split in to three discernible blocks of the input fader-strip section of 24 faders, the master assignable section with the touchscreen above it, and what could be referred to as the control section with automation and machine control, monitoring functions and the master stereo fader.

As standard the desk comes with 24 analogue inputs and these are presented on the first layer of the available three. A second button accesses the next 24 inputs derived from the fitted interface-card options while a third calls up the eight multitrack bus masters, eight aux send masters, and the aforementioned eight aux returns. Metering follows the layer selection.

The first 12 analogue inputs have XLR and TRS jack (line) inputs with a selector, phantom power, mic gain and pad and these also benefit from an insert prior to the A-D. The second 12 inputs are simpler with the same 60dB of gain and a pad, but with Neutrik XLR-jack combo connectors.

A key feature of the desk is the inclusion of audio matrixing that creates the patching between the connectors and



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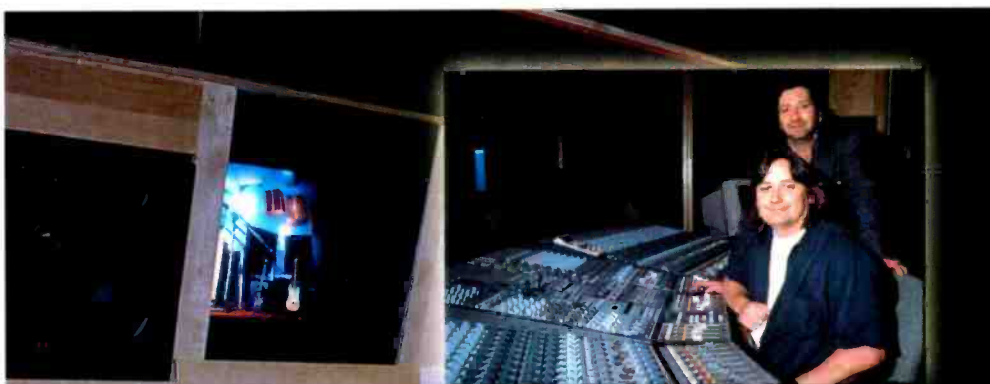


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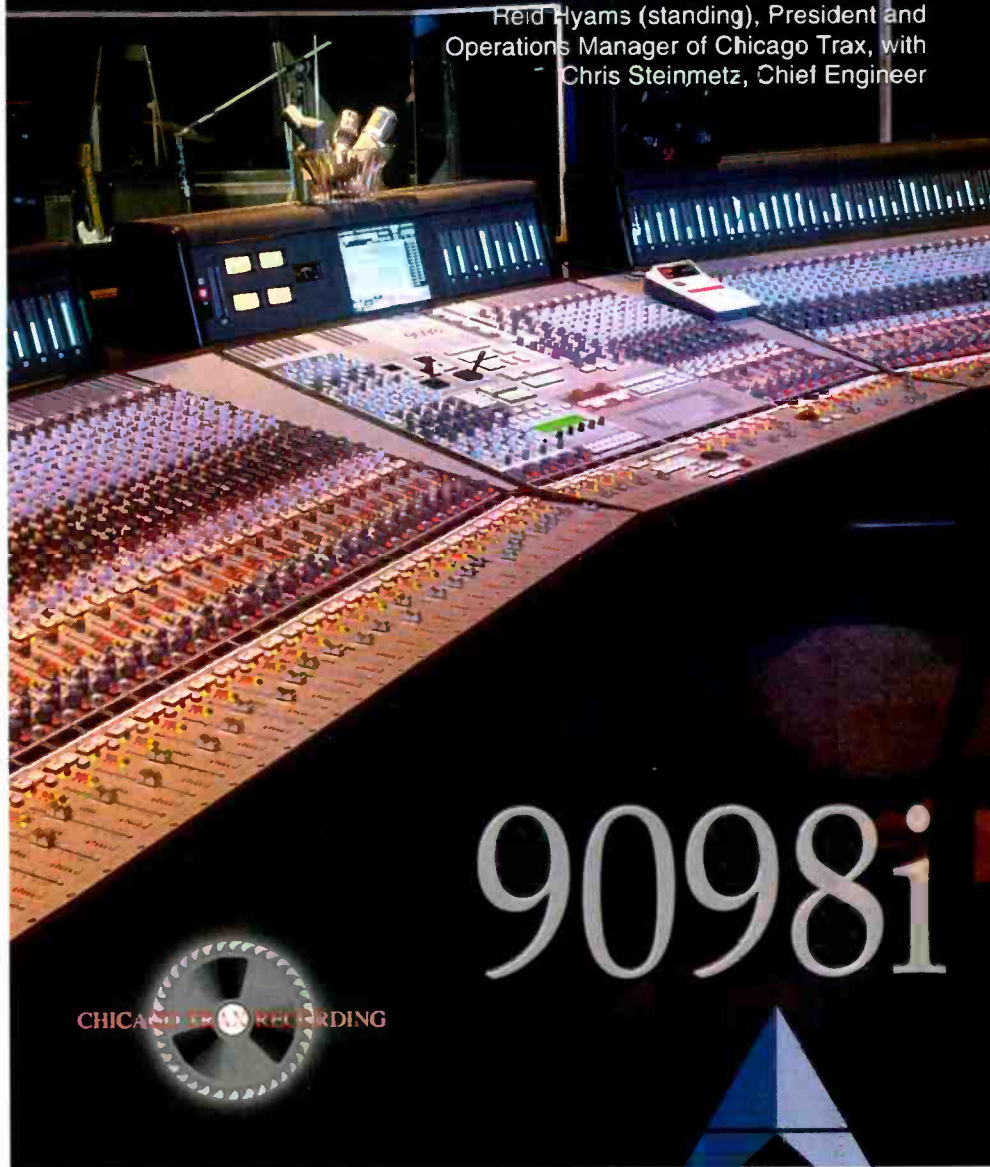
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Reid Hyams (standing), President and Operations Manager of Chicago Trax, with Chris Steinmetz, Chief Engineer



**9098i**

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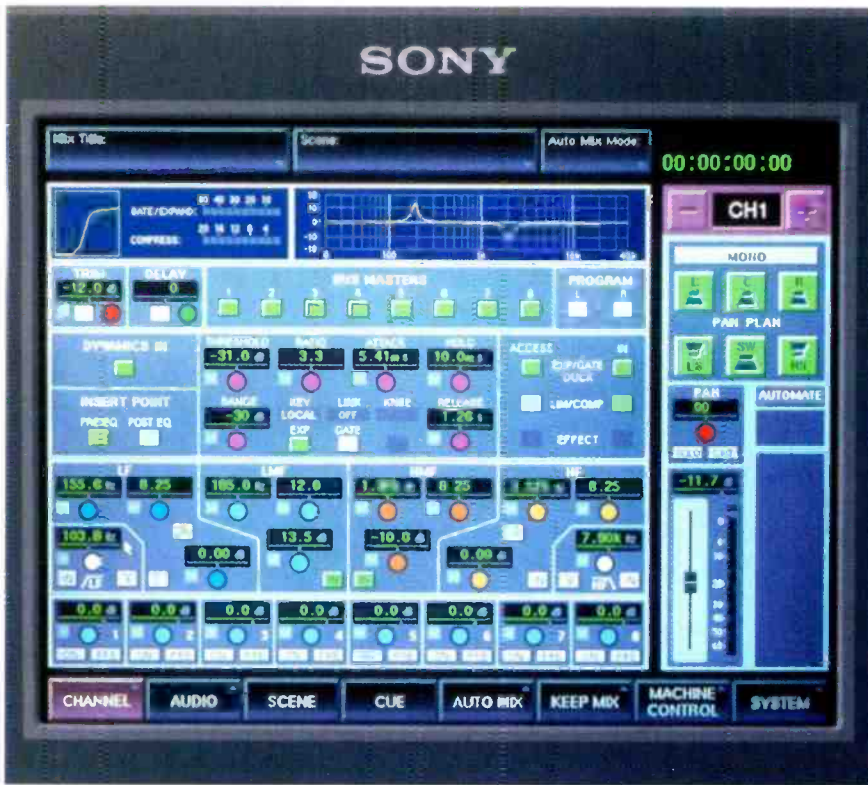
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the processing. Controlled from the touch screen the same input can be routed to any or all channels if required and an output router works alongside the former and employs a very good selection of output connector types. In all this amounts to a very grown up

implementation that allows custom configurations to be created in a manner that is blatantly simple.

As already mentioned the R100, which runs at 24-bit, can be configured to run at 96kHz (or 88.2kHz), the processing and the number of channels

being handled is predictably halved.

With all the buzz features covered it is how the desk drives that will win it admirers and in this respect operation is clear and unambiguous.

The channel-pot controller defaults to pan adjustment but can also be assigned. Most significantly the R100 uses Oxford-type panels of direct access switches, separate banks of which are dedicated to the pot and the fader section and permit immediate switching of the chosen controller to reflect sends to the eight auxes, digital trim or multi-track send level.

Channel processing, all of which is accessible from the assignable control section, includes a 4-band fully parametric equaliser—bands are frequency limited in analogue style—plus low-pass and high-pass filters. Channel parameter displays along with typical EQ curves are displayed on the touchscreen with zoom-in functions. While designed to be completely self-contained a VGA output is provided for those who want to run an external additional monitor.

The dynamics section shares the same controls between its compressor and expander with access via dedicated switches and can be placed pre or post EQ. Other controls include digital trim, phase reverse, delay, bus assignment switches and aux sends each with pre-post switching and On buttons. Two switches at the base of the section allow





scrolling in either direction across the board to access other channels for adjustment as an alternative to using individual channel Access keys.

EQ and dynamics are also available on the multitrack sends, auxes and the main programme.

The desk has AFL, PFL and solo with a variety of screen-set options for cancelling and switch latching ballistics. A variety of playback sources are available along with intelligent monitoring options—all taking in the multichannel format.

Snapshot and dynamic automation is available. The former can be fired from a variety of external controls and employs a very simple method of storage and recall together with isolation of specified channels.

Dynamic automation was the least complete of the desk's components at the time of my visit, but it employs two memories, marked A and B to store passes. Set to a manual rotation method, for example, every time time code is stopped the previous pass moves to the button B memory with your last pass stored in A. It's the sort of simplicity that was welcomed in good early third-party bolt-on VCA systems.

The file system can store up to ten titles with archival performed to diskette (there are USB ports on the back should greater storage be required). The title stores 99 snapshots, the cue

list, machine control setup and the dynamic data. The snapshots store all the routing information courtesy of an initial scene. Touch-sensitive faders make the dynamic automation of levels a straightforward and instinctive business while the specification of particular parameters for automation writing is performed by first selecting the channel and then selecting, say, the band of EQ to be adjusted from the screen. As already intimated the precise nature of the dynamic automation is still to be finalised, but will include absolute and trim adjustment on all rotaries and faders plus isolate and programmable auto return. It feels a solid and confident system that seems to value clarity highly.

Machine control is extensive and works with two 9-pin connectors and MMC plus time-code generator and reader. A bank of transport selector preset buttons work in conjunction with transport controls that are decidedly chunky.

R100s will be software upgradable, so Sony sees it as an on-going product, an observation that is substantiated by the presence of a few as-yet unmarked keys which will no doubt be pressed in to service at some later stage. Plug-ins anybody?

It's all incredibly friendly and while

other desks in this type of neighbourhood encourage immediate and obvious analogies to be drawn, inevitably to the Yamaha 02R, the R100 seems to have moved on enough for it to stand very much on its own as a strongly independent interpretation of the task being addressed.

However, let's say what it is not. It is not a baby Oxford as its complexity and functionality are very far removed from the company's flagship product and it is not a scaled down Oxford architecture built down to a price. Even so there are unmistakable similarities in the logic behind them to the extent that an Oxford owner would take to it immediately and swiftly. Importantly for the rest of the

world the R100 is about as easy to operate as could be and that matters more. It's a triumph of accessibility.

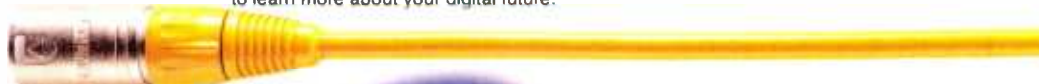
Aside from the final nips and tucks on the automation everything else on the desk seems to be up to speed.

It feels well-rounded and resilient, and the build quality is exceptional with lots of interconnection possibilities. When it comes on stream it may well define something of a new price point as an extremely attractive self contained package.

I really do believe that Sony is on to something rather special here. Watch it with interest. ■

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UR BYTES

## tc electronic M-One and D-Two

Two new processors from Danish tc electronic target the budget professional market: the M-One and the D-Two. **Dave Foister** balances cost and capability



**T**C ELECTRONIC is currently attacking both ends of the market simultaneously. While we look forward to sight of the new flagship Series 6000 machine, here to whet our appetites are a pair of entry-level signal processors bringing tc expertise to the masses. This is something the company excels at—developing ideas at the sharp end then quickly making them affordable. The M-One and D-Two are good examples of this.

They are also good examples of how just doing the same thing again a bit better is not enough any more. It's hard to believe how recently it was that a digital delay was a novelty, never mind digital reverb; yet the basic things they could do were soon taken for granted, as were the ever-more realistic reverb simulations. Most boxes can now do most things, so even something with a tc pedigree needs one or two extra little things that the others haven't got. These boxes have more than one or two.

The D-Two is unusual in that it is essentially a straightforward delay line. This is a gross oversimplification, but the point is that it doesn't do reverb, and its chorus-type bits are incidental and simple. Since there aren't many straight delay boxes around any more, it's intriguing to see what tc can have done to make this worth looking at in a sea of multi-effects processors. That's not to say it doesn't stand out in its own way—the cosmetics see to that.

It may be fundamentally a black box, but its display makes sure it gets noticed. This is one of the increasing number of multicoloured display panels, with brightly coloured panes within it to deal with distinct areas of its operation. The result, with its mixture of graphic diagrams, meters, text, icons and big numbers, is daunting at first, yet very informative once you've sorted out what's where.

What it all controls is a multi-tap delay system with three distinct modes of operation. To show how far we've come, one is called Traditional, offering simple variable delays with feedback and panning of the taps. Here you'll find a preset called 2290, offering the simple power of tc's venerable flagship delay. The second mode is Straight, with the feature you always wanted—the ability to set how many repeats you get regardless of how high the feedback level is. The final mode is a remarkable one called Rhythm, that allows you to tap in a rhythm on a button and have the delay repeats come out in that rhythm. In this mode the feedback function applies to the whole rhythm pattern, so the pattern can repeat as many times as you want. It will even quantise your manually entered pattern to a set tempo and subdivision if you want, and shift the timing as the tempo is changed. Since the tempo can be set either manually or from a MIDI clock, this is a very powerful feature and as easy to use as it should be.

There are several other little features that set the D-Two apart. One, inherited from the 2290, is labelled Dynamic, and operates a ducker on the effect output controlled by the signal—a trick that's often used but normally requires an outboard ducker. There's a button marked SPATIAL, that widens the effect of stereo panned delays—as this can introduce marked antiphase effects it's best used with caution. There is a Ping-pong function that automatically pans delays across the stereo image in time with the programmed tempo in various different patterns; and a reverse setting that plays back chunks of the delayed audio backwards when triggered by the input signal. This is not a simulation, like the fake backwards reverbs you often encounter, but genuine reverse audio. This feature also has a lot of user-control available, as it's possible

The D-Two is unusual in that it is essentially a straightforward delay line.

This is a gross oversimplification, but the point is that it doesn't do reverb, and its chorus type bits are incidental and simple

to set some taps to come out backwards while others come out normally. A Filter function applies progressive filtering to successive delay repeats, simulating very effectively the sound of tape-based and other old analogue delays. Finally there is a Chorus feature that adds simple chorus or flanging to the delayed signal. All these functions can be invoked and edited by tc's smart double-click on the appropriate button—unfortunately in the case of the Rhythm setting it's possible to do this accidentally by tapping in a fast rhythm.

Finding all this lot and adjusting it is surprisingly easy given the apparently simple front panel, and this invites experiment with the 50 factory presets—results can be saved in 100 user memories. The presets show just how powerful the D-Two is, with some very complex and dense effects alongside real delicacy and subtlety. All this is done with 24-bit I/O to very high quality, as one would >

The M-One, a full-blown multi-effects processor at exactly the same entry-level price as the D-Two. In fact it's more than full-blown; it inherits from the M-3000 pro reverb box the unusual feature of having two complete processing engines





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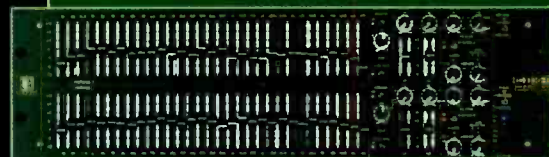


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< expect. Don't be fooled by its 'only' being a delay line; the D-Two is both exciting and friendly, combining more delay tricks than you're likely to have seen in one box with an ease of use that takes you back to the early delay days.

The same is true, in a different way, of the M-One, a full-blown multi-effects processor at exactly the same entry-level price as the D-Two. In fact it's more than full-blown; it inherits from the M-3000 pro reverb box the unusual feature of having two complete processing engines in it, fully independent of each other and capable of being harnessed together in a variety of configurations. The fact that each one is worth the asking price on its own makes this an amazing bargain, a point I'd normally reserve till the end, but this thing is so powerful you may as well know it now.

Each engine offers a choice of over 20 algorithms. Some are obviously distinct, like the various types of reverb; with others, like the Hard and Soft Tremolo, it's hard to see the justification for calling them different algorithms. Nonetheless, even combined into fewer groups, the effects on offer constitute an impressive palette. All the usual reverb flavours are there, including two plate types, a spring, and both Live and Ambience algorithms as well as a hall and a room. Delays, choruses, flanges and pitch shifts are there, along with dynamic processing of all kinds and 5-band parametric EQ.



The display is similar to that on the D-Two—big, multicoloured and comprehensive, as it needs to be with so much available. There are an unusual number of analogue-style control knobs and buttons, so nothing is ever very far away. Central to its operation is the routing of the two processing engines, allowing them to be used as two stereo effects on two mono aux sends, two full stereo effects in series or parallel, or two independent mono processes. This last is especially useful for EQ and dynamics, while the others offer a huge range of possibilities. Never forget that both engines are identical and independent, so whatever you do with one, there's no danger of compromising the potential of the other, even in the dual-send mode. One of the knobs controls the mix of the two engines on the main output.

Management of the processors is based on preset Programs, with 100 factory offerings and space for 100 more. Each program has settings for both engines along with the unit's routing, which would be inconvenient in some situations were it not for the Routing Lock facility that stops it switching from parallel to dual-send when you try another patch. Although the factory presets themselves are very impressive, this is not the kind of unit

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where that's all you ever use because there's never time to get round the complexity of programming it. On the contrary, the selection of parameters and the access to them makes it particularly easy to edit settings and to build them from scratch. Where appropriate all the reverbs have the same subset of adjustable functions, just enough to allow real subtlety and variety while not so many as to bog you down.

This is where the busy screen comes into its own. It manages to show, simultaneously, the input source and level; the current routing setup; the algorithms in use on both engines; any gain reduction activity in the dynamics processors; the number of the current preset; and most importantly, on its own line at the bottom, the current parameter and its chosen value when editing. Parameters are scrolled with buttons and adjusted with a wheel in the expected way, and the only potential confusion is the difference between selecting a preset and selecting a new algorithm for one of the engines. It's not hard, but the procedures are similar and the buttons close together.

Despite the good selection of other processes on the M-One, it sees it as primarily a reverb box, and this is reflected in its choice of styles and in their quality. This is good reverb as you'll find at the price, natural and real when required, bold and striking when desired. There's an optional gentle chorus-like modulation on the tails that I've heard done elsewhere, but not as effectively as this; for realism the 'Vintage' version of this is perhaps better turned off, but for deliberate effect it's very pleasant. There are parameters called Low and High Colour, which might otherwise be known as HF and LF damping; three Size options for the hall and room algorithms; independently adjustable levels for reverb tail and early reflections, and so on—a good combination of detail and quick adjustment. There's no specific control over the early reflection patterns and timings, and the pre-delay is just the delay between the early reflections and the tail, but since the early reflections are largely what define the different algorithms anyway there's no harm in leaving them alone.

The other algorithms are no afterthought either. As examples, the chorus and flange both have classic 2-voice and thick 4-voice settings; there's a vintage phaser setting that's one of the most convincing replications of a real old naff pedal I've heard; the compressor has a choice of soft and hard knee and is very useable as a compressor in its own right, not just as a basic adjunct to an effect. There is even a De-esser as a separate algorithm, and a Tap function for setting a tempo for chorus and delay settings to relate to.

Analogue inputs and outputs to both these units are balanced on TRS jacks, and digital is SPDIF only; it's only here and in the use of more plastic than is found in the pricier tc boxes that any corners seem to have been cut. In terms of quality and facilities these are top through and through, spectacularly easy to use, and flexible enough to give anything a run for its money at this price and more. ■

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# HHB MDP500 Portadisc

The cause of MD in portable recording looks stronger with the introduction of a machine from HHb. **Zenon Schoepe** gives an insight into what it will do



**N**AB SAW THE PREVIEW OF HHb's latest own-brand product and the second in the company's assault on the location recording market. The Portadisc carries over many of the stylistic and ergonomic clues introduced with the established Portadat portable DAT machine, but targets the mass market that MD applies itself so well to. This is a machine that will appeal to radio and TV journalists as well as serving as a professional incarnation of the format for jobbing location recordists especially as backup. As such it stacks up directly against the Marantz MD650 and when the HHb machines start to ship after August, the two will have the market to themselves.

The spate of portable and compact solid-state recorders have been attracting a lot of attention, but MD has much to recommend it. The media is cheap enough to record once to and archive, an approach that is uncomfortably expensive with card storage. MD can also be played back from an enormous installed base of studio machines with full and immediate compatibility.

MD has come a long way in the quality stakes even though many still judge it by their first early encounters with the format. The ATRAC 1.5 algorithm, used in the Portadisc and many new machines, is far removed from initial incarnations and while still a long way off uncompressed digital systems it's easily up to undemanding work and on-the-hoof dialogue recording for radio and broadcast journalism.

Multiple copying of MD remains a bad idea for the adverse sonic effects that can arise, although those establishments that already use the format at acquisition use production chains in which it never becomes an issue. Arguably the strangest thing about MD is the difference in geographical acceptance of domestic and professional incarnations. Japan, the UK and mainland Europe have

taken to it in varying degrees for domestic and professional usage, but the US, and its broadcast sector in particular, has been slower on uptake, but is now reportedly ready and keen.

Price for the Portadisc is being stated as under £1,000 (including VAT, UK) for a full kit that includes a bag, charger, universal PSU and batteries. Supplied batteries are Nickel Metal Hydrides which will give around four hours operation and power management software ensures that if you ever do run it to extinction it will sort itself out and establish the TOC before going down. Alternatively you can just buy eight ordinary AA batteries and get on with the job. The use of AAs is a significant one as HHb reckons that in contrast to the average Portadat user, who is likely to be very well organised, for most Portadisc operators the equipment will be a secondary consideration and AA batteries obviate any need to plan and allow for charging.

Recording gives 80 minutes stereo or twice that in mono if you choose to use the HHb 80-minute MDs. It employs a six second pre-record buffer and the machine is very much software controlled. Preset menus allow the important stuff to be placed on the surface with the more intimate adjustments protected by depth in the menu. A largish switchable backlit screen works in conjunction with a selec-

tion of menu access buttons and three soft buttons beneath the screen come into action to correspond to the various menu functions. The input menu, for example, adjusts source selection, mic attenuation, 75Hz/150Hz bass roll off, and phantom power.

Full screen bar-graph metering is provided with the usual play and remaining time displays, dB accurate margin indicator, and time and date which is recorded and recallable. The last of these will work well with an auto start-cut function with adjustable threshold in environmental noise monitoring applications.

The Portadisc has improved on the Portadat mic input circuit performance and connectors include mic-line input on XLRs, line output on phonos, digital I-O on phono and optical, 1/4-inch headphones jack, and a mini 8-pin DIN remote socket. XLR AES-EBUs have been deemed less relevant to the target market than the more common SPDIF alternative.

Unusually for such a device it boasts a USB port and is said to be the first stand-alone recorder with one fitted. This offers USB transfer to a PC or workstation on Windows 98 and 2000. Transfer is currently single speed, but the potential for integrating the Portadisc into production chains is at least interesting.

Standard MD editing features are included along with a built-in 'last resort' mic, mic limiters that can be ganged for stereo, automatic gain control, key hold, one-touch record, record lock, and level lock.

The display and menu arrangement works well and the machine is clearly built to take abuse, it has a 40s shock memory, yet it still looks stylish. It is particularly important to acknowledge that the Portadisc is an all-new from the ground up machine and a not a rebadging exercise. It was designed in Japan by an independent design and production engineering team to HHb's brief and approval and it will be built in Japan.

MD is the classic example of a consumer technology that has been pressed into professional service through careful application and modification. Add affordability and convenience and it makes it seem as if was originally tailor made for the job that it is now being asked to do. The Portadisc joining the Marantz machine in the market can only be good news for users and the cause. ■

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# KRK V8

Studio Sound's 'bench test' loudspeaker reviews continue with the V8. **Keith Holland** reports

**T**HE KRK V8 is a 2-way active loudspeaker featuring a 200mm woven Kevlar woofer and a 25mm soft-fabric dome tweeter; both have shielded magnets. The power amplifiers and crossover electronics are housed within the cabinet which has overall dimensions of 280mm wide by 106mm high by 305mm deep and weighs approximately 17kg. The drive-units are arranged vertically on the front panel with a slot

of the woofer finished in bright yellow.

Fig.1 shows the on-axis frequency response and harmonic distortion for the KRK V8. The response is seen to lie within  $\pm 2.5$ dB from 70Hz to 17kHz, except for a series of narrow peaks and dips of  $\pm 4$ dB between 400Hz and 700Hz. The low-frequency roll-off is 6th-order with -10dB at a respectable 38Hz. The high-frequency response falls above 16kHz to about -5dB at 20kHz. Harmonic distortion performance is exceptionally good showing a maximum 2nd harmonic of -40dB (1%) at 55Hz and a maximum 3rd harmonic of -30dB (3%) at 32Hz; levels are generally maintained below -50dB (0.3%) at higher frequencies. The horizontal and vertical off-axis responses are shown in Figs 5 and 6 respectively. The characteristic driver interference notch at the crossover frequency can be seen at 15 and 30 above the axis, and there is slight evidence of mid-frequency narrowing below the crossover frequency. The high frequency beaming is typical for a 25mm soft dome, and the only evidence of lobing occurs at about 17kHz and at 60 off-axis; this is not a problem. The effect that the 6th-order roll-off has on the transient response of the loudspeaker can be seen in the acoustic source position plot (Fig.2) which shows an apparent shift in the low-frequency source position to over 3m behind the loudspeaker; this result is typical for ported loudspeakers with high-pass protection filters. The waterfall plot (Fig.7) shows that the high-Q response irregularities seen in Fig.1 give rise to ringing in the mid-frequency range, which is also evident from the step response plot (Fig.3), as is a 0.5ms delay between the high- and mid-frequency responses. The power cepstrum plot (Fig.4) shows little evidence of discrete echoes. Overall the KRK V8 performs exception-

ally well in many areas, but this performance is let down by the on-axis frequency response irregularities in the mid-frequency range, which are also present at all off-axis angles. Given the frequency range within which these aberrations lie, and the general smoothness of the response elsewhere, it is possible that these response irregularities would be audi-

ble. The low-frequency extension and harmonic distortion performance are remarkable given the modest dimensions of this loudspeaker; only a handful of loudspeakers tested to date perform as well in this respect. The off-axis response and time-domain performance are acceptable and typical for a loudspeaker of this type. ■



port beneath the woofer. The power amplifiers are rated at 130W and 70W and the crossover has 3rd-order and 2nd-order slopes with a crossover frequency of 1.66kHz. The system is equipped with a high-pass protection filter that is 2nd-order with a cut-off frequency of 31Hz. Signal input is via a Neutrik Combo connector on the rear panel, which also has controls for HF gain trim ( $\pm 1$ dB) and LF turnover frequency (45Hz, 50Hz and 65Hz). The measurements for this review were taken with the HF control 'flat' and the LF roll-off set to 45Hz. The cabinet has radiused edges to reduce diffraction effects, and is finished in grey with the cone

**KRK Monitoring Systems,**  
16462 Gothard Street, Unit D,  
Huntington Beach, CA 92647, US.  
Tel: +1 714 841 1600.  
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For methodology see *Studio Sound*, April 1998, page 14.

See it on the Internet net-site:

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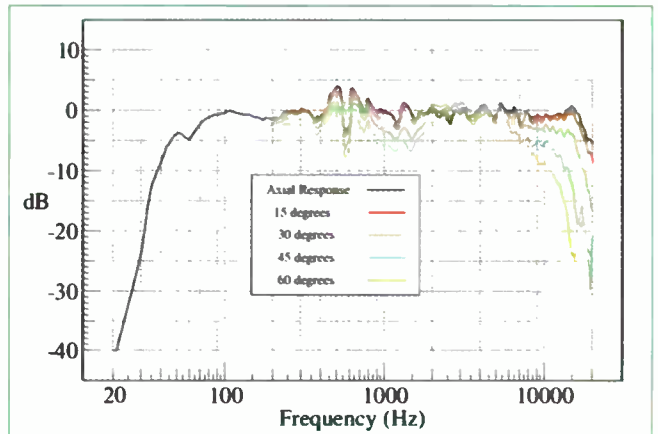


Fig.5: Horizontal directivity

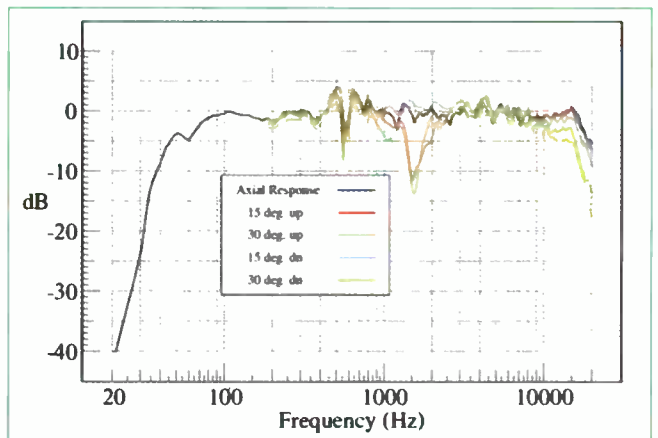


Fig.6: Vertical directivity

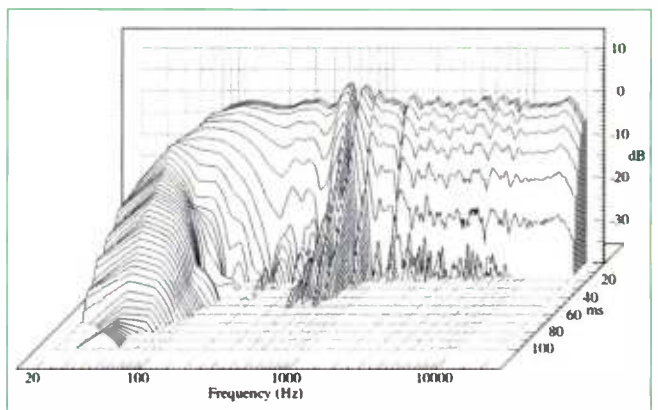


Fig.7: Waterfall chart



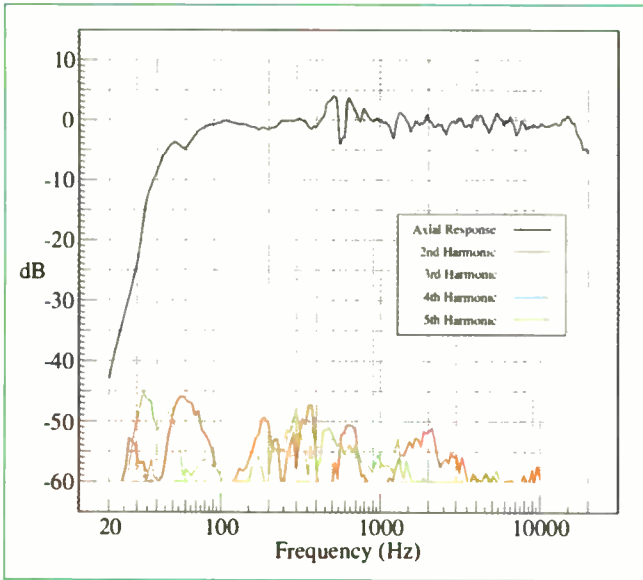


Fig. 1: On-axis response and distortion

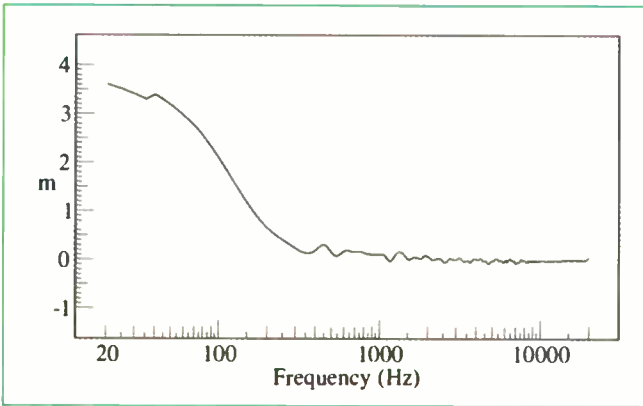


Fig 2: Acoustic source

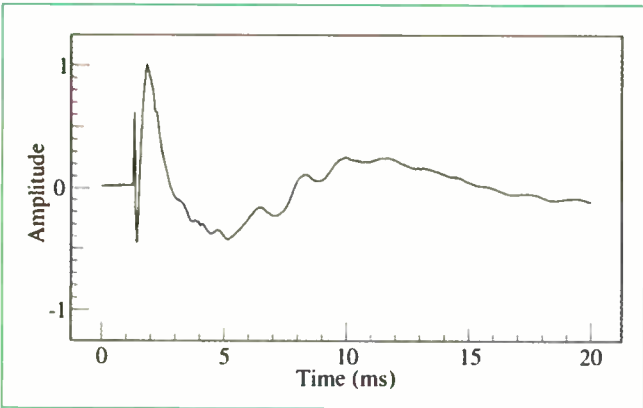


Fig.3: Step response

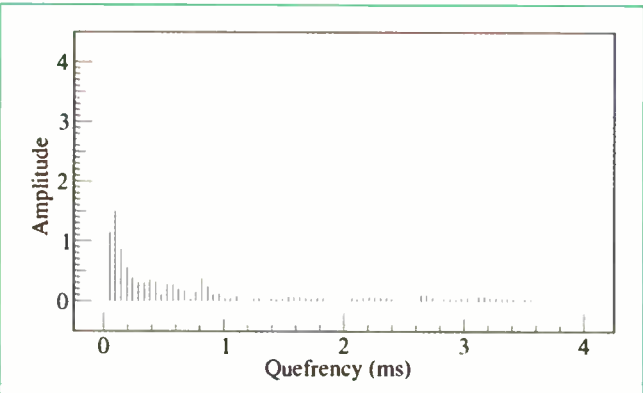


Fig.4: Power cepstrum



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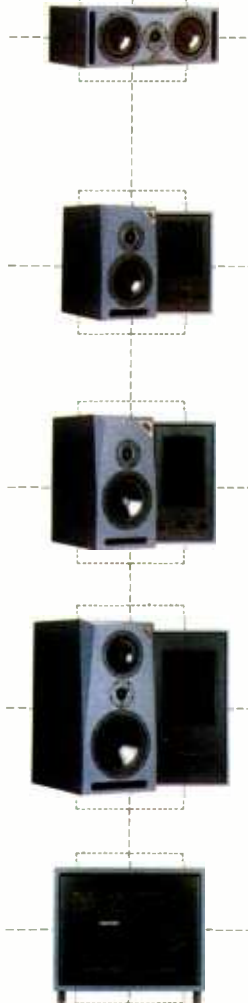
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# ATC SPA2-150

Studio Sound's bench test amplifier reviews continue with the ATC SPA2-150. **Paul Miller** reports



UP UNTIL THE LAUNCH of this £2,699 UK (inclusive) SPA2-150 power amplifier, engineers seeking a 'full ATC system' were limited to a combination of the SCA2 preamp and active SCM-50 loudspeakers. Sure enough, the SCM-50 has carved itself the reputation of a benchmark monitor, in addition to proving popular among domestic audiophiles. Nevertheless, it's only by culling the essential ingredients of this active speaker's amplifier stage and incorporating them into the stand-alone SPA2-150, that users

of ATC's *passive* boxes have the same opportunity to create a one-brand system.

Hookup is very straightforward with the option of either single-ended (phono) or balanced (XLR) inputs and just one pair of 4mm binding post speaker outlets per channel. A 7-segment LED display lights up the grey-coloured fascia to indicate fault conditions including 'overdrive', 'over temperature' and 'DC offset'. As the amplifier is DC-coupled through the input stage, the latter is set at a high 1V. With the amplifier hot, the residual DC offset of this >

(Rated Spec. in brackets where given)	20Hz	1kHz	20kHz
<b>Max Continuous Power Output</b>			
1% THD into 8Ω (one channel)	185W	200W	195W
1% THD into 8Ω (two channels)	185W	200W (200W)	195W
1% THD into 4Ω (two channels)	235W	250W (350W)	240W
Frequency Response @ 0dBW	-0.1dB	0.0dB	0.0dB
Dynamic Headroom (IHF)	+0.8dB (240W)		
Maximum Current (20msec, 1% THD)	15.9A		
Output Impedance	<0.1Ω (0.2Ω)		
Damping Factor	>80 (>40)		
<b>Unbalanced Input</b>			
Stereo Separation (1kHz)	95dB (>105dB)		
(20kHz)	80dB		
Channel Balance, 1kHz (0dBW)	0.01dB		
Total Harmonic Distortion (0dBW, 1kHz/20kHz)	-103dB / -83dB (<-95dB)		
(2/3 power, 1kHz/20kHz)	-99dB / -68dB (<-95dB)		
CCIR Intermodulation Distortion (0dBW)	-100dB		
(2/3 power)	-95dB		
Noise (A wtd, re. 0dBW)	82.0dB		
(re. 2/3 power)	101.5dB (<-110dB)		
Residual noise (unwtd)	-68.0dBV		
Input Sensitivity (for 0dBW)	92.2mV		
(for full output)	1304mV (2000mV)		
Input loading	10kΩ		
DC offset, left/right	+135mV / +103mV		
Serial Number	1065		
Retail Price	£1375 (ex-VAT)		

For methodology see *Studio Sound*, June 1999, page 27.  
See it on the web-site:  
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Fig. 1

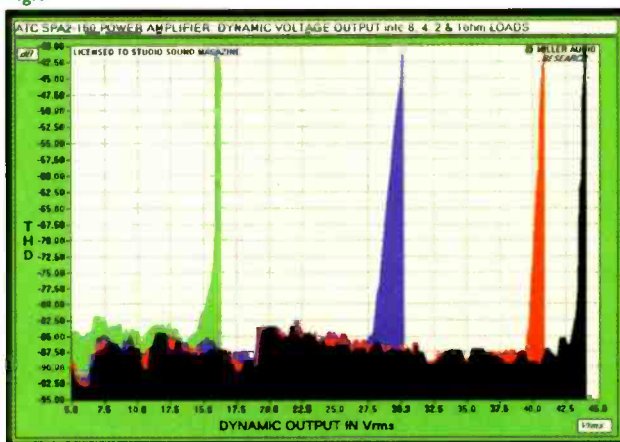


Fig. 2

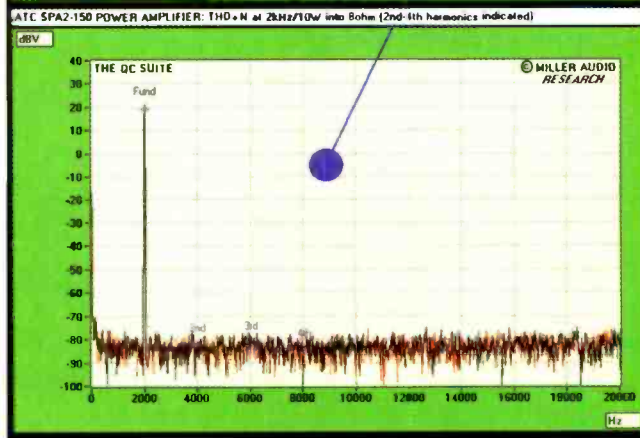
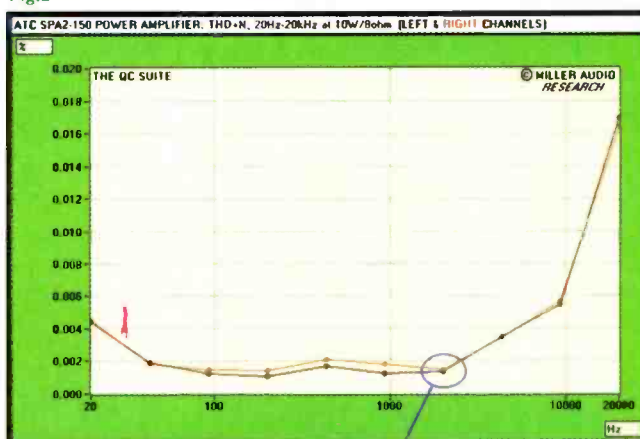


Fig. 3



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R.Ed does what it says (and a few things that it doesn't!).

A DAW where you have to read the small print to find out what works or is available and what it really costs.

R.Ed comes with a minimum of 26 ins and 28 digital outputs, so can connect to most digital consoles with no additional hardware.

A DAW that comes with proprietary connectors and always requires additional interface units to connect digitally to a console.

R.Ed can be operated fully using a simple cable connected to a standard EPP printer port of a PC Laptop.

A DAW that requires an expensive expansion board to run with a Laptop or can just run simple software with

multitrack, stereo, audio, or DSP based effects, plus lots.

R.Ed can expand to 128 outputs with a range of interfaces to suit any configuration, any digital tape machine or digital console, including Fibre connections to link multi-channel 24 bit digital audio over distances up to 1km (600 yds).

A DAW with limited I/O capability and limited I/O options.

R.Ed can run up to 128 tracks with any PC, from supermarket brands to high-end workstations.

A DAW that requires specially approved system configurations with expensive hard drives and SCSI cards to run 32-64 tracks.

R.Ed allows full simultaneous operation with your video editing system even when installed on the same PC (eg. discreet edit®, DPS Velocity/Reality, Fast 601).

A DAW that doesn't work simultaneously with video editing systems on the same computer.

R.Ed can record, edit and be controlled across a standard Windows Network via TCP/IP.

A DAW that can't run across a network, with hardware that has to be installed locally and can't be shared.

R.Ed supports Avid™ OMF™, discreet edit® & Lightworks projects, plus auto-conforming to all common EDL file formats (CMX, GVG, Sony etc.).

A DAW that supports audio projects in only one video editing project format (Avid OMF™).

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A DAW that doesn't support up to date standards, like 96kHz recording for DVD.

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**SoundScape**  
DIGITAL TECHNOLOGY



< unit (inputs shorted) was already moderate at >+100mV, a value that's sufficiently high to pre-bias the bass unit of many sensitive loudspeakers.

Similarly, as the MOSFET power amp stage is richly biased, the SPA2-150 will run very warm to the touch under normal operating conditions. Thus, the over-temperature protection cuts-in at the standard 90 C, which is plenty warm enough to 'cook' any lesser (non-MOSFET) equipment parked in its immediate vicinity. Both domestic and professional versions of the amplifier are convection cooled, though the latter is equipped with additional, exposed heatsinking if the unit is destined for rackmounting.

VI-limiting at high outputs, is dispelled by the SPA2-150 in practice.

Under dynamic conditions (Fig.2), the 200W/250W 8Ω -4Ω specification is stretched to 240W, 420W, 455W (15.1A) into 8Ω, 4Ω, 2Ω but just 252W (15.9A) into 1Ω, respectively. Even here, there is no steady increase in THD through VI-limiting at high power. Instead, clipping remains quite abrupt, even at low impedances where ATC's limiter circuit clearly comes into force. In this respect, the SPA2-150 is evidently less load-tolerant than amplifiers from the Bryston and Hafler stable.

Where speaker loads are less arduous, however, the SPA2-150 comes into its own with an elegant and fully discrete op-amp front-end and driver stage that derives its wide bandwidth from that of the SCA2 preamp. The -0.3dB loss at 12Hz is of no issue, but HF extension is superb at just -0.02dB at 30kHz. As claimed, the 3 pairs of Hitachi MOSFETs that comprise its output stage offer very low levels of distortion (see Fig.3) up until 10kHz or so when its NF compensation is less effective. The lower plot of Fig.3 shows that any distortion harmonics are buried beneath the amplifier's noise floor to the tune of -100dB or so through upper bass, midrange and lower treble frequencies. Once again, the symmetry of this performance bodes well for good sound quality.

Moreover, the generous biasing of ATC's 'grounded-source' FET output stage ensures low distortion at both low and high power outputs. Fig.4 indicates the mean THD from 1-190W into 8Ω is just 0.0013% or -98dB with a spread of just +6dB/-5dB over 95% of its dynamic range. This controlled pattern of distortion-noise with its freedom from high-order artefacts and abrupt changes in harmonic complement will, once again, assist in the amplifier's delivery of a consistently neutral sound.

The 82dB A-wtd S-N ratio might seem a little poorer than expected but as Fig.5 demonstrates, this is largely due to odd-order (50Hz, 150Hz...) supply harmonics rather than any excessive HF 'white' noise. In practice, the SPA2-150 sounds very smooth indeed and should prove the ideal complement to brighter-sounding studio monitors, whatever their origin. Nevertheless, it's the sheer poise, detailing

and transparency of the amplifier's performance that will appeal to domestic users. While other, strictly pro-orientated amplifiers will inevitably be better suited to rugged sound reinforcement applications, the ability of the

SPA2-150 to pick its way through very complex mixes without sounding hard or fatiguing will prove a godsend for engineers involved in very critical monitoring. This is a specialist amplifier, destined for specialist installations. ■

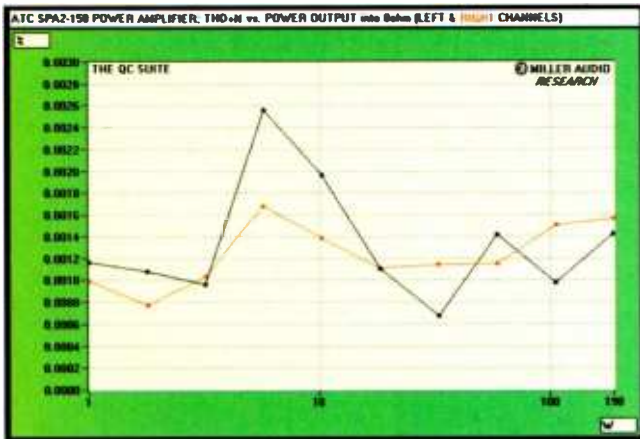


Fig.4

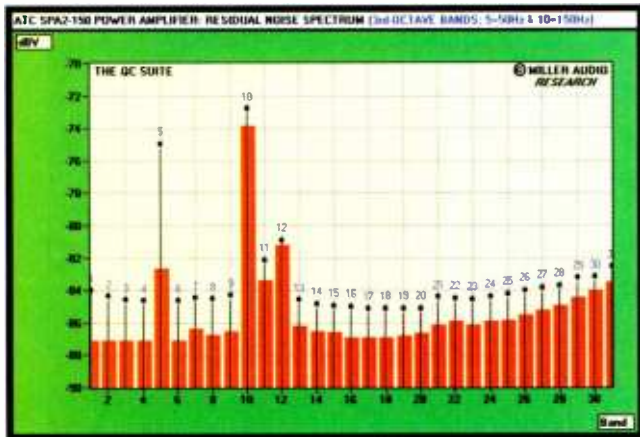


Fig.5

The pro-version also trades the dual-transformer power supply for a single, larger toroid without, ATC claims, any reduction in performance. The domestic version, at least, is genuinely dual-mono in layout and this is reflected in the identical power delivery of both channels, whether one or both are being driven (see Fig.1). In this instance, though the 200W, 8Ω specification is only met by the skin of its teeth, the symmetry between channels is clearly very impressive.

Clipping, when it does occur, is very swift indeed. This seems contrary to ATC's literature which talks of a 'momentary gain reduction' that's invoked if the output drive current and/or rail voltage exceeds a safe value, supposedly suppressing such bursts of THD. Incidentally, the SPA2-150's 'static' gain is 29.75dB. Any similarity with NAD's 'Soft-Clipping' circuit, which applies a progressive

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## NEW TECHNOLOGIES

**Beyer's Opus**

Beyerdynamic released the Opus series of mics at the Frankfurt Music Messe. Designed to provide 'an integrated family of microphone products' the range includes



popular mic types in dynamic, condenser and wireless and all are made in Germany. The mics will be available in May and are said to have received enthusiastic feedback from beta users.

**Beyerdynamic, UK. Tel: +44 1444 258258.**

**AKG's cheapest UHF**

AKG has added a another condenser to its mid-priced range and introduced what it describes as 'the cheapest' self-branded UHF wireless range.

The C 2000 B cardioid has a small-diaphragm transducer capsule for claimed high sensitivity, low self noise, and excellent bass response. Operating as a back-plate electret the 1/2-inch diameter patent



applied for diaphragm design achieves certain 'features' of a 1-inch diaphragm.

Frequency response is said to be extremely flat with a slight HF boost. A transformerless output stage ensures low-end definition. AKG engineers used parts of the C 3000 B to create the new model, which eliminated high tooling costs. The mic has pad and bass roll off switches.

The WMS 40 UHF wireless system transmitter will operate for more than 35 hours

**Neumann KMS105**

Combining condenser quality and road ruggedness gave Neumann the KMS105. **Dave Foister** sings its praise

ONCE UPON A TIME there were studio microphones and stage microphones. Stage microphones might not sound much good, but neither did the systems they were heard through, and at least you could sling them in the back of the van after the gig and they'd still work tomorrow. Decent PAs have inevitably meant decent microphones on stage, but one area where there is still a vestigial distinction is the hand-held vocal microphone, where immunity to rough handling and tolerance of close vocal techniques still score over ultimate quality. There are, of course, condenser microphones designed for this use, but few bring the quality associated with the studio to the stage. Now there's one that does, and the surprise is that it's from Neumann, not traditionally linked with live performance microphones.

The new arrival is the KMS 105, whose name announces much about its background, but not about its origins. Neumann clearly watches the use its microphones are getting in various applications, and the 105 is a response to the adoption of the KMS 150 condenser microphones for stage use by Bryan Adams and Tom Petty. The clear need for a vocal microphone in this league has in turn led to the development of a dedicated model with all the design considerations that the application demands.

The KM designation and the 100 series numbering are a clear indication that the electronics are those found in the FET 100 range, and the overall design is going to have something in common with the KM 100 series, including the recent range of reintroductions of the classic KM 84-type microphones. At the same time it looks nothing like the familiar small KMs, being clearly intended for hand-held stage use and conforming generally to the traditional shape.

Much of this shape is the result of having to incorporate decent wind screening within the basket around the capsule, and in the case of the KMS 105 the detail of the windshield construction is clearly visible through the mesh. There are two layers of protection, one being the outer basket itself and the other a much smaller fine mesh assembly close to the capsule. Besides this, the capsule assembly incorporates the necessary shock mounting to deal with handling noise. The result is a reassuringly solid and rugged body that feels like

a familiar dynamic in the hand. With only two samples of a not inexpensive microphone in Europe, I was not about to try the Roger Daltrey test of bouncing it off the floor and seeing if it still behaved, but it gave the impression that apart from probably suffering a dented mesh it would probably survive. And anyway, a vocal mic without a dented mesh obviously isn't getting enough use.

But lest you get carried away and start chucking it about like it only cost a few quid, it comes,

by way of a reminder of its roots, not in a floppy pouch but in a typical Neumann wooden box. The inside cradles the microphone in foam and has a compartment for a stand mount; the review one came with a standard Sennheiser springy plastic one that was barely big enough for the 105's diameter, but it's still early days and perhaps there's a dedicated clip on the way.

The obvious test for the new microphone was to put it up in the studio alongside a selection of others and see where it fitted in. For reference I used a 414, and also put up a KM 84 and the 105's stablemate, the Sennheiser Evolution 855, the top dynamic vocal microphone in the range. The assumption might be that the 105 would sound similar to the KM 84, and this turned out to be an accurate prediction.

It was no surprise to find the 414 the biggest and fullest; it was also to be expected that the 855 would be marked by a distinct presence lift. What was a pleasant discovery was the fact that the KMS 105 sounded effectively identical to the KM 84. The same neutrality and smoothness were there, and it was virtually impossible to tell them apart, despite using them on instruments as

well as the obvious voice material. The only difference of any significance showed on close voice, where the 84 popped to order while the 105 was at least as immune to plosives as the Sennheiser dynamic. There's no doubt that this will give you a studio-type sound on stage without the usual drawbacks.

None of this is intended as criticism of microphones like the 855; on the contrary, their colour is not a shortcoming but a deliberate feature suiting them to their job. Indeed, there will be those who want their vocal microphones to be anything but flat, regarding the standard presence boost as a useful known shortcut to the sound they want. For them the KMS 105 will have them reach-

ing for the EQ and wondering why they switched; for the rest, the flexibility of starting with a blank canvas and getting precisely what they want out of a vocal microphone will be a long-awaited breakthrough. ■

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# Tascam MD-301 Mark II

MD still evades many studio racks so Tascam has arrived at a budget machine. **Zenon Schoepe** reaches for the keyboard

**S**LIPPING IN AT THE ENTRY LEVEL of Tascam's pro MD machinery, the Mark II incarnation of the original MD-301 is actually quite a significant one. While still a fair stretch away from the top of the line MD-801 model, which sports the sort of features and trimmings that have always been associated with Tascam's best punt at a given



technology approach so well characterised by its pro cassette machines, the Mark II actually shares more than passing similarity to the MD-501 model. In fact it has an enormous similarity in the features list and in the looks department.

As an entry level product, and the MD-301 Mark II really is cheap by any standard, you're getting a lot. The feel of the device is solid—disc handling says so much about the underlying priorities—this is a very strong package.

The front panel looks like a compilation of those of the Mk1 MD-301 and the MD-501. An input selector chooses between the balanced XLR and phono analogue, and rear and front panel optical connectors. Analogue record level is controlled on a single pot, without the balance control that the MD-501 has, and transport and function keys are located in a cluster to the right of the rather nice main display which aside from the bar-graph metering also houses mode and status indicators.

Front panel controls cover Stop, Play and Pause on large keys with record and Search represented by smaller buttons. Pressing the Record button with no disc in the drive activates a monitor 'through' mode. The Display button activates different timing display modes (elapsed, total, remaining) while a Play Mode switch activates different play modes (shuffle, programmed and repeat between defined points).

Track selection is performed on a dial which increments-decrements with turns to the left-right respectively. A push of the same dial equates to enter when adding tracks to programmed playbacks, for example. Two buttons accompany this dial marked EDIT-NO and YES and concern themselves with access and adjustment of menu parameters. It's here that you delve in to MD's editing functions, name discs and tracks, set start points and select such things as auto track numbering.

Fortunately you can also use an infra-red remote control and thankfully dedicated buttons are provided on this for the likes of Insert, Delete, Clear, Title Edit, Character Select and Auto Space.

Together the front panel and remote inter-

act really well to share duties although it has to be said the remote offers the most control. Better still is the ability to plug in a IBM-compatible computer keyboard in to the front panel on a 6-pin mini DIN as on a MD-501. Doing this takes the tedium out of editing and naming discs and you even get an overlay for the keyboard that reminds you of what functions are attributed to which keys.

I have been determined enough to name an MD is the past using the laborious and tricky means available on the machine I was using at the time, but I've never had the resolve to name a track before. With the MD-301 Mark II it becomes a pleasure and the operational aid that it was always intended to be. Shift keys correspond to front panel controls together with an assortment of the remote's dedicated buttons, while shifting the Function keys accesses the editing functions directly. Characters can be entered directly from the keyboard assisted by the usual cursor movement and backspace, delete, insert functions. Show the tidily named and edited disc to a colleague and they will be impressed and immediately presume that you have the patience of Job. No harm there then.

In use this is a very satisfying machine to operate. The ATRAC algorithm is v4.5 so it's pretty much state of the art in this respect and general navigation and response is good. My only concern was that the analogue inputs seemed to require unusually high record level settings to get them in to the section of the bar-graph where you would want them.

Best of all the MD-301 mkII offers you a wide variety of operational methods: front panel with menu access, the remote, and the computer keyboard which combined give enormous possibilities. I would probably err on the side of the computer keyboard with an extension lead as this gives by far the most comprehensive means of control and makes the whole business of track and disc naming and editing very much faster if not immediate.

Tascam has achieved a considerably design and engineering feat with the MD-301 Mark II which eclipses the original machine on all counts and also gives the more expensive MD-501 a serious run for the money although the latter differentiates itself quite obviously by the inclusion of fader start, digital fade in, fade out and improved interconnection possibilities.

Even so the Mark II draws the line at which professional rack-mount MD machines kick off. Optical I-Os, as the only means of digital connection, could be regarded as a drawback, but this box has all the other facilities you would expect from a machine that you'd want to slot in to the rack along side your studio cassette machine. ■

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## NEW TECHNOLOGIES



off a single set of two AA batteries. In addition, the hand-held transmitter and the bodypack use a DC/DC convertor to stabilise the supply voltage so system performance will remain unchanged throughout the battery life.

Each WMS 40 operates on a single, fixed frequency between 710MHz and 865MHz so the system is ready for use. Up to three systems can be used simultaneously. Within Europe, another two ISM frequencies are available that can be used without government approval and thus provide additional savings.

The SR 40 non-diversity receiver uses the same audio circuitry as the WMS 60/80. Integrated SAW filters ensure immunity to interference.

The HT 40 hand-held transmitter uses a permanently mounted microphone element that is acoustically identical to the Emotion Series D 880. The PT 40 bodypack transmitter has been designed for use with condenser and dynamic mics and electric or electronic instruments.

**AKG, Austria. Tel: +43 1 866 54241.**

### KT loudspeaker processor

KT's DN9848 digital loudspeaker management system has four balanced analogue inputs and eight balanced outputs and is configurable for any loudspeaker system. Features include flexible routing, the ability to program delays on inputs and outputs, and eight separately configurable fully



parametric EQ stages plus gain control and compression. Metering with clip indication is available on all I-Os. Output channels have high-pass and low-pass filters for setting crossover characteristics and six further stages of parametric EQ, delay, gain control, muting and limiting together with all-pass phase correction.

**KT, UK. Tel: +44 1562 741515.**

### Power amp

Chameleon has released the d777 1U high 1560W power amp that weighs a modest 10kg. The compact nature is achieved by the use of bi-phase rectification and surface mount boards. Stereo output power in to 4 Ohms is 780W with 1500W available in bridged mode. Features include independent 800VA transformers, bipolar output stages, class A pre stages, Speakon outputs, stainless steel fascia and back and



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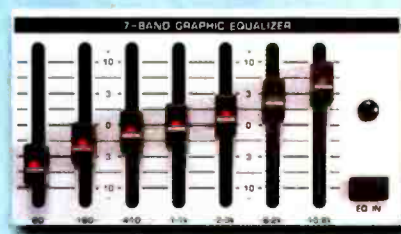


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# Lectrosonics 110-series

Following on from the earlier 300-series, Lectrosonics' new radio mic system combines facility with affordability. **Neil Hillman** tunes in

**I** DON'T KNOW what the world is coming to. From this desk I can see a telephone junction box. Well, I can't actually see that at the moment, as a rather garish red and white striped tent envelopes it and the associated hole in the pavement alongside that green box. I did, however, see two men disappearing into this plastic canopy this morning and assumed that they were sitting warm and safe from the elements, and in the great British tradesman tradition, they would soon be knocking the door in the hope of tea. But I was wrong. In an effort to determine just what was happening I read their company billboard. No, not British Telecom but the XYZ Holdings Company, working as a considerate contractor in partnership with BT. And indeed they were; no tea drinking, just two line-men working-the-pairs and expressing concern that they might be causing me some inconvenience. Whatever next? A full-spec UHF radio microphone channel in the UK for well under £1,000? Well yes, actually.



The Lectro UM-110 transmitter/UCR-110 receiver coupling (US nomenclature '100-series') builds on the considerable success of the larger Lectro-300 series, introduced into Europe last year, and at first glance seems to address the major drawback of an otherwise superb system—namely the size of the receiver. Importantly, what has been sacrificed in the move to belt-pack dimensions, is the space-consuming circuitry associated with the unique features of the smart-squelch circuitry, the tracking front-end and the 32kHz pilot-tone of the Lectro-300. Accordingly, Lectrosonics designate this product with commendable honesty as semi-professional (unlike certain other manufacturers, who attempted to persuade us of the opposite case with one of their more recent offerings to the wireless world). That said though, the Lectro-110 feels like a much more expensive product. Both the transmitter and receiver are housed in a rugged, machined aluminium housing, with a black crackle-finish not dis-

similar to the early Micron receivers.

The transmitter input is suitable for almost any microphone or line-level source, with a  $\pm 5V$  bias voltage available for powering electret mics. Two level-indicating LEDs on the top face marked -20(dB) and 0(dB) aid the optimum level setting, with the green -20 LED lighting in the presence of a signal and the red '0' LED coming on to show that limiting is commencing. With the safety of a high overload threshold of over 30dB, however, I set the levels to give gentle limiting on peaks in speech and felt comfortable with this as a starting point for the overall dynamics of the system. The Lectro-110 boasts a dual-compander, fed from either side of a 1kHz, 6dB octave slope centre point. High and low frequencies are separately processed; the HF compander has a fast attack and release time-constant to keep high frequency transient distortion at a low level, while the LF compander uses a slower time constant that has the effect of reducing low frequency distortion to a much lower level than a single compander system could. The signal-to-noise ratio of the Lectro-110 is also extended by around 10dB to a quoted 105dB through the use of an HF pre-emphasis boost in the transmitter and an HF de-emphasis roll-off in the receiver.

The receiver is configured for easy visual monitoring of system dynamics through the use of LEDs sited on the top panel for audio level-limiter operation, RF level and battery level. The -20 and 0 LEDs, red and green respectively, operate in the same manner as those on the transmitter whilst the green RF LED lights when the transmitter is powered 'on' and shows that an adequate signal is reaching the receiver. The red ON LED lights solidly when the receiver is switched on and acts as battery indicator with a 90% on/10% off flash rate after about two-thirds of its operational life. Another hour of use has a 50/50 flash rate while a 10% on/90% off rate indicates the last hour of life.

If we set aside the obvious short-comings compared to the 300-series of selectivity and RF hardening—provided on the Lectro-300 by the smart squelch, tracking front-end and diversity operation—the audio integrity of the Lectro-110 is nonetheless impeccable. A locking version of 3.5mm socket would be desirable for the output lead, as would a detachable SMA terminated antenna for the receiver, to

match the one fitted to the transmitter. Also, despite my better efforts, the roll-off filter on the side of the transmitter, although graduated down to 35Hz would appear to get no nearer to this than the 50Hz point. But these last minuses are of small consequence compared to its plus points: it is possible to place a 30 $\Omega$  ear-piece into the receiver and to gain a reliable presenter in-ear monitor.

And, of course, it doesn't require regular cups of sugary tea. ■

## Contact

**US:** Lectrosonics.  
**Tel:** +1 505 892 4501.  
**Net:** www.lectro.com  
**UK-Europe:** Raycom.  
**Tel:** +44 1789 400600.  
**Net:** www.raycom.co.uk

## NEW TECHNOLOGIES

removable filter grills.  
**Chameleon, UK: +44 1594 827602**

### BTC analogue desk

The BTC analogue broadcast console from AMS Neve has mono or stereo channels, 10 stereo subgroups or outputs, 10 auxes, a choice of mix minus systems. SAP facilities, surround monitoring options, comprehensive talkback, a VCA fader option and stereo AFL and PFL. BTCs have already been sold to CBS-TV, WITI-TV and All Mobile Video.  
**AMS Neve, UK: Tel: +44 1282 457011.**

### beyerdynamic cuts clutter

beyerdynamic has new components for the MCW microphone conference system wireless. These latest additions allow meetings and discussions to be held without any cables cluttering up the conference table. The SHM 88 is a condenser microphone with a slimline housing designed to make it virtually invisible from a distance. The SHM 88



has a back-electret capsule for clear speech transmission and low feedback. The company is also debuting the MTS 67, a desktop microphone unit. Three operating modes can be chosen depending on the application: On/Off, Push To Talk and Push To Mute. Frequency response can be tailored for use in three modes: linear, 80Hz bass roll off or 180Hz bass roll off. The MPC 67 is switched on and off with a noiseless film button, while an LED indicator shows the ready-to-talk status. The different functions are controlled by an 8-bit micro controller. The MPC 67 RC is available with a remote control: the microphone can be activated by an external switch and an external device—for example a video camera—can be triggered by a MOSFET output. Other new products include VHF and UHF wireless systems, shotgun microphones for video and film and professional headsets.

**beyerdynamic, Germany.**  
**Tel: +49 7131 6170.**

### DUY bundle

DUY Research has released EverPack, a bundle of five plug-ins for RTAS, MAS, VST, AS and Premiere. The plug-ins included are the new DUY Z-Room reverb together with the established DaD Valve, DUY Shape, Max DUY and DUY Wide. A reverb for RTAS, MAS, VST and Audiosuite, the main features of DUY Z-Room are high quality density and diffusion; total control over parameters with intuitive user-interface; Deluxe, Economy and Earlies modes; Rehearsal mode allowing the parameters to be set while hearing the real impulse response of the reverb; the choice of



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# Focusrite ISA 110 Limited Edition

Returning to its roots, Focusrite has resurrected its first classic equaliser. **Dave Foister** makes history

**T**HERE ARE REVIVED CLASSICS and there are revived classics. Revisiting legendary equipment is now big business and has taken several forms: a long-defunct company's vintage equipment produced in replica form by a new company; vintage equipment reproduced with modern updates by the company that originally pro-

duced it; and landmark products recreated as closely as possible by its original manufacturers. Examples of all three abound but the least common, for obvious reasons, is the last. Often a landmark product in itself is not enough to save a company from eventual oblivion, and equally often a close replica of an original is simply not possible after the passage of time has left some components obsolete. Focusrite is in the enviable position of having avoided both misfortunes, enabling it to give us a limited edition of the product that began it all, the ISA 110 equaliser.



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Because it was this equaliser that put Focusrite on the map, at a time when automation and recall were driving console development, some would say at the expense of a musical sound. The Neve-designed EQ addressed this perceived problem, making it a familiar sight in the top-end studio's rack, and the presence of a highly desirable microphone preamplifier didn't hurt it either. The success of the 110 led to demands for a no-compromise console built around its circuitry, and the mammoth Focusrite desks were the result; these in turn led to an extensive range of spin-off outboards, from compressors to mastering EQ. Focusrite guards its heritage jealously, and has recently introduced both the 430 Producer Pack (*Studio Sound*, January 2000) and this ISA 110 Limited Edition. The 110 is electronically identical with the original, and differs only in its horizontal rackmount orientation and in the addition of its insert point.

By definition, a piece of equipment worthy of the epithet Classic will be very familiar to many readers, who can skip the next bit. Those who have never come face to face with a 110 can read on.

The 110 is a good simple example of the outboard mixer strip concept. It has a microphone preamp at its front end that in itself should outperform those on most consoles, with all the essential facilities to hand. Thus there are separate microphone and line inputs on the back, switchable phantom power for the microphone, and separate gain controls for the two inputs. Both have coarse gain switched in 6dB steps, the mic input sensitivity running from 0 to -60dB

and the line gain from -18dB to +18dB, and in addition there is a variable trim control adding up to 10dB to either coarse gain setting. Switching between the inputs is done by two illuminated push buttons that audibly operate a relay inside. There is a phase reverse switch, although you have to explore the opposite end of the panel to find it: quite why

the preamp's controls are at the right hand end is not clear. Those wanting the shortest possible signal path can tap the signal off at the preamp output, as there is a pair of insert sockets on the back. These are proper balanced connections on TRS jacks, so the preamp and the EQ could be used as separate units if required. Otherwise the option is provided to patch a compressor or other processor in; if you want it post EQ, just patch the 110's output to the compressor and take it from there.

Good as the mic pre is, most will buy the 110 for its equaliser, not the preamp alone. This is a very familiar 4-band arrangement, with separate filters (note that these are part of the EQ, not the preamp, slightly reducing the flexibility of the preamp as a stand-alone device). The filters are far more elaborate than is to be expected from the average console channel, with HP cutoff going as high as 330Hz and LP down to 3.9kHz—extreme settings for extreme circumstances.

The EQ itself is in two independently-switchable sections, one containing a complementary pair of shelving bands and the other an overlapping pair of parametrics. Again the range of frequencies is quite wide, with just enough boost and cut (and just enough control of the parametrics' Q) to provide a very versatile set of tools. There are many more extreme equalisers on the market, but few as flexible; and even fewer with such a musical effect on the sound.

This is what makes the Focusrite special.

Fancy circuit topologies and extra features are all very well (and don't forget Focusrite can get fancy with the best of them), but in EQ nothing is as important as the sound it can produce and the ease with which it can be achieved. Somehow the sound you're looking for seems easier to find with an equaliser like this, and you never seem to have to back it off because it starts to introduce things you

didn't want. It's these factors that put the 110 on the map, and they are still there now, the yardstick by which to measure the others. Get one while you can; they won't be around for long. ■

## Contact

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Fax: +44 1494 459920.  
US: Digidesign.  
Tel: +1 650 842 7900.  
Fax: +1 650 842 7999.

## NEW TECHNOLOGIES

several room responses including reverse, gate, hall, room and stage; internal 64-bit processing and over 50 presets. DaD Valve is a physical-modelling-based classic tube simulator for digital audio systems; DUY Shape is a sound enhancer featuring 3-band smooth filters with full audio range continuous crossover points and three independent user-defined shapers; DUY Wide is a stereo and multichannel spatial enhancer that allows widening of the stereo image as well as sound placement outside the physical speaker locations and Max DUY is a sound-level maximiser based on DUY's ILO algorithm featuring seamless level maximising, zero harmonic distortion and release-free operation.

**DUY, Spain. Net: [www.duy.es](http://www.duy.es)**

## Klein & Hummel

Klein & Hummel has introduced the compact active subwoofer O818 and the P104 compact, passive 2-way near-field studio monitor. Designed for broadcast, commercial recording and postproduction studios, the O818 complements active near-field monitor the O104. Featuring a 120 Watt RMS amplifier, the O818 also has an LF driver with a 25mm linear voice-coil travel, triple mag-



net system and a 50mm 4-layer voice coil. A patented 10-inch Nomex cone guarantees lowest harmonic distortions and high internal damping. The O818 gives low frequency extension to 30Hz for standard stereo mixing and LF effect (LFE) channel reproduction for multichannel surround applications. It also has an adjustable phase shift from 0°-180°, and switches for LCR-mode, sub-direct (5.1 Dolby matrix) and a remote controlled bypass. Aimed at smaller applications, the P104 passive near-field monitor was developed from the active version (O104) and offers the same sound characteristics. In spite of the small volume of 7.5 litres the monitor produces a bass response of 85Hz-20kHz ±2dB with a total harmonic distortion below 0.5% at

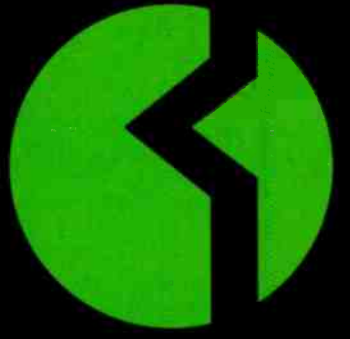


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**CEDAR**

# Korg OASYS PCI

This new card from Korg combines a 12-channel virtual mixer with synthesis, effects, and ADAT and ASIO interfacing. **Simon Trask** finds out if it offers the best of all worlds

**F**ROM MIDI TO AUDIO to virtual mixers to effects and now softsynths, the computer-based virtual recording studio has become ever more inclusive during the past decade. With OASYS PCI, veteran synthesiser company Korg has taken the view that on-card DSP rather than native processing is the right way to integrate its high-quality synthesis and effects into a computer-based recording environment.

Essentially the company has integrated the I-O functionality of its popular and widely supported 1212 I-O PCI card (eight ADAT, two SPDIF and two analogue input and output channels—hence the name) with an on-card 12-channel virtual mixer plus synthesis and effects programs which are automatically downloaded from the computer into the on-card DSP whenever you assign them to the mixer. Initially available for Mac only, OASYS PCI will also be released in a Windows

version. MIDI routing for the synthesiser channels is enabled using OMS, FreeMIDI or a basic serial port driver from Korg.

Each mixer channel has four effect slots. Also provided are four send buses, with four effect slots per bus. You can route each channel to one, two or none of the send buses. The dry signal from each mixer channel and the effected signal from each send bus can be routed to Master or to any pair of hardware output channels, making six output buses in all, any one of which can be designated Master. Each output bus also has four effect slots. You can bypass the OASYS PCI mixer altogether by routing any hardware input channel directly to any hardware output channel or via ASIO to a compatible digital audio program. Another advantage of the card is that it can provide zero-latency monitor mixing.

The synthesis aspect of the OASYS PCI card is very impressive. In essence, OASYS PCI gives you, within a computer-based recording environment, synthesis quality the equal of any stand-alone synth or expander. The 1.01 software comes with 28 synthesis algorithms, or Patches, as standard, organised into seven categories: Analog Synth, EP, Guitar, Organ, Percussion, VPM, and Waveguide. OASYS PCI is at heart an open architecture instrument, meaning that new synthesis models can be added via a software update. A program to be released soon by Korg will allow OASYS PCI users to build their own synthesiser architectures on-screen from predefined building blocks. OASYS PCI also provides the sort of high-quality effects we've come to expect from Korg through their synth workstations. There are 17 effects categories and around 130 effects to choose from, and, as with the synthesis, more algorithms can be added.

Complete mixer, synthesiser and effects assignments and settings can be stored as mixer snapshots known as Multis. However, because downloading of new data into the DSP takes several seconds, you are effectively limited to one Multi (and no synthesiser program-changes) per song. Also, unfortunately the on-card DSP power isn't enough to handle all the synthesiser Programs and insert and bus effects you may want to run at once for multitrack work, which can be frustrating. If you're also using a program such as Cubase VST or Digital Performer you may well need to record some effected synthesiser and/or audio parts into the program as digital audio tracks (easily done by selecting Mixer Outputs as the record source in OASYS PCI's ASIO panel).

What OASYS PCI does, then, it does to a high standard of excellence, just not necessarily enough of it all at once. I found it to be robust and reliable, and an effective and well integrated high-quality synthesis, effects and I-O addition to a MIDI + Audio program such as Cubase VST 24. ■

## Contact

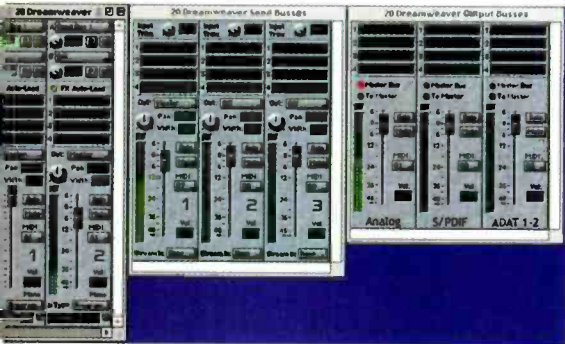
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 www.korg.com

version once the software and drivers are in place (the PCI card itself is cross-platform).

The card is a full-length PCI card; its audio I-O hardware ports are available via a slot on the computer's rear panel once the card is fitted. The analogue I-O features 24-bit A-D and D-A converters, and the ADAT and SPDIF I-O both support 24-bit functionality. Word clock and ADAT sync I-O are also provided as standard. Due to limited space, the OASYS PCI package includes breakout connectors for the analogue and SPDIF I-O.

The card has five Motorola DSP chips, one for handling the I-O routing and mixer implementation while the other four handle the synthesis and effects processing. The OASYS PCI package includes Editor software that acts as the graphical front end to the 12-channel mixer as well as the graphical editor for the synthesis and effects programs.

Audio streaming in both directions between the card and compatible digital audio programs is provided by means of an OASYS PCI ASIO software driver, with up to eight channels of audio interfacing to the on-card mixer and another 12 directly to the I-O. For each mixer channel you can select ASIO stream(s), hardware audio input(s) or a synthesiser program as the input; audio input to each channel can be mono or



## NEW TECHNOLOGIES

90dB/SPL. The cabinet made of compact compound material LRIM (Low Resonance Integral Moulding) eliminates resonances and colouration's, and with an integral computer calculated constant directivity horn improves directivity and sound reproduction. The cabinet has non-parallel surfaces to prevent standing waves from forming inside the monitor, and a 4-position EQ-switch compensates for placement on a meter bridge. The recently introduced control monitor MM 201 D with digital input is now in production, with the first units installed at a Munich television studio.

**Klein & Hummel, Germany.**  
**Tel: +49 711 45 8930.**

## Live desk

Yamaha's M2500 sound reinforcement console has LCR panning and is available in 24, 32, 40, 48, and 56-channel versions. Features include 25 output buses, 8 groups, and 14 auxes along with a 8x13 matrix. Mute



scenes are stored in 128 memories and can be accessed via MIDI and eight are available on direct recall keys. EQ is 4-band with sweepable mids. The M3000 live console is now also available in a 56-input version.

**Yamaha, US. Tel: +1 714 522 9011.**

## UMS-1P subwoofer

Meyer's UMS-1P is a compact, self-powered subwoofer system that provides powerful low-frequency extension. Although designed principally as a companion piece for Meyer Sound's UPM-1P reinforcement loudspeaker, the UMS-1P is adaptable through flexible input options for use in conjunction with other Meyer Sound loudspeaker models. The UMS-1P's bass reflex cabinet houses dual MS-410, 10-inch cone drivers, active signal processing and a 2-channel power amplifier with maximum burst power of 400W. The UMS-1P is conservatively rated at a continuous output of 108dB SPL (127dB peak) within its operating range of 25Hz–200Hz Meyer's UPM-1P is the same size as the original UPM-1, but includes a sophisticated amplification and control electronics package that adds only 2kg to the unit's weight. Advanced horn design achieves a consistent polar response with smooth arraying behaviour and a much wider vertical polar pattern. It is offered with two customised input module options; the standard module features looping XLR connectors. It is said to be well suited for under-balcony, front-fill, and keyboard reinforcement. The DS-4P is an arrayable mid-bass loudspeaker that claims high power and low distortion. It was developed to supplement the 70Hz–200Hz band in full-range systems, affording additional mid-bass headroom.

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

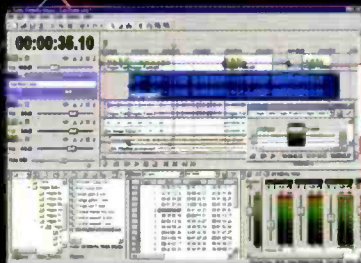


# Vegas<sup>pro</sup>

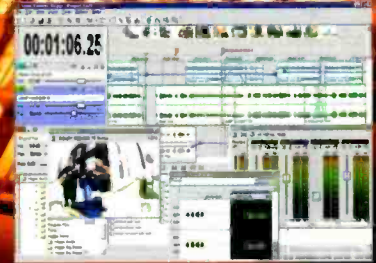
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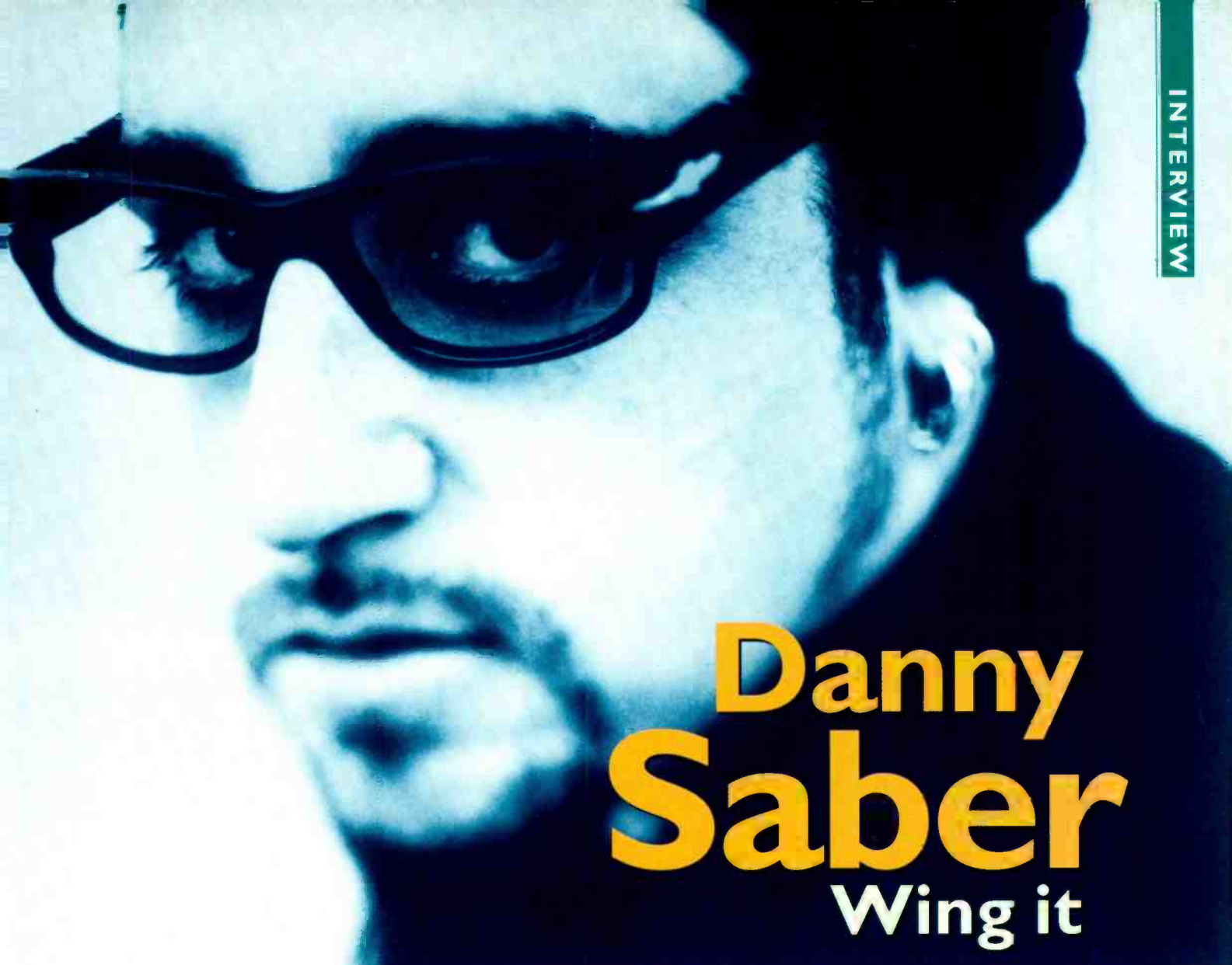


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# Danny Saber

## Wing it

Hard working and hard talking, Danny Saber belongs to the small group of remixer-producers who would rather take accolades than prisoners. **Richard Buskin** takes guard

**T**HE INTERVIEW COMMENCES. I want to know if Danny Saber has a general approach to his work as a producer and remixer, so I kick things off by asking him what is the first thing that he tends to do after entering a studio to start producing or remixing a track. 'The first thing that I do?' he counters. 'Honestly? I usually go straight to the bathroom and take a...'

So it is that I'm treated to the first of many 4-letter expletives that fill the air for the next hour or so. Saber isn't a man who takes himself too seriously, and the same can be said for his attitude with regard to music making in general and this interview in particular. When, towards the end of said hour, I ask him how he determines that a remix is finished, he responds, 'When I'm sick of listening to it,' before adding, 'That's when the interview's over too; when I'm sick of doing it.'

This is said half-jokingly, as is much else during our talk, but the point is

taken—Saber doesn't believe in over-analysing the specifics of recording, mixing or remixing. 'It's only the people who get up their own ass, start taking themselves seriously and get paranoid about how important their career is who think that what we do is work. Well, it's not work, it's fun, and the second that it feels like work I'm outta here. If I wanted to work, you know, I'd go and do a proper job.'

Artists such as Black Grape, The Rolling Stones, Sheryl Crow, David Bowie, U2, Public Enemy, Busta Rhymes, Madonna, Marilyn Manson, Megadeth and Agent Provocateur would probably assert that this is what Danny Saber is already doing. After all, during the past decade they are just some of the acts who have benefited from the overlapping talents of this producer, remixer, programmer and composer who also plays guitar, bass and keyboards. A native Los Angelino, Saber began playing guitar when he was

13 years old, but it was the quick realisation that he was never going to emulate his idol Jimi Hendrix that led to him diversifying his field of musical interests. By the early nineties he was using a friend's home studio to produce the demos of various LA bands, and within a relatively short space of time he was applying his unorthodox pop, rock, industrial and hip hop sensibilities to an eclectic array of recordings.

'I was supplying the music, collaborating with the musicians and playing a lot of the instruments,' Saber now recalls, while pointing out that this is the path that he would subsequently follow with bands such as Black Grape. 'When required I'll pick up the bass or play some guitar, and I also do all of the programming myself. I don't have any programmers who work for me. I learned that stuff by just having a room, buying the equipment and finding out how to work it. Totally trial and error, and that was really cool. I was real lucky in my timing because as things were coming out I was right there learning how to use them. The gear was advanced yet affordable, so at first I was this real technical kind of person. >



'When you're in a room and you're paying for it by the day or by the hour, you end up compromising and making decisions based upon the fact that you've got to be out of there at a certain time. I don't have to do that. It's kind of a luxury, but at the same time you've also got to check yourself, because you can end up spending way too much time on something

< Then I grew into a writer, and that's where I'm at now.'

For the past three years Saber has based himself inside a room at the Record Plant, where he has his own Mackie digital mixer alongside Pro Tools with Logic software. Among his other equipment is an Akai S3000, E-mu Vintage Keys, E-mu Orbit 9090, Roland JD990, dbx 160X and 363X, a Roland MC303 Groove Box, and an Eventide DSP4000 and tc FireworX through which he processes vocals.

'I don't work in other studios that much,' says Saber, 'and if I do, then I tend to look for the cheapest place where everything works. I'm over it, dude. I don't care, man. It doesn't matter anymore. As long as everything in the place works, I'm happy. I mean, I did a mix in Dublin at this place called The Works, and we had to bring in a Neve side-car. I was mixing on an Amek—it wasn't even an Angela; it was just like some old piece of shit from 1983 or whenever. We had to bring in a Neve side-car, another tape machine, and I don't even know how we made it through, but the mix came out awesome. You know what I mean?'

'I don't have any kind of formulated way in which I do things, so I don't really

go in with any preconceptions. To be honest, I don't even think about the gear. I like to work in my room and I've got a system in there. I've got a digital patchbay and everything's connected digitally. When I'm processing vocals, for instance, I actually record all of the effects, and I keep building them and running them back through the DSP4000, the FireworX and whatever other stuff I have around. I really don't have a lot of gear if you compare me to people like Tom Lord Alge who have, like, 20 billion effects running together when they mix. I just build things up and get the mix done, kind of like the old-school method back in the days when they didn't have any choice. They only had four tracks, so they had to bounce everything together, and my work is kind of an extension of that.'

Saber emphasises that his tendency to take his own sweet time on a project lends itself to having his own sweet place to work.

'When you're in a room and you're paying for it by the day or by the hour, you end up compromising and making decisions based upon the fact that you've got to be out of there at a certain time,' he says. 'I don't have to do that. It's kind of a luxury, but at the same time you've also got to check yourself, because you can end up spending way too much time on something. I've done it before—I spent 21 days working on a song with Dave Navarro, although in that case I have to say it was worth it. So, it just seems to work itself out, and you kind of feel it when it's done. There again, I always put myself under some sort of pressure anyway. There are constant deadlines. Pressure is good.'

When it comes to remixing, Danny Saber largely dispenses with tape these days, opting instead to receive all material on CD and downloading the tracks into his computer. This in turn enables him to solo things out much more quickly as he essays to locate the element that will provide him with a sense of direction.

'Usually that comes from the vocals,' he says, 'but it can also come from anything. It can come from a guitar, it can come from a noise that just happens once. So, I look for that one little thing to latch onto, and then usually I start rebuilding the whole song around that. This is how I start work on a remix, and I basically use the same approach if I'm mixing something that somebody sends me. However, in that case, if I know I'm going to use their stuff, I strip it all down and I start building the track around the drums and the bass just like a normal person would.'

'As I've only got 16 outputs right now on Pro Tools, I also have to really think ahead all of the time. I mean, if there are live drums, the first thing I'll do is to make the drums sound bitching, without listening to anything else aside >



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*Left: Mick Fleetwood with HHB Circle 5 active midfield monitors and Circle 1 powered sub-woofer.*

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'I've been really lucky because I've got to watch Tom Lord Alge mix two records. I've picked up a lot of stuff from him. Not specific technical things, but more vibey things, like the way he EQs. By that I don't mean the frequencies, but just the way he physically does that along with a lot of other little things.'

◀ from possibly the bass. I just process the hell out of the drums so that I've got something totally cool to process the track around. It's like I'm always mixing. Even if I'm writing I'm mixing, because I'm building the sound of the song. So, it's kind of open-ended. There's no one way that I do anything, but I definitely do have a system, and it all basically comes down to putting

stuff in the computer and just building it back up.

'I've been really lucky, because I've got to watch Tom Lord Alge mix two records. I've picked up a lot of stuff from him. Not specific technical things, but more vibey things, like the way he EQs. By that I don't mean the frequencies, but just the way he physically does that along with a lot of other little things. Then again, I've also picked up a lot of shit from John X; the way he mutilates stuff and so on. So, I've got all of these different influences, and I really feel good about my mixing now. I'm starting to get really good at it and I feel like I can blow anyone away in my little room, and I can. It's almost like they're getting another producer to reproduce the record and mix it at the same time. There are no limitations and I don't hold back, so I can actually add stuff to it that physically isn't there, as opposed to being stuck working with what's on tape.'

When listening to a Danny Saber remix, often the only element that is recognisable from the original recording is the vocal. All else, including beat and/or melody, is totally different, and this is in line with Saber's understanding that he is being paid to produce an altogether different take on the song. 'I'd be ripping them off if I just put some EQ on it or whatever,' he asserts.

At the same time, Saber also considers himself to be lucky insofar as the rapport that he enjoys with many A&R people who have hired him repeatedly during the past few years. Their mutual understanding of each other's expectations makes for easier communication during the work process, yet Saber

points out that this does not necessarily preclude complications farther down the road.

'I try to be really specific before I go into the studio,' he says. 'Still, even that sometimes doesn't work. Before you start a mix you've got to know what people are expecting, but half the time they don't know what they're expecting. They'll just say, "Well, we kind of want this", and so that's why, while I take everything in, I'll end up doing what I want and what I think is right. I mean, if I start trying to do shit to please other people, I've found that it never works.'



I always end up having to do it 80 more times, whereas if I go with my gut instincts it ultimately makes my life a lot easier.

'Ninety-nine per cent of the time I wing it. I have no idea what I'm doing, and that's great. I'm just trying stuff and seeing if it works. It's like walking through a maze. One thing that I always try to do is make sure that the material has some kind of groove to it. I can't get around that, because I can't listen to stuff if it doesn't have some sort of funky thing going on. That doesn't mean it necessarily has to be funk, but it has to have that kind of feel. It's just totally instinctive, based on feeling >

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< right when I'm listening back. I do pay attention to that stuff a lot more than I used to, but again it's not an intellectual, cerebral kind of thing for me. You just feel when it's right.

'Music is not something that you really want to sit down and analyse, and all of the people who I've worked with who are analytical are a fucking nightmare. They ruin everything because they over-think it, and they end up killing the vibe. If you over-think everything and go through it with a fine-tooth comb to try to understand it, sometimes you remove the mystique. It's like when you've got a collage of sounds that are horrible if you listen to them individually, but sound great when you put them together—if you sit there and try to inspect them and fuck with each one individually as opposed to leaving it alone and let that thing be what it is, you'll ruin it.'

One of the interesting facets of Danny Saber's approach is his insistence on getting on with the recording or remixing and not getting bogged down in minutiae. Never mind his reputation as a cutting-edge dude who uses state-of-the-art gear to achieve his technological ends. His main goal is invariably to go for the vibe in much the same way that his predecessors did several decades ago when none of this gear existed.

'That's another thing that I think people are getting wrong,' he says. 'It's still about guy who's working the equipment, not the gear itself. I was in a club last night and [The Beatles'] 'Tomorrow Never Knows' came on—they were doing the same shit that I do, but they were doing it with 4-track. What happens now is that, because it's so easy to load something up that sounds good, people automatically mistake that for skill. Any jerk now can get a sampler and a computer and a drum machine, and it'll sound kind of alright. So the vibe is almost more important now than it was back then, because that's what really sets stuff apart. Everything's so vibeless, because you've got a bunch of vibeless people making vibeless music. They don't have to reach to get that shit. They're not pushing it. They're just kind of settling for what's there and trying to make easily successful stuff that's obvious. That's what everybody wants right now.'

'As far as being able to get away with murder, remixing is the biggest bullshit job that there is. It's easy to fake that one. I mean, they have a remix category in the Grammys, and all of the people who get nominated for that shit are tired out. I'm not going to mention any names, but you listen to all of their remixes and they do the same shit. They speed up the vocal and put some stupid-ass house beat under it. They do the same mix on every mix they've ever done, and I know, because I've done mixes on records with these guys, I've





'That's another thing that I think people are getting wrong,' he says. 'It's still about the guy who's working the equipment, not the gear itself. I was in a club last night and [The Beatles'] 'Tomorrow Never Knows' came on—They were doing the same as I do, but they were doing it with 4-track. What happens now is that, because it's so easy to load something up that sounds good, people automatically mistake that for skill.'

listened to their stuff and it's crap. A total scam. It's bullshit. What are they really doing? There again, it's cool and I understand it, because those remixes probably do more than mine do for the band. A lot of times it's all about name identification on the club scene, and something gets played because so-and-so did it. So, I do respect that stuff to a certain degree, but then again...

When it comes to his own in-studio contributions, Danny Saber has no illusions as to where he thinks his talents lie. 'I'm an engineer by default,' he says. 'I don't even consider myself an engineer, because that would be an insult to real engineers who are really good.'

Still, as confirmed earlier during our interview, he doesn't deny that he can mix. 'Yeah, but that's a little different,' he reasons. 'I mean, don't ask me to set up 20 mikes and figure out which one is out of phase. If something's out of phase I'll fix it later. I can't figure it out right now.'

And there, in a nutshell, is Saber's philosophy—wing it. Don't over-analyse things. Don't take them too seriously. Follow your instincts. And, above all, have fun doing just that. After all, if he has to

single out the major factor for his professional success, he points to his deep-rooted passion for music as opposed to any overriding technical prowess.

'I'm very lucky because I have numerous [music] careers, and I don't get caught up in any of them,' he says. 'That's what makes the things that I do stay fresh. Everything that I do incorporates everything that I do. For instance, I may be working on a movie, doing a remix. So, it all overlaps.'

'As far as remixing is concerned it's all become one big thing. I mean, the funny thing now is that most of the remixes that I end up doing are being used to actually sell and promote the band. This is as opposed to when it first started, when the remix was intended either to take the artist into another market—to explore and open it up, which I don't think really worked—or, more

usually, to put another spin on a track that people already love and get it into the clubs and on the dance floor. Now, half the time when I'm doing a remix, that's what's selling the band, and it ain't even the band anymore. It's really become influential in terms of people's careers to a certain degree. Like the remix I did for a band called Dark Star—It didn't take away from what they are, but that was a little hit in England and now we're working on a record together. So, it's really kind of crossing over now, and it's a lot more than just putting some shit on a 12-inch and getting it into the clubs where only a small group of people will hear it.'

'The problem with remixing is that there are so many people out there who aren't doing it well, and that kind of fucks it up for the ones who are putting a lot into it.' ■


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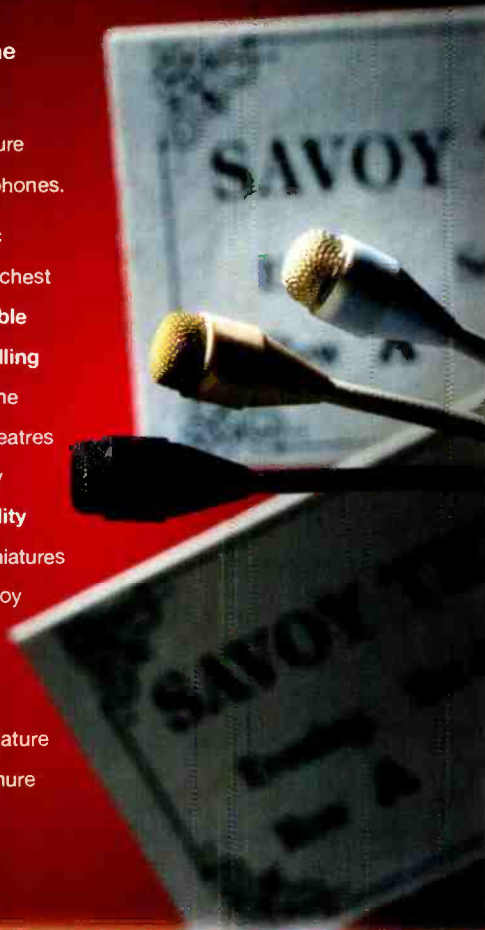
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**F**EW PEOPLE REMEMBER the analogue computer. A child of the early post-war years it barely reached adolescence before its digital brother choked it to death with a string of bits and bytes—perhaps one of the more forgivable cases of fratricide. Other analogue devices have enjoyed greater success. The audio disc has survived the majority of a century, audio and video tape about half as long, and though some would argue that their obituary should not be written just yet few would deny that the digital grip is tightening.

An exception would seem to be the radio microphone. We have digital phone lines and digital radio links, digital cable transmission in studios and Digital Audio Broadcasting but you will find it hard at the moment to buy a digital radio microphone. One or two have been built with an audio bandwidth that is far too narrow or an RF bandwidth that is far too wide but they are no competition for the plethora of analogue devices that are the mainstay of almost every theatre, film, TV production (from one-man news to monster OB) and conference 'event'. And in many ways that is surprising.

The analogue radio microphone is, of course, a strong performer. At its best it has a signal-to-noise ratio of about 100dB, and a frequency response of 50Hz–20kHz. That is close to the performance of a microphone capsule itself and with a range in excess of 50m without significant deterioration it fulfils the majority of user's requirements very well. Of course there are a few weaknesses—the reliability of the transmission path cannot match that of a cable—though many regard it as a close second—and the analogue companders that give the benefit of excellent signal-to-noise ratios may also produce noise pumping and distortion with poorer designs.

Why, then, should anyone consider a change to digital? Not surprisingly there are several reasons, some not directly connected with technical performance. In business there is always the desire simply to make a new product that will give a company an edge over a competitor. Digital technology is well developed and can often give significant improvements. Good noise floors and wide audio bandwidths are usually more easily and repeatably achieved with digital techniques than they are with analogue ones. Error correction and concealment techniques can hide the pops and crackles of analogue. It is both common and commercial sense to consider a change to digital.

Commercial sense of a different kind is adding another pressure towards the digital realm. At present analogue microphones use RF spectrum in the VHF and UHF bands for their FM signals (see Fig. 1). The classic modulation rules dictate an RF bandwidth of around 200kHz

# Digits and Mics

With analogue radio mics well established and accepted, **Chris Woolf** begins a study of the requirements for digital radio microphone systems

with the majority of the energy concentrated at the centre of the band. Given their relatively low power outputs radio microphones are often able to share spectrum with other services either on an allocated or a de facto basis. Since the major occupancy of these bands has been by the broadcasters who are also large users of radio microphones this has often been an easy accommodation.

Unfortunately the situation is changing quickly. The regulators are discovering that the RF spectrum can be used more 'efficiently'. By using heavy data reduction (digital 'compression') and modulation techniques that maximise that spread of RF energy the expanding number of digital radio and TV channels can be crushed into what amounts to a smaller space. This has awakened the golden glint in the eye of many governments. All that appears to be required is for the analogue transmissions to be replaced by digital ones and half the spectrum can then be snatched back for resale at some fabulous price.

The same somewhat inaccurate argument is also being used for radio microphones. Surely by using 'more efficient' digital techniques these too can be crammed into a narrow scrap of spectrum to leave the field clear for the lucrative mobile Internet phone market? The flakiness of that argument needs examining but for now I just want to show that the move away from analogue may not be voluntary and that the problems and benefits that digital radio microphones may bring need to be considered sooner rather than later. The future is far from clear but in Europe it is not

impossible that only a small segment of spectrum at 1800MHz may be allocated for radio microphones and that they will have to be digital ones.

The principle considerations for the new designs are going to be bit rate reduction, delay and power, all of which are interrelated. Simple digital conversion of an analogue signal produces an immediate increase in bandwidth. The most common sample rate 44.1kHz/16-bit produces a data stream for a mono signal of 705.6kbps—48kHz/16-bit, which is more convenient for syncing with pictures, gives 768kbps. These signals are certainly not as easy to squeeze into a 200kHz radio channel as the original analogue one even though they offer no improvement in specification.

What makes it apparently possible to obtain greater spectrum efficiency is the ease with which digital data can be processed to discard 'unnecessary' parts of the transmission signal—bit-rate reduction. There are many well-known methods such as ADPCM, MPEG, ATRAC and they can economise on data rate by between 4:1 and 10:1 while still giving subjectively good results.

However there are costs too. The more powerful psychoacoustic techniques sometimes fail with unusual sound sources—bagpipes are an example. Processing delay tends to increase with the reduction ratio and in some cases is limited not by DSP speed but by the period of LF waveforms—not something that can be overcome by the next version of hardware. Also allied to a high bit rate reduction is an increasing fragility of the signal to any subsequent processing. Mixing, EQ and other signal processing coupled with chained transmission over multiple links using different data reduction systems are highly likely to destroy the carefully calculated masking algorithms and deliver grit and gravel rather than sweet music. A bit rate of 176kbps (for a mono signal) has been mooted by some as an adequate standard and I would encourage users to listen and work with a few streams >

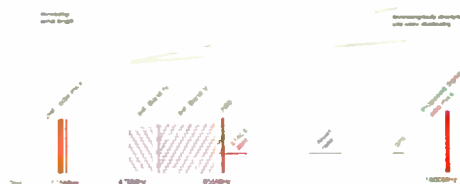


Fig. 1: RF spectrum



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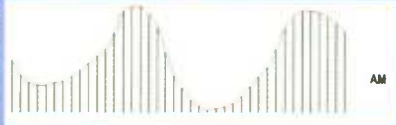
< of this quality.

If the device is to be used by a singer directly into a club's PA then a heavily bit-rate-reduced transmission will be quite adequate. However the broadcaster or film-maker who takes a feed from the desk will be sorely disappointed when they come to try to postproduce and transmit the material despite their ears having told them that the source sound was fine. Manufacturers may be a little reticent about admitting the limitations of their products and users may have to choose very carefully a level of bit rate reduction that suits their pockets, their needs and their bagpipes.

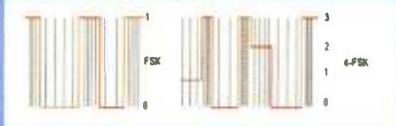
The same applies to delay. There is a degree of vagueness about the permissible lag that users can accept. One scenario looks at the mixing of a cable microphone with a radio one. If the later has an inherent delay it will be 'misplaced' in terms of timing but not acoustic. A compensating delay could be added to the cable microphone but for recording in the field this may be an unattractive concept. Another view looks at the performer to foldback/in-ear-monitor loop. As the delay lengthens so the performance changes, at first subtly but eventually disastrously. The maximum acceptable loop figure seems to vary from <3ms to as high as 10ms, most probably due to different usage. In a theatre where long echoes are normal a longer delay may be less uncomfortable than in a small, dead studio.

This loop delay has several elements which also need considering individually. Better A-D converters often have an inherent delay of about 1ms, which must be added to any processing delay for data reduction. ADPCM, which has been widely suggested as a possible algorithm, has a coding delay of about 2.5ms added to that. Already we are 3ms-4ms late and we are only at the output terminals of the receiver, yet there could well be a digital mixing desk in the path too. If the signal is interfaced digitally then there is the delay of the DSP, of the order of 0.5ms-1ms, but


### Modulation schemes




**1** The simplest form of transmitting information on a carrier wave is Amplitude Modulation (AM): the analogue waveform alters the carrier level on a continuous basis.




**5** Similar digital modulation schemes exist in the frequency domain too. Frequency Shift Keying (FSK) can exist in both simple binary and complex forms by varying the frequency in discrete steps.



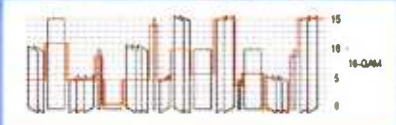
**2** A more useful scheme is Frequency Modulation (FM). Varying the carrier's frequency rather than level allows a receiver to amplify the weak signal to a constant (limited) level which will minimise amplitude modulated interference.



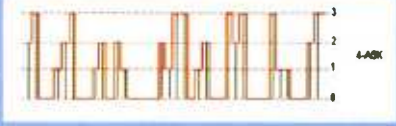
**6** While less familiar in analogue systems it is equally possible to use data to shift the carrier phase. Phase Shift Keying (PSK) shares the benefits of a constant carrier level with FM and FSK. The 4-PSK scheme is often called Quadrature Phase Shift Keying.



**3** With a simple (binary) digital signal just two discrete states need to be detected: the familiar 0 and 1. Digital AM modulation is usually called Amplitude Shift Keying (ASK).



**7** Modulation schemes can be combined to give higher spectrum efficiency: more data transmitted for a given bandwidth. Since amplitude and phase are independent 4-ASK and QPSK can be combined to give 16-QAM (Quadrature Amplitude Modulation). There are an infinite number of complex modulation schemes but they become increasingly vulnerable to noise, more difficult to generate and more power hungry. Some, such as the low frequency component of the otherwise 'clean' GMSK used by mobile phones, may also cause interference in nearby equipment.



**4** Digital techniques do not preclude more than two states so it is possible to use several different levels of keying to enable a greater density of data to be transmitted. This example shows 4-ASK.

if the output is an analogue one and reconverted yet another delay occurs. With this very simple arrangement the signal is 5ms-6ms late, possibly worse. I would encourage anyone with an audio delay unit to experiment and see how this affects their work.

There is obviously an advantage in using a digital interface in terms of quality as well as delay but this too has some

problems attached. The transmitter's A-D is likely to be free-running since any synchronising signal will involve scarce RF spectrum. Thus sample-rate conversion and synchronisation will be needed at the interface, a process that no longer causes serious signal damage but does carry some extra delay overhead.

Next issue we will consider the third area, power. ■

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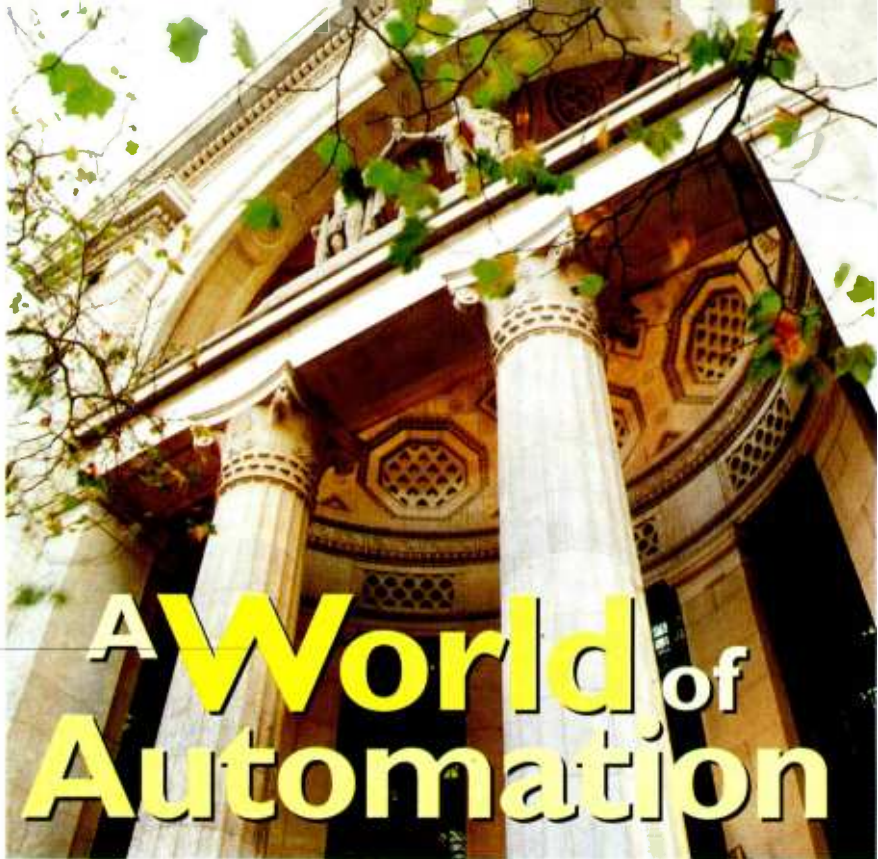
While being a great technological advance, replacing the BBC's World Service broadcast automation system saw much older functionality preserved. **Kevin Hilton** goes back to the future

**I**N THESE TECHNICALLY advanced, technologically arrogant times, it is too easy to assume that what went before was locked in the dark ages, bereft of any ingenuity or sophistication. In truth, the days before micro-computers arguably exhibited as much inventiveness as today. As a case in point, broadcast automation is usually associated with modern stations; but it is something that existed prior to the digital revolution and stretches back to video cartridge machines and time-triggered reel-to-reel tape recorders.

Bush House, headquarters of the BBC World Service and bastion of global broadcasting, got its first automation system in 1956. Like the early computers, this time-controlled automatic switcher would appear crude and unwieldy now but it served its purpose of mechanically controlling the schedule that tells staff what is being recorded in Bush's 120 plus studios.

Time is crucial to all live broadcasters—it is even crucial for pre-recorded material. The World Service epitomises this: it comprises several networks, numerous languages and time zones; many of its programmes are played out at different times on different parts of the service. The mechanical automation system gave way to burgeoning computer technology in 1972 when it was replaced by PDP8 computers driving mechanical switches.

This evolved through several generations, up to schedule automation based on the PDP1123 computer. Known as Mira (the Latin for wonderful), the soft-



ware epitomises the pre-1980s BBC. Until that decade, it was regarded as an organisation that if it needed a certain piece of equipment, its in-house engineers would design it. This would often produce something ideally suited for the task but which, sometimes, was a one-off to the point of idiosyncrasy.

Mira committed one of the most heinous technological crimes of the late 20th century. It wasn't millennium compliant—but only in the sense that it would have not recognised 2000 as a leap year. 'It would have been okay on 1st January, because the operating system was millennium compliant' explains David Gooding of the World Service project department, 'but it wouldn't have recognised the 29th February.'

This was not, Gooding continues, the only reason behind looking for new scheduling automation. 'Mira was some ten years old,' he says, 'and the hard disks were worn out. This was causing some operational difficulties that were

entirely hardware related.' Unlike past times, there was little debate as to where to look for a replacement. 'We did not have the resources or the mechanism to pursue an in-house solution,' Gooding says, 'so we looked for a commercially available, standardised product instead.'

Five to six years ago, other automation had been installed as part of the Service's satellite distribution programme, GDS (Global Distribution System). Based on Probel products of the time,

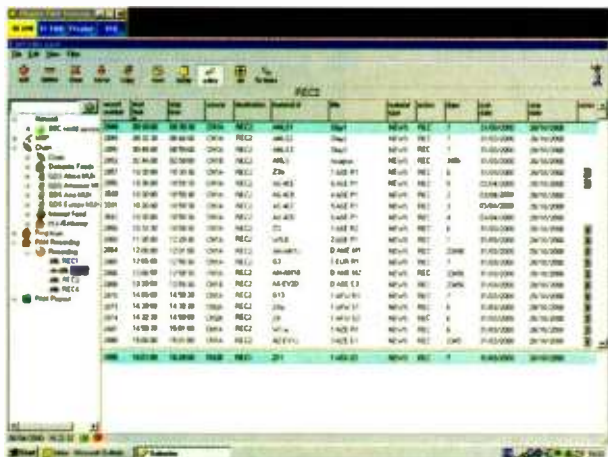
it became more complex than its off-the-shelf origins, ending up almost a bespoke arrangement. But, as Gooding mitigates, it had to take in the needs of satellite distribution.

Like the Bush House switching system, GDS is controlled through the programme schedules. When the BBC privatised the transmission networks for its domestic and overseas services, the running of World Service transmitters was passed to Merlin Communications. This privately owned company, formed by the former management of the World Service's transmission department, now runs the broadcaster's control room, having bought GDS from the BBC.

While this automation system takes care of world-wide distribution, Mira was designed to handle studio routing, enabling the central apparatus room to switch signals to the appropriate distribution system. Sounds simple when put like that, but the World Service's output comprises 1,000 hours of programmes a week in more than 40 languages. Most of these studios work directly to air, with continuity announcements adding to the total presentation demands.

'The switching system takes the studios and effectively forms them into "networks",' Gooding explains, 'running through system paths.'

The schedule is organised on a 6-monthly basis, split into different schedules for winter and summer. While some programmes are routed directly to the GDS, all presentations have to pass through the schedule controlled automation. 'This is a historical hang-over from the days of terrestrial distribution to transmitters,' says Gooding. The NTP switcher additionally passes outputs to other means of programme >



Although part of Pharos' standard package, Mira II has the ability to reshuffle the schedule if no problems occur



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◀ distribution: terrestrial circuits, bits of the Internet and some switchable inputs to GDS. This is the main task of the scheduling system, but it is also responsible for controlling the office ring-main, allowing World Service staff to monitor the output (or listen to their favourite other radio station).

These were the demands the BBC were to make of a commercial automation software package. The company chosen was Pharos Communications, which had built its reputation on developing automation systems for television based on video server technology.

Pharos was founded by Spencer Rodd and Roger Heath, who say there was no significance in naming the company after one of the Seven Wonders of the Ancient World.

The passage of time has made the development of object-orientated soft-

ware a more viable proposition. 'We can now design these sorts of packages using a development team of only five people; before it would have taken a lot more but the advances in software and processing power have changed that,' says Rodd.

Despite Pharos' predominant experience in vision-only applications, the needs of the World Service were not unfamiliar to Spencer Rodd, who, prior to Pro-Bel, worked at Bush House. 'Spencer was one of the leading lights behind the application software for Mira,' David Gooding acknowledges. 'There was already a strong connection there, which meant that he knew what was needed. It is his product and is effectively a commercial realisation of what went before.'

Perhaps in recognition of this, the new program is known as Mira II and

has been running the programme switching since September last year. The schedule appears on standard PC terminals as a recognisable spreadsheet type application, detailing studio to network times, network to line bookings, ring-main routing and miscellaneous lines bookings.

This has now been extended to include a recording schedule for the presentation system. The World Service has been evaluating different digital audio workstations for programme production under the auspices of its Go Digital project; meanwhile, the play-out of prerecorded material continued to be from trusted reel-to-reel tape. The World Service wanted to broaden the scope of the automation for the English language service and enable it to perform time-shifting functions.

In this way, finished programmes would be automatically recorded onto hard disk, their playback automatically triggered from the schedule. Such a concept is possible due to the modular way the English language service is now organised, despite discrepancies in time. The backbone of this output is the 24-hour news service, around which other programmes are scheduled. Three regions—Asia, Africa and Europe-America—make up the English language service. These are further divided into eight English language streams, each programmed separately, with its own continuity announcements.

Since the eighties, the BBC has been under pressure to reduce operating costs; by creating a central output stream and time-shifting specialist programmes, the World Service could obviate the need for eight separate continuity studios. Under the new scheme, commissioned at the end of February, just three continuity suites are needed, none of which operates 24-hours a day.

As well as cutting costs, the new system enables the World Service to cater for different audiences. The concept is not based so much on the countries served, because English is the common language for this part of the service, but, like any radio station, on different times of day. There is a big difference between the drive-time audience and those who listen to the radio in the evenings.

As would be expected, the news service is live, sourced from Bush House's news room. The programmes inserted into this framework are a mixture of live and prerecorded material; some continuity announcements may be prerecorded but there are always announcers on shift in case of emergencies.

A new development for the English language switcher: PAM (Programme Assembly Matrix) helps create the regionally focused programme streams relevant to both the time of day and the region. PAM integrates into the Mira II schedule-controlled switching automa-

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tion and comprises four digital audio stores, each with one input and five outputs. These stores are currently contained on two Compaq servers, using SCSI hard disks running, as does the entire system, on the NT operating platform. Programmes are either transferred to the servers (the system uses Broadcast Wave for file transfer) or recorded onto disk as live, enabling them to be time-shifted for later rebroadcast.

While saying there is nothing fundamentally wrong with the Compaq servers, David Gooding reveals that they are due to be replaced by AMC industrial PCs with separate power supplies. Four existing AMCs, fitted with sophisticated sound cards, are positioned further up the transmission chain. The time-engines of the system are Pharos manufactured boxes, which interface with the SQL-based database. These boxes buffer 24 hours of data, which is routed through a 32x32 Pro-Bel Freeway stereo matrix.

The system was ordered by the World Service in November 1999 and delivered to Bush House by Pharos in January this year.

With a total storage time of 72 hours, Rodd says there is enough capacity for the service's needs. 'It's easy to expand if they need more,' he observes. 'Although Pharos uses MPEG compression of both video and audio for its TV projects, it was decided not to compress in this instance. 'We looked at using MPEG,' says Rodd, 'as it makes sense for distribution. But with storage costs being so low these days, it made no sense for an audio-only installation.'

With such a system, identifying the programmes and ensuring they go out at the right times is crucial. Consequently, relevant metadata is contained in the 'leader' section of the audio file. This is based on SMPTE's unique media identifier and enables files to be easily traced and tracked. As Spencer Rodd concludes, this installation was not so much about audio problems as it was media management.

The final implementation of the schedule is brought together in the central apparatus room as part of the Main Distribution Frame. The Mira II spreadsheet displays the routing of the network switcher, the network chain, the ringmain and the record and playback functions of PAM, controlling start and stop times. Although part of Pharos' standard package, Mira II has the ability to reshuffle the schedule if no problems occur.

Despite choosing 1st April as the date to begin both its new programme schedule and hand its presentation over to PAM, the BBC World Service is continuing to move ahead, not entirely without incident, with the computerisation of its radio output. Now Nation Shall Speak Peace Unto Nation, regardless of the time of day. ■



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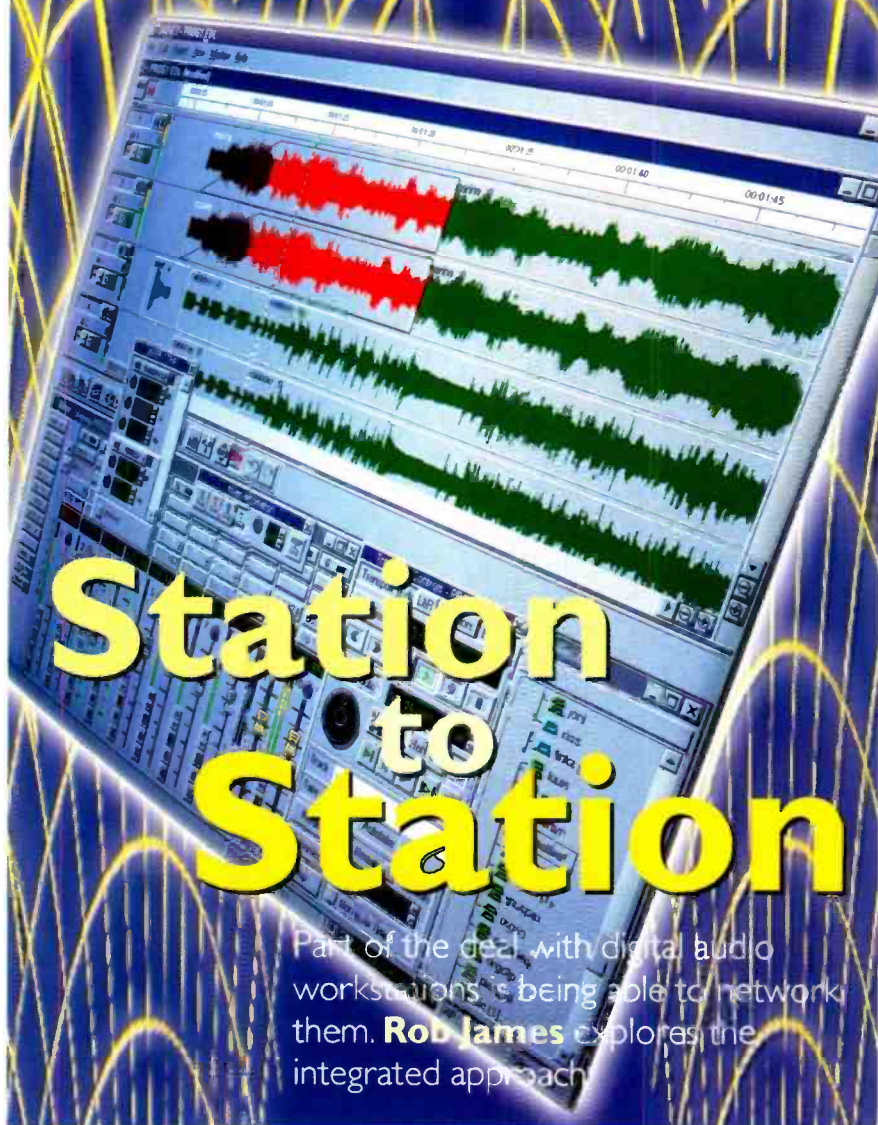
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# Station to Station

Part of the deal with digital audio workstations is being able to network them. **Rob James** explores the integrated approach.

**N**ETWORKING CONTINUES TO excite a good deal of interest from manufacturers, facilities and users. Over the last eighteen months faster hardware topologies have become available at realistic cost and more big toes are being dipped in the murky, deep, and not so still running waters. Manufacturers' approaches are diverse sitting anywhere from proprietary hardware and software to the use of 'standard' PCs and Macs with off-the-shelf hardware and software. The most common approach is, to borrow a phrase, 'leveraging' existing connectivity technologies, adding value and performance with bespoke software.

The danger lies in not considering all the implications. Although the notion of central storage is attractive, putting all your chips in one basket has always

been a dodgy proposition. Without proper backup and management procedures the chances of calamity increase. The perceived absence of credible answers to many of the problems has led some people to watch and wait. Braver souls have already entered the arena and there are encouraging signs from several suppliers that the management issues are being addressed in a suitably rigorous manner.

Networking can undoubtedly offer many potential efficiencies and benefits. However, unless the production process is carefully considered, it can also introduce project management and scheduling difficulties.

AMS Neve networking has now arrived and it looks worth the wait, and WorkFlow solutions aim to offer solid answers to networking problems. AMS

realised long ago elegant stand-alone technology is insufficient and that major clients were looking for complete 'process' solutions. Continuing the use of industry-standard technology such as MIDI, ESBUS and OMFI, the AudioFile SC is intended to provide an open gateway to industry-standard data networks.

Rather than hack Windows-Ethernet network technology to accommodate a proprietary editor, AMS has integrated a Windows NT interface within its platform. This allows easy upgrading to future connection technologies as they develop and accommodates interfaces to approved third-party systems such as sound-effects databases.

StarNet is project-orientated and aims to avoid many potential problems. The basic philosophy is simple—keep all current project elements in local storage. This way playback is guaranteed independent of network traffic. If the system can deal with transfer and archiving of all project elements then the operator does not have to know their way around a network. StarNet uses an intelligent cue-transmission system that ensures only audio not present on the local machine is transferred from the server when up or downloading a project. This is possible because all recordings made on AudioFile systems since the introduction of the first generation in 1984 have been stamped with a unique identifier (UID), that enables them to be identified, even if the name has changed. At the end of a session, the operator has only to select the project name and all data related to the project, including mixer automation, is uploaded to the server. If it becomes necessary to work on the project in another studio, the operator selects the project name and all the elements are downloaded.

A Virtual Folder system enables each workstation user to create folders of frequently used cues and effects under their own file management system, without storing multiple copies of cues on the server.

DAR uses 100Mbit Ethernet running TCP/IP using Microsoft-compatible drivers. Of the system, MD Mike Parker says, 'It is the most common protocol around and therefore compatible with most other platforms. We store audio as mono broadcast WAV files for a similar reason. For our Storm workstation we wrote our own driver software to optimise speed and performance. The protocol is common to all our platforms including OMR 8, the Conform Station, and TheatrePlay.'

DAR achieves around 16 simultaneous channels, but the network is used for data management and auditioning rather than sourcing real-time material during sessions. Background peer-to-peer (workstation-to-workstation) and client-server (workstation-to-server) transfers are possible. The user sees >





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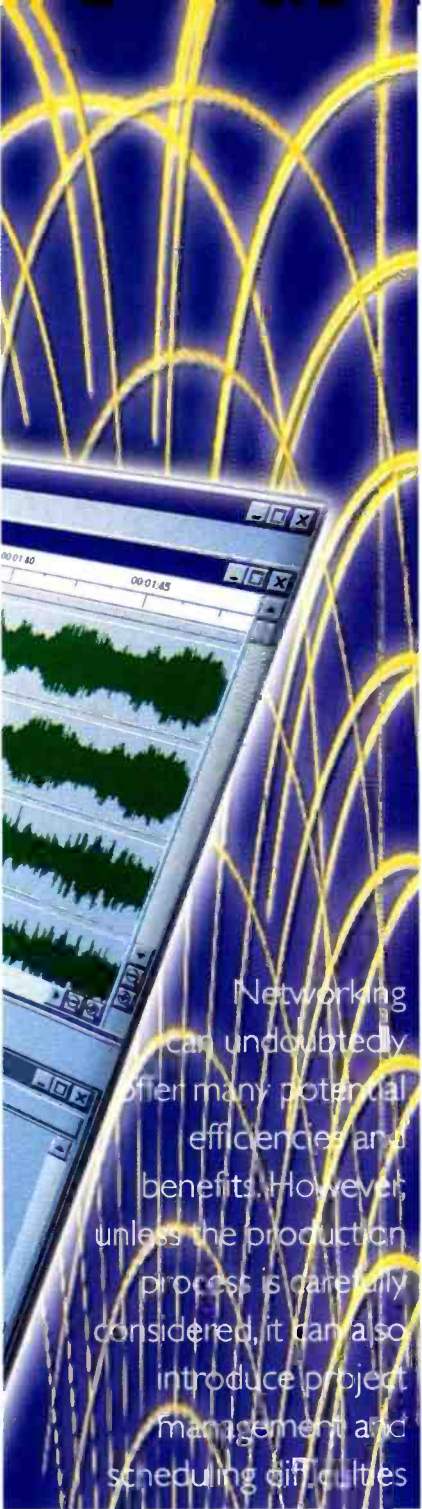
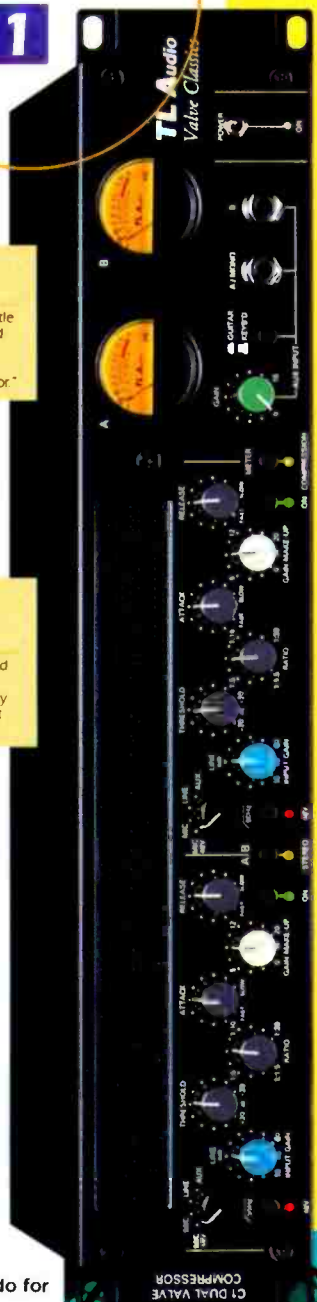
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# valve classics



Networking can undoubtedly offer many potential efficiencies and benefits. However, unless the production process is carefully considered, it can also introduce project management and scheduling difficulties

< storage media on remote devices as if they were local. Hierarchical groups of audio objects (segments or projects) may be created and arranged by subject, project or user. Depending on access rights, data can be pulled or pushed across the network. A server can easily provide 240Gb of storage, equivalent to 300 CDs, for sound-effects libraries and commonly used project material. It can also provide backup services. A tape drive can facilitate transfer of projects or sounds between studios or retrieve individual sounds from archived projects. It is easy to clog up storage devices on the network with multiple copies of the same audio. "We get round this by splitting all audio objects (segments and projects) into two parts," Parker explains, "a small EDL file containing the

name, gain information, EQ, and so on, and raw audio data stored as WAV files. WAV files are given unique names which remain unchanged when files are copied. During a copy process the EDL file is always copied and the destination is simply checked to see if the referenced WAV files already exist."

Data stored with the original audio includes, original date and time of recording, track name and original take name, the recorded time code, recording machine ID, and reel number and source time code for autoconformed material. As network storage capacities grow, data management will become an increasingly important factor in determining network performance.

Fairlight, an early entrant in the DAW market, has MediaLink which, together with Audiobase, a database to manage libraries, underpins its networking. The ultimate goal is real-time full-bandwidth networking with no local drives, together with multiple simultaneous access to the same data. The current hardware supports 86 tracks of concurrent real-time audio which equates to two or three MF3s plus other machines working 'store and forward' —with local storage. Fairlight's server uses a dual Pentium-based PC with Windows NT as the operating system running proprietary networking software. Topology is currently 100 baseT Ethernet using Category 5 cable, but with greater bandwidth. A RAID disk array is required to provide the real-time capability. Fairlight users operate with a mixture of real-time and store-and-forward. Real time is used for applications such as auditioning library material and for final dubbing. While bandwidth is still a scarce commodity, store-and-forward is used for purposes where real-time transfer is not essential.

To aid management a Project can be in any one of five states, Media Read, Project Read, Marked for Backup, Append Write and Modify Write. Other operators can save their versions on your project using what Fairlight term an 'extension'. To assemble tracks for a final mix, dialogue, effects and music blocks edited as separate Extensions can be merged into a single new project.

The use of an NT server enables Fairlight to provide direct connectivity with Avid Media Composers or Audio Visions and with the SGI servers used by some facilities for OMF file storage.

The SADiE system has extensive project management built into the software that is now fully integrated with its networking capabilities. When a project is started within a SADiE station, all file locations are logged within the project (whether audio files, EDLs, Clipstores or whatever) and automatically saved as part of that project. When another SADiE workstation on the network opens this project, the file references will be automatically reloaded so that >

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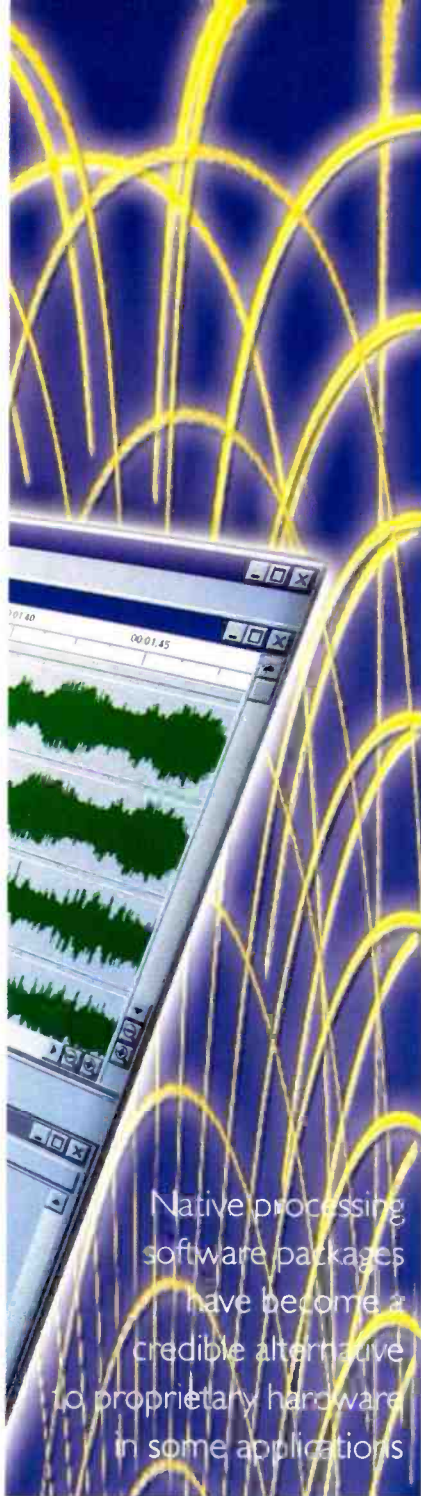
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Native processing software packages have become a credible alternative to proprietary hardware in some applications

< work can continue immediately. Additional recording can be made to other drives on the network and again the project file will append these references automatically. The user never needs to 'find' any of their working files or source material—the SADIe system locates everything automatically.

SADIe's project management also adds intelligence to archiving of projects. For example, if five workstations have been used to create an initial project before it was archived and the audio source material is spread over a number of different drives across the network, SADIe can restore the audio to a new location and automatically relink all the file references for the user, without intervention. Once a project has been archived, SADIe offers the choice of deleting the source material as part of the process to clean up the disk space.

SADIe can also cope with removable drives being part of a network system for integrating with legacy systems that are not network connected. Again, all file references are contained within the project and automatically relinked when the drive is again attached to the network.

Soundscape's REd and SSHDR have networking capabilities courtesy of the host PC used for the user-interface. There is also the intriguing possibility of connecting several units directly to a server PC and operating them from different locations via network connections but with conventional cabling to deal with the audio feeds. Soundscape reckon 10Mbit Ethernet is the minimum acceptable for the network connection and 100Mbit is preferable for successful operation of several workstations.

Native processing software packages have become a credible alternative to proprietary hardware in some applications. The approach taken by most companies in this area is neatly illustrated by Dirk Richter, managing director of SEK'D. 'Samplitude is a Windows host-based application, which means it is not dependent on additional hardware and-

or DSP cards, and automatically inherits the full networking functionality of the Windows system. Samplitude is ready to work in network environments with standard components. It can be used either in simple peer-to-peer networks or in larger client-server based systems (NT, Novell, Unix). The network can be used for workgroup sessions (many users can have access to the same physical sound files and use them for their own cuesheets-virtual projects) and also for playback, archive and backup purposes. In our company, we use a Novell server based network with 100Mbit Ethernet cable system and Windows 95/98 client stations. Samplitude can run four stereo tracks through the network even on my slow AMD K6 with 200MHz.'

These examples demonstrate the considerable progress since I last looked at networking. On the other hand, no-one is yet offering a complete high-end solution. Before I am inundated by irate manufacturers insisting they can already offer this, I will attempt to justify the statement. I would define a complete solution as one that transparently encompasses; audio, video and console automation data. It must have the management tools to cope with many people working on aspects of the same project and to keep track of versions and updates, archiving and security. Real-time auditioning of audio and video is highly desirable, but local storage is fine for intensive use. Secure transmission and reception of complete projects over third-party networks is essential. These days projects seem to come back again and again, sometimes even after they have been delivered to the client. The inclusion of portable mixer automation data and the current version of the picture should not be underestimated. To derive the full potential benefits from networking and 'virtual' mixing it could be considered essential.

Many of these elements are now obtainable, but I have yet to find a single source which covers all the bases. ■

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# Mic Preamps and Dynamics

*Studio Sound* looks back on its appraisal of recent mic preamp and dynamics outboard

IT IS STRANGE that nobody now seems inclined to question the reasoning behind the multitude of stand-alone microphone preamps that litter the market. While the original reason for remoting the preamp from the desk circuitry goes back very many years, the reasoning behind the continued support of outboard preamps is arguably less esoteric and based more on issues of practicality and convenience.

The emergence of the DAW as a powerful production tool has unveiled its shortcomings and the need for high quality and multichannel mic pream-

plification has been identified as one of them. At its most basic, what is required is simply enough circuitry to handle the business of amplification, but the idea has been extended and embellished to produce what are variously termed voice or recording channels. Features on these extend beyond to offer a well featured mixer channel-strip in a box proving that, although all the manipulation in the world may reside within the DAW's digital domain, there is still a reassuringly strong dependence on analogue processing at the front end that quite simply cannot be replaced.

Hand in hand with this is the requirement to watch and manage levels carefully when recording to digital. Few analogue processes impart a more characteristic analogue feel than the use of well-chosen dynamics control. Valve

and transistorised stand-alone compressor-limiters have carved an enduring niche for themselves in such applications, but also serving as good rack investments.

Variety has spawned an increased awareness and appreciation of differing preamp and dynamics designs bolstered in many cases by units that also take care of the analogue to digital conversion process as part of the package. Most interestingly there seems to be no sign of the choice element subsiding and devices that fit the bill and the job can be found for every pocket or ambition.

The following is a list of reviews of preamps and dynamics units that have appeared in *Studio Sound* over the last two years. All can be found quickly and easily on our website. ■

**Net:** [www.prostudio.com/studiosound](http://www.prostudio.com/studiosound)

Purple Audio MC76  
TL Audio Ivory C-5021  
Tube Tech MEC1A

dbx blue 786

Bellari RP583  
Focusrite Platinum Voicemaster

Oram Octamix  
Bellari RP533

tc electronic Gold Channel  
dbx DDP  
CLM Dynamics DB200S  
Bellari LA120; MPI 10

Neotek MicMax  
Hooter Sound B1

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Sonifex Reds

SPL Transient Designer

CLM DB500S

Drawmer MX60  
Mindprint En-Voice

Joemeek SC4 DAD  
Joemeek C2  
PreSonus M80

Summit MPE200  
Chiswick Reach compressor  
Focusrite Compounder  
TL Audio PA-1  
TL Audio C-1

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Tube Tech CL2A

Drawmer DC2476

dbx Quantum

Denecke Dcode AD-20  
Grace Design Lunatec V2  
Crane Song STC-8  
Joemeek VC7

Millennia Media Twincom

Jünger Audio Accent  
EAR-Yoshino 660  
SPL Goldmike

Crane Song Flamingo  
Avalon Vt747sp

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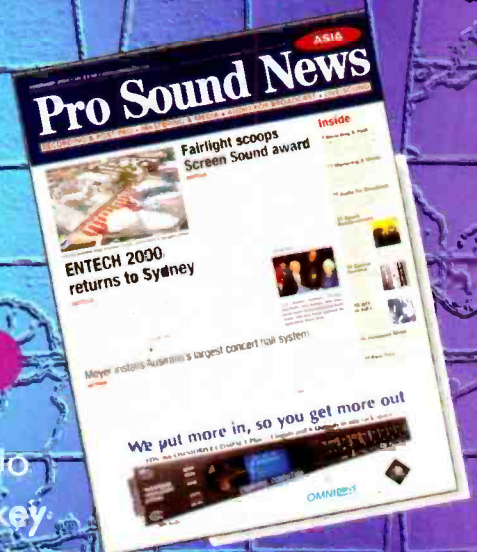
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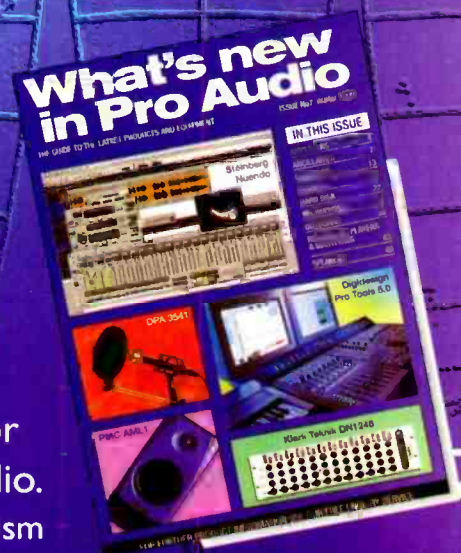
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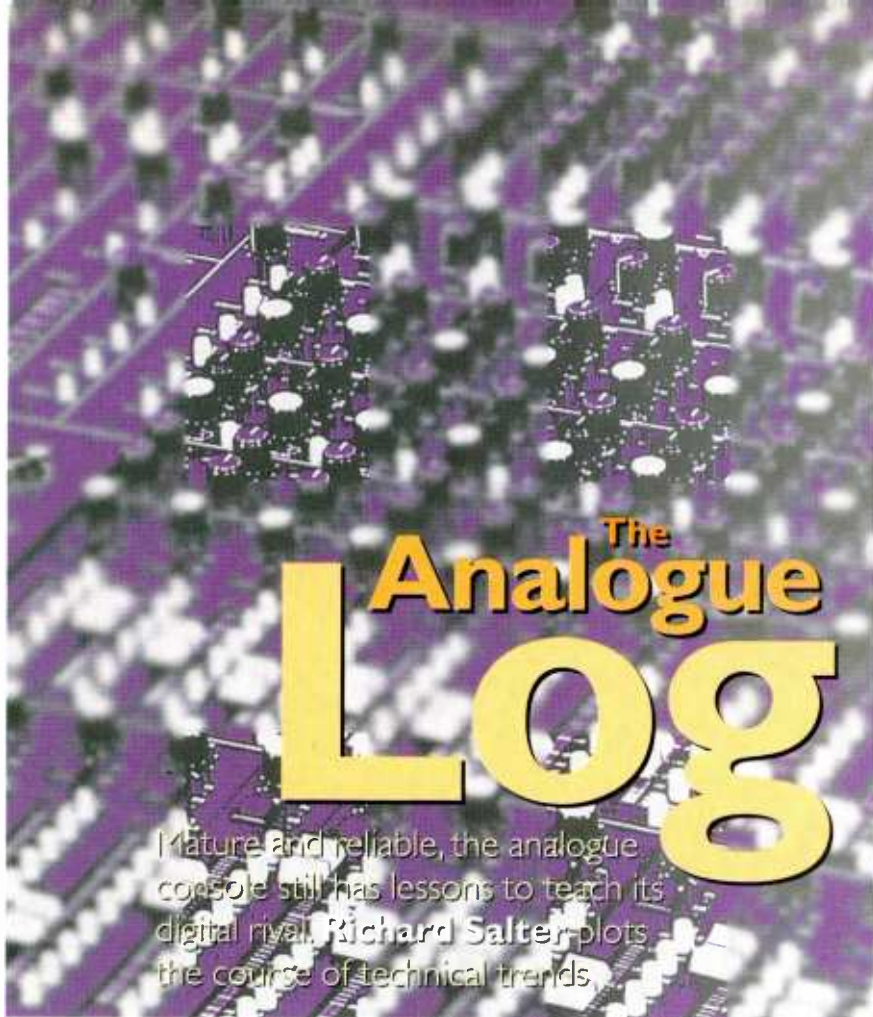
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# The Analogue Log

Mature and reliable, the analogue console still has lessons to teach its digital rival. Richard Salter plots the course of technical trends.

**T**HERE ARE CERTAIN TRAITS that can be seen whenever a new technology emerges and challenges the status quo: the most common of these is that the quality of the main function drops. The new technology will typically allow some other feature previously unachievable in the old domain, which in the excitement of the new is afforded prime status, and, as the new technology is usually immature, the prime function is often the loser.

For those of us old enough to remember the introduction of the transistor into designs for audio products, even without the benefit of hindsight the audio performance of valve systems was well above that of the early transistor products. But the transistor allowed several features to products that those using valves could not provide—smaller sizes, easy portability, long battery life, lack of excess heat. It took a number of years before the sound quality began to equate to the average of the older technology, and some to this day believe that the valves still have the edge.

The same, albeit temporary, affliction came with the introduction of digital audio and the early models of CD players, until the designers began to appreciate the significance of the detailing of the anti-aliasing and reconstruction filters and the accuracy of the system clocks. Again some still believe in the superiority of vinyl. And likewise with the first examples of digital consoles.

The initial offerings were bristling with automation at levels simply not

practical on their analogue equivalents. Moving fader automation appeared on the smallest of portable mixers, apparently for free, and reconfigurable processing and complete automation of every control on the larger examples, even if we had no idea whether or not such additional flexibility was desirable. However, despite all the advantages of the digital technology and the various accessories there are still analogue consoles being made, sold and used.

Another common trait, this time human rather than technological, is the fascination of prediction. From the writings of Nostradamus to horoscopes in newspapers there is an enduring appeal in those for whom the future appears to be so crystal clear. When Neve installed the first large digital console in CTS studios in London all those years ago there were several predictions about how soon it would be before this new technology replaced the old analogue form. One prediction, printed in this august journal, gave the analogue console only a few years to complete obscurity.

Mark Twain's epigram that 'the rumours of my death have been greatly exaggerated' seems to be apposite. Despite two decades of digital console technology, the analogue variety is still very much alive and well, and the principle reason why is old-fashioned market dynamics. The manufacturers will continue to make analogue consoles so long as there is a market willing to buy them, and a profit to be made from manufacturing them.

The manufacture of analogue consoles can certainly be profitable, indeed there are many examples of profitable manufacture of analogue consoles in Great Britain. There are macroeconomic issues such as exchange rates and basic labour costs which may dictate the location or style of some aspects of the manufacture: but the processes, tooling and technologies involved are mature, stable and well known, and the finances are reasonably predictable. From the business standpoint the manufacture of analogue consoles is a comparatively low risk venture, requiring no rocket science or unproven techniques and a selection of prototypes to use as benchmark comparisons.

The continuing design and development of analogue consoles is also certainly practical, as can be confirmed by the continuing examples appearing at the trade shows. Again there is a sufficient supply of competent and excellent analogue circuits designers, whose salary expectations are not entirely outrageous... The ancillary design skills for the internal and printed circuit board layouts, mechanical and production design are all available. Although the devil may have all the good tunes, the digital consoles do not have a monopoly on good design.

A market willing to buy analogue consoles? The overall console market is clearly changing and the variety of analogue designs on offer has declined slightly over the last decade. It is also clear from the recent review of digital desks (*Studio Sound*, January 2000) there are digital console designs for every application in a range of price and quality levels. And without any question at all, the technology is certainly past the adolescent phase, and the quality of audio performance of digital consoles is mature. So why buy analogue?

The first explanation for the continuance of an analogue console market is the simple conservatism of the customers. While the recording industry in particular has an image of being very high tech and innovative, but for those who sign the cheques for large consoles in prestigious installations a certain business conservatism is inevitable. There may be some advantage in being the first digital guy on the block, there are also risks and prices to be paid to be this first guy, and most businesses, particularly owner-manager businesses, will tend to avoid being the first one until they have seen success somewhere else first.

This desire to remain with comfortable known technology is not limited to those who sign the cheques. Service and maintenance staff are usually after a quiet life and learning the ins and outs of a new analogue console is less threatening than a new digital one, to say nothing of the new test equipment likely to be required. >



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The comparison of the whole-life costs of a digital console are open to much more speculation and 'guesstimation': the purchase price is easy, the maintenance costs a little more difficult to predict, but the scorpion sting is the residual value, which bears much similarity to second-hand computer values where the next speed or version may wipe out the previous value overnight.

< This conservatism has a third strand, looking at the whole-life cost of a console—the purchase price, likely maintenance costs and residual value of analogue consoles are reasonable easy to predict, for purchasers and the leasing companies to calculate, in the fiscal sense another relatively low risk venture. The comparison of the whole-life costs of a digital console are open to much more speculation and 'guesstimation': the purchase price is easy, the maintenance costs a little more difficult to predict, but the scorpion sting is the residual value, which bears much similarity to second-hand computer values where the next speed or version may wipe out the previous value overnight.

Whether for the above reasons or others, the long service life of a large ana-

logue console means that this sector of the market will, like oil tankers, be slow to change direction. Each further analogue console sold means it is several years before that control room will be facing the decision again, by which time the console choices will be very different.

Long service life and whole-life costs do not affect the smaller portable and semi-portable console market to any degree. Here the allure of the label 'digital' on a console may in the minds of technically uninformed prospective purchaser convey an impression of 'perfect sound forever' (with all due respect to Philips) and therefore sway this buyer into a digital product. However when faced with extinction it can be amazing how innovative designs become. The last decade has seen small analogue consoles, with substantially more features and performance for much less money, change the marketplace. These new consoles along with the small affordable digital multitrack recording systems has brought small-scale studio systems into the price reach of a much larger domestic-hobby musician field of potential customers.

This shift is already being eaten away by the emergence of one element of design that analogue finds it very difficult to emulate—the merging of different functions within the same product. Once a product, like a small console is in the digital domain, it is often very cost-effective to add further digital functions which in reality only add pennies to the actual cost. Such functions are effects processing, delay, recording, editing, and the like. While it is possible to add these to analogue consoles, the addition is not as cost-effective, and so the balance may tip in favour of digital because of this aspect alone. Again the survival of analogue comes down to which technology and designs appeal

most to the marketplace, old fashioned market dynamics—so much fun to watch if your income is not dependant on them.

There are some console applications where digital designs have been slow in coming, and the analogue varieties remain ahead. One such application is live theatre and stage sound. The market segment was not sufficiently large to attract the larger manufacturers into designing digital products specifically for that application and the specialist manufacturers continued with analogue. Many of these applications have specific customer requirements which have been a little stubborn at overcoming in the digital domain. The solidity and reliability of digital and software processing is clearly very critical in live work, more so than in a studio, you cannot repeat the take again in front of an audience. However even in this type of sector there is usually an advantage or two to be gained with digital designs and there are some interesting examples of digital console design coming from unexpected directions, but the jury here is still supporting the analogue.

If we were to be seeing a wholesale and universal transition from analogue to digital processing for all consoles, then the first observation is that this change has been along time happening and the fat lady has yet to sing. A long time ago Soundcraft used the phrase 'appropriate technology' as a headline in a console advertisement and perhaps it is appropriate for the issue of technology in consoles and which, if either, should be applied. Viewed another way: the market dynamics, the customers and the manufacturers will all make their appropriate decisions and in all probability analogue has a part to play in consoles for a long time to come. ■

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# Jungle Fever

New London post facility jungle is set to build on the successful approach of its sister, Zoo. **Rob James** explores

**S**OHOO. LONDON'S WEST END. The name alone conjures a wealth of images. Narrow bustling streets, some of the best restaurants anywhere, side by side with strip clubs, film distributors, old pubs, sex shops, Hare Krishna and facilities houses. The pace is frantic and the beautiful people work and play hard. Unsurprisingly you will also find many advertising agencies and the facilities that support them. In this climate meteoric growth is not only possible but almost commonplace. Brand new sound facility Jungle is a recent addition to this hothouse.

Somewhere around 1994 two companies, Commercial Breaks and Telstar Records decided it would make sense to have in-house facilities to handle their own work if they could fill the spare time by attracting outside clients. Zoo was the result. Adrian Reith from Commercial Breaks is the managing Director of Zoo and Jungle. From modest beginnings in a couple of rooms in Wardour Street, Zoo quickly moved down the road to its present premises, with three studios. Clients liked what Zoo had to offer and it became apparent more rooms were needed. Sister facility, Jungle was born. Situated just off Dean Street in an old mews building Jungle has four rooms. The conversion involved adding an extra floor on top of the existing building. Since then, two rooms at Zoo have also been refurbished with similar specifications to the

new rooms at Jungle.

As I arrived to meet Graham Ebbs, studio manager and Owen Griffiths, chief engineer, I couldn't avoid the first rather novel feature. Jungle's reception is situated on the second floor up a light and airy winding stair. For those, like me, almost terminally unfit, the huge and comfy sofas when you finally make it are a welcome relief.

As befits a facility specialising in commercials the emphasis on style and appearance is inescapable. Designer, Cressida Bell, also responsible for decor at Zoo has kept the jungle motif subtle and abstract. In the reception area, leaf shapes and symbols against bright green paint hint at lush tropicana. A rug with pile you could mow sets off the exotic looking wood used for the custom built desks. The overall effect is energising without being frantic, in fact it's almost tranquil. On the other hand, minimalist high-tech is also much in evidence. The translucent blue flat TFT screens of the Apple monitors in reception are the first clue. Entering one of Jungle's mix rooms reinforces these impressions. Stripy, laminated wooden surfaces with Quested speakers subtly in evidence and a Fairlight Fame in every room.

Owen Griffiths has been with Zoo since the beginning. Before that he was at Robbie Weston's The Bridge.

Owen reckons The Bridge was a great training ground. 'That's where I started as a runner, and they had some really

good engineers who went on to various different places around town.'

When Adrian Reith approached Griffiths in 1993 about working in a brand new facility he decided it was time to move on. By the time he left, the project was off but fortunately it was resurrected and Griffiths has been involved ever since.

Jungle was built by Recording Architecture to Roger D'Arcy's designs. Each of the seven main rooms in the two facilities is centred around a Fairlight Fame. This is the editor mixer born out of collaboration between Fairlight and Amek. In effect it is a Fairlight MFX3 with a mixer control surface by Amek. I wondered what had led Jungle down this particular path. Griffiths first encountered the Fairlight MFX2.

'It was a chap called Pete Wandless who seemed to crop everywhere at the time. I was used to the Lexicon Opus, in many respects a good system for its time. He showed me the MFX2 and I was very impressed with it. I had a few reservations but we bought one on the basis of it being upgraded to an MFX3 which would answer the snags. I also looked at AMS' AudioFile but it was just too expensive at the time. When I did the budget for the first rooms it wasn't terribly well received. People just don't realise how much it costs to do it properly. And, if you don't do it properly, you end up undoing it which is more expensive. The rooms we've >



< redone at Zoo were okay, great rooms but there were a couple of things which were painful to redo. The thing about Soho is there are a lot of rooms which technically, you could pick apart very easily but they do the work, they have talented people in there and it sounds good on telly. So there is a bit of room for give and take.

The main things we like about the Fairlight are the interface, the speed and the stability. We found very, very little to dislike about the MFX3, I'd still like to be able to pull clips out and see them but... Before the Fames we had a couple of Amek Einsteins in the old Zoo rooms and they were great really, a few power supply problems but otherwise fine.

The interesting thing about the Fairlight is you can do so much with it. I never thought I'd be saying this but, with the clip-based EQ and level control and so on there is a lot of scope for a flat fader mix. Once you know what you're doing it can be much quicker working like this. I mean, I can de-ess using the Fairlight. So Fame as the kind of wrap-around for the MFX was a natural thing to look at.'

Compared to music or other sound for picture studios the outboard seems rather sparse. Griffiths explains: 'One of the overriding principles in what we do is to try and keep things interchangeable between rooms and this links in with staff as well. You really ought to have a situation where anybody can pick up a job from anybody else. That's the way you introduce clients to new people and the way you allow junior people to see how the more experienced ones have been doing their job.'

Ebbs and Griffiths are less fixated about kit than many engineers in other areas. On the third time of asking Griffiths eventually gives in.

'Oh all right, I'll tell you about the boxes. We can also do a lot of the processing inside the Fairlight so we don't have a lot of outboard. All the rooms have Focusrite Greens, you know, the voice boxes because there's no preamps

in the Fame. Master compressors are Red 3s, also Focusrite and each studio has a Lexicon, MPX1 or is it 15?'

Graham Ebbs comes to the rescue: 'MPX1s. You can tell we're really into it.'

Griffiths responds, 'We really love our boxes, we do, MPX 15s and Eventide Ultra Harmonizers.'

Graham Ebbs explains where they're coming from: 'The gear argument does not really apply. If you're recording music, a band comes in and you don't know if they're going to be the next best thing since sliced bread and somebody is still going to be playing it in 30 years time. Then you've got an argument for being very choosy. The stuff we do, it's on the telly for a month, half the audience is putting the kettle on and making the tea, we've got no illusions, it's a completely throw away thing.'

Griffiths agrees: 'That isn't to say you are in any way scrimping on the quality, you're just being realistic. You've got a whatever reverb, you might not use it for making a particular record because different things come into play but what we need is a very good reverb, a reverb which can be used whatever the circumstances. It has to be reliable, easy to use and you throw one into every studio. That way you know if one does go wrong you can just swap it with another one.'

Ebbs and Griffiths may not be particularly excited by toys but they are obviously doing something right. Their client list reads like a who's who of advertising agencies and TV companies. Anyone in the UK who hasn't spent the last few years on Mars will have heard some their work. The Nissan Almera 'Sweeny', Virgin Upper Class (Helen Mirren), Vauxhall Zafira (Griff Rhys Jones), the BBC TV licensing campaign, Sporting Insights and the Christmas drink-drive campaign are just the tip of the iceberg.

One thing which might surprise many people outside the industry is the conservatism evident in some areas. A good example is picture formats. U-Matic has

long since been consigned to history in most TV and film industry roles. But in advertising the humble U-matic, is only now beginning to be replaced by Beta-cam as the lingua franca. Sure, the original source is often ployout from Avid or whatever but this market has been very slow to move to nonlinear picture for mixing. I suggest, with the short lengths of programme material involved, it would be worth transferring material to an in-house nonlinear picture machine. Fairlight's own for instance. However, there are good reasons for not making this change. Griffiths says one reason they haven't moved to this way of working is he has yet to see a machine which answers their basic requirements - background archiving and uploading together with allowing many consecutive items to appear to start at the same time - the usual 10:00 hours. Fairlight are still digesting Jungle's wish list of features. Another reason is the nature of the business. Bookings are frequently very short, one hour is not uncommon, and in this time a voice-over has to be recorded, effects selected and laid and a mix performed.

Griffiths explains: 'The clients walk through the door and the clock is ticking. They want to start as quickly as possible.'

Perhaps the answer would be a system which transparently copies the original material when it is first played. After which you could have the advantages of nonlinear.'

Take up of surround on TV work has also been slow. Graham Ebbs puts this down to rumours that surround mixes come over quieter on air and the agencies perception most people still listen on mono or at best, stereo TVs. On the other hand, the company has spent a considerable sum making one room properly cinema capable. The monitors in this room are Apogees rather than the Questeds found in all the other rooms. This change came about because Quested does not currently have any THX approved units.

Graham Ebbs is an enthusiast for the

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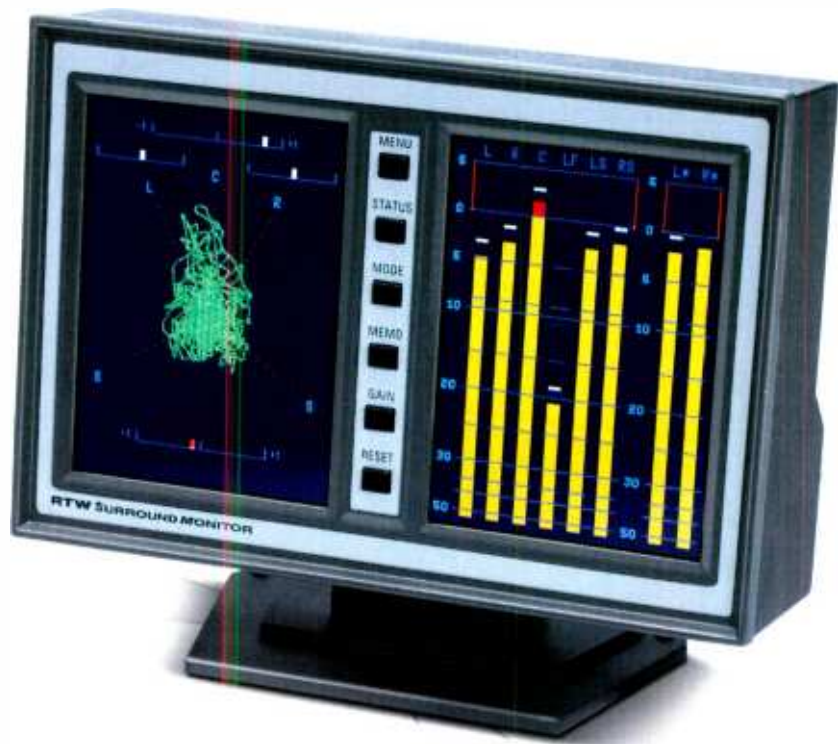
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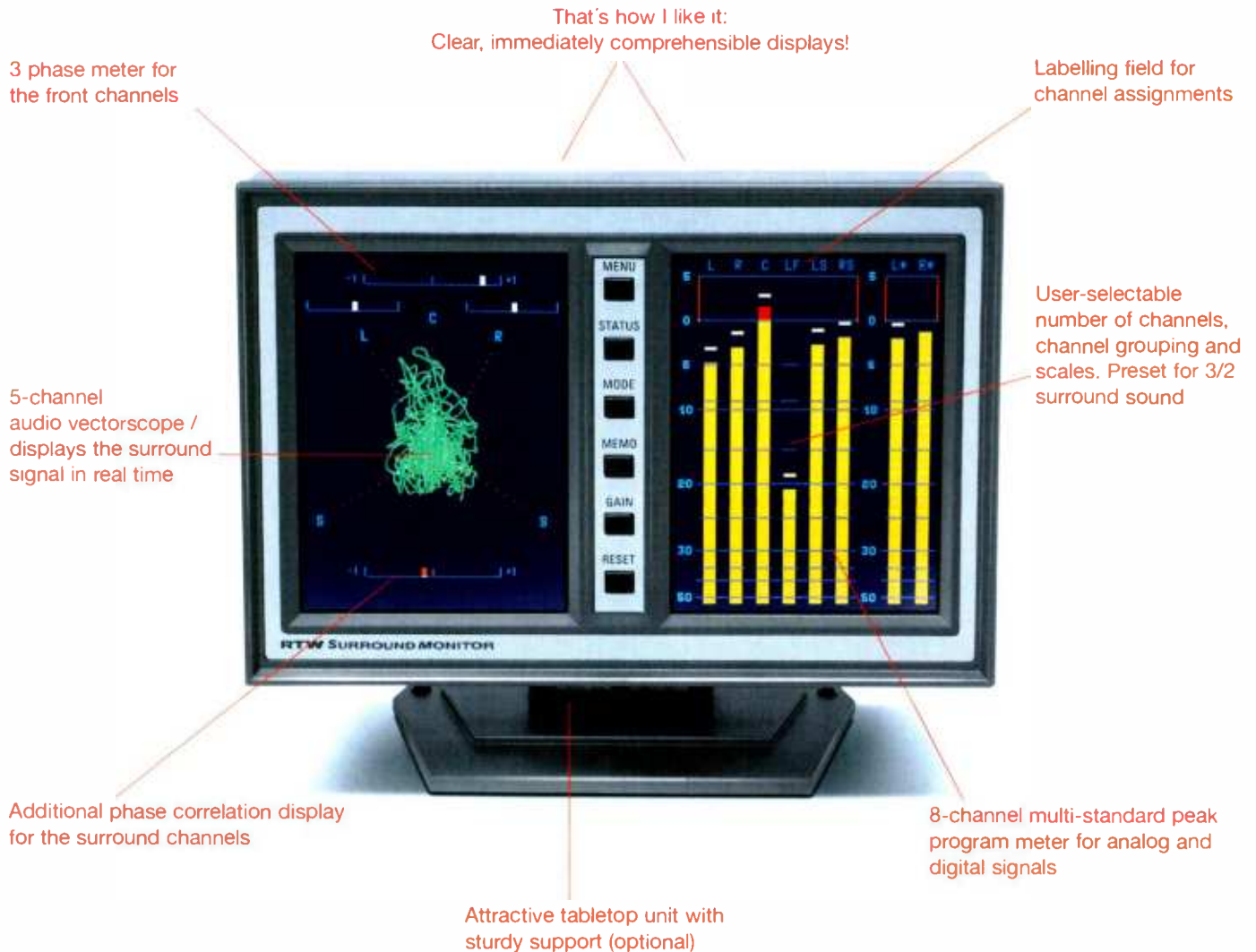
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flagship room: 'We had never had the space before and unless you're going to do it properly it's better not to do it at all. Which is why, when we came to build a cinema room at Jungle, we got THX involved and why we when we decided to use the big space in Jungle for this we really looked into projectors and ended up with a big, line quadrupled, Barco. We could have got away with something cheaper but now when you sit there with the big screen and the lights dim it really feels like you're in a cinema not watching a big TV. It still excites me. When you get clients in it really works, unbelievable.'

I asked Owen Griffiths to describe a typical session. 'Well in one sense there is no such thing, they are all different. The thing about commercials is it's all last minute. So everybody walks in and because they've also got the actor with them and whichever expensive piece of talent it may be, you have to get down to recording with them immediately because they're charging by the hour. They need to record the script this number of times in that amount of ways in the time they've got available. In a session there might be a voice and music to add. It could be prerecorded or you may have to select library music, record it and edit it, record the voice and mix the whole thing in an hour. At the other end of the scale it might take a day, or you might have a 5-hour session doing three pictures. Generally, these days, quite a lot of work is done at the off-line editing stage. There are a number of editors now, quite talented in sound, with their own sound effects libraries, so often a lot of work is done for you. Sometimes you wish it wasn't because you have to do a lot of cleaning up or replacement.'

'Sound effects are quite a big issue for us. Before we put Jungle together, we had been working off CDs for ages. In fact we had a CD jukebox system with WinFx software. It was something I never really wanted to do because of the speed of the jukeboxes, but with



**Contact**  
Jungle, London.  
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several studios, we had to.'

Fairlight's MediaLink networking system would seem a natural for a company split across two sites. Griffiths says they're keeping their eye on it: 'It's looking good. There's another company in London, Waves, who are using it but only with two machines. We're seeing how people in the States get on with it first to make sure it's really bullet-proof. One step at a time really. Just before we built Jungle I went across to 750 MPH studios and saw a mate of mine, Nigel, who has this system, Server Sound, from an American company. Msoft. We went with that and we now have a fibre optic link between our two buildings. The internal network is 100base-T and the fibre link can be used for networking the Fairlights if we decide to go that way. We would use it basically for forwarding, moving projects from one studio to

another. We'd still use local hard drives, just bung projects onto the server so they can be accessed elsewhere and for back-ups. But the policing of it is really, really complicated. I don't think we'd be working direct from the server. You'd pull the day's work down from the server and put the finished product back up there. Then there would be a backing up operation.'

At present, all the backing up is done to Exabyte and they have every mix they've ever done. There is about another years worth of shelf space, then they will need to think again.

For Graham Ebbs, opening Jungle has brought other changes and challenges.

'You do begin to realise you're dealing with a completely different animal, the size we used to be, you knew exactly what was going in and out. With six or seven studios running you don't >

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< know any more. It's impossible for one person to keep track of everything. The biggest difficulty Owen and I have at the moment is maintaining the quality, not of what goes in and out, because that almost goes without saying, but the service levels. I mean when something used to go wrong, with the Fame or the Fairlight, everybody used to know about it and everybody knew what had been done to fix it. Now, somebody can have a problem in a studio and we may not know about it. So now we have all the faults on a computer file which anyone can access. This helps us to see if we are getting a pattern of similar faults and to catch things before they become a major problem. Running seven studios in two buildings full pelt has thrown up a number of new problems, about communication really, mostly just knowing what everyone is

doing. It's easy when you are in one building.'

The internal traffic flow in the Jungle building is unusual, Graham Ebbs says. 'It's strange actually, with the Jungle building when we decided to put the reception at the top, you have to go up those stairs and then, if you're going into the studios, you then go back down, and down again to the kitchens, it's nice, it means people are circulating through the whole building. If the reception's downstairs people just radiate off and there's no flow. With this building and the people we've got, the atmosphere's great, everybody's mates. No back stabbing going on. If the atmosphere's right problems are easy to solve because people don't hide things, they tell you and then you can sort it out together much more quickly than trying to hide it under the carpet.'

The issues affecting this kind of rapid growth are not restricted to managing the equipment and buildings. I asked what makes the difference in a successful commercials sound house.

Griffiths believes that people are more important than kit. 'The equipment can make a big, big difference if you're the engineer or the client. If you have the best people in the world and the equipment is duff you're dead, but good people will do well with mediocre kit, bad people can have the best kit around and get nowhere. The main issue, the reason why a lot of people go wrong, is the kit is only part of the equation. That doesn't mean employing the people who have the biggest client base but actually getting younger people in, treating them properly, keeping them interested in the job and then just keeping them. A lot of people went wrong by treating people as expendable commodities. Around the beginning of the nineties when there was a big slump in advertising, no new people were employed or trained and so no new talent. What we've been trying to do, very consciously, is to build that up from within the company not by employing people from outside. This way, engineers grow alongside the creatives in the same way that happens in film or TV. You have to remember the business you're in. People do have a limited shelf life and that can be a lot quicker than you sometimes think. There's nothing wrong with giving people direction and making them aware of the standards of professionalism required, but you must treat them well.'

Several of the engineers started in transfer and were put through an intensive in-house training programme, but how does the company recruit people to work in transfer?

Graham explains: 'We're always getting CVs sent to us then I call to see if they've got any personality to speak of. That's what swings it more than anything else. You could have someone technically brilliant, top in every class but with a personality like a lettuce. They wouldn't stand a cat in hell's chance. They couldn't hold their own. Thing is they're not just engineers, a lot of the time they are making creative decisions with creative people. It's levelling off a bit now but we've been opening a new studio every ten months or so and it's been hard keeping the staffing levels in pace with development. So far it's worked.'

Jungle's joys and problems are at root very similar to those experienced in broadcast TV and film. The solutions are careful and pragmatic. The people running Jungle are not 'gear heads', neither are they precious about their work but they are conscientious and rightly proud of what they do and their facility, but most of all—their people. ■

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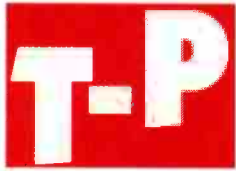


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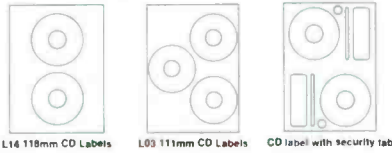
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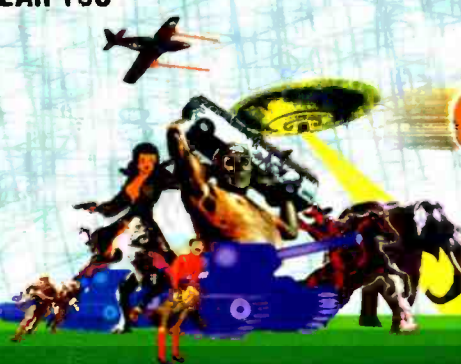
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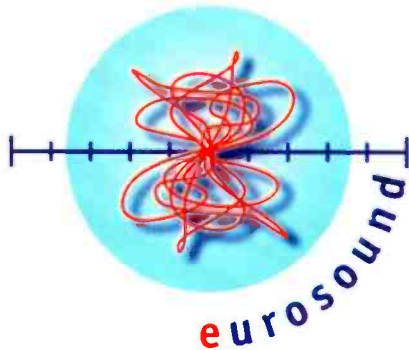
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## America.com

The hierarchy of modern recording studios is the key to profitable business management writes **Dan Daley**

**T**HAT WOULD ACTUALLY make a quite good title for the column, eh? I had originally thought of calling it 'Letter From Abroad', but the political correctness that covers most discourse in this country like a wet blanket put the kibosh on that—it could have been construed as 'Letter From A Broad,' and the lawyers and the women's activists groups would have gotten involved and all hell would have broken loose. So for all this time, we've stuck with this more prosaic rubric.

But the dot.com tag might be more and more appropriate these days. Not for nothing do we get all the high-tech stuff first. Silicon Valley and Silicon Alley aren't in Luxembourg, you know. And the Internet revolution has already significantly changed the countenance of the studio business in the US.

Websites about studios, certainly, have proliferated. But lately these sites have been evolving into more than just ethereal billboards for facilities. A new level of possibilities is being explored. The studio website as a virtual entertainment centre unto itself is what you get at Nashville's Starstruck Studios' site, where 3-dimensional renderings are interactively accessible by visitors' mouse movements, allowing viewers to lit-

erally walk the floors and peer into the rafters of the facility. Starstruck, which developed the site in-house and which has promoted it to the trade media as assertively as many facilities do for major new console acquisitions, originally expected that the site would serve as an elaborate marketing tool. However, Robert de la Garza, vice president of Starstruck's studio and broadcast operations, told me that the site has succeeded to a large degree as a sales tool, as well. Being able to virtually walk them through the facility has closed eight foreign deals thus far, says de la Garza, including projects from Brazil and Australia, success he hopes to see repeated with the company's new broadcasting operations.

Another Nashville palace, Sound Stage Studios, has expanded the way it views the potential of the Internet, as well. Instead of simply a marketing tool, Sound Stage's new web-site is far more complex and far more interactive, listing not only the facility's details but also acting as a centre for information exchange, including message boards, technical questions, and classified advertising. That last part is but the tip of the informational iceberg, though. Says studio general manager Michael Koreiba, 'Other types of advertising are being

planned for the future. Not just for the studio, not just within pro audio. Any kind of advertising is under consideration. Whatever would work within the context.' (And why not? Ringo Starr now shills on television for an online stock trading service.)

Webcasting has become a big business for a few studios so far, such as composer Philip Glass' facility in downtown Manhattan, which hosted David Bowie's first webcast several years ago. In fact, when you get them over a beer and with their guard down, more than a few studio managers will concede that while surround audio has thus far turned out to be something with more buzz than substance, the demand for Internet-based audio services has increased and shows the potential for being more of a real revenue generator over the long haul than does multichannel sound, at least as far as studios go.

(One of the reasons for that is the fact that, so far, at least in the US, the multichannel business isn't being focused on the facilities as much as it's been centred on individual mixers, such as Chuck Ainlay, and Jake Nicely.

But the Internet presents a different picture. Not to denigrate the skills necessary for doing audio on the Web, but code-writing is simply a bit more formulaic than mixing sound, and the talent needed to accomplish that is far more available. (God knows, the schools are churning out new 'Net-savvy grads every week.) Thus, the physical plants that are studios have more opportunity to become centres of Internet-based production. And they're beginning

## Europe: Is it safe?

A victim of its own success, a good security system often becomes sport for hackers writes **Barry Fox**

**F**OR AS LONG AS I CAN REMEMBER the music industry has been dreaming of copy protection. It began 30 years ago when the Beatles' Apple Corp (no relation to Apple computers) promised a spoiler to stop people copying *Sergeant Pepper* onto tape. An inaudibly high frequency signal on the disc would beat with the HF bias in a recorder and put an audible whistle on the tape. Of course it did not work. The HF signal was lost in the disc cutter, or groove, and filtered by the pickup. But the same system was re-invented over and over again. There were also plans to protect FM broadcasts in the same way, even though they cannot carry anything above 15kHz. A French station promised to scare off mosquitoes with ultrasound by radio.

Then we had CopyCode, the CBS system of sucking a notch out of the mid range to trigger a circuit in the recorder and stop it recording. This spoiled the music, and the RIAA and IFPI are still trying to win back cred lost by backing the daft idea.

Then came SCMS, which adds flags to the CD bitstream that tell a compliant digital recorder it can only copy an original

disc. Copies will not copy digitally, but there is nothing to stop someone making endless copies of the same original, or using an analogue connection. The Philips dual-well CD Recorder switches automatically to analogue recording mode as soon as it is asked to copy a copy CD.

More recently we have had watermarking, with the SDMI and DVD Audio camps backing a method of altering a wide spread of waveform so that recorders switch off. So the first thing the industry wants to do with its new super-fi toy is compromise the 'fi'. Sony and Philips have already rejected the idea for Super Audio CD.

The SDMI is now finalising controls on the distribution and copying of MP3 music on the Internet. The scheme is so mind-bendingly complex that the first people to understand it may well be the hackers who find a way round it.

Last year the British company CDilla, that specialises in CD-ROM encryption, came up with a copy-killer called AudioLock. CDilla engineers added not-quite CD-ROM codes to a music CD so that it played on a music CD player but not on a PC ROM drive. So there would be no chance of

using a PC to copy a CD onto a blank disc, without SCMS. I tested a test pressing and it worked as claimed.

CDilla also reckoned it could doctor the sub-codes to disable the digital output of a music CD player to stop digital dubbing.

Immediately there was outcry from all those who quite legitimately listen to music CDs while working at a PC. And Philips was not pleased to see the prospect of all its CD Recorders put out of action.

Macrovision, the company which specialises in video copy protection, bought CDilla and rethought the idea. Doubtless

### CDilla can disable the digital output of a CD player to stop digital dubbing

they were influenced by BMG's unhappy experience in Germany.

Sonopress in Guetersloh pressed two CDs (*Razorblade Romance* by HIM and *My Private War* by Philip Boa and the Voodoo Club) using a system called Cactus Data Shield developed by Midbar, of Tel Aviv, Israel. Cactus plays with the Table of Contents and some players, with anti-shock memory, were unable to play the discs, while others could only start from one track.

Sonopress had tested the system by giving discs to employees. No-one had a Philips player and it was only when the discs



to make those moves.

One of the parallel developments that will facilitate this is the ongoing evolution of mega-facilities, such as The Hit Factory, whose 12 studios in New York City were increased by six more in Miami last year and which does not deny that it is in the mood for further acquisitions, and Pacifica Media, which has quietly bought up many of Hollywood's independent audio post facilities in the last two years, such as Weddington productions, creating a second front after the one Liberty Media opened with its acquisitions of Todd-AO and other companies. Such breadth will position them and their facilities well for the onslaught of Internet radio, Internet cinema and Internet TV, which are already growing.

This is, in short, the dot-comming of America and, by extension, of American recording and post studios. The new models being developed here are going to become the models for the rest of the world, if for no other reason than that America is still the 600-pound gorilla of the entertainment industry. As we've discussed in previous columns, that may well change and change radically in the next decade or so, as other countries log on and build virtual entertainment technology infrastructures and in the process become less and less reliant on America for music, movies, television and other entertainment.

But until that actually happens, the new models are already beginning to take over the old ones. And as we say in Hollywood, it's coming soon to a theatre near you.

had been sold that BMG found they would not play on Philips players. BMG had to re-press to keep customers happy. The trade dubbed Cactus a 'Wild West' fiasco.

This mistake was doubly surprising because it came soon after the Sonopress goof on DVD-Plus, a bonded disc made from one CD and half a DVD. This was too thick to play on some decks.

Macrovision has now renamed Audio-Lock as SafeAudio. The discs will play on a ROM drive and copy or 'rip' onto the PC's hard drive as compressed code, such as MP3. However the MP3 copy must then meet the SDMI's requirements and not copy through further digital generations.

According to Macrovision SafeAudio will also be able to block straight digital dubbing from CD to blank CD—if the record industry dares ask for this and so alienate the millions of people who now own a CD recorder.

Macrovision took part in the recent SDMI meeting in Paris and is planning extensive field trials in the US around May–June ahead of formal proposals to the record industry and music publishers June–July.

Macrovision has a good track-record on ensuring compatibility with legacy equipment, born from a decade of copy-protecting VHS and DVD movies. But even it works I suspect AudioSafe will quickly become just another challenge for hackers to crack.

## First service

Establishing acceptable levels of service for digital broadcast may be more difficult than technology promised writes **Kevin Hilton**

**S**ERVICE, as it pertains to television and radio, has always had a dual meaning. It can refer to a broadcasting organisation (as in the British Forces Broadcasting Service) or be a way of describing the transmission process for the non-technical: as in 'Normal service will be resumed as soon as possible'.

Now it has a third meaning, as broadcasting becomes part of the overall consumer service industry. Television and radio have always provided a service, but in a slightly different way to the current perception of the word. It was, and apparently still is, the remit of public service broadcasters to inform, educate and entertain. Commercial broadcasters have been more interested in entertainment as a way to pull in advertisers; but it had to be good material to get figures, so, by extension, it was a service too.

This all worked well enough in the days when you just switched on the television or radio and wonderfulness came out. Even if you had to pay a licence fee, that was once a year or you bought stamps each week: the rest of the time, it felt like you were getting a broadcasting service for free.

Digital and the multichannel environment have created commercial services in a very real sense because people are paying for what they watch. With the continuing decline in the manufacturing sector, service industries are becoming the core of many national economies and consumers have to expect something to back up or their purchase. For all his faults, Rupert Murdoch recognised this early on, which is why people are greeted by the mantra 'Sky Television at your service' when they call up.

The onus is on the broadcaster to ensure that the service is good; not just the technical presentation and the programming but the support given to those who dig into their pockets for the subscription, satellite dish, set-top box or new aerial. Viewers have always had recourse—but in a different way. They could harangue the luckless duty officers if they did not like a programme or complain to a regulatory body; but now there is direct contact—indeed a direct contract—between the service providers (née broadcasters) and the consumers (née viewers).

Which is why my experiences in this new world (purely as a faceless consumer, not in my secret super-hero guise) have been depressing and disappointing. Lured by a free box and attractive subscription packages I decided to sign up with ONdigital, working on the basis that I did not want to give money to Rupert Murdoch if I didn't have to. It all seemed easy: sign up on the web-site and wait for them to arrange it. Too many days later, a sales representative called, saying something

along then lines of 'Oh, you wanted digital TV didn't you?' They then put me on hold for five minutes because they did not have the relevant details to hand. When they came back on, I said their service was terrible and I wasn't interested any more. I put the phone down.

A few more days passed and I got another call. 'We don't have all your details,' said a new sales rep. I explained what had happened and—after a vague apology—decided that I did want cycled *Deep Space 9* repeats after all. After being assured that I could receive all my chosen primary channels, I coughed up my bank details and waited for the box. It arrived, but, on setting it up, I found that only one of the three necessary muxes was being picked up. There is a grace period within which you can cancel the contract and send the box back, which is

The onus is on the broadcaster to ensure that the service is good; not just the technical presentation and the programming, but the support given to those who dig into their pockets for the subscription, satellite dish or set-top box

what I did. It doesn't sound like a long time to have digital TV, but I once had a 20-minute date, so I know all about short-lived experiences.

The box was not picked up and it was not until I moved apartments that I finally got rid of it and ONdigital (getting out of the contract because the building had a communal aerial). Despite my experiences, friends of mine decided to take ONdigital's prepaid offer. They rushed out, bought the box and returned, breathless, to be switched on. Excitement dimmed when they were told they couldn't get all the channels they wanted, even though the receiver was displaying the channel ID. When connected, they got everything, even though the technical centre's database listed their area as one that could not receive all stations.

Digital TV is still young and the service providers appear uncertain of exactly what they have. There is always a bedding-in period, but the consumer service behind a broadcasting service has to be faultless if digital TV is to truly establish itself. It will become the norm in the future, if only by attrition, but customer support is crucial if the providers want their customers to think kindly of their service.



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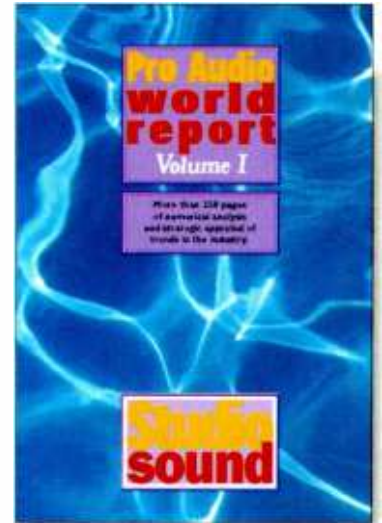
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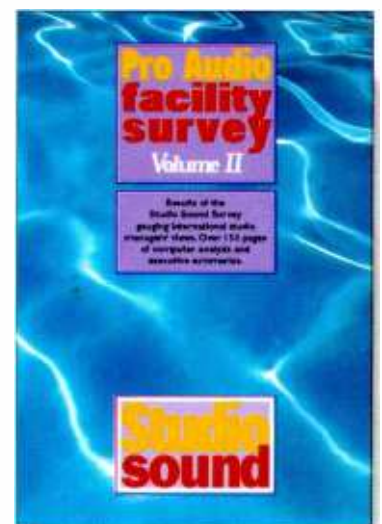


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# Ampex Complex

In the first in a series examining the tweaks and tricks of Ampex tape machines, **Tony Arnold** sets the scene with a timeline of equipment introductions and gives a brief description of the various Ampex models

**W**HEN YOU OWN an Ampex machine you belong to a special club. The Ampex Owners Club. Ampex has a great history and you get a good feeling when you own any of these machines. Rock 'n' roll was developed on them, the guitar became what it is today with the use of Ampex recorders—ask Les Paul or Sam Phillips or the countless other legends that I could mention.

Over the years I have owned maybe 20 different makes of recorder and have serviced and repaired pretty well every make of machine you can imagine.

But whenever I get an Ampex machine in front of me, whatever model, year or type, whether domestic or professional, I am always struck by the solid-

ity of these machines and the solidity of the sound they produce.

I have potential users phoning me and commenting on 'what an unbelievable sound this machine gives out'. Often they'll add: 'but the rewind is a bit slow', 'how can I get my all singing and dancing toys that I am used to?', 'how can I make it find spots on tape quickly?' and 'why doesn't it punch-in and punch-out with the speed of modern machines?'

My answer is always the same. 'Do you wish to purchase this machine for its recording quality or do you just want to watch it do tricks for you?'

There are engineers-producers today who want to capture those great old rock'n'roll sounds, most of which were recorded on Ampex recorders, but don't

want to have the adrenaline running through their veins that the engineers of yesteryear experienced. They want the machines but not the hassle.

I hope this series of articles will help you to keep the great sound of your Ampex, but take out a little bit of the hassle. Not all of it mind, as a little bit of adrenaline also helps to make great recordings.

● **1947 Model 200.** A very rare beast that ran up to 60ips with a frequency response of 20Hz to 18kHz  $\pm 2$ dB.

● **1950 Model 300.** Ampex and Les Paul invent multitrack as we know it and Ampex also invents sel-sync. The Model 300 came in various forms, as well as CCIR and NAB, some would include Ampex' own pre-emphasis EQ, known as AME (Ampex Master Equalisation). There were also two types of Electronic Audio Assemblies: the 350-1 (mono) or the 350-2 (stereo) (Note the minus sign). The Electronic Assembly's Catalogue number was 5701. They used metal valves as opposed to glass, the audio unit had these valves mounted directly on the metal chassis and everything was hard wired. The meters were labelled 'Ampex Corp. Redwood City, Calif.'. They were made by Texas Instruments.

For the 351 (mono) or 352 (stereo) (Note absence of minus sign) the Electronic Assembly's Catalogue number was 30960. These used glass valves mounted on small removable (with difficulty) PWAs inside the chassis. The meters had Ampex written in very small font with no indication of the >

**AMPEX**

1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983



< manufacturer. As both units had balanced microphone inputs they make first class mic amps and are very sought after for this purpose today.

- **1952** Model 400. I do not have much information on this model but I understand that it was similar to the Model 300.
- **1952** 3200 Duplicator.
- **1953** Model 350 351 Motion Picture Sound System
- **1954** Model 600 (also known as the Bing Crosby machine). This again was a valve machine that only took 7-inch spools, and ran on a single motor using belts. Transport controls were two levers and its top speed was 7.5ips, but there was an upgrade kit for 15ips. Intended as a small portable broadcast recorder, I have made some great music recordings on my 15ips/7.5ips version sometimes using the lower speed and I understand that Joe Meek had one. Akai of Japan later copied this machine and called

their grey (rather than the Ampex brown) version the MR8.

- **1955** CinemaScope Theatre Sound System. Ampex ventures into domestic market with the Model 612 which was the first 1/4 track or 4-track domestic recorder.
- **1959** JH Orr Associates, manufacturers of tape since 1946, merge into Ampex enabling it to make its own brand tape. Two more domestic recorders, the Model 970 and the Model 1200, are introduced.
- **1960** The PR 10. Ampex stops using the word 'Model'. This machine was also a valve machine, like the Model 600 it could only handle 7-inch spools, but it did run at 7.5/15ips and had three motors and a push-button transport.
- **1963** Domestic Recorder F-44 Series.
- **1964** A change in the model name to MR. Domestic Machines were the 1000 and 2000 Series. The MR70 was a great machine and is very

Ampex History

sought after today. It used military spec novistors. Frequency response at 30ips was 40Hz to 20kHz ± 1dB and it was switchable between CCIR, NAB or AME and could be used from Stereo 1/4-inch to 8-track 1-inch.

- **1965** The AG Series of recorders (AG-360, 350 and 100 Series). The new domestic additions are the 1100 and the 800 series. Transport design is very similar to the earlier Model 300 series but with illuminated transport push-buttons. Ampex dropped the valve and are now using Germanium transistors, the EQ units are plug-able, and the audio units are obviously smaller.
- **1966** The AG 440B and the new transistorised AG 600 while on the domestic front there's the 940 and 1450 Series. The 440 had nonilluminated coloured transport push-buttons, the electronics were Silicon transistors and were totally removable for servicing with the use of an extension card. Until now all Ampex recorders had to go via Stop before Play from FF or FR, later versions of the 440 series (440C) cured this.
- **1967** The big MM1000. A rush job for Ampex (the inventor was losing ground to the competition) it manufactured a 2-inch video recorder and combined its transport with 440 electronics with the addition of a sel/sync switching box and 1-inch 8-track or 2-inch 16/24-track headstacks.
- **1973** The MM1100 multitrack continued to use 440 type electronics but the MM1000 sel-sync box has now given way to an audio switching card or PWA. This unit consisted of four relays (bias/sync/replay/record) which is fitted in a rack behind the audio PWAs. The machine is much smaller and fully logic controlled with a DC servo motor.
- **1976** The MMI 200, ATR 100 and ATR 700. The MMI 200 is similar to the MM1100 only slightly larger, its electronics are still based on the AG 440 but the audio switching PWA is now above the audio as opposed to behind which makes life easier for servicing. The Ampex MMI 200 is among the best workhorse machines if upgraded by the vast number of improvements available. The ATR 100 series was a complete innovation and has become the most sought after machine of any make or model. No Studio is worth its salt without an ATR 102 1/2-inch. The ATR 700 was a Teac 7300 but with slight improvements by Ampex.
- **1977** The ATR 800. I must admit I do not know a lot about this machine, but it never really took off. It was an ATR 100 built down to a cost, and, although totally designed by Ampex, I am told that Teac made the parts and assemblies.
- **1979** The Ampex ATR 124: 'The Guv'nor' of all analogue multitrack machines. This was a massive investment by Ampex, it was the first machine to have a CPU built into it. It was simply years ahead of its time, but there were only 50 made. ■

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# Transforms and spectra 2

The principles of transforms were explored last month; here **John Watkinson** shows how the transform is actually performed

**T**HE FOURIER TRANSFORM is an extremely useful tool for a number of audio purposes (see 'Dr John', *Studio Sound*, April 2000). This month we will convert from the time to the frequency domain. As with all problems it is necessary to determine what aspects of the conversion are important and this is a function of the application. In a compression system, for example, the sound quality could be impaired if the original waveform is not recreated accurately enough and this suggests that the overall system should have linear phase.

In digital systems, the waveform is expressed as a number of discrete samples. As a result the discrete Fourier transform (DFT) analyses the signal into a number of discrete frequencies equal to the number of input samples. The fast Fourier transform (FFT) is no more than an efficient way of computing the DFT. Practical systems must use windowing to create short-term transforms.

Fig.1 shows that if the amplitude and phase of each frequency component is known, linearly adding the resultant components in an inverse transform results in the original waveform. It should be clear that the correct reconstruction of the phase of the frequency component is vital, as changing the phase of any component will alter the reconstructed waveform. Thus for each frequency the DFT must accurately analyse the phase of the signal components as well as the amplitude.

There are a number of ways of expressing phase. Fig.2a shows a point that is rotating about a fixed axis at constant speed. Looked at from the side, the point oscillates up and down at constant frequency. The waveform of that motion is a sine wave, and that is what we would see if the rotating point were to translate along its axis while we continued to look from the side. One way of defining a sinusoid is to specify the amplitude and the angle through which the point has rotated at time zero ( $T=0$ ). This is the amplitude-phase description.

Alternatively, if in Fig.2a a second point is made to revolve at 90° to the first, it would produce a cosine wave when translated. It is possible to produce a sinusoid having any phase whatsoever by adding together a sine and cosine wave in various proportions and polarities. Fig.2b shows that the proportions necessary are respectively the sine and the cosine of the phase angle. This is the component description. The amplitude-phase and the component descriptions

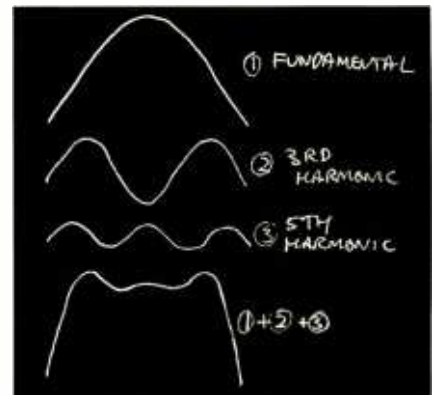
can readily be interchanged as both are describing the same thing. The only difference between the two descriptions is that one is in polar co-ordinates (angle and radius) and the other is in Cartesian co-ordinates (xy or east-north).

The discrete Fourier transform spectrum analyses a string of samples by searching separately for each discrete target frequency. It does this by multiplying the input waveform by a sine wave, known as the basis function, having the target frequency and adding up or integrating the products. Fig.3a shows that multiplying by basis functions gives a non-zero integral when the input frequency is the same. With a different input frequency (in fact all other different frequencies) the integral will be zero showing that no component of the target frequency exists. Thus from a real waveform containing many frequencies all frequencies except the target frequency are excluded. The magnitude of the integral is proportional to the amplitude of the target component and so represents the frequency coefficient.

Fig.3b shows that the target frequency will not be detected if it is phase shifted 90° as the product of quadrature waveforms is always zero. Thus the discrete Fourier transform must make two searches for each frequency, one multiplying by a sine wave and one multiplying by a cosine wave. It follows from Fig.2 that when this is done the two coefficients are representing the input signal phase in component form.

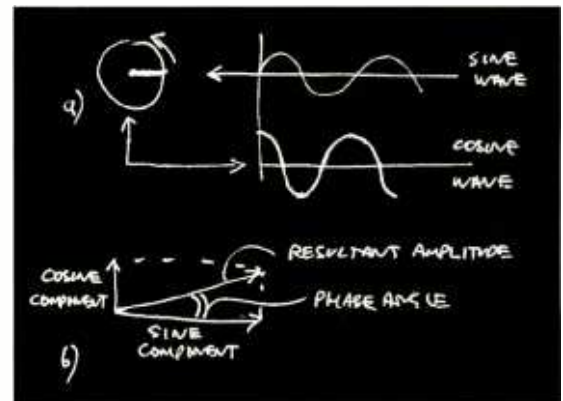
Searching for one frequency at a time will result in a DFT, but only after considerable computation. However, a lot of the multiplications are repeated. The FFT gives the same result with less computation by logically gathering together all of the places where the same multiplication is needed and making the calculation once.

Fig.4 shows a simple example of why the FFT is more efficient. This shows two basis functions of different frequencies. Note that where the waveforms



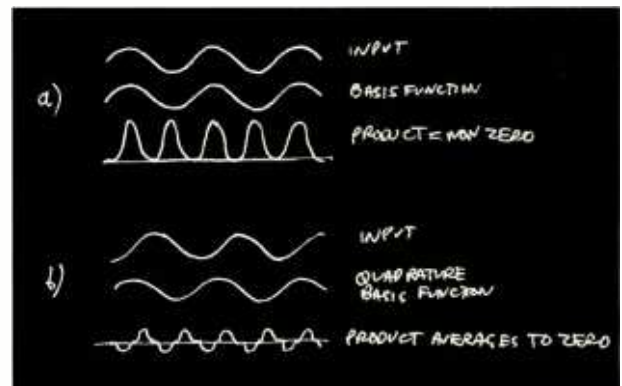
**Fig.1: First three components of a square wave**

cross they must have the same sample values. In this case it is only necessary to make the multiplication of the input samples by those common values once, and the products can be used in both searches. The amount of computation can be reduced by performing the sine



**Fig.2: Phase**

and cosine component searches together. Another saving is obtained by noting that every 180° the sine and cosine have the same magnitude but are inverted in sign. Instead of performing four multiplications and adding the



**Fig.3: Finding a frequency having arbitrary phase requires two searches in quadrature**



pairs of products it is more economical to subtract the sample values and multiply, by sine, and by a cosine values.

In STFTs the overlapping input sample blocks must be multiplied by window functions. Multiplying the basis function by the window function has the same result except that much computation is saved. Thus in the STFT the basis function is a windowed sine or cosine wave.

Let's look at an example that shows off the phase integrity of transforms very nicely. The question is how do we locate the acoustic source of a loudspeaker? This is defined as the point from which the sound would have come had it travelled entirely through air. In a moving coil speaker the input signal creates vibrations in the coil which travel to the cone, and along the cone, at the local speed of sound. As the speed of sound in a coil former is greater than it is in air, the acoustic source of a speaker is generally some way forward of the magnet gap.

One way of finding the acoustic source would be to use the arrangement of Fig.5. Here we use a sine wave generator and compare the phase of the input signal with the phase at a microphone placed at a known location. This method suffers from an insoluble contradiction. If we want high accuracy, we should use a high frequency because this will have a short wavelength so that a given change in acoustic centre would give a large phase shift. However all cycles of a sine wave look the same so we could easily be out by a whole number of cycles. To prevent this ambiguity, we need to use a low frequency where the wavelength is long so we don't pick the wrong cycle. Unfortunately this low frequency produces small phase shifts so the accuracy is low.

What we need is to test simultaneously at a range of frequencies, using the transform analyser in Fig.5 and a broadband noise source. We perform an FFT of the test generator signal and an FFT of the microphone output. It is then necessary to convert the coefficients from component form into the amplitude-phase representation. The phase components are then subtracted to obtain the phase differences at each frequency. If these phase differences are used as the input to an inverse transform, Fig.6

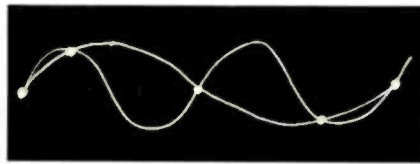


Fig.4: Two basis functions have common values where they intersect. This saves computation

shows that the output is a single peak where all of the frequencies add together. Elsewhere there is cancellation. The displacement of the peak from the origin is proportional to the distance of the acoustic centre of the loudspeaker from the microphone.

The process is called phase correlation and it's one way in which computerised speaker testers can produce so much information about a speaker after passing one apparently meaningless burst of noise.

Of course, there is more meaning in

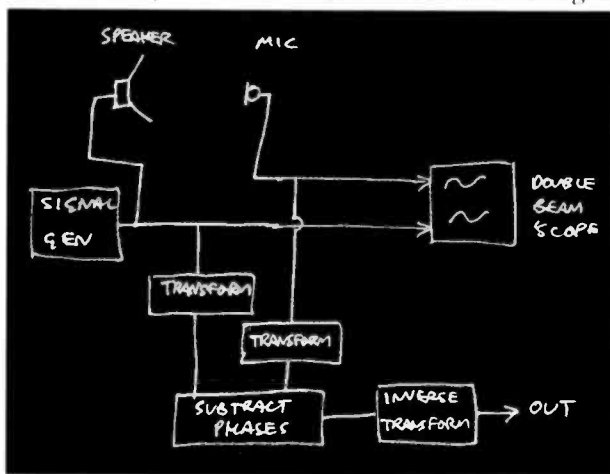


Fig.5: Finding the acoustic source of a speaker

noise than in a sine wave. A sine wave has no bandwidth so it carries no information. Thus an audio system which can pass sine waves could still sound terrible because testing at a single frequency doesn't tell us anything about the ability to handle complex waveforms. Hence the superiority of square wave testing. I wish I had a pound for every person I heard claiming that square wave testing is not appropriate because square waves don't occur in real sounds. Those who can't see the flaw in that argument will have to wait until next month. ■

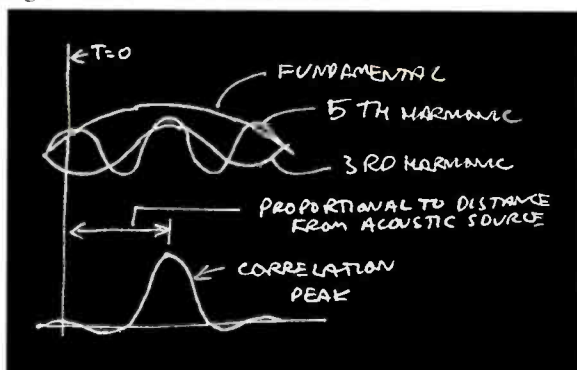


Fig.6: The position of the correlation peak is at the place where all frequencies are in phase

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## Defining a classic

Sennheiser UK's **John Willett**, suggests that the qualities that give dynamic microphones a longevity that rival their condenser cousins are standards and serendipity

**W**HAT MAKES A CLASSIC dynamic microphone? Probably differing degrees of the same considerations that make an unsuccessful one. Some designs come and go in just a few years, some designs see off new contenders for their market for decades, and others appear to have been designed with the accidental foresight in fulfilling some future niche application so perfectly that they will command a substantial price premium.

Sennheiser has its fair share of such long-lived models in its catalogue, to the extent that these now form a 'classics' category of their own. Of these, three great dynamic microphone designs have survived the ravages of progress and time: the MD 21 (omnidirectional, circa 1954), the MD 421 (cardioid, circa 1960) and the MD 441 (super-cardioid, circa 1971).

The MD 21—quite ugly by today's standards, being short, stubby and fat—is decidedly a product of its time and one whose continued existence is determined by the continuance of the practices for which it was originally conceived. Developed specially for broadcasters who were crying out for a rugged and reliable microphone for a wide range of uses, the design succeeded in so many of these that it is still around today to fulfil a more limited number, in spite of all the advances in modern design and construction. Expensive in relative terms today because of old-fashioned production methods it remains, as Rupert Neve once commented to me, the best interview mic around.

The MD 421 is a microphone that re-invented itself. It was designed as a general-purpose microphone, and in its early days was mainly used as a speech and vocal microphone (take a look at early Eurovision Song Contests). In later years it found a niche as a microphone for drums and brass, based on its ability to handle very high SPLs and peak signals and its robust construction.

The MD 441 was designed to obtain a condenser-microphone-type sound quality from a dynamic design, at a time when vocal microphones sufficiently robust to travel beyond the recording studio were clearly a limiting factor in many live production situations. As such it became a vocal microphone of choice for many whose range and power benefited from its qualities in the days before suitable live condenser designs began to appear. It has an extremely flat frequency response and great clarity of sound, but, again, it is getting a little expensive nowadays, even when compared with modern condenser designs intended for stage.

The problem with classic microphones that are still in current production is the

manufacturing costs. These microphones were designed at a time when technology was expensive and labour was cheap—today the opposite is true, which is why microphones of this era can cost more than their modern counterparts, potential economies of scale being less. A few years ago Sennheiser took a close look at the MD 421 and 441 to see if it could make any changes that would make them easier to produce with modern production methods without changing the sound. With the 421 they succeeded and the current version, although looking and sounding the same, is made more cost-effectively with modern production methods. With the 441 any change at all degraded the sound and this model continues to be made in the original way.

A microphone is a precision transducer and quality does not come cheap. Classic designs can be continued, at a price, or production can be moved to a third-world country where labour is cheap, but quality control can drop. Sennheiser was reluctant to go down this route, but the alternative was extremely expensive and carried considerable risks in respect of being able to maintain or grow its market share. In an age where labour is expensive, the only alternative is to automate manufacture and to do this you have to commit heavily to the product in terms of the capital expenditure required for extremely expensive precision machinery, and you have to sell enough pieces or the sums don't add up.

For the evolution range Sennheiser decided to 'bite the bullet' and designed a range of microphones that could be made by highly automated manufacturing processes with just a handful of operators. The investment in machinery was colossal, but essentially it enabled the input of the raw materials at one end and output of completed microphones at the other. It has resulted not in comparable, but in a superior product. Manufacturing in this way means that a high quality European-built product is made available within an entirely new price range—probably less than half that possible had the same microphones been manufactured by traditional methods.

Will they be classics? Introducing the right design at the right time and producing a high quality product ideally suited for its intended purpose is a good start and a proven one. Time will tell how many of the evolution designs have that indefinable 'something' to endure them to users over a life-span measured in decades. However, even as classics they should certainly remain price competitive for a good deal longer than their predecessors. ■



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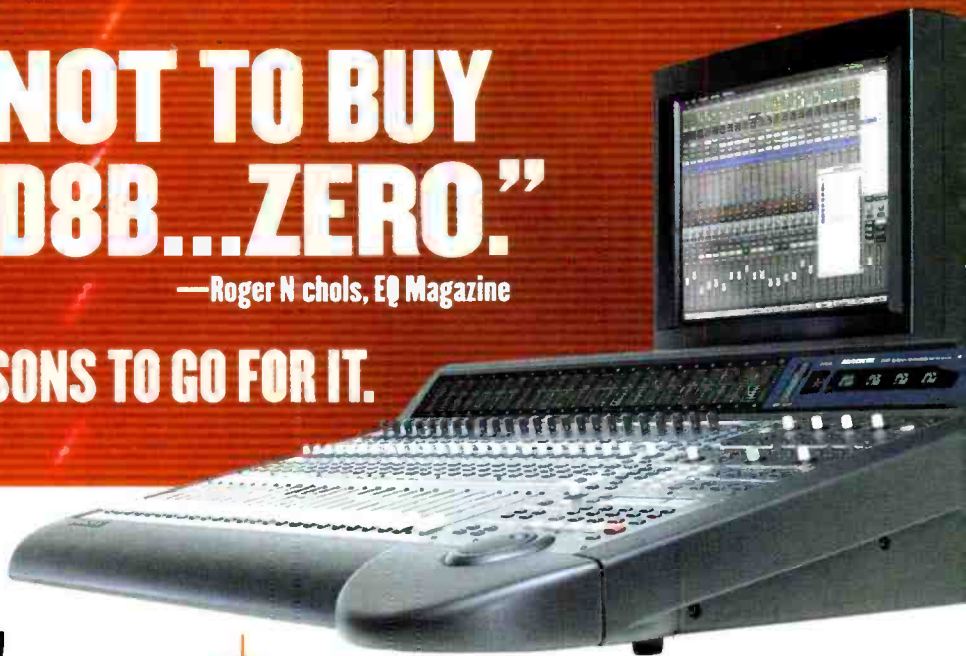
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