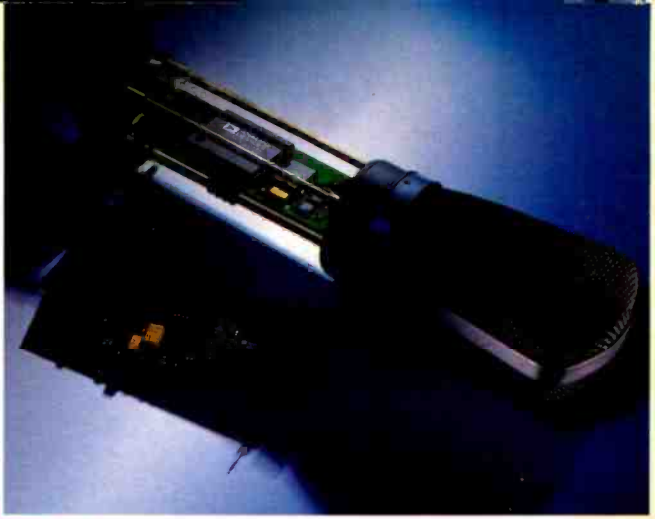


September 1997 \$5.75 £3

Studio Sound



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RSP Circle Surround
Sonodore RCM-402
Grace Design 201
Yamaha 02R v2
GPS SoundPals
Vac Rac TEQ-1
SA&V Octavia
Joemeek SC3
Symetrix 628
Orban 9200
Jünger e07



MARS LANDING

broadcasting from space



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www.prostudio.com/studiosound





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www.euphonix.com

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digital control audio systems

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London (Europe) Tel: (171) 602 4575

Tokyo (Japan) Tel: (03) 3288 4423

http://prostudio.com/studiosound

I DO IT, the chap in front of you and the group of people huddled together over there do it, and, given that you're reading this, you probably do it too. We all make use of the Internet in one way or another be it for e-mail, surfing or the downloading of natty bits of software for your boxes of tricks.

And it's pretty useful stuff. E-mail has revolutionised how a magazine like Studio Sound operates on a core basis while the ability to search for information across the entire Web has no equal. It can be a bit slow, certainly temperamental but it's mind-blowing in its potential. Above all it's a communications medium that takes some beating. If you've spent any amount of time browsing and have followed the evolution of the Web even over the last year, then you will have seen a phenomenal step-up in sophistication and smartness. There's a lot of great stuff out there but still an amazing amount of crap.

We're lucky in the audio industry because with the exception of disciplines like computing and telecoms, there can't be many walks of life where suitably-equipped computers are more commonly encountered. Sure, you will still find a few individuals in this business that will proclaim proudly that they've 'never used one... wouldn't know how to switch one on' but your mother probably warned you about talking to nutters when you were small.

Computers? We've got them and know how to use them. Which is why you can now find Studio Sound on the Web.

The world's longest established pro-audio magazine has gone on-line complete with links to sister publications like Pro Sound News Europe and One to One. A gateway to the editorial content that has made Studio Sound the leading international pro-audio title, Prostudio.com/studiosound is the only address you'll ever need.

Zenon Schoepe, executive editor

Freedom of choice

PARTISAN EDITORIAL has no place in Studio Sound. So when I chose to discuss comparative listening tests of Quantegy's 499 and BASF's SM900 in this space I was aware of the danger of inviting comparisons with less objective magazines. BASF's motivation in hosting the listening sessions—there have been a series of them held around the States too—is easy enough to see. Given 499's lead in this area of the market, BASF is eager for people to recognise that SM900 is capable of matching or bettering it. But beyond a simple bid to ease some of the market away from Quantegy, these events illustrate another aspect of the present situation: that while more people currently thread 499 onto their tape machines than SM900, they all have the option of substituting the other tape should they need to. They have a choice in tape as they have in many other operational aspects of running a recording session.

At present, this choice is being maintained by BASF's interest in the tape market. If enough of us pick up on that choice, we will retain it. But if we neglect it, we run the risk of having it withdrawn.

Taken towards its logical conclusion, this withdrawal of choice could rob us of many of the options we currently relish when making recordings—and of the variation that forms an essential part of recording as art. Implausible? Not if you listen to some of those industry stalwarts with one eye on the future. To them, continuing to exercise our right to choose is essential, partly to retain our choices but also to keep the market leaders on their toes.

And to be fair to certain of the BASF people behind the 499-SM900 listening sessions, they too are conscious of the choice issue. Their concern dates back to before Quantegy's acquisition of 3M—an eventuality arising from this very issue.

So how did the tape measure up? I'll keep my opinion out of print but it's fair to say that the general consensus of listeners was that SM900 presented a genuine alternative to the market leader. You have a choice—but for how long?

Tim Goodyer, editor

Studio Sound

Incorporating Broadcast Engineering
September 1997 Vol 39. No 9. ISSN 0144 5944

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Miller Freeman
A United News & Media publication
September 1997 **Studio Sound**

Life on Earth...



www.ridgefarmstudio.com



SL 9000

www.solid-state-logic.com

Abbey Roadworthy

UK: Following the appointment of Alan Parsons, news from London's Abbey Road Studios currently centres on the activities of Abbey Road Interactive.

Around a year ago, agreement was reached with IBM's York Town Heights research establishment for the use of IBM's MPEG algorithms over a period of three years. With these, ARI is able to use variable bit rate coding on a frame-by-frame basis, optimising both picture quality and storage requirements. Recently processed, packaged and released on the DVD format, *Queen's Greatest Flix I and II* have proven the commercial appeal of the VBR approach. In-house, ARI claim not to have been able to discern a difference between the processed material and the original Digibeta masters.

In an initiative intended to help get the Enhanced CD medium off the ground, Abbey Inter has decided to offer singles to the record industry at 'under £1000'. The format allows inclusion of video extracts, lyrics and other information such as artist biographies. Enhanced CD has been accepted by the British chart body, CIN, as eligible for inclusion in singles chart sales returns.

The CDs are compatible with present CD players, reserving their additional content for Enhanced CD-capable machines. Abbey Road Interactive's 'single byte' technology also enables Enhanced CDs to offer automatic Web site access from a PC but the addition of this feature disqualifies the release from the singles chart.

Latest post

UK: A new addition to London's postproduction scene has appeared in the form of The Old Kings Head Studios in Kingston. The new facility comes with the experience acquired by John and Val Walbeoffe who set up Coach

▶ **SWITZERLAND:** An entirely new sound system has been built by the American Meyer Sound for this year's Montreux Jazz Festival to mark the 10th anniversary of the company's support for the event. The new system accommodates all aspects of the Festival's sound reinforcement requirements from the outdoor garden area through the Jazz Café to the main Stravinsky Auditorium. The varied demands of setting up the new rigs has been eased by the use of Meyer's SIM II analyser but still required a week to complete.

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

▼ **US:** Los Angeles' Conway Recording Studios has recently completed the refurbishment of Control Room C involving the installation of a new SSL 9000j console and a Coastal Acoustics Boxer T5 monitoring system. The project began after last year's LA AES Convention and was the result of the collaboration between Conway owner Buddy Brundo (pictured), Conway technical director David Zeller, Waterland design and HGA's Neil Grant. The completion of Room C has paved the way for the remaining control rooms to be equipped with Boxer monitors.

Coastal Acoustics, UK. Tel: +44 1753 631022



House Studios some five years ago. Equipped with off-line Avid and Lightworks systems and Akai-based track-laying suites, The Old Kings Head occupies premises built at the turn of the century and represent an attempt to offer a competitive postproduction facility away from Soho and in an area



Studio Sound audit

To the acclaim of International BPA president Michael Marchesano, *Studio Sound* has completed its first BPA international circulation audit.

Already a longstanding subscriber to the Audit Bureau of Circulations, *Studio Sound* volunteered its circulation for scrutiny by the American BPA 12 months ago in order to consolidate its legitimacy as both an editorial and advertising medium—independent audits deny a magazine title the luxury of unverified claims to its readership and advertising profile. Marchesano praised the magazine's voluntary approach to a further circulation auditor.

The BPA has a 66-year track record of independent auditing and currently monitors 1,815 publications and Web sites worldwide; it also counts 2,800 advertisers and agencies among its supporters.

familiar to many of the businesses practitioners. The pedigree of the Coach House rests with its success in a variety of television work including *Horizon*, *Timewatch*, *Pride and Prejudice* and four series of *Last of the Summer Wine*.

The Old Kings Head, UK.
Tel: +44 181 740 8000

▶ **US:** The angel and the duck: 45 musicians lent their support to an ugly duck at London's Angel Studios recently. The orchestral score for a new film version of *The Ugly Duckling*, composed by Chris Caswell and produced by Toby Allington, was recorded to Sony 48-track digital with the voice talent being transferred to the DASH machine from ADAT. The final surround-sound mix was made to Tascam DA-88. Angel Studios, London.
Tel: +44 171 354 2525

Web sightings

A sample of new recruits to the World Wide Web include the following pro-audio folk: AKG (www.akeg-acoustics.com); ARX (www.arx.com.au); Audace technical resources (ourworld.compuserve.com/homepages/audace_tech); Audio Ltd (www.audiold.com); Audionics (www.audionics.demon.co.uk); Charles M Salter Assoc (www.cmsalter.com); DACS (www.DACS-Audio.co.uk); Furman (www.furman-sound.com); Group One (www.g1ltd.com); JBL (www.jblpro.com); JR Pro (www.jrpro.com); KRK (www.krksys.com); Little (www.caeinc.com); Millennia Media (www.mil-media.com); New Stage Accompany (www.StageAccompany.com); Pearl (www.pearl.se); Scheck Audio



UK: London's Goldcrest post house has upgraded its Theatre 2 with the installation of a Harrison Series Twelve mixing console. The 48-input desk is equipped with trackball panning and film monitoring, and can be linked to the facilities DAWs as the first Series Twelve-equipped West End installation dedicated to film dubbing. The new setup will continue Goldcrest's line in film and TV drama work which includes successes with *The English Patient* and *Sense and Sensibility*, and is now busy with *Martha Meets Frank Daniel and Lawrence*, and *Sea Change*. Goldcrest, UK. Tel: +44 171 439 4177. Harrison Sales, UK. Tel-fax: +44 1442 875900



DAB update

UK: The BBC's Digital Audio Broadcasting initiative has seen the establishment of a permanent transmission site at Crystal Palace, replacing the existing test transmitter setup. This brings the number of operational UK DAB transmitter sites to 14 of a projected target of 27 sites to be established by spring 1998. This will make DAB available to 60% of the UK population.

The July Radio Festival presented an opportunity for the BBC to demonstrate the potential of DAB

to manage multimedia services with the help of two Web sites—DAB allowed the Web data to be transmitted at 80kbps, in excess of twice the Internet standard. This demonstration was accompanied that of two pioneering interactive radio programmes.

Consumer DAB receivers are expected to attain a high profile at the IFA (internationale Funkausstellung, 30 August–7 September) show in Berlin. The World DAB Forum will take the opportunity to present two conferences covering technical development and user benefits.

(www.scheckaudio.com for design, construction and www.alphaton.com for pro studio equipment); Soundtracs (www.soundtracs.co.uk); TL Audio (www.tludio.co.uk); Yamaha (www.yamaha.co.jp)

Other Web news includes US distributor Sweetwater Sound (www.sweetwater.com) recording some 10m hits to its site and the awarding of a Gold Site Award to AudioControl (www.audiocontrol.com) by NetGuide and UK-based design group The Studio Wizard (www.studiowizard.com) reporting a 20% increase in business attributable to their 12-month old site. The German ProAudio Web service (http://proaudio-web.com) is offering a search engine for audio-related web sites allowing comprehensive search of an established index of several hundred companies.

Updated sites include those of those American purveyors of sound reinforcement EAW (www.eaw.com) and US amp experts QSC (www.qscaudio.com). New studio Web sites include one for London's CTS-Lansdowne studios (www.cts-lansdowne.co.uk). Meanwhile, audio itself is continuing to appear on Web in the form of the recent premier of George Benson's single 'The Thinker' courtesy of Liquid Audio's Gold service, and the Olympia's (www.olympia.net/) webcasting of US radio stations including WMJI in Cleveland, Ohio; KSHE, KTRS and WIDV in St Louis, Missouri; KCPS and KDJG in Dallas.

Imminent additions to this service—which employs Telos' Audioactivetechnology (www.audioactive.com)—will include X105, KEGE and KQRS in Minneapolis.

■ A New York postproduction studio is to be among the first placements of DAR's D-net audio networking 'solution'. Liebert Recording Studios will use D-net to link its 16-channel Sigma Plus SoundStations to a DAR AxIs AudioServer, and will also add a further Sigma Plus to its total commitment to four of the DAR workstation systems. The 4-main studio, 2-voiceover studio facility serves the busy and demanding New York TV post scene.

Digital Audio Research, UK.
Tel: +44 1372 742848.

■ Sydney Town Hall, home to the Australian Ballet and the Sydney Symphony Orchestra, has installed a DDA QII VCA console. The 28-input desk replaces an 'ageing' console in a small control room and will handle live concert sound.

EVI Professional Audio, UK.
Tel: +44 1562 741515.

■ British music industry Website, dotmusic, has taken delivery of a digital ENG kit. Consisting of a Tascam DA-P1 DAT recorder, Sennheiser MD22 reporter's mic and Sennheiser HD25 headphones, the kit will be used to source industry comment while the DA-P1 will serve the additional purpose of uploading record company audio to the site.

Teac, UK. Tel: +44 1923 819630.

Sennheiser, UK.
Tel: +44 1494 551551.

■ Californian studio, Spotted Pecary, has installed a KRK-JBL-Hafler monitoring system to accommodate its particularly broad spectrum of operation. Ranging from indie music recording to film work, Spotted Pecary has opted for a combination of KRK 7000B and JBL monitors driven by Hafler Trans-nova amplifiers.

KRK, US. Tel: +1 714 841 1600.

JBL Professional, US.

Tel: +1 818 894 8850.

Hafler, US. Tel: +1 602 9667 3565.

■ BBC radio facilities at Broadcasting House in London and BBC Bangor in Wales have become the first takers for Spectral's Prisma Express Radio Workstation. Both systems will be used in news editing and general radio production. The BBC's Wood Lane facility has also recently installed in excess of 200 Canford bay frames and jackfields.

Euphonix-Spectral, UK.

Tel: +44 171 602 4575.

Canford Audio, UK.

Tel: +44 191 417 0057.

■ Manhattan's Sony Music Studios has opted for an SSL OmniMix system with ScreenSound and Vislon-Track for its post, mixing and conforming work. With surround television and DVD applications to the fore of its activities, the facility uses SSL's SoundNet to tie in with a ScreenSound in another room.

Solid State Logic, US.

Tel: +1 212 315 1111/

+1 213 463 4444.

■ Europe's first MiniDisc replication facility will be using Sony's MDS-B5 MD recorders on its forthcoming opening. The Netherlands' Studio Xenox has purchased 11 of the high-speed, 10-disc capacity systems—the investment reflects an ongoing increase in take-up of the MD format.

Sony Broadcast & Professional, Europe. Tel: +44 1256 483172.

■ Tokyo is to be the location of a new Bernie Grundman Mastering house. Building on the reputation of the Hollywood complex, the new Shibuya house will feature a custom house console, Harmonia Mundi BW102, custom Studer A80s, modified Scully lathes, Apogee Electronics converters and Tannoy-Crown monitoring.

Bernie Grundman Mastering, US.
Tel: +1 213 465 6264.

■ The Canadian Broadcast Corporation has increased its use of the Soundscape system with the delivery of 44 hard-disk recorders equipped with v2.0 software. With a total of 56 systems all at v2.0, CBC will use Soundscape widely at radio production facilities across Canada. CBC, Montreal. Net: www.src-mtl.com/

Gerr Audio Distribution, US.
Tel: +1 416 6906 2779.

■ Dallas-based Susquehanna Radio has recently installed two Yamaha O2R and three O3D digital consoles in its production facility. Susquehanna owns and operates four stations in the Dallas-Fort Worth area, KLIF, KKZN, KPLX and KTCK, and already uses a Yamaha O1 desk. The consoles will work in conjunction with the facility's Spectral Synthesis workstations and a selection of DAT machines and CD burners.

Susquehanna Radio, US.

Tel: +1 214 520 4380.

Yamaha Corp, US.

Tel: +1 714 522 9011.

■ French state television broadcaster France 3 has purchased a 16-fader Fairlight FAME workstation as part of its preparations for digital broadcasting. This brings France 3 into line with France 2, which operates Fairlight MF3s, although France 3 operates uniquely to serve both local and national broadcast programming.

Fairlight, UK.

Tel: +44 171 267 3323.

■ American sound companies are increasingly adopting valve outboard for touring duties. Californian Summit Audio reports numerous incidences of its DCL-200 dual compressors, TLA-100A levelling amplifiers and EQP-200A dual equalisers taking to the road including use with Phil Collins, Chicago, Counting Crows and John Mellencamp and Peter Frampton.

Summit Audio, US.

Tel: +1 408 464 2448.

■ London-based SISLink has finalised an arrangement with Sky News to supply satellite uplinks for its increasing satellite news gathering (SNG) activities. The deal enables Sky to increase its live news coverage both within and outside of the UK, a duty which has recently seen reportage of the Monserrat volcano. SISLink presently operates 18 uplinks and serves ITN and the Regional News Group which includes Anglia, Yorkshire-Tyne Tees, Meridian and Central television operations.

SISLink, UK.

Tel: +44 171 696 8002.

October 2-5

18th Nordic Sound Symposium
 Bolkesjø, Norway.
Contact: Seerf Audio.
Tel: +47 66 98 27 00.
Fax: +47 66 84 55 40.
Email: soundsymp@nrk.no
Net: www.nrk.no/soundsymp/

9-11

LLB
 Stockholm, Sweden
Tel: +46 8 24 07 00.
Fax: +46 8 21 84 96.
Email: lib@branschkanslet.se

16-19

7th Intermedia 97 Music Expo
 Hala Ludowa, Wystawowa Street 1,
 Wroc/aw, Poland.
Tel: +4871 481821.
Fax: +4871 481451.

16-20

10th International Audio, Video, Broadcasting, Motion Picture and Telecommunications Show
 Milan Fair, Porta Metropolitana
 Pavilions 9/1, 9/11 10, Milan, Italy.
Tel: +39 2 481 5541.
Fax: +39 2 49 80330.
Email: assoexpo@assoexpo.com

20-22

Asia Cable, Satellite & Broadcast 97 (ACSB 97)
 Putra World Trade Centre, Kuala Lumpur, Malaysia.

Tel: +6 (03) 264 5663.
Fax: +6 (03) 264 5660.
Email: acsb@mfsb.po.my

23-26

Reproduced Sound 13
 Hydro Hotel, Windermere, UK.
Tel: +44 1727 848 195.
Fax: +44 1727 85 0 553.
Email: Acoustics@clus1.ulcc.ac.uk

26

The National Vintage Communications Fair
 Hall 11, NEC, Birmingham, UK.
Tel: +44 1392 411565.

28-29

Broadcast India 97 Technical Symposium
 Chavan Centre, Mumbai, India.
Contact: Kavita Meer
Tel: +91 22 215 1396.
Fax: +91 22 215 1269.
E-mail: saicom@bom2.vsnl.net.in

28-29

9th ITA Magnetic and Optical Media Seminar, MOMS
 The Palm Springs Marquis Hotel,
 Palm Springs, California, US.
Contact: Charles Van Horn
Tel: +1 609 279 1700.

29-30

22nd Sound Broadcasting Equipment Show (SBES)
 Hall 7, National Exhibition Centre,
 Birmingham, UK.
Tel: +44 1491 838575.

Fax: +44 1491 832575.
Email: dmcv@pointproms.co.uk
Net: www.i-way.co.uk/~dmcv/sbes.htm

30-1 November

Broadcast India 97
 World Trade Centre, Mumbai (Bombay), India.
Contact: Kavita Meer
Tel: +91 22 215 1396.
Fax: +91 22 215 1269.
E-mail: saicom@bom2.vsnl.net.in

November

4-6

Vision & Audio 97
 Earls Court 2, London, UK.
Contact: Michelle Calder
Tel: +44 181 948 5522.
Email: michelle@smexpo.demon.co.uk
Net: www.aprs.co.uk

5-8

Apple Expo 97
 Grand Hall, Olympia, London.
Contact: Lisa Parrett
Tel: +44 171 208 5020.
Fax: +44 171 388 2578.
Email: lisap@computing.emap.co.uk
Net: www.apple-expo.com/apple

6-9

Música 97
 Portugal.
Contact: Mr. Gonçalo Graça Moura
Tel: +351 2 998 1400/27.
Fax: +351 2 995 7499.
Email: gsgm@exponor.mailpac.pt

Net: www.exponor.pt

18-20

Digital Media World 97
 Earls Court 2, London, UK.
Tel: +44 181 995 3632.
Fax: +44 181 995 3633.
Email: digimedia@atlas.co.uk
Net: www.dlgmedia.co.uk

18-22

Pro Audio, Light & Music China 97
 Tianjin International Exhibition Centre, Tianjin, China.
Contact: Ms Shuping Wang or Mr Kun Tao
Tel: +86 22 23321067.
Fax: +86 22 23301376.

29-3 December

International Broadcast 97
 Hall 8, Jakarta Fairgrounds, Kemayoran, Jakarta, Indonesia.
Tel: +6221 4204300.
Fax: +6221 4201151.
Email: +ib97@mmp-net.com.
Net: http://mmp-net.com/ib97

December

9-11

BCS India 97
 New Delhi, India.
Tel: +91 11 462 2710.
Fax: +91 11 462 3320.
Email: exhibind@gjasdl01.vsnl.net.in.
Net: www.exhibitionsindia.com

One of these is *obviously* the key to a door..



...the other is the key to recording success.



Schoeps GmbH
 Spitalstrasse 20
 D-76227 Karlsruhe
 Germany
Tel: +(721) 943 20-0
Fax: +(721) 49 5750
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SA&V Octavia

Octavia's prototypes have been exciting interest at trade shows for a couple of years now. Finally, **Rob James** can report that the wait for SA&V's multitrack DAW is well and truly over



AT LAST, OCTAVIA SYSTEMS are being delivered to impatient customers—and there are some surprises in store. Building on the success of its SADiE disk editor, British-based Studio Audio & Video has promised a similarly friendly and capable multichannel digital system: Octavia. The system I used for this review was a fully-specified 8-input 8-output setup with hardware comprising a 19-inch rack-mounted audio processing unit, break-out panel, rack mounted PC, two hardware controllers, PC keyboard, screen and mouse.

The audio processing unit's front panel is sparse indeed—four LEDs, a headphone socket, volume control and two half-height 5¼-inch drive bays with, in this system, one removable 4Gb SCSI drive.

The rear panel more than compensates for the minimalist front, however. A Varicon connector links an Analogue Audio Multiway cable to the break out panel or to a user jack-field while the GPI and connection to the Host PC use 9-pin D-connectors. XLRs are provided for 8 channels of AES I-O and two

channels of analogue I-O along with LTC input and AES sync in. MIDI In, Out and Thru connections are here together with consumer optical digital Toslink I-O. A BNC covers video in and there are two 68-pin mini D-connectors, enigmatically labelled TENTACLE, to facilitate future expansion and a fully-integrated multiple unit system. All D-A and A-D converters are 20-bit Crystal devices.

The break-out panel is simply two rows of eight XLRs for the eight analogue ins and outs. The edit controller has 47 illuminated keys, one motorised, full-throw fader and a nicely weighted jog-shuttle wheel. Two large green displays show Source time and EDL time while a smaller, 2-character display above each fader indicates which mixer strip is currently under fader control.

The fader panel carries eight motorised, full-throw faders, each with associated SELECT and MUTE buttons and 2-character display. A group of six assignable rotary parameter controls, each with a neat arc of LEDs to indicate position, allow control of EQ and dynamics. A block of nine keys and a further 2-character display complete the panel. Aes-

thetically, the slimline controllers look good stand-alone or could easily be built into custom made furniture. The PC functions simply as a controller for the system. No audio passes through it.

Do not be deceived by the eight physical inputs and outputs as Octavia can manage a minimum of 24 simultaneous data streams, with full dynamics and EQ, from one suitable disk (SA&V supplied or recommended). The real surprise is that Octavia can alternatively provide double-sample-rate recording and processing. I-O is currently achieved by using a stereo 48kHz AES stream as mono 96kHz, as opposed to doubling the speed of the AES bus to provide stereo 96kHz audio over a single connection. The number of tracks is limited to around ten with real-time crossfades from one disk. I am sure somebody will tell me otherwise, but to my knowledge this is the first DAW capable of handling 24-bit 96kHz on this number of tracks. The practical constraints on how many tracks you get are disk capacity and the 'pool' of DSP processing available.

The interface follows Windows 95 conventions—although there are a few exceptions in the way certain windows behave. These help keep the screen from becoming too much of a mess. Most of the icons used have 'bubble help'—if the mouse pointer is over an on screen button a bubble appears with a text description of its function. In Windows fashion, an expanded version is displayed at the bottom left-hand side of the screen. These tricks help flatten the learning curve.

The main windows are the EDL (or playlist) and Mixer. The EDL can be viewed as text or, more usually, as a horizontal track display although, if you wish, you can see both at once. The window can be zoomed to display as many tracks as you wish and zoomed in time from a full-screen display of a couple of seconds to several hours. The track display is fixed with a moving cursor, however, the display pages before the cursor reaches the end of the displayed material to avoid surprises. At the left of the EDL display are a number of Stream Control buttons these can be displayed or hidden as you wish. The buttons determine whether a Stream (or track) is muted, armed for recording, whether Profiles (waveforms) are displayed and if pan or level automation envelopes are displayed. Profiles are automatically generated as audio is recorded and stored with the tracks. Further buttons select the input to the Stream, solo and the Stream name button enables or disables the stream for editing. At the top of the column two buttons allow global switching of the automation and profile displays.

Along the top of the window is a row of buttons which control editing and display functions. Immediately below this is the Time Bar, this scales according to the zoom

level and can be used to initiate or Stop Playback. The Trim Editor sub-window can also be opened from here. In the Trim Editor it is possible to work on an edit between two Clips on the same Stream with the two Clips displayed as separate tracks. This provides easy and precise definition of the parameters of the edit. Every clip carries fade-in, level and fade-out information. Fades of various profiles are provided and user-defined defaults can be set. Multiple EDL windows can be open concurrently and Clips moved between them.

Features such as the Auto Intelligent Mouse, which changes the editing function depending on which area of a Clip the mouse pointer is near, aid 'power user' editing. There are 25 levels of undo and redo when you change your mind.

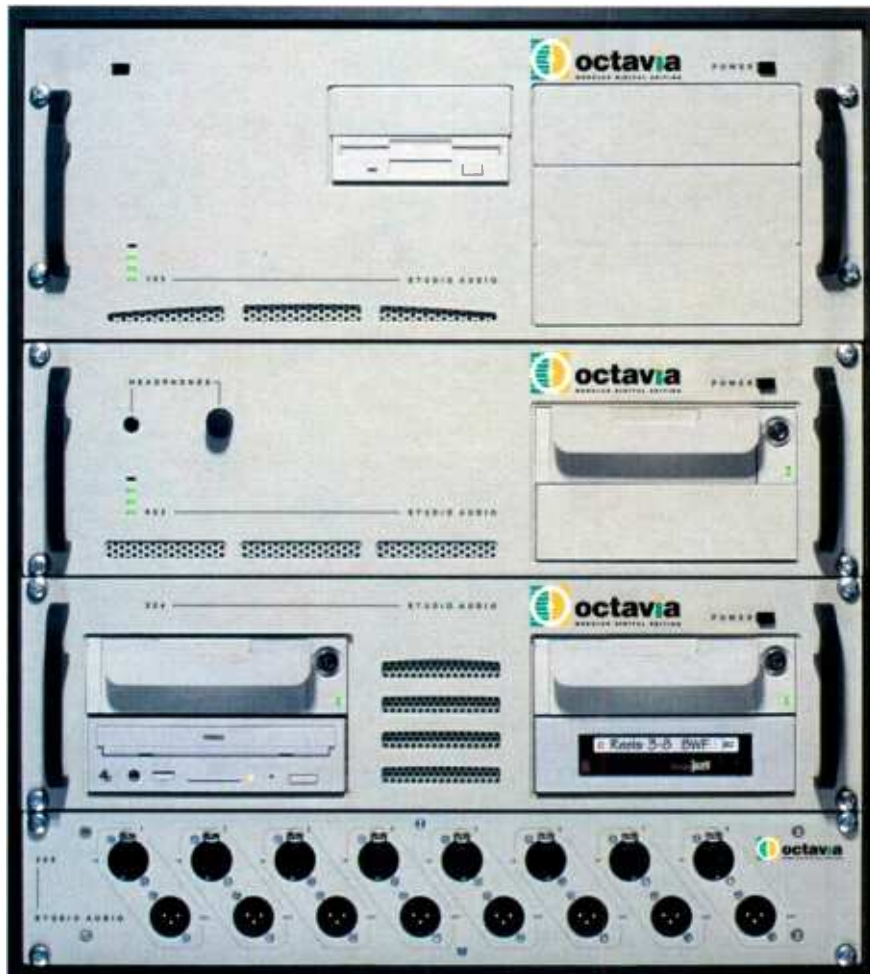
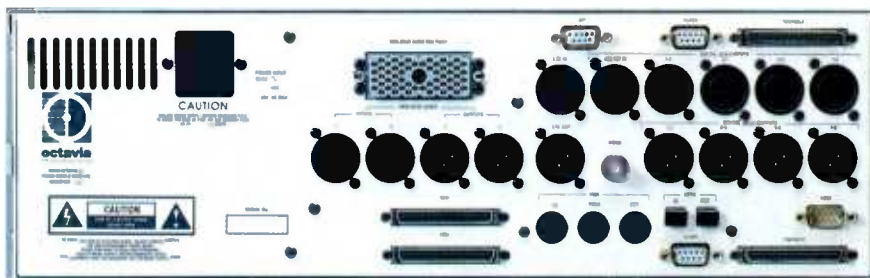
Transport controls, whether virtual, on-screen or physical on the edit controller operate on whichever window currently has the 'focus' in Windows parlance—that is, which is the active window. In operation, this means the transport controls will play clips in a clip-store if it has the focus. Punch-ins can be made manually or automatically. If multiple punch-ins are performed, the Clips generated can all be accessed meaning that this feature could be used for ADR work.

When recording, the Input Monitor window can be invaluable. This shows the status of the input signal and logs errors. It can also be set to pop up automatically when an error is detected.

The Mixer window shows a representation of fader strips, meters, knobs and buttons. Strips can be defined as mono or stereo, with or without pans, and processing blocks can be added to provide EQ, dynamics, auxiliary sends, and so on. The input and destination of each Strip is selectable with layers of sub grouping possible. If you have ever wanted to design your own mixer, now is your chance. Mixers can be saved and recalled at will. Only one mixer can be active at a time since there is only one set of physical I-O. Physical inputs or internal streams can be freely routed to channels. Channels can be routed to buses or outputs and buses to buses or outputs. The EQ blocks currently available are low-pass, high-pass, low-shelving and high-shelving and band-pass. Band-pass Q is variable 0.1-100 and all EQs are notable for the +20dB/-60dBs available. Nudge buttons are provided to allow accurate setting of levels to 0.1dB resolution and frequency to 1Hz. Plug-ins supplied include reverb, dither, chorus delay flange and Noise Abate. The latter is a 3-band expander with adjustable crossover frequencies and thresholds, and so on. Time shift and pitch shift functions will follow.

THE ONLY LIMITATION on how much of this you can use at once is the available DSP power. The amount provided seems unusually generous and I didn't manage to run out in normal use. A future development may see the provision of a DSP 'fuel gauge'.

Mixing a number of streams and rerecording within Octavia can be accomplished in real time through the mixer or in less than real time using Bounce Recording—with all



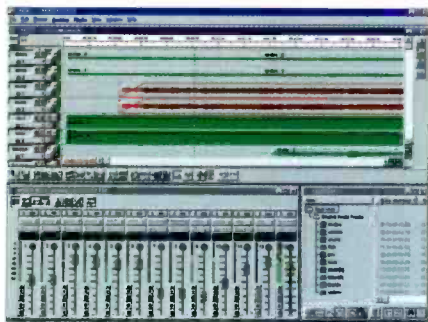
automation and effects applied. Automation is dynamic and performed in real time. Automation written using the fader panel or mouse is clip based when a replay stream is the mixer channel source. This means if you write automation on a Clip and later move or copy it, the automation can accompany the Clip. EQ, dynamics and aux sends are all automated. The level automation is superimposed over the existing fade-in, level and fade-out information carried by the Clip. Data written on channels with 'input streams' or buses as sources is time based.

Automation modes include Overwrite where existing data is replayed until a fader is touched. New data will be written from that point on. Autoreturn, where releasing a fader in Write returns it at a predetermined rate to the pre-existing level, and Disconnect, which replays existing data until a fader is touched and then affects monitoring only, are available. There is also a Write to End function and a SNAPSHOT button which will write EQ settings over a selected Clip or Clips. Automation can be armed on a per-item basis or globally. Envelope automation

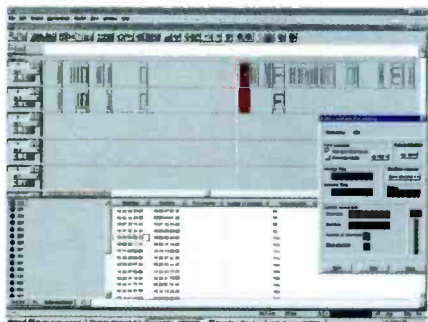
can also be performed or existing data edited by grabbing points on the envelope display with the mouse and dragging. The envelope data displayed is selectable to any automatable parameter.

In the mixer screens, as elsewhere, a right mouse click will bring up a submenu relevant to the position of the mouse pointer.

Although there are other possibilities, the best way to approach Octavia is on what is termed a Project basis. A Project contains all the EDLs, mixers and clips used in a production project. This information is stored on the PC drive. Actual audio Tracks are recorded onto an audio, SCSI drive. While access to a Project can be restricted to specific people, Project information may be copied to the audio drive and for archiving purposes an entire project can be backed up to, say, Exabyte. With this option the whole Project including audio will be backed up. As an additional incentive to working in projects all components of a Project, EDLs mixers and clipstores, can be saved with one button press on SAVE on the edit controller or the SAVE ALL button in the Project window. **page 14 >**



Tracklay



Autoconform

< page 13 Machine control is pretty comprehensive. Octavia can be a time-code master or slave with good lock up times or a Sony 9-pin (P2 protocol) master. There are four 9-pin ports. One of these is used by the hardware controllers. All the usual time code formats are accommodated.

Recording, autoconforming and back-up can all be performed in the background while other tasks are being undertaken.

Virtually every editing and mixing function can be performed with the mouse or using the dedicated hardware controllers. Indeed there are many instances when using a combination of both is the optimum solution. Moving Clips between tracks feels far more natural using the mouse, you see it, grab it, and place it where you want it while controlling transport and levels on the controllers.

Autoconforming has been carefully thought out. Many of the pitfalls inherent in the process have been addressed—Octavia goes into record before the designated source time-code is received. When valid code is read this is 'back stamped' onto the Clip. If an entry on the EDL cannot be found Octavia can be set to give up and move onto the next entry after a predetermined period. It will, of course, flag the entry as not conformed. Clips retain the source time-code stamp throughout subsequent processes which can aid back tracking.

Octavia is well suited to CD mastering and also burning CD-Rs. The DDP standard using Exabyte tape is supported and there are a variety of tools to aid in the preparation of Red Book standard PQ lists. The high sampling rate 24-bit capabilities used in conjunction with one of the MO disc drives with a predicted media life of 100 years or better should make Octavia 'future-proof'.

Many of Octavia's editing features are applicable to radio production. If you have a large amount of material to edit down to a small slot the Autoplace (butt) function enables you to extract the good bits and compile them on a different stream for fine editing. An unusual feature allows you to start editing a clip while it is still being recorded.

In sound for picture applications, Octavia can be used for rushes syncing, autoconforming, tracklaying or mixing with all the usual 'outboard' built in. I can see no reason why a completely professional project cannot be undertaken. All the ingredients are here. You can autoconform and tracklay over, say, 24 tracks, do the entire mix using the automated mixer plus external effects if desired, re-record the final mix back into Octavia and transfer the result to whatever is required.

OCTAVIA is massively configurable. In order to address real world tasks there have to be rafts of adjustable parameters to cope with the vagaries of other people's work and the variety of external equipment. If users intend dedicating a machine to specific tasks it is worth spending time optimising parameters to suit and saving the results. SA&V will produce 'templates' for common tasks. The User Management functions allow privilege levels to be set for specific users and allow a variety of operators to work in the way that suits them. The beauty of a system like this lies in the dedicated audio hardware coupled with the familiar interface of a Windows PC with all the possibilities it offers. User-configurable macros or 'hot keys' to automate common tasks and the ability to map these to buttons on the edit controller or computer keyboard allow operators to work in the way which suits them best. Equally functions can be limited by supervisors to those appropriate to the user.

Slated for v3.1 of the software are M-S channels for the mixer with decoding and width controls, surround channels with multi-format surround panning and new plug-ins including CEDAR. Also planned is Jeff Bloom's VocAlign.

In the space available I can do no more than scratch the surface of Octavia. The scope of this system is huge. Individual features such as the ability to do 24-bit, 96kHz multitrack editing are impressive enough. The fully-featured digital mixer with Clip and time-based dynamic automation, comprehensive EQ and dynamics could occupy this entire article.

I am sure, despite this embarrassment of riches, most people will still have their personal 'wish lists'. On this brief acquaintance mine is unusually short. I have a strong preference for scrolling tracks but other than that all my other real needs seem to be catered for. If all this still leaves you wanting more it is possible to specify systems with multiple hardware controllers or multiple audio processing units.

Anthony clearly didn't know what he was missing. ■

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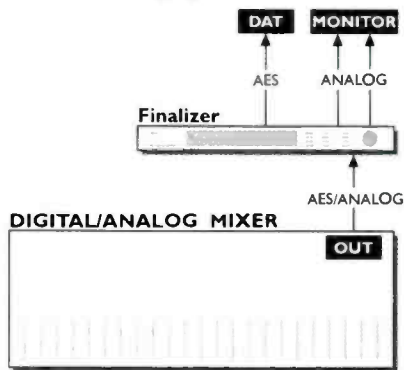
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Graham-Patten Systems SoundPals

Carrying its considerable interfacing expertise from video to audio, Graham-Patten's place with the professionals is all but assured. **Rob James** makes friends with some new boxes

PREVIOUSLY LOW KEY players in pro-audio, Californian Graham-Patten Systems can expect wider recognition imminently. From the video field—where its D-ESAM digital audio mixer for video editing applications was a recent recipient of an Emmy award—GP has introduced a range of digital audio building blocks with the collective title 'SoundPals'. At present, there are six units in the range comprising a mic preamp with A-D, A-D and D-A converters, a gain trimmer-fader and a 4-input mixer. The other product in the launch line is a range of converters entitled DATS (Digital Audio Trans-

mission System).

These are the odd ones out of the range so far as form factor goes. Physically they consist of XLR 3 connectors with BNC connectors where the cable would normally be. The male, source, converter is titled Model 10 and the female, destination, converter, Model 21. These compact devices transform 'normal' AES3 signals (balanced, 2.7V p-p at 110Ω) to and from AES31D (unbalanced 1V p-p at 75Ω). This enables digital audio to be sent over standard video circuits. In the early-1990s when dedicated AES routers were very costly compared to the video equivalents I was involved with an installation which used

this technology extensively. In order to assure ourselves it was sufficiently robust a signal was sent over vision circuits from London to Glasgow and back and the source and return signals compared. There was no meaningful degradation, just a few phone calls from puzzled video engineers at various points along the chosen route. Graham-Patten reckons DATS is good for up to 1000 feet with no equalisation using the recommended cable or when used in conjunction with RCA to BNC adaptors, provide SPDIF connectivity over distances up to 100 feet.

The rest of the current SoundPals range is built into compact extruded alloy cases (132mm x 41mm x 168mm plus connectors). Inevitably, all the bricks are powered by an external 6V DC supply. External PSUs really are becoming one of my pet hates. I understand the reasons for their proliferation but I wish somebody would come up with a standard locking connector at least. Many of the applications for this type of unit will be in 'mission critical' situations and the danger of a power connector being dislodged is one thing you can do without. GP has recognised this problem and used a screw locking version of a concentric power connector. Other manufacturers please take note.

Each unit has XLR-3 connectors for AES I-O and BNCs for DATS (AES31D) I-O. Analogue connectors (where applicable) are XLR-3s. AES reference input (where applicable) is on a BNC. This can be terminating or bridging depending on the setting of an internal jumper as can the AES connections. If several SoundPals are to be looped together it is recommended they are kept within a metre of each other.

A 1U-high rack mounting tray is available which houses and powers up to three SoundPals units.

THE ADC-20 IS a stereo 20 bit A-D converter. The input levels can be adjusted with two multi-turn pots between -10dBu and +4dBu. Two models are available which default to either 44.1kHz or 48kHz. If an external reference is applied to the AES reference BNC connector the output will be locked to the reference and an indicator LED will light. Two ladders of four LEDs give level indications at -60dB, -20dB, -3dB and 0dB. The -20dB LED should just light for a -20dB input signal. This will not suit those working to the EBU standard of -18dB but is only a minor inconvenience.

Both AES outputs can be used simultaneously—XLR and BNC.

As you might guess, the DAC-20 is the stereo 20-bit D-A converter. In this unit it is the analogue outputs which can be adjusted



with two multi-turn pots between -10dBu and +4dBu. LEDs are provided for emphasis and error detection. If an emphasised signal is connected it will have de-emphasis applied automatically provided the sampling rate is within 4% of 32kHz, 44.1kHz or 48kHz. A jack and volume pot are provided for stereo headphone monitoring.

THE DMIC-20 STEREO mic pre-amp and 20-bit A-D convertor has 16 DIP switches to set the input level in 5dB steps from -20dBu to -60dBu. As with the ADC-20 it is supplied in two versions for 44.1kHz and 48kHz respectively. Again, as with the ADC-20 there are LED level indicators and an indicator for external reference. There is also a 3.5mm jack connection for phantom power. I would like to have seen a locking connector here, particularly for field work for which the unit seems ideally suited. The DIP switches allow precise tracking between channels and repeatable settings although I am not totally convinced this outweighs the flexibility of a pot in real world situations.

Unfortunately the remote stereo digital fader with local level adjustment DFADE-2 did not arrive in time for evaluation. However, on the strength of the other units I have no doubt it will perform as well as the rest.

Full range fading, panning and channel swapping functions are remotely controlled using either an optional remote controller from Graham-Patten or a custom made device. The remote connects to a 9-pin D-connector on the front panel. Also on the front panel is a bank of four DIP switches which select Stereo mode, individual unity gain switches for left and right channels and a switch for remote enable. When in Stereo mode, level trimming for both channels is performed with the left multi-turn pot. LED indicators show I-P ERR—no signal or invalid signal on the inputs, REMOTE, I-PVALID and STEREO. The gain trim works over a range of -18dB to +30dB. The unit is capable of handling 24-bit signals but unless the input stream auxiliary data bits are known to contain the four least significant bits of a 24-bit audio signal it is recommended the default 20-bit processing is used.

24-bit processing can be selected via an internal jumper. The sampling rate applied to the input will be the rate which appears at the output. Either the BNC or XLR connector may be used for input and both outputs may be used simultaneously.

The DMIX-41 is a unity gain mixer which will sum up to four stereo AES streams into one stereo output. A number of options are available resulting in six different models. Models A0, A2 and A4 have balanced XLR inputs with 0, 2 or 4 inputs respectively equipped with sample-rate conversion. Models B0, B2 and B4 are the equivalents with unbalanced (BNC) inputs. All units are equipped with concurrent balanced and unbalanced AES outputs. A red LED for each input designated ERROR lights solid on no

input or invalid input and blinks if the input has been muted remotely. A green MASTER LED for each input lights solid to indicate the input signal may be used as a reference. The LED blinks if it is in use as the master reference and is off when remotely disabled as a master clock reference. An input can still be used as the master reference when remotely muted. In the absence of a remote control the lowest numbered error free input is assigned as master.

There is a 9-pin D-connector which allows muting of any input and disabling any input from being designated as master. As with the DFADE-2, processing can be 24-bit if required. The default is to 20 bits.

The ADC-20 A-D and DAC-20 D-A can, of course, be used to insert analogue equipment into a digital environment or used wherever a quick and simple conversion is required. The D-A, with its headphone socket would make a useful adjunct to an AES jack field for quickly identifying content of AES streams.

The DMIC-20 will find application anywhere a microphone or other low level analogue signal needs to be introduced into a digital environment.

A single DFADE-2 could be used in a variety of transfer situations as a simple method of level adjustment, boost or cut, while remaining in the digital domain. I can think of many occasions in the past where transfer suites faced with just this sort of problem have resorted to unwanted A-D conversion because the alternative would have been to tie up an expensive mix room. The reasonable cost of the DFADE-2 should render such practises obsolete.

The DMIX-41 is, perhaps, the most versatile brick in the wall. It is priced well enough to allow use simply as a sample rate converter, if that is all you require. Alternatively it is a low cost option for connecting a number of sources to a single input on a mixing console, with or without sample rate conversion. In this mode it could also be used to combine multiple outputs from DAWs for recording or monitoring. It can be used as a bypass switch, for example, in a broadcast situation to feed audio direct to air or through a mixing console. I can also envisage the units being used to combine premix

'stems' in film work where using a dubbing theatre would be expensive.

The other application which should answer some prayers is in switching encoded Dolby AC-3 signals. This will only work when the inputs are not equipped with sample-rate converters, the unit is set for 24-bit processing and remote control input mute

switches are connected.

Remote controls for both the DFADE-2 and DMIX-41 may be easily and cheaply constructed. Only passive components are required, switches and pots, connectors, cable and a case to put them in. This should make the units attractive to builders of complex, bespoke systems, since pots and switches can be chosen to match other equipment in appearance.

Setting the internal jumpers is not really an operational exercise since there are a fair number of screws to be removed and caution is needed to avoid static damage to the ICs. I think, for the widest appeal, external loop-terminate switches would have been a good idea and, where applicable, external 20-bit 24-bit processing selectors.

Graham-Patten has conducted a considerable beta-test programme on its new friends. Participants include: Microsoft, Intergraph, Adobe, Macromedia, Silicon Graphics, and a number of facilities, among which are Framestore in the UK, and Fox Tape, and The Troupe in the US. For radio broadcasting, Fidelipac and KXPK in Denver were test sites. For DVD Mastering, Image Entertainment in California was a SoundPals test site. The beta test programme resulted in a number of useful detail changes. If several units from the range are used together analogue sources can be combined with digital signals, fading, panning and switching may be accomplished with the possibility of providing outputs in multiple formats. Used together the units offer the specifier a way of economically constructing systems for specific, relatively simple, production processes where a full-blown mixer would be inappropriate.

The DATS converters offer a real alternative to balanced circuits for professional use, particularly in video environments. The provision of dual BNC and XLR digital outputs makes for flexible configurations to suit a wide variety of applications. The units are well constructed and robust. In conjunction with the rack mount kit and optional remote controls the SoundPals range makes a real digital audio Lego set.

There are seven more products that will be announced at the IBC: DA-14 4-way AES distribution amplifier; ADAT-to-analogue, analogue-to-ADAT, ADAT-to-AES, AES-to-ADAT converters; DTG-1 AES Test Signal generator; SPDIF converter.

All the units I had for test performed as I would expect. My particular favourite is the DMIX-41 because it addresses a number of previously intractable problems at a sensible price.

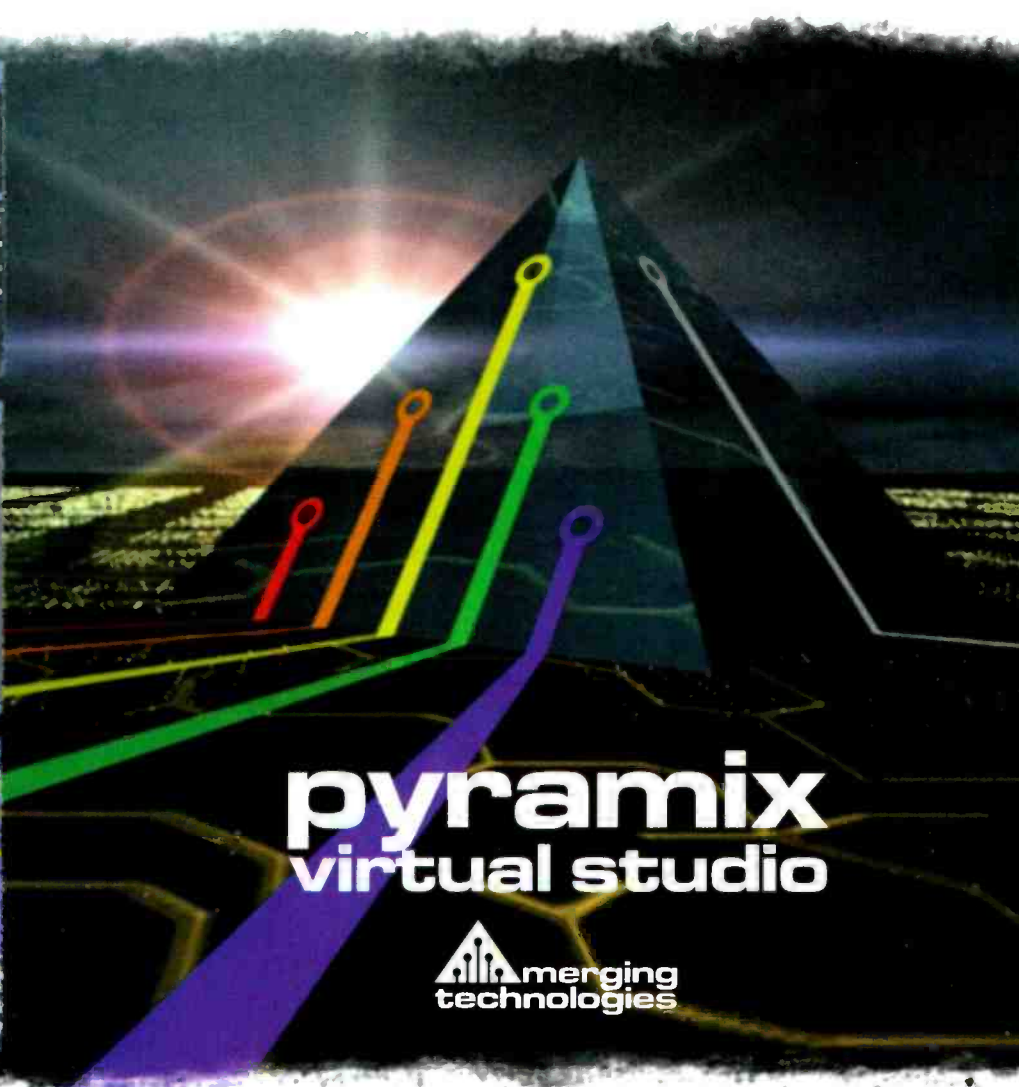
I hope these units presage a change of direction for Graham-Patten which may result in some more interesting developments. If you have a digital audio interfacing problem there is a good chance you will find an answer somewhere within this range. ■



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Orban Optimod 9200

Broadcast processing is one of the less glamorous areas to benefit from the digital revolution. **Rob Budding** checks out Orban's new Optimod targeted at AM

IT IS NOW some 25 years since Orban introduced the first Optimod audio processor. To many people, these not inexpensive pieces of equipment are a bit of a mystery, but to those who know, they can save a station's bacon—more than that, they can literally make you sound bigger than you really are and gain those all important listeners. Given this power, it was inevitable that other manufacturers would follow suite with processors of their own. Orban's reaction was to develop and adopt digital signal processing to its new models—first to the 8200 FM processor (big box, big price) and now to the 9200 AM (smaller box, smaller price).

In the increasingly competitive market of commercial radio, a station has to be heard if it is keep hold of its existing listeners never mind gain new ones. Audio processing modifies the audio signal going into the transmitter with the net result that the received signal sounds louder without increasing the carrier power of the transmitter. Something for nothing? Not quite. The purpose of audio processing for a radio station is to deliver a signal of the highest subjective quality to the listener's ear. The world of AM is inherently restricted by noise, interference, and a narrow bandwidth. Because of this, the purist ideals that the output should replicate the input signal are just not relevant. Substantial compression and limiting will be needed if the received signal is to overcome noise and interference, plus some form of equalisation is required to overcome the high-frequency roll-off exhibited by AM radios. Any processing is a direct trade-off between loudness, brightness and distortion. If you improve one, it will be at the expense of the others. It is a balancing act, get it right and your listeners will thank you, get it wrong and you'll drive them away in cartloads.

AM is a broadcast medium whose performance is dependant on a number of factors. The most influential areas being the high-power sections of the transmitter and the antenna system bandwidth. The Optimod-AM processor has a transmitter equaliser that attempts to correct linear problems such as poor LF response and overshoots caused by the transmitter RF stages. To make the most of

the processor's features, it is normal to fit the unit at the transmitter site. Ideally it should be last piece of equipment the audio sees before it hits the transmitter. You can install it in the studio racks but at the expense of absolute performance, typically 2dB-4dB lower average modulation level.

The 9200 is the latest in the line-up of Orban equipment to feature digital processing. The digital world offers many advantages—multiple memories, extensive remote control, improved filter performance, but what benefits do these features bring?

The analogue input is buffered and immediately followed by an analogue-to-digital convertor. Thereafter all processing is done digitally which ensures the sound is more consistent and stable. There is an optional AES-EBU digital input-output for a complete digital signal chain. Filter response is spot-on and group delay distortion is virtually nil.

The unit comes preprogrammed with eight factory preset 'sounds' that get you off the blocks in no time at all. There are also user-definable settings; anyone who has been in the hot seat, adjusting an analogue processor will welcome these. After hours of pot-tweaking finding that 'little bit extra', you discover that your output now sounds like it's being played through a wet sock. Now, what were the old settings? With user presets, if you screw up, you can hit the tit, restore the old settings in seconds and the black-edged memo from upstairs is halted. If you really want to, you could have different presets for different shows during the day—loud and punchy for pop-and-prattle Breakfast, smooth and controlled for the Classical slot, different again for talks... The RS232 remote control now allows selection of these presets (and adjustment of the audio settings) from the studio via a PC.

The previous AM Optimod units had a slightly old fashioned look to them: moving-coil meters, clunky selector switches and the important controls hidden behind a hinged, locked panel. This new model is different: it has a soft, organic shaped front panel with an LCD and led bar graph meters, looking not unlike a tuner from your hi-fi.

All the functions are driven by soft keys and a control wheel selects options. There are four buttons on the right-hand side of the front panel which select the main functions—Setup, Modify, Recall and Escape. A further four buttons—the soft keys—relate to the labels displayed on the screen above. The screen display shows various options, you spin the control wheel, select the one you want and so on. There are a pair of scroll buttons to the left of the display which light up when there is more to a menu than fits the screen, however, in normal light the illumination is difficult to see. All the controls can be password protected at various levels of dangerousness.

I have to admit to a personal dislike for menu-driven controls. I invariably get lost in the myriad of options and resort to a hard reset—pull out the plug. The Optimod 9200, however, scored a hit here. A quick look at the handbook to point you in the right direction and you're off. Intuitive menus and an ESCAPE button that takes you back to the previous function meant that it was almost an hour before I had to resort to the book and there was no reaching for that plug.

The meter displays are LED bar graphs, four individual—Input, AGC, Output +, Output—and five for the multiband limiter. Red sections on the meters show overloads, or as Orban describes it 'where various nastinesses are likely to commence'.

SOUND IS what the box is all about and the only real way to tell how a processor sounds is to try it on the real thing. So I rigged up one on a portable 100W AM transmitter connected into a dummy load, and set-to. Several loudspeakers were on hand to simulate transistor radio, car radio, and home hi-fi, all driven from a Sony tuner-amp that happened to be nearby.

Transmitter equalisation was accomplished in no time, which is just as well as it involves injecting a square wave at low and high frequencies, the harmonics of which make up a lot of power, that the transmitter dissipates as heat—quickly. Audio levels were adjusted and then it was judgement time.

The factory presets all had their **page 20 >**



< page 19 own sound, but the difference between them was only moderate. If you want more aggressive processing, or less, Orban have included a nifty LESS-MORE control which in a single function does away with complex tweaking—the handbook says the Optimod's 'intelligence' corrects the parameters automatically to minimise distortions when this control is used. There is no doubt about the increase in loudness and the output never gets fuzzy or muffled, even with maximum 'more', but surely we can do better than that...

AS MENTIONED earlier, any setup is a compromise between loudness, brightness and distortion, and there are a lot of parameters that can be changed. If complex tweaking is your bag, then the 9200 has plenty to keep you quiet in a darkened room for some time. There is a 3-band parametric equaliser. You have full access to all parameters—Gain, Bandwidth and Frequency and it is here that you can really make a difference heard. During testing it is best to vary the programme content and it helps to go away for a while then come back and see if you still like it. Once I started to play with the 'expert controls' I soon had it sounding ragged and harsh. Easing the gain back from maximum on all the settings helped a bit and before long I had a sound that I liked. You can switch easily between presets (factory or user) and I soon discovered that my sound was actually no better than the 'Music—Medium' factory preset. My advice is to choose the preset you like best, live with it for

a week then gently fine tune it. Orban has spent a long time playing with these things.

Listening on different speakers was interesting, the 'small transistor radio' gained the most in terms of sounding 'bigger'. The distortion from heavy processing was more noticeable on the large monitor speaker, as you might imagine, but the overriding impression from this unit is that it really does make a difference—and straight out of the box.

Some 'new' models are old ones with new knobs and a few functions added that you didn't want anyway. I'm pleased to say that the 9200 is a 'proper' new model, it may have new knobs, but it keeps the functions that you liked, and now they are easier to use.

The remote control is a big benefit too. Previous versions had the option to switch to different settings for night-time operation but if you wanted to adjust the settings you had to go to the transmitter site. Some of the latest solid-state AM transmitters are fully digital, accepting an AES-EBU input, so if you're up to date in the studio, there's no reason to have anything other than ones and noughts from the music library file server to the output filter of the transmitter. Now, what you really want is a valve in there to round off all those square bits.

If you have a radio station and don't have a processor then one thing is for certain—you should have. Whether I would change what was already installed is a different question altogether. If the station has older, valved transmitters then I doubt I would change from the existing processor (unless it was very basic). You see old transmitters have lots of iron in them and can struggle to meet the 0Hz–15kHz spec. asked for by Orban. It's a bit like getting your grandad to start jogging, give him the latest pair of trainers and he may look the part, but by the end of the street he'll be wheezing.

However, if I had an empty transmitter hall, it would be something to seriously consider, because, with a modern solid-state transmitter, they will complement each other hugely. (I have deliberately not done a like-for-like comparison with the competition and should point out that there are other processors on the market that also warrant serious inspection.) It is, however, worth mentioning that Orban has priced this unit below the analogue 9100 that it is bound to replace. Once the use of the 9200 starts to become more widespread then it may be a very wise move to look again at replacing that old processor sitting in the equipment rack. ■

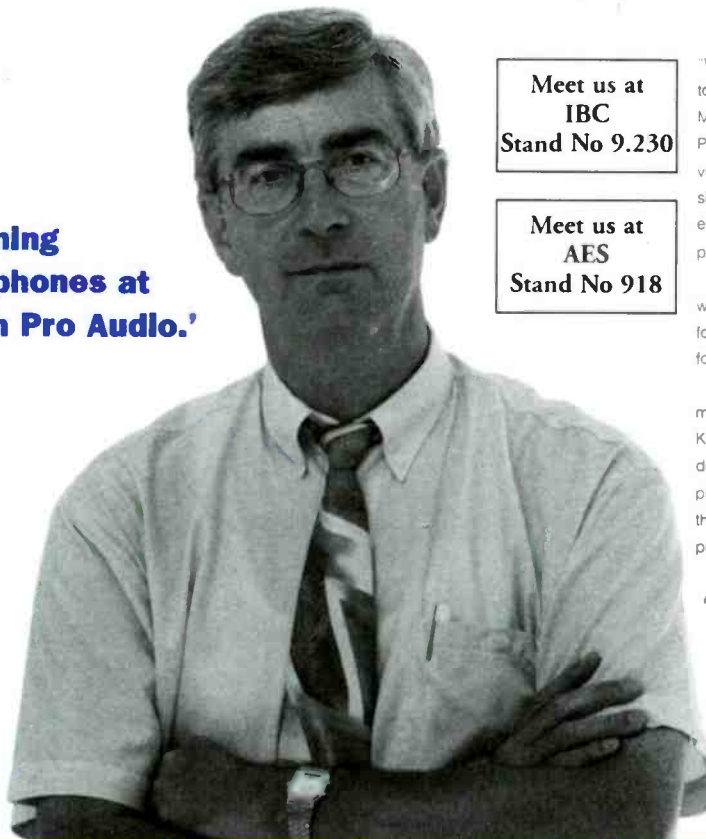
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RSP Technologies Circle Surround

Where the 1970s scorned the idea of surround sound, the 1990s are poised to welcome it.

Dave Foister weighs up RSP's contender for a flexible and practical surround system

THE BIGGEST REGRET for those of us interested in surround-sound music recording is that of all the possible encoding formats, the one that has become the norm was never intended for realistic surround reproduction of music. This is no criticism of Dolby Surround *per se*—it performs its intended cinematic role splendidly—but even its best friends would not advocate it for straight music recording. Its centre channel, vital for dialogue placement, is superfluous to music, and appears at the expense of stereo surround—the rear information is essentially mono, however many surround speakers are used. It also incorporates artificial enhancements of the rear effects, which ruin playback of a proper surround music recording just as delaying half a stereo signal destroys the imaging.

While the jury is still out on what might be done with DVD's multichannel potential, RSP Technologies is tackling the existing situation from the inside rather than presenting yet another conflicting and incompatible format. Circle Surround is designed to be compatible with the world's 23 million Dolby Pro Logic decoders in that either will decode the other with pleasing results that are close to those intended; indeed it claims to be backwards compatible with virtually every type of encoding that has ever been commercially used, from QS to UHJ. The point is that, besides this catch-all playback capability, when used to the full it is capable of encoding and decoding an additional channel, giving left, centre and right plus discrete left and right surround signals, giving rise to the 5:2:5 nomenclature

to distinguish it from the 4:2:4 nature of previous matrix systems.

The other point is that Circle Surround is already building quietly on the foundation it has laid. Consumer decoders are already appearing, including in-car systems, and RSP has licensed the algorithms for Motorola and Analog Devices DSP chips to a number of consumer electronics manufacturers. Moves are afoot to make full cinema systems available; Smart Devices introduced a cinema DSP decoder at the Amsterdam show, and one of these has been installed in a Sony screening room in LA. According to Circle Surround's Henry Root, a comparison was made between CS 5:2:5 decoding of the optical track and conventional playback of the AC-3 5.1-channel digital track, and the Circle Surround system won. If this degree of compatibility is sustainable, RSP points out that nobody needs to go out on a limb with this technology, but can continue doing what they are currently doing with additional possibilities available to them.

Circle Surround encoding is available built in to RSP's Project X digital console, and also as separate processors to patch in to an existing system. The stand-alone professional studio setup in its basic form comprises two 1U-high boxes, an encoder and a decoder. Various patching suggestions are offered in the encoder manual, but essentially it needs five discrete console outputs, be they five groups, left-right mix plus three groups, mix plus three auxes—whatever the console has available and the engineer feels comfortable with. These are fed to the encoder through a 25-pin D-connector (flails available sepa-

rately) and the 2-channel encoded signal is delivered on XLRs. An additional input is provided for including the low frequency effects (LFE) track of an existing 5.1 mix; this must be prefiltered as the encoder does nothing to it, but the decoder is able to sort it out as intended. The encoder front panel carries only one control, enabling it to be switched to 4:2:4 mode if required, and six pairs of signal present-clip LEDs for the inputs. More informative metering is available via a 9-pin D-connector on the back, which provides metering outputs for all eight of the signals that may be present: left, centre, right, left surround, right surround, LFE, and encoded left and right.

SINCE FULL 5:2:5 compatibility is only possible with a Circle Surround decoder, RSP recommends that the results should be monitored using its high performance studio decoder. This has six XLR outputs decoded from two XLR inputs, and its front panel more than makes up for the sparseness of the encoder. It has four basic decoding modes, including straight mono and stereo; the surround modes offer a choice between video-style and music-style decoding, with the expected enhancements applied in video mode and removed for music playback. A switch allows for the presence or absence of a dedicated centre loudspeaker; if no centre speaker is being used the unit adds the centre information equally to the front left and right outputs as expected. The big difference between this and other decoders is the treatment of the surround informa- **page 24 >**





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< page 23 tion, which can be set to deal with all kinds of sources. For a start the rear channels can be switched between mono and stereo, so that mono surround information stays where it's meant to be rather than having the decoder try to steer it into places it shouldn't go. Switchable filtering band limits the surround channels to 7kHz, in line with the standard Dolby practice of using such filters to prevent spurious dialogue sibilance from bleeding on to the rear channels. For other uses the bandwidth is the full 20kHz.

A final surround switch selects Wide mode, which brings hard left-right panned material on to the rear speakers and reduces its presence on the front pair.

A common problem with a surround monitoring system is calibrating it, and the Circle Surround decoder helps with this too. Individual output trim controls are provided as screwdriver presets on the front panel, and to assist with getting the balance right a pink-noise setup routine can be switched on which feeds noise sequentially to the outputs (excluding the LFE feed). As it steps round the speakers this makes it easy to get the relative levels right in a way that tones never could and without the hassle of switching an external music source around manually. The only thing it doesn't check is phase, which experience shows must be carefully scrutinised: one out of phase recording in a surround system is far less easy to detect than one of a stereo pair, and the very nature of the setup with multiple power amps involved (and who knows whether different manufacturers are delivering the same output phase?) means that mistakes are much easier to make.

Having got the system set up and checked, I found that claims of backwards compatibility are more justified than I expected. I was able to play test recordings of QS, SQ, UHJ and Dolby Surround material through the decoder, and all gave enjoyable persuasive results. Listening to the back pair alone in stereo was revealing of the differences; some lurched arbitrarily from side to side as the decoder tried to follow non-existent steering cues, while others remained stable, but with distinctly 'phasey' artefacts.

The most successful in this mode was, surprisingly, Dolby Surround, but this is not a fair test of anything: these symptoms are, of course, the very reasons the decoder has a mono surround switch, and use of this removed these effects and left a stable and convincing rear image, much more as intended. Again, Dolby Surround per-

haps worked best (as one would hope given the underlying philosophy) with strong stereo music, solid centre dialogue and head-turning effects. Having established this compatibility, the crunch was adding the encoder, routing discrete signals to it, decoding its output and switching it all to 5:2:5.

This showed exactly what Circle Surround offers over what has gone before. Front panning remained exactly where it should, and the real surprise was the panning at the back. A pair of groups assigned to the rear encoder inputs appeared in near-perfect stereo on the rear decoded outputs. Full stereo panning is possible between the two channels, and there is even a strong centre image between them that appears solid and convincing.

For discrete material that already has front-back separation inherent in it, or for mixes where sources are panned to position and then left there, this simple setup using standard console outputs works amazingly well.

Few consoles will have enough panning flexibility, however, to move sounds smoothly from front to back, or to move a single source freely around the sound stage, unless designed for surround in the first place. Circle Surround's solution is neat and simple, and consists of a dumb 1U-high controller box with a remote joystick panel. Four mono inputs, which could be fed from channel direct outs, feed four joysticks, and individual balanced panned outputs are available as well as a balanced multichannel mix. For use with the main system a simple link is provided for mixing these panned outputs with the existing static mix, and up to four of these units can be daisy-chained to give 16 joystick panners. Chris Blythe at Audio Dimensions has a system for automating the joysticks, although I wasn't able to get details in time; this would perfectly round off an elegant, comprehensive system which is easy to set up and easy to use.

There's always a temptation when talking about surround to say if I was doing it I wouldn't start from here; that's not helpful, and is part of the reason for the 1970s quad wars. We have at last an established world-wide surround format, and RSP has been very clever in building on that solid user-base rather than fighting it. If music applications can use Circle Surround's capabilities alongside the existing Home Theatre world in the same box, we might at last be getting somewhere. This technology works, and nothing needs to be dumped for it to get used. Try it. ■

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< page 28 the relevant Select keys putting the whole team into overwrite and you can achieve the same from via Touch Sense. Neat.

Surround sound can be fully automated and is pretty similar to that on the 03D (*Studio Sound*, May 1997) and in addition to the left-right and front-back motion you can also alter the divergence and the subwoofer. The buses, in digital or analogue, are used for the surround outputs and these can be linked to facilitate a fade out. Third-party joysticks will be supported.

The 02R has a Cascade function built in for piggybacking desks and the v2 software simplifies the management side of running four together. Linking the desks via MIDI integrates them as one with regard to Automix and Scene memories—store a scene on your master 02R and it instructs the others via MIDI to do the same. The Automix and Scene memories are still held locally in each desk but they now behave more as one big desk from an operational standpoint.

OUTSIDE OF the automation enhancements there's an input patching facility that permits the moving of inputs within sets of eight channels for stereo pairing and dynamics keying. Buses can also be assigned to a channel and patching assignments can be part of a scene memory. You can also go out digitally on the aux sends.

Operating on a slot-by-slot basis, 24-bit recording allows higher bit-rate recordings to be made on 16-bit machines like the ADAT or DA-88 by splitting off the first 16 and next 8 bits onto individual tracks. Yamaha's method

differs from Rane's Paqrat process in using Tracks 1 and 5 rather than 1 and 2 as this allows four consecutive faders to be used on the desk for the 24-bit signals rather than the less convenient alternate faders. And it's scene-memory based.

M-S decoding is available (there's also independent attenuation on individual legs of stereo signals) and MIDI remote control of external devices has been added with four remote pages plus another that assigns buses and aux masters to the faders. MMC with eight locate points arrives with v2, along with transport controls and templates for such units like the ProR3, Rev500, Pro Tools, GM and XG sound modules, the 03D but more interestingly the super-cheap 01 digital mixer. The last of these is significant because the MIDI

remote functions are fully automated so this serves as a natty method of automating the 01 as a sidecar expander without resorting to the latter's own sequencer-based storage method. The 01's automation via this method is limited to faders, on-offs and pans but look at the alternative. Very clever.

ESAM is not part of v2 although it will be shown on 03D soon but it has to be said that the 03D seems to make more sense for video suite use.

As an associated development, Zeep has a software package that goes beyond Yamaha's

simple librarian Project Manager software which includes overview pages of the console with EQ displays. This is a great improvement for those who need to view more than the assignable 02R's surface gives out. RS422 connection runs between the desk and the Mac.

After something of a layoff from the 02R following a long period in which I used the desk intensively, I'm surprised at how exciting the console remains. It's such a wonderfully clever and smart desk. Looking at the v2 version reminded me of sections of the desk that I had forgotten existed because I hadn't found much use for them in the general run of things. This underlines the simmering power of this affordable mixer and how much of it can remain hidden and unobtrusive until the day you have cause to wonder if it can perform a specific function for you. It is still an incredible achievement and all the more amazing that there is still nothing to challenge or touch it a good two years since it was launched.

The v2 revision redresses some of the perceived imbalance that the arrival of the 03D suggested—as the newer, smaller and cheaper desk had some tricks that the 02R couldn't immediately answer. As such, it makes a damn good desk awesome and it's so elegant. It's an absolute must for all 02R owners and moves the goal posts again for the competition. ■

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JBL monitors

JBL has introduced what it terms Linear Spatial Reference (LSR) technology that spearheads a new drive into monitor speakers. LSR is described as a series of techniques that measures spatially the response of a monitor over a sphere that encompasses all energy radiated in to the listening environment. This data is analysed to calculate optimisation of the soundfield including direct sound field, the reflected soundfield and the reverberant soundfield to claim an improvement in performance over the $\pm 15^\circ$ vertical and 30° horizontal field commonly used for assessment. JBL claims that its LSR 32 3-way monitor offers consistent, precise sound reproduction in a wider field regardless of the playback environment.

The components in the LSR32 include Differential Coil Drive technology which uses two voice coils in each driver with their magnetic gaps at 180° out of phase to double the power handling of each driver. This is combined with lightweight Neodymium, a nested magnetic structure and preferential airflow design.

The monitor's high frequency device is a 1-inch composite diaphragm integrated with an Elliptical Oblate Spheroid (EOM) Waveguide with $60^\circ \times 100^\circ$ dispersion. The midrange is a Neodymium 5-inch driver with a woven Kevlar cone whose motor structure was chosen to support the intentionally low crossover point of 250Hz to the 12-inch Neodymium woofer. An additional third coil between the drive coils acts as a dynamic brake to limit excess excursion and reduce distortion. Mid and high frequency drivers are mounted within millimetres of each other on a cast-aluminium sub-baffle that can be rotated for horizontal or vertical placement.

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

Summit mixer

Summit has a linkable line-level mixer with valve and solid-state circuitry. Four line-level inputs have pan controls, input level



control, in-out switching, phase switch and an aux send with pre-post switching. The master section has master level control for the two outputs, two vU meters with peak indicators and separate trim controls. Linking is achieved by pushbutton and can create a 16-channel mixer. It can handle -10dB and +4dB I-Os.

Summit, US, Tel: +1 408 464 2448.

Crest launches

Crest Audio has two new desks and two amplifier products. The V12 is its new flagship live performance desk for high-end mobile and installed sound and has 12 VCA groups, doubles as a monitor mixer and has sidecar expanders that can realise **page 26 >**

Studio Sound September 1997

SSL Aysis Air

The SSL A-dynasty continues with a new broadcast desk for IBC and AES. **Zenon Schoepe** gains an exclusive look at a change of tack

THERE HAS BEEN something of a deluge of digital equipment beginning with the letter A from SSL ever since it embarked on the original Axiom drive. For those who have not appreciated it yet, the A-series products owe a debt of technology to this one-knob-per-function digital console that represents a more advanced generation of number crunching than the previously top-of-the-pile OmniMix and Scenaria packages.

Axiom was followed by Aysis as a physically compacted version for use in broadcast applications that are tight for space. But the cherry for many was this year's Altimix: an unusual cross between the bones, pump and constitution of an Axiom with some of the good looks and outgoing personality of the OmniMix. The A-series will be expanded still further at the IBC and AES New York and not

can spread it out broadly.

All this suggests that the Aysis Air should be cheaper than a standard Aysis and it will be—the official line tells us that we will all be 'pleasantly surprised'. This desk is intended to appeal to all those studios that would otherwise shrug at the price of a digital desk and go on to install an analogue console.

Aysis and Axiom remain current and are the ways to go for the high end but predictably Aysis Air networks in to the same sort of kit that all the other A-series units do. However, it's stressed that this is not obligatory or even necessarily relevant for a small studio installation as the Air has a routing hub built in to it, so you don't need the second large-scale routing hub in order to get a small studio running. It's therefore the most stand-alone of the A-series products but could



Like all A-series products Aysis Air is a derivative of Axiom technology

be piggy-backed on to larger networked systems should the need or indeed the other bits of gear exist.

Like all A-series products Aysis Air is a derivative of Axiom technology in the manner that some have expected—an all digital 'proper' music recording console—but rather as another move on broadcast. Again it is a development of the technology started with Axiom (it has to be because it starts with an A) it's called the Aysis Air. It is intended purely for on-air and production studio broadcast and trucks with much simpler control than the ordinary Aysis.

While the original and plain vanilla Aysis is a rebalancing of the Axiom, it amounts to essentially the same control surface in a different frame and Aysis Air uses the frame ergonomics of Aysis. However, its worksurface is different primarily in the centre section. Axiom is a smart desk because it allows you to achieve all kinds of things through a centre section that is largely programmable. Aysis Air uses a far more application-specific and preset approach which amounts to the closest SSL has come to producing an off-the-shelf digital unit that can be a slot-in replacement for an analogue console installation.

There is some degree of flexibility built in but in terms of the control surface, it is preset for the applications and many of the knobs from the standard Aysis have gone. It's a fixed 48-channel desk but you can, achieve an extremely compact version or you

too, because it can be judged on two levels—as a stand-alone desk that replaces an analogue one or as a small constituent in a much larger system. Where will SSL go with it next, I wonder? ■

DiskTrack is optional and the desk is stereo with stereo subgroups in the traditional sense with master dynamics and inserts. Multichannel surround capable, it will go to 5.1, it has 20 mix minus sends, 48 channel direct outs, channel inserts, eight aux sends, stereo AFL-PFL, channel signalling and red light switching, fader starts on all faders, channel memories for mixing, matching and swapping channel processing, and, the big reason for going for a digital console in the first place, snapshot automation. Shipping will start immediately after the New York AES.

Aysis Air addresses a new market for SSL and will take it into competition with manufacturers that it historically hasn't acknowledged.

It's an interesting development that actually takes the A-series technology downwards presumably to entice and hook broadcasters on to the escalator. It's a smart move

too, because it can be judged on two levels—as a stand-alone desk that replaces an analogue one or as a small constituent in a much larger system. Where will SSL go with it next, I wonder? ■

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DAR Genesis

With software an increasing part of equipment development, DAR has redefined it's core software. **Zenon Schoepe** bears witness

NOT SO MUCH a new system as a new generation of software, DAR's Genesis is supplied on all new systems and is available as a retrofit on all Plus machines. Its core is a software revision, the new platform that the company has been writing for the last two-and-a-half years. And with it come new (if optional) pieces of hardware, such as a CD-ROM drive and networking hardware.

The Genesis software form the basis of the DAR's next-generation systems and combines current user interfaces and multiplatform compatibility with file import-export, networking-OMFI compatibility and the ability to work with a wide range of third-party devices. It

other manufacturers. Lightworks for example, already have a very similar format and this permits Lightworks media to be plugged directly into DAR DAWs.

In terms of potential, Genesis will allow DAR systems to go to many more channels and the company will be looking to 64-channel system plus the significant ability to go to 24 bits and 96kHz. The goal is to extend the range of machines from the OMR8 right up to a top end which will have more tracks and increased mixing capability.

An underlying concern was the desire to retain flexibility and this is demonstrated by the already current ability to look at an audio

CD via SCSI and store an EDL for it. CD-Advance, as this package is called, allows audio CDs to be accessed directly from the directory allowing the audio to be pre-viewed, edited, EQed and copied without having to record it first. Other features include high-speed, disk-to-disk copying of CD audio segments for immediate spotting to picture and the ability to name, comment, group and re-order CD tracks.

Most importantly this arrangement replaces the whole business of lining up an effects CD and putting it into Play, the CD drive becomes part of the DAR system and it's important to currently no other DAW has this ability.

point out that

On previous software releases from the company, one playback sequence meant you had one reel, whereas now you can have as many reels as you want on the same playback sequence and collect them together in a Project. This means that they can come from separate physical devices with, for example, footsteps prepared on one machine and brought in on optical disc and combined with music and effects coming from a local hard drive. You can now work with several media devices at the same time, including OMR8s on the network, and they will all look to the user like local devices.

Genesis is DAR's answer to the problem that afflicts all DAWs in that the speed of development is so high that it's important to design software that can withstand change at a high rate without blowing up. It's also something of a rebirth in terms of where its software now is and now it will be free ramp up

its development speed for the next five years. CD-Advance is a good example of what it can now throw together in very little time. ■

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Tel: +44 1372 742848.
Fax: +44 1372 743532

NEW TECHNOLOGIES

< page 31 220 mono or stereo channels. Sixteen aux sends are provided as are separate direct output controls, microprocessor-based mute and MIDI control, illuminated switches throughout and 8 mono and 4 stereo matrix outputs.

The X-series desk has feature sets to address particular installation and tour disciplines. Two versions are currently available: the X-Eight-HS with group and master sections adaptable for FOH and stage monitor use, and the X-Eight-RT which can be configured for live performance recording and theatre applications. Eight-bus, 4-bus, stage monitoring and rackmounting versions will also be available.

TKS amps are more compact and lighter than the current Professional Series and have direct computer control network connection for NexSys software monitoring, control and load analysis and onboard DSP modules with digital or analogue capability. The Pro2 Series amps are described as cost effective and lightweight and will initially be available in 600W, 1000W and 1200W versions.

Crest Audio, US. Tel: +1 207 909 8700.

MusicTaxi VP-Pro

The successor to the MusicTaxi VP, the MusicTaxi VP-Pro from Dialog4 is based on a new hardware platform, is modular and can be expanded in ISDN accesses and future codec algorithms.

MPEG1 and MPEG2 algorithms are complemented as are Layer II and III. Also included are G.722 7kHz and G.711 telephone modes plus musifile format which guarantees compatibility to the PCX card. It is additionally 100% compatible with the CCS CDQ Prima and Telos Zephyr at 64kbs mono and 128kbs stereo. The J.52 standard will be provided as soon as it has been approved and 94 entries can be stored in the ISDN directory and accessed via short code dial.



Other standard features include 20-bit D-A, sample rate convertor at input and output, and sync in to the external clock of the digital output. It operates at data rates of 56-384kbs, has no fan, has 11 ISDN D-protocols and a short delay time.

Dialog4, Germany. Tel: +49 71 4122660
The UK Office, UK. Tel: +44 1442 870103

AKG in-ear

AKG's in-ear monitoring system employs 'individual virtual acoustics' to overcome the 'in-head localisation of sound' that can be created with in-ear monitoring. AKG's system claimed to achieve the separation and space produced by on-stage monitors but without the sound pressure levels and feedback. Each unit can be customised to an ear shape and transfer function characteristics.

The Emotion range of dynamic mics has diaphragms of varying thickness **page 34 >**

September 1997 **Studio Sound**

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Location photography courtesy of Arena Mobiles

for instance. The choice of mono or stereo groups. Or the comprehensive and flexible monitoring, including Surround Sound. And that every input channel features a clean feed/direct output.

But there again, perhaps we should leave that to the hundreds of audio professionals around the world that rely on the Soundcraft B800 day after day, night after night.

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 The inclusion of B800 users in this advertisement does not imply their endorsement of the product

beyerdynamic MCD 100

Marrying condenser mic and A-D convertor, beyerdynamic has come up with a 'digital mic'. **Dave Foister** takes an exclusive look

SOME YEARS AGO, somebody made us laugh by maintaining that digital audio would remain so much bunk until we had digital microphones. The implicit assumption was that microphones were such a weak link in the chain that no amount of improvement elsewhere would make any difference, which has long been nonsense. Microphones, even bad ones, contribute no wow or flutter, and a good one has a dynamic range comparable to a 24-bit digital recorder and therefore an order of magnitude better than most analogue ones. The parameter deviating most from the ideal has always been frequency response—but again, in a good design, even this has few more lumps and bumps than an analogue tape machine.

Nevertheless, the biggest race in audio has been the one to get the digits as far back down the chain as possible. Given a belief in digital

controls on the microphone body; the 2-stage pad is retained, but controlled remotely, and there is no filtering available.

The microphone does of course need power, and it runs from the proposed DPP (digital phantom power) standard of 6V–10V at 150mA. It is envisaged that digital consoles will incorporate this on their AES-EBU inputs, but in the mean time three power supply options are available from beyerdynamic. Two of these are 2-channel units, offering two ways of handling a pair of MCD 100s. The MPD 50 treats them individually, delivering two separate AES-EBU outputs each carrying a mono signal from one of the microphones. Pads are switched from here, with separate push buttons for the two microphones stepping through the 0dB, -10dB and -20dB options and switching the microphone around internally by sending signals up the cable. The MPD 100 assumes stereo operation, and combines the two inputs on to a single AES-EBU output assigned left and right. Pad switching is common to both microphones. Unlike the 50, this has BNCs for external word clock, synchronising both channels to any required rate 32kHz–48kHz; without this the sample rate is fixed at 48kHz. The third option is an 8-channel supply, delivering four synchronised AES-EBU outputs again with external word clock.

The word length is fixed at 22 bits, with 24-bit internal signal handling; this means that direct connection to a 16-bit recorder which just throws away the extra bits is not a good idea, giving the expected unpleasant effects on low-level signals. Besides this, the absence of any gain control apart from the pads means that the microphone benefits from the use of some kind of digital mixer. Since it can handle 130dB SPL without pads, more modest acoustic sources don't modulate the digital data to anywhere near full scale—close to a piano I only hit -20-odd dB—so

some additional gain is useful. Adding this control and proper noise shaping shows what the MCD 100 can do, and fully justifies the bold approach.

For a start, it's phenomenally quiet and clean with no hum and very low noise, itself less coloured than is often the case. Its manual warns about its extended LF response, and this is borne out with an impressively full sound, sacrificing nothing at the top either. In fact the response is customisable; beyer will design DSP filters in EEPROM to user specifica-

tions. As it stands, this is an excellent analogue microphone to begin with, as it would have to be to do justice to the concept. Realising that concept is a remarkable achievement and could well be the shape of things to come. ■

—argue about that in your own time—it follows that the sooner fragile analogue is converted to robust data the better, and this has given us microphone amplifiers with digital outputs designed to be placed right by the microphones and adjusted remotely. The only place left to go is into the microphone itself, and that is what beyerdynamic has done for the first time; while the MCD 100 is no more a digital microphone (whatever that may turn out to be) than the MC 834 on which it is based, it does contain all the required stages to go digital within its body, and the signal present on its output connector is AES-EBU.

It looks almost identical to its analogue counterpart, the only differences being the charcoal grey finish in place of black and an extra centimetre or so on the length. This could constitute a trap for the unwary, especially as beyer has felt constrained to use the standard XLR connector for the output, making the MCD 100 look for all the world like a straightforward condenser microphone. What would happen if it were plugged into a 48V powered input I was not about to find out. Another difference is the absence of

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Fax: +1 516 293 3288.

NEW TECHNOLOGIES

< page 32 allowing the mics to be tuned at the capsule for 'near-perfect' feedback suppression.

Harman, UK. Tel: +44 181 207 5050.

AKG, Austria. Tel: +43 1 866 54280.

Avalon tube

The Avalon 737 direct signal path combines valve preamps, an opto-compressor, sweep EQ, output level and vu metering

Inputs are provided for mic, DI and line and four valves are configured in single ended topologies with anode coupled followers for high current drive.

The opto-compressor has a minimum signal path with twin class-A valve triodes for gain matching. Controls are provided for threshold, ratio-compression, attack and release while de-essing is possible with the EQ in the side chain. EQ high and low bands are passive while the dual mid bands have variable frequency and switched Q. Mid band ranges are extended with x10 multiplier switches.

Avalon Design, US. Tel: +1 714 492 2000.

ASAP, UK. Tel: +44 171 231 9661.

Juke Box, Europe. Tel: +33 1 48 34 33 24.

ADAT cleaner

TDK's TCL-11 head cleaner for ADAT machines is a non-abrasive, dry head cleaner for VHS and S-VHS systems.



The product follows the introduction of TDK's Studio range of products which includes professional grade CD-R, MiniDisc, Hi-8 and DAT media.

TDK UK. Tel: +44 1737 773773.

TDK, Europe. Tel: +352 50 5011.

E-mu sampler

The ESI4000 is E-mu System's latest professional low cost sampler armed with V3 software and 64-voice polyphony. It's a next generation ESI32 and combines low cost with greater polyphony, increased RAM, more filters and the ability to read 128Mb of RAM.

Other features include 64 digital 6-pole filters (18 different types) and DSP functions such as time compression-expansion, parametric EQ and digital tuning. Sampling tools take in manual and automatic truncation, crossfade looping, gain change, normalisation and automatic correlation for finding loop points. Ten programmable trigger buttons are also included.

The ESI-Turbo option kit adds two more stereo subs, an effects stereo submix, a 24-bit dual stereo effects processor and SPDIF I-O.

E-mu, US. Tel: +1 408 438 1921.

E-mu, UK. Tel: +44 131 653 6556. page 36 >



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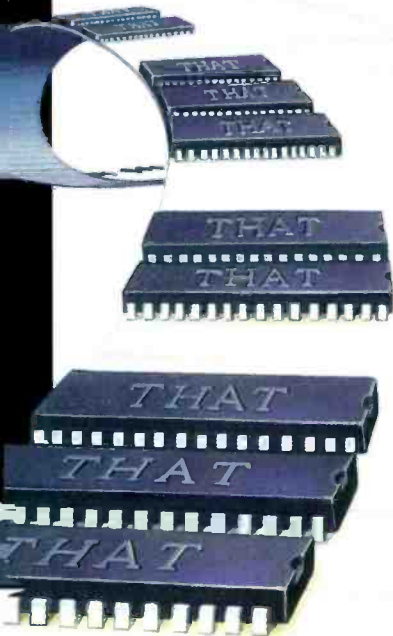
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Joemeek SC3

Yesterday's pop production technology squares up to the digital age. **Dave Foister** rediscovers the Joemeek compressor

IF YOU thought the Joemeek range was pure retro and analogue to the death, think again. Ted Fletcher, erstwhile Alice guru and all-round Grand Old Man (no offence) has once again solved a problem of his own so elegantly that it's worth sharing with the rest of us, and this time it takes the green boxes into the digital domain.

The original brief was to produce a top-end A-D without spending top-end money; this was found to be relatively easy, and the perceived desirability of the existing Joemeek compressor for final mastering seemed to warrant combining the two. A little bit of optimising between old-style compressor and new-style convertor, plus a rethink to the compressor's innate behaviour, produced the SC3 stereo compressor. The one I have is research

prototype No.2, and the manual is still in preparation, so I hope Ted will forgive me if some of my observations and assumptions are in any way wide of the mark.

other is what makes the difference; known as Transient Release, it determines the way the compressor recovers after fast transients, giving a rather grown-up auto function which can overcome the blandness many auto settings (or even manual ones) can produce. Its centre position is marked Normal, and its extremes Sharp and Smooth, and the flexibility it gives is something of a revelation.

What it appears to be doing is looking for particularly aggressive peaks and then either slowing down the compressor recovery or speeding it up depending on the control position. On the one hand, it can allow an overall slow release to be used without big short peaks ducking the whole thing down for long periods; on the other it can allow a fast overall setting but make sudden peaks

slow it all down a little bit to avoid excessive pumping.

There is also an output level control, which like the input knob has considerable gain available above its clearly marked unity setting; the potential for tailoring the compressor's behaviour using various combinations of the two levels belies the apparent simplicity of the other controls, particularly as the headroom leaves nothing to be desired. A single good old vu meter can be switched to show either level pre the output control or gain reduction, and is augmented by a separate overload LED which is also pre the output pot.

So effective is the unusual control selection that its biggest danger is that it encourages you to play too much as it's great fun; rarely have I used a compressor which can give such a vast range of effects with so few twiddles of seven knobs. Despite the rock 'n' roll image, the SC3 is perfectly capable of sufficient subtlety to deal with classical recordings, where its unusual release arrangements are at least as useful as they are on diver's-boot squashing. In either case it seems particularly easy to achieve considerable amounts of compression without sucking the life out of the signal. This is a stonking compressor, and would be without the digital I-O; the presence of such good convertors both ends moves it into a whole new league, where its appeal to

those who love digital convenience but mourn analogue immediacy is obvious. Yes it's fun, but it's also a powerful tool which could find itself a permanent part of the signal chain in almost any environment. ■

Contact

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Fax: +44 1923 285168.

The biggest difference from previous Joemeek designs is the extra time constant control; the usual Attack control (marked simply from Fast to Slow) is joined by two release controls. One, for long releases, is actually numbered from 250ms to 2.5s, but the



NEW TECHNOLOGIES

Garwood agility

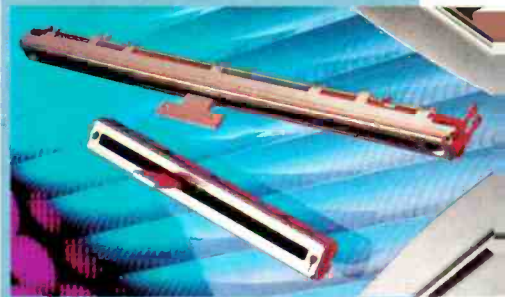
Garwood will launch two wireless monitoring products at the AES and emphasise frequency agility. While the Radio Station IDS is aimed at performers on the multinational touring circuit the Radio Station TS is designed for users that require several frequency options in their local spectrum and is supplied with 16 onboard UHF frequencies between 518-900MHz with a choice of four frequencies configured for legal use in different international territories. The 2-channel system can also be integrated into presenter IFB systems and operated in single or dual-channel mode.

Also new is the System Plus 2 as the first low cost System product to use synthesiser technology rather than a crystal-based design. A stereo UHF unit with user selection of two on-board frequencies, it includes a mic-line switch to match input gain and 48V phantom plus a 12V DC option.

Garwood, UK. Tel: +44 181 452 4635.
US. Tel: +1 215 860 6866.

Faders and knobs

New slimline faders from ALPS claim attenuation levels exceeding 110dB, resistance values of 10kΩs minimum and availability in 600mm and 100mm versions. The EM20 range of magnetic encoders have 40 detented positions with a pulse per position and the option of a built-in pushbutton.



An optional 31-LED array can be fitted around the encoder to enhance position recognition and can be mounted directly on to the PCB.
Roxburgh, UK. Tel: +44 1724 281770.

Quested installs

Quested has unveiled the first model in a range of compact self-powered monitors applicable to installation purposes. The first offering is a compact; fully shielded 2-way design with a 165mm woofer and 28mm soft dome tweeter run by rear-mounted electronics capable of 100W and 50W into the two drivers respectively. A variety of mounting options are available. The company now also offers a 15-inch version of its VS1112 subwoofer called the VS1115.

Quested, UK. Tel: +44 181 566 2488.

Feedback killer

Sabine's FBX1020 feedback exterminator, an upgrade on the PBX901, automatically senses feedback, determines its frequency and places a narrow constant-Q digital notch filter on the offending frequency. **page 38 >**

September 1997 **Studio Sound**

Loved by The King, The Chairman, The Material Girl, some Hot Tuna & everyone aboard the Airplane.

Don't tell Al Schmitt that names aren't important in recording. He has recorded, mixed, and produced some of the greatest names in history - everyone from Elvis to Frank Sinatra, Madonna to Steely Dan, Barbra Streisand to Toto, and Natalie Cole to Jefferson Airplane. His Neumann mics (which he has been using since the mid-1950's) have even helped him win six Grammy Awards for Best Engineer. "I believe they are the best microphones in the industry," he says.

And when you also believe, as Al does, that great sound comes from good microphone technique (and not from constant EQ adjustments) you want to use the very best mics you can get. The natural choice for Al is Neumann. And while he has great affection for all his Neumanns, he has grown particularly fond of his new M149 Tube. "Like the original M49, the M149 Tube never lets me down," he says. "It's an extraordinary microphone - clean and crisp."

Being the award-winning professional and sound perfectionist that he is, Al has chosen to record the voices and instruments of so many of our favourite artists - Tony Bennett, Jackson Browne, Willie Nelson, Quincy Jones, Dr. John, Michael Bolton, and many, many others - through his favourite mics.

After all, nothing else sounds like a Neumann.



Neumann

Neumann, FREEPOST,
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Bucks HP12 3BR.
Tel: 01494 551551. Fax: 01494 551550.
email: 106066.2217@compuserve.com

Sonodore RCM-402

Little known but commanding a large amount of respect, Sonodore's omni mics demand a higher profile. **Dave Foister** reports

ONE OF THE NICEST THINGS about the industry's revitalised enthusiasm for microphones has been the encouragement it's given to smaller companies and even individuals to share their ideas of what microphones should be about with the rest of us. The new names in the field aren't all Russian; some belong to people who have been hand-building custom microphones for some time,

fed to the microphone lines via current limiting resistors, which will rapidly drop an input's voltage rails as increasing current is drawn from it. This is quite intentional, designed to prevent one failed microphone taking out the entire phantom supply and hence all the other microphones, and with this in mind the relevant standards decree that no device shall draw more than 10mA.

It is not unusual for high SPLs to make a microphone place enough demand on the supply for its voltage to drop, with consequent loss of headroom and compromised performance. Hence Sonodore's dedicated power supply, which is mains operated, doesn't use the phantom at all, and delivers an unspecified voltage to the microphones down a 4-core cable with enough in reserve to avoid problems. As a sideline, it has struck me that valve microphones are always (for obvious reasons) powered in a similar way; could this explain the extra something they are reckoned to have?

The upshot is that not only does the RCM-402 claim to handle 143dB SPL, but it does it with virtually no change in its distortion figures from those at more modest levels, unlike its chosen comparison whose distortion increases by a factor of 50-100 at 130dB while the Sonodore remains approximately the same.

Another parameter subjected to special attention is the accuracy of the omnidirectional polar pattern and its uniformity with frequency. Obviously this is an important factor in the performance and flexibility of a microphone, but Sonodore's claim that other microphones' deficiencies in this area are primarily responsible for the 'hole-in-the-middle' commonly associated with A-B omni techniques strains credibility. If a spaced pair's lack of centre focus was simply due to off-axis response aberrations as Sonodore suggests it could be cured by angling them in to point at the central sources; however, a particularly good all-round response such as these seem to have can only help the overall image and enhance the sense of the recording space.

And indeed the response is particularly impressive. The small capsule size is reflected in the extended HF behaviour, and the low end once again challenges the view that big bass needs a big diaphragm. Transients and high levels are handled effortlessly, and the total lack of strain is strongly in evidence, producing an unusual transparency. The laws of physics dictate that self-noise is always going to be an issue in a design of this kind (from the mechanical bits, not the electronics) and all omni manufacturers address it carefully; the Sonodore succeeds especially well, minimising the tendency for the noise to undermine the obvious merits of the microphone. The RCM-402 has many of them, and competitively priced as it is it deserves a careful listen. ■

and who see in the fresh appreciation of quality (and preparedness to pay for it) an opportunity to contribute their own expertise on a broader commercial basis.

One such is Rens Heijnis, whose company has been custom-building mixers, amplifiers and power supplies in Holland since 1988 and also uprating various items including microphones. Microphones have been built to special order, largely for classical music recording companies, and now an off-the-peg model is available, the Sonodore RCM-402.

One glance is enough to reveal that this is an omni microphone. The fact that it shares its distinctive shape with one or two other omnis, and that they all look like measurement microphones, is not just a crude attempt to make us believe that if it looks like a reference transducer it must be accurate; it's a function of its function.

If you need to put a small-diaphragm capsule on one end and an XLR connector on the other, and minimise the acoustic influence of the bodywork behind the capsule, this is the shape you end up with, just as one racing car looks pretty much like another. The Sonodores are particularly nicely made and finished, and the review samples were supplied as a pair in a sizeable foam-lined wooden box complete with adequate stand mounts.

Also provided was a power supply, complete with special cables. Sonodore's approach to the powering of these microphones is an important part of the design philosophy, and while they are not the first to rethink the way we operate condenser microphones, it's surprising that it's still such a rarity. It's fairly obvious that the limitations of what a standard phantom supply can deliver are liable to place restrictions on a microphone's performance. Phantom is always

Contact:
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NEW TECHNOLOGIES

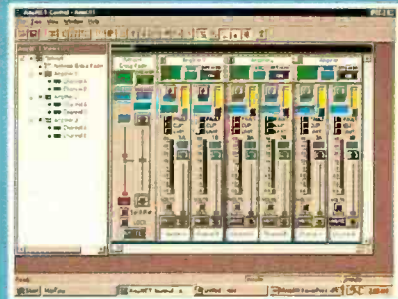
< page 36 The new unit has 20-bit performance and offers ten feedback filters. ClipGuard adaptive clip level control with Turbo Setup mode makes setup faster and easier and the unit has an internal power supply and front panel buttons for setting total number of filters, setting the desired number of fixed filters, locking fixed filters and switching filter width.

The Power Q ADF4000 workstation combines the functions of seven digital products in a 2U-high package through 24-bit processing. Features include up to 12-band parametric EQ with high and low-pass filter widths; up to 12-band FBX feedback extermiator with adjustable sensitivity; real-time analyser with reference mic input; a compressor-limiter; digital delay for speaker alignment and a noise gate. It also sports ClipGuard and an automatic room equalisation process.

Sabine, US. Tel: +1 904 418 2000.
Fuzion, UK. Tel: +44 1932 882222.

AmpNET 98

Apogee's AmpNET 98 is an enhanced version of its amp control software. The new version has all the features of the previous version and works with DA-series digitally controlled amps out-of-the-box, and the SA-series and CA-series amps can be upgraded for networking but adds support



for MA-series modular multichannel amps which are designed for the commercial sound market.

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

Calrec Compact 2

The Calrec Compact 2 desk is designed for medium production facilities and vehicles where space is at a premium. It is available with up to 56 inputs and with mono mic/line, stereo mic and stereo line inputs and eight stereo or mono subgroups. All channels have 3-band EQ with swept mid, high and low pass filters, mix minus output with talkback and metering, 6 auxes, surround panning and 4 VCA groups plus an optional surround monitoring panel.

Calrec, UK. Tel: +44 1422 842159.

Soundscape reverb

tc electronics' new plug-in company and Soundscape have announced a reverb plug-in for the Soundscape DAW which uses the DSP capabilities of its SSAC-1 accelerator card. The plug-in has a graphical **page 40 >**



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Swiss Radio DRS, Zurich



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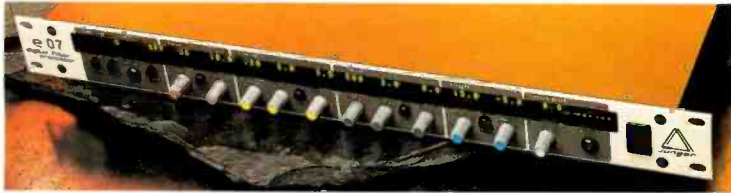
Jünger Audio e07

Although still in their infancy, digital filters are now on the pro-audio agenda. **Rob James** evaluates the e07

BERLIN-BASED Jünger Audio has been quietly making a name for itself in digital dynamics units. This new e07 Digital Filter Processor, is a departure: a 4-band parametric EQ with time-code snapshot automation, working at 24-bit resolution with double sample rate processing.

The unit is a 1U-high 19-inch rack-mounting box and fairly deep (251mm) it is also pretty heavy and will benefit from some rear support in the rack. The rear panel is neat and clearly labelled. Two XLRs provide AES I-O with two phonos for SPDIF. This is a digital only device. No A-D or D-A convertors are fitted. A further XLR takes care of time code input. A male 9-pin D-connector allows RS232 remote connection and a female 15-pin is provided as a GPI connector.

The front panel is divided into six blocks



graphically. From left to right these are: Setup, Low, Low Mid, High Mid, High and Output. The clear green displays are hidden behind a smoked plastic panel when the unit is not powered. All the push-buttons are positive in feel and the BYPASS and CAPTURE buttons are internally illuminated. The knobs are covered in a grey rubbery material with coloured caps according to which block they are in. The knobs also activate switches when pressed. This is used to change the scaling of the FREQ (frequency adjustment) controls, and on the FREQ (boost-cut) controls it switches the filter band in or out. Pressing the output GAIN knob bypasses the filter processor and there is a BYPASS switch which bypasses all processing.

The unit provides six independent bands per channel—two of which may be used as dynamic filters and there is an adaptive limiter. Attack and release times are programme dependent; threshold is fixed at 0dBFS.

The band-pass filters are accessed by pressing FILTER in the Setup block. The display changes to reflect which controls are active and their functions. Low Cut has a range of 2Hz–120Hz and the shelving can be set to 6dB/octave, 12dB/octave or 18dB/octave. The High Cut covers 2kHz–20kHz with the same shelving options. The LF and HF bands of the main equaliser are shelving with frequency ranging 20Hz–500Hz and 2kHz–20kHz respectively. The low and high mid bands cover

50Hz–5kHz and 500Hz–20kHz. The two mid bands have WIDTH controls with Q variable from 0.4–8.0 This is not intended to be a notch filter. All bands have ±15dB of boost or cut.

Pressing DYN (dynamic) associated with a band takes the filter parameters already set and allows you to set a threshold between -50 and 0dBFS and the amount by which signals are cut or boosted. If for example you set a turnover frequency of 3.9kHz and select DYN and adjust for Reduction, frequencies which would normally be affected by the filter will only be reduced when they exceed the threshold level. If set for Enhance they will be boosted when below the threshold and only boosted to the threshold.

The unit can be used in stereo or independent 2-channel modes. In 2-channel mode the controls are toggled between the two channels using the L-R button.

There are 50 onboard memories for storage of all parameters. Each of these will store independent settings for the A and B channels when in 2-channel mode. Presets can be named and

for quick comparisons there is an A-B button. The B store can be loaded with a preset or copied from A and then compared with the active, A set. The B parameters cannot be altered which avoids confusion.

Snapshots can be automated against time code. By the time this article appears it will be possible to bulk dump the data associated with a project to a digital audio recorder via the AES connection and reload later. This would be highly desirable when the unit is used in mastering if changes are required by the client after the initial mastering session.

The *raison d'être* of this unit is the reputation of digital filters for harsh, metallic qualities. In properly designed analogue filters the difference between analogue and digital should come down to the frequency range. In a digital filter the range is sharply limited to half the sampling frequency. This tends to result in

nonlinearities in amplitude and phase characteristics occurring well before the cut off frequency—that is, within the audible range. The e07 seeks to address this problem by using up sampling to double the input sampling rate. Down-sampling is used to restore the rate before the output. The unit is '96kHz ready' awaiting availability of I-O chips.

The filter does sound very sweet and musical to my ears. If you are sceptical about digital filtering, this unit may be the one to change your mind. ■

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NEW TECHNOLOGIES

< page 38 approach to parameter control and will be available later in the year. According to tc electronics it is the first of many similar collaborations that will be announced.

Soundscape, UK. Tel: + 44 1222 450120.

tc Works, Germany. Tel: +49 40 531 0930.

Mytek 24-96

Mytek Digital has introduced the ADAC 9624 and convertor which offers 24-bit, 96kHz performance for \$4000 (US).

Targeted at high-end mastering, the unit offers several selectable sampling rates, noise shaping, headphones amp, optional external synchronisation and several optional digital I-O interfaces.

Included in the package is the MRX data format licensed from Prism Sound which allows for six channels of 20-bit, 4 channels of 24-bit or stereo 24-96 to be stored on 16-bit machines like the DA-88 and ADAT.

It is claimed to be the first convertor on the market to use the new Crystal Semiconductors CS5396 chip.

Mytek Digital, US. Tel: +1 212 388 2677.

TL Audio Ivory

TL Audio is to introduce a new Ivory range of valve outboard which offers extra facilities over the Indigo range and sits between this and the company's Classic range. Initially the range will include a 4-channel mic pre, a stereo parametric, a stereo compressor and a mono voice processor.

TL Audio, UK. Tel: +44 1462 490600.

Sascom, US. Tel: +1905 469 8080.

CD-R price cut

Marantz has cut the price of its stand-alone CD-R recorders. The CDR615 now costs £1395 plus VAT (UK) while the CDR620 with



wired remote and SCSI-II now asks £1995 plus VAT (UK).

Marantz, Netherlands. Tel: +31 40 2732241.

AVT, UK. Tel: +44 1932 854544.

Hafler monitors

Hafler is introducing the TRM8 2-way powered monitor designed and produced in co-operation with speaker manufacturer Rockford Acoustic Design Division.

Based on Hafler's Diamond Series Transnova amp technology the monitor is a bi-amped, 2-way system and claims a frequency response of 45Hz–21kHz and peak acoustic output of 123dB. The amps provide 75W for the HF driver and 150W for the woofer with a clip indicator for each. Crossover is 2.5kHz with a 24dB/octave slope while a subsonic filter rolls off at 12dB/octave at 30Hz. Bass and treble level controls switch between -4, -2, 0, +2 and +4dB from 40Hz–200Hz and 3–20kHz respectively.

Hafler, US. Tel: +1 602 967 3565. page 42 >

September 1997 Studio Sound



**IF IT'S THERE
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dynaudioacoustics
Ultra Precision Studio Monitors

www.americanradiohistory.com

Grace Design Model 201

Despite their pedigree, American Grace preamps have yet to achieve international recognition. **Tim Goodyer** believes their time has come

GRACE IS THE NAME that American audio designer Michael Grace has bestowed on his company. It is also the quality he has imparted to both the looks and performance of his new Model 201 mic preamp.

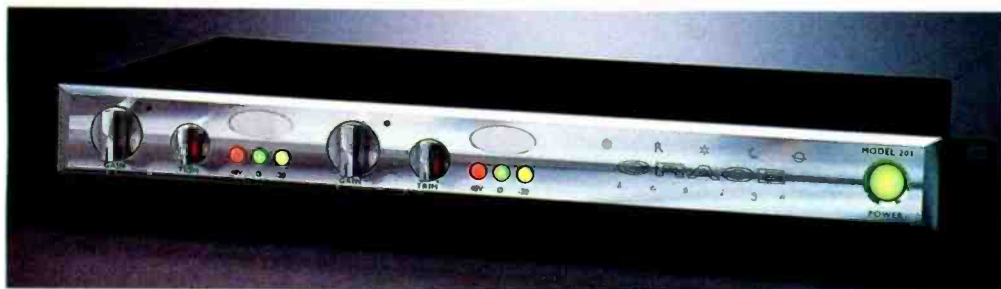
Dressed in its sleek silver livery, the 201 successfully avoids the modern generic, retro and the garish schools of design shared by much of today's outboard. There are points of familiarity, however—the 201's knobs bear broad comparison with those of dbx' Blue units, while its buttons and scribble spots are reminiscent of Focusrite's Red series. Simplicity is the word here with the two channels of preamplification each enjoying a large stepped rotary GAIN control, smaller TRIM knob, peak LED and lit-when-active buttons for 48V phantom (red), phase reverse (green) and insertion of a 20dB pad (yellow). Power is switched from the front panel; connections are all balanced XLR with the outputs using a proprietary transformerless class-AB amplifier reckoned to outperform 'traditional transformer-like designs' and there is a ground lift toggle switch provided on the rear panel.

The peak indicator presents the only form of metering, lighting green at -14dB and going red at +16dB. The manual sets the +16dB

chassis to better screen out stray RF interference if at the cost of some lower frequency screening. But its use is the key to its appeal and Grace's own literature is quick to point out that music 'does not behave like a steady state sine wave test tone'.

Setting up is easy with the green-red LED window providing an excellent reference for both coarse and fine level adjustment. And with the signal flowing the 201 declares its worth. I wasn't able to stack it up against anything too esoteric but on the strength of its performance against a couple of respectable and respected mic amps, it belongs toward the front of the field. The sound is pleasingly open and uncoloured, giving a gentle lack of the kind of brightness that readily becomes harshness in less refined designs (attributed by Grace in part to the exclusion of electrolytic capacitors from the signal path). The 201's ability to handle harmonically rich sources such as gongs demonstrates how this refinement translates into useful audio performance.

Tracing the Model 201's heritage brings us to the Model 801—eight Grace preamps tucked into a 2U-high box—which has been available in the US for over a year now. The intended application is easy to spot: direct



point at 12dB before clipping for balanced operation and 6dB before clipping in unbalanced mode. Setting the level using the 24-position GAIN control gives 18dB–64dB of gain in 2dB steps, with the unstepped 10dB attenuation of the TRIM control available for fine tuning. With the attenuator switched in, the 201 will handle a +4dB line-level input without complaint.

If the Model 201 offered nothing unusual in terms of audio quality, this review would be almost finished. But Michael Grace's 10 years plus experience in audio design have not been wasted. The unit's spec sheet makes reassuring claims to a frequency response of 20Hz–300kHz (± 0.2 dB), $< 0.0015\%$ THD+N at 40dB gain (+20dB output), phase deviation of $< 2^\circ$ between 50Hz and 20kHz, and some -130dB noise level at 60dB gain. Much is also made of the use of transimpedance—or current feedback—amplifier topology at the heart of the 201. Indeed, Grace's technical description makes a good theoretical case for the 201 being something special—including the use of an aluminium

recording to a modular digital 8-track machine—although a block of eight amps of high enough quality would give good company to a less well specified console. And it is through the development of this earlier amplifier that Michael Grace elicited the elements of the new one. With the introduction of the 201 it appears that he is attempting to establish Grace among the elite of mic preamps—certainly the pricing policy seems to indicate this with the Model 201 coming in at almost \$1000 (US) per channel. I would be interested to hear just what sonic benefits the 201 offers over the 801. If there are few enough, and assuming a couple of economies of scale, the Model 801 could represent something of a steal on a cost-per-channel basis away from the MDM market.

Speculation aside, the twin-channel Model 201 is certainly a preamp worthy of note outside of its native America. Easy in operation, it's sonically very well suited to purist recording and rates highly enough to score on those 'special' jobs, such as vocals, piano and percussion, that regularly crop up in a multitrack session. ■

Contact

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Fax: +1 303 444 4634.

NEW TECHNOLOGIES

DAT to CD-R

Following the release of the CD2CD/Pro CD-R duplicator, MediaForm has introduced the Easi-DAT add-on which allows a DAT player to be interfaced via SPDIF or AES-EBU ports and offers conversion of DATs to CD-DA discs. Features include selective track extraction, multisample rate support, start ID editor and CD player emulation from hard disk.

The CD2CD/Pro stand-alone duplicator copies up to six CD-Rs simultaneously from a single CD with a single button touch. Features include prescan, which scans the



entire master for any errors prior to burning, and a 6-digit password to prevent unauthorised operation.

MediaForm, US. Tel: +1 610 458 9200.

Sony 24-bit print

Sony has published a handbook which promotes its concept of 24-bit. Entitled *Explores the 24-bit World*, it is less a hard sell than a discussion of the topics involved and acts as a good source of answers to the questions you were too shy to ask.

While the back of the book does contain information on the company's Oxford desk, 3348HR DASH and PCM9000 MasterDisc recorder the remaining two thirds would be of interest to anyone who has an eye for the digital domain but could do with a little more explanation.

Topics covered in some depth in a clear and concise manner include converters, (including opinions on the bit issue), oversampling, dither and jitter (including the importance of clocking). There's a particularly interesting section on the logic behind using fixed or floating point processing and the importance of word length in mixing consoles and a pleasantly simple explanation of noise shaping. Perhaps to underline that the publications is more than just a brochure, a section on sampling frequency does not shirk the 96kHz question.

While the underlying theme might be construed as a soft-sell for the **page 44 >**

September 1997 **Studio Sound**

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Vac Rac TEQ-1

The glowing valves and military styling of the Vac Rac sit well with its classic sound. **George Shilling** signs on

ORIGINALLY REVIEWED to considerable acclaim, the American Inward Connections has recently added the TEQ-1 equaliser to its Vac Rac modular on-board system. The equaliser shares the valve circuit topology and unashamed 'retro' styling of the older Vac Rac mic preamp (Studio Sound, March 1996) and limiter, all of which require one of Inward's range of mother racks for mounting and power.

The Vac Rac 4000 comes as a sturdy 3U-high rackmount system, with space for four modules and an onboard tube power supply to the right. At nearly twice the price, the model 6000 has space for six modules with the power supply moved into a separate 2U-high rackmount unit, along with the mains transformer. The 4000 has an external toroidal mains transformer which is extremely heavy, and is connected via a thick 15-way cable. This is optionally rackmountable with half-rack ears. A rackmountable grille is supplied to be fitted above the main unit—a great idea



to ensure all those valves don't get too hot. The range of 'Rac modules now comprises the TMP-1 Microphone Preamplifier, the TLM-1 Tube Limiter, the TII-1 Direct Inject module, and now the TEQ-1 Step Equaliser. The look of the range is unashamedly very retro: grey 1940s military-spec paintwork, bakelite knobs, and heavyweight metalwork. Even the manual looks like a dossier of Top Secret papers, with 'Operations Manual' printed on the cover, and plenty of technical diagrams.

The TEQ-1's lone tube is an authentic American GEC 6072A. Its control knobs are all stepped offering three bands with gain settings of $\pm 2\text{dB}$, $\pm 4\text{dB}$, $\pm 6\text{dB}$, $\pm 9\text{dB}$ and $\pm 12\text{dB}$. The low band has frequency settings of 50Hz, 100Hz, 200Hz, 300Hz and 400Hz, the mid has 400Hz, 800Hz, 1.5kHz, 3kHz and 5kHz, and the top has 5kHz, 7.5kHz, 10kHz, 12.5kHz and 15kHz. These all look like sensible choices, and the overlaps are welcome, although one wonders if slightly differing frequencies would not have more useful where overlap occurs. The stepped knobs are much stiffer than those on the TLM-1, but this is not generally a problem. They click solidly into place, and there is little possibility of confusion when recalling previously noted settings, a definite plus in mixing and mastering situations. The US-style up-for-on operating toggle switches of the earlier modules have

been abandoned in favour of tiny plastic green pushbuttons, mainly I think due to reasons of space. These are, perhaps, less confusing to Europeans but it is now less obvious which position the button is in, as the travel is shallow and there are no indicator lights except an LED for EQ On. There is also a Power On LED although, of course, the power switch is on the transformer box. The TEQ-1's switches and LEDs detract from the retro look and feel of the other modules.

On the back there are XLR and jack connections for input and output, and I was surprised how cheap and plasticky the sockets were. They are not what I would expect on a unit such as this, but they seem serviceable enough.

The buttons operate high-pass and low-pass filters set at 50Hz and 15kHz respectively, (not 50kHz as stated in both manual and brochure) and also separately switch the high and low bands between peaking and shelving. The five mid-band frequencies are 'reciprocal bell-shaped peaking curves'. Bandwidth is unspecified but sounds about average and is well chosen. Frequency response is quoted at a remarkable $+0.25\text{dB}$ at 5Hz–100kHz. It is virtually impossible to overload the input, yet the output is astonishingly quiet.

As you notch the gain up it seems very subtle: 6dB of 10kHz shelf added to a vocal or mix does not sound as much as the numbers suggest. This is because the unit works with seemingly little of the distortion or unpleasant phase shifting that lesser EQs sometimes exhibit. The TEQ-1 is wonderfully smooth and gentle, but nevertheless very powerful—the LF shelf just goes down and down and nothing you can do with any of the knobs sounds wrong. It is easy to get carried away and make huge boosts and cuts without realising the extent of the changes you have made until you compare the flat signal.

Despite the diminutive front panel, this has more clout than many larger units. I found it preferable to units such as the Tube-Tech PE1C but quite different in approach—the modular concept and the switched controls, which make it more like the (transistor) API 550. It is best suited to gently shaping rather than dramatic mangling and manipulation of a signal.

Because of the modular approach of the Vac Rac system, it is difficult to compare prices—the rack and power supply are actually the most expensive part. However you look at it, however, these are not cheap units and work out somewhere in the same region as the aforementioned Tubetechs. There are few if any really similar units on the market that I know of, and I would certainly recommend them as a best buy. ■

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NEW TECHNOLOGIES

< page 42 gospel according to Sony Digital, there is enough general information available here to make this free booklet which can be ordered over the web well worth a read. And it looks nice enough to keep.

Sony B&P, Europe. Tel: +44 1256 355011.
Net: professional-audio.com

MFX3Plus Rev 14.2

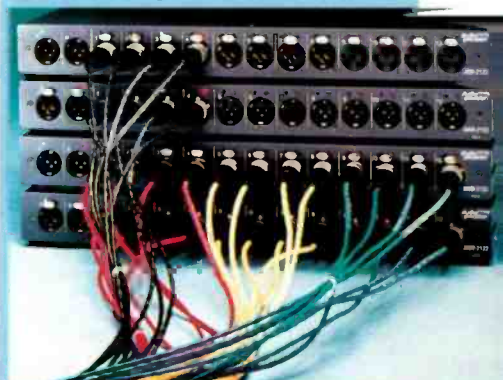
Revision 14.2 for Fairlight's MFX3Plus workstation includes 64 levels of undo, an extended Audiobase clip database and search engine, and support for storage media greater than 4Gbytes. Audiobase provides search facilities for clips by user-defined criteria including wild card and simultaneous multiple-field searches. Clips may be auditioned and a sync point found using audio scrub directly into the Audiobase database before placement in to the current project.

Fairlight's DaD digital audio dubber will be compatible with Avid's Level 2 release of OMF for playback capability with other workstations.

Fairlight, Europe. Tel: +44 171 267 3323.
Fairlight, US. Tel: +1 310 287 1900.

AP switchers

SWR-2122 audio switchers are designed to expand the 2-channel input and output of the Audio Precision Systems One and System Two audio test systems. The switchers are available in 2 x 12 formats with various connectors to suit specific applications. Sixteen units can be cascaded to handle 192 inputs and outputs and are suitable for



interfacing with multichannel devices or production 'bed of nails' test fixtures. Based on high-reliability relays, the units preserve the signal integrity of the generator and signals from the device under test for transparent operation. It achieves crosstalk performance that typically exceeds 140dB at 20kHz in balanced operation.

The switchers are controlled by various AP software options via an APIB interface and integrate into APWIN Windows or S1.EXE DOS control software.

TTI, UK. Tel: +44 1480 412451.

AP, US. Tel: +1 503 627 0832.

Short/Cut v2.0

360 Systems Short/Cut v2.0 adds support for an external Zip drive which can page 46 >

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Symetrix 628

The latest digital voice processor for radio comes from the established Symetrix stable. **George Shilling** takes to the air

WANT TO SOUND like a tacky radio jock? Thought not—but if you're in the broadcast business, you know that you need to process to your announcers' and deejays' mics. A host of all-in-one vocal processors is available to do this, with a new one appearing about every month. The Symetrix 528E has been available for some time: a fairly straightforward processor that leans in the direction of the broadcast market. Now, Symetrix claim this new unit, the uninspiringly named 628, has been developed as a result of requests from 528 users. The problem with the old-fashioned 528 was that you had to adjust the settings for each user, but the digital 628 gives you 127 preset locations. So as long as you remember which number your preset is, this could be very useful.

The 628 is a 1U-high, 6 1/2-inch deep dark grey box, with a fairly solid feel. On the back are XLRs for mic and line inputs; the latter has a TRS socket, the former is accompanied by a phantom power switch—a daft place for any switch. There are XLRs and unbalanced jack analogue outputs for left and right, which is

reduction. It works well, but I found its release to be a little slow.

The expander-gate section works very well, featuring THRESHOLD, RATIO and RELEASE knobs and a row of LEDs to indicate gain reduction.

The compressor section features identically-labelled controls to the gate section, so be careful here Attack is preset pretty fast, but not fast enough to stop explosive transients such as 't's.

Each of the preceding three sections seem to have an odd set of numbers for the Threshold setting. This is because it is referenced to digital zero (dBFS).

The 3-band EQ shares one set of knobs for FREQUENCY, BANDWIDTH and CUT-BOOST, with overlapping hands and LEDs to show which band you are editing.

The Master section features an OUTPUT LEVEL pot, an OUTPUT LEVEL meter, a preset number pot and LOAD and SAVE buttons, and a simple 3-figure LED display.

The input stage feeds a 20-bit A-D converter, then a 24-bit Motorola digital signal processor handles the signal dynamics. Because there is no Input meter, the manual



odd as this is not a stereo unit: both outputs carry the same signal. Next, the digital output section comprises a toggle switch for sample rate, a pushbutton to select AES-EBU or SPDIF and the appropriate phono and XLR sockets. There is no digital input. Further along there are MIDI In and MIDI Out-Thru, the In doubling as a 7-pin DIN socket to accept the special lead supplied with the optional RC-1 remote control unit. A screwdriver operated pot selects MIDI channel. Mains goes in via an IEC socket.

On the front panel, from left to right you will find the pre-amp section, featuring the only real pot, for input gain (which therefore, irritatingly, does not get saved as part of the preset), and latching switches for mic-line input selection and 15dB pad. LEDs indicate Clip and Phantom On. All subsequent pots are data encoders with small but deep rubbery knobs which have a pleasantly damped feel, and about 20 'notches' per full rotation. One click of any pot displays its current setting on the LED panel on the right of the unit. All subsequent buttons are momentary push switches, and each section features a button and LED to make it Active.

The de-esser features frequency and threshold pots and a row of LEDs to indicate gain

suggests bypassing all the sections, setting the output gain to zero, then using the Output LEDs to set input gain—it's a bit of a palaver really, and to get unity with Output set at zero the input pot has to be down at about 10 o'clock which does not feel right.

Presets 120–127 are set up with some examples for different styles of radio announcer. You cannot overwrite these, but you can resave any tweaks to any of the other 119 stores, which all start off 'blank'. The lack of layered menus is admirable in a digital unit, and I found it very simple to use. It can, however, take many rotations to twiddle through some of the scales—for example, from the bottom to the top of an EQ frequency range. Perhaps some of the scales are a little too fine,

or maybe Symetrix should have employed an accelerator mode. You could then whizz through the scale when the knobs are turned faster, as you can with certain other modern kit (like my cooker).

The manual is good-humoured in an American way, and although not that logically ordered, all the information you need and more is in there. The sound quality is superb, and all those intimate, super-present deejay and announcer vocal sounds are instantly achievable. For talk radio, this is just the job, if a little pricey. ■

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100613,760.

NEW TECHNOLOGIES

< page 44 be used for recording, editing, archival and transfers. It can also create a DigiCart/II Plus formatted Zip disk and then store audio files to the disk for playback on DigiCart units.

V2.0 comes with D-NET file transfer capability for the transfer of audio files and related information such as cut names and running times. The version can also assign GPI inputs to trigger Hot Keys and allows users to replace files when copying to a Hot Key so the audio content mapped to a Hot Key can change while retaining the original name. Other features include an undo transport command that returns the cursor to its original position, setting a zero mark at any point in a file, play selected (highlighted) audio in the editor, and the ability to copy an entire directory.

Hard disk storage capacity has been increased with four hours' storage on the internal 3.2Gbyte drive.

360 Systems, US. Tel: +1 818 991 0360.

THX monitors

Miller & Kreisel Sound Corp has a new line of THX-certified main monitors and is offering the MPS-150 Main in three application-specific cabinet shapes to suit different needs. A left/right mirror imaged configuration has cabinets that have complimentary angles in the horizontal plane and the tweeters are located on the inside edge of



the cabinet. The Angled series consists of mirror imaged cabinet configurations - the MPS-150 Main AL (angled left) and the PMS-150 Main ACR (angled centre-right). A Square mirror image configuration has cabinets that are fully squared with no horizontal or vertical angle on the front baffle. The series features two mirror imaged cabinets - the MPS-150 SL (square left) and the MPS-150 Main SCR (square centre-right).

At 125-inches high, the cabinets are about half the height of most THX-compliant front channel speakers and use a proprietary "phase-focus" crossover which is designed to maximise the system's performance in vertical and horizontal planes.

The company now also has MPS-150 SUR Tripole speakers designed as the companion surround speaker for the MPS-150 Main monitors. The speaker's three-baffle and four-driver configuration can be operated in THX dipole, direct radiating and Tripole.

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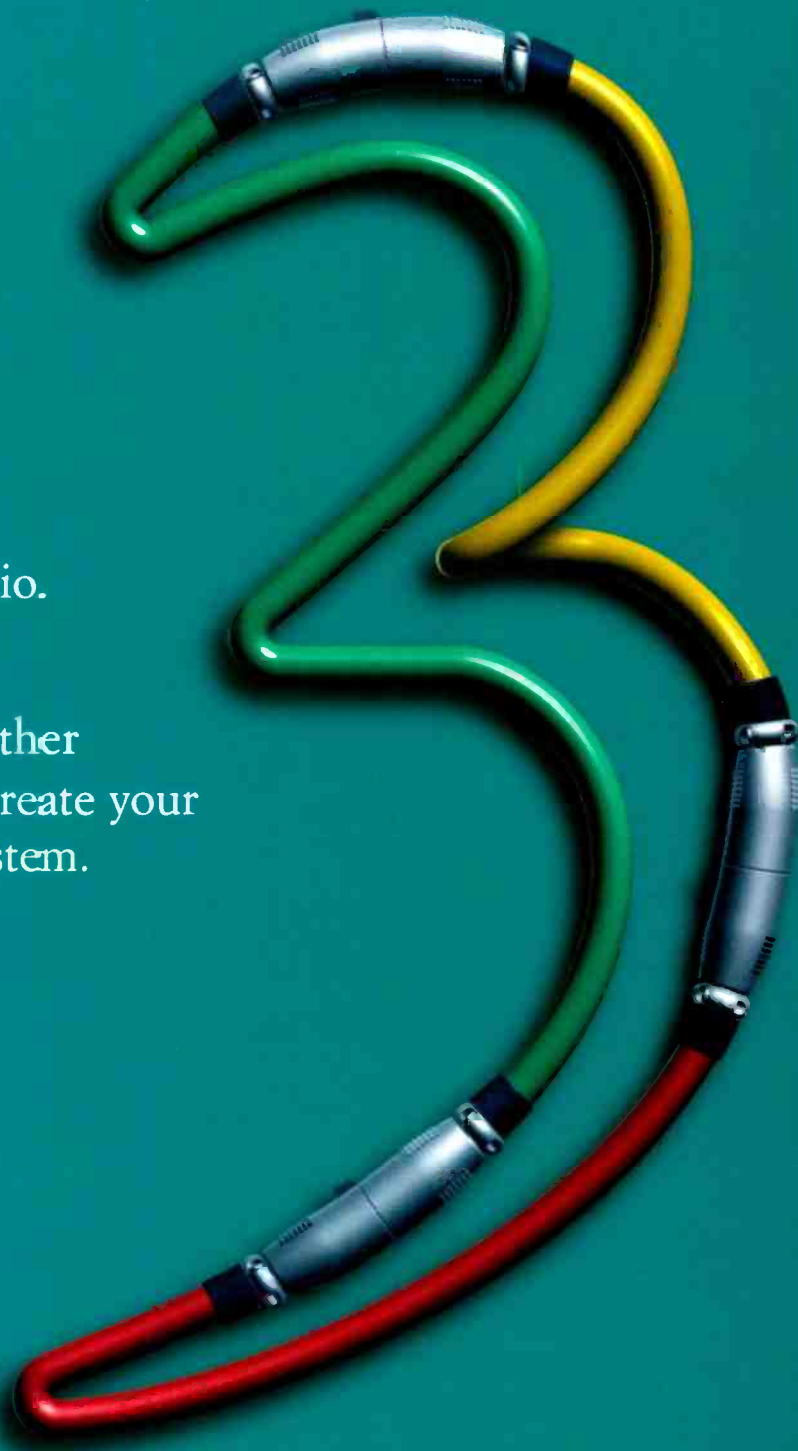
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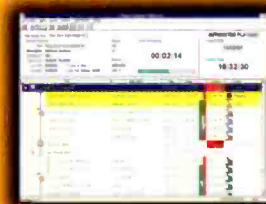
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Equalisers

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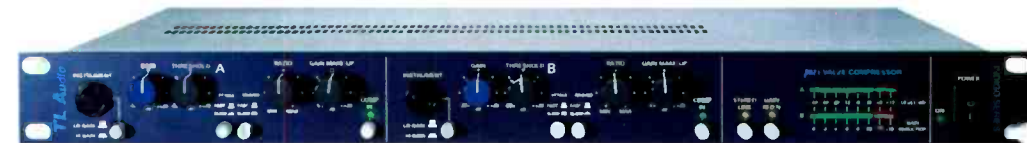
WHEN YOU GET to the top, and whole careers as well as sessions can depend on the right choice of equipment, an equaliser's history can count for as much as its specification and its cost. Air Studios' Malcolm Atkin, for example, is on record as saying that the best engineers can get what they need out of most compressors but that equalisers demand particularly careful selection because of their character. And he's right.

Equalisers come in a lot of flavours—from exotic expensive passive valve units through powerful parametrics to the distinctive massed faders of graphics—and can be called upon to provide treatments as diverse as mix sweetening, session salvage work and PA system setup. This variety is reflected here, through the opinions and preferences of working engineers, technical explanations of the physics behind the panel and a comprehensive listing of current models that clearly demonstrates the breadth of choice and the interest currently commanded by outboard EQ boxes.

Malcolm Atkin, like many others, reckons that no-one really understands some of the key aspects of the workings of an equaliser—although a brave handful claims that it does. Whichever side of the fence you sit, the last equaliser you used is often a good ice breaker at a particularly dull audio engineers' party.

Dave Foister: EQ perhaps elicits the most emotional responses of any processes we use, and the importance of sonic nuances over facilities is perhaps greater than anywhere else. For me this makes the likes of API's equalisers particularly attractive, as represented by the 550b modules for the Lunchbox range. Here a switched frequency control and fixed bandwidth makes them look rudimentary, but the sound more than makes up for it, with as much smoothness, warmth and clarity as you could ask for. Giving the best of both worlds was the Avalon 2055, with its audiophile design justified by incredible transparency and yet coupled with full pro flexibility. They want a lot for it, but if you can afford it it's worth it—I found that almost everything I asked of it it did that little bit better than I'd hoped, and never ever compromised anything.

If it's character you're after then John Oram's not going to be too far away, and his High Definition EQ was something I very



much enjoyed having around. The curious idea that the response with the controls flat is actually not quite flat will not be to everyone's taste, but the difference is extremely subtle and almost always enhancing; besides this, the EQ itself is so flexible and sounds so good that the underlying philosophy is frankly irrelevant.

If there's a temptation to assume that good equals expensive, then TL Audio seems almost to have set itself up to challenge that assumption. The little 8-channel valve mixer is without doubt an odd beast, but its EQ is phenomenal, again despite its apparent simplicity. The expansion on that EQ, again based on valves, is the EQ-2, and this is a spectacularly worthwhile box. You always get more than you bargained for with TL, hence the multiple inputs and the stereo linking—such a good idea that it's amazing nobody else does it—but the point remains the EQ, with a sweetness and responsiveness that belies its price and image.

Those who know me know that I'm no fan of graphic equalisers; all those filters resonating away always seem to make their presence felt, and for my money they're normally something you use because you have to rather than because you want to. If ever a graphic was going to change my mind it would be EMO's GEQ-60, whose electronic simplicity and high

engineering standards seem designed to overcome my prejudices. This one's clean and smooth, just as suitable for musical sweetening as for system tuning.

George Shilling: Tim da Paravacini's superb EAR 822Q is a black 2U-high mono valve unit loosely based on the Pultec EQP1A. It is not as accurate in its emulation of the Pultec as units such as those by Tube-Tech, but perhaps that is why I like it. It seems to brush with broader strokes than the vintage units, really opening up the air over a vocal sound, and adding true warmth in the bottom end, with more power than you might expect from a valve unit. I wish more studios would invest in these.

The dual-channel Focusrite Blue 215 is one of the most powerful yet pure-sounding EQs I know. With more bite than the lovely GML 8200, I like the ability to really sort things out without adding nasty distortion or phasiness. There is a genuine straightforwardness about the way the knobs do what you expect, and this unit is exceptional at tweaking details on vocals, or even for tonal corrections across the whole mix for example. How would I improve it? Perhaps by adding a fifth frequency band on each channel—you occasionally do need that extra tweak.

When I was in-house at Liv- **page 52 >**

< page 51
 ingston I used to love using the APSI EQs in Studio 1. I have occasionally found them elsewhere and recently discovered some at Air Lyndhurst. These are very odd looking beasts: 8-band vertically-set graphics with stepped cut-boost levers which go left and right in 2dB and then 3dB notches. The frequencies are all good ones: 16kHz, 7.5kHz, 3.5kHz, 1.6kHz, 750Hz, 300Hz, 160Hz and 75Hz. My favourite use for them is when tracking, strapped across bass drum and snare groups. They are also good at adding some presence when recording guitar or organ. Watch out, though, for the similar but not-quite-as-good 'Aengus' imposters.

Zenon Schoepe: The great thing about EQ is that it is far easier to justify a good selection of boxes than it is with other types of outboard because they can all tug at distinctly different heart strings. Variety is the spice of life in this case, and if all channels performed similarly then there really wouldn't be much point.

A superb starting point is the original TL Audio Classic dual-channel 4-band switchable equaliser which is not flashy but boasts ridiculously broad curves that can be simply piled on and on as an excellent general sweetener. However, I consider the TL Audio Indigo series 2012 2-channel parametric to be the best equaliser the company makes when used in mono 4-band operation. Two of these and you're really cooking with gas for not very much money at all.

As desk-derived EQ goes you can't go

wrong with the MTA Signature Series EQ. Again it's not terribly glamorous stuff with only boost and frequency control, but it is remarkably musical and easy on the ear—proper tracking EQ. There's always a trade off between true versatility and accessibility in an EQ and while the Malcolm Toft-designed unit cannot cure every evil it is general enough to cover the ground extremely well. It's satisfying to use and pretty predictable in response.

My superleague of outboard EQs includes only two boxes. I'm a fan of Amek desk EQ but the Rupert Neve-designed 9098 single-channel unit is quite removed from anything the company has ever put on its own in-house designed boards. It achieves the not inconsiderable feat of being eminently sweet and rich while still being capable of surgeon-like precision and incision. It's a joy and a pleasure and has overtones of some of the man's previous designs although I think he surpassed himself on this occasion with little twists like switchable halving of the boost range. Above all else, it's the relationship between pot turn and audible result that contributes significantly to the feel of an EQ and the 9098 has it spot on.

For pure feel-good factor Tube-Tech's EQ1A stands alone. It's curious that a valve-based EQ should offer the degree of control on offer here as frequently tubes are associated with basic designs. This box is up to mastering but you would want to use it on every stage of the production. It sounds absolutely glorious. ■

An explanation of equalisation

John Watkinson lifts the lid on the different types of equaliser and explains their operation

EQUALISATION—or EQ—shows up in almost every aspect of audio and means different things to different people. Basically a way of altering frequency response, EQ can be used to put the response right when a deficiency or characteristic of some process has got it wrong, or it can be used as a creative tool to deliberately make the response 'wrong' for effect. What it won't do is make up for ten years of experience.

EQ is provided in mixing consoles so that individual tracks can be compensated prior to mixdown. Single-channel rack mount EQs are also available which offer all the facilities of a console strip but at a higher quality level. Dual-channel EQs are available for 'sweetening' a stereo mix. It is important that the two channels track precisely in order to prevent image smear. This will require the use of accurately matched pot tracks and this will reflect in the cost of a good quality unit.

As sound has such a wide range of wavelengths it is common to suffer frequency dependent effects. When a pressure gradient

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or 'velocity' microphone is used near to a sound source the proximity effect kicks in to give a bass tip-up. This is caused by the acoustic impedance becoming complex near the source so the pressure and velocity aren't in phase. The result is that the modulus of the velocity component has to increase so the component in phase with the pressure can stay the same. As bass tip-up in microphones is always at 6dB per octave, that's the slope a tip-up equaliser needs. The turnover frequency needs to be adjustable as the frequency at which tip-up begins varies according to the distance from source to mic.

Most mixing consoles offer bass, mid and treble controls and some split the midrange and have two controls there. Control range is usually $\pm 15\text{dB}$, although when such controls need to be at the end of their range it often indicates that there is something wrong. Bass and treble controls are often used to compensate for losses in microphones, especially the treble control which may compensate for the roll-off when a sound is off axis. This is particularly noticeable with larger microphone capsules.

The midrange control generally operates over a frequency range corresponding to the human voice and so it can be used to lift a vocal out of the background if spill is a problem. In the case of artistes with loose dentures sibilance can be a problem and backing off the mid, especially the upper mid, control may help.

The bass, mid, and treble controls each

work over a broad frequency range and for higher selectivity a bank of narrow-band controls, called a graphic equaliser, can be used. These are usually controlled by parallel sliders whose position graphically draws the frequency response obtained.

Graphic equalisers might be used to tune out response peaks in a room allowing more gain to be used in a PA system before feedback. While graphic equalisers are good fun they do mangle the phase of the signal quite seriously. That's okay as an effect, but not a good idea if realism is the goal.

They can be used to match loudspeakers to control rooms, but the phase response deficiencies mean that the realism will be affected. If a graphic equaliser is used in this way, it should be as a temporary measure to establish the parameters for a fixed filter.

The parametric equaliser is a useful piece to have in the armoury. Whereas these have fixed parameters such as frequency and Q factor, the parametric equaliser allows everything to be adjusted. Generally only one peak or dip can be applied by a single parametric equaliser. The centre frequency can be slid up and down the band allowing more accurate setting than the fixed bands of a graphic EQ. The Q factor also can be adjusted. Q factor is a measure of the peakiness of the response so a low Q factor gives a gentle or broad response change whereas a high Q factor gives a sharp peak or dip. Finally the level control allows the amount of correction to be set.

Parametric equalisers can be very useful in

difficult rooms which have a characteristic 'honk' or resonance because the frequency and Q of the honk can be accurately tracked. Equally a parametric equaliser can be deliberately used with extreme settings for effect. Note that if a high Q factor is selected with a peaking response the output will ring at the selected centre frequency.

What determines the 'sound' of an EQ? A great deal of mythology has grown up about EQ, with some brands trading heavily on the mystery factor as if all that was needed for perfect results was to put any old crap through a magic unit. There is no doubt that a good EQ unit has transparent distortion performance which is usually obtained only with a price premium. Wide range EQ requires a lot of gain and to do this with minimal distortion requires a certain mixture of skill and silicon. Consequently there is some rationale in 'designer' EQs which are sold on the reputation of an individual.

Distortion apart, much of the audible difference between EQs comes down to the phase response. Consequently by measuring both phase and amplitude response it should be possible to build a digital EQ which sounds exactly the same as a given analogue EQ. While any phase response can be used to get an effect, for natural results there should not be any dramatic phase changes across the band. There is a school of thought that suggests that in a presence control the effect may be as much due to a phase lead in the affected band as to the amplitude boost.

DN4000
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DN4000 units from one master. Advanced 20bit AD/DA conversion gives a dynamic range comparable to that of the best analogue equalisers, while an optional AES/EBU digital audio interface aids use in

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The equaliser listing

- Alcasis**
MEQ230 dual-channel 30-band graphic EQ
- Amek**
System 9098 single-channel 4-band parametric EQ
- AMS Neve**
1081 single-channel 4-band EQ with HF-LF filters and mic preamp
- Aphex**
Model 104 'psychoacoustic' EQ
Model 109 single/dual-channel 4/2-band EQ with 'Tubessence'
- API**
550b single-channel 4-band parametric EQ module
560b single-channel 10-band graphic EQ module
- Apogee Sound**
CRQ-12 single/dual-channel 12/5-band parametric EQ with HF-LF shelves and filtering
- ARX Systems**
EQ15 dual-channel 15-band graphic EQ with high-pass filter
EQ30 single-channel 30-band graphic EQ with high-pass filter
EQ60 dual-channel 30-band graphic EQ with high-pass filter
MultiQ digitally controlled parametric EQ
- Ashley**
GX1502 dual-channel 15-band graphic EQ with high-pass filter
GX3101 single-channel 31-band graphic EQ with high-pass filter
GX3102 dual-channel 31-band graphic EQ with high-pass filter
MX2150 dual-channel 15-band graphic EQ
MX3 single-channel 31-band graphic EQ
- Audio Toys Inc**
Pro* channel strip
- Avalon**
737VT valve voice processor
AD2055 dual-channel 2-band parametric EQ with HF-LF shelves
AD2077 dual-channel 4-band mastering EQ
- Behringer**
PEQ2000 single-channel 5-band parametric EQ
Tube-Ultra-Q dual-channel 4-band parametric EQ
Ultra Curve dual-channel configurable digital processor
- BSS**
Varicurve FCS-926/FCS-920 configurable digital EQ
FCS916 stereo 30-band graphic EQ
FCS930 single-channel 30-band graphic EQ
FCS960 dual-channel 30-band graphic EQ
DPR901 II single/dual-channel 4/2-band parametric EQ
- Calrec**
RQ2200 dual-channel 4-band EQ
RQ2300 dual-channel 4-band EQ with preamp and dynamics
- dux**
dbx905 3-band parametric EQ for 900-series
- Dothy**
740 stereo/dual-channel spectral EQ
- Drawmer**
1961 dual-channel 4-band parametric valve EQ
EAR8220 single-channel valve EQ
- EMO Systems**
GEQ60 dual-channel 30-band graphic EQ
- Fairman**
TRC single-channel 3-band EQ with HF-LF shelves
- Focusrite**
Blue 215 dual-channel 2-band swept EQ with HF-LF shelves and preamps
Blue 315 dual-channel 2-band swept 'isomorphic' mastering EQ with HF-LF shelves
Red 2 dual-channel 2-band parametric EQ
Red 6 single-channel 4-band parametric EQ with mic preamp
Green 2 single-channel 2-band parametric EQ with HF-LF shelves and mic preamp
Green 3 voice processor
Green 5 channel strip
- Furman**
Q-301 single-channel 30-band graphic EQ
Q-151 dual-channel 15-band graphic EQ
Q-302 single-channel 30-band graphic EQ
Q-152 dual-channel 15-band graphic EQ
Q-541 dual-channel quad 5-band graphic EQ
Q-602 dual-channel 30-band graphic EQ
PQ-4 4-band parametric EQ
- GML**
8200 dual-channel 5-band parametric EQ with HF-LF shelves
- Groove Tubes**
EQ1 single-channel 5-band passive valve EQ
- Hot**
Spectral Ecolter dual-channel 'psychoacoustic' EQ with bass enhancement
HSE
EQ1 dual-channel 4-band parametric EQ with HF-LF shelves
Inward Connections
Vac Rac single-channel 3-band EQ with HF-LF filters
- Jünger**
eQ7 stereo/dual-channel configurable digital EQ
- Klark Teknik**
DN300 single-channel 30-band graphic EQ with HF-LF shelves
DN301 single-channel 30-band graphic EQ
DN332 dual-channel 16-band graphic EQ
DR360 dual-channel 30-band graphic EQ
- DNA05** single-channel 5-band parametric EQ with HF-LF swept bands
DN410 dual-channel 5-band parametric EQ with HF-LF swept bands
DN3600 dual-channel programmable 30-band graphic EQ with HF-LF swept bands
- LA Audio**
Classic Equaliser dual-channel 4-band EQ with mic pre
Classic Channel channel strip
Millennium EQX2 single/dual-channel 6/3-band parametric EQ with HF filters
Millennium MPX1 voice-instrument processor
- Langwin**
MF-EQ1 dual-channel 2-band discrete EQ with mic preamp
EQ-P1A single-channel 2-band discrete EQ
- Manley**
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MSS-20 single-channel valve EQ
- NTI**
EQ3 dual-channel 6-band EQ with 'Air Band' HF shelf
EQ3-D dual-channel 6-band EQ with 'Vari Band' HF shelf
- Oram Sonics**
HD-EQ dual-channel 4-band parametric EQ with HF-LF filters
MWS dual-channel 4-band EQ with HF-LF filters and mic preamps
- Peavey**
Q215F dual-channel 15-band graphic EQ
Q231F dual-channel 31-band graphic EQ
Q431F single-channel 31-band graphic EQ
Q431FM single-channel 31-band graphic EQ
- P&G**
PP10 digital audio processor
- Priam Sound**
Maselac MEA-2 dual-channel 4-band mastering EQ
- Rane**
MQ302 stereo graphic EQ
- SCV Electronics**
EQ215 dual-channel 15-band graphic EQ
EQ231/231S dual-channel 31-band graphic EQ
EQ231SPR dual-channel 31-band graphic EQ with dynamics
PFL52 single-channel 5-band parametric EQ
PFL104 dual-channel 5-band parametric EQ
- Sony**
SRP-E100 single-channel 31-band parametric EQ
- SPL**
Vitalizer 9319 stereo 'psychoacoustic' EQ
Vitalizer 9320 stereo 'psychoacoustic' EQ
Classic Vitalizer 9214 dual-channel 'psychoacoustic' EQ
Classic Vitalizer 9215 dual-channel 'psychoacoustic' EQ
Optimizer 9318 4-band parametric EQ
EQ Magix 9422 single-channel 'psychoacoustic' EQ with mic preamp
Tube Vitalizer single-channel valve 'psychoacoustic' EQ
Spectralizer 9631 dual-channel digital harmonics processor
- Summit**
EQF100 single-channel 4-band passive EQ with valve make-up amp
EQP200 dual-channel 4-band passive EQ with valve make-up amps
- Symatrix**
531E single-channel 31-band graphic EQ with HF-LF filters
532E dual-channel 31-band EQ with HF-LF filters
551E single-channel 5-band parametric EQ with HF-LF filters
SX201 single-channel 3-band parametric EQ with mic preamp
- te electronic**
EQ000 configurable digital processor
M5000 configurable digital processor
- TL Audio**
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2011 dual-channel 4-band valve EQ
2012 dual channel 2-band parametric valve EQ
2051 valve voice processor
3011 dual-channel 4-band EQ
3012 dual-channel 2-band parametric EQ
3051 voice processor
- Total Music Design**
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- Tube-Tech**
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PE101 single-channel passive EQ with HF-LF shelves and valve make-up amp
EQ1A single-channel 3-band valve parametric EQ with HF-LF shelves and filters
EQ1AM mastering version of EQ1A
- Weiss**
EQ1 stereo/dual-channel 7-band digital parametric EQ
- XTA**
DP200 dual-channel 4-band digital parametric EQ (4 output)
DP202 dual-channel 3-band digital parametric EQ (2 output)
GQ600 dual-channel 30-band graphic EQ with high-pass filter
- Yamaha**
GQ1031C single-channel 31-band graphic EQ
GQ20156 dual-channel 15-band graphic EQ
Q2031B dual-channel 31-band graphic EQ
YDG2030 stereo/dual-channel 30-band digital graphic EQ
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Tapeless location recorders

If DAT has found favour as a location recording medium, it is not with everyone—for many the appearance of practical disk-based recorders will come as a considerable relief. **Neil Hillman** reviews the Mandozzi Electronics ME-DART and Zaxcom Deva and *Studio Sound* offer an equipment overview

ATENTION MAY have been focused on the exploits of DAT as a location acquisition medium and the progress of the open-reel Nagra-D digital but a quiet revolution is occurring, the full force of which should be felt later this year. A number of manufacturers are squaring up with PCMCIA or hard disk-based location machines and while at present some are restricted through the use of compression to voice orientated reportage, indicators suggest that the increased sophistication required to achieve linear digital more widely is not far away.

The selection is currently a little restricted as most machines will start shipping by the beginning of next year but the potential for choice then is very promising.

Aside from the Mandozzi DART and Zaxcom Deva looked at here, there is the Nagra Ares-C (*Studio Sound*, August 1997) and the Maycom Digicorder.

Intended for news-type audio gathering and preparation, the Digicorder is a portable self-contained recording system storing up to four hours of audio on PCMCIA, credit-card-sized, hard disks or flash cards. Cut-and-paste editing is provided, complete with a jog-shuttle wheel, and optional interfaces allow the unit to be directly connected to ISDN or telephone lines for data transmission.

Musicam audio compression is used, with compression giving 32kbit/s to 192kbit/s per channel, and 32kHz, 44.1kHz and 48kHz sampling rates are supported. If ISDN is available on site, the Digicorder can go on-air in

real time and has a feed-through mode for live direct audio. A suitably equipped PC can receive the files from Digicorder ISDN transmissions, complete with an identification of the source machine, and process them using Digitrans software under Windows.

Significant is the launch at IBC this month of the Easycorder which will be presented as an easy-to-use unit with basic functions like record, playback and limited editing. It includes FIFO recording which enables the machine to record prior to engaging the record function. It employs MPEG2 Layer II for recording and PC-cards for storage and interchange with automation systems and hard-disk editors. The price is said to be competitive with run-of-the-mill DAT recorders.

Sonifex's Courier portable recorder should be shipping by the time you read this and is aimed at journalists, sports reporters and sound recordists. Weighing 1.4kg the machine records digital audio to a PCMCIA card, has graphical scrub wheel editing and can transfer audio via mobile phone, modem and ISDN.

Marantz has joined the portable digital recorder arena with the PMD690 which the

company says is the first in a new generation of equipment. Available towards the end of this year, it records to PCMCIA III or hard disk through an interface in MPEG Layer II and its data is accessible via an external computer or via analogue and digital I-Os. Features include onboard editing, MS-DOS-compatible file storage, parallel data output port, XLR mic-line input, and phantom power.

Dialog4 has extended the choice of location reporting recorders with the C(Centronics)-TAXI measuring 140mm x 200mm x 40mm. Using Flash-EPROM, the machine can record 40 minutes of stereo with ISO-MPEG. Material is stored in Broadcast Interchange Format (BIF). Offering mic, line and headphone connections, recording parameters and limiter settings can be locked in during operation, while an Index key allows access to different takes. Finished material can either be transferred as a file or in real-time using the Digital Audio Library interactive program.

Eela Audio, originator of the Reportophone, has unveiled the Reportable digital news recorder which offers recording to PC cards and editing functions using an onboard speaker and scrub wheel. ■

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Marantz Professional, UK:

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Dialog4, Germany.

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Fax: +49 7141 22667.

Eela Audio, The Netherlands.

Tel: +31 40 251 0484.

Fax: +31 40 257 0482.

Mandozzi Electronics ME-DART

Already established as a player in the tapeless location recorder field, the DART has good credentials.

Neil Hillman grips a doughnut and runs around

KNOW THAT the Mandozzi Electronics ME-DART gains its title from its role as a Digital Audio Recorder EdiTor because it proudly displays the fact with an intentional mixture of upper and lower cases in a logo on the machine's top face. So why then, is it not called the 'DARET' I pondered before I wore the machine in its operational position? The answer is one of anthropology.

The perfect physique to operate this device is the summation of age-old homo-erectus development and therefore proof-positive of Charles Darwin's musings. What is required in fact is the finely-honed stance and stature so epitomised by that of the professional dart

Studio Sound September 1997



Mandozzi Electronics ME-DART solid-state recorder

player. Indeed, it is from this shape that all future generations of sound recordists will be wrought and they will all proudly rest their audio-archive capture-consoles on the protruding abdomens that previous generations

ridiculed as pot-bellies (tape-tubbies?). How liberating it is for us to know that our descendant recordists will no longer be subjected to the cruel jibes and taunts of: How do you know when a sound recordist is dead? The **page 58 >**

< page 57 doughnut falls out of his hand'.

It would appear that some of us are already years ahead of our time-and that certain manufacturers from an area renowned for fresh air and clear skies know more than they are letting on.

The DART is one of a growing number of solid-state recorders now available that use PCMCIA hard disks as their recording media. Mandozzi believes that these disks give the highest storage capacity at the lowest price per byte, while being robust enough for daily use in severe environments.

A DART 340Mb hard disk can store 44 minutes of 15kHz-bandwidth stereo or almost three hours of 7kHz-bandwidth mono. The DART does not compress the audio, hence the lower recording time capacity compared to other PCMCIA recorders, which this manufacturer believes maintains the quality of the original sound; but stores the audio information as linear PCM signals in DOS files, enabling the hard disks to be read by studio digital systems. To overcome the discrepancy between the 48kHz sampling rate of those systems and the variable sampling rates of 16kHz, 24kHz, 32kHz of the DART, a small software programme is supplied on request to allow PCs equipped with .WAV audio programmes to read the edited audio from the hard disk or to convert the sampling frequency to 48kHz.

The latest version, the DART 2, also offers built-in CCITT G.722 and ISO-MPEG1 Layer II codecs as well as an ISDN terminal adaptor enabling the transmission of edited packages in real-time via ISDN.



ME-DART showing PCMCIA facility

This unit sits head-to-head with the Nagra Ares-C (*Studio Sound*, August 1997, p12) and has clearly arrived down the same evolutionary path. There is more than a passing resemblance between the two models in concept, looks and layout.

THE FRONT face of the DART is easy on the eye, divided as it is into 'fields', and carries the recorder's left and right GAIN control faders, pleasingly calibrated in dBs rather than a 0-10 scale or the baffling 'mHPa sensitivity' favoured by the Nagra Ares-C. Three monitor adjustment pots are mounted one above the other on the left of the front panel for the in-built 2W speaker, headphone amplifier and ISDN return channel feed. The

speaker is automatically muted when the machine is recording, irrespective of where the level is set during playback.

In the centre of the front face are the temperature-intensive LED level meters, arranged as a bar graph that conforms to DIN 45406 ballistics (no, I had no idea what this was either, but they twinkled away as I would expect for the given input signals), and again calibrated in dBs, with green segments illuminating for signals arriving between -20dBu and 0dBu and red segments for the range between 0 and +3dBu. The right hand meter can display the battery level by means of a small toggle switch that also switches on the display back-light.

The two output levels are controlled by a single pot with a range of ±12dB **page 60 >**

NDR. MDR. WDR. ZDF. SRT. ZKM. SWF. YLE. SDR

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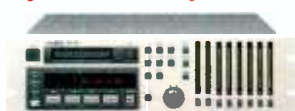
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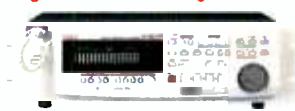


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< page 58 around a nominal 0dB.

The DART's communication status is displayed by means of small indicator LEDs that confirm compression of MPEG or G.722 and a small toggle switch that enables the ISDN codecs. Other LEDs are sensibly placed to show that the unit is switched on, external power supply is connected, and whether the LF Filter or the Limiter function has been selected. There is no display to show how hard the limiter is working, or at what point it begins to limit, but it is audible when used as anything other than a gentle safety net.

The physical inputs and outputs of the DART are located on the left-hand side of the machine with XLRs for the inputs and the respective coarse mic gain mounted just below. The machine can handle input levels between -70dBu and +22dBu. The gain can be adjusted in three steps of 50dB, 30dB or 0dB

and 48V phantom is available. For line-levels, the stereo inputs and outputs are transformer decoupled. Two different LF filters may also be selected independently for each channel.

THE LINE outputs appear either on two male XLRs with a nominal output level of +6dB or as an AES-EBU digital signal on a male XLR. The sockets for the ISDN and Telephone-Modem are sited below the AES XLR and a locking 1/4-inch headphone socket is provided at the nearest end to the operator on this left-hand side.

The right-hand side of the machine is home to the disk drive, protected by a substantial hinged door, the monitor speaker grille, a 5-pin Canon-female surprisingly-for external powering and battery charging via the in-built charger, a sub-D socket for RS232 and the vital ON-OFF switch.

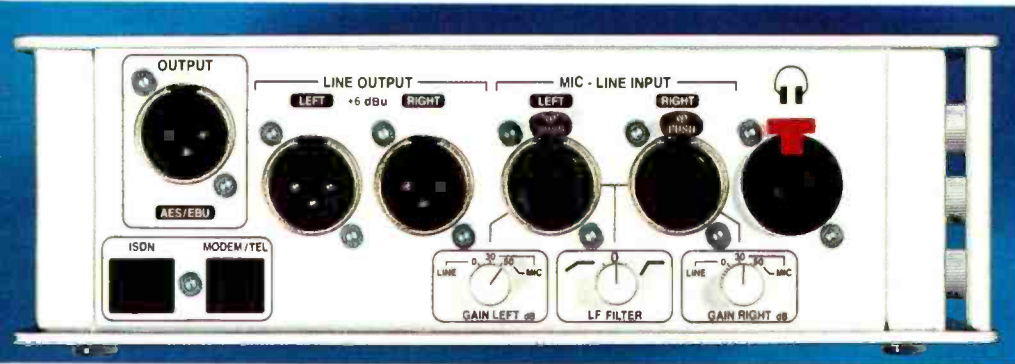
The top face of the DART is in effect the edit deck, conspicuous with the large jog-shuttle wheel, eight function keys and display screen.

Recording parameters such as bandwidth, mono or stereo selection, and even giving each individual track a title are easy to set or change by means of the vertically-mounted software controlled keys F1 to F4, and the on-screen options aligned to those individual keys. It is the work of moments to completely change the recording characteristics of the DART, should you wish to, for each individual track you want to record.

In Play mode, the four horizontal function keys just below the screen behave like conventional transport keys: REW, STOP, PLAY and FF. In Test or Record mode they become dedicated keys that switch the limiter-while recording if necessary-in or out, stop-pause the recording, continue recording or switch in the 1kHz line-up oscillator, the output of which may be varied via the jog/shuttle wheel to give four stepped levels of -20dBu, -6dBu, 0dBu or +6dBu.

In short, Mandozzi claims to have created a self-contained system that is 'reliable, robust, light and extremely easy to operate'. But has it been successful?

The recorder is very straightforward and logical to use, no plug-n-pray here thankfully, essentially being driven by means of a single rotary function key set on the top right of the front face; Record is an instinctive turn clockwise and Play a turn fully in the opposite direction, confirming the **page 62 >**



ME-DART interconnection panel

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< page 60 quality and integrity of the DART's recording. So far so good; if only editing with the DART was as straightforward.

I really, really wanted to love this machine. It looks classy, almost retro, in its styling; it's well thought-out and simple to use as a recorder; it feels unbreakable in use. But the editing facility badly lets this machine down.

The on-screen prompts allied to the function keys of the edit-deck are at best confusing, and relying solely on numbers to impart the position of the edit within the monitored audio is uncomfortable, making the system counter-intuitive and one to be learnt as a series of commands rather than exploited as a tool to be wielded to bestow

speed and creative freedom to its master.

Perhaps if this was the only editing system that a reporter had used, or was likely to use, it would in time become familiar; but, for instance, the absence of a graphical representation of the audio scrolling past a fixed head is sorely missed. For what is fundamentally a 'cut and paste' operation it is clumsy and certainly inferior to that of its close competitor the Nagra Ares-C.

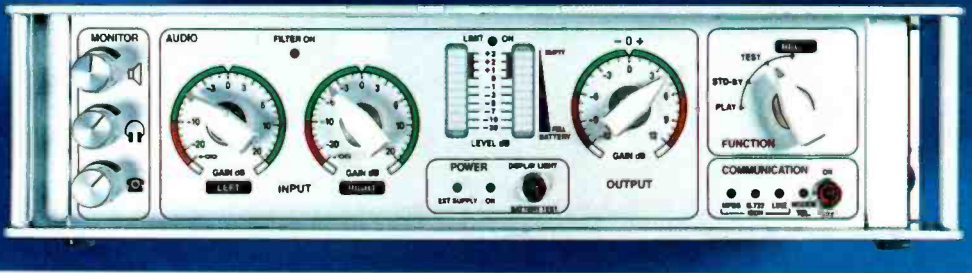
But don't get me wrong, it's not that the editor is impossible to learn or use, hey—I eventually became extremely adept at statistics.

Reliable, robust, light and extremely easy to operate? Yes, yes, yes, no.

Six from a possible two is not so bad is it? ■

Contact

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ME-DART control face

Zaxcom Deva

Better known for digital mixers that sit in video edit suites, Zaxcom has branched into location sound.

Neil Hillman discovers 4-track hard-disk audio with the constitution of a hammer

I WOULD BE HAPPY to move away from the small tape format of DAT as an originating medium. If I'm honest, I've never been completely confident about how robust the system is for location recording. That personal, sweeping generalisation probably says more about me than about DAT because I have colleagues who certainly do not suffer from this form of insecurity; they love the convenience of digital quality in such a small package, and the fact that at the end of a day's shooting the sound rushes can probably be passed over to the postproduction house on a single tape. It's just that somehow the sight of the tiny tape spools turning oh-so-slowly while I get one-shot at a recording in a remote setting is not inspirational; although it does usually involve me in a dialogue with some higher sentient being...

In the 1970s, Steely Dan invoked the help of a Boddhisatva, a Buddhist god **page 65 >**



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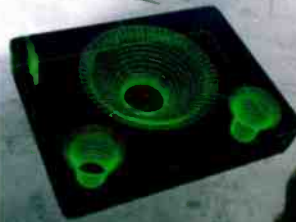
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< page 62 of compassion, to hold their collective hand and point the way. Could it be that Fagen and Becker established a channel that has remained open between this earth and the heavenly realm of various deities, well known for their ability to appear in many various, differing forms? Who knows, but this Deva appears to manifest itself more as a demagogue than a demi-god, the lofty heights it aspires to owing more to a design reminiscent of a cold-war bomber's navigational system than that of a fragrant lotus blossom carried on the wind.

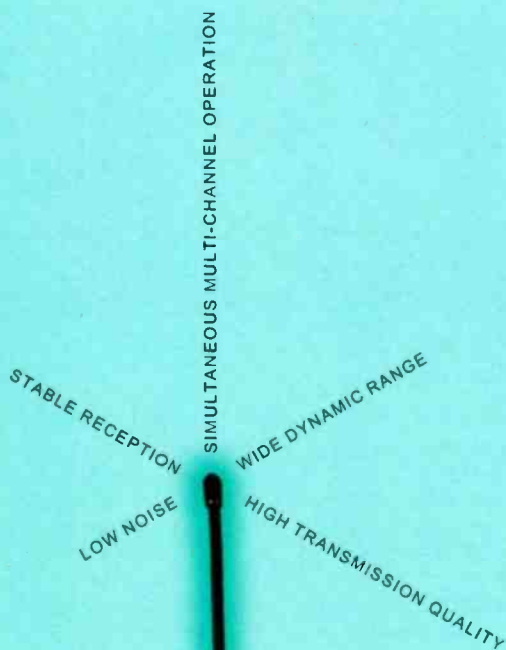
The Zaxcom Audio Deva is a hard-disk based recorder offering 2 hours 35 minutes of 4 track audio on a removable 2.5-inch IBM PC disk, as well as being a 4-channel mixer with assignable EQ and effects.

But how resilient to the bumps and knocks of location working must a hard-disk system be to prevent holes appearing in the audio tracks while the device recovers its composure after a shock? Put it this way: last week I assembled a shed in my garden and purchased a 2lb hammer especially to drive in the nails. Had I known sooner, I would have dispensed with the hammer and used something eminently more suitable—the Zaxcom Deva, for instance. This device appears to be bullet proof, but more importantly than that I have, in the course of testing, worn headphones and a personal microphone and shaken the Deva with all my strength while it is recording, giving the outward impression of discovering the awesome secret of successful death-metal-grunge vocals. The Deva never missed a beat, which is more than can be said for my heart after a period of particularly intensive testing with the 5lb machine rotating like a Lesley cabinet above and around my head.

THE DEVA protects the integrity of the audio by means of a large RAM buffer that stores audio for 24s in cases of severe movement that would ordinarily affect disk recording; a buffer of 8s is used for playback. The specifications claim that the disk can withstand a force of 125G—gravities not grammes, remember—so it would appear that short of a pan-galactic jaunt through hyper-space at warp speed, the Deva is extremely reluctant to deviate from its given task.

On the right-hand side of the machine are four female XLR sockets, carrying switchable 48V phantom power. The mic inputs are balanced, with a dynamic range of 105dB, and can be adjusted to accept input levels ranging from -30dBm to -60dBm. The dynamic range of the balanced line inputs is slightly higher at 110dB, for levels between 0dBm and +8dBm, and both the line inputs and outputs are sent via a 25-pin D-connector. The balanced output line level is +2dBm at 600Ω while the transformerless input impedances of both the mic and line inputs is 10kΩ. The 100Ω impedance 1/4-inch headphone socket is also mounted on this right-hand side.

The left-hand side of the machine could be considered the 'digital' side; here are the two 15-pin small profile D-connectors for AES-EBU connections and for time-code In and Out. The A-D and D-A conversion is to **page 66 >**
Studio Sound September 1997



Sound thinking, from Sony.





Zaxcom Deva solid-state recorder

< page 65 20-bit resolution, with selectable sample rates of 48kHz, 48.048kHz and 47.952kHz—the thinking here being that for most transfers 48kHz will be the norm but the rate may be pulled up or down if necessary.

The Deva supports active balanced time code, with the full rate-range of 24fps, 25fps, 29.97fps Drop, 29.97fps, 30fps Drop and 30fps, and the device can act either as a master generator locked to an internal crystal or it can be slaved to read and lock to an external time-code reference. As you would expect, User Bits may be accessed and incremented

as required and the generator selected for either Free-Run or Record-Run.

The disk itself is loaded through a locking door on this same side and a PCMCIA slot is also present here, although it cannot be addressed with the present software.

The front face of the machine is where all the controls to record, playback and configure the machine are sited and at first—and, come to think of it, second—glance the appearance really is more like a piece of test gear or an outboard device rather than a mixer-recorder, with the large, uniformly square buttons of

the numeric keypad and function keys occupying most of the room around the display screen which is mounted on the right-hand side of the front panel; the four small rotary channel faders are set in a row across the top-left-hand of the front face.

En-route to the disk, the audio signals may be routed and processed in a variety of ways, offering complete flexibility in designating the destination of the inputs to the recorded tracks.

Configuring the machine through a software menu tree, the various branches of which are reached directly in the case of Play,

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Record or Stop from individual buttons or via the SHIFT key to each button's secondary function printed above it, is straightforward and the associated variables are displayed on the screen and adjusted by selection through the four function keys and then either the Increase or Decrease buttons.

A compressor-limiter may be assigned to each input independently, with variable ratio's up to 9.9:1 and a threshold adjustable between -90dB and 0dB, as may a gate with similar threshold variables and an opening time of between 0 and 300ms and a close time of between 0 and 2.5s, adjustable in 10ms steps. A 3-band equaliser is also available, designated Low, Mid and High, rather than any specific spot or turn-over frequencies.

ONCE THE machine has been configured for a particular recording or to favourite operating conditions, all the required information can be loaded into one of the 10 memories available for storing user setups. These can then be easily recalled, viewed, loaded or rewritten as desired. The memories will be retained for about two days with the power off.

The machine is powered either externally or by an NP-1 14V battery which gives a usable working life of about two hours before a battery change is indicated. The unit supports an in-built charger that can charge the battery while it is operating on external power.

In the normal operational Home menu, the screen displays the four audio tracks' record or playback levels crudely as horizontal strips mounted above each other in multitrack fashion, a solid bar advances from left to right, as audio is recorded on to the selected tracks, towards the only two calibration points of 0dB and +20dB. Also displayed on this menu screen is the present time-code, recording time remaining on the disk, the current segment of the disk in use, the total number of segments recorded on the disk, whether the FX menu has been selected to any of the channels, which tracks are record enabled, which tracks, or combination of tracks, the headphones are monitoring and the voltage level of the battery. Stop, Play and Record indications are displayed in large letters in the top corner of the screen as they are selected.

The headphone feed is comprehensive and allows for individual channel monitoring, combinations of Tracks 1&3 to the left, Tracks 2&4 to the right, Tracks 1&2 or 3&4 as discrete stereo or mono pairs or all four tracks summed as a mono signal.

Operationally, this is a recording device that needs to be fed by the output of a properly designed mixer—the channel faders are really attenuators and suitable only for trimming an input level. Nonetheless, this is an interesting entrant to the field and its success will be determined largely by the calls from postproduction.

I think we may well soon hear people advising, 'don't do DAT, do disk'. ■

Studio Sound September 1997

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Bringing a drummer's understanding of rhythm to the production chair has served Narada Michael Walden well. And, as **Richard Buskin** discovers, his artists have come out quite well too

Capture the spirit



IT'S VERY NATURAL for a drummer to become a producer because he's the heartbeat of the music,' says Narada Michael Walden, a composer-producer-drummer who has been responsible for numerous beat-orientated hits. 'The rhythm comes through in the records, and if they're ballads—no matter what tempo—they're definitely spirit oriented, which is in the beat and in the performances. I come from a background of playing with The Mahavishnu Orchestra where all of the songs were dedicated to playing to the high spirit of life, and so if it's a pop song or whatever I still want to capture that spirit.'

Whitney Houston, Aretha Franklin, Steve Winwood, The Pointer Sisters, Lionel Richie, George Benson, Kenny G, Natalie Cole, Gladys Knight, Mariah Carey, Barbara Streisand, Diana Ross, Elton John, Mica Paris and Al Jarreau, have all benefited from Walden's talents on both sides of the console. Yet it was alongside guitar ace Jeff Beck and John McLaughlin that he originally established his credentials as a drummer. Born in 1952, Walden grew up in Plainwell, Michigan listening to the soul music emanating from Chess and Motown Records in the surrounding cities of Chicago and Detroit. Inspired to play the drums, he played with a variety of bands in California and Florida during the early-1970s, before a friendship with John McLaughlin led to him replacing legendary sticks-man Billy Cobham in The Mahavishnu Orchestra. Walden began to learn about recording techniques while watching George Martin produce The Mahavishnu Orchestra's *Apocalypse* album in 1974, and then Jeff Beck's *Wired* project a couple of years later. In addition to drumming on the Beck record, Walden also wrote several of the songs, enjoying the opportunity to combine fusion music with loud rock. 'It's the sweetness of the soul combined with the power of the instrument that I liked,' he says. Today, as a producer, Walden still likes to drum on other artists' records and combine his performances with machine tracks. 'I don't hire drummers,' he says. 'I use machines or I play myself. Machines don't lie when it comes to time, so I learned how to play with a machine, how to punch myself, and how to make it sound so that you can't really tell what it is. That's a discipline, and so I don't like to go with that process too much with other people. I prefer to do it myself.'

Having worked at The Automatt studios in San Francisco during the late-1970s, as well as The Record Plant in Saucalito, Narada Michael Walden decided to take on his own facility during the mid-1980s. Located in San Rafael, northern California, Tarpan Studios largely caters to Walden's own work, although it is also open to outside projects that have artistic or financial appeal. Equipped with an SSL G-series console, analogue tape machines and a host of classic outboard gear, Tarpan translates as 'satisfaction unparalleled', an ideal that the owner aspires to. Still, jumping back to the mid-1970s for a moment, it was following some work with Weather Report that Walden initially opted to branch out on his own. In 1976 he secured a deal with Atlantic Records which led to him writing, producing and performing a succession of solo records

over the next several years, and during the early-1980s he then began producing recordings by other artists, including Stacy Lattisaw, Sister Sledge and Aretha Franklin.

Aretha's career was in a lower gear before Walden co-wrote and produced her smash hits, 'Freeway Of Love' and 'Who's Zoomin' Who', the former gaining Walden a Grammy for 1985's Best R&B Song while also garnering Franklin her first platinum disc in more than 30 years as a recording artist. Thereafter he guided her towards more hit singles when she duetted on 'Through The Storm' with Elton John and 'I Knew You Were Waiting' with George Michael. 'When the artists are vulnerable enough to let down their defences and let what is beyond them come out, that's when you capture magic on tape,' he says. 'It's a case of making the artists feel comfortable, relaxed and trusting, just like lying on the couch in a psychiatrist's office, so that their most intimate feelings come out. I mean, if you spend a little time with a person before you start recording, you may light candles, burn incense, give them a stuffed teddy bear, massage their neck or crack jokes. Obviously each person is different, but what it comes down to is intimacy.'

Then, once the person starts singing, the endorphins start kicking in, the spirit gets really, really warm and it wants to come right out. At that point you have to get as many takes as fast as you can, because you can't maintain it that long. You know, the voice tires, the spirit tires, so when you get that thing going you really have to capitalise on it. Even if a person sounds a little hoarse, he or she can sing through the hoarseness. I'm always amazed—if I push hard the first day and try to get everything, more often than not 90% of it is there.

'If you put things off until the second day, by then the artist's tired emotionally. However, if I can get 90% of it sounding good, then the next day the artist comes in and hears it and goes, "Damn! That sounds great!" Now the person's encouraged and uplifted and doesn't mind punching in a few lines here and there. So, that's the trick; I try to get as much as I can on the first day, I have the artist go home and then we comp every bit of what he or she sang. It may take me four or five or six hours to go over every bit of what they sang, then I leave and my engineer David Frasier will stay even later and put it all together, so that when the artists come in the next day they're hearing a fresh-sounding recording even though they thought they were tired. That's uplifting to carry on.'

LIKE WITH ARETHA, she's rehearsed the song and knows it so well that, many times, when she's ready to sing the song, I'll start working with her on the vamp first because her spirit's so strong. Then we can go back and get particular verses, bridges, first chorus, second chorus, but you'll never get anything like that if you don't get in right away when she's hot and the spirit's strong, and I find that works with quite a few singers.' Sample Whitney Houston, whom Walden refers to as 'a fantastic, natural artist'. In 1985 he produced 'How Will I Know' from her multi-platinum 1985 debut album, and in 1987 produced and co-wrote her **page 72 >**



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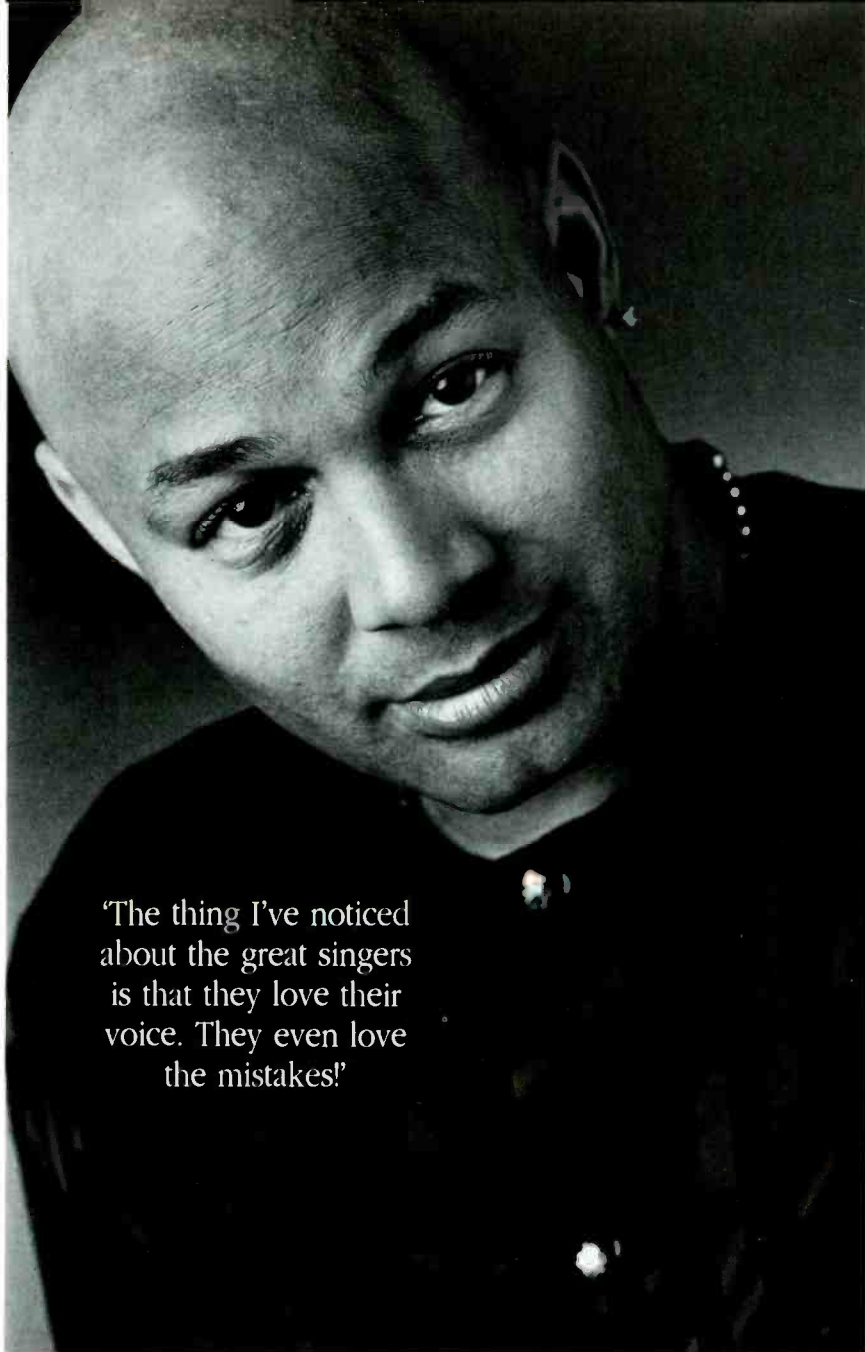


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"The thing I've noticed about the great singers is that they love their voice. They even love the mistakes!"

< page 71 worldwide smash hits 'I Wanna Dance With Somebody', 'Where Do Broken Hearts Go' and 'So Emotional', not to mention the 1988 US Olympic song 'One Moment In Time' for which he won a Sports Emmy. The last few years have seen a hiatus in their working relationship as Houston has involved herself more in acting and soundtrack recordings, yet Walden looks forward to collaborating with her again.

"To me she's still one of the greatest singers," he says, "but like all singers she needs to be pushed. That's what happens when we get together—she will let me push her. Other artists are different. Aretha, for example, is the Queen of Soul. She's taught everyone, and she'll let me get away with things a little bit, but then if I get too carried away she'll also stop me. She'll just say, "Do you know what beautiful is? What I just sang, now that was beautiful." And I'll say, "Yes, yes it was". That's when I know not to say anything more.

"The thing I've noticed about the great singers is that they love their voice. They even love the mistakes! Aretha will come back in the booth and smoke a cigarette and listen to the playback, and even if I say it's a little

flat—which nobody but she and I can notice because it's so minuscule—she'll say, "Narada, that's just the way I felt that".

"I've worked with singers who don't like the sound of their own voice, and, no matter how much perfection you go for and how much attention you give to intonation, they're still not satisfied. Well, I relish the singers who like their own voice because that makes things so much easier for me. When I come across singers who don't like their own voice I sit them down immediately, and I say, "Listen. We're here to make some great recordings together and I believe we can do that, but you're going to hurt the process if you hate everything that you sing before I even get the chance to evaluate it. I can't work that way. So, even if you hate it let's make a pact that, for now, you're going to try not to hate it, and, if you do, then you won't tell me. Because I may love it and be able to convince you that it is good".

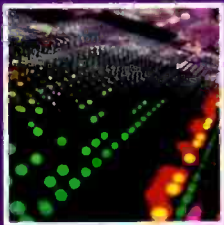
This isn't to say that Walden doesn't want his artists to experiment and work their way around their vocal parts. "In the first two or three hours I want to hear their interpretations and what they're going for, and page 74 >

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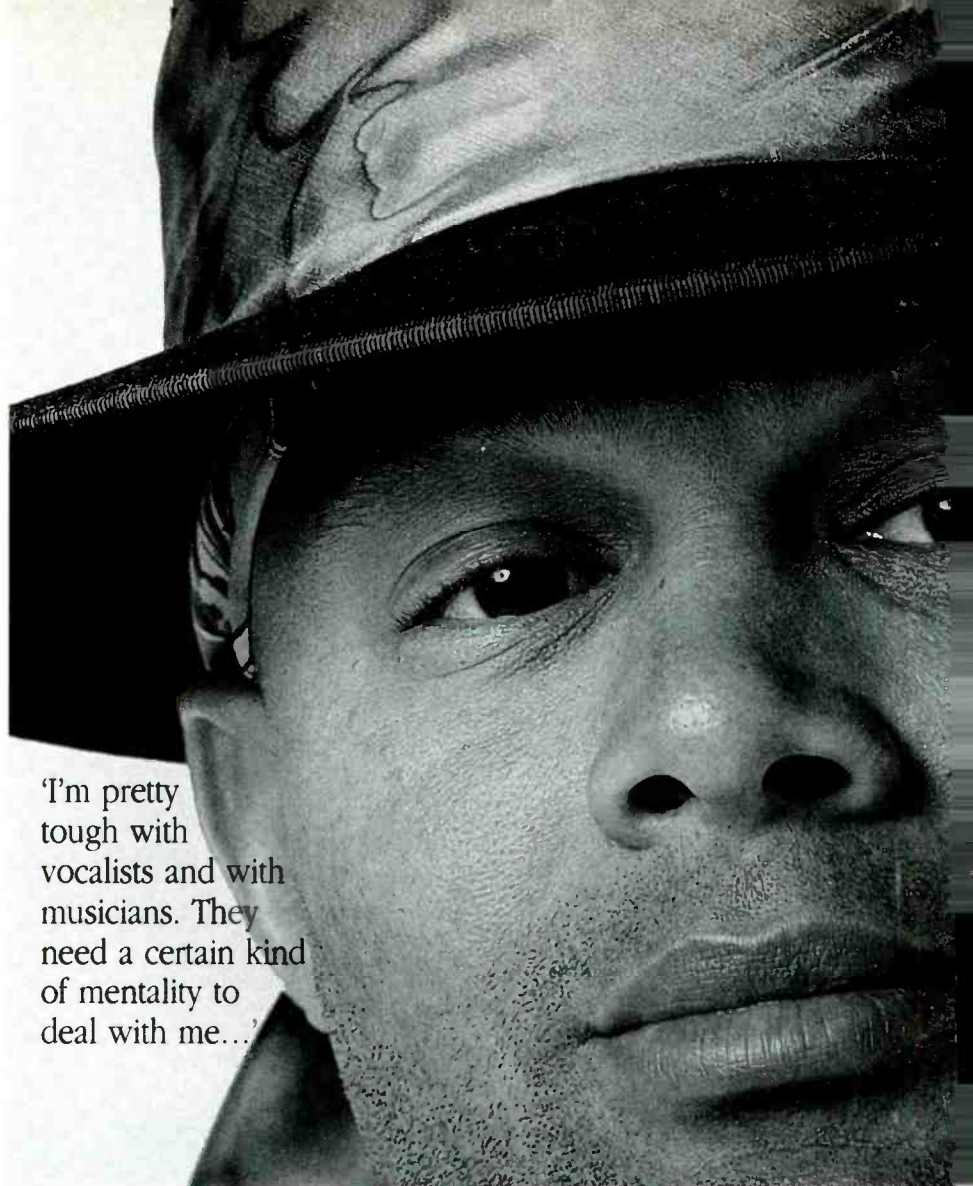
Frank Serafine, Sound Designer on *Star Trek*, *Virtuosity*, *Lawnmower Man*, *VR5*, *Hunt for Red October*.

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'I'm pretty tough with vocalists and with musicians. They need a certain kind of mentality to deal with me...'

< page 72 then take it from there,' he confirms. 'I don't want to interfere unless they need help. I mean, even with the great ad libbing singers like Whitney—These songs are put together like puzzles, so there are times when even I have to give them an idea as to how to make the puzzle work in terms of their phrasing and so on. Otherwise, I'm only looking to capture them, make sure it's in tune and felt deeply.'

As a composer Walden sits at his Roland D50 in the studio, his Korg M1 at home, or either one of his two acoustic pianos, and, with no particular tune in his head to kick things off, he touches the keys and allows the chords to inspire him. 'I'm very blessed that way,' he says. 'If I touch any kind of keyboard something will come to me. It may not be that great, but something will come, and usually, once the spirit gets warm after playing for about half an hour, I'll try to formulate that first idea and then move onto another. I'll formulate several ideas and force myself to sing a chorus. If I can sing a chorus then I can sketch or hum a verse and bridge, which lyricists can later put some words to. But if I can get a hook then at least I've got a direction. All I care about in the writing is whether the hook is strong or not. I can always change a verse, but if the hook isn't good it's like a joke with a poor punch-line.'

A producer with his fingers firmly on the faders, Walden asserts that one of his chief

strengths is the speed with which he's able to punch in individual syllables. Which is fortunate, being that heavy comping is a major feature of his modus operandi.

'I have the fastest hands in the West,' he says. 'What really sells a record is the perfection with the spirit. That means the song's in tune, that it's not being rushed, that it's not being dragged, and as a result you can hear it over and over and over again and not get tired of it. If there's too much hollering and screaming going on it gets boring after a while. There needs to be a delicate balance between an energy that people really believe in and a perfection that, when a song's soft and intimate, is convincing as well.' When Narada Michael Walden talks about perfection he is largely referring to standards of performance. 'I don't really know what audio perfection is,' he says. 'I'm just concerned that a recording has enough bottom to make my heart pump, and enough top so that I can hear the crystal clarity of what's being said. You know, the hi-hats, the natural cymbals, the natural tambourines—I kind of like bright records. Plus I've got into this whole thing of wanting to compete with what's on the radio, and that when my records come on they have a zing, a splash, an extra sizzle because that top end is cooking. You know, on radio they compress things anyway, so by putting extra top on, say, Whitney's vocal, it'll jump that much harder and just catch your ear. Now, there **page 76 >**

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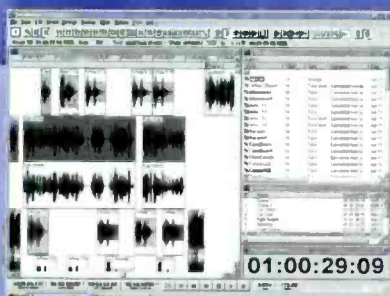
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Walden learned recording technique from watching George Martin produce Jeff Beck's *Wired*

< page 74 are a lot of records that are dull and sound fine that way, but that's never been my thing. I've always wanted to have the cutting edge."

Which returns us to Walden's endeavours for the perfect performance. This stems from a deep desire for the recordings that he works on to enjoy longevity, to be appreciated far into the future for their inherent quality. "The only way you achieve that is by trying many different avenues and by really harnessing the singer," he asserts. "Like when you ride a horse, there are times when you've got to be strict and strong. They think, "Oh, I can't go that high," and I'll be there going, "Yes, you can go that high. Do it again!"

Little wonder that Walden has been dubbed 'Coach' by Steve Winwood and 'Sgt Walden' by Elton John.

"I'm pretty tough with vocalists and with musicians," he admits. "They need a certain kind of mentality to deal with me... It's probably down to how I was raised. My family was real strict. I was raised a Catholic and everything was discipline-based. Then there's the fear of failure. Almost like a boxer I go into the studio feeling charged, determined to make a smash record so that I'm not defeated."

Keen to branch out into as many different musical directions as possible, Walden is currently interested in discovering and nurturing younger artists, involving himself in the areas of jazz-rock and orchestral music, pursuing his own solo projects, and 'being prepared for when the divas call'. In the US alone he has been responsible for nine No.1 singles since 1986, while there have also been a slew of Top Ten hits and best-selling albums. Which is largely what it's all about for Narada Michael Walden, a man who thrives on chart success.

"That's important to me because I want to keep my house," he says openly. "It's also down to passion, but if I said that's all it is I'd be lying through my teeth. I have to get myself inspired, and in that respect I find singles work the most satisfying because I want to be on the Billboard chart. I want to have the hits. I love that, and I also like the kind of songs that can carry an album. In fact, I'm not going to be happy until I get my own hit as a solo artist."

So, in the final analysis, where, I ask, does Narada Michael Walden draw the line in terms of compromising his art in the pursuit of success? "I will tell you what Quincy Jones told me," comes the reply. "I can be bought". ■

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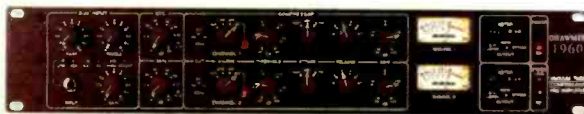
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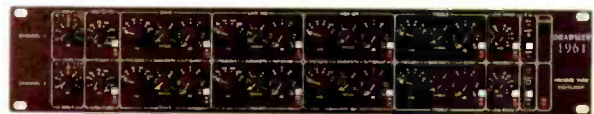


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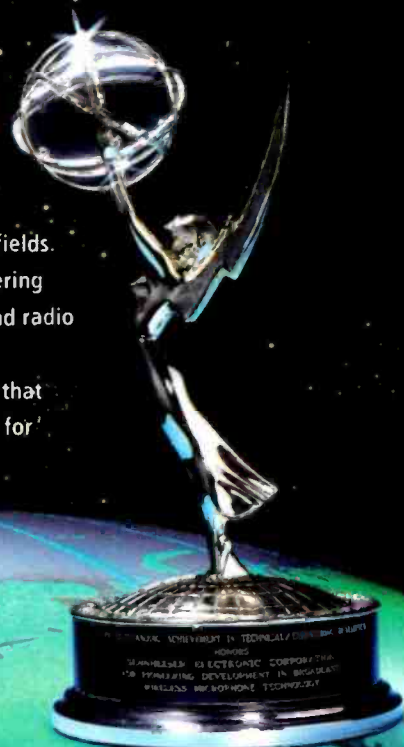
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Making Contact

FROM ITS OPENING SEQUENCE, *Contact* is clearly aimed to impact the senses of sight and sound with equal intensity. Starting with a tracking shot, we travel backwards through space as well as figuratively through time by way of the increasingly distant broadcast signals emanating from earlier decades. This is a portent of things to come, as later on we follow Jodie Foster while she manages to pick up sounds and pictures that are being transmitted from another planet, before travelling to said planet courtesy of an eye-catching, ear-popping, speed-of-light journey straight out of *2001: A Space Odyssey*.

Randy Thom, who previously supervised the sound on Robert Zemeckis' Oscar-winning picture, *Forrest Gump*, was the director's natural choice to serve as the sound designer on his latest film. This assignment began with the start of shooting in the fall of 1996, although Thom's work began in earnest at Skywalker Sound in early-January of 1997. Phil Benson was hired as the supervising sound editor to oversee all of the other editing staff, most of whom came aboard in March. After editing and temp mixing had taken place, premixing then began around the end of May, while the final mix was completed on 2nd July. All in all, a fairly pleasant schedule, and, as Randy Thom realised very early on, a dream project.

'A lot of the film is played through the point of view of Jodie Foster's character, and point-of-view sequences in movies always provide field days for the sound people,' he

says. 'Sound is such an emotional thing, and if the audience is perceiving what's going on in the story through the filter of each of the characters, then that gives me a lot of latitude to play with the sound. It enables me to use, in some cases, slightly exaggerated or odd sounds in a way that I couldn't do if a sequence is shot more objectively.'

Given that, in the film industry, sound work sometimes amounts to embellishing a *fait accompli*, Randy Thom stresses the importance of meeting with the production designer, the director of photography and the writer very early on during a project. This way the sound person can coordinate what he wants to do in line with the others' objectives. 'On *Contact* this cropped up in lots of specific ways,' he says. 'One example related to the sequence when Ellie travels to the far-off planet. The visual effects people wanted to fill the frame with things moving by all the time—hundreds or thousands of points of light or other objects moving through the frame so that it looks like she's travelling through a tunnel. Well, that's fine, but the problem for sound in that instance is that if you have 20 objects that are more or less of equal value being panned from, say, the left side of the frame into the centre and then back through the surrounds in the theatre, what you have in the end is pink noise. You're not going to be able to distinguish the objects from one another or get any sense of movement, because there are going to be loud sounds in every channel at all times.'

'So, what I urged them to do—and luckily

Zemeckis agreed—was to focus on a few objects that she's flying by, rather than have 20 or 30 or 100. That would ensure that there would be some dynamics, and that I'd be able to emphasise the sound of a lightning flash, a brilliant burst of light or whatever it may be. In turn, the audience can actually hear that sound move from the front to the back of the theatre without having to compete with 20 other sounds.'

The trick in movie making, and certainly no less mixing sound for movies, is to focus the attention of the audience. It's very misguided to think that every element has to be in play at all times, because then you just end up with visual and aural noise.'

SELECTING which visuals are to have an allotted sound can be a tricky process. Yet, in the case of *Contact*, Randy Thom's life was made easier due to the production designer and director of photography taking him seriously and actually designing the sequence. Consequently, there were often only one or two things moving through the frame at any one time which were logical for Thom to focus on. The related sounds would be brought to the foreground, while in the background there was a general wash of movement sounds.

'One of the great things about creating sounds that accompany visuals for the movies is that audiences will go out of their way to accept whatever you present to them,' Thom asserts. 'As long as it seems to make dramatic or emotional sense, and if they can somehow

Sound designer Randy Thom and dialogue rerecording mixer Tom Johnson talk to **Richard Buskin** about their work on the new sound-led sci-fi movie, *Contact*



including literal point-of-view shots, and extreme close-ups of Ellie's face and hands, as well as whatever she is doing.

This ride scene is an example of how the special effects and point-of-view shots can be one and the same. An altogether different yet equally informative sequence in terms of how the sound is handled takes place towards the end of the film, when Ellie is interrogated in court. This is shot more or less objectively—the viewer doesn't get the impression of being almost inside her. Accordingly, the sound is fairly predictable. There is some murmuring, people shift in their chairs, the air-conditioning system whirs gently, and so on. However, at the very end of the scene, there's a subtle change of gear.

'At the point when the camera moves in for a close-up of Ellie and she is at her highest level of emotional intensity, we dropped out every sound except her voice,' says Thom. 'That has two effects: One is that it focuses your attention on her, and the other is that it brings you into her mind-set or point of view much more than if we had left all of these competing or distracting sounds in there.'

While bombast is often far easier to deal with from the sonic standpoint than anything subtle, Robert Zemeckis was fairly bold in terms of his use of silence on *Contact*. Sample the film's aforementioned opening, when the camera pulls back from earth and the viewer sees entire galaxies flashing by while old radio waves fill the air. Eventually, we reach the point where the earliest broadcast has been passed by. The sound of static ensues. Then there is nothing.

'There's silence for about 45 seconds,' says Thom. 'and I can't tell you how much guts it probably took for Zemeckis to have that take place three minutes into his \$100m film. There are very few directors who would have done that. The temptation is to cover it with music in order to convey to people what they should be feeling from moment to moment. Zemeckis, however, was brave enough to allow it to be silent, and as a result I think it's a very powerful sequence.'

When Jodie-Ellie finally arrives on the distant planet, it has the appearance of one of the more glamorous locales in a Club Med brochure... as seen through the eyes of someone who's just swallowed half a tab of LSD. There's a sandy beach, rippling water and tropical vegetation, yet the colours are all slightly out of whack. Call it exotic surrealism.

'Zemeckis wanted that beach sequence to be artificial for lots of reasons,' says Thom. 'One of them is that he wanted to leave question marks in the air as to whether **page 82 >**

Tom Johnson (left) and Randy Thom work the Capricorn desk on *Contact*

PHOTOS: RICHARD BUSKIN



Postproduction

rationalise consciously or otherwise that this one object should be a little bit louder than the others, then they'll tend to buy it. However, if I or someone else hadn't been there to suggest that too many visuals of equal value would wind up causing both me and the sequence a problem, probably nothing would have been done about it.

'Obviously, I'm not saying that sound should rule films, but so far through movie history it has tended to go much too far in the opposite direction. One misconception that many people in the film business have—even directors and producers and editors—is that if you want great sound in your movie you don't really need to think about sound early on. All you need to do is hire a sonic genius, and that's so misguided and wrong because no matter how talented you are as a sound person, when you're handed an almost complete product that doesn't have hardly any room to do anything interesting with sound, your work's going to be fairly mundane. It's funny that a lot of lip service is paid to this idea that film making is a collaborative effort, that this synergy takes place between the visuals and the sound, and it's all sort of organic and unified, but when it comes down to actually doing the work very little attention is paid to those ideals.'

Early on, Thom and Zemeckis agreed that the space ride sequence would play most strongly if the viewers feel on a subconscious level as if they are experiencing the journey from Ellie's vantage point. This could be achieved in a number of different ways,



< page 81 Ellie went anywhere or whether the whole thing was, in fact, in her imagination. If we had fleshed out that sequence with a full set of sound effects at all times, I think it might have left the audience with too solid an impression that she had actually been somewhere. So, what we ended up doing on the beach—in line with what Bob Zemeckis had always wanted to try—was to focus on only one sound at a time, not including the music and the dialogue.

'In terms of effects, you typically only hear lapping waves, or you only hear the wind in the palm trees, or you only hear the sound of her father scooping up a handful of sand, but you rarely hear any two of these mixed together. What Zemeckis hoped this would achieve was to reinforce the idea of an artificial environment, and I think it also helps reinforce the feeling of seeing things through Ellie's eyes. It's like a dream, and, in philosophising about movies, it's often been

said that people perceive films in very much the same way as they perceive their own dreams. It's a highly stylised, focussed and emotional experience, and so the more stylised and focussed that it is, the more it seems like she's having a dream.'

Indeed, subtlety is one of the keys to why the sound in *Contact* works so well. From the start there is some pretty heavy panning, between left and right and front and back, yet the sound team successfully negotiates the fine line between the effective and the crass. 'There's a saying that we often quote around Skywalker Sound that comes from Jim Cameron,' notes Randy Thom. 'In the middle of a mix someone played a sound for him, and he was obviously ambivalent about whether that sound was too over-the-top or too exotic for use in the film, so he said, "You know, there's a fine line between art and dog-shit!"

'Zemeckis has traditionally been very careful about panning. He didn't want anything

panned in *Forrest Gump*, and that was almost entirely the case, even in the Vietnam battle sequence where you get the impression that you're hearing these bullets whizzing over your head. In fact, the bullets were never panned into the surrounds, although the way in which it's shot and the sounds make you feel that they are. Zemeckis is very aware of alerting the audience to the contrivance of the whole thing, and sort of waking them from the dream of the movie and reminding them that they're watching a movie.

'I think there's a lot to be said for that. With many action-adventure films, especially in recent years, the impulse is to play them as if they are theme park rides and forget that they're movies, even though you're going for every visceral thing. That means panning sounds when sometimes it's not even justifiable. So, what we tried to do in *Contact* was to only pan things when the visuals and context supported this. There's an awful lot of material that we could have panned but didn't, and there are also sequences which I was amazed Bob allowed us to play as discreetly as we did, placing sounds only in the left or right surround. In fact, when I mix any film I tend to be a little more conservative than the average mixer in terms of panning.'

STILL, it was thanks in large part to a new mixing console at Skywalker that the pans in *Contact* could be executed so efficiently. This was the AMS Neve Capricorn, which, Randy Thom nevertheless admits, he and some of his colleagues initially had certain reservations about.

'Like a lot of people I still wasn't sure about all-digital consoles and everything being automated,' he says. 'You know, I love the idea that it can happen, but it's pretty difficult to move from the work environment where only faders are automated, into automating equalisation and panning. Suddenly you have to think about those things beforehand, and it just changes your mind-set. For instance, if you want to equalise a piece of dialogue that runs from 100' to 120', you have to consciously think about automating only during that stretch of time in a way that you don't if, obviously, the automation isn't an option.

Therefore, Dennis Sands, who was the music mixer on *Contact*, Tom Johnson the dialogue mixer and I were all filled with trepidation in regard to working on a completely automated console. However, the impression that I think all of us had in the end was that it's a wonderful tool. Like most new tools it doesn't save any time, but it allows you to try things that you never would have tried otherwise.

'The panning of the music and the other broadcast elements in the film's opening sequence couldn't have been done in the same detail if we hadn't had automated panning. We were panning literally hundreds of sounds from the front of the room to the back of the room and from the back to the front, and I can't imagine how we would have accomplished that without the Capricorn. It would have taken weeks just to do that one sequence.'

For his part, while Randy Thom was doing his effects premixing on the Capricorn, Tom Johnson had to pre-mix the dialogue on an SSL G-series board. He then used the Capricorn for the final mix. 'I liked it quite a lot,' he says.



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'It was great for panning, and I was also able to ride a lot of EQs on dialogue, which was really nice, and it would play back that stuff. So it had tremendous advantages for me. Now I'm back on an SSL for the premixing of dialogue on Titanic, and I really miss the Capricorn. It's a whole new way of working. There are definite disadvantages to looking at a display on a console instead of at a screen while you're EQ'ing, but I think the payoff in the end is worth it.'

The dialogue which Johnson had to work with was recorded on DAT and transferred into Studioframe digital editors. Very well recorded, about 75% of the production dialogue made it through to the final cut. ADR was only necessary during the noise-infested action sequences, such as Foster's space trip to the beach.

'The main noises I had to deal with came from the VistaVision cameras that Bob was using,' says Johnson. 'However, Jodie Foster is the best looper I've ever seen in my life. She would not only match her performance, but, in my opinion, often do a better job. So, there were a lot of places where we were able to go from production to ADR and back to production without any problems. It was a dream for me.'

MEANWHILE, less than ideal on *Contact* was the manner in which visual effects kept arriving during the final mix. 'Everything was always changing,' says Randy Thom. 'They actually had too many visual effects to do in the allotted time, and it was frustrating to me because often I would create a sound for a given visual and then a couple of days later I would see a new visual which didn't match the sound at all. So, I'd have to start over again.'

Thom mainly uses Pro Tools for his sound designing. He likes the versatility afforded by the availability of so many third party plug-ins, and feels that provides the designer with the most latitude to modify sounds.

'The latest version, v4.0, is great because all of the plug-ins now can be automated,' he confirms. 'I've really become seduced by using the volume graph, where you can essentially draw how loud you want the sound to be over the waveform, and I've gradually been weaned away from faders. As a result, during my design and early premixing of films I now almost never touch a console. I use the console for monitoring and I do virtually all of the mixing inside Pro Tools.'

'Being able to see the waveform, it's very easy to amplify or attenuate a single syllable of dialogue, or very precisely finesse the entrance of a sound. The automation works similarly, and so I've just fallen in love with that. We did the temp mix for *Contact*—which was actually pretty elaborate—entirely inside Pro Tools in a dining room in Santa Barbara. The same was the case—even though the mix was less sophisticated—on *Forrest Gump*. Zemeckis lives in Santa Barbara and so he typically rents a large house to edit his films in... I'll be very surprised if, during the next few years, films don't start to be mixed in directors' houses, or at least in the editorial suite, and I think it'll be a good thing.'

One *Contact* sequence which Thom didn't design the sound for was the one in which the space project is sabotaged, leading to explo-

sions, fire and assorted pyrotechnic mayhem. A heavy duty action scene for the guys... yet it was a woman, Terry Ekton, who was mainly responsible for the sonic excitement.

'We have this tradition at Skywalker of jokingly referring to "boy effects" and "girl effects",' says Thom. 'Traditionally, the boy effects have been the gunshots, whips, alien roars and that sort of thing, while the girl effects are the winds and so on. Occasionally it has been true that the boys have wound up cutting the boy effects and the girls have done the girl effects, but in this case I thought it would be great to get Terry to cut the explosion sequence. She did a marvellous job, putting together the explosions and pieces of metal flying through the air... I guess I'm tempted to say that it's a slightly more tasteful explosion sequence than I might have expected to get from a man, but I don't know if that's true.'

'One thing that I should say in terms of the

general philosophy is that usually the role of the mixer on film soundtracks is vastly over-rated. I've been on both sides of this argument, in that I edit sounds, I fabricate and design sounds, and I often wind up mixing sounds—sometimes the sounds that I've done, sometimes the sounds that other people have done, and I've mixed dialogue, music, whatever. Well, for a complicated set of reason the rerecording mixers often get a lot of the credit that is actually deserved by the people who have found and fabricated the sounds, before then handing them to those mixers.

'In general, if I had to choose between a great sound editor and a great sound mixer on a project, I would probably choose to have a great sound editor and a mediocre mixer rather than the opposite. I think so much rests on the choices that you make about what sounds to use. You can smooth things out and you can enhance a little bit when mixing, but the principal thing is to start with the right sound.' ■

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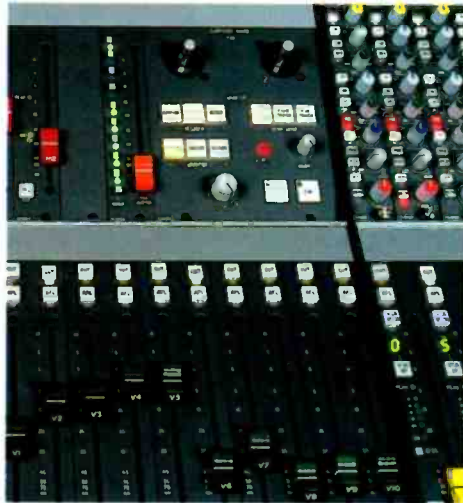
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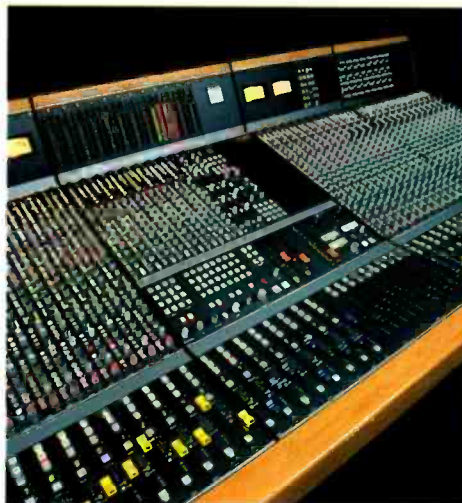
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Martian Chronicles

Not since the 1969 Moon landing has a space shot achieved such a high media profile. **Kevin Hilton** reports on the low-budget, large audience event that gave us a close-up on the Red Planet

THAT'S DECIDED THEN. The next time I play the bar game where you have to answer the question 'If you had a time machine, where and when would you go?', my choice will be London in 1969. There I would ingratiate myself with the young David Bowie, one day remarking off-handedly, 'Dave, Take a look at the lawman/Beating up on the wrong guy/Oh man! Wonder if he'll ever know/He's in the best selling show/Is there life on Mars?'. I would then help him with the lyrics and sit back and wait for the day in August 1996 when scientists identify primitive lifeforms in a meteorite that broke off from the Red Planet and hit Earth. In this way a slice of the £20,000 Bowie earned in royalties that day, when radio stations the world over played 'Life On Mars?', would be mine.

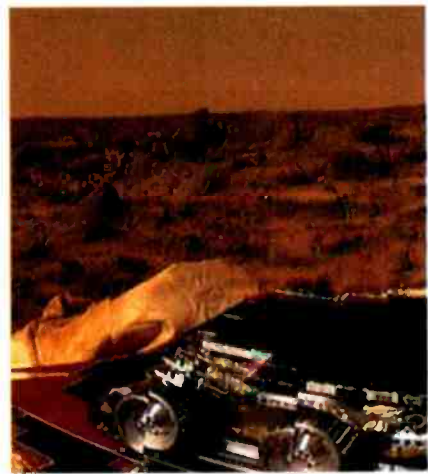
The fourth planet from the Sun has long been an obsession here on Earth. When people talk about aliens they usually imagine Little Green Men from Mars; HG Wells arguably started the trend with *The War of the Worlds*, which Orson Welles took and scared the bejesus out of middle America in 1938. Since then Martians have drifted in and out of fashion, coming back to the fore recently through *The X-Files*, *Independence Day*, *Mars Attacks!* and *Men In Black*. On a more scientific level, the inhabitants of planet Earth were enthralled by the Pathfinder mission, which, six months after blasting off, finally (crash) landed in the Ares Vallis, thought to be a flood plain that dried up eons ago.

The over-riding purpose of Pathfinder was to take a more in-depth look at the composition of rocks on the planet's surface, particularly as the last mission, Viking (which landed in September 1976), was restricted to a small area around the lander vehicle and ceased to transmit information back to Earth in November 1982. At that time it was concluded that there was no life on Mars in the two locations investigated, although scientists did not dismiss the possibility altogether. With the evidence of the crashed meteor that micro-organisms may have inhabited Mars 3.6bn years ago, much was expected from Pathfinder, especially as the landing craft contained a rover that could explore a larger area of the surface and take more extensive soil samples.

As scientists anticipated the fulfilment of the plans they had drawn against the Martian landscape, television viewers back on Earth turned

envious eyes towards their sets, all the better to see whether David Bowie's 1971 question would be answered. Television has long played a major role in space exploration: the images of Laiku the dog being sent into space (never to return) in 1957; the 1961 footage of Yuri Gagarin becoming the first human in space; and, in 1969, Neil Armstrong taking the first steps on the Moon (something that I, as a child, was allowed to stay up late to watch).

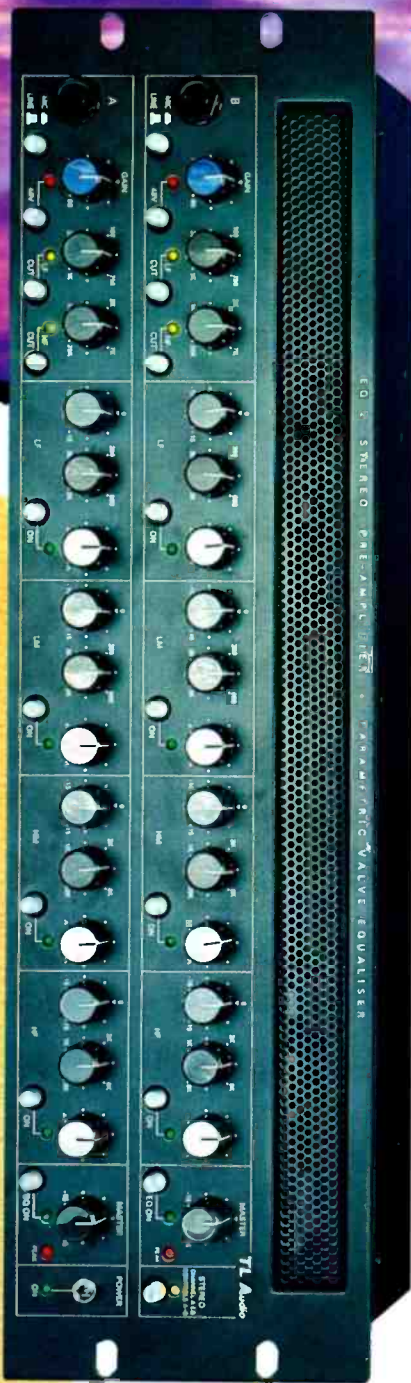
While space exploration has always attracted the attention of mainstream broadcasters, particularly as part of general news coverage, there are now more specialist channels on the air that can devote more time to covering and analysing the latest steps in mankind's adventure beyond the boundaries of Earth. On the day Pathfinder landed on Mars—co-incidentally the 4th of July—The Discovery Channel and ABC News co-produced a special edition of their science news show *Discovery News* to chronicle the progress of the mission. Broadcasts **page 86 >**



ABC News, New York, and The Discovery Channel presented *Discovery News Special Report: Mars Live* on 4th July 1997 using Solid State Logic's Axiom digital console. The special covered the historic Pathfinder landing on Mars. The Axiom became the audio mission control for the live broadcast from Pasadena, California



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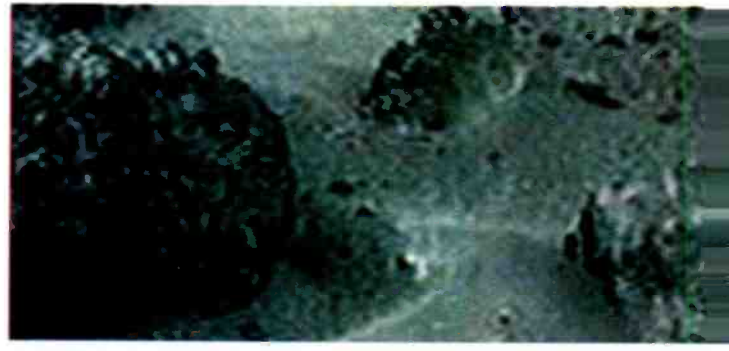
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< page 86 trometer designed to examine the composition of Martian rock. Unfortunately it was not sophisticated enough to carry out tests that would answer the Life On Mars? question once and for all. In addition to this, the Pathfinder landing craft doubled as a weather station, able to collate data about temperature, wind speed and atmospheric pressure during its month or so existence on Mars.



In knowing when to go on-air, Discovery was dependent on information from NASA, which had to anticipate the times when there would be something newsworthy.



'It worked out perfectly in that regard,' Reid comments. 'About every hour there was something happening. As well as anticipating the various interesting aspects of the day, we had segments that attempted to put what this all meant in the overall context of Mars exploration.'

Discovery News first went on-air shortly after Pathfinder had landed on the surface of Mars (although 'landing' is too generous—the craft basically crashed onto the planet at 40mph-72kmph, the impact being cushioned by four giant balloons that allowed it to bounce to a stop). After this Mission Control and the production team waited anxiously for the arrival of the carrier signal that would indicate that the craft had arrived safely and was functioning properly.



'When Mission Control received the confirmation signal we had to wait for the sun to rise on Mars,' Reid says, 'because the rover was operated by solar power. Before that there was not much that we could do. Another thing we had to take into consideration was the 10 to 20-minute delay on signals getting from there to here. Timing was a bit tricky but NASA kept us in touch and it worked out well.'

For the first six hours of the broadcast, the only significant element coming back from Mars was the carrier signal, meaning that the TV coverage concentrated on NASA Mission Control, the preparations and reactions of page 90 >



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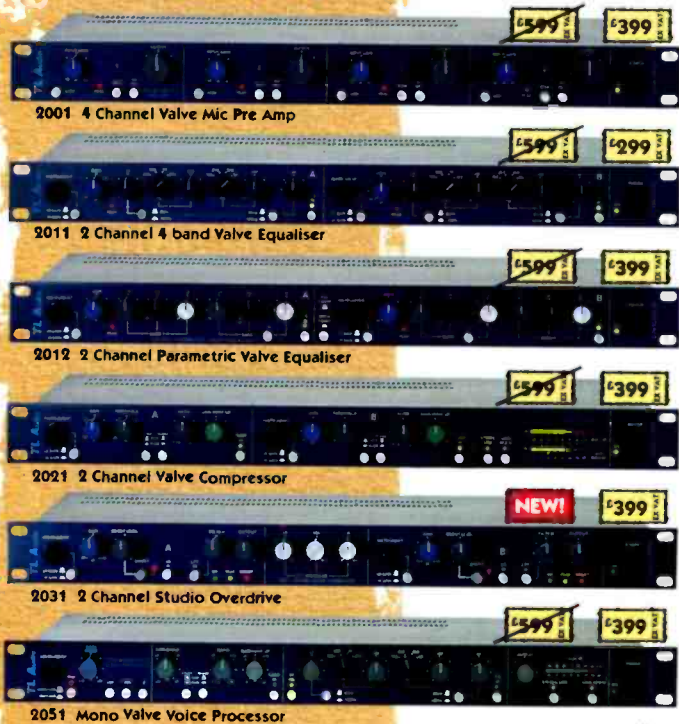
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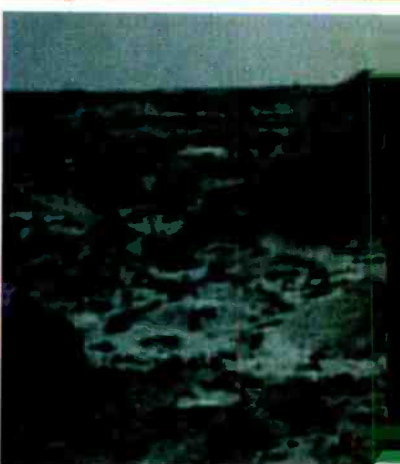
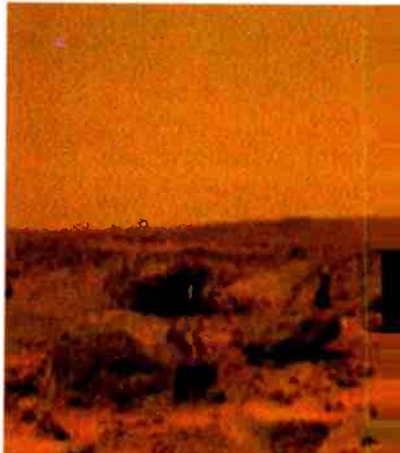
< page 85 began at 11am and ran to midnight.

Overseeing the whole 20 hours of the broadcast, comprising feature programmes and news inserts into scheduled Discovery programming, was Discovery Channel executive producer Bob Reid, who explains that the decision was taken not to be on air continuously with Mars coverage.

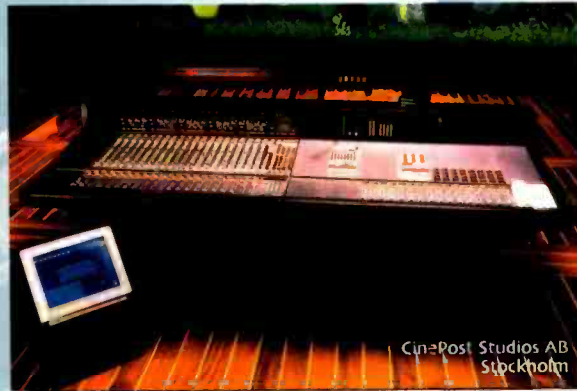
'There were intermittent broadcasts when there was something interesting to transmit,' he says. 'Our philosophy was to go on air when we had a good reason and stay on as long as there was something to be said. Unfortunately there is a common practice in television these days to stay on air regardless of whether there is anything going on. If you have the luxury of being able to do that, then that's fine but few stories have enough going on to justify constant coverage.'

Even though, as Reid says, the Pathfinder landing was an 'unique' event, the news value could have been diminished if TV cameras had stayed fixed to the various scenes of the action all the time or tried to pad the proceedings with interminable talking heads. Aside from Mars itself, the main focus of attention was on the Jet Propulsion Laboratory (JPL) in Pasadena, California, which acted as Mission Control. A 'pool' camera was installed here by the US Space Agency, NASA (National Aeronautics and Space Administration), with feeds running to Discovery-ABC, allowing viewers to see the activity of the mission controllers. As is now almost commonplace in these situations, during the day NASA staff broke into applause when something significant happened, particularly as it became apparent that the mission was proceeding as planned.

Other cameras were positioned around the JPL by Discovery-ABC for interviews with scientists and NASA officials as they came out of or made their way to Mission Control. Then there was the Martian footage itself, which was downloaded from NASA's computers as it was beamed back from Pathfinder and the Sojourner rover, which enabled more extensive exploration of the planet's surface. This compact vehicle (25-inches long, 19-inches wide and 10-inches high) was controlled by instructions beamed from Earth and, with its six independently moving wheels, was agile enough to negotiate the rocky terrain. As well as being equipped with a camera to record where it was going, Sojourner contained APXS, a high-tech X-ray spec- page 88 >



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< page 88 the scientists and technicians working on the project. While some live TV broadcasts can milk the build-up to events that may or not deliver, Reid says that Pathfinder was an important story exactly for this reason.

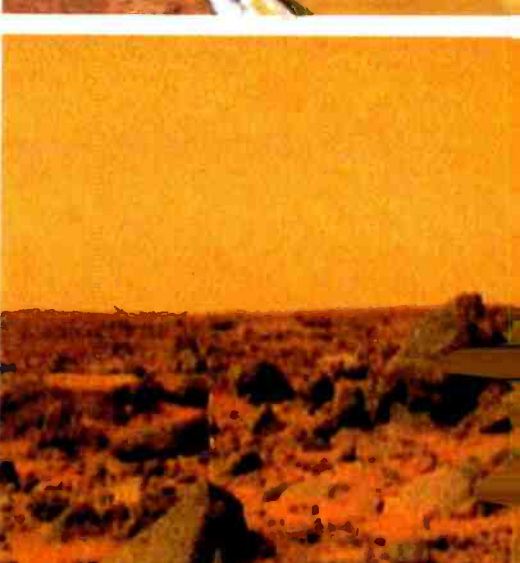
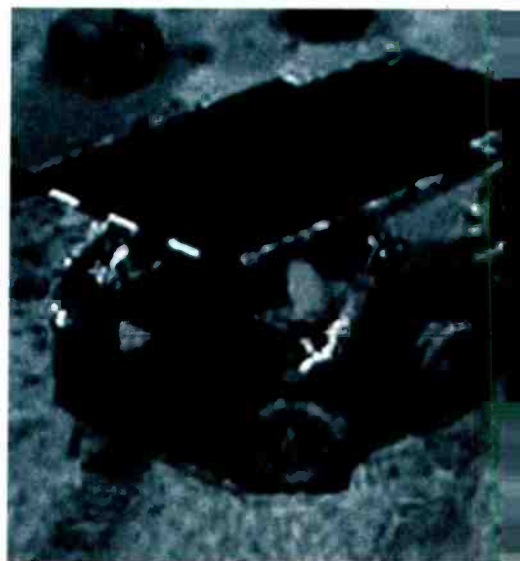
'It was a mystery,' he says, 'because there were all these questions. Would it land? Would it land safely? After that the question was whether it would work and whether the cameras would operate. Then the expectation was as to what the pictures were going to show. It was a story that took so many dramatic turns because there was always a chance of failure. Anxiety was high.'

The build-up was mixed with experts, either at JPL or in Discovery's studios in New York, explaining what was going on and what they expected to see once images started to arrive back from Mars. Facilities were provided by ABC, Discovery's partner for live events coverage: of the number of different control rooms and studios that the network has available, a suite equipped with a Solid State Logic Axiom digital console was allocated for the audio production. Feeding into this were inputs from the four remote locations involved in the project, including the JPL. In addition there were microphone feeds from the link studio as pundits pontificated as to the final outcome. The desk was used both for live inserts and for preparing pre-recorded packages: the DiskTrack and Hub Router systems enabled effective routing without the need for extensive patching.

Use of the Axiom was something that was possible, rather than something that was part of any original plans.

'Using it came down to a combination of factors,' explains Reid. 'As it turned out, that control room was available for use when, normally, it wouldn't have been. Also, the audio production was a complicated one. We had audio from the studio, with up to three guests, and six to eight sources on tape from around the building, with satellite feeds from at least three to four locations, including Washington and the JPL. In this respect it was not an easy production: the only way we could manage it, keep control of the number of sources and maintain quality was to use a sufficiently sophisticated system that was easy to work with under live conditions. The requirement was to have access to all the sources immediately because we didn't have a second chance. It worked magnificently.'

For other technical facilities, Reid and the production team chose one of page 92 >



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< page 90 ABC's studios (one that is not usually used for Discovery News) that best suited the kind of look that they wanted to give this coverage. This included using elements of Discovery News' regular virtual set, although not fed through a computer as usual but involving digital graphics and chroma-keying.

'Technically it all worked beautifully,' says Reid, sounding as though he still cannot quite believe it himself. 'If we had sat down a week before the broadcast and said "This is what is going to happen", I think that we would have laughed. When it's live you can never count on things happening when you expect them to but every time we made the decision to interrupt our regular programming, there was something going on. There was never a time when we had nothing to say.'

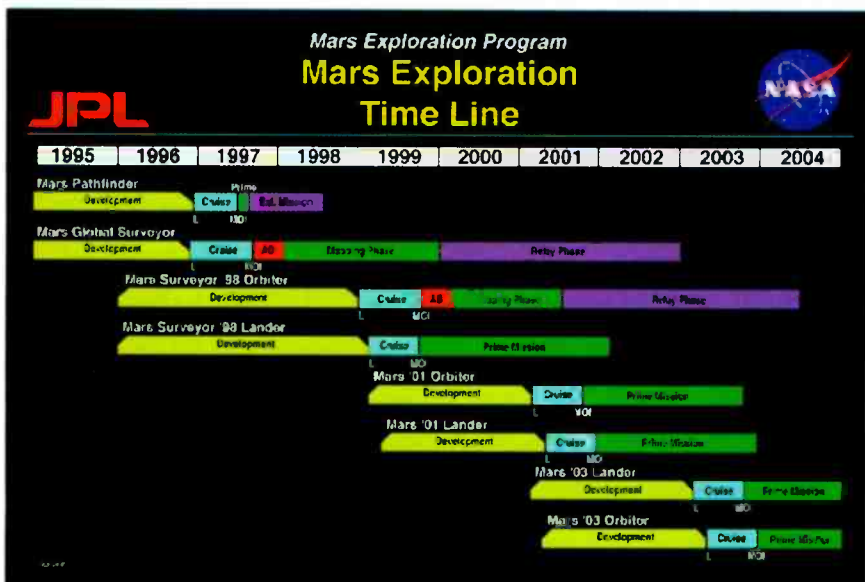
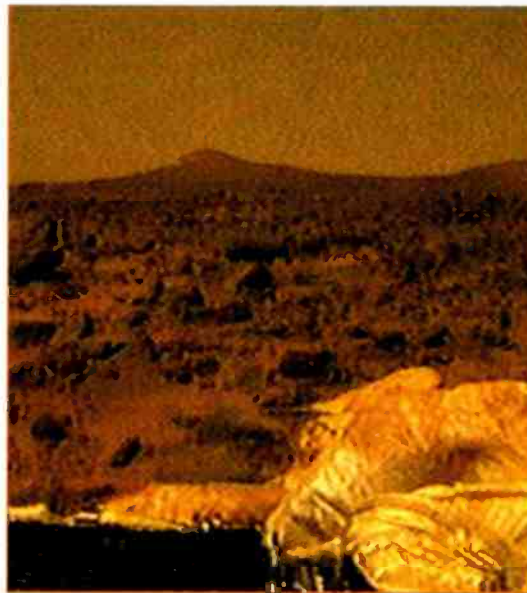
After the anticipation of six hours, colour images started to be relayed from Mars to the JPL, causing the Mission Control personnel to break into spontaneous applause, all of which was captured live on TV. This meant that computer images from the Red Planet could be added to the Earth-bound pictures that had so far sustained the broadcasts. From this point all inserts were live up to going off the air. 'Once events moved on beyond just getting radio signals back from Mars, we could go on for five to ten minutes at a time,' says Reid. 'But we did have pre-prepared packages to explain what was going on and why. These carefully crafted pieces could be used where appropriate during the day. At 11pm we broadcast a compilation of those and the live inserts, with analysis of what it all meant.'

As executive producer of *Discovery News Special Report: Mars Live*, Bob Reid declared himself very satisfied with the way everything turned out.

'It was flawless coverage,' he says. 'The technical team was superb and the equipment performed perfectly. That's the real trick, getting it to all come together, making a symbiosis. From the viewers' point of view, they saw it as a tremendous success and that's what it's all about, giving benefit to the viewers and producing good TV.'

Over the next ten years the Red Planet is unlikely to be far away from TV sets, with NASA's Surveyor '98 orbiter and lander mission due to be the next significant foray, while

joint US-Russian projects have been slated for 2001 and 2003, with Japan preparing to launch its own probe next year. All of which is unlikely to pacify the two Yemeni men who have issued a writ against NASA for trespass, claiming that they own Mars after inheriting it from ancient ancestors. Now, if these ancients are there to meet the first person to land on the planet, due in 2012, that would be something to stay in and watch. ■



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Vonk Sound

Once the preserve of the broadcast fraternity, SSL's Axiom has curiously found its largest multiple installation in the commercials market. **Zenon Schoepe** visits Amsterdam and asks why



ONE NAME STANDS OUT against all others in the commercials facilities market of the Netherlands: Vonk Sound. With enough history to give it lineage, enough character to keep it interesting and enough technological risks to keep it current, owner Wim Vonk has created a Mecca of commercials in Amsterdam that has won awards and accolade from the creative advertising industry.

Amsterdam may not seem to have as bur-

geoning a post community as Soho in London and the number of facilities would bear this out, but when you corner a market, you corner a market in whatever sphere. The art then is all about keeping it that way.

Vonk was the first to go with DAR Sound-Stations in Holland almost eight years ago and uncannily the country has since progressed to boast one of the highest densities of the company's equipment anywhere. Coming from a film background, he grabbed the opportunity

of an expanding commercials requirement and moved his expanding team to a new complex on the outskirts of the city where he constructed three identically-equipped and specified rooms for himself and engineer, Marcel Walvisch and Eelco de Vries. Together they present a magnificent force in audio for commercials by combining musical skills and aptitude. sound design, engineering and mixing and—by Vonk's own admission—getting paid admirably for working to their own **page 96 >**

< page 95 uncompromising high standards.

Vonk is a man who knows his own mind. The last time I met him, he was in uncompromising mood and relishing tales of arguments with directors and creatives. Yet the clients keep coming back, the list numbers many of the top international agencies, they never but never work weekends, and you've got to believe him when he says they are always offered more work than they can handle.

The years have mellowed him slightly and he's now contemplating the future with some further expansion, a tentative move in to film mixing and the recent installation of the first 3-SSL Axiom complex on this planet.

Those that have been reading *Studio Sound's* contracts columns will have noticed that the take up of the Axiom has been largely restricted to the realm of large broadcasters who have applied the digital desk to production duties. It's a far cry from the cut-and-thrust of one-stop self-op commercials creation, so what was Vonk thinking when he replaced his ageing Sony analogue boards?

'The company is growing and growing with a lot of work coming in from outside of Holland—we get a fair amount from England, Germany, even one of two American agencies over here,' he replies. 'I wanted to go digital. We decided that we needed to go to a stage where we could have total but total recall. I work on a job for three days. I start the next one and then the client with the first commercial always says it's great but they think that one bird sound is too loud. If I'm busy they can go into one of the other Axiom stu-



dios, push a button, load the project and just remix it. All the creative energy is in the desk and none of it is wasted. And you get maybe three days to do the whole commercial but only a half-hour for the remix,' he continues.

'We wanted to go to a networking situation and we were interested in the possibilities of digital equalisers because in our line of work where you want to do things with sound, a lot of it is not what you would term normal on a music session. We tend to use the desk as a sort of instrument and we want to fool around.

'There's also the fact that just about every thing we do for television is in surround these days,' he adds.

The search for the new desks started two-and-a-half years ago although Vonk was adamant that they would keep the DAR Deltas as their editors. A wealth of smaller systems were identified but assignability was not appreciated and with the Pro Tools-02R camp membership swelling meant a top-end facility required something that would clearly allow it to work faster and better. DiskTrack was a real bonus.

'The trouble is that people only ever come

in here when they don't know what they want,' claims Vonk, 'if they know what they want then they go somewhere else. They send us a tape and have a rough idea and then give us three or four days. You start working on the DAR, creating sounds, sampling, effects, whatever and it doesn't take very long to fill the first 16 tracks. I used to use Sony PCM800s to dump off 8s to get back tracks but now I dump the lot into the DiskTrack and carry on working. I find I usually end up using about 30 channels. Now the whole damn project goes on to DiskTrack and redoing something is a piece of cake.'

This contrasts to the previous scenario of an impromptu remix where in complicated jobs only the originator could tell how something had been done.

'If you've got to tell somebody how to do it then you might as well do it yourself,' says Vonk. 'In the past we used to work during the day and either come in very early in the morning or work very late at night to change whatever they wanted changed and try and get it to sound the way it sounded. That was the hard part because it's fine if somebody came back within a week but sometimes they'd come back after two months when the commercial had been on the air. That was a big problem.'

The three identical Axiom rooms are each equipped with 48 processing channels and integrated via the Hub Router to DiskTrack with 72 hours of storage. The desks are networked with Vonk's console acting as gatekeeper to the resources. page 98 >

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The Whole Truth And Nothing But The Truth

< page 96 'What's nice about digital and the networking is that I can access every machine in every room and every microphone and the system grows with you,' enthuses Vonk. 'The first time we did an ISDN link up with this desk we were recording somebody in the States and I was directing them from here, we made a setup with the patching and the routings and you store it on a key. Every time you do something you haven't done before that needs a special setup you can store it on a macro and recall it the next time you want to do the same.'

He's not averse to mixing and matching technology or even passing on it. He's worn away the finger groove on the scrub wheel of his DAR Delta and refuses to allow the manufacturer to replace it because he says it is now a part of him, 'I edit on the DAR because it's fast and I love it. I still think it is the greatest editing machine ever.'

'All my life, whenever I bought a piece of

equipment, by the time I ordered it and received it was outdated because I'd read about a new machine that could do just that little bit more. My DAR has been here for nearly eight years but if you buy a new one today it does exactly the same as mine. There's new software and it's a new machine and it grows with you. The Axiom and the DAR are not investments in the normal sense where you buy a desk and expect it to last four or five years, it's longer-term than that.'

FIVE YEARS ago I was involved in surround for film and now it's getting really big for television and I don't know what will be thought up in the next five. What I do know is that it's much easier to tackle things from software than it is from a hardware route and in that respect I think we're well covered.'

However, perhaps peculiarly for a picture-related environment, he has not opted for

VisionTrack random access picture.

'It's great but it's so incredibly fast, and this is a hang up of mine. In the old days with a projector you had time to think while you were winding back. It changed a lot when we started working with the DARs and videotape but I still have time to think while I'm spooling back. That's not the main reason though,' he explains. 'The main reason is that all my clients still work on U-matic or they come in with a Beta. I put that in the machine and start working and when I'm finished I relay the tracks and they leave again. That saves me thousands of pounds per studio yet all VisionTrack gives me is incredible speed. It doesn't enhance the picture quality and I've always got directors in here who have just spent four hours grading their picture and I couldn't face them sitting in here saying, "I'm sure there was much more green in that when we did it". I don't have any of those hassles. Also, the average commercial is 40s and spooling time is nothing.'

The Axiom decision was made prior to the announcement of the Altimix but Vonk believes that the assignable nature of the newer worksurface would not have altered his decision. Similarly the OmniMix, while intriguing for post, was dismissed for similar reasons.

'I want to work on a real desk because I want to be able to do everything with both hands like you can with an analogue one,' he says.

The facility bought Circle Sound systems two years ago and Vonk describes the medium as another dimension that can be used to impart emotion. 'What's fantastic about the Axiom is you can slow it down to a fifth of the speed and pan surround in the old traditional way and it's all in there. Before this desk I had to perform the pans manually each pass and I couldn't do more than four groups at a time using the Circle Sound joysticks,' he recalls.

Despite the investment Vonk underlines that the clients are still hiring the operators—the performers, as he calls them—who now have new expensive toys to play with. Adding value to the operation is the recent opening of a jingles and incidental music studio with one of the old Sony boards run by Boris Kothuis. This works in a co-operative manner with the Axiom rooms and the Axiom rooms also co-operate on projects when required. Indeed it is the combination of everyone's speciality that makes the facility work a little differently to some of the larger and more anonymous palaces where an isolated operator welcomes in a stream of clients with little or no interaction with any of his other colleagues. Vonk Sound's brew of in-house composers, musicians and sound designers means that the originators of the different stages of a production can be in close contact with each other. There have even been projects where all four of them have been involved in some way be it engineering, designing or playing.

Vonk's latest plan involves the construction of a film mixing theatre complete with an 8.4m-wide screen on land adjoining the complex in the immediate future and the creation of a type of demo facility where clients can spend a day storyboarding ideas for commercials before they start shooting. The film the-

September 1997 **Studio Sound**

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The install

WHILE ONLY installing three new desks, plumbing-in the Axioms required the whole infrastructure of the complex to be reconfigured. Vonk had a feature film to mix in the UK and worked the whole schedule for the installing of his own desk around this with the studios closing on Friday, everyone but Vonk training on their own desks on the following Thursday, and normal business resuming on the Monday.

'When you make the decision to buy three desks like this you're continually comparing them to other systems and by the time you buy them you're pretty familiar with the idea but I'm still learning,' admits Vonk.

'You've got to expect that there will be some problems. The desks were in for a month before the networking side was working properly because we were the first to ever try to connect three of these things together.'

'One of the advantages of having three systems and four people that can run them is that you can always walk to another room and ask—alone on an island we've all got the same problem. I'm very bad with manuals but Eelco always has the manual on his lap if he's not doing anything else and he's going deeper and deeper in to it.'

'There have been hiccups on sessions too. But thank God for hiccups because you learn from them and it has usually been me doing something to make it hiccup. Of course, there were also a couple of bugs and some crashes including ones when there was a studio full of people.'

It's all open and frank talk but have the new desks allowed him to increase his rates?

'I could have done but I haven't,' replies Vonk. 'We're all working much more efficiently—I get home at a more reasonable time at night now. We are going to increase the rates but first I want the clients to recognise what is happening and what it means to them and what they do.'

'I'm a firm believer in people understanding what they're paying for so we're going to keep the rate the same for at least eight months. I don't want anyone to get the idea that they're paying for this, I've got a bad enough reputation as it is.'

'One of the things you realise is that there are a lot of people that would like to buy this gear but can't afford it so the easiest thing for them to say is that I've gone out of my mind. But they said that when I bought the first DAR in this country.'

'It's very important to do things when you feel you want to do them and not wait until somebody else does them first.'

are is closest to his heart: 'I think that's the sort of job I could do until I'm about 70,' laughs Vonk. 'It's also my background and where I came from.'

Vonk is being deliberately cautious about the new venture although he admits that cinema commercials are already a very important part of their business. In the first instance he will install one of his old Sony desks and start off with a video projector until the concept is proven. There is already talk of using the new theatre space as an additional live area for the music studio. Should a big enough job warrant it there is also the contingency of wheeling in one of the Axioms. And he's not particularly interested in the Dutch film market.

'What we did with the film that I was finishing in England when the Axioms were being put in was take on the whole project,'

explains Vonk. 'We put in two AudioVisions in upstairs and two sound editors sat there for two-and-a-half months and then I mixed it. I think there is room for that type of service over here and it's where I want to go. We've been getting offers but we haven't been able to do it because we haven't had the space.'

He's going back to his roots and is preparing to step back from the intensive day-to-day routines that have ruled his life.

'Marcel is my partner in this business and he will be taking over in a couple of years time,' adds Vonk. 'I'm 44, I can't keep this up for ever, it's a young man's game and it's very important to get new blood in to the commercials side of the business. And by that time I'll be getting to the sort of age where I will be old enough to be allowed to do feature films. I know you need to be 65 but I'll try it a little earlier.' ■

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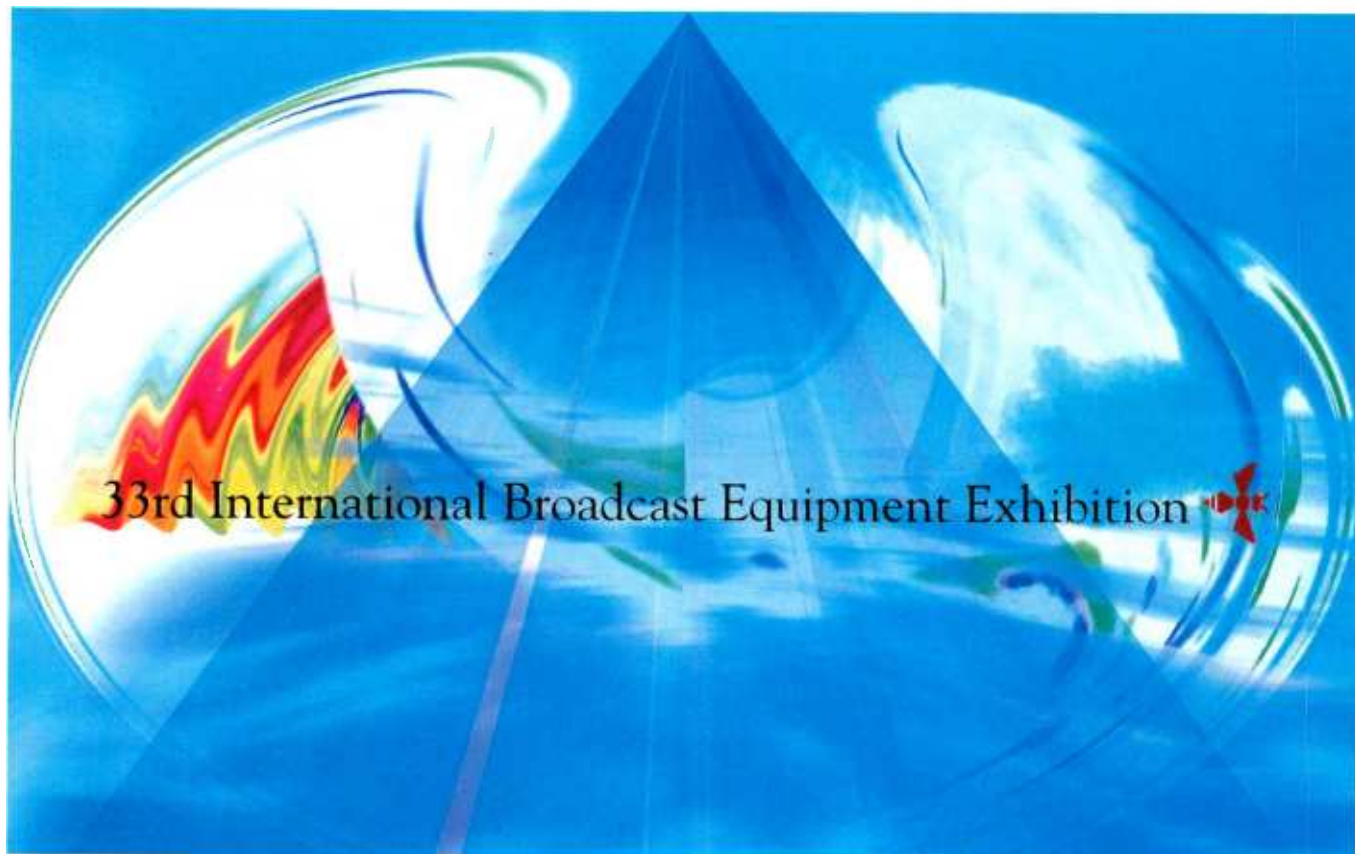
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Gold standard

As the AES 'goes Gold', it seems timely to look back over 50 years of its service to audio. Here, some of those involved identify forthcoming frontiers and offer insights on trends in the industry, while other innovators are profiled for posterity

AS WE MARK the 50th year of the Audio Engineering Society, an organisation dedicated to the advancement of audio engineering, it's important to understand how the adventure began. Its roots go back to the end of WWII, when the term 'electronics' was first being used in print. It was a time of rapid advancements in virtually every aspect of American society: medicine, science, music, communications, transportation—name it and it was undergoing change. The pace of life had picked up, as the country began feeling its collective muscle. The audio, film and broadcasting industries were experiencing an avalanche of technological breakthroughs, although at that time audio was given scant recognition. That too was changing, thanks to the efforts of the Institute of Radio Engineers in the US and similar organisations in Britain and Europe.

The success of V-Discs (which brought the music of great American musical artists such as Frank Sinatra to our GIs abroad) in the Army Morale Program demonstrated that a quality audio recording had a place in the nascent modern cultural landscape. The emergence of British Decca's 78rpm Full Frequency Range Recording (FFRR) and the introduction of the Pickering integrated playback pickup, that tracked these advanced discs, spurred the onset of quality record reproduction. Professional audio was on its way to becoming a significant factor in the average music enthusiast's life.

During the same period, a new pickup cartridge was introduced by William Bachman of GE, and economical cartridge pickups became a reality. The groundwork was laid for improved cartridges and arms via the work of Hunt and Pierce at Harvard during World War II; their work was released for public distribution and sparked a recovery in the record market, which had been stifled both by wartime shortages of supplies and by a bitter labour dispute pitting the American Federation of Musicians against record companies.

The emergence of the GE RPX-050, cartridge was a harbinger of even greater change. Paralleling this innovation, Dr Peter Goldmark and William Bachman, now at Columbia Records, were leading a team that was secretly developing the 'LP', a 33 $\frac{1}{3}$ rpm microgroove long-playing record. Its introduction in the late summer of 1948 augured a new era of quality audio reproduction.

Executives were awakened to the potential of quality recording and reproduction and its potentially huge economic impact. The professional disc jockey emerged as records gained acceptance in the entertainment and broadcast fields.

During the prewar and war years, a group of highly-regarded audio and recording engi-

neers formed a small, elite association to contend with the shortages that had made it difficult to obtain wax and lacquer masters and sapphire styli for cutting records. This group, called the Sapphire Club, helped its members obtain vital supplies and material. Prior to the Sapphire Club's formation, little audio recording technology information had been exchanged. Most of the companies felt it was confidential. As the war ended, the members discovered the importance of information exchange and cooperation. It helped save the rapidly growing and vital business of recording, thus establishing a camaraderie among engineers on the east and west coasts. Both regions had contained installations used by the recording industry and also time-shifting operations, which in turn became a corporate catalyst to improve audio. In this way both ends of the broadcast chain were served.

The combination of listening pleasure and corporate participation helped shape the founding tenets of the Sapphire Club into a coherent society. The work of early club members like CJ Lebel, Chester A. Rackey, Theodore Lindenberg, Norman C Pickering, Lawrence A Rudell, Frank L Capps, Albert A Pulley, Walter O Stanton, Vincant J Liebler and Harry L Bryant evolved into a formal organisation that was called the Audio Engineering Society. Work on this consolidation started late in 1947 and become a reality with the first AES meeting on March 11, 1948, which featured a lecture by Dr Harry Olson at the RCA Studios in New York City.

AT THAT first meeting, over 150 interested and concerned engineers involved in the fields of recording, research, manufacturing, broadcasting and product improvement and development met to exchange ideas. The concept of this interaction and intellectual exchange spread like wildfire. Two months later sections were organised in Denver and Los Angeles. During the remainder of 1948 and into 1949 growth and interest in the AES was enhanced by the publication of Audio Engineering, later to become Audio Magazine, a magazine that was the industry's communications link until the development of AES's own publication, the *AES Journal*, in 1953. *The Journal* was a joint labour of love by Lewis Goodfriend and Vincent Salmon.

The Society, its section operations and the *AES Journal* have been responsible for the rapid growth in membership that continues today. Over 70 AES sections have been formed throughout the world. The organisation has allowed audio to become both science and industry rather than avocation. To those early pioneers we owe a debt of gratitude for a job well done; a job that has had an impact on every level of the **page 102 >**

1876: Thomas Alva Edison, working in his lab, succeeds in recovering Mary's Little Lamb from a strip of tinfoil wrapped around a spinning cylinder.



Barry Blesser

1877: Edison demonstrates his invention in the offices of Scientific American, and the phonograph is born.

1878: The first music is put on record: cornetist Jules Levy plays Yankee Doodle.

1881: Clement Adler, using carbon microphones and armature headphones, accidentally produces a stereo effect when listeners outside the hall monitor adjacent telephone lines linked to the stage of the Paris Opera.

1887: Emile Berliner is granted a patent on a flat disc gramophone, making the production of multiple copies practical.

1888: Edison introduces an electric motor-driven phonograph.

1895: Marconi achieves wireless radio transmission from Italy to America.

1898: Valdemar Poulsen patents his Telegraphone, recording magnetically on steel wire.

1900: Poulsen unveils his invention to the public at the Paris Exposition. Austria's Emperor Franz Josef records his congratulations.

1901: The Victor Talking Machine Company is founded by Emile Berliner and Eldridge Johnson.

1906: Lee DeForest invents the triode vacuum tube, the first electronic signal amplifier.

1910: Enrico Caruso is heard in the first live broadcast from the Metropolitan Opera, NYC.

1912: Major Edwin F Armstrong is issued a patent for a regenerative circuit, making radio reception practical.

1913: The first talking movie is demonstrated by Edison using his Kinetophone process, a cylinder player mechanically synchronised to a film projector.

1916: A patent for the super heterodyne circuit is issued to Edwin Armstrong.

The Society of Motion Picture Engineers (SMPE) is formed. Edison does live-versus-recorded demonstrations in Carnegie Hall, NYC.

1917: The Scully disc recording lathe is introduced.

1917: EC Wente publishes a paper in Physical Review describing a uniformly sensitive instrument for the absolute measurement of sound intensity—the Condenser Microphone.

1919: The Radio Corporation of America (RCA) is founded. It is owned in part by United Fruit.

1921: The first commercial AM radio broadcast is made by KDKA, Pittsburgh PA.

1925: Bell Laboratories develops a moving armature lateral cutting system for electrical recording on disc.

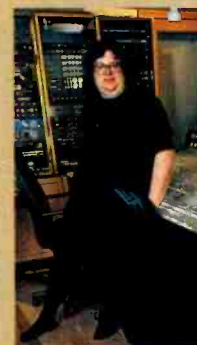
Concurrently they introduce the Victor Orthophonic Victrola, Credenza model. This all-acoustic player with no electronics is considered a leap



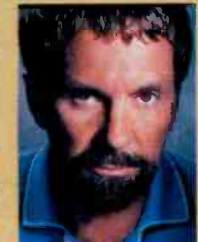
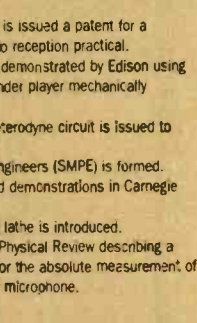
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**AES
GOES
GOLD**



Ray Dolby OBE

forward in phonograph design. RCA works on the development of ribbon microphones.
1926: O'Neill patents iron oxide-coated paper tape.
1927: *The Jazz Singer* is released as the first commercial talking picture, using Vitaphone sound on discs synchronised with film.
 The Columbia Broadcasting System (CBS) is formed.
 The Japan Victor Corporation (JVC) is formed as a subsidiary of the Victor Talking Machine Co.

1928: Dr Harold Black at Bell Laboratories applies for a patent on negative feedback. It was granted nine years later.
 Dr Georg Neumann founds a company in Germany to manufacture his condenser microphones. Its first product is the Model CMV 3.

1929: Harry Nyquist publishes the mathematical foundation for the sampling theorem basic to all digital audio processing, the Nyquist Theorem.

The Blattnerphone is developed for use as a magnetic recorder using steel tape.

1931: Alan Blumlein, working for EMI in London, in effect patents stereo. His seminal patent discusses the theory of stereo, both describing and picturing in the course of its 70-odd individual claims a coincident crossed-eights miking arrangement and a 45-45 stereo disc cutting system.

1932: The first cardioid ribbon microphone is patented by Dr Harry F Olson of RCA, using a field coil instead of a magnet.

1933: Magnetic recording on steel wire is developed commercially.

Bell Labs demonstrates the first inter-city stereo audio transmission.

1935: AEG (Germany) exhibits



Phil Ramone

< page 101 industry, from technicians to musicians, and subsequently on the general public. If the next 50 years of audio innovations even approach the breakthroughs of the first half century, we are heading for some exciting times indeed. As it has in the past, AES will be there to support the new ideas and technologies its members develop.

Donald Plunkett

The birth of digital audio

JOHNNY CASH has observed that in the mid-1950s, when he, Elvis, Carl Perkins and Jerry Lee Lewis were tooling around the south in their cars, pioneering the most traditional strain of rock 'n' roll, and in the process altering an industry, none of them had any idea they were doing anything more than trying to make a living. 'Now,' he notes, 'that's become the important stuff.'

The same might be said about digital audio, another 1950s innovation that has grown to have a greater impact on subsequent decades. Its early history has been little recorded, because those of us involved did not perceive that we were doing anything very profound.

The initial milestone in this historical progression would be the development of the first viable A-D and D-A converter in the early 1940s, a subject on which I wish I could provide more personal insight.

In the late 1950s Manfred Schroeder, a brilliant scientist and mathematician working at the Bell Laboratories Research facility, was

interested in the relationship between physical acoustics and human perception. Next door to his office was one of the earliest and largest computer software development projects of the time. One of Dr Schroeder's pet projects, unrelated to his main professional activities, was the creation of synthetic acoustic reverberation to test some of his perceptual models.

Because those models were based on audio delay lines, and because there were no other technologies available to get audio delay, he used the computers to implement his models. It took more than 10 hours of computer time to get one minute of reverberated audio. Only a few real experiments were done during off hours when the computers were not busy. Published in the *Journal of the Audio Engineering Society* in the late 1950s, that work demonstrated that useful things could be done with an audio signal in the digital domain.

Fifteen years later, at a point when computer technology had grown dramatically, I was sitting at MIT. A colleague of mine, Francis Lee, was actively trying to push the envelope of computer memory technology, which was perceived as being one of the major bottlenecks of that industry. Memory was based on a very expensive (by today's standards) magnetic core technology. A typical mini-computer would have 4k of total memory. Dr Lee had just created a magneto-strictive delay line as one of many experimental attempts to find viable alternatives. Having a strong interest in audio, I worked with Dr **page 104 >**

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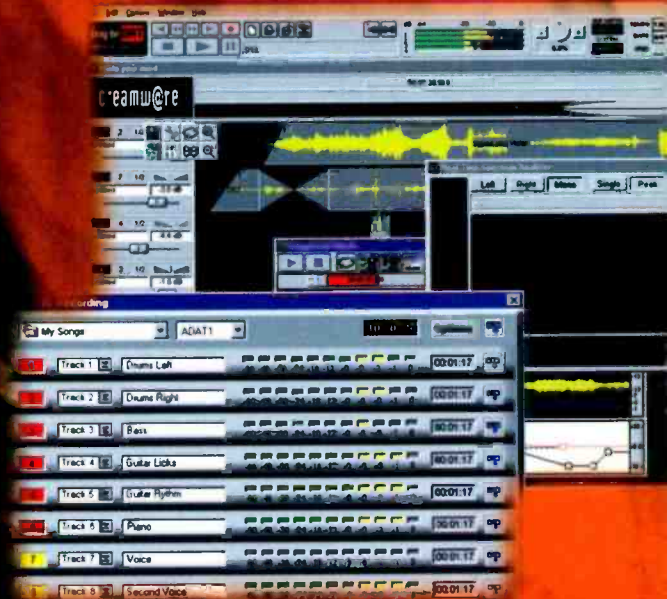
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Elizabeth Cohen

its Magnetophon Model K-1 at the Berlin Radio Exposition. BASF prepares the first plastic-based magnetic tapes.

1936: BASF makes the first tape recording of a symphonic concert during a visit by the touring London Philharmonic, with Sir Thomas Beecham conducting Mozart.

1938: Benjamin B.—Bauer of Shure Bros.—engineers a single microphone element to produce a cardioid pickup pattern, called the Unidyne, Model 55. This

later becomes the basis for the well-known SM57 and SM58 microphones.

Under the direction of Dr Harry Olson, Leslie J Anderson designs the 44B ribbon bidirectional microphone and the 77B ribbon unidirectional for RCA.

RCA develops the first column loudspeaker array.

Walt Disney's *Fantasia* is released with 8-track stereo sound.

1939: AC biasing of magnetic tape is accidentally discovered by German researchers working with an oscillating record amplifier. Independently, Marvin Camras working at Armour Research in the US develops AC bias for wire recorders.

In Germany, a patent is granted to von Braunmühl and Weber for the cardioid condenser microphone.

Western Electric designs the first motionial feedback, vertical-cut disc recording head.

Major Armstrong, the inventor of FM radio, makes the first experimental FM broadcast.

The first of many attempts is made to define the vu meter standard.

1941: Commercial FM broadcasting begins in the US. AEG adds AC bias to the record circuit of its Magnetophon.

Arthur Haddy of English Decca devises the first motionial feedback, lateral-cut disc recording head, later used to cut their FRRR recordings.

1942: The RCA LC-1A loudspeaker is developed as a control room monitor.

Dr Olson patents a single-ribbon cardioid microphone (which later was developed as the RCA T7D and DX), and a phased-array directional microphone (as yet undeveloped).

The first stereo tape recordings are made by Helmut Kruger at German Radio in Berlin.

1943: Altec develops its Model 604 coaxial loudspeaker.

1945: Two Magnetophon tape recorders are sent back to the US in multiple mailbags by Army Signal Corps sergeant John T (Jack) Mullin.

Dr Robert Moog

1946: Webster-Chicago manufactures wire recorders for the home market.

Brush builds a semi-professional tape recorder as their Model BK401 Soundmirror.

3M introduces Scotch No. 100, a black oxide paper tape. Jack Mullin demonstrates hi-fi tape recording with his reconstructed Magnetophon at an IRE meeting in San Francisco.

1947: Colonel Richard Ranger begins to manufacture his version of a Magnetophon.

Bing Crosby and his Technical Director Murdo McKenzie agree to audition tape recorders brought in by Jack Mullin and Richard Ranger. Mullin's is preferred, and he is brought back to record Crosby's *Philco Radio Time*.

Ampex produces their first tape recorder, the Model 200. Major improvements are made in disc cutting technology: the Presto 1D, Fairchild 542, and Cook Feedback cutters. The Williamson high-quality power amplifier circuit is published.

1948: The Audio Engineering Society (AES) is formed in NYC. The microgroove 33 $\frac{1}{3}$ rpm long-play vinyl record (LP) is introduced by Columbia Records.



Jay McKnight

Scotch types 111 and 112 acetate-base tapes are introduced.

Magnecord introduces their PT-6, the first tape recorder in portable cases.

1949: RCA introduces the microgroove 45rpm, large-hole, 7-inch record and record player adaptor.

Ampex introduces their Model 300 professional studio recorder.

Magnecord produces the first US-made stereo tape recorder,

< page 101 Lee in creating what became the first commercial digital audio product, the Lexicon Delta-T Delay Line. The article, published in the *JAES*, presented to the world a solution to the old acoustical engineering issue of how to create quality delay feeding the loudspeakers in a public address system. There were no really equivalent competitive alternatives. We had demonstrated that digital audio could have real world uses in a commercial setting.

The momentum began to pick up and one could see a pattern emerging. EMT, a West German company, dominant in plate reverberation systems, sponsored my work in the development of an all-electronic reverberation system using digital technology. We created the EMT-250 in 1976, which was both a combination and an extension of Dr Schroeder's reverberation computer models and Dr Lee's digital delay line. Computer components had come down in price sufficiently that one could conceive of using them in the audio context. By today's standards, the EMT-250 was prohibitively expensive, costing some \$20,000 and made up of over 400 discrete ICs.

The final milestone in the progression was based on the broad observation that when audio equipment was reduced to software, there would be no manufacturing cost. The digital audio revolution was now complete. Analogue would only own the acoustic domain of transducers which translate between the digital and the inherently analogue nature of acoustics. Violins and ears are likely to remain analogue for some time.

The number of audio engineers engaged in the application of digital technology grew so rapidly that I could no longer say I knew them all. It became a big business. The accidental quality of combining technology from different disciplines, as we did in the 1950s, is now an explicit and formal part of the audio business. We are all part of the computer and communications business with audio just the application. Where it goes we go.

We have an expression in our development group which describes this approach as that of getting a free ride on the elephant. It is big and goes where it wants to. By sitting on top, we move rapidly yet we expend only a modest effort to gain from its billion dollar development budgets. However, if you get ahead of the elephant you get stepped on; and if you get behind it, you experience an equally nasty surprise.

Barry Blesser

The mother of invention

IMAGINE A parallel world. It is the Year of Our Lord 1948 and approximately 150 audio engineers are converging on the RCA Victor studios in New York City. As they begin to arrive, a faulty pentode-tube power amplifier overheats, starting a small fire. The rooms fill with smoke and although the fire is quickly contained, the fire chief orders the engineers to go home, pending a full inspection. The engineers drift away; there is talk of another meeting, but they are all very busy in that post-war era, and never quite get around to it. The Audio Engineering Society is never founded. **page 106 >**

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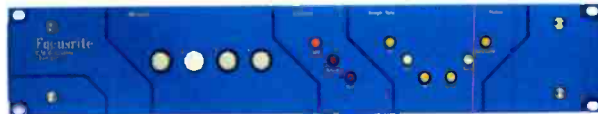


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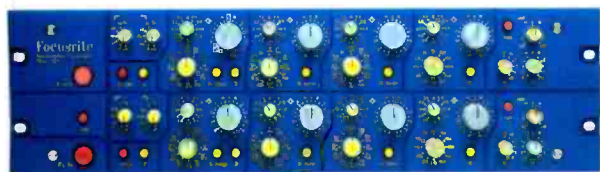
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Bob Ludwig

employing half-track staggered-head assemblies.
A novel amplifier design is described by Macintosh and Gow.
1950: Les Paul modifies his Ampex 300 with an extra preview head for 'sound on sound' overdubs.
IBM develops a commercial magnetic drum memory.
1951: The hot stylus technique is introduced to disc recording. An Ultra-Linear amplifier is proposed by Hafler and Keroes. Pultec introduces the first

programme equaliser, the EQP-1. The Germanium transistor is developed at Bell Laboratories.
1952: Peter J. Baxandall publishes his (much-copied) tone control circuit.
1953: Ampex produces a 4-track, 35mm magnetic film system for 20th Century Fox' Christmas release of *The Robe* in Cinemascope and stereo.
Ampex introduces the first high speed reel-to-reel duplicator as their Model 3200.
Emory Cook presses experimental dual-band left-right binaural discs.
1954: EMT introduces the electromechanical reverberation plate. Sony produces the first pocket transistor radios.
Ampex produces their Model 600 portable tape recorder.
GA Briggs stages a live-versus-recorded demonstration in London's Royal Festival Hall.



George Massenburg

RCA introduces their polydirectional ribbon mic, the 77DX.
Westrex introduces their Model 2B motional feedback latera-cut disc recording head.
The first commercial stereo tapes are released.
1955: Ampex develops Sel-Sync (Selective Synchronous Recording), making audio overdubbing practical.
1956: Les Paul makes the first 8-track recordings using the Sel-Sync method.
1957: Elektra releases the first

electronic music recording; Morton Subotnick's *Silver Apples of the Moon*.
Westrex demonstrates the first 45-45 stereo cutter head.
1958: The movie *Forbidden Planet* is released, with the first all-electronic film score, composed by Louis and Bebe Barron.
Stefan Kudelski introduces the *Nagra III* battery-operated transistorised field recorder, which with its Neo-Pilot sync system becomes the de facto standard of the film industry.
1959: The first commercial stereo disc recordings appear.
EMI fails to renew the Blumlein stereo patent.
1961: 3M introduces the first 2-track closed-loop capstan-drive recorder, the M-23.
The FCC approves the FM stereo broadcast format.
1962: The Society of Motion Picture and Television Engineers (SMPTE) sets the standard for the time-code format.
3M introduces Scotch 201/202 Dynarange, a black oxide low-noise mastering tape with a 4dB improvement in s/n ratio over Scotch 111.
1963: Gerhard Sessler and James West patent the electret microphone.
The Beach Boys contract Sunn Electronics to build the first large full-range sound system for their rock music tour.
1965: The Dolby Type A noise reduction system is introduced.
Robert Moog shows elements of his early synthesisers.
Eltro (Germany) makes a pitch/tempo shifter, using a rotating head assembly to sample a moving magnetic tape.
Herb Alpert and the Tijuana Brass tour with a Harry McCune Custom-Sound System.
1966: Philips introduces the Compact Cassette tape format, and offers licenses worldwide.
1967: Richard C. Heyser devises an acoustical measurement scheme called Time Delay Spectrometry, which paves the way for the revolutionary TEF technology.
Altec-Lansing introduces the concept of room equalisation, using variable multiband filters.
The Monterey International Pop Festival becomes the first large rock music festival.
The musical *Hair* opens on Broadway with a high-powered sound system.
The first operational amplifiers are used in professional audio equipment, most notably as summing devices for multichannel consoles.
1969: Dr Thomas Stockham begins to experiment with digital tape recording.
Bill Hanley and Company design and build the sound and lighting system for the Woodstock Rock Music Festival.
3M introduces Scotch 206 and 207 magnetic tape, with a S-N ratio 7dB better than Scotch 111.
1970: The first digital delay lines are used in sound reinforcement installations.

< page 101 Fast-forward to 1998. In many ways the technology of this parallel world is very familiar. However, the audio technology is shocking. The playback systems are all monaural; stereo recording was never perfected because companies kept their work secret and never shared information. There are no digital recorders, because there was no forum to introduce and demonstrate this technology to the recording industry. There is no optical storage, because there was no education mechanism to teach this technology to the audio industry. Finally, vacuum tubes are still widely used. Without the exchange of ideas and clash of egos afforded by scientific debate, the mysteries of transistor circuits were never solved, so transistor technology was abandoned. Ironically, vacuum tubes are still responsible for numerous fires each year in this parallel world.

Let's return to our own world, complete with stereos, digital recorders, optical discs, solid-state circuitry and the Audio Engineering Society. It might be overly generous to say that without the Society, none of those inventions would have ever appeared. But it is clear that the Society has greatly expedited the evolution of audio technology. In fact, its ability to promote progress in invention is the Society's mission, and its greatest benefit to everyone who enjoys audio technology.

The conventions, first held in 1949, are perhaps the most visible aspect of the Society, and each one makes essential contributions to the industry. Workshops help to teach members about new principles and techniques, and often promote lively discussions. The tutorial value, as well as the exchange of practical information, is invaluable. Technical paper sessions allow individual members to present the results of their latest theoretical work, and hold it up to the scrutiny of other experts, often leading to vigorous debate.

The convention's exhibit floor is high-tech bacchanal. Without promotion to create capital to fuel the industrial engine, audio evolution would grind to a halt.

Almost invisible in the convention activity, but powerfully important, is the work of standards committees. These groups of engineers meet to decide very specific technical details, and establish conventions that can be shared across the industry. Without standards, incompatibility would reign, prices would be driven higher, and progress would be slowed. Standards committees prove that the devil is in the details. Even more discrete, the Education Foundation meets to consider the Society's role as educator; the scholarships provided for graduate study in audio engineering help to fashion the next generation of audio inventors.

As counterpoint to the conventions, international conferences provide a more focused look at specific topics of interest. The first conference, held in 1982, introduced digital audio to the Society and was organised by some of the pioneers of the technology.

However, it is the local sections that form the Society's backbone. These monthly meetings may ostensibly convene to hear from an outside invited speaker, and that is certainly beneficial, but the most important benefit is the cementing of the local community.

The *Journal* documents all Society activities, but at its core are the technical papers, repre-

senting the most outstanding papers from conventions, all subjected to peer review. The dissemination of this reference information is critical to the industry: professional engineers can study the most current and expert thinking, and students can begin to learn it. Moreover, the *Journal* represents the historical record of the progress of audio technology. In a future time, when living engineers have passed on to their own nirvanas, and when the products they designed are collecting dust in attics and museums, the *Journal* will remain as a record of what really transpired.

The Society's Web page provides current information on conventions, conferences, standards committees and Sections. It also contains a directory of educational programs, a selection of information from the *Journal* as well as a searchable *Journal* database, and other assets and links. The activities of the Society are varied, ranging in size and scope, private and public, tutorial and technical, national and international, professional and social. Together, they comprise an organisation that efficiently promotes the evolution of audio technology. It would be impossible to catalogue all of the new technologies, improved products, brilliant ideas, creative insights, breakthrough inventions and successful career paths that have been fostered by the Society over its 50-year history. Clearly, the 150 engineers who met in the RCA Victor studios that evening helped to make this particular world a better place.

Ken Pohlmann, chairman of the music engineering department, University of Miami

The future

WHEN I WAS asked to look into the future of audio, I felt vulnerable to hubris, then humbled by the task, and subsequently liberated by the privilege of amusing myself with all of the possibilities and the knowledge that my preconceptions might prevent me from truly seeing/hearing what is to be known. What my experience tells me is that open-mindedness, awareness, and letting things be (amazed at how they unfold) is the joy of audio engineering.

Audio Engineers, as guardians of the groove, must continually take chances and have faith in the freshness of the moment. As we work with musicians, we are continually conscious of how the present dissolves, evolves into the future.

The raft of new information on perception, cognition, and consciousness will inform and direct our industry in the 21st century. Audio engineers will be building interfaces, exploring these pathways to mind and heart as musicians have done since time immemorial.

We will be creating ways to explore many modes of being and reality, virtual environments will be alive with and given life by audio. As we increase our understanding of brain circuitry, audio circuitry will develop concomitantly, with new art forms arising out of both knowledge and awe.


In the late 1990s, semiconductor companies began sponsoring audio-based events, one example that marked the watershed change in audio from a totally hardware-oriented industry to a software-based industry. We will undoubtedly be generat- **page 108 >**

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Donald Plunkett

Ampex introduces 406 mastering tape.
1971: Denon demonstrates 18-bit PCM stereo recording using a video helical-scan recorder.
1972: Electro-Voice and CBS are licensed by Peter Scheiber to produce quadraphonic decoders using his patented matrixes.
1974: DB Keele pioneers the design of constant-directivity high-frequency horns. The Grateful Dead produces the 'Wall of Sound' at the San Francisco Cow Palace, which incorporates separate systems for vocals, each of the guitars, and for piano and drums.
3M introduces Scotch 250 mastering tape with an increase in output level of over 10dB compared to Scotch 111.
DuPont introduces chromium dioxide cassette tape.
1975: Digital tape recording begins to take hold in professional audio studios.
 Michael Gerzon conceives of and Calrec (UK) builds the Soundfield Microphone, a coincident 4-capsule cluster with matrixed B-format outputs and decoded steerable 2-channel and 4-channel discrete outputs.
 EMT produces the first digital reverb as their Model 250.

< page 101 ing music by the bit, transmitting it by organising the bits efficiently, disseminating them globally, and paying for them by the bit as other measures fall by the wayside.
 The AES is ready for this interconnected world. With our entire planet shrunk to a tiny globe by various forms of satellite and wired communication systems, virtual contacts will make real time with our colleagues more vital and informative. Our conventions will grow stronger as 'build to market' methods of inventory allow for swifter implementations of innovations. The setting for demonstrating these innovations will continue to be the floor of the AES conventions, which draw the international and interdisciplinary creatives that populate the audio community. Our conferences, where already participation can be either in physical or virtual space, are scheduled to present pressing and pertinent information in both tutorial and technical critical path detail. The local sections will continue to

nurture new business development, serving as the 'stellar nurseries' for ideas.
 So into the near future of cable-modem-telephones and IP broadband quality multi-cast signals, audio goes; the ears leading the eyes, discovering the perfection of possibility, the adventure of a sound life.
Elizabeth Cohen

Innovators Bob Moog

IT SEEMS SUCH distant history now, that moment in 1968 when Wendy Carlos' album *Switched on Bach* introduced the music world at large to the wonders of the newest musical instrument, the modular analogue electronic music synthesiser, developed by Robert Moog. In short order Moog's innovation found its way into rock and pop music, and serious composers began using it as the foundation of an entirely new genre, electronic music.

Moog, now the holder of a Ph.D in engineering physics, began his career when he was 19. He was selling theremins, the world's first electronic music instrument. In 1964 he paired two voltage-controlled oscillators with two voltage-controlled amplifiers, using doorbell switches for controls. 'Breadboards', Moog called his contraption; 'synthesiser' became the more elegant term as the original design evolved into a sophisticated and revolutionary technological wonder.

In the wake of Carlos' album's success the Moog synthesiser became a hot item. In its original incarnation, however, the instrument was not only pricey, it was bulky, in that it was designed for studio use. The next evolution of the revolution found Moog introducing the portable, lower-cost Minimoog, which was embraced by working musicians of every stripe in racking up sales of over 12,000 units.

Asked if he feels the full potential of the synthesiser has been explored, as he envisioned it in his mind's eye when he developed the instrument, Moog answered, 'I don't remember envisioning anything when I developed the first modular analogue synthesisers,' and explained that he was 'simply responding to what I understood to be the needs of musicians that I encountered at that time. I certainly don't think that the full potential of the synthesiser has been explored. Synthesiser development has been going on since the late 1920s, has spanned many technological revolutions, and is continuing to evolve.'

'I'm personally interested in developing instruments that facilitate more direct and intimate human control over the sound.' Sounds like another revolution is at hand.

David McGee

Innovators Ray Dolby

INTERESTINGLY, it was a video project that brought Dolby's genius to the audio realm. From 1949-52 he worked on various audio and instrumentation projects at Ampex Corporation, where from 1952-57 he was mainly responsible for the development of the electronic aspects of the Ampex video tape recording system. That product, obviously, was the forerunner of what was to become a huge industry in its own right.

Dolby's breakthrough audio page 110 >

September 1997 **Studio Sound**

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Ampeg introduces 456 high-output mastering tape.
1976: Dr Tom Stockham of Soundstream makes the first 16-bit digital recording in the US at the Santa Fe Opera.
1978: The first EIAJ standard is established for the use of 14-bit PCM adaptors with VCR decks.
 Sony markets their PCM-1 14-bit adaptor for consumer use with VCR decks.
 3M introduces metal particle cassette tape.
1980: 3M, Mitsubishi, Sony and Studer each introduce multitrack digital recorders.
 EMT introduces their Model 450 hard-disk digital recorder.
 Sony introduces the Walkman.
1981: Philips introduces the Compact Disc.
 MIDI is standardised as the universal synthesiser interface.
 IBM introduces a 16-bit personal computer.
1982: Sony introduces the PCM-F1.
 Sony releases the first CD player, the Model CDF-101.
1983: Fibre optic cable is used for long distance digital audio transmission, linking New York and Washington, DC.
1984: The Apple Corporation markets the Macintosh computer.
1985: Dolby introduces the SR Spectral Recording system.
 WGBH in Boston originates the first live digital audio broadcast, sent direct to local radio stations in the US.
1986: The first digital consoles appear.
 DAT recorders are introduced in Japan.
 Dr Gunther Theile describes a novel stereo sphere microphone.
1987: Digidesign markets a Macintosh-based digital work station using DAT for storage.



1990: ISDN telephone links are offered for high-end studio use.
 Dolby proposes a 5-channel surround system for home theatre.
 The write-once CD-R becomes a commercial reality.
 3M introduces 996 mastering tape, a 13dB improvement over Scotch 111.
1991: Wolfgang Ahnert presents, as a binaural simulation, the first digitally-enhanced modelling of an acoustic space.
 Ampex introduces 499 mastering tape.
1992: Digital audio data-reduction record-play hardware and software is offered to consumers as MiniDisc and DCC.
 The Nagra-D is introduced as a self-contained battery-operated field recorder using Nagra's own 4-channel, 24-bit open-reel format.
1995: The first solid-state audio recorder, the Nagra Ares-C, is introduced. It is a battery-operated field unit recording on PCMCIA cards using MPEG2 audio compression.
1996: Experimental 24-bit 96kHz recordings.
1997: DVD discs and players are now commercially available.
 An audio version with 6-channel surround sound is expected within two years, supplanting the CD in the home.

< page 108 innovation under the aegis of his new company was Dolby A-type noise reduction, a sophisticated new form of audio compression and expansion that dramatically reduced the background hiss inherent in professional tape recording with no discernible side effects on the material being recorded. Among the new concepts Dolby incorporated in his system was the treatment of only soft signals, leaving the loud signals that naturally mask noise unprocessed, and dividing the spectrum into multiple bands to prevent the 'pumping' (noise modulation) inherent with conventional wide-band compressors.

Dolby decided to manufacture his new system himself, and market it primarily to record companies. That decision laid the foundation for what today accounts for some 60% of Dolby Laboratories' turnover: the manufacture in the company's own factories in the US and England of more than 50 different professional audio products that are sold in 50 countries around the world.

But Dolby didn't stop there. He moved on to upgrading theatre sound with applications of Dolby technology, and brought those innovations into the consumer market with the 1982 introduction of Dolby Surround, an extension of the Dolby film sound project.

Then in 1986 he introduced Dolby SR to take analogue recording into the digital age, which propelled film sound into a new era of unparalleled audio quality and realism, both in the mixing of soundtracks and in the soundtracks themselves, which were subsequently released with Dolby SR encoding.

The year 1984 saw the advent of the first Dolby digital coding system, Dolby AC-1, a form of adaptive delta modulation; five years later came Dolby AC-2, a more sophisticated system providing full professional quality audio, and has become *de rigueur* in music recording and film studios for interconnecting widely-separated facilities via economical ISDN lines for remote monitoring, dubbing and other applications.

Dolby AC-3 coding, introduced in 1992, is the most visible Dolby audio coding system (also known as Dolby Digital), developed specifically for multichannel applications including film sound and digital surround sound in the home.

Doing full justice to Dolby's vision would

take a book's worth of words. One of the most honoured of audio professionals (including an Oscar in 1989, Gold and Silver Medals from AES, and being made an OBE in 1986), Dolby's quest for new frontiers now finds a skilled staff of 400 employees working under the Dolby Laboratories banner in modern manufacturing facilities, shaping unique programs to make his technologies available and properly implemented worldwide. His is a unique American success story.

Innovators Les Paul

HE IS 82 years old, has had some health problems in recent years, but Les Paul is still holding forth every Monday night in Manhattan's Iridium Club near Lincoln Centre, fronting a trio and dazzling the assembled multitude with his crystalline, stylish guitar work. How many of those club goers know that the man they're watching is regarded both as one of the 20th Century's most influential musicians and as an audio technology visionary whose innovations helped pave the way for the modern era of recording?

Born near Milwaukee in 1915, Paul was an inveterate tinkerer who built his first crystal radio before he was ten years old. As a youngster he taught himself to play several instruments, but fell in love with the guitar, and with its tonal possibilities. While still in his early teens, he devised a way to obtain a primitive stereo effect by wiring his guitar into a pair of radios placed on either side of him.

He also began experimenting with home-grown recording technology: at age fourteen he recorded himself on a homemade device fashioned from a weighted cutting lathe, a turntable made from a Cadillac flywheel, driven by a small motor and dental belts; at age 19, he was tinkering with the idea of disc-to-disc multiple recordings and found he could record duets with himself, or build tracks of himself playing each of the instruments in the band. The same year he cut his first multiple-overlay disc he also designed a solid-body electric guitar with two pickups.

Battling the sceptics never frightened Les Paul. His stubborn persistence and belief in his own ideas ultimately paid dividends both for himself and the industry he loves. Not that he's stopped working. A call to his New Jersey home invariably finds him tinkering with some new electronic device, no matter what hour of the day or night.

His *raison d'être* is beautiful in its straightforward simplicity: 'First you have to get old, then when you get old you have to cope with it. So you got two problems—one, to get there, and two, what are you gonna do about it? Stay busy. It keeps your head going and you don't dry up and you do the best you can. If you're 5-foot 8-inches, you'd like to be seven feet. No matter how much you try, you're never gonna get to be seven feet. But if you set your sights within range you can do a hell of a lot.'

The other thing is you share with other people and you learn from them. I learned so much from everybody. The longer I'm in this business the less I know and the more I appreciate what the other guy is doing. That's the way I live.'

David McGee ■

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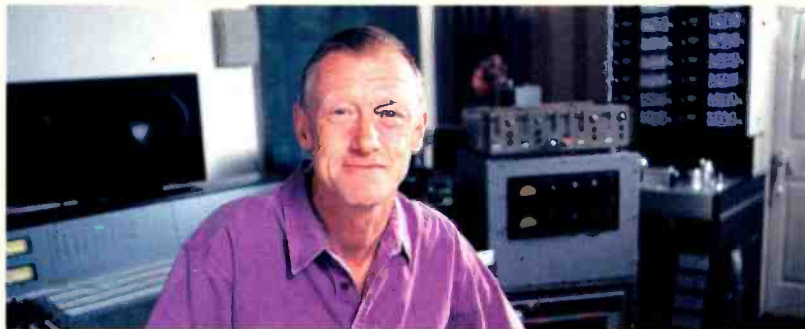


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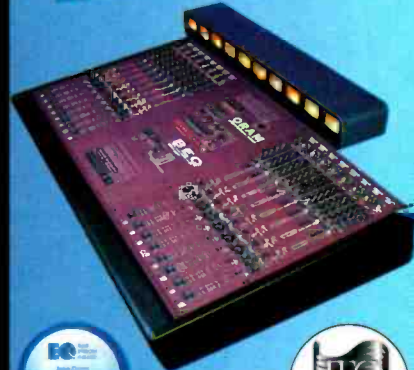


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There is something special about Oram EQ, its control ranges and response shapes have been so well chosen that corrective and creative adjustments appear effortlessly out of it. It also seems to add gloss and smoothness to everything, apparently drawing comparisons with valve designs. It, too, is extremely quiet and clean, it's very difficult to make it do anything unpleasant at all. **Dave Foister,** voted *Technical Journalist of the year 1995.*



The board is so well laid out, easy to use, impossible to distort and the sound, well, the sound is phenomenal! The EQ is smooth and very musical. It sounds like the BIG guys and it's dead quiet. In a word: gorgeous!
Abby Straus and Carl Casella, TRI-MUSIC CORP. New York. BEQ 24.



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John Cale, 'Velvet Underground'
Project Studio, New York. HD EQ-2, MWS and BEQ Series 8.



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US: Re-Pro rides again?

Contrasting national traits have rarely been more visible than when the UK-based Re-Pro approached US shores writes **Dan Daley**

UK READERS ARE, of course, familiar with the Re-Pro organisation. So bear with me for a moment whilst I update any Americans or other aliens peeking in this month. Re-Pro is the evolutionary descendant of the British Producers Guild, whose purpose was implicit in its original name. The title was changed in 1992 when some within the BPG and its nominal mothership, APRS, decided to broaden its membership to include producers from elsewhere, in particular, the US, then and now the world's largest producer and consumer of prerecorded music.

The thinking was sound: if there is strength in numbers, then tapping the massive pool of producers in the former Colonies is an obvious move. Re-Pro's excursions to points outside of the UK have met with some success; the organisation now has a European affiliate, the European Sound Directors Association (ESDA), and an international branch, Re-Pro International. But Re-Pro's initial efforts in the US met with the sort of fear and loathing Americans tend to exhibit whenever they

encounter something they haven't first seen on television. The responses tended to centre on any organisation's potential to set—read limit—rates within the industry. The emotion that this issue aroused is illustrated by the fact that it was the prime focus for many who viewed a producer's guild warily despite the fact that US anti-trust regulations specifically prohibit trade organisations from even discussing rates amongst each other. What Re-Pro really ran into was a clash of cultures. One US producer used an appropriately American sports analogy to me, saying that, like athletes, a producer's successful moment in the sun is relatively brief and can be cut short by mercenary changes in popular taste, just as a football player's career can be prematurely ended by injuries. There is also the 'cowboy culture' that pervades many things American, one that offered another basis for resistance to joining a group. As Peter Filleul of Re-Pro told me, 'The whole notion of the US is based on individual rights within a community. It's easier in a country like England where individuals view duties as importantly as rights'.

With typically British resolve, Re-Pro never gave up its assault on these lucrative shores. And it now seems to found a champion, though a reluctant one. Producer Ed Cherney (Bonnie Raitt, Jackson Browne, Rolling Stones, Manhattan Transfer, *et alia*) quietly took on the mantle of starting a US version of Re-Pro in the States. His hesitancy was based on how much of his time such an undertaking would consume. He found lots of interest and verbal support. But producers are in the business of producing, which leaves little time for organising.

But the support that the idea seems to have won this time around is based on the fact that producers have come to realise that what they produce is, ultimately, content, and with the focus on content in other industries in recent years, they've become aware of what they're missing. Specifically, remixers not getting credit or royalty participation from their work; participation in airplay royalties, which some European producers and more recently and closer to home, Canadian producers now receive; and, with the US record industry in a no-growth mode, leverage to get better audits on their mechanical royalties from labels that are claiming the right to hold reserves as high as 40%. And there are the less obvious benefits that become apparent when organising is detached from its emotional component, such as creaky Baby Boomer-era producers suddenly seeing the benefit of group medical care.

Cherney indeed has his work cut out for him. But he'll be labouring in a much more

Europe: DVD-Audio exposes factions in pro-audio

As the stakes rise on the spec for DVD's audio content, contracting camps are being pitched writes **Barry Fox**

THE INTERNATIONAL steering committee of the IFPI, RIAA and RIAJ currently holds monthly meetings to discuss DVD-Audio. Usually these take place in the Hollywood area but in July the ISC met in London close by the IFPI's offices in London's Regent Street. There they heard demonstrations of 96kHz audio set up by Ted Abe, head of Panasonic's Audio Technology Group in Osaka, Japan. Abe was using a standard DVD video player modified, with British dCS converters, to give 22-bit decoding. Standard production models already have 96kHz D-A converters, but resolution is to 20 bits.

Panasonic has invested heavily in a string of live music recordings, made in Europe and Japan on various disc formats, at different resolutions. The Korean electronics companies have so far been sidelined from all DVD standards and policy, but Samsung is now gunning for a place at the negotiating table.

Based near Cambridge, dCS has been making 24-bit digital-analogue converters for studio use since 1990, has already developed a 24-bit converter that works at 96kHz and has worked on 192kHz sampling at the lower res-

olution (as part of a different project for the BBC). In January, Jaehoon Heo, from Samsung's R&D Labs in Korea, asked dCS about 24-bit /192kHz working. Through June, dCS worked with Kompas CD Multimedia of Holland, to make three demo recordings; a jazz trio in Holland, a string quartet in Germany and choral music in Queens College, Cambridge (see *Studio Sound*, August 1997).

Ted Abe argues that there is no point in seeking any resolution higher than 96kHz and 24-bit coding, 'The least significant bit of a 24-bit word decodes into such a low-level analogue signal that anything smaller will be lost in thermal noise'.

Panasonic has also analysed the sound of musical instruments using B&K's industrial mics. Cymbals are rich in high-frequency overtones but the plots show that there is no useful signal outside the 50kHz bandwidth provided by 96kHz sampling.

Says Abe, 'Sony claims 100kHz bandwidth for DSD. And Samsung suggests sampling at 192kHz. But is it useful or meaningful? The sound from a cymbal is at -80dB at 40kHz. There is absolutely nothing meaningful from a woodpipe wind instrument. And sound at

those frequencies is very directional. The transducer beams like a laser or a pistol. This is not about music. A 50kHz bandwidth is enough. But the standard should be open-ended so that if ever 192kHz sampling is proved useful or meaningful, we can extend'.

The hybrid disc is the lynch pin of the ISC's dream for DVD-Audio. Record companies will press only one disc, which plays either on a conventional CD player or the new DVD player. Two versions of the same recording are stored at different depths. So record shops can stock a single inventory.

'The idea is very attractive,' says Abe, 'but it's idealistic and very hard to realise'.

The only sure way to sell hybrid discs on single inventory basis is to sell them at the same price as CDs—or at most somewhere between the price of a CD and a DVD. But the cost of pressing a CD is now around 20c (US); a DVD costs around \$1.20; and a hybrid will come in at around \$3. Artists may ask for double royalties. The sums just don't add up.'

Abe also warns that the hybrid disc may be unstable, especially in humid environments. A conventional DVD, whether single-sided or double-sided with single-depth or dual-depth recordings, is always a symmetrical sandwich. But the hybrid is asymmetrical. One surface on the disc is sealed aluminium, the other is bare plastics. The two surfaces may also absorb moisture differently and cause the disc to dish. The high density Multimedia CD proposed by Philips was asymmetrical, which is why Toshiba's SD sandwich format won Panasonic's backing and became the DVD standard.

All this and more can be thrashed out at a European Conference which the DVD forum

receptive field than his predecessors did. And the fact that a 'name' American producer has taken the lead on the issue helps the cause greatly. In a sense, Cherney's reputation will do a substantial portion of the work for him. An announcement is expected at the New York AES which will list proposed board members, many of whom will likely be of Cherney's own stature, and that alone could ensure the success of an American producers' organisation.

The American stamp will quickly find itself in this organisation. It has already been decided that the name 'Re-Pro' won't be used. However, the really American thing is what it's going to be like with an odd number of oddballs of the sort it takes to want to produce records assembled in one room. If America is the Great Melting Pot, a stew of musics from rock to rap to jazz to country to whatever, this could well rival the bar scene from *Star Wars*. But a changing industry has forced collectivisation on a lot of the professional industry in the States in recent years, whether Americans are joiners or not. Nashville, a city that no one could organise the studios in, try as they might, now has three—count 'em—three organisations representing its studios and engineers. Chicago and New Orleans are two more cities that now have loose studio confederations, and New York City has several independent engineer collectives. Cherney and company have a task before them, but it looks like the cowboys on their particular range are about

plans for October. But this time there will be a press conference in contrast to the last event in Brussels where the planned press conference was cancelled, with consequent confusion and bad will.

The supreme irony is that while the IFPI and RIAA plan for higher quality new music recording formats, their own member companies are cutting back on research and music production. Philip's PolyGram group has been badly squeezed by competition in the classics market from Sony and budget label Naxos. So PolyGram Classics is now axing the Decca Recording Centre.

The magneto-optical recorders used both by Samsung and Panasonic for DVD-Audio recording, come from Genex, the North London company formed by ex-Decca engineers when Decca decided it no longer needed Tony Griffiths or his R&D. PolyGram's facility at Baarn, in Holland, is also for the chop, leaving a slimmed down Deutsche Grammophon Recording centre in Hannover. The Hamburg offices may relocate to Berlin.

All this 'restructuring' will doubtless make Polygram's balance sheet look better, and help pay for all the money Deutsche Grammophon wasted on trying to make the vague concept of a 4D a household word. Decca President Roger Lewis says that closing Decca's centre was necessary to 'secure' Decca's future. PolyGram has enough new material in the pipeline to last for several years. But the pipeline of new music, and research of the type that produced the Genex recorder will start to run dry—with bad luck at just about the time when PolyGram is trying to launch DVD-Audio with a bang.

Making a killing in radio

Recent reports suggest that a radio is quite safe from damage from technological revolution while its politics remain in their present on course writes **Kevin Hilton**

BACK IN 1979, we were told that video killed the radio star. It seemed to be a clear-cut case, particularly as The Buggles managed to anticipate the coming of the music video boom, but now it seems that the visual medium could quite comfortably make an appeal against its earlier conviction.

Let's examine the evidence. Even before the coming of the video age, radio had to fight off the advances of sound with pictures; while it had quite comfortably co-existed with the cinema, radio really had a fight on its hands with television. When once radio could take the high ground, with programming of an arcane or specialist nature that would not be seen on TV (with the possible exception of minority channels), it had to compete with progressively populist schedules and a growing demand for popular music.

Radio Luxembourg was undoubtedly the pioneer in Europe, the founding pop music radio station that followed the American lead way before anyone else had thought that it was a viable direction. Legend still has it that it was the first channel to play a Beatles record and thousands of listeners braved the coming and going signal to hear the latest cool grooves.

Then came the pirates: the Scandinavian Radio Nord in the 1950s and Radio Caroline in 1964. I've always been ambivalent about stations like Caroline and Radio London; that's not to say that they were not significant but they have been built up to mythic status when, in many respects, they are guilty of creating the bland, superficial strata of radio that is the norm today. There is no denying that there was a need for national pop music channels, as there was a need for alternatives to public broadcasting. The pirates proved that and led to the creation of Radio 1, which recently celebrated its 30th birthday, and the formation of the commercial radio network in the UK (albeit not until 1973, despite the campaigning efforts of failed rock star and politician 'Screaming Lord' David Sutch, who first mooted the idea that was eventually picked up by the mainstream parties).

Commercial radio has spread slowly across Europe, with some countries only legislating for private stations within the last ten years. Even in that short period of time there have been deviations from any initial creative intentions. As with any business, money is the key word but it appears all the more so in radio. In the 1950s America was rocked by the Payola scandals (which ruined top DJ

Alan Freed); these were mirrored by similar ignominy at Radio Luxembourg.

While such controversy has not arisen in recent times, money—getting it, hanging onto it and giving it away—is still of prime importance. All this is tied up with advertising revenue and boosting audience ratings, something that private stations are locked into a deadly fight with public broadcasters. Witness the Capital Radio Group buying Virgin Radio (a deal that has got tacit approval from the Radio Authority but is waiting for further consent), all to take on Radio 1, which has announced poor figures on its key breakfast show since the departure of Chris Evans.

AN ELEMENT that has worried observers recently is the money being thrown at listeners as competition prizes, just to ensure an audience, rather than concentrating on interesting or innovative programming. While the sums involved appear obscene in the UK, it is worse in Germany, where stations are going mad to outdo each other. Amid all of this is the fact that many commercial services are in trouble, either through the strength of public channels or increased competition in the private sector. This is confirmed by a recent report, the Plimsoll Portfolio Analysis (Radio, Second Edition 1997), which has examined 308 companies in the UK and concludes that 33% of the industry is suffering financial difficulties of some kind. It suggests that unless there is considerable change in performance, many will face worsening financial situations, if not potential liquidation.

An extreme example of this can be found in the Irish Republic, where national commercial station Radio Ireland, which probably thought it was on a good thing by launching on St Patrick's Day (17 March), is to revamp its schedules in an effort to survive. Surveys show that the new service has barely troubled public service broadcaster RTE or local stations. With only 1% of the audience, Radio Ireland appears to be following in the disastrous footsteps of the country's first national commercial station, Century Radio, which collapsed despite being backed by big names like broadcaster Terry Wogan and singer Chris de Burgh.

Even in speech-based radio there are problems, with talk stations continually re-aligning and even BBC Radio 4 shaking up its schedule in an effort to boost figures. If things carry on like this, video could soon be cleared. Nobody needed to kill the radio star—it simply committed suicide.

Cables

The misconceptions and arguments that surround the issue of cabling offer professional studios an ideal opportunity to distance themselves from hi-fi hype. **John Watkinson** gives a tutorial on the requirements of analogue and digital signals and speaker applications

FOR SOME reason cables are always a subject of controversy and tend to accentuate the irrational in any debate. Despite the school story of the Emperor's new clothes, phenomenally expensive exotic audio cables are still touted even though their supporting arguments defy the laws of physics. I do get a lot of entertainment from these claims, but the truth has a habit of getting in the way of belief.

It's an understandable, if emotive, argument to suggest that having spent a lot of money on equipment that it is foolish to spoil the result with 'ordinary' cables. Unfortunately it is a fallacious argument because ordinary cables simply don't spoil the result. In fact, on a fixed budget, better results can be obtained in a typical system by using ordinary cables because it leaves more in the kitty for things which do matter like microphones and A-D converters.

Neglecting AC power leads, there are three basic types of cable used in audio: analogue signal cables, digital signal cables and speaker cables. The first two have to deliver information whereas the last also has to deliver power.

In analogue signal cables the goal is to replicate the original audio waveform at the destina-

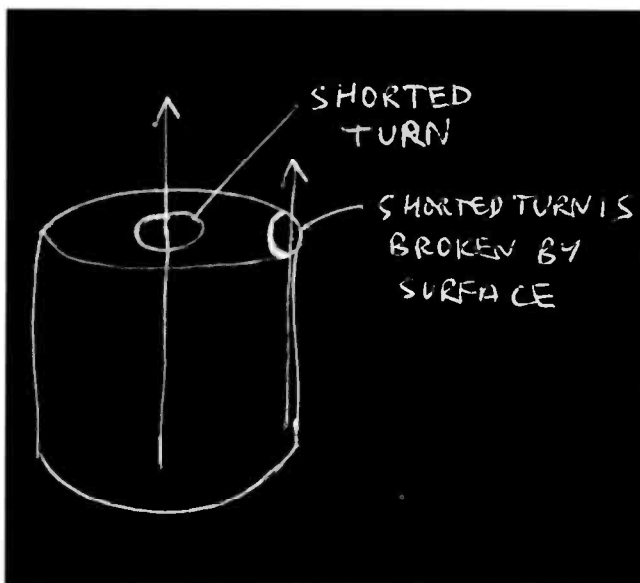


Fig.1: skin effect does exist

tion. It is important to avoid any damage to the waveform which might take the form of additive noise or signal-dependent distortion. Noise pickup is avoided in professional analogue systems using screening and balancing. The balancing accuracy is largely a function of the associated input, but some cables have better screening than others. Noise can also be caused by triboelectrical effects in the insulation which generate voltages when the cable is flexed. So called low-noise signal cables have an

insulation material which reduces this effect.

TYPICAL cable lengths in audio installations are short compared to the electrical wavelength and this means that the distributed cable capacitance and inductance can be lumped as if they were real components having the same value. As modern professional signal outputs have a low output impedance (600Ω being seen only in museums), these stray components are not generally a problem.

Distortion can be linear or nonlinear. Linear distortion is a change of the waveform which doesn't affect the spectrum, in other words lack of phase linearity. High capacitance cables can cause HF phase lag, but this is generally negligible except on the longest runs. Even the most humble cables are quite incapable of generating nonlinear distortion, so forget it. If a system has harmonic distortion, it's not due to the cabling.

The oxygen-free debate rolls on, but really the only benefit of oxygen free copper is a marginal reduction in resistivity which has the same effect as using slightly thicker wire. However, oxygen free copper does at least have an effect that can be measured. In complete contrast, the practice of putting arrows on audio cables to show the signal direction is utterly without foundation. It is a tribute to the power of marketing that high-end hi-fi enthusiasts have managed to replace knowledge with belief to the extent that their behaviour has all the rationality of a Californian religious cult. I wonder how long it will be before the first audiophile mass suicide?

Skin effect actually does exist and it's worth knowing the basics.

Fig.1 shows an element of current in a solid conductor. A current produces a magnetic field, and if the current is alternating the surrounding metal forms shorted turns which cause power loss. Clearly at the surface of the conductor the effect is reduced because the shorted turns are broken. High-frequency currents then prefer to flow on the surface so the effective cross section appears to go down.

The surface area of a wire is proportional to the radius, but the section is proportional to the square of the radius. Thus as the wire gets bigger, the skin forms a smaller proportion of the section and thus skin effect is worse with larger diameter wire. Stranding the wire has no effect as the strands are in electrical contact with one another. The only solution where skin effect matters is to use stranded wire in which the strands are individually insulated.

In analogue audio > page 122

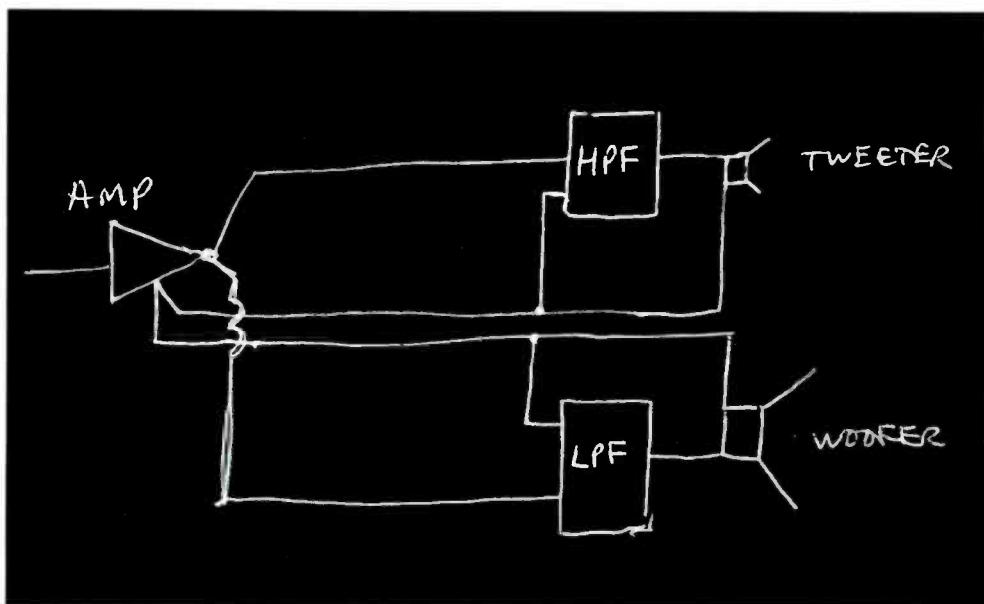


Fig.2: bi-wiring is a useful step

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< page 120 signal wires, the conductor diameter is so small that the skin effect does not become significant until way beyond the audio band. Consequently silver or gold plating the wire to reduce its surface resistivity is a waste of time and money. Actually that also goes for connectors, although gold plated plugs do look nice.

In the digital domain, the goal is accurate transfer of data. In other words the numbers from the source should be transferred to the destination unchanged. When digital audio is serialised for transmission on an AES-EBU link, the frequencies are high enough for transmission line behaviour to be evident on longer runs. The signal amplitude falls with distance setting a length limit beyond which bit errors set in. It is important to match the source, cable and load impedances to prevent reflections. The type of dielectric in the cable affects the losses. Although PVC insulated analogue cable can be used, there are now lower loss dielectrics available for digital audio cabling which allow longer runs. The eye pattern should be checked at the receiver, also the receiver parity indicator. If these are both good, the interface is transparent. If changing a digital cable changes the sound quality, it's not the cable. There is a D-A convertor somewhere which isn't rejecting jitter well enough.

My favourite quote on the speaker cable audibility debate is from Douglas Self: 'Much of this has been raving nonsense'. There's not much I can add to that view. Let's start as ever with the basics. At the highest frequency of interest, 20kHz, the electrical wavelength of a signal is around 15km. This corresponds to 1° of phase shift in 40m. Most practical speaker cables are far shorter than this and consequently the phase shift between the ends of the cable can be safely neglected.

Consequently, speaker cables show none of the attributes of transmission lines. The easiest way to prove this is to test for the most fundamental of transmission line behaviours: a logarithmic signal loss per unit distance measured in dB/metre. Unfortunately speaker cables show a loss directly proportional to distance.

It's just as well that speaker cables aren't transmission lines because we deliberately don't do a very good job of matching. The calculated impedance of a speaker cable is high at audio frequencies, but it is swamped at one end by an amplifier which uses heavy feedback to give an output impedance as close to zero as possible. At the other end the impedance of a typical passive loudspeaker

is hardly constant and highly frequency dependent.

As a speaker cable of typical length isn't a transmission line, it can only be a simple conductor and its important attributes are resistance and the ability of the insulation to resist abrasion in service.

UNtil cryogenic superconducting speaker cables are adopted by the looney fringe, we have to face the fact that there will be an Ohmic loss in the cable. If the loudspeaker were to be a linear device which presents a constant and purely resistive load, the cable and the load would form a potential divider. The loss would take the form of a slightly diminished amplitude, with no change to the waveform.

However, a real loudspeaker doesn't have a constant impedance and so the voltage drop across the cable becomes greater at frequencies where the impedance is lower. This makes the cable appear to have a frequency response. Quality passive speakers have additional components in the crossover which attempt to keep the impedance more constant, but cheap units omit them.

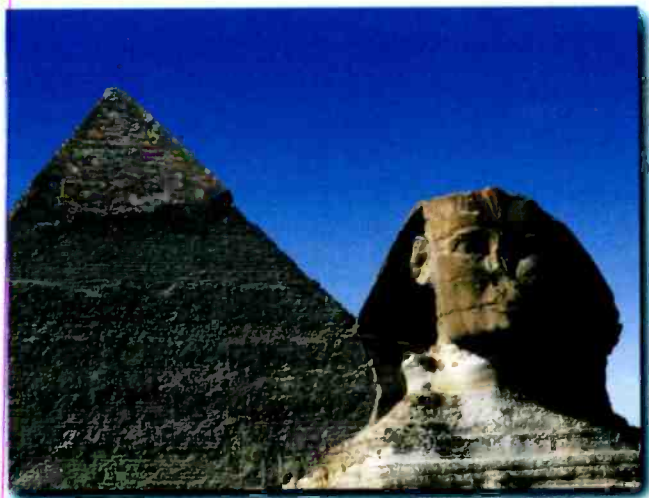
Practical loudspeakers, particularly LF drivers, are not very linear and they generate harmonics. The amplifier output impedance is extremely low and controls the voltage so the harmonics appear as currents. When these currents flow in the

speaker cable it then appears to be causing distortion. These distortion currents are within the passband of the tweeter and are audible.

The most effective way of cabling a passive speaker is to use bi-wiring or tri-wiring. Fig.2 shows that the loudspeaker crossover is divided so that separate wires can be used for HF and LF back to the amplifier terminals. This is a useful step because it removes the woofer distortion currents from the tweeter circuit.

In many woofers the coil inductance changes as the coil moves in and out. When the inductance is part of the crossover, the effect is that the tweeter signal is modulated by the LF cone position. Bi-wiring also removes this effect. However the advantage of bi-wiring will be obtained without exotic cables. Heavy duty mains cable is perfect for the woofer except for kilowatt PA rigs. The damping factor is dominated by the coil resistance and provided the cable resistance is less than 5% of this the damping factor won't be affected. Tweeters actually work better when thinner wire is used because it keeps skin effect out of the audio band. They are mass controlled and don't need damping. ■

My favourite quote on the speaker cable audibility debate is from Douglas Self: 'Much of this has been raving nonsense'. There's not much I can add to that view. Let's start as ever with the basics. At the highest frequency of interest, 20kHz, the electrical wavelength of a signal is around 15km. This corresponds to 1° of phase shift in 40m



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Professional audio file interchange

For those at the coalface of audio postproduction, the absence of an agreed audio interchange standard—PAFI—is an increasing problem. **Rob James** outlines the problems and possible solutions

FROM THE MOMENT there were two, credible, Professional DAW—digital audio workstation—manufacturers there has been a project interchange problem. A lot has been written in recent months on the subject of file interchange. I make no apology for adding to the debate from the perspective of the practitioner and facility manager—the fact is that the absence of a universally accepted interchange standard is holding back development in the industry.

It would be difficult to over emphasise the significance of this subject to the continued progress of professional nonlinear audio recording. While DAWs have become ubiquitous in television and radio production there are other areas, notably feature film production and sections of the music recording industry in which DAWs have yet to achieve the recording the output of the source DAW onto linear tape. Time-code DATs and DTRS (Tascam DA-88) format machines are now common in film facilities: for music digital PCM-3324 or PCM-3348 machines, or 2-inch analogue is frequently used.

The early acceptance of the virtues and vices of DAWs in the broadcast TV and radio companies is unsurprising. Compared with linear techniques, they allow manning levels and therefore costs to be dramatically reduced and, since most projects were handled 'in house' in their entirety, staying with one DAW manufacturer meant projects could be reliably moved through the various postproduction processes.

The advent of nonlinear picture editing systems and the profound changes in broadcast commissioning policies rendered this situation unsatisfactory. A programme might be shot on film, have its rushes synchronised, be edited, tracklaid, have Foleys and ADR recorded and the final mix completed in different facilities each with machines from a variety of

manufacturers. More recently, the same problem has applied to studio based TV programmes originated on tape.

Facilities managers found themselves faced with a series of highly complex problems—beginning with deciding what equipment to purchase. These decisions could no longer be predicated solely on the suitability or cost effectiveness of a piece of kit for the particular process but had to take into account how projects were to be moved to and from processes performed at the facility. Most important was which solution would provide the maximum number of potential clients with a workable route for their project.

Bookings became a nightmare. For example, previously, all a facility manager needed to know about a 16mm film booking to successfully complete it was; how many (physical) tracks will the editor be bringing, is the project in stereo or mono and how long would you like to book? Now virtually every booking requires detailed technical information and discussion about how the project will be undertaken and a careful assessment of which bits of kit will be needed if the booking is to stand any chance of proceeding smoothly. Independent facilities houses have approached this brave new world in several ways. Some have emulated the major broadcasters by bringing as many of the processes as possible into the facility where all stages can be controlled. Other, smaller facilities have relied on linear interchange, physically moving DAWs or using inefficient routes requiring the redigitising of material.

These problems are intensified when projects are moved between countries.

All these facilities companies are, in essence, adding value to the material which passes through them. If an acceptable scheme for interchange is not available, all stages of the production must be completed in the

same studio. From the facility managers point of view it would be nice to imagine that studios could continue to operate in this fashion. While it is certainly possible, clients often find it impractical to work in this way for many reasons, ranging from the technical to the personal. Producers will often wish to use their favourite specialists for particular parts of the process.

The benefits of working with disk-based nonlinear sound and picture are now widely recognised. The lack of a corresponding nonlinear interchange format has not persuaded producers to change their habits; instead, random access projects are transferred to linear media in order to guarantee interchange.

But at what cost? Downloading a series of tracks from a DAW to multitrack tape—analogue or digital—means that most of the edit information is lost. A substantial part of the value added by the operator to the raw material is consequently lost, as will be realised when the inevitable changes are required in subsequent processes. Working in this way leads to inefficiency with decisions deferred to the last possible moment in order to avoid costly and next to impossible backtracking.

It is tempting in this debate to consider the interchangeability of linear analogue media as an ideal to aim for. I believe this is slightly deceptive. Analogue formats are not without their interchange problems. Equalisation can be IEC or NAB. Noise reduction may be present at a variety of operating levels. Head azimuth is not always the same... Only certain track configurations are widely available—such as the 17.5mm magnetic common in Europe especially Germany but unknown in the US. Written information must accompany the material if it is to be accurately reproduced. Cue sheets or track sheets are needed to inform operators what is where if laborious detective work is to be avoided. However, analogue does represent a better situation than that which currently pertains in nonlinear digital.

AS HAS BEEN stated in other articles, there is no technical reason why nonlinear project interchange cannot be as effective if not actually improve on analogue

So, an innocent user may be forgiven for asking the questions, just what is the problem? Why hasn't a credible standard been ratified by the institutions and universally implemented by manufacturers?

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< page 125 In fact, there have been a number of initiatives but, until very recently, there was only one 'standard': OMF, the Open Media Framework originally proposed by Avid. One barrier to the universal acceptance of OMF as the solution is its approach to the problem. The OMF format seeks to describe a complete project in terms of its source audio and video files together with an

tries. BWF or Broadcast Wave Format. A .WAV file in its simplest form consists of two parts. The audio data and a descriptor of the file parameters such as sample rate, bit rate and so on. However, other parts can be added which can contain information only of relevance to specific applications. The crucial factor is the addition of these parts does not render the basic information unreadable by a

There is, of course, the bi-lateral approach, where two manufacturers agree to support each others' native formats. One recent initiative has been an extension of this with a group of manufacturers all agreeing to support each others formats. While this is an encouraging development it does not offer a universal solution

extensive 'composition' structure that defined edits as well as a range of more or less elaborate processing attributes including video and graphics instructions. This makes it extremely complex and in many cases translation is required between a DAW's native format and OMF which can take as long as re-conforming the audio. Although there are developer toolkits available the implementation of OMF requires large R&D resources. Small (and some large) manufacturers simply cannot afford the cost.

An analysis of the real requirements to carry out everyday processes reveals the majority of users have more modest needs.

There is, of course, the bi-lateral approach, where two manufacturers agree to support each others' native formats. One recent initiative has been an extension of this with a group of manufacturers all agreeing to support each others formats. While this is an encouraging development it does not offer a universal solution.

At the other end of the scale the IBM-Microsoft .WAV file or IFF. 85 format is the nearest thing to a universal sound file format for PCs and is increasingly supported by Macintosh software.

What is needed is a LCD—lowest common denominator—approach which can be expanded as requirements change and technology develops.

At the end of 1996 the EBU ratified a new standard as a common format for the broadcast indus-

machine without the extra capabilities.

BWF, although highly encouraging, is not a world-wide standard.

In May 1997, the standards committee of the AES announced that its activity related to computer based audio had been restructured in recognition of the number of important issues in this growing field. There are four new working groups which have been formed under sub-committee 06 covering the topics of file interchange, networks, IEEE1394 (Firewire) and Internet technologies. Following a number of requests it has been proposed that AES 31 xxxx be extended to form a software interchange model for professional audio in four key stages.

THE AIM IS to guarantee basic audio interchange while providing appropriate sophistication for more complex processes. The four key stages are: a Physical Interchange Medium; a Soundfile format to include relevant source data; an Edit List Structure for simple project interchange; and an object-orientated project structure represented by OMF.

It is anticipated the interchange media and Soundfile format will be common to all AES 31 xxxx interchanges. The new Broadcast Wave Format has been proposed for this role.

The physical interchange media is likely to be SCSI although, with an eye on the near future, I hope net- page 128 >

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< page 126 work servers and IEEE1394 will not be excluded. SCSI now has several variants but these are backwards compatible. A reasonable analogy might be 35mm magnetic film with various track formats. If the destination machine is equipped with a range of head blocks and sufficient replay amps it can cope with all the formats. Similarly a fast-wide SCSI interface can read data from a plain vanilla SCSI device.

The Soundfile format, will contain among other things, vital source references. These will enable operators to determine when and on what machine the file was created. There will be an optional place for coding history such as MPEG. The creation stamp will be recorded in the form of Time Reference Low-Time Reference High, in samples-since-midnight. This high-resolution reference can be used with any time code standard. A 64-bit value will provide for the possibility of sampling

rates higher than 48kHz.

These references are of considerable importance to sound-for-picture users and are also applicable to forensic work. This might easily be extended to incorporate source references such as key code, rubber numbers and intermediate telecine time codes. Further parts of the file structure will deal with textual notes or comments and possibly EQ, dynamics and similar process information.

The edit list structure needs to cope with a number of parameters not addressed by the current LCD which is the CMX EDL format in a variety of flavours. Practical DAWs divide into those that render crossfades and non-renderers. This distinction is critical and the proposed format will need to cope elegantly with

files generated on a non-rendering DAW interchanged with a rendering machine and vice-versa.

Audio editing needs to be capable of

greater than frame accuracy, music edits etc. and this too must be addressed by the EDL structure if it is to have universal appeal.

For the most complex interchanges, a development of the object oriented OMF is likely to cater for high end requirements.

This initiative offers a tantalising glimpse of nirvana for all users of digital audio. If the delicate seedling is allowed to grow and become a fully grown tree the whole industry will benefit. Work can be undertaken on the most appropriate equipment for the task from a simple software package on a PC all the way up to full-blown integrated systems in the knowledge that interchange will be guaranteed. At the simplest level this will allow a hard drive to be plugged in to any DAW and audio retrieved and played at the appropriate time. All the layers beyond this are a bonus.

THE ADVANTAGES in this approach to the equipment manufacturer are obvious: R&D effort is only required to implement the appropriate parts of the standard. Additionally, there is no need for manufacturers to release commercially sensitive parts of their intellectual property to their competition in order to achieve compatibility and previously 'difficult' markets such as film will be easier to penetrate.

Perhaps the biggest threat to success is the demon of complexity. The first imperative should be the KISS principle (Keep it simple, stupid) The crucial part is to get the framework right. If this done the bells and whistles can be added later. ■

The physical interchange media is likely to be SCSI although, with an eye on the near future, I hope network servers and IEEE1394 will not be excluded. SCSI now has several variants but these are backwards compatible. A reasonable analogy might be 35mm magnetic film with various track formats. If the destination machine is equipped with a range of head blocks and sufficient replay amps it can cope with all the formats

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Getting your back up

The arrival of practical 24-bit, 96kHz digital recording has reanimated the archiving issue. Turner Broadcasting's **Bill Tullis**—aka Dr Troll—gives an American perspective

TURNER BROADCASTING Systems has grown at a staggering pace over the last few years and, just like at any other company, technical issues change almost daily. In order to preserve the relatively large amount of custom music we produce, technology being used to produce the music had to be addressed.

In earlier days, everything went to multitrack tape. Later, time code became a prime player, then more formats appeared. None were universally compatible aside from the constants, which are SMPTE time code and open reel, or 'organised' multitrack formats such as 8mm—which is winning over SVHS.

At present we're not considering optical mediums for long-term storage. Just as a synthesiser-based studio may not have the same gear in a couple of years because of upgrades—newer storage mediums are specific to propriety systems. Once DVD is fully developed, I might consider dumping the multitrack tapes we have in the vault to that medium, as long as everything can be kept separate track-wise. This is our problem with individual project studios and small vendors: it is necessary to rent a multitrack to transfer everything in real time to tape.

But since SVHS and 8mm have appeared, no-one has the excuse not to transfer elements of other recordings to a moving tape. Right now I am leaning toward the 8mm format as an adjunct to 32-track or 48-track; the only problem with either MDM format is that if you have more than eight tracks, another hardware item is needed, and requires sync equipment to replay.

Where possible, we try to make a straight transfer from the digital domain to analogue. In many cases though, it is more desirable to go through a console to clean up problems that may exist on the original tracks. We did the same when transferring old 24-track material, especially where noise reduction such as dbx Type-1 or Dolby-A was applied. You can't readily find a full rack of

Dolby-A or dbx noise reduction, and we don't usually have the budget or time to rent gear and studios.

On sampling rates, I must hide under the umbrella of popular opinion—although other people I know who do mastering work and remixing-remastering agree—that all recordings should be done at the highest sampling and bit-rate available. To con-

Whoever still has a 3-track or 16-track analogue machine in 10 years may command a pretty penny

vert up is to risk adding unnecessary artefacts to the product; to down-convert is to give up some accuracy. As technology provides better means of creation and storage, items which are spawned on the prior highest level are more confidently transferred later.

From a broader perspective, whoever still has a 3-track or 16-track analogue

machine in 10 years may command a pretty penny while playing or transferring newly-found tapes. Maybe that's why consultants and specialists make so much money. There are some 6-wire recording formats—many don't know it—and there were also between two and five versions of heads for any particular analogue tape format. For instance, ask a mogul about butterfly heads, or differences between metal and ferrite heads. As long as it went to tape and stuck, it was fine. That great tape in its day was stellar, but might sound different if played on a modern machine, be it 1/4-inch, 1/2-inch, 1-inch or 2-inch. And then there were those Stevens machines, not to mention the odd Telefunken 32-track 2-inch decks, and then Dictaphone took over Scully for a while... And on and on.

Getting anyone else to conform to our standards can be problematic. Most are willing, some take the attitude 'call us, and we will do the mix for you', but too often over the past few years, those types have either gone out of business or upgraded gear to a point where it is impossible to reproduce the original project. In effect, a potential performance of genius has been stymied for want of newer and better technology. Regularly and forever, attempts to re-create an original work lack the nuances of the original. We're talking about regular daily production here, not soundtracks or classical recordings.

Optimistically, as long as there is competition there will be a next Great Invention but it would be nice to see agreement on digital formats, and perchance a common software genre to manipulate and transfer data. I used to say that the communists should have invented hard disks, DOS, and computers. That way, there would only be one—or at worst just a few—to choose from. But then, everyone who wanted to extend or improve the standard would have to go through a lot of red tape. Or is that the way we live now? ■

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Low Cut filters (18dB/oct. @75Hz) on mono mic/line channels allow use of low-frequency EQ on vocals without boosting room rumble, mic thumps, P-pops and wind noise.

Trim Controls on mono channels have 60dB total gain range for boosting weak sound sources and a 10dB "virtual pad" for taming hot digital multitrack outputs.

2 Aux Sends per channel (one globally switchable pre/post, one post-fader), each with 15dB of gain above Unity to boost weak effects.



3-band equalization with 12kHz High shelving EQ, broadband musical 2.5kHz peaking Midrange & 80Hz Low shelving EQ.

Constant loudness pan controls.

Stereo in-place Solo.



Mute button routes signal to "bonus" Alt 3-4 stereo bus outputs & Control Room matrix. Handy for both recording and live applications.



MSI402-VLZ ONLY: 60mm logarithmic-taper faders based on our exclusive 8-Bus design. Long-wearing wiper material and tight polymer lip seals to protect against dust & other crud.



Built-in power supplies — no outlet-eating wall warts or hum-inducing line lumps.

Phantom power so you can use high quality condenser microphones.

XLR outputs with mic-line level switch (along with 1/4" TRS outputs on top panel).

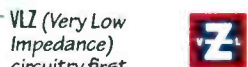
MSI202-VLZ = 12x2 = 4 MIC PREAMPS



MSI402-VLZ = 14x2 = 6 MIC PREAMPS



All inputs & outputs are balanced¹ to cut hum & allow extra-long cable runs, but can also be used with unbalanced electronics.
¹ except RCA tape jacks, headphone jack & inserts.



VLZ (Very Low Impedance) circuitry first developed for our 8-Bus console series dramatically reduces thermal noise & crosstalk in critical areas.



Control Room outputs feed monitor speakers without tying up the headphone jack.

BOTH MODELS HAVE:

Radio Frequency Interference protection via metal jacks & washers plus internal shunting capacitors.



High-output headphone amp can drive virtually any set of phones to levels even a drummer can appreciate.



Aux 1 Master level control & pre/post switch.

Effects Return to Monitor switch folds Aux Return 1 effects into a stage monitor mix via Aux Return 2 level control.



RCA-type tape inputs & outputs.

Peak-reading LED meters with Level Set LED combined with In-Place Solo allows fast, accurate setting of channel operating levels for maximum headroom and lowest noise floor.

Control Room/Phones Matrix adds



monitoring, mixdown & metering flexibility. Select any combination of Main Mix, Tape In and Alt 3-4 signals for routing to phones, Control Room outputs and meters. Can be used as extra monitor or headphone mix, tape monitor, or separate submix. Way cool.

Tape Assign To Main Mix assigns unbalanced RCA tape inputs to main mix. Besides its obvious use as a tape monitor, it can also add an extra stereo tape or CD feed into a mix or play music during a break.

MSI402-VLZ only: Global Solo Mode selects PFL or AFL solo modes.

Solid steel chassis & thick fiberglass internal circuit boards resist abuse.

Channel inserts on mono channels.

Not every production project requires dozens of input channels and boatloads of buses.

But doing ANY audio job well requires a mixer with superb specs...and the right combination of useful features.

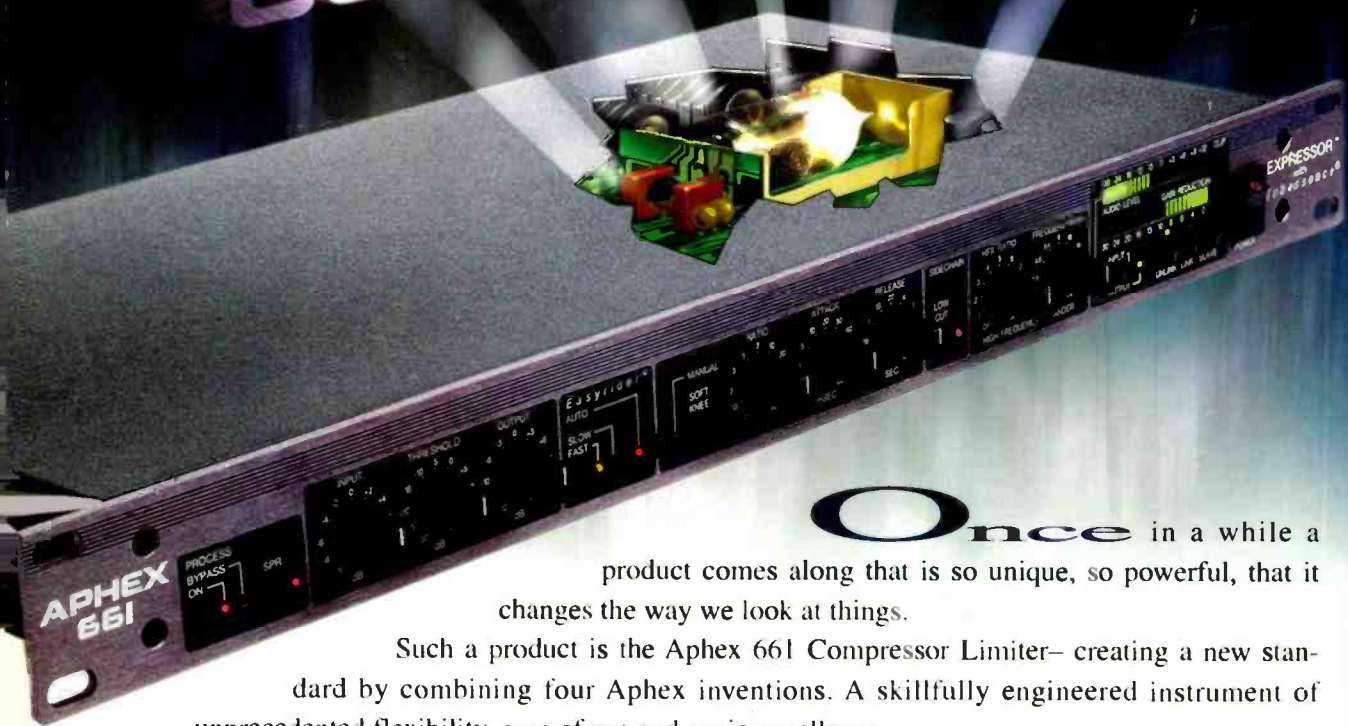
Our MicroSeries 1202-VLZ and 1402-VLZ might have small footprints, but when it comes to performance, they walk very tall.

Since both are basically chips off our blockbuster 8-Bus Series consoles, they have big-board specs:

greater than 90dBu signal to noise ratio, less than 0.005% distortion, more dynamic range than compact discs and frequency response that's only down 1dB at 60,000 Hz.

Why own an imitation when you can own the brand of compact mixer that serious pros prefer. Call for info today.

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