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Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE
FOR RECORDING, POSTPRODUCTION & BROADCAST



EXCLUSIVES

tc electronic FireworX
Earthworks Z30X; QTC1; Lab 101-102
Prism Maselec MLA-2; MEA-2
Tascam MD-501; MD-301
beyerdynamic MCE 82
SPL Machine Head
Weiss Gambit EQ1
Sony PCM-R300
Jünger Vamp1
Otari DX-5050
ADL 1500

DAB

Driving or hitching?



The
ARIF
MARDIN
Interview

RECORDING FOR BLUES BROS 2000
COLIN SANDERS: A TRIBUTE
MAC-PC AUDIO WARS
SOUND FOR SPHERE



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4 Editorial

On sight and sound

6 Soundings

Hot news from pro-audio

8 World Events

The real industry diary

10 Letters

Mix throws down the gauntlet

12 Colin Sanders

A tribute to an innovator

52 SSAIRAs
Cast your votes

Reviews

18 Otari DX5050

Exclusive: portable MO editor

22 tc electronic FireworX

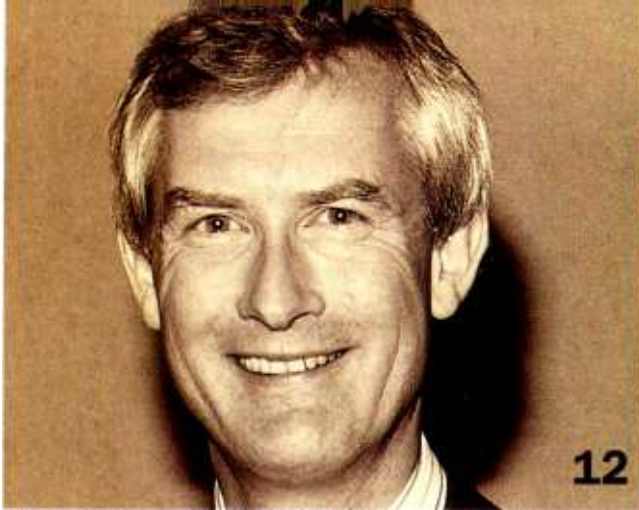
Exclusive: adult digital fx

24 Prism-Maselec MLA-2; MEA-2

Exclusive: precision comp-EQ

28 Earthworks Z30X; QTC1; Lab 101-102

Exclusive: US mics and preamps



12

32 Weiss Gambit EQ1

Exclusive: Swiss digital EQ

37 Tascam MD-301; MD-501

Exclusive: affordable MiniDisc

38 Sony PCM-R300

Exclusive: affordable DAT

40 Jünger Vamp1

Exclusive: smart digital VP

42 ADL 1500

Exclusive: US stereo compressor

44 SPL Machine Head

Exclusive: digital tape emulation

46 Demeter HM-1

Hybrid US valve preamp

48 Totalsystems DBM 3

British digital audio meter

Above: *Studio Sound* pays tribute to SSL founder, and mentor Colin Sanders following his tragic death

50 beyerdynamic MCE82

Exclusive: classy stereo mic

Features

55 Interview: Arif Mardin

Defining the producer's role

65 Broadcast: DAB

Queuing for the airwaves

70 Recording: Blues Brothers 2000

Rebirthing the Blues

77 Postproduction: Sphere

Below the water line

85 Facility: Gaurav Digital

Indian post house

90 Broadcast: MD in the field

MD viability on trial

92 Horizons: Platform wars

Mac vs Pc: the sequel

Comment

104 Comment

Breaking the news

105 Broadcast

Surround in the streets

114 Open Mic

The Asian angle

Technology

107 Dr John

The first part of a two-part account of telephony basics and the workings of ISDN

111 Digital dubbers

A hot report from AES NAMM summit on the state of digital audio dubbers

www.prostudio.com/studiosound

Below: *Blues Brothers* attitude to sound; posting *Sphere*; Weiss EQ; Maselec EQ



70



77



32



24

Five minutes

I was fortunate enough to have overheard a conversation at a digital desk presentation at the NAMM show having parked myself in front of two 40-something gents. With nothing to do but look at a blank screen in the five minutes before the next presentation kicked in, my ears swivelled.

Within seconds it became apparent that the two knew each other and were involved in audio postproduction (at a NAMM show!) certainly at a managerial level as they implied that they were there to look and buy new 'bits and pieces', as one of them said.

Their appraisal of what they had seen was revealing. 'The trouble with a lot of this stuff is that it's such a job keeping up with it,' said one. The other had a requirement for a combined MIDI/hard-disk system for a new sound design room and knew his hard-disk audio but wished he had his young sound designer with him to advise on the rest. 'The good thing is that it's all so cheap in comparison to what we're used to paying, the downside is that the computer stuff is so difficult to get working out of the box and you never know who to phone to complain. They're promising us the world next week but I'm tempted to just go out and get another of our workstations and buy a bigger monitor for his sequencer.'

At this point they were joined by what I decided was a young project studioist and they responded to his enthusiastic questions... 'Yep, the faders move... yep, you can do all that stuff with the EQ... yep, it's cheaper than the other one but you got to add on the interfaces, the meter bridge and the computer for the automation... sure it's in the running, I'm looking at five small desks just to have around the place for the video suites and stuff... no, I don't know if it has MIDI... oh, really? You'd be able to do that? Tell me, what do you make of that MIDI/hard-disk system over there?'

Zenon Schoepe, executive editor

Atarashimi: the new new

THERE IS A JAPANESE term, *atarashimi*, meaning, literally, novelty. Used in conjunction with hokku—a form of Japanese poetry—it refers to the newness of perception of nature expressed by the poet. It was, for example, a notable aspect of Matsuo Basho's *Hatsukaishi Hyochu*, a critique of a collaborative work by Basho himself and 15 of his students. But while this was published back in 1763, the concept of *atarashimi* is alive and well and active in professional audio.

It accompanied the arrival of stereo when a new dimension was added not only to the recording process, but to countless (stereo) record collections when they were first aired on a stereo system. And it happened with the arrival of digital when the noise floor fell away. But these events should not be confused with something that's simply new, something that has not been heard before. Rather, they are exactly as the Japanese usage has it—a development of perception, a rediscovery of something that is already there. Proof, if you need it, lies with a second reciprocal occurrence of *atarashimi* that frequently accompanies the first.

Viewed conventionally, digital audio has addressed some of analogue's shortcomings while introducing some of its own. It has also, however, changed the way in which analogue audio is viewed—analogue itself has not changed, but our perception of it, and most critically our appreciation of it, has changed dramatically. The same can be said of radio, although the reaction time has been rather slower. Previously all but dismissed as having been superseded by the more capable medium of television, radio is presently finding renewed appreciation for being nothing more than it has ever been. (Video killed the radio star? Mistrial.) And in the face of an avalanche of multichannel options, the same appears to be happening to mono.

The accepted view of the human condition has us readily reacting to change almost indiscriminately—one study showed an improvement in productivity when music was introduced to a production line, and a further increase when it was withdrawn. But this doesn't appear to be the case here. We're comfortably beyond finding valves appealing simply because something else has arrived, and we're way beyond mere snobbery. This accepted, there is nowhere else to look for an account of the current popularity of valve outboard or the endurance of analogue 2-track machines. It has to be *atarashimi*.

Perhaps the situation also bears reference to our night vision: sometimes you have to take your eye off the ball in order to be able to see it. **Tim Goodyer, editor**

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March 1998 Studio Sound

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▲ UK: More Genelec monitors have found favour in London's Roundhouse studios. Pictured with the new Genelec 1039 system now installed in Studio Two is chief engineer Fred de Faye whose belief is that the compatibility between the facility's three studios in terms of monitors will complement that already offered by the choice of SSL consoles throughout. The policy has proven popular with a number of recording projects including one by current pop darlings All Saints. Roundhouse Studios. Tel: +44 171 485 0131

▼ US: Miami studio The Gentleman's Club threw its all into a recent recording project for a new artist—including the services of studio manager and engineer Charles Dye (below). New Universal Records signing singer-songwriter Billie Myers' album *Growing Pains* was the focus of the 48-track Pro Tools-based session which involved importing recordings of the rhythm section made a Criteria Recording and then building up the guitar, keyboard and vocal parts at The Gentleman's Club using a combination of Pro Tools plug-ins and a selection of Focusrite and Neve preamps, Focusrite and Empirical Labs compressors, and Neve and Pultec EQs. The effort is currently rewarded with a Billboard placing of 20 with a bullet for the debut single, 'Kiss the Rain'.

One-stop DVD production

UK: A new DVD production line has been opened by London facility, Tele-Cine. The move is to provide a one-stop DVD shop and follows a careful evaluation of the world DVD market and consultation with the facility's major clients. Head of production, Jeff Emerson, comments: 'We are satisfied that there is a large niche for us in this market. Following the model of digital videotape mastering, we have built an integrated facility that will not only fulfil our clients' DVD requirements but will also function as a department to run in conjunc-

tion with our existing digital mastering resource, allowing clients to fulfil home video language requirements whilst utilising the same elements. With the pressure on distributors to get product out across the formats on a day-and-date schedule, we know this to be the only practical production solution.

'One of the key aspects to successful DVD operation is the amalgamation of a range of post-production disciplines. Not only do we have the necessary expertise to work with graphics and

multichannel audio, but we are also developing a true digital post environment in conjunction with another recently launched service called File Exchange. This will enable anything from on-line delivery of TIFF files and audio tracks, to asset management and production tracking. As anyone who has made a disc knows, it is this organisation and information exchange that is half the battle.'

The venture will employ elements from Minerva Systems, Daiken Software and Dolby Labs. Tele-Cine. Tel: +44 171 208 2200.



◀ US: The recent Broadway debut of Disney's *Lion King* saw a cast of 48 and a 23-piece orchestra take the boards at the refurbished New Amsterdam Theatre along with over 100 puppets, a 13-foot elephant and 26-foot flying giraffes. FOH sound was handled by a 117-input Cadac J-type console with 111 motorised faders and 8 programmable dual-input modules under the control of Scott Stauffer. On stage were a huge array of mics including 45 Sennheiser radio systems.

Surround soundings

Worldwide: The proliferation of Dolby's surround formats progresses with a number of continental television broadcasters agreeing to 'flag' Dolby encoded programmes with the Dolby Surround logo for broadcast—for which Dolby's figures claim an audience of over 30m worldwide.

The latest tranche of licensees includes Pro 7, one of Germany's top five television broadcasters, and the French Canal+ and Canal-Satellite TV stations. In addition,

France 2 in association with France 3 is preparing to cover World Cup 98 with sound in Dolby Stereo. The event will be broadcast on a special channel, Superfoot 98, in 16:9 aspect ratio beginning on June 10 and offering 10 hours of coverage per day including matches, archive footage, and behind the scenes scenes. The broadcast will use the TPS digital satellite system.

An announcement made in Tokyo by the DVD Forum Steering Committee has named Dolby Digital as one of the mandatory PAL DVD audio formats.

Dolby Labs. Tel: +1 415 558 0200.



▼ **UK:** Closed since the Arndale Centre bomb blast, the Manchester Royal Exchange Theatre is now due for a major refit by the Oxford Sound Company. Extensive damage was sustained through the explosion, just 150 yards distant; although the distinctive Module Theatre's glass dome escaped. Inside, a heptagonal auditorium hosts in-the-round productions demands a particularly flexible sound system that will consist of a 68-box Meyer setup including UPA 1Cs, UPM2s, MSL2As and USW1s addressed through a Timax level and delay matrix system. Audio playback will be from Akai samplers and Denon MD machines with Yamaha and Lexicon reverbs via a Mackie 8-bus desk. The theatre is set to reopen its doors towards the end of this year. The Oxford Sound Company. Tel: +44 1608 659025



Belgian hospitality

Belgium: Opening its doors for a general inspection, the Belgian La Chapelle Recording Studios and Medias Waimes is expecting to attract the industry's attention on 27th-29th March.

The open invitation is to coincide with the opening of its TV studio: it will also be accompanied by a CD presentation '2gether'. More information and formal invitations can be secured from La Chapelle in Waimes (Tel: +32 80 670037, Fax: +32 80 670029, Email: studios@skyney.be).

Audio 98

UK: The details of the Audio 98 show have been announced by the APRS and Single Market Events organising body. The venue is to be London's Olympia 2 hall and the show is set to run from Thursday 12th November to Saturday

14th November. The show aims to attract recording industry professionals and will feature exhibitors and workshops from recording, film, broadcast and audio post-production.

APRS. Tel: +44 118 975 6218.

Single Market Events.

Tel: +44 181 948 1666.

▼ **Music recording facility** RG Jones Studios has recently enjoyed a major refurbishment that has seen the enlargement of its control room and a general upgrade of acoustic treatments and decor. The work involved a 3-week shutdown, but has seen the facility reopen with a new Studer A827 24-track analogue multitrack to accompany its existing 32-track digital recording, and a complete overhaul of its SSL console. RG Jones Studios. Tel: +44 181 540 9881



■ Nashville's Starstruck Studios has installed a Pro Tools 24 system in each of its two music recording studios. Each of the SL9000j-equipped rooms now has a 32-track Pro Tools with 16 inputs and outputs, and additional DSP Farm cards running on a Macintosh 9600-300 platform. Both studios' systems also have Antares Auto Tune and VocAlign plug-ins, as well as Sample Cell and Studio Vision Pro software. Further down Music Square, the Underground Sound rental organisation has added Sony PCM-3348 DASH machines. Manley Vox Box mic channels and Avalon V-737SP outboard units. Its existing 3348s, meanwhile, have had their filters upgraded.

Starstruck Studios, US.

Tel: +1 615 259 5440.

Underground Sound, US.

Tel: +1 615 269 7131.

■ Swedish commercial radio station Radio Rix has installed a further eight Orban Optimod FM 8200 digital processors at its transmitter sites, ensuring that all its broadcasts are now Optimod encoded. Rix supplies 70% of the country's population with 'adult contemporary' music, news, weather and traffic reports. Swedish Radio, meanwhile, joins the Finnish Broadcasting company and Rome's Capital Radio in adopting Junger Vamp digital voice processors for its broadcasters. To date, the Finnish installation has taken 12 of an intended 50 units while the Italian order is for four Vamp2 units.

Radio Rix, Sweden.

Tel: +46 705 901 559.

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

Junger, Germany. Tel: +49 30 6777210.

■ London's Livingston Studios has recently undergone a major refit of its Studio 1. Designed jointly by London Sound Design and Livingston's Jerry Boys, the changes include the construction of four isolated recording areas and the installation of a Neve 33609 compressor.

Livingston Studios, UK.

Tel: +44 181 889 6558.

■ Korea's MBC has installed a 20-channel Calrec Minimixer in its OB vehicle No.10. The 13th such desk in use with MBC will see action over on-air sports coverage. Seoul's KBS, meanwhile, has installed two 12-channel Minimixers, one in its TV opening hall for music and variety work and the other in its news centre for news and documentary programmes. A further recent Korean Minimixer installation is to be found at Samsung's Studio A, for educational, news and special project work.

Calrec, UK. Tel: +44 1442 842159.

■ Californian post houses, Soundelux-Signet Sound and 20th Century Fox Pictures, have both placed new Neotek Essence desks in ADR and Foley stages, while Monterey Post and The Enterprise, have installed Miller & Kreisel loudspeaker systems. Monterey Post's MPS 5.1-channel THX-certified system includes MPS-150s for LCR, four MPS-150 SUR tripole surrounds and MPS-350 SUP active subwoofer has gone into its new DVD rerecording suite which also contains Euphonix and Yamaha consoles. The Enterprise has added a further pair of MPS-5000 SUB units for its 'living room style' sweetening and mixdown studios.

Martinsound, US. Tel: +1 626 281 3555.

M&K, US. Tel: +1 310 204 2854.

■ London's Sega Digital Studios has installed the largest Pro Tools 24 system installed outside the US. Running on a Macintosh 9600-350, the 64-track system uses eight DSP cards, with its 48 I/Os served by six 888 24-bit interfaces. Operation is via a Mackie HUI interface. Storage is handled by two 9Gb Seagate

Cheetah hard disks in Rourke Data rack system, with archiving on Exabyte and Jaz drives. Among the plug-ins included in the setup is a Dolby Surround Tools module. The console is a Mackie 32:8:2 with two 24e sidecars while monitoring is handled by an M2-based DynaudioAcoustics system

Sega, Europe. Tel: +44 181 995 3399.

Digidesign, UK. Tel: +44 1753 653322.

■ Mexico's video post facility Virgin Television de Mexico has moved into audio post. The move is facilitated by the installation of an SSL Scenaria with VisionTrack and is a response to client needs outstripping Virgin Television's previous capabilities. The new system will be used to mix and edit audio for commercials.

Virgin Television, Mexico.

Tel: +1 11 525 546 0113.

SSL, UK. Tel: +44 1865 842300.

■ German take-up of the Stage Tec Cantus console continues with a fifth desk going to Bayerischer Rundfunk for its Gasteig concert hall installation in Munich, two desks going to Deutscher Oper in Berlin, and one to German university Muzikhochschule Detmold which specialises in training audio engineers.

Stage Tec, Germany.

Tel: +49 951 71295.

■ Tokyo's Studio Crow and Nihon TV Video have furthered their investment in AMS Neve digital desks. Studio Crow has installed a 24-fader Capricorn in its No.4 MA Room following the earlier installation of a 48-fader Capricorn.

Duties will include posting television programmes and commercials. Similarly, Nihon TV Video's order for a 36-fader Libra console follows its installation of a Capricorn. The desk will be used for TV programme production.

Studio Crow, Japan.

Tel: +81 3 5632 8011.

Nihon TV Video, Japan.

Tel: +81 3 3265 4556.

AMS Neve, UK. Tel: +44 1282 457011.

■ British-based Manor Mobiles has bought two Studer D827 DASH machines. The 48-track digital recorders will be used in Manor's two main trucks.

Manor Mobiles, UK.

Tel: +44 181 756 0660.

Studer, Switzerland.

Tel: +81 1 870 7511.

■ American music recording facility NRG Recording Services is to install an SSL SL9000j console in its newly built Studio C. The new room is designed by Studio 440's George Newborn whose themed work sees the 72-input desk sporting a custom 'Gothic' look to complement Studio A's Art Deco and B's Moroccan themes.

NRG, US. Tel: +1 800 760 7841.

SSL, UK. Tel: +44 1865 842300.

■ Worldwide studios operated by the BBC's World Service will be installing Audionics Audio Workshop packages—a custom version of Audionics' ACE broadcast console—for local preparation of programmes that are then submitted to London. Among those preparing for the new installations are sites in Jakarta, Belgrade, São Paulo, Dar Es Salaam, Sofia, and New York's UN building. Additionally, the World Service Bucharest studio is to install a 6-channel ACE console.

Audionics, UK. Tel: +44 114 242 2333.

■ Swisscom AG telecommunications has commissioned the first use of 2Mbps digital audio switcher for its national switching centre in Zurich. Handling telephone calls as a side function, the Mandozzi Electronics switcher is able to eliminate any audio glitches, featuring sample-rate conversion to sync all incoming audio to the system clock.

Mandozzi, Switzerland.

Tel: +41 91 945 2351.

March

3-5

Replitech Europe
Utrecht, The Netherlands.
Contact: Knowledge Industry Publications.
Tel: +1 914 328 9157.
Net: www.kipinet.com

11-13

The Production Show 98
Business Design Centre, Islington London N1, UK.
Contact: EMAP Media.
Tel: +44 171 505 8130.
Fax: +44 171 505 8020.

11-15

Musikmesse
Frankfurt, Germany.
Contact: Anke Witte.
Tel: +49 69 7575 6596

16-17

AES UK Conference: Microphones and Loudspeakers: the ins and outs of audio
Church House, London.
Tel: +44 1628 663 725.
Email: AESUK@aol.com

16-19

Technology India 98
Bombay Exhibition Centre, Mumbai (Bombay), India.
Contact: Above & Beyond Exhibitors.
Tel: +91 11 651 0205.

Email: vikas.gulaty@gems.vsnl.net.in

18-21

ITA
Ritz Carlton, Laguna Niguel, Dana Point, California, US.
Tel: +1 609 279 1700.
Fax: +1 609 279 1999.

23-27

4th BTV China 98 and 3rd COMMTEL China 98
Contact: Business & Industrial Trade Fairs.
Tel: +852 2865 2633.
Fax: +852 2866 1770.

29-1 April

SIB 98
Rimini Trade Fair, Italy
Contact: Tony Andrew—KMS
Tel: +44 1323 442747.
Email: andrewkms@aol.com

31-2 April

World VSAT Communications Congress 3
Cavalieri Hilton, Rome, Italy.
Contact: AIC Conferences.
Tel: +44 171 242 1548.
Fax: +44 171 242 1508.

April

14-16

PLASA: Light and Sound Shanghai
Intex Centre, Shanghai, China.
Contact: P&O Events.

Tel: +44 171 370 8231.

Email: shanghai@eco.co.uk

27-28

DVD Forum
The Berkley Hotel, London, UK.
Tel: +44 171 691 9191.
Email: dvd@iqpcco.uk

29-30

20th ABTT Show
Hall One, Royal Horticultural Halls, 80 Vincent Square, London SW1, UK.
Tel: +44 171 403 3778.
Email: office@abtt.org.uk

May

16-19

104th AES Convention
RAI Conference Centre Amsterdam, The Netherlands.
Tel-Fax: +31 35 541 1892.
Email: 104th-chairman@aes.org.
Net: www.aes.org

18-20

Cable & Satellite 98
Earls Court 2, London, UK.
Net: www.cabsat.co.uk

21-27

Expo Sound & Light 98
Romexpo Exhibition Centre, Bucharest, Romania.
Tel: +44 171 886 3103.
Email: info@otsa.prestel.co.uk

26-28

TV 98

Thermal Hotel Helia, Budapest, Hungary.
Tel: +361 153 1027.
Email: hiradastechnika@mtesz.hu
Net: www.mtesz.hu/hiradastechnika

26-29

Midem Asia 1998
Nusa Dua Beach Resort, Bali
Tel: +331 41 90 46 31.
Net: www.midem.com

29-31

5th Annual Latin-American Pro Audio & Music Expo Miami 98
Miami Convention Centre, Miami, Florida, US.
Contact: Studio Sound International.
Email: chris@ssiexpos.com
Net: www.ssiexpos.com

30-June 2

Nightwave 98
Rimini Exhibition Centre, Italy
Contact: Ms Gabriella de Girolamo.
Fax: +39 541 711243
Net: www.fierarimini.it

June

2-5

5th Broadcast Asia 98 and others
World Trade Centre, Singapore.
Contact: Overseas Exhibition Services.
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Sound advice

I JUST SAW your November issue—it takes a while for the issues to arrive here in the States—and I think your writer Dave Foister has pulled a fast one on you. From reading the 'review' of the AKG SolidTube, it's clear that he never used the microphone at all—never plugged it in, never recorded a single track with this mic.

At one point in the article, he talks about the sight of the valve glowing through a red window in the body. In the ads and brochures for the mic, this glow is quite bright, illuminating the logo brightly; however even in dim studio lighting, the actual glow visible is so faint that one has to look quite closely to see if the tube is powered at all!

In another point, Dave says that all of the mic accessories fit 'neatly' into the aluminum carrying case. In my experience with the mic, the case is so cramped that it's nearly impossible to get everything back into the case unless you roll the cable into a very tight 3-inch diameter coil, which is not a recommended procedure with any audio, particularly a non-standard 7-pin XLR cable! (Especially when replacement cables would not be readily available.) In fact, the cable that accompanies the SolidTube is of embarrassingly low quality for an AKG product, it has a very small diameter (1/8-inch), and is highly susceptible to kinking and was a constant problem in actual studio conditions. Of course, had Dave actually used the mic, he would have noticed this...

I respect you quite highly and I think you deserve better from your contributors. Sincerely,

**George Petersen, editor,
Mix magazine, US**

Dave Foister replies: We all know there are magazines that print 'reviews' of equipment the author has never seen, but that's not the way we do things at *Studio Sound*. I have never written a review of anything I haven't personally used at every available opportunity, and



I deeply resent your suggestion—nay, unequivocal statement—that I did so in this case.

Since, in fact, I had extensive experience of the SolidTube over a period of weeks, your comments come down to mere differences of opinion. You might not be able to see the valve glowing in the window, but I can and so could the many singers and instrumentalists who found themselves standing in front of it. You might not be able to get the cable into the flightcase but I can—it fits in the cavity beneath the PSU coiled no more tightly than most valve microphone cables. You might consider it lightweight and awkward, but I regard it as perfectly adequate for the job—its more substantial than the Neumann M149 cable, but, perhaps, you haven't seen one of those.

I note that you don't disagree with what I said about how it sounds, so your comments are reduced to petty carping over trivial details of a good microphone at a bargain price. This makes it all so pathetic to be almost amusing, which is lucky for you otherwise I might be looking to m'learned friends for advice.

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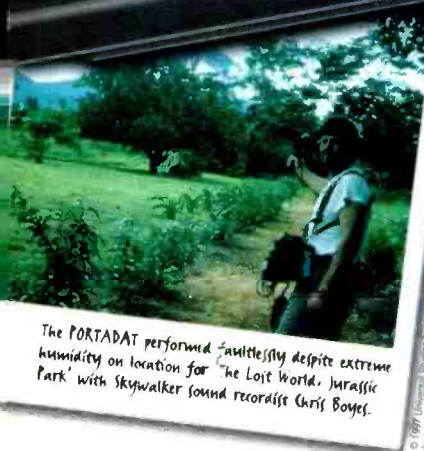


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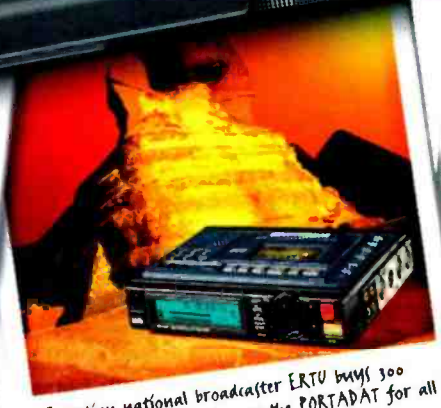
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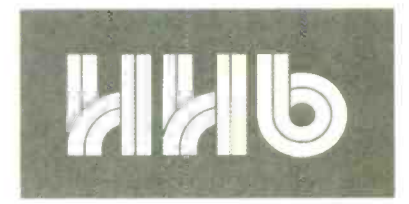
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Colin Sanders

THE UNTIMELY DEATH of Colin Sanders at the end of January closed a chapter on a most extraordinary period of change in the world of professional audio. Best known as the founder, managing director and chairman of SSL until 1991, Sanders had not been connected with any recording industry interests for the last seven years. Many are conversant with the transformations he caused, armed with little more than a few very good ideas and the determination to make them happen.

His expertise in electronics was largely self taught. There are tales of his building, aged eight, a telephone system between his bedroom and that of his twin sister, with the option of a light or buzzer alert for night and day. Involvement in local theatre production followed later, and an interest in lighting that led to the development of automated lighting systems for various projects.

Solid State Logic was formed in 1969 by Sanders to build electrical control systems for church and cathedral organs which he designed and installed. His first employee, Colin Bateman, joined in 1970 while everything was run out of a bedroom in his parent's Oxford house where he 'worked as a little dynamo and was into everything'. The organ business grew and by 1982, over 8,000 systems had been installed in over 23 countries.

Sanders had been a chorister when young, and had a good knowledge of music, but didn't play an instrument which often caused a surprise to his organ-installation clients. He saw music as a wider issue and started a record label, Acorn Records to issue theatre and classical organ music. Although this was treated as a hobby, it was where Sanders' passion increasingly lay. He kept designing and building more sophisticated recording equipment and the label gradually became a studio.

In 1971, a brief mention in *Studio Sound's* Studio Directory indicated that the whole operation was about to move outside Oxford to the village of Stonesfield where a small building initially doubled as a workshop and studio. Later, following the purchase of the rest of the building, there was then room for a dedicated studio that remained a console demo facility even many years later.

The small studio became successful and they decided to go multitrack. There was no likelihood of buying a console so Sanders threw himself into intensive R&D, studying all

the, then, available consoles while adding features that experience in the studio suggested would be useful.

Although the 'official line' was that he only ever wanted to build a console for his own studio's use, there never being any intention of making them for others, this is probably a romanticised view. Following all the research and the development of an original concept it seems fairly clear that Sanders designed it on a production-orientated basis from the very

beginning, and, of course, it later turned the whole industry round.

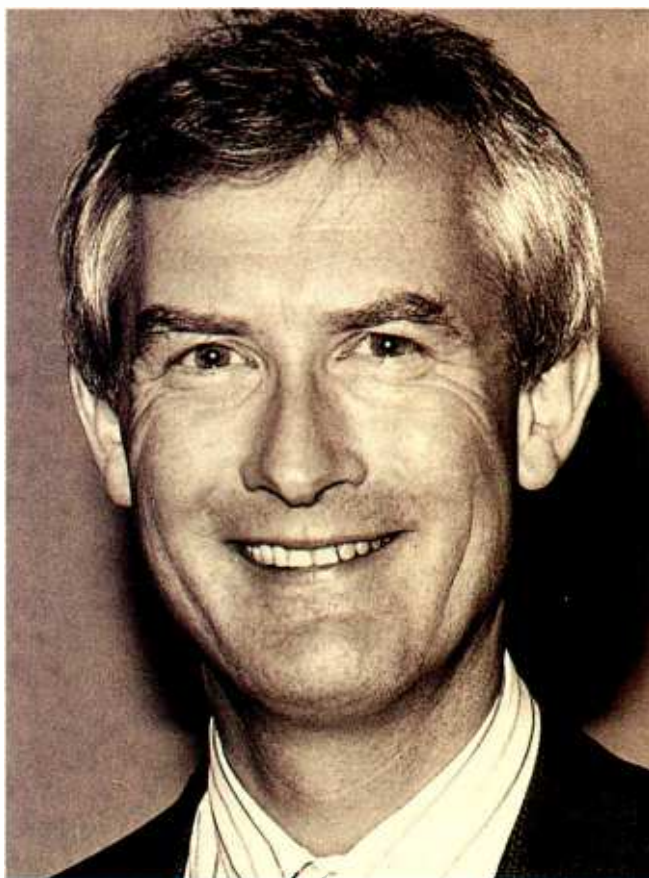
Others shared Harries' opinions and they ended the show with orders for three, what were then allocated '1000A' identities. So began a period of console building and development that was to grow exponentially for the next five years. The 'A' quickly became the '1000B' adding features and changes in the routing section with about seven being built.

One important client for a '1000B' was new London studio, the Town House. Phil Newell and Mick Glossop went to Stonesfield in a sceptical mood, but came away convinced. According to Newell it was his 'honesty and openness to questions plus the solid nature of his answers. He was a really straightforward guy to deal with, it was all quite believable and I was prepared to give it a chance'. On the operational side Glossop remembers it being a major step forward in ergonomics, and it all came from Sanders. 'He was an engineer who had sat up until 3am doing vocal overdubs without an assistant! There was never any hard sell, you just talked about the product and the way it worked.'

By 1979, continuous R&D and user-feedback had created the '1000E', or as it was also marketed, the Master Studio System, which, for the first time, integrated many studio functions centrally with the console computer, plus automated console features. This was the basis of the console that was to create the company.

Early '1000E' UK clients included Ridge Farm Studios, Eden Studios and the Town House, again. This last association continued to be particularly important as house engineers, such as Hugh Padgham, picked up on the facilities of the console and became responsible for several important hit albums that helped establish the creative abilities of the console, particularly those drum sounds.

The studio technical staff of the Town House were also impressed. Chris Jenkins had immediate responsibility for Town House Two. 'My first recollection of Colin was when he came down to commission the console he did everything himself in those days. If there were any problems he would talk me through fixing them over the phone. His abilities as a designer were such that he could work very quickly and the result worked.' Jenkins and a number of the Town House staff joined SSL over the next few years helping Sanders build a staff that was almost all experienced in the practicalities of the recording studio.



Studio Sound pays tribute to one of the few true pioneers of pro audio, whose tragic death in January shook the industry. Keith Spencer Allen writes

beginning. A key addition to the team was old school-friend Paul Bamborough who brought computer and software skills to the project, although the relationship between them was volatile. A console was assembled, but the degree to which it was complete by the 1977 Paris AES Convention is questionable. It certainly looked good and there was paperwork to say what it would do.

Dave Harries, then of Air, recalls seeing the desk at the AES and 'congratulating Colin on the build quality. It was an incredible concept and he'd obviously paid great attention to all areas. The facilities were revolu-

It was Sanders' hands-on approach in every aspect of the company that set the tone for everything. The priority was being available to customers and this was appreciated. Chris Stone, then of Record Plant in the US, was an early customer and came back for many more. 'I bought my first E-series from Colin in 1979. If we had a problem with the console we could call him, the president of the company, in the middle of the night and he would stay on the phone with us until the problem went away. Even then he believed he was setting a standard for the industry.'

Also in 1979, American recording engineer Doug Dickey joined SSL. He complemented Sanders' approach totally, and, although they rowed frequently, the results were spectacular. First visible signs were the expensive colour advertising campaigns and sales literature. Many of the SSL staff credit Dickey with considerable responsibility for the degree of success that the company had, particularly in the US. In the mid 1980s when the industry was looking for input from SSL on the debate on future console technologies, it was Dickey who put himself in the firing line with reasoned and articulate eloquence.

Sanders, who was a good, but reluctant public speaker, was keen to see Dickey take this role. Piers Plaskitt who headed up the SSL US operation for many years felt that in public Sanders always played down his role, being very reluctant to market himself feeling that it was the products that were important.

Success brought awards. 1981 saw a UK Design Council Award for the SL4000E —Sanders had an advanced sense of the aesthetically pleasing and ergonomic design

—and the same year saw the first of two Queens Awards for Export Achievement. By 1982, 80% of all sales were exported. In 1986, he was awarded a CBE.

Many of the, then, SSL staff tell of a crazy time. Console production had gone from one every month to at least a dozen a month. While externally the company maintained a



very calm image, internally the workload was immense. 12-hour days were common, and 18-hour days not unusual. Several had more than one job and because of a shortage of test engineers if you were still around in the evening many would move down to the test

shop till the early hours of the morning before being back around 7am. Sanders would be there all hours even taking to sweeping up if that was what was required.

He was a charismatic figure, with determination and a very clear vision of what he wanted. He paid incredible attention to detail with fingers in every part of the company —from approving the design of letterheads, working with external suppliers, with sales and marketing. The outside world saw a unified company image with no obvious shortcomings and this could undoubtedly be traced back almost entirely to Sanders.

He had a profound influence on all the people around him even those doing basic wiring on the shop floor. He would walk round the factory regularly, and his office door was always open. He had the ability to make everyone feel very welcome and your status wasn't important.

He loved parties and the annual SSL BBQ was famed for the way it brought company, clients and the industry, plus their families, together in a riot of entertainment that was typical of what made him happiest. He also was a very generous person in terms of his time. He helped out many people quietly in ways that were never made public. There is more of this than anyone will know.

As the company became bigger he had to delegate and this he found difficult when it resulted in work not being done quite as well as he would have done. Within the company he was famous for his temper. 'He'd fly off the handle several times a day, and be thoroughly unreasonable. It wasn't one of his most endearing traits,' commented one insider.

According to Antony David, who >>>>

WHEN JOHN STADIUS and I started building mixing consoles in 1980, we were already aware of the SSL presence in our own business. Soundtracs grew, but it wasn't until November 1986 that I met Colin. He wandered onto our stand at Interbee in Japan with a Dalek-type robot he bought for his 'kids'. He was going home to England that evening and with some time to spare, I had an opportunity to talk to the man behind what was to become the 'Rolls Royce' of mixing consoles.

In the following years, we used to spend brief moments at exhibitions or in airline lounges talking about business. He was always bright, cheerful and full of enthusiasm. This side of his character was magnetic and it was the reason for his success. He pushed himself and insisted everyone else went along with that. No hostages.

In the early nineties after he left SSL he purchased a property in France and it was there I had the opportunity to socialise with Colin and his family. He was a great practical joker. On one occasion when we lunched with the family, he had a 'nameless' Member of Parliament on duty as a butler! He was extremely relaxed with his children and anyone else! In fact he made my holidays ideal

because he'd amuse my own children for me.

I got to know him better. We lunched a little, I had tremendous respect for him because I don't believe he was a qualified electrical engineer, yet he created, with others something at the forefront of audio technology, the SSL SL4000B. He was very bright, in some respects eccentric. He was, to me like a child (and that's why he got on so well with them) yet a child in the sense of having no spite or anguish. Everything was fresh and an opportunity and much more so to be enjoyed. That was one of his attributes because, like children, he was very sensitive to the real world and could detect the good guys from the rest. Colin was very generous with his time and he enjoyed nothing better than to entertain people of any walk of life and listen to the conversation. He'd mix kings with paupers (literally) and welcome the friendly interchange. His obvious well-earned wealth was never garish or obscene. He was at ease with himself, his friends and much more so, his family.

In recent years, I 'trespassed' on my social friendship with Colin and asked him to give me guidance over Soundtracs. He readily gave free advice, but much more so encouragement and tried to reassure me about being able to achieve everything I wanted.

This man was, like most successful men, insecure. He wasn't shy, but he was private. He fiercely defended his family privacy, but if he wanted you as a friend on the inside he welcomed you with open arms.

My clearest memory will be of the man from SSL who, during a trade show, had time to buy a robot for his children. More so the outrageously successful 50th birthday party a few of his industry colleagues and endless personal friends attended February last. Nobody could do it better than Colin. I considered it a privilege to have known the man I had the utmost respect for. An innovator, a risk taker, a guy with a great zest for life (the helicopter pilot's licence was yet another goal he was determined to achieve), a man with a tremendous sense of humour and fun.

Some of the new faces in the industry may not appreciate his influence, but it's there anyway under the stewardship of John Jeffrey at SSL. My own world will be sadder with Colin's abrupt, unfair and uncalled for departure. I'm angry about that because it seems to me it's always the good guys this happens to. My thoughts are now with Colin's wife and his children. Let's hope there's another 'Colin' in there because the world needs people just like him.

Todd Wells, chairman, Soundtracs plc

joined in 1983, this was just simply an indication of his passion. He had such incredibly high standards that whenever anything fell below them it just set him off. But he inspired the most incredible loyalty in everyone. He set very high standards and everyone else adopted them and that became the culture of the company.

Reflecting his own background, Sanders never placed much emphasis on formal qualifications, being much more interested in what other aspects people could bring to the company. Graduate Antony David reckons that he got a job on the strength of his tie. Others suggest Sanders had a policy that if you found a good person you should give them a job and precisely what they would do could be decided afterwards.

Whatever was true, his management style built a capable team. Those that knew him well say that he had a short attention span and would never persevere with anything if it stopped being fun. When it did, he would do whatever he felt like. This is the side of Sanders that many don't know. The stories range from the verifiable riding of a bicycle round his office while conducting interviews, to teaching the staff of the Japanese office how to play leapfrog, something he was arrested for in Germany. When Neve cheekily held a recruitment open-day in the nearby town of Woodstock, Sanders hired a coach and took 100 staff there. Everyone has a 'Colin story' but the best ones remain impossible to verify having attained the status of legends.

Despite new buildings and moving manufacturing to industrial units away from Stonefield, SSL needed a new home under one roof. An old convent in the nearby village of Begbroke was identified, but Sanders had to use immense effort to convince villagers that SSL would make worthy neighbours on what

was a greenfield site. The resulting HQ and factory opened in 1986 at which time the company employed 300 people and had an annual turnover of 18.5 million.

The company's growth had been staggering. New ranges of consoles had been added—SL6000 in 1982, SL5000 in 1985 together with expansion into areas outside of music production. The existence of digital R&D was confirmed in 1985 and Sanders perceived a need to alter the structure of the

THE FIRST THING that struck me about Colin Sanders was his boyish enthusiasm for the product he had designed, a product that was obviously way ahead of its time. It was immediately apparent what a brilliant and inspired guy he was, and at the same time he was humorous, witty, and very, very likeable. I hadn't seen much of him in recent years, but I'll always remember him with affection.

Frank Andrews, owner Ridge Farm Studios (purchaser of first SL4000E in the UK)

company to meet future requirements. In 1986 he negotiated for SSL to join the UEL, a group of high technology companies, including Quantel, that fitted well with SSL. Despite owning 99.7% percent of the company stock he chose to convince an initially sceptical SSL board that this was the right direction.

One of the results of the new corporate structure was that Sanders' hands-on-all areas management approach was seen as a weakness for a company of this size—there was a distinct lack of middle management. Bringing in qualified people to fill these positions frequently proved difficult because so much of the company ran on an instinctive understanding of 'what Colin wanted'. Gradually the company structure became more regular. In 1988 what is seen as the only glitch in the smooth expansion of SSL occurred.

The 01 was to be the company's first digital product, a combined hard-disk and mixing system, using the first of the digital building blocks developed by its own research. As with most companies making the transition to a digital technology, there were difficulties. Timescales, costs and defining product specifications, his relationship with the digital team became strained and shortly after the initial showing of the product in mid-1988 a large number of the team left, many of whom formed the basis of the team that developed the Sony OXF-R3 desk eight years later.

Exactly why this had occurred is less >>>>>

THE EXTRAORDINARY success of Colin Sanders resulted from a fortuitous combination of his own ideas about the type of console that recording studios might require and the age in which he had his primary success.

The SSL console started to become visible in the early 1980s. This period was one of radical expansion and financial growth and change culminating in the stockmarket excesses of 1986-87. In recording studios, traditional multitrack techniques had not yet fallen prey to sampling, MIDI and synthesis and great emphasis was placed on building luxurious facilities for high-budget recording projects.

The early SSL console was introduced to this arena and as a result of its cosmetic look and the master stroke of incorporating a computer monitor into the console, set new standards in marketing for pro-audio equipment and also new benchmarks in concepts

of what could be charged for a console.

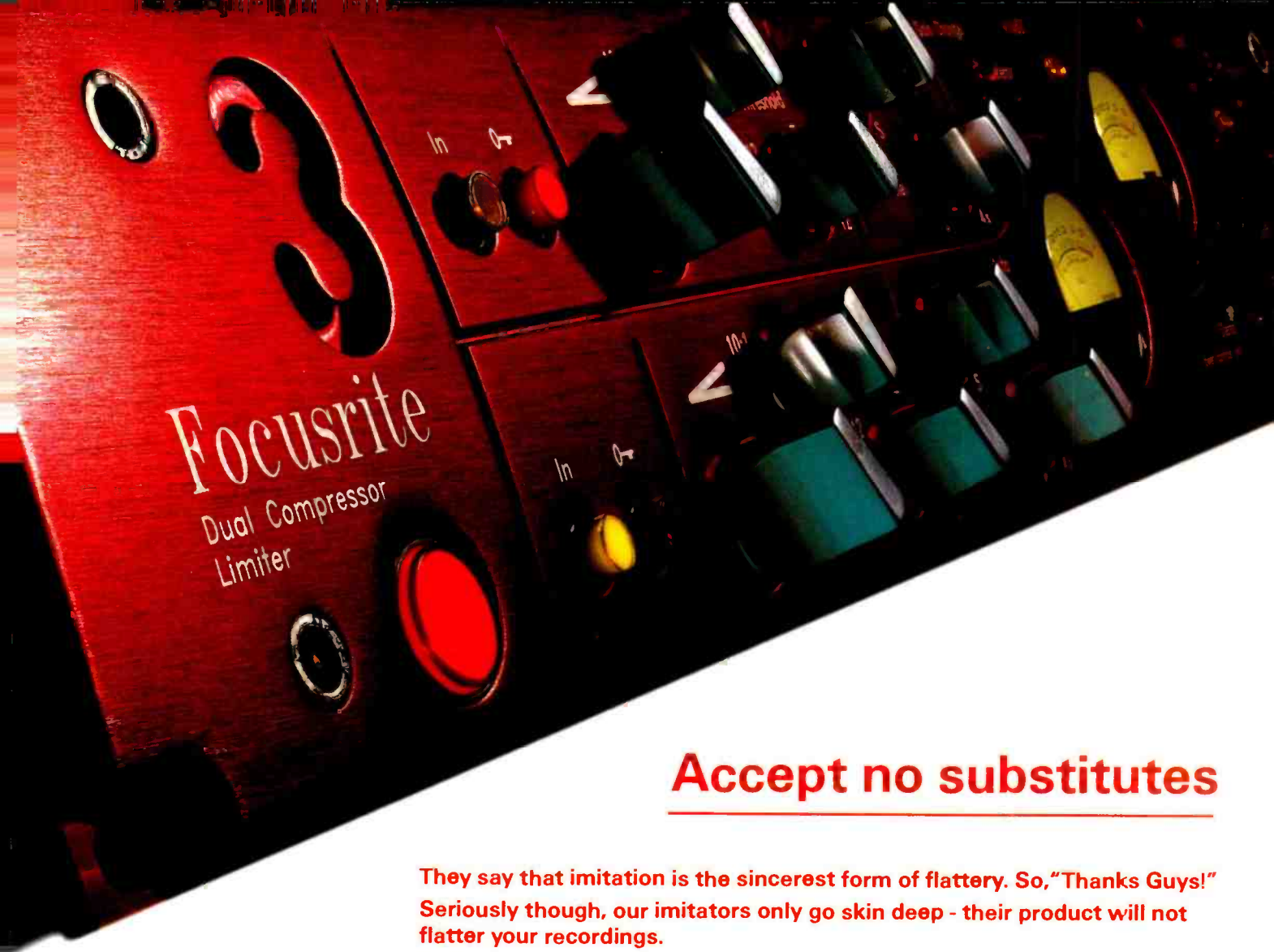
Of equal significance, although, perhaps, not as visible, was also the profit which could be made out of manufacturing them. This enabled Colin Sanders to build up the most financially successful console company ever, and, eventually, through a chain of deals in a rapidly-expanding stockmarket, to accumulate a vast personal fortune by the time he left the company he had founded. In a few short years he had turned his brand name into the pro-audio equivalent of Gucci or Versace, the must of console owners.

I only knew Colin Sanders on the most superficial level and therefore cannot offer praise for the character of the man. His commercial achievement, however, outstripped anything I was able to achieve during my 24 years at Amek and I doff my cap to him. *Sic Transit Gloria Mundi* for Colin, and for us all. **Nick Franks, former chairman and co-founder, Amek**

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It's no accident that the Red 3 was awarded the 1995 TEC Award for Outstanding Technical Achievement - many of the nominators actually own one!

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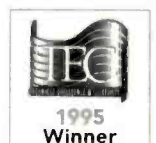
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Red 8 Stereo Mic Pre



Focusrite
audio engineering



clear. Sanders played down the effect of the loss of so many key R&D people but apparently it was really something that he took personally, a loss of part of the 'family'.

The acquisition of UEI by the Carlton Group in 1990 put increasing pressure on Sanders to be even less hands-on with SSL and spend more time in meetings with UEI and Carlton. He was conscientious in this but found it hard. His concentration continued to wane as there was less call for his entrepreneurial skills.

By 1991 he decided that it was time to leave and end all business contacts with the industry, even declining a seat on the Carlton board. A number of interesting projects ensued including Water Recovery, a manufacturer of water filtration systems, and Induced Energy, a company with a high-technology line in induction cooking hobs, and he was about to appear in a TV food show about them. He also became involved with the Prince's Trust, where his efforts were directed towards engineers and their status. He retained many close friends among his former colleagues, SSL clients and even other pro-audio manufacturers. He expanded his interest in flying he'd held a fixed-wing licence for many years, but had turned towards helicopters. In 1991 he began a year's training and soon gained a licence, qualifying to fly in all weathers.

It is, perhaps, true that unless you were aware of what the industry was like prior to 1979, you will not appreciate how Sanders' SSL was a catalyst in change. The approach to the console and automation was revolution-

ary and it took most other manufacturers years to catch up. Some aspects of the automation made it easier for a single operator to pay more attention to the creative aspects than that of running the console. The design meant that for many studios the consoles were flexible enough to not need customisation. This and the number of units out

I WORKED FOR COLIN at SSL from 1978-88 starting before the famous E-series consoles were around, I worked directly with him on various aspects of the E-series design including its image. I watched the company flourish from 7-8 staff, in the small recording studio building at Stonesfield (so small that Neve couldn't even find it, as the story goes!), producing a console every few months, to 12 consoles per month in the later 1980s with 300 plus staff members.

Colin could be very demanding to work for, always looking for that perfect, but pragmatic solution, within the available technology. His approach to any situation was always 'bullish' with a touch of inspirational flair. Since working for Colin I often look to him for inspiration, asking myself, 'Now what would Colin do in this situation?' This I shall continue. Whatever the situation, Colin's great sense of humour was rarely far away, he was a good mimic. I caught him mimicking me on several occasions, even so he just carried on, right in front of me! Away from business, as everyone who went to his parties knows, Colin's were always 'the best'.

John East, in the Sony Oxford camp

no story. To his wife and three children he will be painfully missed: to his many close friends, likewise. For the rest of us we've lost a visionary who in a few short years changed much of our industry through his ideas, enthusiasm and a commitment to being the best. ■

We are indebted to the friends and colleagues of Colin Sanders for their considerable assistance in compiling this tribute, particularly Colin Bate-man, Antony David, John East, Sean Fernbach, Chris Jenkins, Mike Large, Piers Plaskitt, Colin Pringle, Hugh Padgham, and all those who also offered their thoughts and memories.

Personally, I learned a great deal from Colin. For example, that willingness to praise others is not a weakness. So often in business senior people can feel that praising others in some way robs them of their importance. Colin was always liberal with his praise and as a result always seemed more impressive for it. It also engendered a loyalty in others which is extremely rare. Indeed, it was this ability to bring out the best in others which was Colin's true skill.

I am sure that everyone who knew Colin will have cherished memories of him. I thank him for giving me the confidence to follow my own ideas by telling me 'Your instincts are good. You know what to do and should always follow that.' I thank him for the joy on one memorable occasion reducing the entire board of SSL to convulsive fits of laughter.

Most of all, I thank Colin for his friendship and for the many friends I made through him.

Colin Pringle, former SSL marketing director

COLIN SANDERS was a unique personality. His intelligence, insight and playful sense of the absurd were a delight to witness. Colin had that special ability to profoundly influence the lives of others, either through the landmark SL4000 console design, or, for those lucky enough to know him, through his charm, humour and generosity.

Despite having achieved so much, revolutionising music production and in consequence becoming very wealthy in the process, Colin always displayed interest in others. His generous parties have become legendary, but this generosity also spilled into his everyday life. On at least one occasion he returned to the SSL factory with cream cakes for everyone in production; a gesture which meant more to people than any bonus or letter of thanks. His lack of airs and witty 'pythonesque' outlook endeared him to everyone that met him.

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Otari DX-5050

The evolution of digital recorders continues with the introduction of Otari's 2-track MO machine. **Rob James** assesses the viability of the latest generation

AIMED PRIMARILY at the broadcast market, Otari's DX-5050 is a high-quality 16-bit, random-access, digital 2-track recorder and editor. As such it provides a compact, cost-effective alternative to a traditional 1/2-inch analogue tape or DAT recorder. Magneto-optical (3 1/2-inch) disc has been chosen as the primary storage medium.

A number of extra cost options are available. A carrying handle that makes the machine transportable. Since this is a purely mains powered machine that weighs a not inconsiderable 7kg, it is not a Nagra replacement, nor is it intended to be, but compare the weight and ease of moving the DX-5050 around a facility with an equivalent 1/2-inch machine. Alternatively, for more permanent applications, there is a 3U-high, 19-inch, rack-mounting kit.

An input sample-rate converter may be specified, and there are two remote control options on offer from Otari, a standard model and an 'instant start', while many broadcast facilities will no doubt wish to 'roll their own'. Full pin outs and protocols are included in the comprehensive manual along with a parts list and exploded view that will please the mainte-

The machine is solidly constructed to Otari's usual high standards. Anybody familiar with the MTR-90 will know what to expect

nance department. A 640Mg MO disc gives an hour of stereo recording at 44.1kHz.

The machine is solidly constructed to Otari's usual high standards. Anybody familiar with the MTR-90 will know what to expect. A glance 'under the hood' reveals neat wiring and an uncluttered layout. Servicing, if it is ever required, should pose few problems to broadcast engineers. The rear panel is populated with XLR connectors for AES-EBC and analogue I-O, phonos and optical connectors for SPDIF, a 9-pin D-connector for serial I-O and a 37-pin D-connector for parallel I-O. The SCSI port is a 50-pin half-pitch SCSI II standard item with four associated DIP switches which set the SCSI ID of the MO drive and enable remote mode. The SCSI connector is not intended to expand the storage capacity of the machine, at least not in the current software. The interface is intended to allow the DX-5050 drive to be accessed by an external DAW such as a PC-based device. The 9-pin serial interface is configurable via internal jumpers to act as RS232, RS422 serial or fader start GPI.

There are external trim pots for analogue output level adjustment in the range $\pm 10\text{dBu}$ and a 4-position switch for analogue 'head amp' gain. The range is from -60dB to 0dB in

20dB steps allowing for the direct connection of a suitable microphone.

Internal tweaks allow in-house engineering staff to adjust the Standard Recording Level (SRL), left and right channel offset and left and right channel level. There is an internal switch to reduce output level by 20dBu if required. Re-calibration of the A-D converters to minimise DC offset can be carried out using the front-panel menus and keys.

The front panel is neat and mostly quite obvious with transport controls in the usual position, bottom right. A small jog dial sits above the [\ll and \gg] (previous and next) keys. Jog modes are selected by pressing the CTR key which also doubles as record pause if set up to do so. Above the jog wheel are record selects, left and right, internally illuminated. When in Stereo mode, pressing either key selects both tracks. In mono mode the keys toggle, selecting one deselects the other.

To the right of the record selects are two SRL—calibrated—indicator LEDs and associated analogue Input Gain pots. For calibrated operation the LEDs are illuminated and the knobs are almost flush with the panel. Pressing the knobs activates the manual, un-calibrated analogue gain and the knobs emerge from the panel to allow adjustment. Under the main LCD are two banks of four keys labelled 1 to 8. The top bank contains function keys used to select menu items on the display in conjunction with the adjacent NEXT SELECT key while the bottom row are edit keys also labelled CUT , DUMP , SPICE and PRE-POST used with the adjacent EDIT MODE key. The last three keys are MARK and LOCATE which work together as a simple, one memory locator and PROGRAMME SELECT which is used with the main LCD, jog wheel and function keys to set parameters and to create and edit play lists. A bright green LED counter displays minutes seconds and frames running at either 100fps, 30fps, 25fps or 10fps. A tiny recessed button enables the counter to be reset to zero in Normal mode. Under the counter is a row of 8 LEDs that give an indication of time remaining on disc. These are usefully calibrated in a nonlinear fashion to show 1, 2, 5, 10, 20, 30, 40, 60 minutes remaining so you can get really paranoid when you are sailing close to the wind on a live recording. Just like watching the feed spool on an analogue machine (not).

The numeric counter has four modes one of which is time remaining on disc. The other modes are Normal which displays elapsed time from the beginning of the current Program and Total which either displays the elapsed time from the beginning of the playlist or remaining time in the current playlist.

Adjacent to the counter are three LEDs that indicate whether varispeed mode has been selected. Time Remain indicates one of the time remaining counter modes has been

selected. The Emphasis On indicator should be self-explanatory.

Meters are bright, horizontal LED ladders. Adjacent are indicators for sampling rate, 48kHz, 44.1kHz or 32kHz and above these further LED indicators show the selected input. Analogue, AES-EBC, Co-axial or Optical.

A headphone socket and MONITOR pot almost complete the picture. A nice touch, there is an internal monitoring speaker, controlled by the monitoring pot. Inserting a jack in the headphone socket mutes the speaker. The monitoring point when recording is selectable either before or after internal memory. After introduces a small (10ms) delay and is useful for checking the effect of the converters on critical material.

The DX-5050 records in the Microsoft-IBM .WAV file format and the latest version of software supports Broadcast .WAV or BWA. The actual disk format is DOS. This is an encouraging sign of the progress of file exchange and a wise move by Otari as it will enable material recorded on the machine to be easily edited by a variety of DAWs.

Each new recording results in a file on disc automatically labelled TAKE01.wav, and so on, up to TAKE99.wav. Where there are more than 100 recordings a letter is inserted starting with FTAKEF01. A maximum of 512 files can be created per disc. This includes files created by editing.

When a file is split in editing the 'new' part is given a further suffix to the first part of the file name.—the new part of TAKE01 when split will be named TAKE0101. Files may be renamed to something more meaningful.

If a file is 'dumped' in the editing process it is renamed with a .AVV extension in place of .WAV. This enables material to be recovered if dumped in error. The dumped files can, of course, be erased to reclaim disc space.

Each recording or file on disc is termed a Program. Recording is possible in two modes New which will write new data to disc irrespective of where the 'transport' currently is and ASM or assemble which will overwrite





data from the current transport position. There are two options as to how recording is initiated. Either PLAY and RECORD keys together or PLAY only when record ready(s) are armed. STOP and or CUE keys may be selected to be record pause. A key press pauses, a second press restarts recording. If recording is actually stopped as opposed to paused no further key inputs will be accepted for 2-4 seconds while the directory information is written to disc. Recordings are given a time stamp from the internal time of day clock.

There are a number of playback modes. Normal plays a selected Program, then pauses at the beginning of the next. Continuous plays all the Program files on the disc, in directory order as does Endless except the latter will loop back to the beginning ad nauseum. The final option is Memory Start mode. Up to eight Programs may be assigned to the numbered MENU and EDIT keys. Any of the modes can use playlists to determine which Programs are played and in what order. The directory order can easily be changed or playlists created and saved to disc on the machine or, since the playlist is a simple ASCII text file with the suffix .OTA, play lists and Program files can be prepared on a PC and copied onto MO for use in the DX-5050.

Varispeed playback is available with up to $\pm 12.5\%$ variation possible. Since there is no output rate convertor, this should be used with caution in a digital environment.

Fader start from external equipment is catered for by the serial interface.

The function of the [<< PREVIOUS and >> | NEXT keys can be changed. In Next Program mode, the keys are used to locate to the beginning of Programs. If the CUE key is pressed during playback in EDIT mode the keys become cue and review with (jerky) audio playback at speeds from 2x to 32x set by the dial. In Dial mode, once the jog dial is selected, pressing either key once is equivalent to turning the dial one step. This mode disables cue and review. A further mode, End Monitor, is in the latest version of software and will play the last few seconds of the previous Program then pause at the beginning of the next.

Editing is of the simple, cut and paste, variety. Cutting a Program changes it into two files. The PRE-POST key selects either section. The DUMP key erases the selected section from view. (although not erased from disc as mentioned earlier). Program files may be joined together using the SPLICE key. When the MENU SELECT key is pressed after an edit operation you are given the option to Undo the last edit or Review it which also confirms the edit. There is a further Edit mode, Programmed Edit, which allows edit points to be set within a file to remove (Dump) a section and join the remaining bits together in one operation. This can be Previewed before executing the edit. Similarly there is a Spot Erase function which

allows up to 199ms of audio to be erased within a Program file. The destructive edit resolution is quoted at 92ms on a 640Mb disc, apparently dependant on cluster size. This seems a little coarse but this did not seem to be the case in practice, so, perhaps, it only applies to permanent erasure of material. Up to four Cue Points can be set in machine memory which trigger a tally signal from the parallel interface. This information is not saved to disc.

There are many possible applications for this machine in a broadcast environment.

In the news department items could be recorded into the machine and the running order decided at the last minute, before or even during transmission. It is also perfectly feasible to edit interviews for transmission on the machine.

The Memory Start mode could be used for instant spotting of sound effects, jingles, and so on. The RS422 control will make the machine attractive to some VT editing setups as a lay off recorder or as a quick way of assembling voice-overs, music or whatever. The adoption of the BWA format opens up many further possibilities. Any DAW that can work in this format and either has a 3/4-inch MO drive or an external SCSI port capable of connecting to the DX-5050 can be used to perform complex editing on material recorded on a DX-5050. Equally edited material, which could well come from a variety of >>>>



sources in addition to DX-5050s, can either be recorded to 3 1/2-inch MO disc or downloaded direct to a DX-5050 for play-out. This is a considerable advantage because DAWs are generally not ideal for on air use especially by relatively unskilled operators, not to mention the cost of using a workstation for such a comparatively mundane purpose.

It is not difficult to envisage facility wide adoption of the machine in a variety of roles. In a radio station the DX-5050 could find a home in recording channels and field acquisition where battery powering is not required. Further machines could be used in transfer bays to upload raw recordings for complex editing and downloading the resultant packages. The editing functions would allow modest productions to be completed in simple edit channels. In transmission, as well as playing out programmes, machines could be used to produce entire commercial breaks complete with bumpers. Playlists could be prepared for different spots with, perhaps, all the commercials for a day or week on one disc. There are considerable advantages in this sort of approach. While complex, networked systems will one day fulfil all of these roles, the cost will be considerably greater. If one type of machine can be used in all these roles there are obvious savings on operator training and maintenance costs. If a machine in a vital role did have a problem another could swiftly be substituted. In contrast the failure of a networked system has the potential to really screw up transmissions.

In any event both options are covered. The adoption of BWAV should enable the DX-5050 to feed material into a networked system with ease.

The DX-5050 is far more versatile than the 1/2-inch analogue tape recorders it hopes to replace. This versatility is both its strength and

a potential weakness. I think the major omission, at least with current software, is the lack of user memories for setups. With the huge number of possibilities on offer there are a considerable number of opportunities for 'finger trouble'. The menu system is easy to navigate but for an operator in a hurry it would be too easy to be in a mode which would not deliver the expected results. For this reason and particularly for transmission use it would also be prudent to provide a means of 'locking' the machine into a given mode via a password or similar. There is a menu option which allows record and editing to be disabled but this is not lockable.

I would also like to have seen word clock and possibly video sync options. As it is, the alternatives are internal or sync to digital input. Subsequent equipment has to sync to the digital output or use a sample-rate converter.

Otari has succeeded in producing an attractive, highly robust and reasonably simple to operate replacement for 1/2-inch analogue and DAT recorders in broadcast situations with the considerable advantage of instant start. The package is neat and compact, the displays clear and keys sufficiently large and well spaced to inspire confidence. The optional sample-rate converter on the input should enable fairly easy integration into all digital environments and the adoption of the Broadcast Wav format is a very healthy sign of commitment to the broadcast markets real needs. The 3 1/2-inch magneto-optical discs chosen as the storage medium combine greater robustness than the alternatives with reasonable cost. If the idiot proofing can be beefed up a little bit and word clock sync and time code are not an issue there is little to criticise.

This machine should be given serious consideration for inclusion on the short-list by anyone contemplating the purchase or replacement of broadcast tape recorders. ■

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tc electronic FireworX

Throwing up a storm of digital effects processes, tc's latest box combines professional processing with the reckless indulgence of early musicians' MIDI multieffects units. **George Shilling** has a ball

I WAS INTRIGUED to see a couple of die-hard, analogue-loving, colleagues were salivating over some new equipment. I presumed it was another valve compressor or some such thing—but no, they were thirsting for this new tc box. Surely those Danish digital hofpins hadn't gone analogue? Not a chance. Their interest was aroused because this latest offering brings to a digital world treatments that were previously thought exclusive to obscure crackly old boxes from the 1970s. Wonderful effects such as vocoding and ring modulation, which are great, but difficult to do properly with the current crop of multieffects boxes, and hard to track down in original form. Not only that, but press releases mentioned fantastic unheard-of effects such as fractal noise generator and aliaser.

The FireworX looks similar to other recent tc units. It occupies a 1U-high case with the familiar large-ish green LCD screen on the front panel. Despite my one-man campaign for better legibility on studio equipment the multitudinous grey and black buttons are graced with tiny white lettering, the only colour provided by LEDs. Three continuous-type knobs grace the right-hand side, one intriguingly labelled ALPHA MOD and accompanied by a row of LEDs. Over on the left are a couple of small knobs for input and output level—I like this a lot: if you want to tweak the level, you don't want to do it via a menu. However they will not completely kill the signal, having only a 32dB range of tweakage. Two rows of LEDs are provided for input level metering, but, strangely, an Overflow light situated below them blinked occasionally when input level was around -12dB to -6dB, and, occasionally, glitching was audible.

There are physical similarities with the Finalizer Plus model, such as a PC memory card slot on the front panel and that the entire back panel looks identical—stereo analogue inputs and outputs appear on XLR connectors; digital inputs and outputs appear on optical connectors for ADAT or SPDIF, XLRs for AES-EBU and phono sockets for SPDIF. Internal resolution, A-D and D-A converters are all 24-bit. The digital In and Out levels can be trimmed here, (useful to stop the Overflow flashing). There is a Sync In phono socket for Word Clock, MIDI In, Out and Thru and a mono jack socket for external control. An IEC mains socket is happy with voltages from 100V–240V, and a rocker mains switch is provided in addition to the 'soft' STANDBY switch on the front.

System navigation is fairly intuitive: left and right arrow keys select different menus within each display section, and a PARAMETER wheel moves the cursor while the VALUE wheel adjusts the selected parameter. Two hundred presets are included, all numbered and named, and are found by pressing RECALL and scrolling through with the VALUE wheel. When you see what you want, you simply press ENTER.

Presets make use of one or more of the 12 effects Blocks. One useful feature is the ability to apply a 'filter' when searching for a particular type of effect. The user chooses one of the 12 effect types, and only presets that include that particular Block will be available. This system is simple and more practical than some of the more complex 'keyword' search menus found on other units. The Alpha Mod wheel is much like the Lexicon PCM80-90s ADJUST knob. Each preset can include one or more settings patched to the wheel and therefore instantly adjustable, a description of its function appearing with each preset. The row of LEDs gives an indication of the current setting. Storing edited presets is simple: just press STORE then ENTER to fill the next free User memory space. Two hundred spaces are available internally; a standard PCMCIA card will hold 999 user presets.

The 12 basic effects Blocks each have a corresponding key with LED on the front panel, much like the Lexicon MPX1. These effect Blocks comprise: Dynamics, which includes compression and gating; Filter, all sorts including one sub-algorithm that emulates a phaser with a sweeping notch filter; Formant, variations on the wah-wah theme, with other vowels and diphthongs achievable; Distortion, Drive resembles amplifier distortion, with unusual Body and Smasher parameters, while Crunch performs aliasing and quantising simultaneously, making use of uniquely 'digital' types of distortion; Vocoder is impressive, this Block including Ring Modulator, both effects including useful filter parameters; Synth, which contains curve, chaos and noise generators useful for example as carrier input to the Vocoder block controlled by MIDI; Pitch, which can generate two high-quality pitch shifts with a range of ± 2400 cents; Chorus-Flanger with all the parameters you would expect plus a few unusual ones such as LFO Phase and Golden Ratio; Delay, which has available up to six taps, plus a wacky Reverse algorithm; Reverbs are varied and of high quality; Pan-Tremolo includes a pseudo-surround effect using phase shifts; finally, the EQ Block includes a 5-band parametric and a 4-band 'modulatable' parametric. Active blocks' keys are lit, but may be defeated by a single press, or edited by a quick double-hit. This takes you to a list of parameters which are available by scrolling the PARAMETER wheel. There are usually many more parameters than can be seen on the screen at one time, but the familiar tc vertical scrolling system is used. It is enhanced on this unit by the display of a little bar on the left, much like a PC's scrolling bar, to show you how far down the list you are.

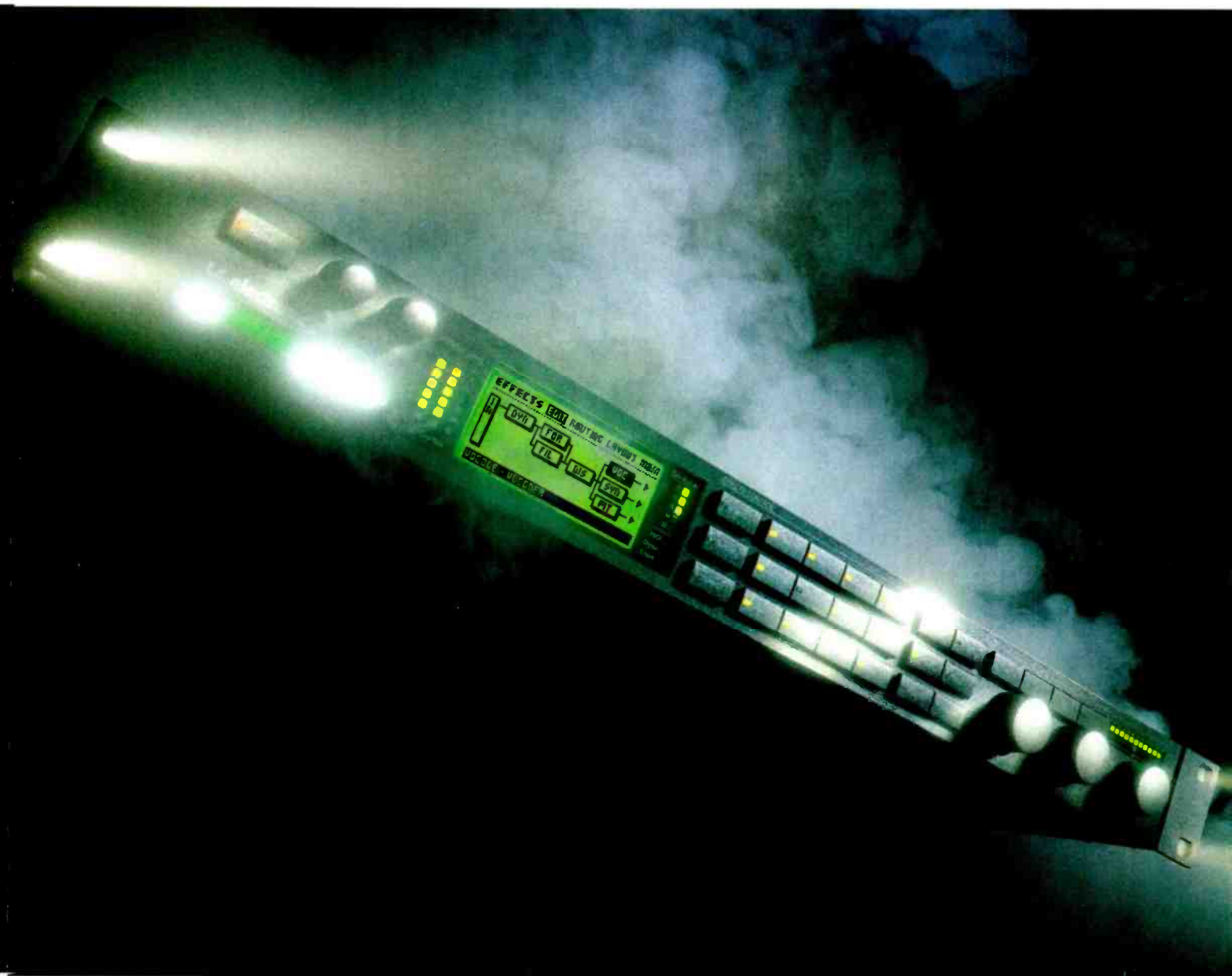
A TEMPO key can be tapped to provide in-time delays, auto-wah-wah, and so on, and this can be set globally or pertain to each individual preset. MIDI Clock can be used to set this.

The I-O Setup menu comprises four main pages where, for example, you can switch between -10dB and +4dB operation. You can select whether a word clock input-controls the digital clock, and switch dither options. Individual ADAT tracks can be selected for the Optical input and output. A comprehensive MIDI setup page is accessed from here, with multitudinous options available. A Utility menu contains odds and ends such as viewing angle and MIDI dump; although you would expect the latter to come under the MIDI menu. A Card page contains functions pertaining to the memory-card capability.

If you want to rearrange Blocks or create your own presets, the next port of call is the Routing page, accessed from the EFFECTS key. Here you can choose your effects blocks. From each of the aforementioned Block types you can choose from up to six sub-algorithms. For example, under the Dynamics heading you can choose Compressor, Compressor-Limiter or Gate-Expander. On the Routing page you can insert Blocks and Route them in various ways, using an 8 x 8 matrix. You are not always limited to one Block of each type. For example you could have a Compressor and a Gate-Expander; although you can only have one type of Distortion in a setup. Parallel or Serial routing can be used, and one Feedback Send and one Feedback Return can be inserted as Blocks. Also available are external Insert Loop Send and Return which enable you to use redundant rear-panel connections (selected from the I-O page) to hook up another device in the chain. Each Block can have its own In-Out settings to choose whether it takes its input from Left, Right or Both, and how the Output is mixed. This is a bit of a fuss as you have Wet, Dry or Mix, where the Mix parameter is set up on yet another menu page. Each Block can also be assigned one of five Mute modes.

The Layout page is a list of options to change the grid size and move, insert or delete rows or columns. The possibilities of getting confused are endless... Another page, the Tool page, shows you, as a percentage, how much DSP power the current setup is using. Some of the sub-algorithms can use 25% or more of the available DSP power, so there is a limit to the combinations you can have. The Edit menu displays your effects blocks in a much neater way than the Routing page, and you can see at a glance what is going where. The Tool menu gives you a list of choices as to what is displayed in the Edit menu on each Block such as little level meters or the percentage of DSP power used.

Pressing the MOD key brings you to the Modifier display that initially consists of three main menus: Matrix, Modifier and Dials. There are further sub-menus, but hang in there... There are up to nine 'external' modifiers available: these are Ext 1-8 plus the Alpha Mod wheel. External controls can be



MIDI controllers or the external jack input using a pedal or the tc Digital Master Fader. The Matrix page allows you to select one of these or an internal Modifier such as an LFO, ADSR, Envelope Follower. Then you can scroll down a list of available parameters from the current preset and choose what to control. Not all parameters are available: it depends on the sub-algorithms used. When you have alighted on a parameter that takes your fancy, pressing ENTER takes you to a Link page. Here, a number of parameters control the curve determining the relationship, and a setting controls Glide Time. This is stuff for dedicated boffins only.

Undeniably, some interesting possibilities are available, but it would take some time before I felt confident enough of navigating my way around all these various menus and submenus to start fiddling with this at someone else's expense. The hours could easily turn into days.

When I had recovered from Modifiers, Matrixes and Glide Slopes, it was time to try some of the effects. A quick whizz-through gives the impression that this machine is heir to the wonderful Eventide H3000D SE, with a

measure of the infuriating complexity of the DSP4000 thrown in. Plenty of imaginative, unusual, wah-wah, flangey and over-the-top effects are contained within the presets. Remixers and ambient specialists will have a whale of a time with some of the outlandish effects contained within, several of which made me laugh out loud. There are also plenty of high-quality 'useable daily' effects. One marvellous rarely found feature is the ability to generate 'true-stereo' reverbs and other effects. Your stereo positioning will be apparent on the reverb returns if you use a stereo send and pan it appropriately between the inputs. However, it becomes apparent as you select various Presets that there are varying degrees of dry signal mixed in with some of them. Each effect Block has its own signal mix setting 0-100% wet, as well as a choice of Dry, Wet or Mix output mode. So if you have the unit conventionally attached to your mixer's sends and returns, you will always want 100% wet at the Outputs, but will not always get it with the supplied presets. You must then mess

with the menus and edit the necessary settings, which is not entirely straightforward, requiring several button pushes. It baffles me why manufacturers do this. Answers on a postcard please...

The review model came with a preliminary manual, but an insert promises a proper manual will be forwarded after the guarantee card is received. I think this is a bit naughty: they should have finished writing the manual before shipping units.

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Despite some niggles I really liked this unit. The major irritation is the mix settings contained in the presets. There is inevitably something a bit 'shiny' about the sound which is inherent in a digital unit, and I missed some of the warmth of analogue processing. Inevitably, digital processing is subject to a delay, and this is increased if an external loop is inserted, so care with phase is needed when assembling effects. However, the sheer variety and quality of the effects make the FireworX very good value, and perhaps in the future a Plus version might improve operation. ■

Prism Sound Maselec Master Series MLA-2; MEA-2

Impressively specified and patiently awaited, Lief Masses' 'Maselec' analogue compressor and equaliser designs have made the transition into available hardware. **George Shilling** weighs them up

WELL KNOWN FOR its A-D and D-A converters, Prism Sound enjoys a prominent place in CD mastering, classical recording, and higher-quality studio recording circles. Its key engineering staff have been developing DSP audio equipment since the late 1970s, and the company has developed sophisticated measuring equipment to assess the performance of its digital converters. These devices are now widely used by recording studios, manufacturers and broadcast facilities worldwide.

Meanwhile, producer and engineer Lief Masses, known for his work with the likes of Led Zeppelin, Jeff Beck and Black Sabbath, has also been involved in equipment design for some years. He began by setting up and modifying equipment at Abbas Polar Studios in Sweden, and is widely known for his development of an alternative equaliser circuit for the SSL E-series desk—known as the Maselec. He also designed a brick-wall limiter for broadcast use which became popular with mastering engineers.

In recent years, Masses has recorded new bands, but lately he has scaled down recording commitments to concentrate on equipment design. This is a lengthy procedure as equipment is tested extensively by trusted colleagues in real situations during the development stage. In fact, it was as a consequence of a coproduction project with Metropolis Studios' Carey Taylor that Masses made the acquaintance of Prism Sound, whose name now graces the front of these units.

The compressor looks like it may be test equipment. This 2U-high stereo unit has a front panel dominated by two huge vu meters. These look as if they belong in a school science lab, with black-on-white legending instead of the usual red and black-on-cream. The weighty (9lb) case is no-nonsense bare steel; the (perhaps slightly thin) front panel is finished in a durable matt grey, with clear white legending. The two channels are arranged side by side and between them there are small toggle switches for POWER ON-OFF and LINK ON-OFF. Each channel features huge, stepped-rotary-gain controls for input and output levels. Smaller rotary controls adjust Ratio, Attack and Release times: each of these have six switched posi-

tions. The vu meters are accompanied by VU/GR and compressor IN/OUT toggle switches. On the rear panel, inputs and outputs appear on well-spaced XLR connectors. Mains is supplied via an IEC socket with a fuse, and there is a primary power switch on the back with a built-in light. An external switch allows voltage selection. There is also a large binding post with a screw-top for earthing, and, unusually, a toggle switch labelled NORMAL/HIGH THRESHOLD. When the unit is turned on, there are no flashing lights. If the compressor channels are switched in, you will see a green light glowing on each channel, and, well, that's all. The vu meters are not illuminated, which I found a little disappointing. However, the meters are so huge that even in fairly low light they are still visible. Not only that, but the green lights on each channel turn red when the compression threshold is crossed. The Input gains have a range from -20dB to 0dB in 1dB switched steps. The Output gains are similar and range from 0dB to +20dB.

output to compensate, as you would on other designs. Unlike the Urei, the Input and Output gain knobs have no effect if the compressor is switched out, which helps when matching compressed and uncompressed levels.

This unit has a much more refined character to it than many of its competitors. The Maselec is no slouch if you want heavy compression, but it is harder to make it pump than most. It has a very musical sound to it, allowing the signal to breathe, yet smoothing the level in a very pleasing way. Nominal attack times range from 0.005ms/dB to 1.5ms/dB, which represent average attack times for typical audio programme. Similarly, the Release times can be set from 0.02s/dB to 1.0s/dB which represent the maximum release times. One of the key features of the MLA-2 is the ability of the circuitry to vary these times according to programme content. Short duration peaks will cause shorter release times. This enables more transparent operation than can be obtained with less sophisticated

units, and I thought it sounded great on a variety of programme material. The Ratio can be set between 1.4:1 and 8:1 (five positions). Changing this setting also adjusts the threshold to cleverly maintain output level for small (less than 6dB) amounts of gain reduction. This system works well, and enables the user to hear the difference between different ratios without the usual corresponding jumps in gain. It is at this point I should explain the back-panel



Every single position is labelled, and, with such large knobs, there is no chance of confusion when recalling previously noted settings.

THE COMPRESSOR works optically rather than the more commonly used VCA method. This provides a smooth transition across the threshold as the compression starts to work. Like the Urei 1176, the MLA-2 has a fixed threshold: increased compression is obtained by increasing the input gain. The advantage of this is that when increasing the input gain to increase compression, the output level remains fairly constant (depending on the chosen ratio). You do not have to alternate adjusting threshold lower then turning up the

THRESHOLD switch. The manual suggests setting this to High for mastering applications and Low for recording. Actually, the legending on the unit indicates High and Normal rather than Low. As a recording engineer I would agree—we are much more normal than mastering engineers... The large toggle switch locks into place and has to be pulled outwards to change its position. The Normal (Low) setting puts the threshold about 9dB lower than in the High position. (The actual threshold depends on the other settings.) The philosophy assumes that you want substantially more compression when recording as opposed to mastering. This is mostly true, and even when not the case, the 20dB ranges of the >>>>

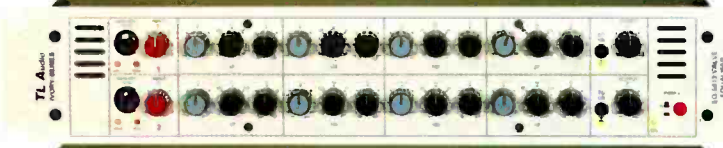
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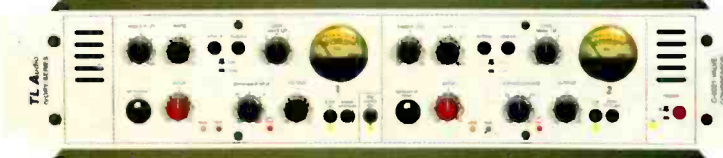
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input and output controls allow you to set a wide variety of compression amounts. However, I have a natural aversion to switches placed on the back panel of any unit, as you inevitably want to change them at some point. This is obviously a nuisance when the unit is in a rack.

The Link feature does what you expect, but again features enhanced circuitry. The ImageLink, intelligent, dynamic, stereo-linking system is programme dependent. Momentary gain reduction due to short duration peaks will not be linked. This means that the integrity of the stereo image is maintained, but obvious pumping effects from short peaks on one channel are avoided. This system works beautifully, and enables a clarity and smoothness that you just cannot obtain from most stereo units. The manual states that the ImageLink system is independent of all other controls—different ratio, attack and release can be set on each channel. I cannot imagine wanting asymmetrical stereo compression very often though.

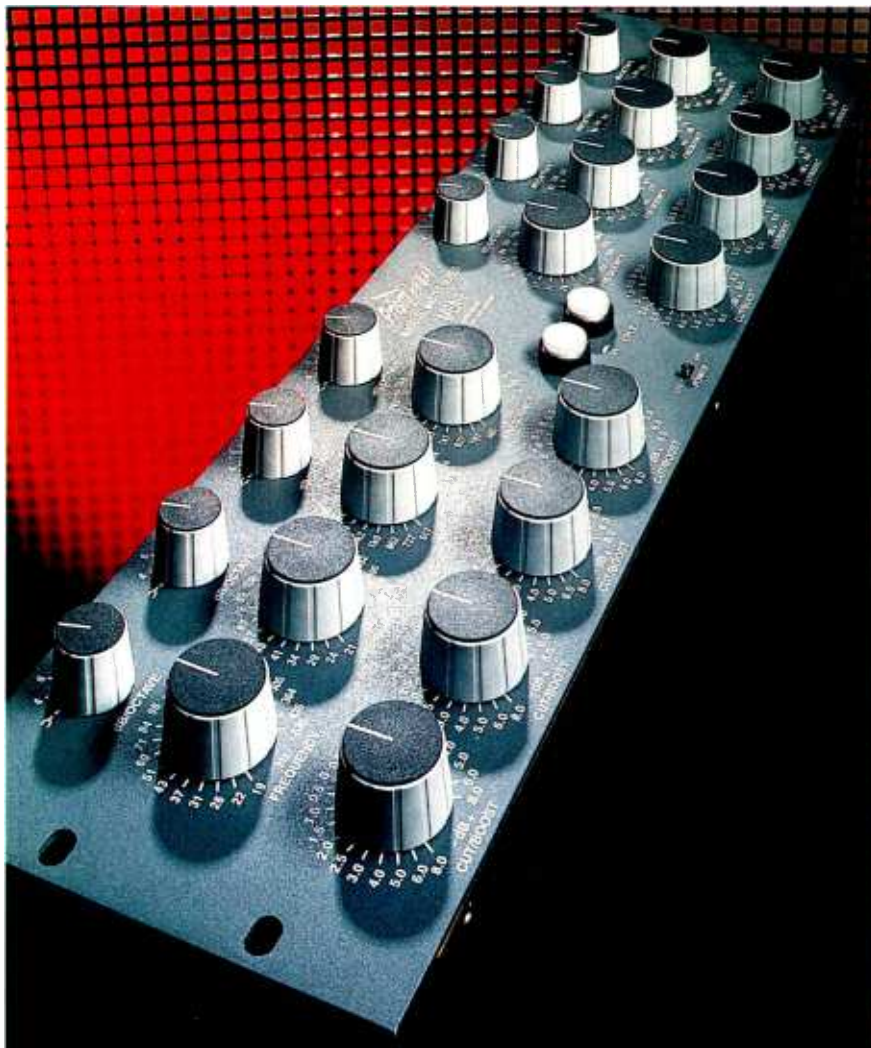
The manual examines every detail of the unit's functions and contains many charts of test results, no doubt obtained with Prism test equipment. All the theory has been put into practice impeccably. The audio performance is exceptional: the manufacturer's figures quote huge dynamic range and a flat frequency plot over a huge range below and above the generally acknowledged range of human hearing. I am a great believer in the importance of this extended range.

I am really sold on this unit. It is by no means cheap, but I believe the right combination of scientific practice and recording engineers' desires have come together in this unit. Less fully featured than some similarly priced competitors, it nevertheless delivers in the important area: it sounds superb. It worked well on vocals, but would not necessarily be my first choice for that particular application. However, on stereo programme material it really comes into its own.

THE EQUALISER, the MEA-2, is a dual-channel affair housed in a bulky 3U-high case, with a similar build to the MLA-2. I really feel that a thicker front panel would be more appropriate, as lazy people often bolt units into racks with just two bolts. I predict there might be a few warped front panels on some of these units before too long. Apart from that criticism, the unit feels very solid with the important practical aspects thoroughly satisfied. The legending is large and clear, and the array of large switched knobs all feel solid. They are easy to set, clicking positively into place.

The back panel features inputs and outputs on XLRs, an earthing binding post, a fused IEC mains socket with voltage selector and a primary mains switch with a light. In the centre of the front panel, a small toggle is provided as a secondary mains switch. There is no indicator of the presence of mains power on the front panel, however if power is switched on and present, the two large EQ bypass switches glow dimly green when pushed in and EQ is on. These are centrally mounted and usefully adjacent to each other.

Each channel comprises four bands of EQ, but when you look at the legending you will



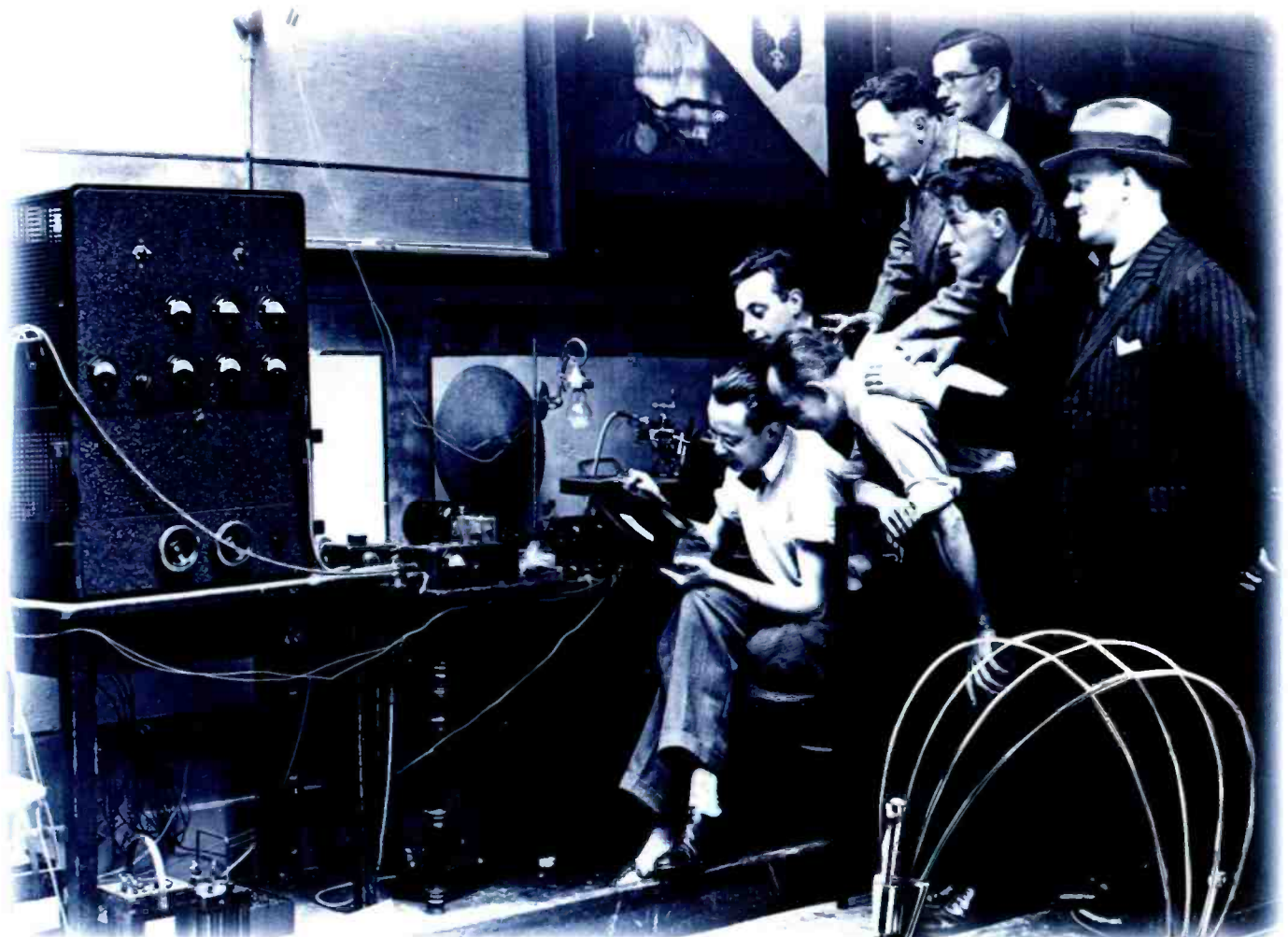
realise that this box is something out of the ordinary. For a start, each band's gain control can boost or cut the following amounts: 0.5dB, 1.0dB, 1.5dB, 2.0dB, 2.5dB, 3.0dB, 4.0dB, 5.0dB, 6.0dB and 8.0dB. This suggests a mastering rather than recording application, with the stepped rather than continuous controls, and the seemingly small amount of maximum boost and cut. However, a look at the frequency selector knobs reveals an unusual approach here, too. The two low-frequency bands and the two high-frequency bands of each channel are paired thus: each control has 21 frequency settings; LF1 ranges from 19Hz to 530Hz, while LF2 ranges from 21Hz to 572Hz, filling in the gaps. Similarly, HF1 ranges from 617Hz to 2kHz, while HF2 ranges from 665Hz to 27kHz. This gives a complete set of an astonishing 84 frequencies to select from for each channel, about 8 per octave. The overlap of the paired bands means you never have the problem of running out of frequencies having started with the wrong band. A corresponding set of controls adjust bandwidth or set shelving characteristics for each band. The two LF bands can be set to a low-frequency shelf and the two HF bands to a high-frequency shelf. The BANDWIDTH control has five bell-curve settings labelled 4, 6, 9, 14 and 20. The curves are asymmetrical to give a more useful and musi-

cal EQ, so without diagrams it is difficult to explain the exact settings. Suffice to say they work well in practice for a broad range of applications. The limit of only 8dB cut and boost may preclude the use of this unit in some recording applications. However, at the cost of losing one frequency band, you can set two bands to adjacent frequencies and by overlapping them virtually obtain ± 16 dB cut boost at any frequency. Boosting two adjacent narrow bands gives a pleasing spread of coloration. The superb design of this unit means that such gains can be applied without fear of distortion or nasty phase shifts.

Internally the construction of both machines is similar, and most impressive. In each, two circuit boards are linked via ribbon cable. The main board mounted behind the front panel includes a huge number of resistors, including one for each position of the knobs—no continuous pots are used. At the rear, another board is mounted horizontally and connected to the inputs and outputs, next to a huge encased toroidal mains transformer.

Like the MLA-2 this unit boasts astonishing audio performance figures and I would love to have one of these strapped across my mix, whether in the studio or in the mastering room, where I am sure their use will be popular despite the high price tag. ■

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Earthworks LAB 101-102, QTC1 and Z30X

Despite its alignment to omni ideals, Earthworks now has a cardioid to join a new omni and mic preamp. **Dave Foister** opens the faders

THEY ALL SEEM to have to do it eventually. No matter how keen a company is to promote the virtues of omnidirectional microphones, or with how much justification, sooner or later it has to face the fact that the world wants cardioids and if it doesn't give them one it ends up looking like an evangelical fanatic. Earthworks was in danger of heading down that road, but a collection of new products includes that very thing. The last time we looked at Earthworks microphones (omni of course) there was a preamplifier in the pipeline aiming to do justice to the high specification of the microphones themselves. That design has since appeared, in no less than three guises, along with a new variant on the omni microphone and the aforementioned cardioid.

The LAB102 is one of those three versions of the preamp, all of which share the LAB designation by way of suggesting their capabilities. One version, the LAB1 is, indeed, intended for measurement, with appropriate calibration and connections, but the other two are specifically for recording, the 102 being two of the mono 101s in a 1U-high package. Some equipment tries to attach credibility to itself by pretending to be fit for measurement when, in fact, it is no such thing; the specs for the Earthworks preamp make it clear that this is not the case here. The circuit offers a frequency response from 2Hz to 100kHz within 0.1dB, can deliver 8Vrms at 0.02% THD, and can handle input peaks up to 10V. Gold-plated switches and an absence of electrolytic or mylar capacitors in the signal path are cited as the reasons for absolute transparency, with specific claims of suitability for 96kHz 24-bit recording. The noise specifications make interesting reading, as the equivalent input noise figure goes down as the gain is increased, dropping to -136dBV at 60dB of gain.

All this might be expected to be accompanied by the most rudimentary, sorry, minimal facilities, but there's more than the basics on the 102. Phantom power and phase invert

are both switchable, and a **STANDBY-ON** switch gives an unusual facility to mute the output while repatching or moving microphones. Gain is switchable in 6dB steps, and a **Clip LED** offers a rather more helpful guide to its setting than you might think. Rather than wait until the damage has been done before informing you of high levels, it begins to flicker when the signal reaches 90% of clipping level; thereafter its On time is proportional to the excess over its threshold, and it stays alight for one second when clipping actually occurs.

This stepped-gain output appears on a rear-panel XLR, but there are two additional outputs, both separately buffered, which allow further control with a fine **GAIN** pot down to 20dB below the calibrated level. One is on an XLR and the other on a TRS jack, and these extra feeds allow the preamp to be used for multiple destinations without the need for a DA. And, indeed, it would be a shame to put any other electronics in the way of this fine preamp. It is, as claimed, extraordinarily quiet and transparent, joining that select band of preamplifiers which can truly present the microphone signal to the recorder untarnished. Any microphone can benefit from this kind of performance, and the Earthworks models, with their similar aspirations to accuracy, deserve nothing less.

One such microphone is the new Earthworks QTC1, described as a Quiet Omnidirectional Microphone. Earthworks has always felt the need to apologise for the noise levels of its microphones, even though (as the literature always points out) self-noise within the diaphragm of an omni is impossible to eliminate. The trade-offs between diaphragm >>>>

Elegant and distinctive, Earthworks' 'house style' mic design and preamp



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«««« diameter, noise, frequency response, sensitivity and SPL handling are well documented, and are no more or less of a problem for Earthworks than for anybody else. However, awake to the demands of increasing recording resolution, Earthworks has a new response to the challenge.

THE QTC1 sacrifices little of the exceptional frequency response of the existing models, with a quoted spec, on axis, of 4Hz–40kHz within 1dB, but does it with a noise equivalent to 22dB SPL (A weighted) coupled with an ability to handle peaks of 142dB SPL. This is all done with an extremely small microphone element in the tip of the distinctive probe shape, a shape dictated by acoustic considerations as much as by any intention to imitate a measurement microphone.

Like all Earthworks models, the QTC1 is claimed to possess unusual accuracy in the time domain. This is, perhaps, Earthworks' most significant selling point in its supporting literature, with other microphones accused of smearing the impulse response unacceptably with diaphragm ringing and reflections within the housing. Certainly experience shows the Earthworks omnis to have a quite remarkable degree of clarity, but whether this is due to this impulse response, the extended frequency response, other factors altogether or indeed whether all these are interrelated is not clear and probably not relevant as far as the user is concerned. What is of the utmost relevance is the fact that the QTC1 produces an absolutely beautiful sound. It has an uncoloured transparency that in my experience can only truly come from an omni, with a big smooth bass which once again exposes the idea that only big diaphragms can deliver low frequencies as nonsense. The smoothness goes all the way up to the top and beyond: the sound is as open as you could wish for, with all the edge of the source intact but without a trace of hardness. Forget any preconceived ideas about omnis having a limited application—you could record anything with these, getting as close as you like in the knowledge that there is no proximity effect, or as distant as ambient pickup demands without fear of excessive noise.

In a sense, both these items are no more than we would expect from Earthworks, fitting in as they do with the company's established aims in life and recording philosophy. The same cannot be said of the Z30X, which appears to fly in the face of everything Earthworks has been telling us all these years and display a willingness to compromise and diversify that I would not have expected. But then again, as I suggested at the

The important point, and one whose significance is easy to miss, is the fact that the frequency response is quoted at 15cm. This is close enough that for most designs—this one included—the proximity effect is having a distinct influence. Clearly the aim has been to produce a microphone that when used close up sounds like an omni

beginning, in a world where cardioid microphones are the norm and omnis a specialised variant, a company, perhaps, has to establish its credentials with a microphone that has a broader appeal. No doubt the hope would be that once people were impressed by the cardioid model they would be more inclined to buy an Earthworks when they decided they needed a dedicated omni.

Hence the Z30X, a cardioid microphone sharing the styling of its omni siblings as far as the capsule dimensions will allow and attempting to bring the Earthworks sound (or, if you like, lack of it) to this new territory. Its cardioid nature is given away immediately by the much wider nose and the grille slots along its flanks, but from there on down the tapered shoulders, the satin silver cylindrical body and the black identifying collar are identical. When held up beside the specifications for the omnis in the range, the figures for the Z30X look almost mediocre, until you remember what is generally expected of a cardioid. The response is claimed to be within 1.5dB from 30Hz to 30kHz; the SPL limit is 145dB without any kind of pad, although the sensitivity is reasonably high at 10mV per Pascal; and the noise level is equivalent to 22dB SPL, not the lowest one has seen but creditable nonetheless.

The important point, and one whose significance is easy to miss, is the fact that the frequency response is quoted at 15cm. This is close enough that for most cardioid designs—this one included—the proximity effect is having a distinct influence. Clearly the aim has been to produce a microphone that when used up close sounds like an omni, but with the reduced rear pickup advantage that draws most people to cardioids in the first place. The published polar plots go on to suggest that primary consideration has been given to the response at 90° rather than smoothness at the back; the variation with frequency at 90° and 270° is relatively small, while at 180° the shape is more like hypercardioid at 4kHz and subcardioid at high frequencies.

Certainly at close quarters this has the desired effect, with an unusually open and complete sound, with a smooth, extended top, but it must be said that at greater distances there is an undeniable lack of bass. This is not a problem as long as one is aware of how the microphone is intended to be used, which is clearly explained in the literature—assuming it ever gets read. Once again Earthworks is treading its own path, producing a microphone that challenges the established norms and encourages us to take a second look at the way we use our equipment. ■

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Weiss Gambit EQ1

Digital control with an analogue feel is an oft-attributed quality, yet few can truly say they have conquered all the points on the agenda. **Dave Foister** discovers a high definition digital EQ that gets pretty damn close

DIGITAL EQ has come a long way, and eventually its path was bound to cross that of Daniel Weiss. Several times now I have seen Weiss' convertors held up as the reference to which others should aspire, particularly in a mastering context, and my own experience with the ADC1 mic amp-converter (*Studio Sound*, September 96) supports this. There are many people who depend on Weiss' DSP expertise for critical work, and they will no doubt be first in the queue for the new version of the company's digital parametric, the Gambit EQ1.

The box and overall design are in themselves not new, having been available for some time; what is new is the double-sampling capability, and since the unit has not been covered in these pages before a full run-down is in order.

The Gambit EQ1 is a full-blown 7-band parametric equaliser, operating entirely in the digital domain, but offering analogue-like control. It is rare, and very refreshing, to see a digital processor with quite so many controls on it, and the way those controls are used, and the interaction with the display, makes this a masterpiece of ergonomic design.

The front panel is dominated by 21 black control knobs, immediately indicating that all seven bands have real controls for all three of their parameters. A further encoder handles other functions, and sits next to a big bright display screen that manages to convey a lot of information at once. Eight dedicated pushbuttons deal with memories and channel ganging, leaving only four softkeys beside the display to worry about, controlled in turn by a MENU key.

The joy of the system is that these softkeys are only really needed for set-and-forget utilities and 'are-you-sure?' type confirmations; the real job of the equaliser is always live on the panel. Most of the display screen is given over to a real-time frequency response curve, complete with flags showing the selected frequen-

cies of the seven bands. The rest changes function according to what you're doing, generally showing the numeric values for the band currently being adjusted.

All seven bands are identical, and offer a wide range of filter and EQ configurations. Each band can be independently configured as a high or low-frequency shelving equaliser, or as a high-pass or low-pass filter, or as a conventional peaking parametric. Each band can be individually bypassed, so that you only activate as many bands as you actually need to use. Its two channels can be ganged for stereo operation or used entirely separately; although since the unit only has digital I-O I imagine most users will be processing complete stereo signals.

Apart from the fact that the two channels share one set of controls, nothing is duplicated on the equaliser panel itself. The bands' knobs are sensibly laid out, with boost-cut at the top, frequency at the bottom and slope or bandwidth as appropriate in the middle. All are continuous rotary encoders, and all are touch sensitive, placing the relevant band's details in the numeric read-out section of the screen display as soon as they are touched. Alongside each of the bandwidth knobs on the main control panel is a line of five LEDs, showing a surprising amount of information about the status of the bands. First, if a band is bypassed, no LEDs will be showing at all. Second, the currently selected configuration for an active band is shown by one brightly-lit LED next to the appropriate shape. Finally, the band currently shown in the panel in the main display screen has all its LEDs glowing at half brightness. As a further luxury, the overall brightness of all the unit's LEDs has two settings to allow for darkened control rooms. Control ranges are more than adequate, bearing in mind that for extreme correction or treatment two bands can be overlaid precisely on top of one another—with the luxury of seven bands there's usually at least one spare.

Boost and cut is up to 18dB, and every band can operate from 16Hz to 20kHz; in peaking mode the Q runs from 0.4 to 8.6, while the filters have a choice of slopes, offering 6dB or 12dB per octave. Of course, since this is a digital system, the parameters are not continuously variable, but stepped in small increments, a fact that Weiss is happy to admit by printing lists of the available values in the manual. This reveals that there are only six possible values for the parametric bandwidth, but the frequency centres are at 1/6-octave intervals, giving control almost as fine as a continuous pot, but with the bonus of precision and repeatability. The stepped nature is always a potential stumbling block on a digital EQ, as it can so easily give rise to zipper effects when the controls are turned quickly, and the fast nature of the EQ1's controls should make it more vulnerable to this than an EQ with nudge buttons; however, it doesn't seem to be a problem, as the response to control movement is smooth and natural. The same applies to the gain settings, which are in half-dB increments up to ±10dB and progressively more widely spaced after that.

Overall gain is also adjustable, to allow for the possible increase in level brought about by the EQ, and setting this is made easier by high-resolution peak logging and Over indication. In line with Weiss' convertors, the system allows the number of consecutive maximum samples representing an Over to be adjusted by the user up to a rather reckless 16. Overs then light a little dot next to the peak value display, and further usefulness is added by the fact that the peak doesn't stop at 0dB but shows positive values as well, showing just how far over the top you've gone. Simple as it is, this is a huge bonus and something we should see more of.

This level of detail, showing us things others don't bother with, reflects Weiss' high-end approach to the job of a digital processor, and further evidence is there in the way the >>>>



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TASCAM

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<<<<< unit can deal with various digital formats. Where most digital equalisers would simply pass the incoming format out unchanged, the EQ1 allows it to be switched from consumer to professional or vice versa, and to be dithered, using second-order noise shaping, down to 20 or 16 bits. A further nicety is auto blanking, which turns off the dither when the input signal is digital zero to avoid adding noise to digital silence.

Huge amounts of memory are available for storing presets, or Snapshots as Weiss calls them, along with two complete work-spaces for instant comparison of settings. Four of the dedicated buttons deal with switching around this lot, allowing swapping between A and B settings and copying either into memory. 128 snapshots are available, known simply by their numbers, and the display can show the outline curve of a snapshot before it is recalled. Further memory space is available for backing up two complete sets of snapshots. These aren't strictly extra presets as they can only be stored and recalled as a complete block of 128, over-writing everything in their path, but the amount of storage available means that whole banks can be swapped in and out of current memory at will.

THE SNAPSHOTS can, of course, be selected remotely with MIDI program changes, but the MIDI implementation doesn't stop there; perhaps surprisingly, the EQ1 offers full dumping of all 128 snapshots to a sequencer, and complete remote control using control change commands rather than sysex. This level of access is also available via RS232 and RS422 using the same command set, and the degree of automation this could offer for broadcast or installation use is clear.

The chief recent addition to the facilities is the ability to handle double-sampled signals, making the unit ready for 96kHz-24-bit work. This thrust runs right through the Weiss range, making sure that the gear remains a strong contender at the top whatever may be around the corner.

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Sonically you'd have a right to expect the EQ1 to be superb, and it won't disappoint. The days when digital EQ was a poor substitute for analogue designs are now behind us, and the Weiss shows just how far. Its enormous power and flexibility is complemented by a quite remarkable sound, as smooth and musical as you could wish with the surgical precision only digital can offer. Not once did I ask anything of it that it couldn't deliver, and not once did I feel I was compromising anything in the interests of digital convenience. Quite clearly the EQ1 has a claim to being an ideal mastering equaliser, and, indeed, I used it to remaster a distinctly dodgy flute and piano CD, producing a result I didn't think the source had in it. Beyond that, it has the potential to fit in to any digital environment, where its impressive combination of sound, ergonomics, thoughtful facilities and raw muscle could make it the only EQ you'll ever need. ■

Studio Sound March 1998



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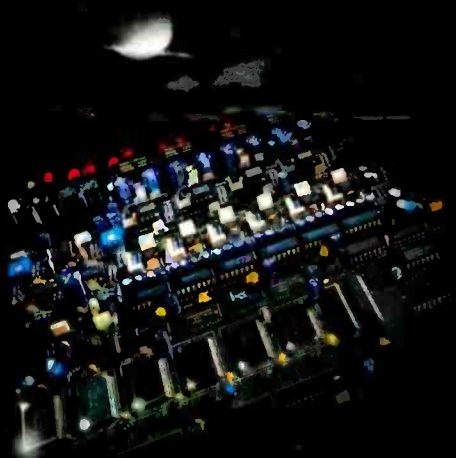
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Shure net

Shure's UA888 networking interface system can be used remotely to control and monitor 32 Shure UHF receivers and consists of a rackmount interface module, Windows software and connecting cables. Monitoring features keep tabs on RF levels, diversity signal strength, audio levels and available battery power at the transmitters. Monitoring and control capabilities are offered for group-channel selection, frequency, user name, squelch and lock-unlock status.

A walkaround RF plotter function is included together with a frequency scanner to indicate local RF activity. The system will interface with any Shure DSP device and is password protected while the software permits scenes to be setup, stored and recalled. **Shure, US. Tel: +1 847 866 2200.**

ART valve EQ

Art's Tube EQ 4-band single-channel equaliser uses a 12AX7a and fully adjustable input and output controls. The fixed LF and HF bands can be switched between 50Hz-80Hz and 5kHz-15kHz respectively, while the two frequency variable mid bands



both sweep from 20Hz to 20kHz with the help of x10 multiplier switches. All bands offer ± 12 dB of boost and run to balanced XLR and unbalanced jack connectors.

The Tube Pac, on the other hand, uses two valves to combine a mic-line preamp with phantom power, phase reverse and an optical compressor. Equipped with fully variable threshold and output pots, switches select limiting or compression and automatic or fast release times.

ART, US. Tel: +1 716 436 2720.

Small lavalier

The latest mic from Countryman Associates is the B3 small, round, omni electret, which is said to be resistant to moisture and makeup. The mic is available in black, white, light skin, cocoa and grey, and boasts a claimed frequency response of 10Hz to 25kHz and an SPL handling of up to 150dB on 48V power. The model is accompanied by the Isomax headset mic which has a headband that fits around the back of the head. Available with hypercardioid or cardioid patterns with a frequency response designed to create a 'warm' sound at the side of mouth position, it features a telescopic adjustable mini-mic boom.

Countryman, US. Tel: +1 415 364 9988.

Accessorise

Rolls continues to expand its range of small fix-it accessories. Latest in the line that already includes a direct inject box, high-low impedance matcher, personal monitor system, headphone tap, phantom power adaptor, cable tester, headphone mixer, 4:1 mixer, 2:1 mixer, tiny 2-way crossover, mini mic preamp and test oscillator is a >>>>

Tascam MD-301 and MD-501

Joining the burgeoning MiniDisc market are two new machines from Tascam. **Jim Betteridge** asks if they're up to professional use

THE MARCH OF MiniDisc continues unabated, and not only in the professional market. Like the penultimate scene in a Hollywood disaster movie, the now sometime-lifeless body of our hero coughs, splutters and opens its eyes. 'Domestic MiniDisc, you're alive!'

And, if the MiniDisc hasn't suffered brain damage in the interim, the pro-sales market certainly is now. With discount stores in the UK offering the Sony MDSJE510, a full-size hi-fi unit at around £175 (£299 rrp), margins are shrinking and the costs of offering full after-sales support are looking less sensible. The same could be said of DAT when it was still on the ventilator as a domestic format but, unlike its tape-based cousin, MD is starting to catch on with the punter. A keen young salesman in a very well-known London retailer told me excitedly that the Sony MDs were selling 'unbelievably quickly' and he was definitely going to get one himself. Of course, as inventor of the format, Sony has more reason than most to plunge the adrenaline-filled syringe of underpricing into its darling's ailing chest.

The MD-301 and MD-501 are two new MD record-play machines from Tascam. Both are 2U-high rackmounting with large, bright displays and plenty of dedicated controls, clearly

Divide function and erasing the two unwanted end cues. Having pressed the EDIT button while in Play, an edit point is initially entered on the fly by pressing the YES button. At this point the machine automatically cycles around a few seconds starting at you mark. Turning the rotary TRACK control either advances or retards that point by a digital frame and continues looping from the new position. This is then confirmed by pressing YES again. It's all very simple for the inexperienced editor.

Having recorded, titled and trimmed your various recordings you can chain up to 25 tracks together into a Program. A silent recording can be entered as spacing between tracks.

There are some things an MD can't do as compared to a stereo hard-disk editor and they're to do with data retrieval times. Most typically, tracks constructed from lots of recordings with lots of edits may not happily combine with other tracks in a Program without losing audio the machine simply can't get around the disk quickly enough. This is where Tascam's MD-801, their original and professionally spec'd machine, can claim some superiority. It boasts the fastest transport in the known universe. In the case of the two models under review, however, a standard trans-



port is used and no advantage offered. marked in simple English. The more expensive MD-501 has balanced analogue ins and outs on XLR as opposed to unbalanced RCA phonos, and permits the connection of a standard P2-type PC keyboard for titling and some degree of remote control. This latter facility is particularly important as neither machine offers a wired remote, opting instead for well-spec'd wireless units. Otherwise the two machines are very similar.

Recording is straightforward: press the REC button alone and you get line-in monitoring and the display tells you how much time you have left. Then hit the PLAY button and the display counts your record time. Considering the audio is data compressed (ATRAC) the results sound quite excellent. During or after recording you can name the track using up to 255 characters which scroll across the display when you subsequently select the track—for once a format offers a really useful titling capacity.

You can then trim the top and tail using the

port is used and no advantage offered.

It is a strange and difficult market into which these two new Tascam models arrive. As with all Tascam equipment they are both well built and ergonomically pleasing. What puts them firmly in the domestic or perhaps semi-pro market is their lack of any wired remote control facilities, and the absence of a wired digital output. They have an SPDIF input but only an optical digital output, not commonly used by professionals. With a price several times that of the Sony (which even has a co-axial SPDIF output) it would seem that these

models might fall between two stools. They are unquestionably more solidly constructed and would probably stand up to hard daily use better, but then with only consumer-level facilities that degree of build quality is, perhaps, unnecessary. It's also true to say that for 10% more than the MD-501 you can get a fully-spec'd pro machine from Denon, the DN-M1050R. Possibly not. ■

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Sony PCM-R300

From consumer to professional and back again, DAT's role remains undefined. **Dave Foister** test drives Sony's latest recorder

JUST AS WE START to believe that DAT has finally died as anything other than a professional medium, along comes another consumer machine to prolong the death throes for a while. Sometimes it's a little portable, producing another crop of amateur recordings for us to salvage; less often, it's a full-blown table-top model, which immediately has us asking if it's suitable for studio use. Whether Sony's new PCM-R300 is truly aimed at the consumer market I'm not sure, although its styling has as much in common with Sony's domestic cassette decks as with its professional DAT machines: its facilities too



look at first glance as though it's meant for home use, but a closer look reveals a surprising number of features the small studio would find useful.

Despite its similar model number, this new machine doesn't appear to be intimately related to the 500 and 700 models (Studio Sound, July 1997). Gone are the balanced XLR analogue connections and AES-EBU, and the integral rack ears which marked those down immediately as pro machines. Yet the 300 comes as standard with a rack mounting kit; and with digital ins and outs on both optical and phono connectors, the lack of professional analogue interfacing (and any lurking doubts about the converters) becomes irrelevant to anybody with a digital mixer. Suddenly the machine starts to look like a studio contender. Incidentally, I don't have any serious reservations about the converters, which in the absence of any specs sound very good indeed.

The transport itself appears similar to that in the R700, both in the way the motorised drawer sucks the tape inside and in the layout of its controls. There is a complete set of all the expected functions, including full ID handling, and still more is available on a well-planned menu arrangement which is accessed from the counter mode button when there's no tape moving. Here we have settings for the Auto ID functions, allowing level thresholds and gap lengths to be programmed, as well as control over how the digital inputs handle incoming IDs from DAT or CD. The machine supports the broadcast version of the IEC-958 format, allowing transfer of material to and from similarly-equipped machines with no

SCMS codes and copying of some subcodes. The type of digital signal being received can be displayed via the menus, showing whether the source has identified itself as DAT, CD, Mini Disc or whatever, including indication of the Pro broadcast status.

Mechanically the machine is responsive and quick, without too much clanking and whirring accompanying the expected fast wind speeds. The operating buttons are large enough not to be fiddly, but the little symbols in the display showing what the transport is currently doing are not duplicated in button illuminations as they are on the 700. ID searches are efficient, and the infrared remote allows direct access to a specific program number. The ID writing functions include a rehearsal mode which allows placing of IDs with 0.3s precision, and this mode can also move existing IDs.

Several facilities help to further the 300's claim to pro or semi-pro status. Less notable than it would once have been is the ability to record analogue sources at 44.1kHz, and this is backed up by the presence of Super Bit Mapping. No information is given in the manual about the nature of the A-convertors, but presumably they must be capable of more than 16 bits in order to warrant the inclusion of SBM. More interestingly, the display allows for an error read-out: once this was unheard-of on a machine that might have found its way into somebody's living room, presumably on the basis that Joe Public wasn't supposed to know that DAT had errors. On the R300 both heads are continuously monitored and the errors can be shown on 4-digit displays in place of the timing information when required. Besides this, there is actually a head hours counter down at the bottom of the menus: the combination of the two should make diagnosis of playback difficulties, and the timing of head cleans, unusually easy. Funnily enough, with only two hours on the clock of the review machine I didn't once see it show an error.

On the down side, the construction is hardly designed with roadworthiness in mind - I wouldn't bolt this into a rack and throw it in the back of a van - but unless you have particularly clumsy clients this is no problem in a control room. Also the headphone output is pitifully low in level, but that's not unusual and anyway who ever uses them?

After a while the PCM-R300 starts to feel like a scaled-down professional machine rather than a domestic machine trying to break in to the big time. Everything you need in a basic machine is there and readily to hand, without clutter and unnecessary frills, and at a very attractive price. It sounds good too, and could turn out to be another example (just like the DAT format itself) of something intended for the layman finding itself sought after by the specialist. ■

Contact

Europe: Sony.
Tel: +44 1256 55011.
UK: HHB Communications.
Tel: +44 181 962 5000.

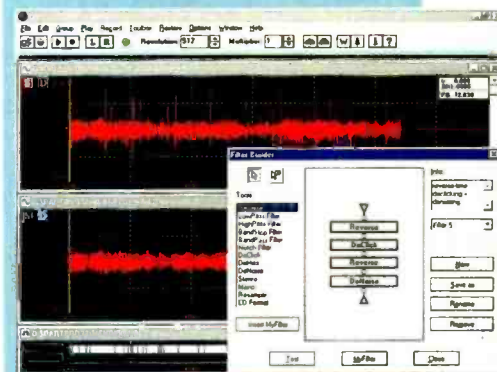
NEW TECHNOLOGIES

<<<<< mic splitter and a phono preamp. The splitter is transformer coupled with a ground lift while the phono preamp offers RIAA EQ on phono inputs and outputs plus a stereo jack output.
Rolls Corp, US. Tel: +1 801 263 9053.

PC-based restoration

DART Pro 32 is a PC-based, 32-bit, noise-reduction software package with CD burning capability. The system includes noise algorithm layering for combining processes, pitch shifting, 3D spectrum analysis and a function that allows the recording of a 78rpm record at 33 1/3 rpm and then translate it in the computer to the original speed.

DART is complemented by Diamond Cut audio-restoration tools v2.0 real-time noise-reduction application again for PC. Algorithms are provided to remove clicks, pops,



hiss, surface noise, hums, buzzes and static. The package includes a variable speed controller for correcting varispeed problems within a sound file and a forensic-type application for pulling voices out of extremely noisy material, for instances where the noise ratiion outweighs the good signal. An intelligent harmonic reject filter used for hum and buzz can remove 500 harmonics in one pass. CD quantisation allows a complete album to be recorded on to the hard disk, markers to be dropped at the end of each song and then the appliance of a 'chop file into pieces' function that breaks the recording into track-sized chunks.

Tracer Technologies, US.
Tel: +1 717 843 5833.

Vox Box

Manley's Vox Box is a combination compressor, mic preamp, 33-frequency Pultec-style equaliser, de-esser and limiter based on several of Manley's existing valve designs including the 40dB microphone preamp, the electro-optical limiter, and the all-tube mid frequency equaliser. However, it achieves this with a significantly shorter audio path and more processing power than the individual units.

Features include a variable attack-release opto-compressor located before the mix preamp, instrument and line inputs, vu meter, high-pass filters, phase and phantom-power switching, and is said to be well suited to drums, guitar, synthesisers and bass.

The EQ is based on the Pultec MEQ, but the low and high frequency peak >>>>>

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Jünger Vamp1

Jünger's digital voice processor eschews fashion in favour of an ingenious approach to practical operation. **Rob James** reports

BUILDING ON ITS considerable reputation in the digital dynamics field, Jünger is branching out into other areas. This new box, the Vamp1 appears deceptively simple to the casual observer and before you think 'not another voice processor' Jünger has delivered something very different to others in the market.

The Vamp1 has been designed to be extremely simple to operate by non-technical people. Suggested applications include universal interface for audio or video workstations, sound reinforcement, and as a sophisticated voice processor in studio applications such as for radio and TV broadcast. To this end the power of the device is well hidden from the user, and indeed, it is possible to lock out accidental tampering with the settings. The memory key receptacle allows a small memory chip (ROM or RAM) in the form of a stainless steel button set into a plastic key fob to

The outputs from these are fed to input selectors which allow any input to be routed to the Mic chain and either analogue or digital ins to the Line In chain. From here the Mic chain consists of a MUTE switch, gain, compressor-expander, parametric filter and de-esser. The Line chain has a MUTE switch and AGC. The two chains are combined in a mixer and fed to the digital output via a limiter. The mixer can also function as a ducker. There is a separate analogue mono mic output which is routed before the mixer with its own limiter and 20-bit A-D converter. The selected monitor input may be combined with the mixed out signal, after the limiter.

The Monitor section works in a similar way with the inputs routed via a selector to a LINE MUTE switch, level control and 20-bit D-A and to the headphone level control and 20-bit D-A.

The parallel remote functions (GPIOs) allow remote mic muting and 20dB attenuation of the monitor output. This is useful for preventing howl-round where talkback is required. Inputs and presets can be given meaningful names which will then appear in the displays.

Gain is adjustable from -15dB to +15dB in 1dB steps. Adjustable parameters of the dynamics are deliberately kept simple and are limited to expander threshold and release time, fixed compression ratios of 1.3:1, 1.6:1, 2:1, 3:1 and 4:1 and range 0dB-15dB. The de-esser is simpler still with either Female or Male characteristics and range -20dB to -0dB. The limiters are fixed; although output attenuation is provided giving a maximum output -5dB -0dBFS. Dither is selectable as none for 24 bits, or 20-bit or 16-bit. The equaliser provides two peaking bands, Low-Peak covers a range of 50Hz-500Hz and Mid-Peak of 50Hz-15kHz. Q varies 0.5-8.0. In addition, there is a high shelf from 1kHz-15kHz with ±15dB ranges. Lastly, there is a High Cut ranging 1.0kHz-15kHz. These ranges may seem restrictive at the top end but given the intended purpose are more than adequate. The ducking function is the most programmable with threshold, range, attenuation and attack and release times. The AGC has no variable parameters.

Vamp1 performs just as you would expect a Jünger device—the accent is on clean, smooth control with extreme effects possible, but really outside the more likely applications. Jünger has provided harassed engineering staff with a very high quality front end that can be set up for a wide variety of applications and then 'idiot proofed'. The dinky key fob memory keys will, I am sure, prove popular with artists. All-in-all, it's a very useful addition to the armoury. ■

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Fax: +44 181 460 0499.

be used to store personal presets. A ROM 'administrator' key enables access to the editing facilities when the internal DIP switch is set to Edit Lock. All parameter editing can be achieved from the front panel; although this is somewhat frustrating due to the scarcity of controls. Perhaps there is a case for a PC editing package connected via the RS-232 port.

Connections are made mostly via XLRs with additional connectors being a BNC for digital sync input a headphone jack and an 9-pin D-connector for RS232 and parallel remote. The front panel is more interesting, smart graphics divide it into three main blocks, Voice Processor, Mic and Source mix and Monitor. The Voice Processor section has a strange chrome bezel, on the left, with what looks like a button battery inside it—this is the memory key 'socket'. A green alpha-numeric display with three illuminating preset buttons complete the section. The mixer has two alphanumerics one each for Mic and Source both with illuminating off buttons. Source selection also uses one of the rubbery push and turn knobs seen on other Jünger devices. A central knob with a shocking pink flash mixes between mic and source. The monitor section also has an alpha-numeric with associated OFF button and SELECT knob plus knobs for LINE and PHONES with a jack socket.

Functionally, the signal paths contain the following blocks; the Mic section has a 24-bit A-D converter on the mic input and 20-bit converters on the analogue line inputs. The AES-EBU and SPDIF inputs go into an SRC.

NEW TECHNOLOGIES

<<<<< boosts are extended to another six positions. The opto de-esser/limiter circuit has four notching frequencies and a 'flat' limit position which is claimed to be almost identical to the EL-OP limiter.

Manley, US. Tel: +1 909 627 4256.

CS3 facelift

EVI has announced revisions to the DDA CS3 mixer to bring it into line with the CS8 and the Midas range of desks. The revisions



consist of cosmetic and component changes such as a new colour scheme and higher profile pots as used on the CS8.

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

MultiMax

Designed to give any console with eight buses the ability to handle multichannel post, MultiMax offers control of three loudspeaker systems with individual muting.

The main surround can be set up for stereo, 4-channel Dolby matrixed, 5.1 or 7.1. In Dolby 4:2:4 mode, MultiMax provides one-switch insertion of a matrix encode-decode system. It permits direct-playback (PEC-direct, bus-tape) switching of all eight monitor inputs or the addition of switches to a console panel for individual PEC-Direct and mute-solo on each of the eight inputs. It also provides the ability to bring surround-formatted premixes in to the monitor mix without having to mix them into recorded signals and without using up the console buses.

Neotek, US. Tel: +1 626 281 3555.

Perfect pitch

AnTares Systems has released a hardware rack version of its Auto-Tune TDM plug in. According to the company, the Auto-Tune Rack permits any solo vocal or instrument track to be instantly and automatically corrected to the proper pitch without losing the nuances of the original performance.

The Rack comes with preset scales including major, minor and chromatics in any key and can save 100 different custom scales. Any scale can be detuned to a different pitch centre and the box can be set up to ignore vibrato, bends, slides, and other performance frills. A retune speed parameter controls the time allowed for the pitch to remain out of tune while vibrato can be added with programmable delay, depth, rate and waveform. Extensive MIDI control is supported.

Cameo International, US.
Tel: +1 408 399 0008.

>>>>>

“A revelation...”

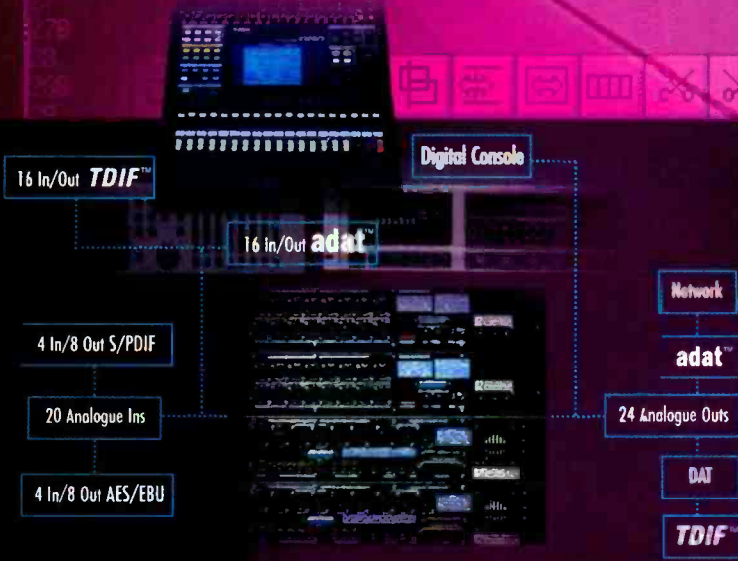
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MEL LAMBERT MIX MAGAZINE, FEBRUARY 98.

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ADL 1500 stereo compressor

Valves and compression continue hand in hand. **Dave Foister** reports on a box that has both, and a strong reputation to match

THERE ARE MANY AREAS where character is a disadvantage, and compression isn't one of them. Here people have their favourites more than anywhere else, and right now several people's favourite seems to be Anthony DeMaria. For some time we've been hoping to have a look at ADL's 1500 compressor-limiter, and here it is.

First glance reveals the unit's roots. Four valves per channel protrude bravely from the rear panel—only one is protected by a can—proclaiming immediately which camp the 1500 belongs in. The chassis looks almost home-made, an impression that is only partially countered by the austere front panel. This is dominated by a pair of big double-function vu meters, flanked by two pairs of good-old black rotary knobs, making this the ultimate minimalist compressor.

The 1500 provides combined compression

and limiting, and each channel has just one control to adjust its behaviour. Marked simply Peak Reduction, it appears to set the threshold for the limiter, with the compressor coming into play a certain amount below that, producing a classic double-knee slope. As far as the compressor stage is concerned, its threshold is fixed in relation to that of the limiter, and its ratio and time constants are outside the user's control. Although no figures are given, it seems that the ratio increases as the threshold is reduced, starting at around 1.5 or 2:1 for high thresholds and getting up to 4:1 or 5:1 at lower ones, and has a soft knee characteristic at all settings. This makes the Peak Reduction knob very much a 'more compression' control. Attack is fixed, and the release characteristic has a 2-stage decay, coming quickly back to 50%, and then having a variable time to full recovery depending on the amount of the previous reduction. The meters can be switched independently to show either the output level or the resulting gain reduction, and the only other variable control provides gain make up following the dynamic processing. Neither control is calibrated, both showing simple arbitrary numeric values and with knobs far enough from the panel that parallax is a problem when trying to match them.

Matching remains important when the 1500 is switched to stereo. The two channels are linked with a single switch, but the resulting stereo operation is not as simple as on most compressors. In the first place, it remains necessary to have the two channels' Peak Reduction and Gain controls matched as closely as possible so that each contributes equally to the overall gain reduction; and secondly, there are screwdriver presets within holes in the front panel for precise calibration of the stereo link. There is a line-up procedure outlined in the manual for making sure the gain reduction at a given signal level is the same on both sides, but curiously the instructions insist that the calibration presets should be returned fully anti-clockwise when the channels are to be used separately in mono. I can not see anybody being prepared to go through all this palaver every time they want to use the unit for a single vocal track rather than a full stereo mix, and there's no explanation offered as to why this should be necessary. On the other hand, once I'd put right the appalling miscalibration of the review sample, the difference required to set up the stereo link was quite small and could probably be left there.

Inputs and outputs are on XLRs nestled between the valves, and surprisingly both input and output impedances are 600Ω. I am astonished to see anything these days being offered with such a low input impedance; just feeding my console's insert sends into it made the desk go into serious distortion at just over +12dBm as its circuitry couldn't handle being so heavily loaded. The problem remained with the 1500 fully in circuit; although the wide range of gain adjustment available meant that I could drive it at a lower level and make it up within the unit. This is not, however, a comfortable way to work, and wastes around 10dB of desk headroom.

All these quirks could be justified by the unit's character, and it has plenty of that. If you want good old-fashioned fat compression, this could be for you. It's a real blunt instrument, whose vocabulary doesn't include the word subtle: as the Peak Reduction knobs are advanced the compression suddenly kicks in and rapidly gets heavier. I found it difficult to achieve any kind of gentle control, but on the other hand very easy to get a big thick punchy effect. Across a complete mix it does a terrific job of making it much more dense and present, perfect for the client who wants everything louder than everything else. It manages to do this with no tonal trade-offs, avoiding the dulling effect common to heavy compression.

The ADL 1500 is an unusually specialised compressor, extremely good at one aspect of compression, but not, perhaps, the ideal all-rounder. It will unquestionably give you big fat mixes with the absolute minimum of adjustment, with a sound that has already won it many fans. ■

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NEW TECHNOLOGIES

PreSonus M80

The PreSonus M80 8-channel mic-instrument preamp with mix bus houses Jensen transformers, FET, Class A discrete input buffers, twin servo gain stages, and an XLR balanced output on each channel.

Each channel has switchable phantom power, phase reverse, 20dB pad, high-pass filter, pan, insert, routing to the stereo bus and a gain control. Additionally, an IDSS pot adjusts harmonic distortion from 0.001% to 0.5%.

The box is described as a suitable front end for existing DAW A-D convertors.
PreSonus, US. Tel: +1 504 344 7887.

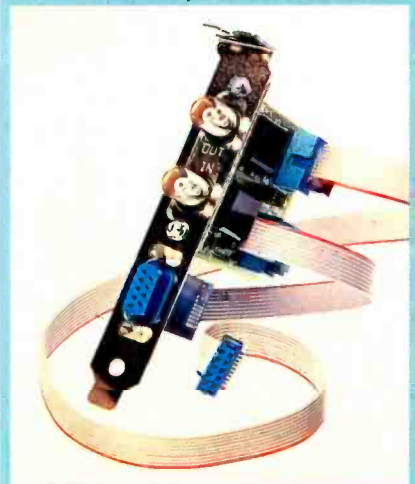
Line mixer upgrade

Speck Electronics has upgraded its Xtramix 40:8:2 4U-high rackmount line mixer. New features include true stereo-effects sends and eight stereo-effects returns that are fully assignable to the 8 buses, lower-noise electronically balanced inputs and a talkback section with an internal mic and level control. All inputs and outputs sections have undergone significant circuit improvements, a new grounding architecture and lower noise pots and switches.

Speck, US. Tel: +1 760 723 4281.

Sonus enhancements

The Studi/o 16-channel digital interface for PC and Mac DAWs is soon to be made available in a version designed to complement Steinberg's Cubase VST 3.5. Studi/o users are currently able to use Cubase



VST via the standard Windows WaveAudio drivers, Asio drivers will noticeably improve the overall performance. Drivers will also be released for Windows NT 4.0.

Other news includes the Sync Backplate for Studi/o which provides word clock in and out, ADAT time-code input and MTC input.
Sonus, US. Tel: +1 212 253 7700

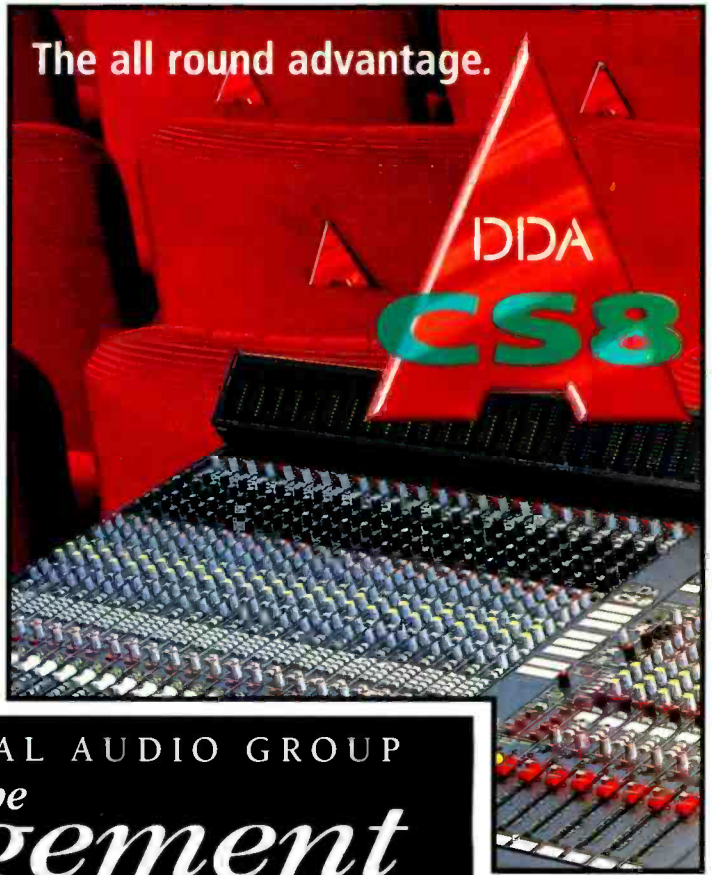
Rupert Summit

In a collaborative agreement with the designer Rupert Neve, Summit expects to unveil a new product line under the Rupert Neve signature in April. The new line will include 'innovative technology', according to the company, and will combine >>>>



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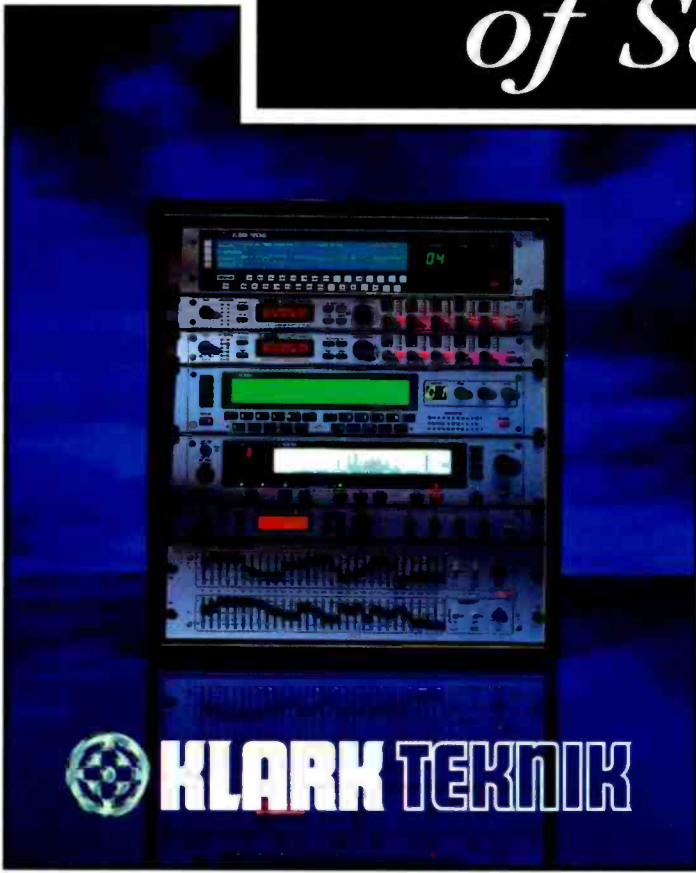


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SPL Machine Head

An absence of tape saturation effects is one of the objections levelled at digital recording. **Dave Foister** finds a box to solve the problem

WHenever something new comes along, there are those who maintain that something has been lost. Sorting out valid claims from mere nostalgia is often difficult, but there are clear-cut cases, such as the time Hammond found a way to stop the keys on their organs clicking and then had to design the click back in to the solid-state instruments because everyone stopped buying them. The fact that valve technology, once the domain of the misty-eyed enthusiast, is now taken seriously again, shows that going solid-state was just one path to progress, alongside further refinement of tube designs, and both have something to offer.

On the other hand those who mourn the passing of the steam engine have little practical weight to their arguments, sad though its demise may be. In between these extremes are many developments with less clear-cut consequences. One such is undoubtedly digital recording, which divides the audio fraternity into two camps: one sees it as liberation from the frustrating limits of analogue and a step closer to the truth, while the other sees it as an unmusical travesty. That both technologies have their place has been shown by those who run analogue and digital multitracks alongside each other, recording some instruments on one and some on the other according to which character suits them better. In particular, it has been common for some producers to record drums analogue in order to exploit the squashing or frequency-dependent compression analogue tape produces when driven hard. There are also those who make sure everything they do goes on and off analogue tape at some point during its preparation.

input and output gain controls with corresponding meters, giving very flexible control over the gain structure through the box. In a way this allows the Machine Head to mimic the elevated level approach, where the recorder's electronics were adjusted to put more level on the tape while maintaining overall unity gain, either to take advantage of high-headroom tapes or to deliberately utilise the effect of slight over-modding.

The last adjustment is for the HF content, which can simulate the slight treble loss and compression often found with analogue tape, or even mimic a bright misaligned recorder. This is fairly subtle—not an EQ by any means—and it, more than anything, is affected by the single pushbutton, which actually alters the characteristics to simulate 15ips or 30ips.

If this were the April issue I'd now be going on to describe the variable wow and flutter knob, the hiss level and spectrum controls, the asperity simulation and the azimuth error adjustment, not to mention the gradual progressive HF reduction that is reset by pressing the HEAD CLEAN button. None of these, of course, is present, and that's the point: here we have the aspects of tape non-linearity people like without any of the nasty mechanical problems. And, although I confess to having approached the Machine Head with a liberal helping of scepticism, I have to say that it works.

I proved this by passing a digital source simultaneously through the Machine Head and a Studer B67 running at 15ips, monitoring off tape. Even while calibrating levels for a fair test it was immediately obvious that the bloom around the 1kHz test tone was identical in

Given a perceived need for this effect it was only a matter of time before someone put it in a box, and it may have been worth a small wager that it would have been SPL that would do it.

No, it isn't April, this is for real: the SPL Machine Head Digital Tape Saturation Processor sets out to duplicate the effect of analogue tape recording, with enough variable parameters to simulate various modes of analogue working. It belongs in the same family as the Spectralizer and Loudness Maximizer, being a highly dedicated, fully digital processor with no analogue I-O at all.

The crucial control is the DRIVE knob, simulating the amount of level piled on to the virtual tape. This has a wide range, from very subtle effects to extreme saturation, and it has a pair of LED meters showing the notional recording level. This is complemented by

nature to that on the real tape. As soon as music passed through the systems the similarity was obvious: an extra thickness and warmth, especially around the top end. The tape speed button opens up the top a little, moving the whole effect upwards and smoothing out the middle. Varying the drive and HF controls does just what it should, even producing unpleasant (yet still characteristic) distortion at the extremes.

For every person that wants what the Machine Head does there will be another who was glad to see the back of the artefacts it simulates and will be astonished that anybody could possibly want them reinstated. That doesn't alter the fact that there will be countless digital studios on the phone to SPL right now to buy one of these to stick between their consoles and recorders, to give them back that character they sacrificed on the digital altar. ■

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UK: beyerdynamic.
Tel: +44 1444 258 258.
Fax: +44 1444 258 444.

NEW TECHNOLOGIES

<<<<< the traditions of Summit and the sound quality of the designer.
Summit, US. Tel: +1 408 464 2448.

Schoeps filters

Schoeps has introduced a new line of active high-pass filters for removing wind, infra-sonic and handling noise. The phantom



powered LC60 and LC120 filters (60Hz and 120Hz frequencies respectively) have low output impedances for low long-run cable losses and RF pickup and are inserted in any convenient point in the mic cable.

Although designed primarily as an accessory for the CCM series compact mics, the devices are applicable to other manufacturers' products.

Schoeps, Germany. Tel: +49 7 219 43200.

Energy efficient amps

Three amps in Yamaha's Energy Efficient Engine range are the P1600, P3200 and P4500 offering 230W, 520W and 720W per channel into 4Ω respectively. The company claims the models require around half the input power of traditional designs to achieve the same output power. Three out-



put modes embrace normal stereo, parallel and bridged mono. All models have power-on muting, quiet variable-speed cooling fans, noise filtering, PC limiter for short circuit protection and an attenuator security cover to protect level settings.

Input attenuators are 31-position and dB calibrated while balanced XLR, standard jacks and a barrier strip handle inputs connection. Speaker connection is via 5-way binding posts.

Yamaha, UK. Tel: +44 1908 369269.

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Demeter HM-1

A new line of valve outboard from American specialist Demeter opens with a preamp. **George Shilling** lends an ear

THE BEST KNOWN of Jim Demeter's pre-amplifiers are for bass guitar. These are the ones that many players aspire to, and Demeter has built up an impressive list of well-known users. To understand the popularity of his designs you have to look at the philosophy behind them, and the build quality of these units. Every box sold is painstakingly hand wired, then tested with Demeter's Audio Precision System One Audio Analyser to make sure published specifications are met or beaten. The H-series is a new range of three similarly priced tube solid-state designs: a parametric stereo equaliser, a mono optical compressor and this stereo microphone preamplifier.

My initial impression on seeing the preamp, the HM-1, was that it is not exactly 'pretty'.

A well-finished deep metallic-blue front panel enables the white legending to be visible in low-light situations. However, the push-buttons appear somewhat cheap and old-fashioned, looking like refugees from an early-eighties Eventide Harmonizer or something similar. This is a functional design, with none of the visual appeal of, say, a Focusrite Red. However, the two knobs on each channel are pleasantly

quality input transformers supplied by Jensen. Distortion figures are astonishingly low. It seems the trend of throwing any old circuit around a valve and labelling it as 'vintage sounding' is over. More people are realising that it is possible to achieve very low noise and distortion designs with good valve circuitry, examples of which put some solid-state designs to shame.

On the rear panel, mains is supplied via an IEC socket, accompanied by a protruding fuseholder and voltage selector. Inputs and outputs feature on XLRs and TRS jacks. The mic inputs have an impedance of 1k Ω . The front panel features an instrument input on each channel with an impedance of 1M Ω .

The front panel arranges the two channels side by side, with a power switch to the right. A small red LED glows when the unit is on. The aforementioned instrument jack is leftmost, somewhat cheap and plasticky, nevertheless usefully turning the unit into a valve DI box. A row of push buttons follows. First, LOW CUT which applies a 6dB per octave high-pass filter which starts at about 200Hz and is 12dB down at 40Hz. The gentle slope reduces phase shift. There follow a -20dB Pad, PHANTOM

POWER (with corresponding LED) and PHASE INVERT buttons. A GAIN control gives a range of 30dB to 60dB, controlling the amount of feedback going to the tube using solid-state components. A VOLUME knob follows for fine tuning; this behaves like a channel fader. Finally, there is a switch to change the meter scale to -10dB. A row of 10 LEDs along the top in three different colours forms a VU meter. The mic preamp has over 18dB more headroom than the highest +3dB LED. An Overload LED separately indicates distortion in the tube amplifier. This actually lights 6dB before distortion, so some flickering is permissible.

In use the performance of this unit ensures a particularly clean signal direct to tape or subsequent processing. The high overload margin is extremely useful, enabling easy setting of levels with a variety of microphones and recording formats. Sound quality was every bit as pure and clear as you would expect from a high-quality unit, and the instrument input gave my Strat a bright, full tone.

While the price may be higher than that of smarter and more stylish-looking units, the performance speaks for itself. It will not be the design of the front panel that influences the choice of a unit such as this: it is the 'gubbins' inside that is important. If you are looking for a superior mic preamp to that in your console this fine unit is well worth a listen. ■

damped and inspire confidence.

The box itself is sturdy enough, a standard 1U-high rackmounter. Positioning will need careful thought, as the top features a long row of vents, precluding the placement of anything immediately above. Having said this, the HM-1 does not generate as much heat as you might imagine. Through the gaps, two 12AX7A-ECC83 valves are visible, and weighing the case down is a substantial toroidal transformer. Inside, the home-made approach is fairly apparent, but this preproduction model may not fully represent the nature of the finished products now shipping. For example, the small PCBs at the rear of the case for the connections were all rough, and the cut-out holes in the front panel for the meters slightly too wide. This is unusual in this age of computer-designed mass-produced electronics, but obviously does not affect audio performance.

This unit is unusual in that it features a fully regulated power supply providing 200V to the tubes and +18V and -18V to the solid-state components. This is double the voltage of some other units, but this high voltage uses the valves the way in which they were designed. This gives tremendous headroom: up to +28dB output into 600 Ω . A huge signal-to-noise ratio is one of the benefits of this design, partly due, no doubt, to the high-

Contact:

Demeter Tube Amplification,
2912 Colorado Avenue,
Ste 204, Santa Monica,
CA 90404, US.
Tel: +1 310 829 4383.
Fax: +1 310 829 3755.
UK: The UK Office.
Tel: +44 1442 870103.
Fax: +44 1442 870148.

NEW TECHNOLOGIES

Crown's cheapest

Crown's CE series amps are described as its most affordable yet. The CE1000 and CE2000 produce 560W and 975W into 2 Ω respectively, and are said to guarantee 0.5% or less THD at rated power.

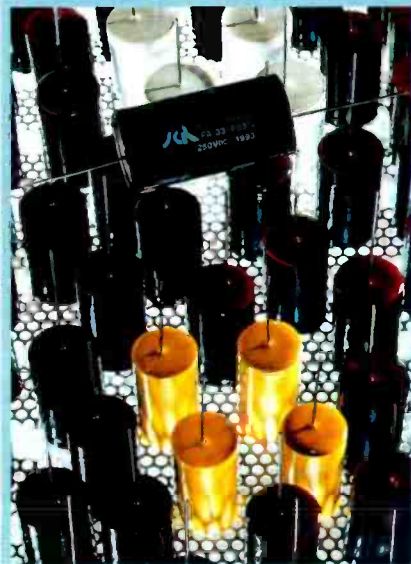


Both models have fan-assisted cooling, front-panel controls, signal present LEDs, a rear-panel fault jack that permits remote monitoring of the fault light circuit, and a three-year warranty.

Crown, US. Tel: +1 219 294 8066.

Fancy caps

French company SCR has developed a range of capacitors for audio filtering comprising aluminium metalised polypropylene capacitors, coated or encapsulated in plastic or aluminium cases.



The range includes components with tin foil electrodes and the capacitors are cylindrical or rectangular in shape with tinned copper leads, and a polyurethane resin seal. **SCR, France. Tel: +33 2 54222724.**

Acoustic modules

IAS-A1/A2 and IAS-D1 are acoustic modules for the low-priced acoustic optimisation of smaller studios. The modules are accompanied by general installation instructions free of charge. An alternative to on-the-spot consultation is the measurement CD which can be used for simple measurement of reverberation time in the rooms which can then be evaluated by the acoustic engineers of IAS.

The modules are extremely flat in design and serve to provide absorption of resonances and the optimisation of reverberation time. The A1 is a low-mid frequency absorber, the A2 a broadband absorber for reverberation time correction >>>>

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C. Bridger

Chas Bridger, B400 and B800 Designer



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H A Harman International Company

Totalsystems DBM 3

A capable digital metering unit from a British company. **Paul Mac** plugs it up and gets its measure

IF YOU'RE WORKING with digital, you need metering that is up to the job. It's no good throwing money at the most obvious trappings of audiophilia, only to sold short by not working at optimum levels. Remember, peak is paramount. Not many engineers buy into a digital format because of its distortion characteristics. Some time ago we looked at a wide array of metering options, from economy analogue to first degree digital. This time, one meter gets all our attention: The DBM 3 from Totalsystems.

The box itself will fit just about anywhere. Panel or chassis mounting is a good option for permanent installations, though a standard 1U-high, 19-inch box is available that will

3.75ms. As we mentioned earlier, the decay time is internally adjustable, but is factory set to the comfortable, IEC directed, 1.7s from 0 to -20dB. The metering resolution changes over three linear scales, top being the 0 to -20dB stretch that allocates 0.4dB per segment.

Anybody who has seen single-colour, high-resolution metering before will know that it is extremely easy to read. The DBM 3 demonstrates that. Brightness might be an issue, as the red glow can soon become a blaze at the back of the eye, but is tempered with the Bright-up facility in place. That dims the lower end of the scale, and brightens the upper end, above a user-set threshold. The brightness 'ratio' is adjustable, but overall brightness is not. In general, the combination of black surround, large legending, and red illumination is nothing short of obvious, and the factory preset ballistics are just fine for anything other than very special cases. Just don't stare—you'll lose.

Two front-panel buttons administer the peak hold options. The PEAK button switches peak hold on or off, while the MEMO button activates infinite hold (until reset). Without that, peak hold updates every 1.5s. The memory function includes the overload indication: two circular LEDs, positioned a few millimetres past the end of the scale. The overload threshold can be set anywhere from 1-15 full scale samples on the back panel. It's a shame that there's

not more control over the peak hold times, not just for 'comfort setting', but so that source material can be matched by the metering. More specifically, transient signals would be better served by shorter peak hold times.

That's the important stuff covered. The rest of the front-panel indicators cover incoming sample frequency, emphasis presence, and an alarm LED for major signal errors. The three sample frequencies indicated are 48kHz, 44.1kHz, and 44.056kHz, with a tolerance of 400ppm. All that remains on the back panel is a remote memory reset socket for lazy operators or automated monitoring.

The strength of the DBM 3 is its simplicity. You don't get the option to do much fiddling, so the preset parameters make the meter. If you spend too much time meditating on the bobbing fluorescence it's likely that you'll end up talking to pot plants, but no one gets that attached to a meter. The important thing is that the DBM 3 is easy to read, and accurate, and has just enough adjustments to be friendly. ■

accommodate two DBM 3s without so much as a squeeze. Front-panel paraphernalia is minimal, leaving the pair of boldly labelled, 100-segment bar graphs to dominate the available space. Some settings appear at the rear of the unit, so anybody thinking of throwing a variety of jobs at the DBM 3 should make sure there's a back entrance. The only internal setting is the decay time, for which you'll need a frequency counter, a trimming driver, and a calculator. That makes it a good candidate for setting and forgetting.

I-O is simple: AES-EBU in, and the very same out again. The output is a straight through connection provided for the next input in the chain, and a 110Ω terminating switch lets you arrest the signal safely, just like ending a SCSI bus. Next stop, the metering.

The DBM 3 is a peak reading meter with zero integration time. That means you see exactly what's what. There's no mechanical or arithmetic delay, so the only delay of any consequence is purely down to the display, which can do a dash from -60dB to 0 (full scale) in

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NEW TECHNOLOGIES

«««« while the D1 is a diffuser for mixing the generated sound energy.

IAS Germany.

Tel: +49 2241 62918.

Dalet5

Many applications and features have been added to the Dalet Version 5 of the hard-disk audio system for radio.

Dalet News attempts to create a paperless central newsroom and staff can create, review and modify their news stories using a single application from any networked workstation. NewsWalk transforms a portable computer into a mobile newsroom using Digigram's PCX Pocket Type II PC card. Reporters can record and edit audio, integrate audio into a text document and transfer it back to the newsroom by modem or ISDN.

Dalet Web Publisher enables radio stations to build and maintain a web site that incorporates audio, graphics and text. The site can be updated or modified by dragging and dropping audio, text or logs from the Dalet5 databases into the web publisher window.

Database replication is a new feature of Dalet5 and allows multisite exchange and management of audio. By dragging and dropping a file from one database window to another the audio is transferred to the local server. New database management tools take advantage of client-server technology that permits Dalet to install much larger networks.

Dalet's tradition is in providing an open architecture: Windows NT operating system, Sybase Client-server database and Digigram audio cards. ISDN, Internet and satellite technology connects stations within a group. **Dalet France. Tel: +33 1 40 38 01 39.**

SPL tubes

SPL has extended its Golden Tube series with the availability of the Stereo Vitalizer MkII in a MkII-T valve version and the Qure EQ. The former uses E83CC valves for the high fre-



quency and harmonic processing while the Qure dual channel, 3-band parametric uses LC filtering to create a vintage sound.

Beyerdynamic, UK.

Tel: +44 1444 258258.

Mini stagebox

Deltron has launched a low-cost mini stagebox that will accept 40 universal XLR connectors front or rear mount. Of simple mild steel construction it can be supplied as a plain box or prewired assembly painted matt black.

Deltron UK. Tel: +44 181 965 4222.

SuperMini and monitor

Martech's SuperMiniconsole is targeted at Flying Faders users and adds 32 channels with automated faders, EQ, aux sends, 8 buses, panning, direct outs, inserts, solo, mute and dual inputs. As an option, >>>>

xt20



The new Alesis ADAT XT20 is a 20 Bit Digital Audio recorder offering a new standard in audio quality while remaining completely compatible with the huge foundation of over 100,000 ADATs in use worldwide. Using ADAT Type II, the only modular digital multi-track recording format that writes 20 bits to tape, the XT20 raises the standard of sonic excellence that ADAT recorders have established since their introduction in 1991. Rather than just a 25% increase, the jump from 16-bit to 20-bit recording provides audio quality that's sixteen times more detailed than the 16-bit sound of compact discs, resulting in a wider dynamic range and lower quantisation noise. This, coupled with high quality A-to-D and D-to-A converters and the lack of any form of data compression gives unparalleled sonic quality.

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Beyerdynamic MCE 82

Frequently a possession of the elite, the stereo mic has become attractive to the masses. **Dave Foister** looks at a new contender

IN OUR ROUNDUP of stereo microphones a while back there was a clear division into two leagues. In one category were the top-end models, based on, or equivalent to, existing grown-up mono microphones and suitable for use as a main (or only) pair in a purist setup; while in the other were the convenience models with no pretensions to such roles, but suitable as good solid workhorses. A decent microphone like this can save the bother of rigging two equivalent mono models with the attendant risk of the carefully aligned lashup getting knocked out of whack, and can be a real boon on location. Indeed

the growth of stereo TV production has been directly responsible for the ever-increasing number of such microphones. At the time of our survey beyerdynamic's only contribution was the expensive and flexible MC 833, belonging firmly in the first division, but now the range is joined by the MCE 82 which sits happily in the second.

The MCE 82 contains two cardioid capsules fixed at 90° to each other. This is a pretty common arrangement; although it disregards the preference many of us have for a slightly wider angle between cardioids, 90° is optimum for figure-of-eights as anything

NEW TECHNOLOGIES

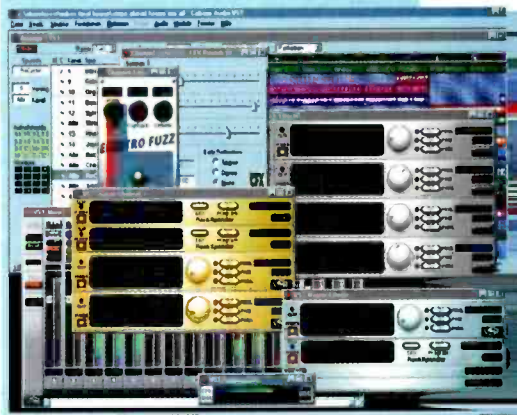
<<<<< the events control facilities of Flying Faders may be used to automate the input select, EQ and insert functions.

The news coincides with the release of the Martech Recorder Monitor System a multi-input monitor matrix that provides programmable headphones, loudspeaker and vu meter monitoring of recorder inputs, sync outputs and repro outputs of multiple 8-channel audio sources. The listening paths provide LCR placement of each track, separate volume and mute controls for headphones and speaker and single track solo. The metering path, consisting of 8 meter buses with auxiliary balanced output drivers on each bus, permits metering of one machine at a time or the summed outputs of several machines/stems.

Martinsound US. Tel: +1 626 281 3555.

VST 3.5.5

Steinberg has released Cubase VST 3.5.5 for Windows which now features channel inserts meaning that every channel of the VST mixer is able to run four additional effects and realises 32 x 4 additional effects for the entire system. Other features include



an updated implementation of DirectX Plugins, support for Recycle Export Files, and the VST Audio Engine can now be disabled while VST is running.

Cubase VST for Windows has also been integrated with the Lexicon Studio System. The Steinberg ASIO system provides complete support for LexiPowerCore technology for 32 tracks of 24-bit audio. Cubase VST directly supports the PC90 complete PCM90 effects daughter board for the Lexicon Core 32 card.

Steinberg, Germany. Tel: +49 40 201330.

5-disc CD

The CD305 is a 5-disc CD multipler in a 3U-high rackmount designed for installation and extended playback applications. Outputs are balanced XLR, phono and SPDIF co-axial.

A programmable playback sequence mode enables custom playlists of 32 tracks from all discs to be created while a shuffle mode plays out tracks in a random order. Repeat play repeats playback of all tracks on all loaded discs, various tracks on several discs, all tracks on one disc or just one track. The unit comes with an infra-red remote.

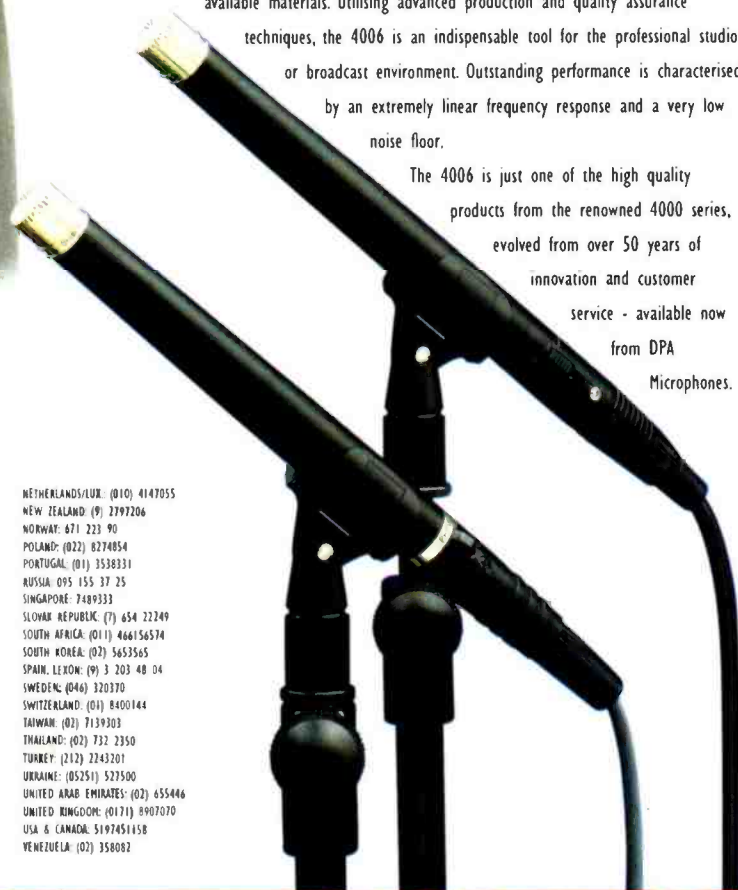
Tascam, UK. Tel: +44 1923 819 630.

Classic Performer

The classic 4006 omnidirectional microphone from DPA Microphones

(formerly known as Danish Pro Audio.) is a proven, no-nonsense cost effective workhorse with an enviable pedigree. The audio professionals' choice, the 4006 embodies the finest available materials. Utilising advanced production and quality assurance techniques, the 4006 is an indispensable tool for the professional studio or broadcast environment. Outstanding performance is characterised by an extremely linear frequency response and a very low noise floor.

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DPA
MICROPHONES

March 1998 **Studio Sound**



to convert from the 5-pin XLR on the microphone to a pair of 3-pins, colour-coded red and yellow, and numbered, but without any hint in the instructions as to which is which. It turned out red was left, which threw me for a while. The cable is too short to be of much use to get directly to a recorder, mixer or tie-line, yet longer than it needs to be to perform its Y-cord function, and coupled with the strange, stiff, oval cable used, this makes it a bit of a liability. The quality is not in doubt, however, and in any case the standard 5-pin stereo wiring makes it possible to substitute any suitable cable.

The sound it delivers has a presence that in most cases is going to be very helpful. I found it lent bite to a big grand piano which was particularly appropriate for jazz work, and gave a crisp clear picture of a drum kit when slung overhead, handling the high levels comfortably. It also worked very well for overall pickup of a small chamber group arranged in

a horseshoe with the microphone above the conductor's head; imaging was clearly defined and the sound lacked nothing, except, perhaps, a bit of bottom-end grunt. This is hardly surprising in a microphone of this type, and does not detract from its general usefulness.

This broad category of microphone covers models intended for the whole range of recording applications, and some of them are only really fit for use with portable cassette recorders. There's a definite trend here, but it is not easy to sort out the sheep from the goats. The MCE 82 inspires confidence in its ability to do its job professionally, and not just because it's got beyerdynamic written on it. This is a microphone that would always be handy to have around; it's clearly built to last, and can deliver a good solid sound fit for quality recording. Whether stuck inside a piano or waving around on the end of a boom, the MCE 82 will unquestionably do the business. ■

wider can lead to out-of-phase elements, but for cardioids it can give rather a narrow centre-clumped image. Pushing out towards 120 can often give a more natural stereo picture—I seem to recall 117 being the theoretical optimum for even pickup of the reverberant field. That aside, for many typical studio stereo applications—piano, drum overheads, horn or string sections—the standard arrangement works fine, the stereo image being determined by how close to the source the microphone is placed. It's also useful in the field to have a pickup that is not too wide.

The capsules in the MCE 82 are electret elements, which has the advantage that it can be run off a single AA battery for quite some time. An ON-OFF switch is fitted, complete with a battery check position that lights a LED if all is well. Naturally, it will also run happily from phantom power, which as well as 48V can be anything down to 12V. The only other switch is for LF roll off, introducing a 12dB per octave filter at 100Hz.

The shape is unusual, with only a central bar through the end grille, and a left-right orientation graphic, indicating the stereo nature

Germany: beyerdynamic.
Tel: +49 7131 6170.
Fax: +49 7131 604 59.
UK: beyerdynamic.
Tel: +44 1444 258 258.
Fax: +44 1444 258 444.

of the microphone. The overall appearance is more like a handheld radio microphone than a studio condenser, but the net effect

is to make it reasonably neat and unobtrusive. It is end-fire, although it's big enough to make you check before setting it up for the first time, and comes with a simple but effective stand mount. Although this provides no shockproofing, the transducers themselves are mounted in an elastic suspension to reduce the effects of handling, stand and cable noise—particularly important in location recording, one of its target markets.

The other accessory is the expected cable

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The extensive range of Micron radio microphone systems offers one of the widest choices of compatible products available.

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Studio Sound audio industry recognition awards

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2. By faxing the form to +44 171 401 8036.
3. By emailing their unique reader identification number, the category numbers and their votes to zschoepe@unmf.com
4. By filling in the interactive voting form on the Studio Sound website: www.prostudio.com/studiosound

Readers will only be allowed to vote once. Readers may only vote for one product in each category.

The object is not necessarily to identify the best equipment in each category but to identify those items that genuinely warrant recognition as being special in some way.

It should be noted that in the case of outboard equipment, the categories describe a function rather than a product type. Thus a 'voice channel' may legitimately qualify under dynamics and/or EQ if you feel it excels in these areas. Readers are not obliged to vote in all categories and their attention is drawn to Special Category 13 which serves as a 'catch all' for any products not covered in the other 12.

Any questions can be directed to Zenon Schoepe and Tim Goodyer at Studio Sound. Tel: +44 171 921 5010.

THE AMSTERDAM AES Convention in May 1998 will be the setting for the first SSAIRAs—the *Studio Sound* Audio Industry Recognition Awards. Following our call for nominations there follows a list of products that have been put forward in the various categories at the time of going to press.

While the voting process is now effectively open, products can still be nominated and indeed will be should our readers choose to vote for products that are not currently listed. The only condition is that the product has to have been released onto the market since last year's European AES Convention in Mu-

nich. Nominations will be updated on the *Studio Sound* website www.prostudio.com/studiosound.

While anyone can nominate a product for a category, only qualified readers of *Studio Sound* are eligible to vote and this will be verified by the requirement for readers to quote their unique reader identification number.

Ways to vote

Readers can vote for one product in each category in four ways.

1. By filling in the form and posting it to: SSAIRAs, *Studio Sound* Magazine,

**Fax your vote to:
+44 171 401 8036**

Nominations

1 Large scale console

Calrec Q2
D&R Octagon
Lawo MC82
Soundtracs DPC II
SSL Avant

Stage Tec Cinetra
Studer D950S

2 Medium to small scale console

ATI Pro⁹
Audio Developments AD149
Allen & Heath GL3300
AmeK Soho
Calrec C2
Summit TMX-420
Tascam TM-D8000

3 Outboard dynamics

AmeK 9098 compressor-limiter
Aphex 661
BSS Opal DPR422
BSS Opal DPR522

dbx Blue 160s
Drawer MX30
Drawer MX40
Empirical Labs Distressor
Fairman TMC
Focusrite Green 4
Joemeek SC3
SPL Machine Head
Symetrix 562E
Prism Maselec MLA-2

4 Outboard preamp

AMS Neve 1081
Cadac mic pres
CLM Dynamics DB400
DACS Micamp
Grace Model 201
Martech MSS10
Oram Octasonic

5 Outboard equaliser

AMS Neve 1081
HSE EQ1
IC Vac Rac TEQ 1
Joemeek VC5 Meequalizer
Prism Maselec MEA-2

TL Audio Ivory EQ-5013

6 Outboard Reverb

tc electronic FireworX

7 Combined outboard device

Cedar CRX
dbx 1086
Junger Vamp 1
Manley Vox Box
Orban Optimod 9200
SPL Spectralizer
Symetrix 606
Symetrix 628
TL Audio O-2031

8 Monitors

DynaudioAcoustics C4
FAR AV5
Hafler TRM8
Harbeth Monitor 30
Harbeth Monitor 40
JBL LSR32
Meyer HM1S
Miller & Kreisel THX monitors
Quested F11

9 Microphones

AKG SolidTube
Audix D4
beyerdynamic MCD100
beyerdynamic MCE 82
BPM CR-10
Brauner VM1
Earthworks QTC1
Elatlon KM-201
Neumann TLM50
Oktava MK319
Pearl C-22
Rode NT1
Sondelux U195
Sonodore RCM-402
Trantec S4000

10 Convertors

Apogee AD-8000
dCS 972DDC D-D
Prism AD2/DA2
11 Audio editor
Creamware TripleDat 16
Digidesign Pro Tools 24
Orban Audicy
Otari DX-5050

Otari PD-80
SA&V Octavia B/24
Soundscape v2

12 Audio recorder

DAR OMR8
Digigram PCXpocket
Fostex D160
HHB CDR800
Sonifex Courier
Sony PCM-R700
Tascam DA-98
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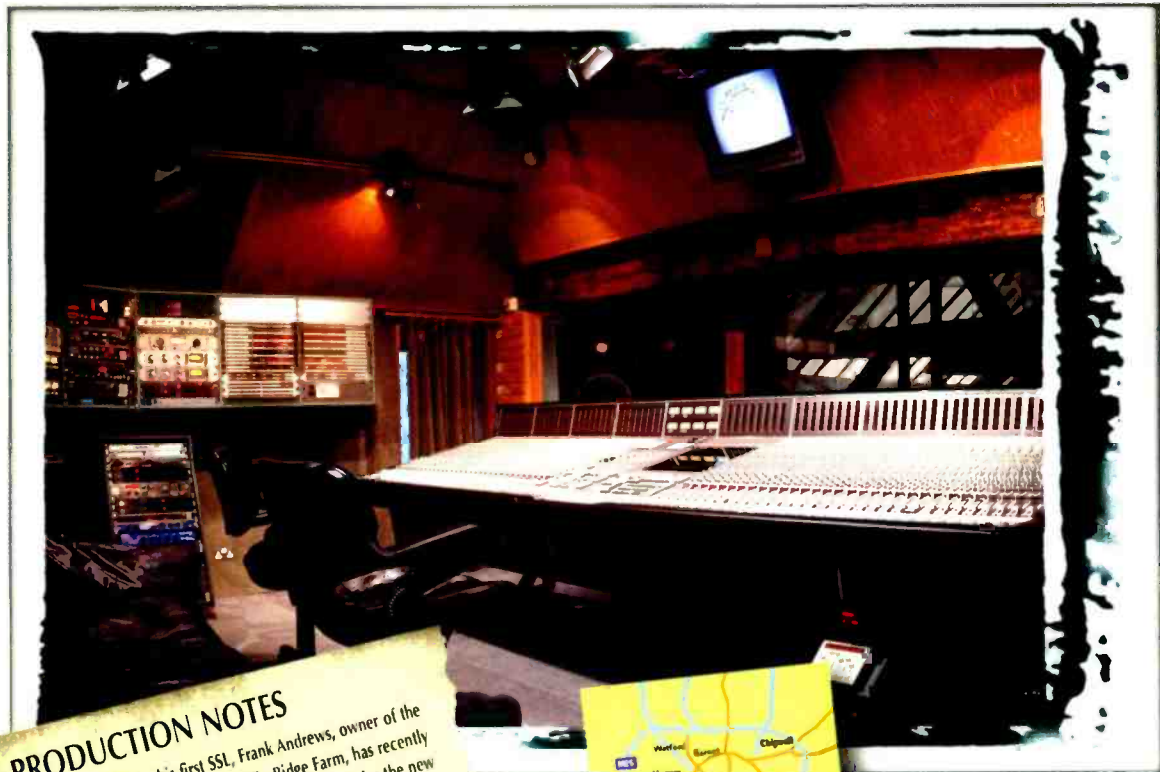
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PRODUCTION NOTES

20 years after buying his first SSL, Frank Andrews, owner of the highly successful UK residential studio Ridge Farm, has recently installed an SL 9000 J Series console in preparation for the new millennium – a decision endorsed by pioneering Drum & Bass artist Goldie who chose to record much of his new album 'Saturnz Return' there. A double CD, one extraordinary track – 'Mother' – accounts for almost half of the album. "The SL 9000 was a great asset, giving us all the power and strength we had envisaged" commented engineer Will O'Donovan. "For a track as ambitious and revolutionary as 'Mother', only the SL 9000 was good enough".



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FEW NAMES are as synonymous with the title 'producer' than that of Arif Mardin. His is inextricably linked with five decades of milestone recordings and artists, and with Atlantic Records, where he began work in 1963 as an assistant to Nesuhi Ertegün, brother of company founder Ahmet, and where he remains today as senior vice president.

Since then, Mardin has accumulated over 40 gold and platinum record sales awards and an extraordinary six Grammy Awards, and was nominated for what could be his seventh in this February's round. NARAS has also honoured him with membership in its Hall of Fame and as a NARAS Hero. The roster of artists he has worked with as a producer and arranger is encyclopedic in scope, including Barbra Streisand, Carly Simon, Bette Midler, Phil Collins, Roberta Flack, Average White Band, Hall & Oates, Aretha Franklin, Whitney Houston, the Bee Gees, Ringo Starr, Cher, Dr John and Smashing Pumpkins.

Mardin's speech is precise and quick, as much a product of his UK higher education as his 35 years living in New York City. Born in Istanbul, Turkey, Mardin graduated from Istanbul University and then studied at the London School of Economics. Although he is a self-professed life-long jazz aficionado (his *oeuvre* includes records with the Modern Jazz Quartet, Sonny Stitt and Max Roach), it was not his intention to pursue a career in music, despite his intense love of it. But a chance meeting with Dizzy Gillespie, when the trumpeter was on a European tour in 1956 and passed through Turkey, proved to be a life's turning point.

'It was the biggest event of my life to that point,' recalls Mardin. 'I had the chance to meet him and he wound up playing one of my pieces and giving me some pointers.' Two years later, in 1958, Mardin became the first-ever recipient of the Quincy Jones Scholarship at the Berklee College of Music in Boston. After graduation, he stayed on to teach for a year. (He was ultimately made a trustee of the school and awarded an honorary doctorate.)

He then travelled to New York in 1963 to work as an assistant to Nesuhi Ertegün, and soon became a staff producer and arranger for Atlantic Records, as well as manager of the large recording studio that Atlantic maintained on upper Broadway in Manhattan. 'I was still leaning towards jazz at that time,' he recalls, 'but within a few years, Atlantic had signed The Young Rascals, and they wanted a team to produce them: me and [engineer] Tom Dowd.' Dowd was then chief engineer at Atlantic, and would go on to an impressive career of his own as a producer, centred mainly out of Criteria Recording Studios in Miami. But from this pairing of a jazz-starred young junior executive, a budding technical genius, and the record label that, perhaps, had done more to foster American R&B as a viable, profitable mainstream idiom, came 'Good Lovin', the band's second single, which was released later that year. It went to No.1 in the charts, becoming one of the biggest records of the decade. It also set the course for Mardin's career as a producer.

'I was bitten by the bug after that record,' he says. 'They didn't call us producers then: the term, I recall, was "supervisors". >>>>>

From a chance meeting with jazz trumpeter Dizzy Gillespie to laying the ground rules for electronic dance, Arif Mardin has helped define the role of record producer.

Dan Daley greets a genuine great

Arif Mardin



3

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<<<<< But that's what we were doing—producing. I learned a lot from Tom [Dowd]. Mainly, I think, I learned how to mix from him. I would always ask him, "What do you think about this sound or that?". Then I started mixing a little more myself and I was enjoying it tremendously by the time I was working with the Average White Band and doing Aretha's 'Young, Gifted and Black' record. Mixing was a lot of fun at that time, though much of the sound was determined during the recording process with microphone placement, and so on. There was less you could do to change things in the mix other than relationships between parts and EQ. Things like that. It was truly an art. But now, I rely more on younger engineers for mixing. Techniques and technology have changed. But the essence of mixing is still the same—more vocal, more bass. It's all in the relationships."

Mardin claims that he consciously never tried to develop a signature sound, the way producers like Phil Spector had as the concept of the producer evolved through the 1960s. But he was hardly passive in the studio.

"I try to have certain desires when I start a record," he explains. "What I'm always trying to do is to have the elements in a record in the background that can create depth to the sound. I put the sound together in layers, and they can be made up of instruments or things like reverb." Mardin cited Bette Midler's 1991 hit single "From a Distance". "That record has so many layers," he says. "There are string or synth pads in the background. There's a small percussion instrument that has reverb and repeats on it that is mixed in very softly but which gives the illusion of depth to the panorama, of three-dimensionality to the record. Most of my pop records have elements like that in them. It's not a sound, but a technique. But you still want to produce for the song and the artist—if it's a rhythm-driven, dry-sounding thing, then that's what it is."

When Arif Mardin came to Atlantic Records in 1963, the label's studio, at 1841 Broadway, was still reserved for in-house projects. It would not become open to the public for another year. It had a large, open recording space and only one iso booth, and sessions tended to be done ensemble and mixed on the fly.

"It was big enough to have 20-piece to 30-piece string sections in there," he remembers. "Jerry Wexler, and Ahmet, and Tom Dowd would record there, and even when there was an 8-track recorder available, they would still often use that just for a safety and record right to a 2-track or to mono. You only went to the multitrack if there was some disaster. But usually you got what you wanted on the very first take."

The 8-track was an Ampex, as were the mixdown recorders, which had interchangeable mono, 2-track, 3-track and 4-track headstacks. Despite being essentially a private facility, the studio saw almost the entire range of American music, thanks to Atlantic's emphasis on R&B and the creative mission of Wexler and Ertegun to move those artists in a pop direction, and because Atlantic still had a strong jazz division. The studio hosted records for MJQ and King Curtis, as well as early efforts by Aretha Franklin, for whom Wexler would bring in musicians from Muscle Shoals, Alabama, and mix them with the cream of the



The Queen of Soul: Aretha Franklin

crop of New York studio players like guitarist Cornell Dupree. Later on in the sixties, it was also the site of sessions for Cream's *Disraeli Gears* and some of the Bee Gees' earlier records. It was watching Wexler, Ertegun and Dowd work that Mardin says he learned what

it means to produce a modern record.

"They were not afraid to bring up the kick and the bass on a record," he says. "I liked that."

When Mardin and Dowd were teamed for the Young Rascals (the 'Young' was dropped two years later in 1967, along with the stage costumes the group used), he found he could not have asked for a better first project. "To work with the Rascals in the studio was really funny, like working with the Marx Brothers," Mardin laughs. "There were always jokes and they'd be playing basketball in the same hallways we used to sing the harmonies in. [Keyboardist] Felix Cavaliere played the bass to "Good Lovin'" on the pedals of the Hammond organ and on stage, although sometimes we used a bass player, often Chuck Rainey, who played on "Groovin'". The great thing about the Rascals was, they could duplicate the same excitement in the studio as on stage, so we wanted to record them the same way as they played live, and that meant using >>>>>

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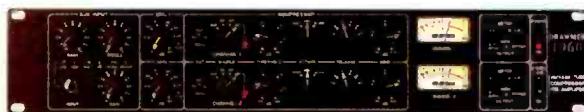
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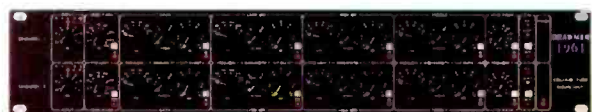


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<<<< the foot pedals for bass a lot. I had seen them play live in a small club before the sessions and they were great. The Leslie was recorded with two microphones, one on top and one on the bottom. Which ones, I don't recall. I'm not what you'd call a microphone person. I know that this one works great on Aretha's voice, or that's a great one for somebody else. I don't get bogged down in those kinds of technicalities when I do a record. I know what can be done in a studio. I know what a gate is and how it works but don't ask me about brands.'



Phil Collins' 'solo' career drew on Mardin's expertise

MARDIN did travel outside the confines of Atlantic as his career progressed. (His contract with the company specifies that he can produce for other labels.) He worked at the legendary American Studios in Memphis on the classic Danny O'Keefe track 'Goodtime Charlie's Got The Blues'. 'I believe that was a 4-track session,' he says. 'Sessions used to go very quickly in Memphis. I think we got the Dusty Springfield [1964] record done there in a week. We would often get three songs done in one day. When I worked with a real poet like O'Keefe, or Steve Goodman or John Prine, I always looked at the lyric as a mini-film. It's going to be a 3-minute recording, so I choose certain sounds and hooks to surround the lyric with.'

And, he adds, the way the recording process at the time worked facilitated that. 'When we were working at American or Muscle Shoals and we heard how long it was taking to do a Fleetwood Mac album, we were amazed. When we were working, the drums would be set up a certain way with the microphones already around them in place. The guitar is there already on certain settings. There were grease-pencil marks on the console for settings. You weren't so much plugging into equipment as you were plugging into those musicians. You weren't taking a day to get sounds.'

'We were doing the overdubs on 4-track as we went, combining instruments. You'd want to combine instruments that were playing in different frequency ranges, like a guitar and bass on the same bounced track. Or drums and piano on the same bounce. That way, you could use EQ to bring the guitar out more at around 2kHz and not affect the bass level or sound. You made those decisions as you went along, and it became part of the production process. I was doing albums on 8-track with Tom Dowd and on one song we had one track left open and I had to write a big jazz orchestration with French horn lines and a solo. But only one track open. Yet, Tom recorded everything in such a way that all these elements were perfectly balanced. That's the way it was at Motown Studios, too. The engineer there knew exactly what the balance would be, knew the room and the instruments and amps because they were the

same ones at every session. When we went to studios in the 1960s, we were plugging into expertise, not technology.'

Mardin is hardly a Luddite, though. He stresses he does not long for 'the good old days'. Rather, he says, his approach to the song and to layering sounds works well whether it's on four tracks and demands

bouncing decisions every pass or in the more complicated environments he works in now. 'We make very good-sounding records today, but it's craziness to always link up three 48-track digital machines,' he exclaims. 'Regardless of how many tracks there are, I'm still making my choices as I go. I know that if there's going to be a certain reverb on the final picture of a sound, I will tell my engineer to record that reverb to tape and not wait to put it on in the mix. The more choices you leave till the end, the more time it takes and the more potential you have to drift away from the original vision of the picture.'

Mardin has an affinity for the ways in which musicians work, and for any economies of effort they invent that allows him and them to get the aesthetic point faster. For instance, he recalls seeing musicians in Memphis using numbers on charts instead of chords—1, 4 and 5 instead of C, F and G—allowing them to change keys instantly to accommodate >>>>

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«««« the singer. (The system originated in Nashville in the 1950s, and is unofficially known as the Nashville number system.) But I also used to watch John Robie, a real pioneer of Rap music, cut up the 1/2-inch tape and throw it around and do crazy edits,' Mardin says. 'I like that kind of thing, as well, and now you can do it on digital editing systems.'

Mardin was also one of the early proponents of synthesiser technology on pop records, which was used heavily on the Bee Gees' *Main Course* record in 1975, the recording that marked a transition for the band from the introspective, at times thematically ponderous pop of 'Trafalgar' and 'Odessa', to the disco kings who fused R&B with pop. RSO Records president and Bee Gees' Svengali at the time Robert Stigwood recruited Mardin to work with the Bee Gees for that record, which was done at Criteria in Miami. It resulted in 'Jive Talkin', which went to number one that year, and gave the band its first platinum album.

Mardin created the definitive 'Jive Talkin' for the Bee Gees



cover up the splice.'

Aretha Franklin is a long-time Mardin diva; he produced *Live At The Fillmore* and *Amazing Grace* in the early seventies when Franklin was on Atlantic, and he joined her again in 1980 for her first two efforts on Arista Records, *Aretha*, and *Love All the Hurt Away*. Mardin liked the gospel record approach that Franklin herself had used so many times before, and Mardin made sure that each

record had an old soul standard as a sort of spiritual guide for Franklin, such as the remake of 'Hold On, I'm Comin' from 1981's *Love All The Hurt Away*, which went to number six on the charts.

'Those sessions at Criteria were incredible,' Mardin waxes. 'Any number of people walked in and played on those sessions—Donny Hathaway, Dr John, the Memphis Horns. The record was made mostly everyone playing ensemble, with maybe a tambourine or some other horns later. Aretha sang a guide track as we recorded on a 16-track machine. We usually recorded a final vocal later, but it might as well have been the guide vocal. That's how good it was when she sang in the same room with everyone. And anyway, there was only one vocal booth. Tom [Dowd] would choose microphones for her, depending upon the type of song; he picked an old Neumann for ballads and some kind of dynamic mic for when she sang big. What Aretha would >>>>



Hall & Oates' Daryl Hall—Mardin on pop funk

Mardin is credited with precipitating the famous Bee Gees funky falsetto that became a trademark of the band and of the entire *Saturday Night Fever* era.

'I told Barry to take the line up an octave and he went into falsetto and that was it,' Mardin remembers. 'That was it. It sounded so good that we kept on using that approach. 'Jive Talkin' also has a

7/4 measure in it that I came up with in the turnarounds. The drums stayed on with 4/4, but the synth part is played in 7/4. Listen to it and you'll find it. That's one of the layers of that record.'

Mardin insists that *Main Course* was not envisaged as a dance record. However, attention was paid to tempo, with the drummer playing to the flashing visual pulse of an electronic metronome. 'The tempo was coming out at about 120bpm,' he says, 'even though we didn't know it at the time. It was an instinct. Apart from seeing Gloria Gaynor, I didn't go into clubs much. Then Ahmet and Robert Stigwood came into the studio to listen they both said this is a great dance record.'

So was 'Nights On Broadway', the other hit single off that album, on which Mardin was asked to remove a musical interlude from between verses. He cut the 2-inch tape.

'Back before computerised mixing, if you cut the master tape and if the section demanded an incredible change in feel, like this did, you had to mask the splice some way. So we had to make a safety copy and test the edit, then add some new sounds to cover the edit. I remember a jazz session I did at Columbia Studios once where I went out into the stair well and played a cymbal to

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«««« do is, she would sing and play the piano on the sessions. And sometimes that would actually turn out to be the final vocal. So we always made sure we isolated the piano well. But she had to play on the sessions. Everything on the record stemmed from her playing. The bass player would take his cues from her left hand and the guitar player would play the same inversions she was making with her right hand.

The Scottish constitution of The Average White Band was an unlikely foundation for serious funk, but when they were signed to Atlantic in 1974 by Jerry Wexler after an unspectacular debut on MCA Records the year before, Mardin was asked to produce three new tracks with the band; the rest of the record would be rereleases of the MCA material, which AWB—as they started calling themselves around this time—had retained reuse rights for and which virtually no one had bought anyway. However, Mardin and the band got along well personally—I had been to school in England so we talked about soccer constantly,” he says—and musically: the title track ‘Pick Up the Pieces’ went to No. 1. When Wexler heard what Mardin had done after a listening session at Criteria, he asked Mardin to rerecord all the other songs, as well, and produce the entire album.

MARDIN MAY BE the Julio Iglesias of the control room; his theme could be ‘For All The Girls I’ve Ever Produced’. He calls 1997 his Year of the Diva after productions with Barbra Streisand, Bette Midler, Carly Simon, Patti LaBelle, Brandy and Whitney Houston. However, there is nothing Lotharian about this scenario. Instead, Mardin uses it to underscore both the fact that artists such as these are often long-time associates and tend to become part of his family, and the fact that, yes, there is a difference between men and women. ‘Everyone said that Streisand is difficult to work with,’ he says. ‘But I have to respect anyone I work with before I work with them. And I admire Barbra’s genius and because of that, I would defer to her in the studio. The worst thing a male producer can do is to have macho aspirations when he’s in the studio with a female artist. A lot of people do just that.’

Mardin still gets to do recordings with large orchestras playing ensemble—he produced the show cast albums for Broadway hits *Rent* and *Smokey Joe’s Café*. But even those were not done in the usual two takes with singers and orchestra playing together. Instead, Mardin recorded the orchestra and then multi-tracked the singers. ‘*Smokey Joe’s Café* was done more like a record than a cast album,’ he says. ‘Leiber and Stoller wanted it that way because they wanted to have more of a choice on the vocal tracks at the end. As a result of how that record turned out [it earned him his sixth Grammy Award] the people from *Rent* approached me to do their cast album.’

That earned him a platinum record and another Grammy nomination.

Mardin likes big studios—he expresses a preference for Right Track Recording and The Hit Factory in New York, and Conway Recorders and Ocean Way Studios in Los Angeles. But while he says he chooses a studio



Mardin’s currency is currently maintained through acts such as Smashing Pumpkins

based partly on its vibe (‘I love the trees in the gardens at Conway; that studio is like home to me’) he puts more emphasis on maintenance. He may not know the brand names but he knows when it works and when it doesn’t.

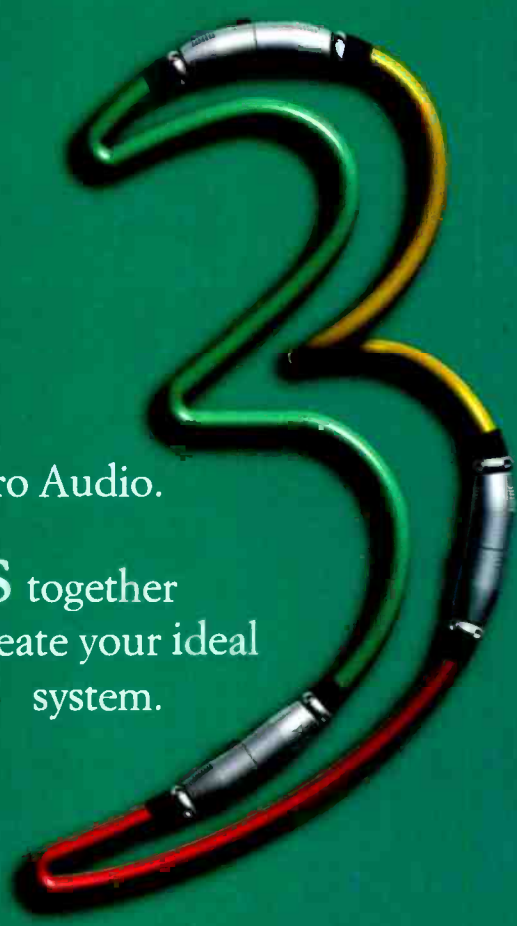
‘I don’t want anything to stop in the middle of a session,’ he says. ‘And I leave the board to the engineer; I don’t care if it’s a Neve or

an SSL or a Focusrite. It’s the engineers’ choice,’ although he specifically expressed an appreciation of the Neve Capricorn he worked on with engineer Frank Filipetti at Right Track on Streisand’s recent recording. The EdNet system, though, was more appreciated by Ms Streisand. ‘She didn’t have to fly to New York,’ he quips. ‘We got the mixes recalled in minutes instead of hours and we mixed five songs in seven days.’

He is not picky about formats: he likes the sound of Dolby SR but he has no problems with 48-track digital. He is a bit fastidious about choosing engineers, though. He has worked with Michael O’Reilly for the past two decades, and likes to work with Jack Joseph Puig and Jeremy Smith in LA, and Filipetti in New York. ‘An engineer not only has to be good technically, but he also has to be able to be your friend and to have a sense of humour,’ he observes, ‘because you’re going to spend a lot of hours in the studio with each other.’ ■

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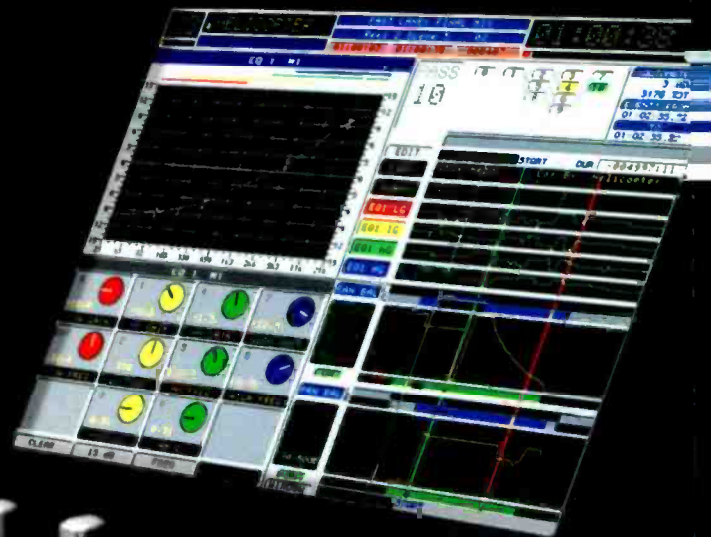
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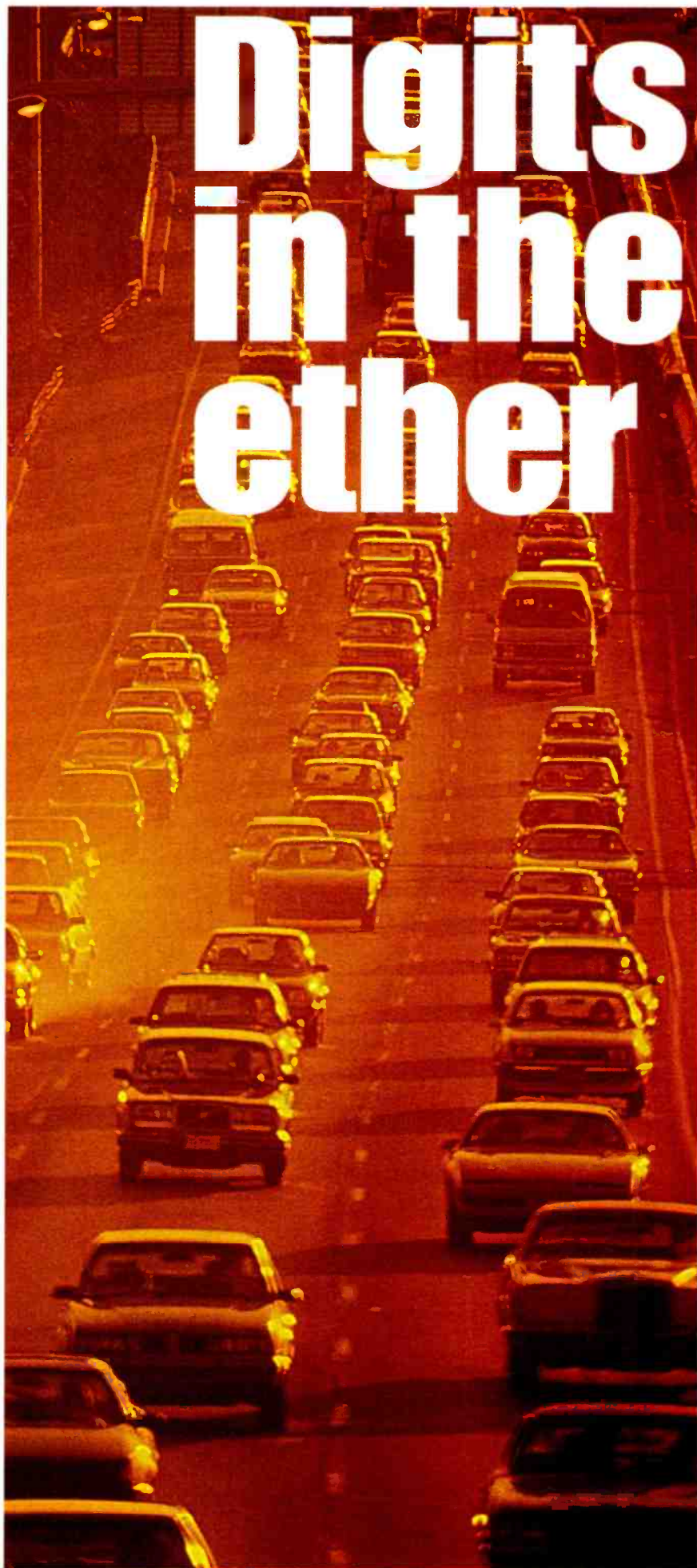
Some years have passed since the first firm promises were made on behalf of DAB. In the absence of a revolution, **Kevin Hilton** offers a re-evaluation of the state of digital radio

RADIO IS NOW some 2½ years into its third age, or at least it should be. In September 1995 Liz Forgan, at the time managing director of BBC Network Radio, said that the medium was entering this new phase in its life due to the start of Digital Audio Broadcasting (DAB), a technology that would do for the wireless of the future what AM and FM had done in the past. That autumn press launch was intended as one of optimism, with the BBC, and other broadcasters in Sweden and Denmark, becoming pioneers of an exciting technology.

Even at the time, the optimism was immediately tempered by reality, something the BBC had to deal with in those early days. Focusing on the BBC experience is not just another case of UK-centricism; the Corporation had chosen to push ahead with DAB without waiting for the relevant receivers to hit the domestic market. There had always been a feeling that the technology would be a chicken and egg one—receiver manufacturers would not produce the new equipment until services were in place, while broadcasters would not start transmissions if there was no way for listeners to pick them up—and that one of the two main groups involved would have to be brave and take the lead.

In 1995, the BBC dropped the word 'launch' in favour of the phrase 'switch-on', making a clear delineation between the start of a full service and a pilot scheme (although the European Broadcasting Union considers these early transmissions as operational or pre-operational arrangements). The build-up to this semantic confusion started in 1987, when European broadcasters, including the BBC, and manufacturers began collaborating on the Eureka 147 project, with the aim of creating a radio system for the 21st century. As with digital television, digitisation allows multiple radio channels to be carried as a group, or multiplex, on a single frequency. The greater capacity would not only enable existing stations to be carried as a bouquet but had scope for additional services, not just new, specifically digital stations, but also so-called side facilities.

These would involve specialised services, for example a dedicated parliamentary channel and additional sports coverage, and the potential for associated text, data, still pictures and even near-audio-on-demand. Eureka 147's intention was to offer all this with near-CD audio quality, plus the advantages of easier tuning and distortion-free reception. Another advantage was the potential to >>>>



Digits in the ether

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«««« free up the existing, crowded analogue frequency bands—in particular the jam-packed FM spectrum; although it was accepted that these frequencies would co-exist, or simulcast, with DAB for at least the next 10 years.

As research work progressed, occasional demonstrations were presented to the industry and press. These usually involved being driven around a city in a specially equipped bus, as, initially, the in-car market was identified as the one that would substantially benefit. To anyone who has endured poor, wavering reception during a long-haul drive, with the added annoyance of having to re-tune to get the best signal, this would appear to be something to make for an easier life.

Eureka 147 was subsequently adopted as a world-wide standard, something that caused amusement at the BBC press conference in 1995 as journalists could not understand how a format could only be a worldwide standard, rather than the worldwide standard. The confusion was caused because, at the time, the US was not prepared to follow Europe and was seriously considering the rival IBOC-IBAC (in-band, on-channel/in-band, adjacent channel) systems.

It was Europe's commitment to Eureka 147 that inspired the BBC to move things on and become one of the first broadcasters to create a DAB network. Go-ahead for this was given in mid-1994, with a pilot scheme launched on 27th September 1995. Coverage was limited to 20% of the UK population, with plans to reach

60% by March 1998. This service is still running, with Radios 1, 2, 3 and 4 carried in full stereo and Radio 5 Live in mono. Additional services have included BBC Parliament and BBC 5 Live Sports Plus.

THE COMMERCIAL radio sector, not surprisingly, has not wanted to be left behind. The Radio Authority, which licences and regulates independent radio in the UK, has kept up with developments and on 25th November 1997 published both its plans for licensing digital services and a timetable of when everything is likely to happen. The RA will advertise the licence for a single national commercial multiplex sometime around March 1998, guaranteeing space for the three current independent countrywide stations, Classic FM, Virgin Radio and Talk Radio, if they show that this is what they want. The Authority says that another five or six services could be sustained on this carrier. Local multiplex licences will be advertised once the mix of programming on the national multiplex has been determined. Present estimates put this at Autumn 1998.

Like the BBC, the RA is running a pilot scheme in the London area, with technology provided by NTL, the company that supplies the transmission infrastructure for both independent television and the majority of commercial radio. This service started in March 1996 and currently offers the three national stations plus Melody, Sunrise, Kiss, WRN and Capital. There is also a service running in Birmingham, featuring nine of the most pop-

ular commercial stations in the West Midlands. Independent Digital Radio services are also due to go on air in other parts of the country as the build-up to licences continues.

It is this activity that leads Frank Kozumernik of the EBU technical department to say, 'Almost all countries in Europe have operational or pre-operational services. The BBC has had regular services since 1995, as has Swedish Radio. There is a pilot scheme in Germany but it is only being called that for political reasons; in reality it is a full service'.

According to the EBU, the only European countries currently without some form of DAB are Spain and Portugal but even here national platforms have been established, comprising broadcasters, retailers and manufacturers. From this description, the conclusion should be that digital audio broadcasting is firmly established throughout almost the whole of Europe. Eureka 147 has also been adopted in Australia, Canada and, most recently, India.

With Canadian broadcasters enthusiastically adopting the European standard, North America was split as the US was torn between those in favour of the own band Eureka 147 format and those who extolled the virtues of IBOC instead. In August 1995, the results of EIA radio subcommittee laboratory tests were published, coming out in favour of Eureka and concluding that none of the IBOC-IBAC systems proposed to replace the existing FM and AM bands was viable. The report said, 'All six in-band proposals

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showed major deficiencies in some or most of the crucial performance and compatibility tests. Multipath is the basic problem for all IBOC-IBAC systems'.

Canadian proponents of Eureka had earlier added to the misery of IBOC-IBAC supporters with a survey at the Toronto International AutoShow in May 1995 when visitors were said to have overwhelmingly preferred the sound of Eureka-based systems to their in-band rivals. One of the main consortiums backing IBOC, USA Digital Radio (with connections to CBS) continued to push ahead, but in May 1996 it withdrew its system from on-going tests. AT&T-Lucent Technologies and Amati Communications Corporation followed suit in September that year (ironically when Eureka was getting its big lift-off in Europe), saying that no acceptable testing facility was available.

This left three technologies undergoing field tests in the US: AT&T and Lucent Technologies with an IBAC contender; Eureka 147 on the L-Band; and the Voice of America-JPL satellite system at S-Band. Meanwhile, North America's first DAB transmission was being put in place in Canada as, in November 1997, Iteco won a contract in excess of \$1m to supply transmitters. In that same month, at the Canadian Association of Broadcasters Convention in Toronto, Master FM Limited, the consortium of 15 Toronto Broadcasters and the Canadian Broadcasting Corporation (CBC), announced that it had applied for a license to operate four DAB transmitters, offering 20 services from the CN tower.

It is this kind of activity that convinced broadcasters that the technological groundwork had been laid and that it was time to move ahead and finally take DAB to the listeners. Key to this, in the UK at least, is another semantic change, calling the system

Equipment shown at IFA and due for future releases

Manufacturer	Type of receiver
Alpine	Car
Bang & Olufsen	Home mini system
Becker	Car
Bosch Blaupunkt	Car (two models)
Clarion	Car
Delco	Car
Grundig	Car/Hi-fi tuner
Fujitsu Ten	Car
JVC	Car
Kenwood	Car/Hi-fi tuner
Panasonic (Technics)	Car/Hi-fi tuner/PC card
Phillips	Car
Pioneer	Car
Sharp	Home midi system
Sony	Car/Hi-fi tuner
TechnoTrend	PC card

Digital Radio as opposed to DAB. Those involved in promoting the system say that the main reason for this is to separate the technology from what it can do for the audience. Stephen Mulholland, editor, BBC Digital Radio, says: 'By calling the format Digital

Radio, we think that people will be able to get a better handle on what it can do for them. Anyway, digital is no longer a scary thing in the public psyche'.

Despite this, Digital Radio appears to be in the same chicken and egg situation as it was in 1995. Then, as now, this is largely due to the lack of domestic receivers. The promise was that the breakthrough would come at the IFA consumer electronics fair in Berlin in August 1997. While 17 manufacturers showed product in four distinct areas (in-car, hi-fi tuners, mini systems and PC cards), that promise has yet to be transferred to where it matters, the high street.

It is a Catch 22 situation that is acknowledged by all those involved with Digital Radio, including the EBU. 'The only problem,' says Frank Kozamernik, 'is that there are not any receivers on the market. We had a pledge from the manufacturers at IFA that receivers would be launched but they only showed prototypes. However, the bright side is that there are some 20 different manufacturers developing DAB receivers and this year should certainly see a lot of units, mainly in-car models but also portables.'

In the UK, trade groups variously representing high-end dealers, retailers and manufacturers say that their members are aware of Digital Radio but that there is still an element of wait and see. One comments that product is not available to the public in a serious way, with some companies still at the semi-prototype stage. Stephen Mulholland at the BBC says that the first phase of Digital >>>>

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Radio, the launch of the technology, has been successfully completed. Now the emphasis is on 'selling it to the public', which will initially concentrate on the general awareness of digital and then split between the technologies for television and radio. 'We've put together a retail database as well,' comments Mulholland, 'so that when product arrives, the retailers are knowledgeable.'

Mulholland says research shows that public awareness of Digital Radio is 40%, while that of the retail sector is 95%. He describes Digital Radio as 'redefining radio, making it a more compelling proposition for the multi-channel future', but warns that people 'tamper with the ancient art of making radio programmes at their peril'.

While agreeing that, for many, the basic way of listening to the wireless will not change, Mulholland observes, 'It's a question of scalability. In the future, there will be small screens on in-car sets, while the Sharp mid-system [due for launch towards the end of 1998] will have a screen and deliver text, audio and still images that change once every 10 seconds. However, there is no way that we are trying to create a cheap form of television. The pinnacle of this overall development will be a Digital Radio card in a PC or personal organiser, giving the full multimedia effect.'

The services are here now and are being developed for the future. The crucial factor for Digital Radio is the receiver. In-car units were due to appear during the spring of this year, the time when the next phase of Digital Radio was due to begin, but there is no doubt that they will be expensive. While observers feel that the in-car market is important, the real benefit of this technology will be felt not in the high or medium end of hi-fi, where those with good FM tuners and permanent aerials may react like a vinyl buff confronted with a CD, but in the home portable market.

At present, the focus for Digital Radio transmission has been squarely in the terrestrial domain, with much discussion as to what will be the permanent home for multiplexes. At present most countries have chosen the L-band for Digital Radio; although there is an on-going discussion as to whether the FM spectrum should be used for the purpose once simulcasting is no longer necessary. However, it is thought that simulcasting would be required for at least the next ten years and even after that the FM band may be used for new community stations.

IN EUROPE, satellite Digital Radio is seen as something of the future, taking a back-seat to terrestrial. Elsewhere there are moves to create such services on satellite before the end of the millennium. Plans have been proposed by US-based WorldSpace to broadcast by satellite to Africa, the Middle East, southern Asia and central and south America. The company says that, ironically, people in developing countries may receive digital radio before those in the developed world.

The AfriStar satellite, due to be launched on Ariane 4 this year, will carry Digital Radio services, while AsiaStar will follow in December, with CaribStar in June 1999. Chip manu-

facturers and consumer electronics companies in the US have shown interest in producing relevant equipment for this project, while WorldSpace is working in collaboration with the Fraunhofer Institute of Germany.

In the US itself, the Federal Communications Commission (which ignored telephone requests for further information on the current situation there) held an auction in April of last year for what it calls satellite digital audio radio services (DARS). The sale raised \$173.2m for two licences, which were awarded to Satellite CD Radio and American Mobile Radio Corporation.

Looking back on the history of Digital Radio, it can be said to have had a long gestation period, particularly if compared with other technologies, like NICAM stereo for television, that have become established more quickly and readily. It is true that NICAM did not require the building of a new transmission network but in terms of domes-

tic receivers, the manufacturers appeared to enthusiastically enter the new market of stereo TV sets. The sluggishness of those involved with radio receivers appears to be slowing up the development of Digital Radio, while consumers are annoyed at the prospect of splashing out on new equipment and fearful that another change could occur in the future.

While, unlike the whole vinyl-CD-MD-DVD scenario, this seems unlikely, a potentially exciting technology is being held up. True there is no startlingly discernible improvement in audio quality but the advantages come in easier tuning, better reception and the possibilities of associated text and image services. The broadcasters and infrastructure providers say they are ready; once the Schrodinger's Cat-like problem of actually being able to observe the phenomenon is conquered, then judgement can truly be given on Digital Radio. ■

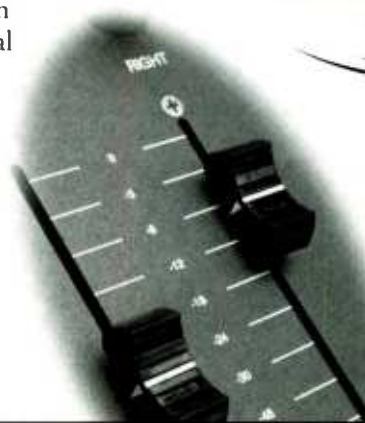


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The story of the Blues



The Blues Brothers are back, with a soundtrack recorded in a way that pays a homage to the original records. **Dan Daly** reports

PATIENCE is its own reward. That's eminently provable if you can sit through the first 20 minutes of *Blues Brothers 2000*, the 20-year-late sequel to the original *Blues Brothers* film, that starred Jim Belushi and Dan Ackroyd as Jake and Elwood Blues, a felonious pair of fraternal ne'er-do-wells who play the blues and destroy entire fleets of automobiles while eluding the authorities throughout the Midwest. Those first 20 minutes look as though surviving Blues Brother Ackroyd (Elwood)

and director John Landis (*Animal House* and other *National Lampoon* adolescent testosterone classics) were using the original film and a few weary sight gags as a substitute for a new plot. But once Aretha Franklin, playing Matt "Guitar" Murphy's long-suffering wife, kicks into a rendition of "R.E.S.P.E.C.T." in a Mercedes dealership, you know something's up. By the end of the film, it has morphed from a tepid follow-up into a 70mm music video and then into a boisterous Cab Calloway-esque musical comedy, complete with

an all-star, 32-piece battle-of-the-bands finale. And if you're exceptionally patient and can sit through the credit crawl at the end, you get to see a caped James Brown do full-blown version of "Baby, Please Don't Go".

What you don't see is a recording odyssey in which the standard methodology of film audio is turned on its head, in which the picture was shot and cut to music instead of the other way round. And one that had almost as many adventures as Elwood and Mighty Mack (successor to the deceased Jake, played by John

Goodman) themselves getting to the finish line.

'The whole thing was on-again, off-again,' recalls Harvey Goldberg, the music recording engineer for *Blues Brothers 2000*. 'The picture seemed to be in doubt for a while and then they called with a go-ahead at the last minute to start recording the music. The upshot of that was, we would up recording 22 songs in about eight days.'

That kind of deadline was routine for the original records that comprise the film's score—classic R&B and blues tracks from the 1960s, some from Chicago and Memphis, but most made in the legendary enclave of Muscle Shoals, Alabama, home to the seminal generation of R&B classics such as Aretha Franklin, Wilson Pickett and the rest, where three albums a week was often the norm in the mono and 4-track days. Goldberg started his career as an assistant engineer at New York's famous and now-gone Media Sound and had been the engineer on Kool & The Gang's early funk hits as well as milestone jazz (Lonnie Liston Smith) and rock (Frampton, Til Tuesday, Soft Cell) records. It was there that he first met Paul Shaffer, then a well-regarded session keyboardist. Shaffer later became musical director for NBC's *Saturday Night Live*, where he was the MD and pianist on the original five-minute *Blues Brothers* skit with Ackroyd and Belushi that would blossom into a two-decades-long lucrative running gag, and is now band leader for the comedy talk show *Late Night With David Letterman*.

Shaffer's long association with the *Blues Brothers* made him the natural as the current film's score producer. (He also plays the part of an outlandish MC and weird consigliere to singer Erykah Badu's voodoo princess in the film), as well as handler for BB King's Gator Boys. Shaffer's nightly *Late Night* gig dictated that most of the music recording be done in New York, and more went into the studio choice than just the console.

'The sound of the records that make up this movie comes from Muscle Shoals Recording, which was a very tight-sounding mid-sized room,' says Goldberg. 'Finding that and recreating that sound is something of a lost art these days, even in a place like New York. You have to use a lot of baffling and muting of the room ambience, yet still let the instruments have some ring and be able to breathe. In fact, it's the overtones of the drums that contribute a lot to the overall sound of those records. They get covered up by other instruments in the mix, but they're still there and they definitely have an effect on the way the final record sounds. People try so hard now to separate sounds, by either taking everything direct, like with drum machines and synths, or by doing every part as an overdub. But I tell you, there's nothing like having everyone playing together in the same room at the same time.'

Goldberg chose Manhattan's Sound on Sound Recording in the Times Square area more for its ambient but compact main recording room and large glassed-in iso booth than its Neve VR desk. And Shaffer once again assembled the Blues Brothers Band, made up of a core of the Music Shoals and Memphis session players, including Steve Cropper on guitar (who also wrote and played on Otis Redding's 'Dock of the Bay' and Booker T's 'Green Onions'), bassist Donald 'Duck' Dunn, and Matt 'Guitar' Murphy, augmented by Blues Brothers Band and *Saturday Night Live* alumni Leon Pendarvis (keyboards and current SNL band leader), Blues Brothers Band road drummer Steve Potts and *Late Night* drummer Anton Fig, sax player Lou Marini, Tom 'Bones' Malone on trombone, and trumpeter Allen 'Mr Fabulous' Rubin.

RECORDING STARTED in May, 1997. 'The scoring was going to be cut before the filming even started,' Goldberg explains. 'There were meetings between Paul and Dan Ackroyd and John Landis in which Landis would figure out approximate scene lengths and Paul would arrange similar score lengths. So we'd do a version of 'Green Onions,' say, and then it would be edited down later to fit the picture.'

The songs that were to be featured in the films, though, were going to determine the scene lengths in the end. Everything but the vocals were cut in the 2-month recording window at Sound on Sound, with session dates and times determined by musician availability, Shaffer's television schedule, feedback from



Landis in Los Angeles, and the constantly shifting sands of the Hollywood movie machine that at times made it seem as if the film could go into permanent hiatus at any moment. Goldberg pushed ahead regardless, relying on a career of recording R&B and funk records. 'The arrangements pretty much came from the original records, so there was a guide there in that respect,' he says. 'And some of the musicians were the same guys who played on those records, so that took care of a lot of the sound. They know those records inside out.

So I wanted to record the tracks as close to the way they were originally done as possible, which meant recording the band playing together, pretty much in the same room. I put the horn section into the large iso booth and set up everyone else in the studio. There was some bleed—there had to be with everyone playing that close together. But not so much that if we had to fix something, you could hear the ghost of the original part. Tracking this way is what made those records sound as good as they did, and, along with having a lot of the same musicians playing on them, it's what made the film's soundtrack sound as good as it does. I put as many blankets as possible on top of the piano and baffles around the guitar amps, but bleed was part of the original sound, so that worked out.

'Steve Cropper's guitar style is very tight and short, a very distinctive, percussive sound,' he observes. 'He used a Fender Twin Reverb and I miked it with a Shure 57 close-in on axis from one of the speakers. You go out and listen to what the amp sounds like in the studio, then go into the control room and try to capture it exactly that way on tape. I compensated a bit for the mic using some EQ and added some compression with a dbx 160, but no signal processing; the only effect was reverb and that was from the Twin, which was printed to tape along with the guitar parts. The bass was recorded direct. Those old records had a big, sometimes kind of floppy bottom end, and I wanted some of that on the tracks. But we were also making a contemporary record that would be played on THX film sound systems and put on to CDs, so it had to be tight, as well. That's why we went direct. The same with the bass drum. We were trying to recreate Muscle Shoals 1967 but we had to sell CDs, as well. The trick was to add fidelity but not at the expense of feel and spontaneity.'

It worked—most songs were caught on the second or third take, not unlike the way they had been 30 years earlier. Producer Shaffer helped the process along by having the band play the rehearsal pass at a very low volume, getting the band to save its energy for the when the tape was rolling. 'The challenge to me in that was that I never had a chance to get the level exactly set before recording,' says Goldberg. 'But there was no way I was going to ask them to do another pass for my benefit—this stuff is all about feel. If there was a level problem, I'd find a way to deal with it later.'

Paul Shaffer says he just 'didn't want the band to blow it out before it went to tape. These guys are a band and they've played these songs for 20 years on the road as the Blues Brothers Band, fronted by Tommy McDonald and the great Eddie Floyd. I think this is the last truly authentic soul and R&B revue left.'

Steve Cropper says that low-volume run-throughs were the norm at the old Stax >>>>





«««« Studios where a lot of the originals were recorded. 'Sometimes a producer would come in and want it on the first take,' recalls Cropper, who has played on all previous Blues Brothers Band records. 'I had barely gotten through the chart. I like to do it this way better.'

Needless to say, the recording was analogue, to Quantegy 156 analogue tape—which Goldberg likes because it saturates faster and he wanted natural distortion across the tape—at 30ips with no NR on a Studer A800 2+-track deck. 'I would like to have done it at 15ips with Dolby, but we couldn't get approval for that in the budget,' Goldberg says wryly, a rare instance of parsimony in a Hollywood production. 'I told them that at 15ips we could have used half the tape and saved some money that way, but they didn't buy it,' he laughs.

Minor mistakes—'clams' in New York recording session nomenclature—were left in as part of the feel. 'We only fixed the really obvious ones with punches,' he says. 'Everyone was really conscious about not wanting to mess around with the feel. We wanted it to be a live-sounding track. We also didn't use a click track. I've come to realise, and the band felt the same way, that the precision of drum machines have entirely screwed up concepts of tempo. Part of what made those records great was that the tempo moved—it was usually faster at the end of the track than where it started.'

Tempo is a key ingredient for these songs, stresses Cropper. 'A good example is Eddie Floyd's '63+5789'. We really tried to pull the tempo on that one back in the sessions from where we play it on stage. But what happens with a lot of those songs is, they breathe. They may end up at the same tempo that they started at, but during the song the pulse moves in and out. 'Midnight Hour' was always a good example of that: the 1 and 3 beats are always dead on, but the 2 and 4 are a little delayed. You can't do that with a drum machine.'

A few overdubs were done at nearby Warehouse studios, such as John Popper from Blues Traveler who recorded harp solos and parts on Dr John's 'Season of the Witch'. 'Can't Turn You Loose' and Kenny Kossek's mandolin and

violin on the Blues Brothers Band's 'Ghost Riders in the Sky'. The multitrack tapes of the tracks were then shipped to Toronto, where the film was being shot, to McClear Pathe Recording & Post, where engineer Jeff Wolpert did vocals with the artists on their respective songs and some basic tracks, as well, including Aretha's 'R.E.S.P.E.C.T.' and Sam Moore's rendition of 'John the Revelator'. (Goldberg came to Toronto with Shaffer to record the vocals on Badu's version of 'Funky Nassau'.)

THE ENSEMBLE 32-PIECE recording of the finale tracks—a battle of the bands between the Blues Brothers Band and The Louisiana Gator Boys, an act made up of just about everyone else including BB King, Dr John, Steve Winwood, Eric Clapton, Wilson Pickett, Charlie Musselwhite, Junior Wells, Billy Preston, *et al*—was the *coup de grace* of the project. Each band played a song on a film set made up to look like the House of Blues in a Louisiana swamp—the Blues Brothers played 'Turn On Your Love Light' and The Gator Boys did 'How Blue Can You Get'. Then both bands played together on 'New Orleans'. The Blues Brothers Band's tracks of that song were recorded by Wolpert in Toronto and delivered on Tascam DA-88; the Gator Boys—all of them—played theirs live on stage against a playback of the Blues Brothers Band version. Westbury Sound, which staged a rehearsal of the mammoth scene the night before in another location, handled the live sound, and Live Wire's remote truck did the actual recording, with 48 tracks each of analogue and digital running. Sixteen Audix microphones—chosen for their high rejection qualities—were set up on stage for vocals alone; the instrument mics were almost uncountable.

'There were so many open mics on stage it was ridiculous,' recalls Wolpert. 'It was wild. We had two drum kits on stage, and even though only one was miked, it was still nuts trying to keep everything straight. We had to replace the main power feeds just before the shot because they had been driven over by the trucks one too many times. I was determined that nothing technical was >>>>>



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Steve Cropper plays to celebrate the premiere of *Blues Brothers 2000* at Planet Hollywood, Nashville

«««« going to hold this shoot up.’

The situation was helped somewhat by not having acoustic pianos on stage, but it was still a musical menagerie. The entire sequence was accomplished in an amazingly minimal four takes. Then, each individual artist—they were arrayed in three rows across the stage and the cameras were wheeled in closer as each rank was done—was recorded in close-ups.

Shaffer, who was on-stage in a dual role as the band leader for the Gator Boys and the house MC, says he could see how Wolpert could view the situation as almost overwhelming. ‘It was like a mass overdub,’ he says. ‘But on stage I wasn’t worried about it a bit. Being there gave me the chance to conduct right there and it gave me the chance to do terrific cues. I knew that as long as we got to tape, we could sort everything out later.’

‘We recorded ‘How Blue Can You Get’ as though it were a live concert,’ adds Wolpert. ‘There were 200 extras in the audience for reverse shots, though we added the audience sounds later in post. John Landis was yelling through a wireless mic hooked up to the PA throughout the shoot. He’s not a musician but he’s very clever and has a sensitivity to the music. Funny thing was, though, we got back a layback to the picture later and we had to send it back telling them that you can’t have a bar of 13 in a blues song.’

The recording was taken from the two analogue multitracks and transferred to 24 tracks in a 24-bit Pro Tools system, from which a pre-mix was made for film-editing purposes.

Mixing was done at McClear starting in September on the studio’s SSL G-series desk, with various combinations of Goldberg, Wolpert and Shaffer riding the faders. Stereo mixes for the soundtrack record were done first, then LCR mixes for the film soundtrack were done to DA-88s, with kick, bass, solos and lead vocals in the centre and stereo background vocals and band tracks. ‘The LCR mixes were all based off of our stereo mixes,

so that if you lined the faders up straight in a row, they would have our original mixes as a reference,’ explains Goldberg.

Mixing was as peripatetic as the Blues Brothers themselves: ‘Love Light’ was mixed at McClear in Toronto; ‘How Blue Can You Get’ was mixed at Sound On Sound in New York. The finale, ‘New Orleans,’ however, was mixed at New York’s The Hit Factory and with 32 vocalists was the most complex mix of all. ‘Every line had a different singer and we had to have the right EQ for each one,’ Goldberg says. Jeff came up with a method he called “checkerboarding”—we did a composite reel to 2-track from all the vocal slave reels with each successive line on alternate tracks. Then I patched it to between 10 and 12 faders, which let us put separate EQ on the vocals that needed it, and then we muted all the others as each line was sung.’

On the concert section mix, Goldberg used a time-tested trick from analogue days to get a snare drum sound that better matched the studio-recorded snare. Rather than use a sample, which he felt would betray the attempt to stay true to the original recording techniques, he ran the snare through an Auratone speaker which was then placed face down on another snare drum, which in essence ‘played’ the second snare, which was then combined with the first one.

The mixes, says Goldberg, were a learning experience, and a fitting cap to a vintage excursion down R&B memory lane. ‘On one hand, these are R&B records; on the other hand, we’re making a musical film,’ he says. ‘From Landis’ point of view, this is like a cast album and the vocalists are like actors and he wants the vocals to be right in your face. But an R&B record needs the rhythm section to be punchy. So we mixed the vocals up, but then compressed the mixes more to bring the track up around them. It was an amazing project from the beginning right through the end.’ ■

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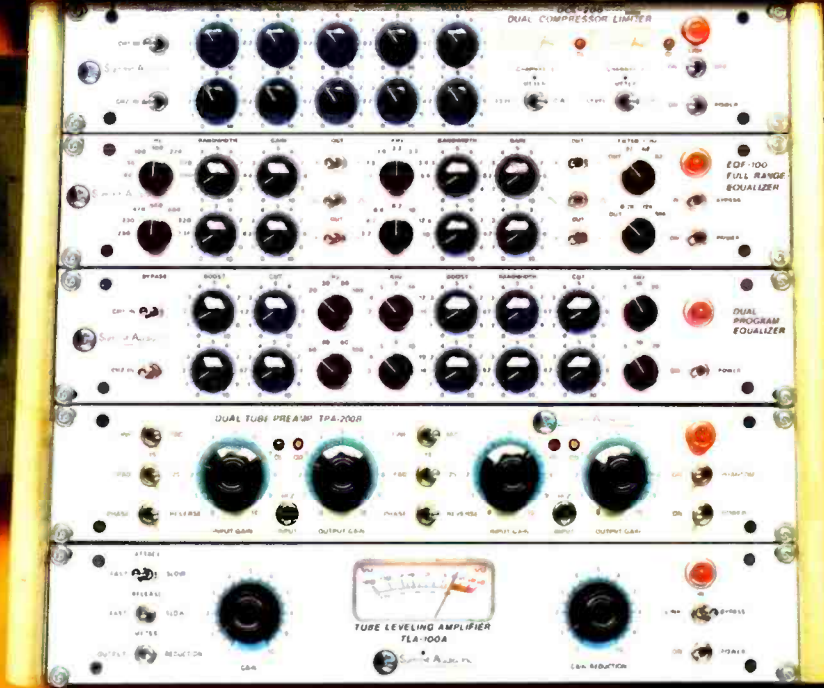
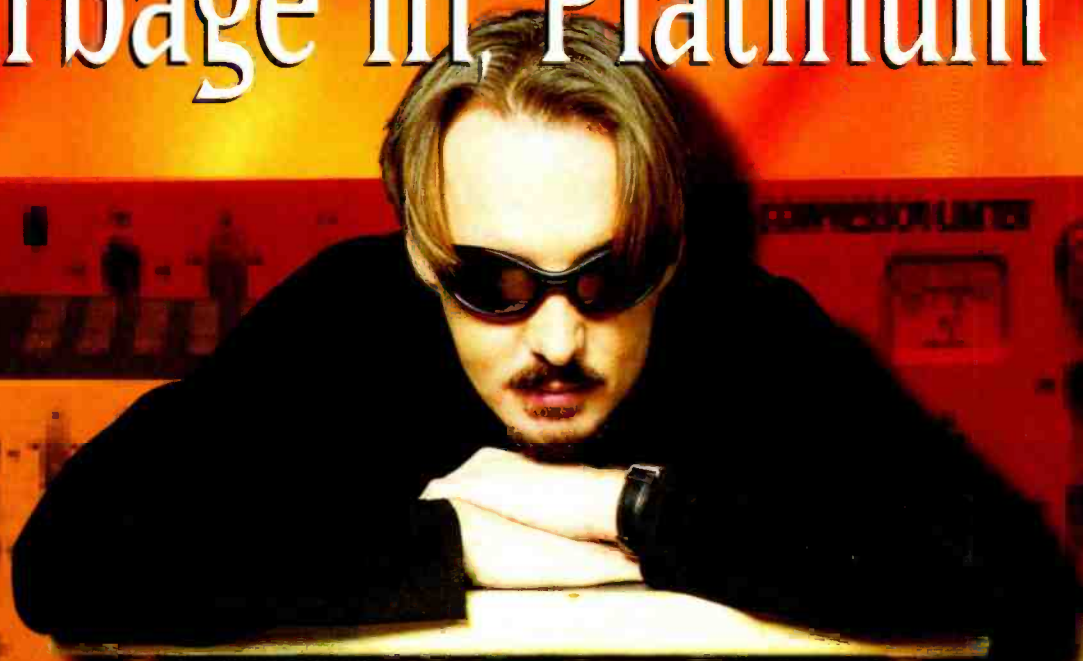
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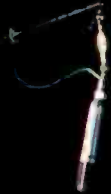
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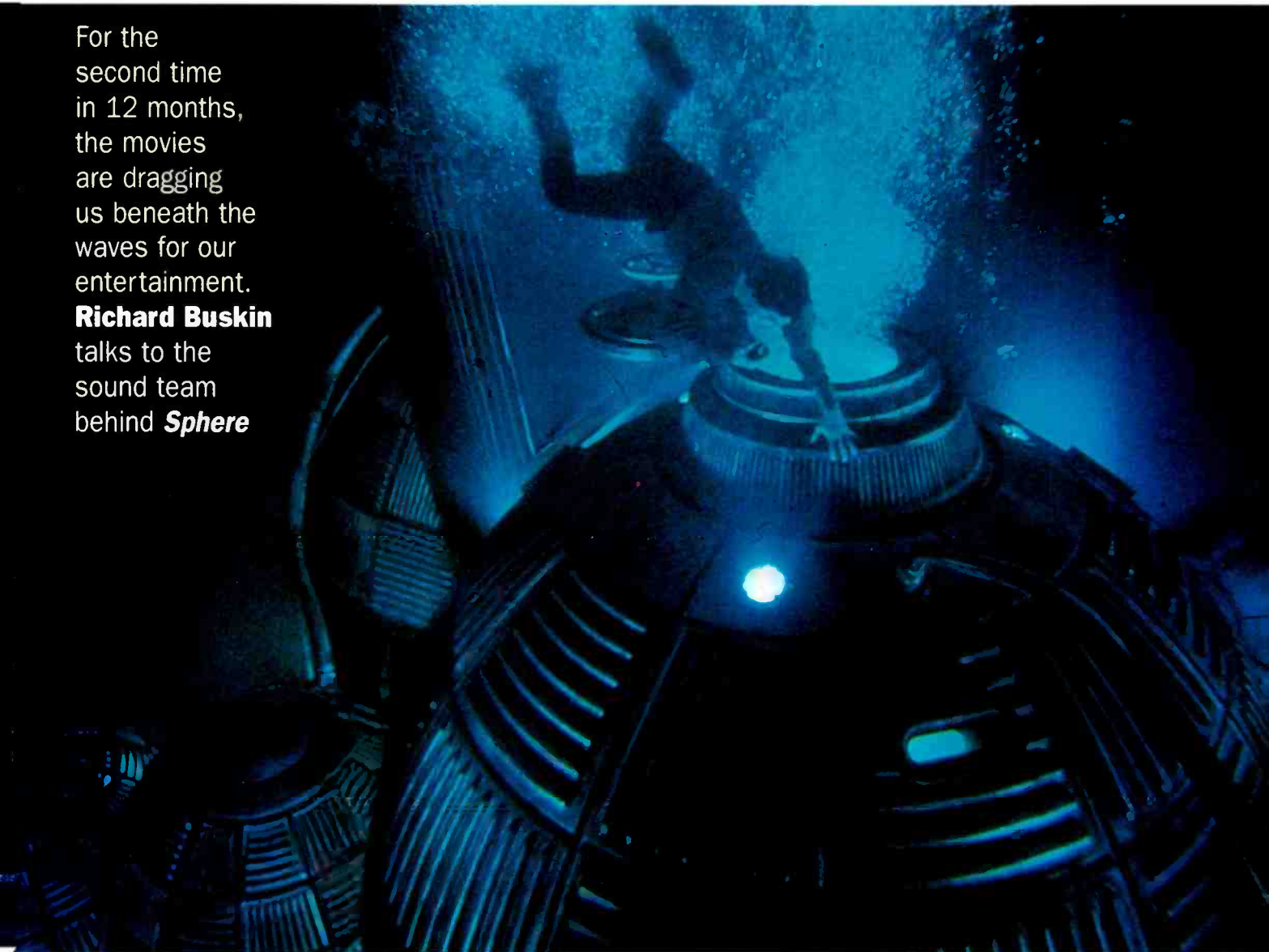
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Deep trouble

For the second time in 12 months, the movies are dragging us beneath the waves for our entertainment.

Richard Buskin talks to the sound team behind *Sphere*



HAVING DIPPED our heads beneath the waves with this year's blockbuster movie, *Titanic*, it's time to break out the snorkels once again as we immerse ourselves in the sound recording and postproduction on *Sphere*. Directed by Barry Levinson and starring Dustin Hoffman, Sharon Stone and Samuel L. Jackson. The film is based on a novel by Michael Crichton and employs enough sci-fi staples to make it an action-packed project worth investigating.

Indeed, this tale of the investigation of an alien sphere by an American spacecraft and the monstrous manifestations of the subconscious mind (shades of *Forbidden Planet*, which was itself based on Shakespeare's *The Tempest*) features a *20,000 Leagues Under the Sea*-style giant squid to occupy our heroes, while the inherent properties of underwater filming also served to keep the sound crew

more than busy. You see, Academy Award-winning director Barry Levinson is not a man who likes to leave the audio to ADR. Rather, he insists on retaining as much of the production sound as possible, an admirable approach that is evident in the more naturally energetic on-screen results, yet this is nothing if not a challenge to those who realise his sonic ambitions, most of whom have already worked with him on previous pictures.

'I've worked with Barry Levinson since *Rain Man* in 1989,' says sound designer, Richard Beggs, who operates out of his own home while most of the post work on the new film was done at Lucas Digital's Skywalker Sound facility near San Francisco. Beggs first became involved with the project in July of 1997 while shooting was still taking place and continued to work on it for seven months.

'After a 2-picture layoff this film represented a logical progression in relation to the

collaboration that has existed between Barry and I during the past decade,' he explains. 'Obviously, over the course of several pictures we've developed a kind of style, as well as a way of dealing with certain problems, and there's a stylistic path that I follow that Barry apparently thinks is sympathetic to what he's doing. As a result, there weren't any specific directives regarding the concept of the sound.'

'I read the script at a fairly early stage, thought about it, went on location a couple of times, got a feel for what was happening and looked at the dailies. At the same time, Barry talked about the picture and how he saw it; he didn't talk about it in sound terms, but described the mood and atmosphere that he envisaged for what I guess could be called a psychological underwater thriller. My previous picture with him had been *Sleepers*, whose soundtrack was fairly innovative, employing abstract sounds in very >>>>



<<<<< expressive and emotive ways. For me that is kind of where the meat is, and so he obviously saw this picture as an opportunity to push that idea even further. He basically said, "See how far you can take this", and that was it—meaning that I was off on my own.

'Of course, there were several specific things that he wanted to make sure I dealt with. There are hundreds and hundreds of details in the picture and some of them that were important to me he wouldn't think about twice—they would never occur to him until he heard me do something to them or about them. On the other hand there were also things that he was concerned with that didn't strike me as particularly outstanding. You see, by a certain stage on this project I'd formulated an approach—almost an architecture—for how the sound would develop and behave, and to that end I divided the picture into three parts, tying in with the points at which things go in a certain direction. For

one, the characters lose their power support system and communication with the surface, and the on-screen incident that underscores this consists of a large umbilical cord becoming detached from the craft and disappearing into the darkness. An announcement is made to the crew that they're now on emergency power, and obviously things are about to happen in this completely artificial environment. For me, from a sound perspective, this was a hinge point; a lot of electronic equipment that contributed to the general ambience of the place has shut down and we're left with a more bare-bones approach, so the texture would have to become more open and transparent, with fewer high-technology sounds being audible.

"That, at least, was the plan; although it's not quite as obvious in my telling. Still, it's there, operating in a more unconscious way. You know, nobody knows what has happened but things are, in fact, different. That was the first

mood shift, and then the second point that delineates between the second and third act occurs after this kind of apocalyptic encounter with the giant squid, a manifestation of what's going on in people's psyches. Two crew members are killed as a result and then there's a fire, following which the place is a wreck but it's still running. Now, therefore, this decayed, decrepit aspect creeps in; everything is dark and in half-light, the red warning indicators are constantly giving this sort of low-level throb, the place has been ruptured and it's leaking, and so there's this almost cave-like sound along with a kind of exaggeration of the essential functions of the habitat.

This, therefore, was the concept that I discussed with Barry. He agreed to it and the finished picture more or less conforms to that, even though nothing, of course, ever works out exactly as you planned. Meanwhile, within that context, Barry really wanted things to sound broken in the >>>>>

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end and dangerous, compared to the beginning of the film where he wanted to downplay the idea of any threat. For instance, when we first encounter this sphere, this alien object, composer Elliot Goldenthal had scored it very dramatically, but Barry then asked, "Why are we afraid of it? It's awfully early and we don't know it's dangerous". He wanted to play that card later, and so that kind of thinking is what helped shape the various stages.

The composer rescored the said scene.

THIS EXAMPLE of the director paying attention to detail was fairly broad, however, compared to the minutiae that captured his attention on other occasions. Sample the scene where Dustin Hoffman backs up and bumps into a metal equipment trolley, causing a loud and sharp clattering sound. This was initially retained from the actual production footage, yet, at the point where Hoffman appears to have stopped moving, another clattering sound occurred as a result of something that had been teetering on the edge. Accordingly, being that this errant object couldn't be seen, the sound that it made was edited out. Levinson wasn't happy.

"Something's missing," he complained at a subsequent screening. "It doesn't sound the way I remember it." Only Richard Beggs could recall what he was talking about, and so the spurious sound was reinserted. Fine, except that later on the effects crew would be redoing all of the effects that Beggs himself hadn't personally created. One of these, of course,



was the sound of Hoffman colliding with that damned metal trolley, and so once the editors got their hands on the relevant scene they came up with a sound that they considered to be infinitely better. "They", because, after Levinson heard the re-re-re-edited effect he exclaimed, "What's happening? This sounds even further away". Things were amended once more, but this kind of incident kept repeating itself because few people could accept the notion that the director would care about such seemingly trifling matters when he had so many more major issues to concern himself with. Wrong.

"They're all judgement calls," says Richard Beggs, "and if I had been on my toes enough I would have made an announcement earlier

to the effect that, despite what anyone thought about something being right or wrong, it would be in the picture if that's what the director wanted. I, however, never made that distinction to the crew, and so to some degree what happened was my responsibility. Still, that's how our concerns could differ.

"I came onto the project at a fairly early stage with just my assistant, and from the very first cut I started providing sounds to the cutting room, making it easy for them to incorporate things into their ongoing mix. Rather than be surprised on the dubbing stage—which is often the case—unlike a lot of other directors Barry would much rather know what's coming. In fact, on previous pictures he would come to the dubbing stage after having worked on the picture's development for a year or year-and-a-half, and he would have a very clear idea in his head as to what it was going to sound like. Maybe he never articulated it, but there was some idea there. Then, if he suddenly heard something and it didn't conform with this idea, even if it was terrific, he would be so thrown that his initial reaction was to reject it. So, this method of working where the soundtrack develops along with the picture is what we now do."

A lot of the *Sphere's* effects are original, Beggs having recorded them with an HNB DAT and Neumann SM191 stereo mic. At the same time, for his own home-based editorial work, alongside a minimum of outboard gear such as an E-mu Systems E4X Turbo sampler and a pair of Lexicon 300 processors, he employed a 32-track Sonic Solutions >>>>

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«««« system. His assistant, Nicole Bugna, used a 12-track Sonic Solutions setup and these two workstations were linked together via Medianet. Beggs asserting, 'I'm a real Sonic Solutions kind of guy', while admitting that, relative to the *modus operandi* at the Pro Tools and Waveframe-dominated Skywalker facility, he's in a minority. Consequently, all other effects were done on Pro Tools, while Foley was carried out on Waveframe.

'Thinking that the film was going to be released sometime last year we started pre-mixing it in the fall,' says Lora Hirschberg, who dealt with the sound effects and Foley while Tom Johnson mixed the dialogue. Richard Beggs brought special tracks that he had constructed in his studio to the dub stages here at Skywalker Sound, and we mixed his sound effects, those that our regular sound effects editorial crew had put together and then the Foley. We pre-mixed all of that here on an 80-input SSL 5000 and the final mix started shortly after the New Year on Mix Stage A, which has a 150-input Capricorn digital console. Richard usually generated somewhere between 20 and 50 tracks, whereas the effects department probably had about 40 tracks when they worked on the attack by the giant squid. At the most I'd say that there were maybe 70 raw tracks in the bigger scenes.'

'We pre-mixed to 6-track mag, and then, because there were a load of picture changes, we actually loaded the mag back into workstations in order to be conformed. That way we didn't have to go back and update all of the mag premixes; we just played them back

off of a workstation and re-recorded them during the final, using the workstation to do the fixes where the picture changes had taken place. We'd have to either lengthen or shorten any backgrounds we'd done and resync any hard effects.'

SUPERVISING sound editor Tim Holland was in charge of the audio crew at Skywalker for what he describes as 'the nuts and bolts kind of work', while Michael Silvers supervised the dialogue. 'I tended to do a lot of the bashing and crashing things for scenes such as the squid attack and the fire,' explains Holland, who has now worked on three of Barry Levinson's films. The effects editor, JR Grubbs, and I sat down with Richard at the start of August and divided up what we were going to do. To give credit, Richard actually had the bulk of the impact—he did the art. We, on the other hand, also did the Foley: footsteps on steel gratings and so on.

'In terms of ADR, the vast majority of the production dialogue was retained. Steve Cantamessa, who recorded it at that double tank in Valejo [California], did a really good job. Barry really liked the sound that came from the mics that he used underwater, and so when we came to do the looping—which was mainly for added dialogue—Michael Silvers took a couple of those diving helmets to the ADR stage. The actors, however, didn't want to wear them as they were so uncomfortable, so instead they took the mics out of the helmets and rigged them up to Telex headsets.

Using the same mic really helped match the sound, and Tom Johnson would process it until it was exactly the same as what they got from production.'

And the mic that Steve Cantamessa used? 'It's a microphone developed by Ocean Technology Systems in Orange County [California],' he says. 'We'd called just about every company that manufactures diving sound equipment and OTS seemed the most competent and this mic worked very well. It's basically a very noise-cancelling microphone, a hot mic, and it enabled us to get fairly clean dialogue underwater.'

Cantamessa, who has worked on Barry Levinson's last five pictures, was involved with *Sphere* for about a year before it was made as there were several initial audio problems to be tackled.

'For one thing, the sets were very restrictive and it was very difficult to get a microphone in overhead,' he says. 'Still, it all worked out. The shots were tight enough that we were able to use a Sennheiser 416, which is what I like best, and when the headroom really got too cramped we used a Schoeps with the angled adaptor on it. That would enable us to work within, like, two inches of headroom, so my boom man, Gary Thomas, was able to work alongside a couple of cameramen... You had to get along with everybody because it was like jumping into your closet.'

'Apart from the underwater dialogue there was also dialogue when they were wearing suits out of the water. We basically used a hard-line Duplex system which went into a

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mixing panel on the deck when they were in the water, and that would allow us to record their dialogue and then to hear the other actors underwater. We had the mics coming into different channels and we had a return going back into the water so that they could all hear each other. When they were on the spaceship they then walked around in different helmets, as the ones for underwater weighed in the region of a hundred pounds. These ones were much lighter and we figured we could all hear each other—there were even holes for ventilation—but it didn't take long to find out that wasn't so. We therefore used the same microphone tied into a Vega cue system that was all RF, and we branched off of that with an Lectrosonic UHF radio mic transmitter. I took the feed off of that and then the Duplex system worked for all the actors so that they could understand each other.

'Going into the water, we'd initially tested a wireless communications system in a pool and in the ocean and it worked very well. However, when we got into the tanks the filtering system in there which was ionising the water created loads of tiny bubbles. These basically would break down the sound signal. We were already going to use the Duplex system for the close-ups, so, assisted by the stuntmen, we now ended up also running it down the actors' legs and using it for everything.'

Bubbles aside, the sound of the actors' breathing was another vital issue.

'In terms of concepts for the habitat, air was real important,' says Richard Beggs. 'I mean, breathing's important, right? At all times the characters' very existence is tied to a rare mixture of gasses down there, and so early on I decided to use that to provide environmental background and dramatic effect. On the level of reality, all of the production recordings of the actors when they're wearing their deep-sea diving suits include the sound of a valve through which air is fed in and ejected. This isn't in real rhythm with their breathing, but sort of tracks it on a demand basis.'

'So, I took some of the production sounds of breath and breathing as well as these valve sounds, put them in the trusty EFX and did the usual kind of tricks, slowing them down

while not lowering the pitch.

'I subsequently developed a vocabulary of breathing and breath that ranged from the very, very abstract all the way up to the stuff that's very real. I gave a lot of the real stuff to the dialogue department so that they could enhance the production dialogue track, and then retained the stranger material in order to create a sort of breathing texture. There are two different versions of this, and those play simultaneously whenever they're in the space

ship. Then there's this low, heavy breathing which relates to the sound of sleeping—a lot of bad stuff happens when this one guy is sleeping and dreaming, even though the others don't make the association early on, and so the sound of that breathing becomes a motif. Initially this is restricted to the interior of the spaceship itself, but later on you hear the sound everywhere, almost as if it's taken on a life of its own... A hokey idea, but I think it probably works.'

'It's a very interesting film,' says Lora Hirschberg. 'As a psychological thriller, the story isn't totally linear, and so a lot of the changes that they made involved switching scenes around and changing the order of some things. There were also a lot of transitional elements to go in between scenes, and so whenever any of those transitions changed we'd have to remix them.'

'Sphere changed a lot while we were working on it,' adds Tim Holland. 'In fact, it's one of the hardest movies that I've ever done. A lot of picture changes came rather late in the process—much more than on Barry's other films—and, while it's obviously done to make the movie better, that kind of thing creates big problems for the sound department. It's very easy for the picture guys to make an 8-frame trim somewhere but we have to then trim all of these tracks, and what's even worse is when we have to fill in where they've inserted new material. They actually had a small reshoot two weeks before the end of the final mix, but, you know, Barry is a really nice guy and a talented guy, so it's a pleasure to work for him.' ■

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BOLLYWOOD, as the film studios of Mumbai (formerly Bombay) are collectively known, produce more films in a year than anywhere else on Earth. Although not officially recognised as an industry by the Indian government, the business of making and screening movies is reckoned to provide employment for a million people—no mean feat in a country not renowned for its career opportunities.

But India doesn't just make a lot of films. It makes them bigger too. Every production is a heady mixture of comedy, suspense, drama, action and—above all—music and dance. Or, as director Sehdev Kumar Gupta commented at the Venice Film Festival: 'Indian cinema is at once a night club and a temple; a circus and a concert; a pizza and a poetic symposium.'

In a country of 300 dialects, sharply pronounced cultural differences and low levels of literacy, India's films are more than simply entertainment. They are in a sense the social glue of the nation, as well as its most powerful form of communication.

Music has been a key element in Indian films since its first silent productions in the late 19th century. In reality, the cinema theatres were never completely silent as the films would be accompanied by live music, often featuring harmonium, tabla, or violin. The 'talkies' came to India in the 1930s. The first film with synchronous soundtrack was *Alam Ara* and it gave Indian cinema its first singing star, WM Khan. It also gave the Indian film industry an international market, as the release was an enormous success in Iran, Iraq, Syria, and Egypt.

Given that almost every Indian film has six to eight songs, a number of which may become hits in their own right, it may be surprising to discover that sound dubbing techniques are relatively rudimentary by Western standards. It is quite usual for a large production to use no more than 16 tracks of sound at any one time, with the whole soundtrack built up through a lengthy process of predubs on 35mm mag film.

However, all that is starting to change and in a pretty dramatic fashion, because the leading edge of the industry is moving straight >>>>

Bollywood digital

There is an audio revolution taking place in the world's largest film industry, reports **Simon Croft**



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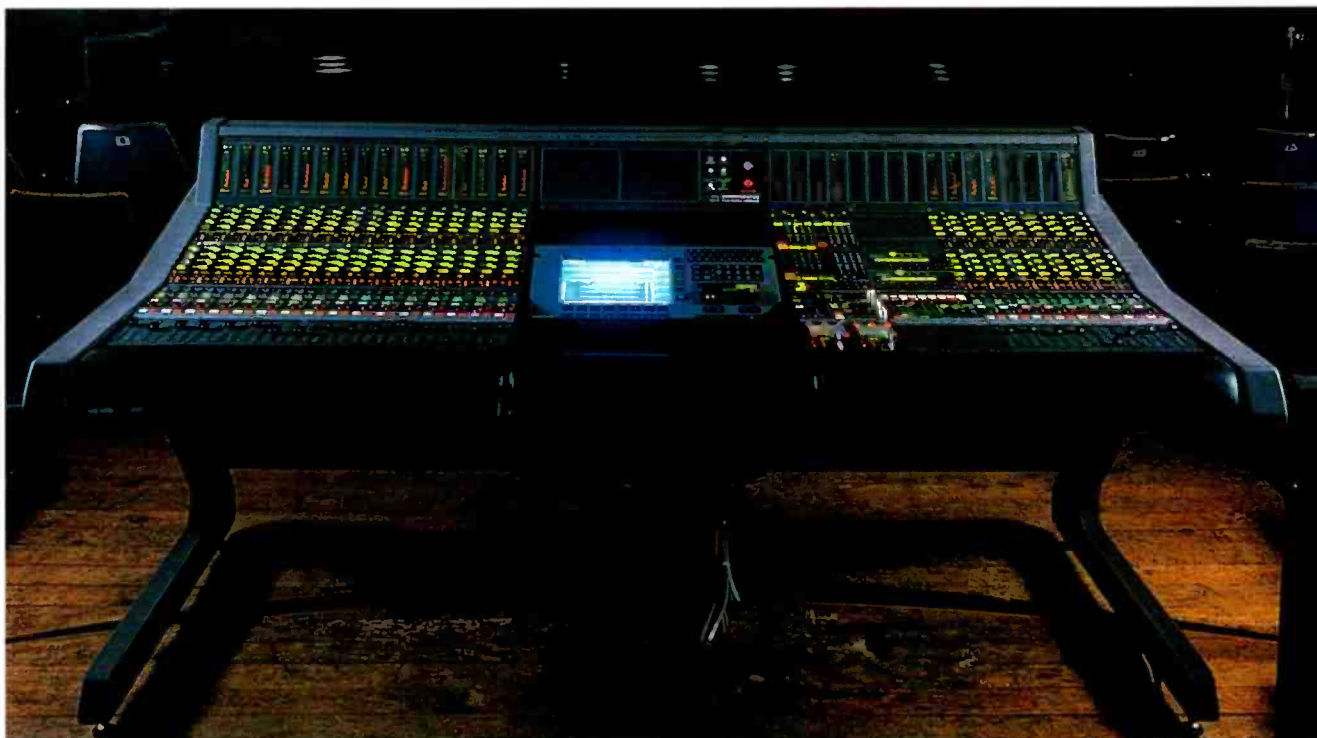


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<<<<< from mono mixes on small-scale desks, to automated dubbing in digital surround.

Dil to Pagal Hai is the latest Indian blockbuster to be released in the Dolby Digital format and the signs suggest that, as in other areas of technology such as mobile communications, India is about to skip a generation or two and go for the best technology available.

One of the first companies to move in this direction is film facility Gaurav Digital. Although the 'Digital' appellation is new, the company and its Raj Kamal Studio has a long history of technical innovation, as facility owner Sushil Gupta explains.

'It has been in operation since 1954. It was the first to have multitrack recording and more than 5,000 films have been mixed here,' he recounts.

The Raj Kamal Studio is one of the largest in

India, but it is not only the facility itself which has dubbed an unparalleled number of productions. Gupta explains that the studio also has the most experienced recordist, as the dubbing mixer is called in India.

The chief recordist is Hitendra Ghosh and he has mixed 984 films, which in itself is a record,' he says.

Gaurav Digital recently became the owners of a 60-channel AMS Neve Logic 2 digital mixing console and an AudioFile hard-disk/recorder-editor. The purchase makes it the first AMS Neve digital console customer in India.

The new equipment is installed in the facility's main film mixing room, which is set up for a full range of surround formats, including DTS, Dolby Digital and SDDS. In addition to the hard disk tracks of the AudioFile, which are replayed directly on the dubbing stage, the Logic 2 is

linked to Tascam DA-88 digital tape machines through the AMS Neve TDIF-MADI interface, ensuring that the whole process remains within the digital domain. In fact the facility is one of the few in India running a variety of analogue and digital, linear and non-linear formats.

THE FACILITY'S purchasing decision was not made in a hurry. The Gaurav Digital team visited fellow facilities in the US and Europe, as well as US trade shows, before opting for the AMS Neve combination.

'We chose the AMS Neve Logic 2 because of its excellent digital sound quality and easy operation,' says Gupta. 'We like the familiar layout of the Logic 2 because it is similar to a traditional console. The powerful EQ and the ability to re-configure between mono mixes >>>>>

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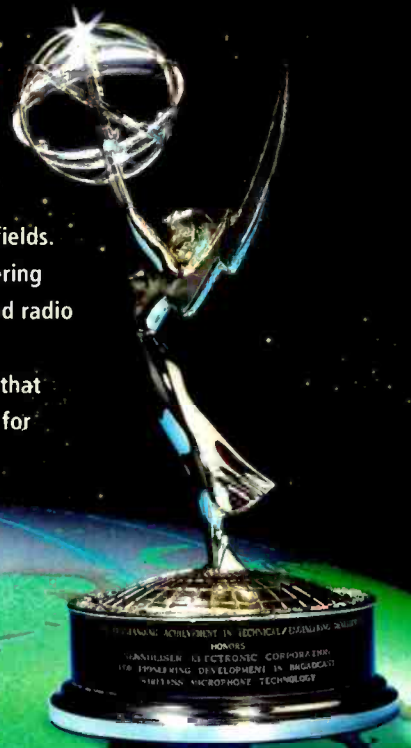
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Sushil Gupta, owner of Gaurav Digital, AMS Neve product support engineer Jason Power, film director Yash Chopra and Gaurav Digital's chief recordist Hitendra Ghosh

<<<< and any surround sound format mix were other main deciding factors.

Privately, Gupta is scathing of designs which use less traditional control devices than knobs and faders, calling them 'very tedious'. He explains that if the controls do not have the necessary tactile response, the operator spends a lot of his time looking at them and not at the screen. 'This makes the mixer very difficult to operate. It wastes a lot of time.' He also reckons that with one-man operation being the norm, automation will be increasingly important but on some designs, the automation is so bad you end up switching it off.

JASON POWER is an AMS Neve product support engineer. Having liaised with the Gaurav team and conducted training sessions at the facility, he has a strong insight into what Hitendra Ghosh in particular liked about the Logic 2.

'He felt the Logic held out a few key advantages for him,' Power says. 'For one thing, it looked traditional in that it had a lot of knobs and faders—real controls for each channel strip. But he also very much liked the fact that there was a degree of layering, because he didn't want a physically huge console, although the room is quite big. In India, most studios use mixing desks of 20-30 channels, so he didn't want to move to an over-large design.'

Gaurav Digital's Logic 2 has a 24-fader control surface addressing 60 audio channels. With the ability to instantly reconfigure to almost any format from mono to multiple output surround, the desk clearly has a lot to offer the operator. He freely admits that this is not enough to justify 'a huge investment'—there must be tangible benefits for the client as well.

Fortunately, it seems that there are.

'In addition to quality, they are offering cost savings and greater flexibility,' says Power. 'They can make alterations more easily, there



is much greater flexibility when last minute changes are needed.'

The reasons for sudden changes to a film are less likely to be the whim of the director as the whim of the censor. By all accounts, censorship is still heavy in India but it is quite hard to predict what the censor will, or will not, find acceptable.

With the high degree of automation offered by the Logic 2 and the much larger track capacity now that the DA-88s and AudioFile are on-board, 'virtual premixing' is a useful strategy which copes well with sudden changes of plan.

Power adds, 'I have tremendous respect for the Indian film people because they are embracing such a large amount of technological change in a very short space of time.'

Gaurav Digital certainly seems to be. In addition to the AMS Neve AudioFile integrated with the Logic 2 console, it apparently intends to add another AudioFile. This is destined to live in the facility's second room where it will be used for duties including Foley recording and editing. Sushil Gupta meanwhile has no doubts about the viability of the course he has taken, estimating, 'In US dollars, we expect to make \$100,000 in the first year.' Nice work if you can get it. ■

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New Horizons

MiniDisc is the latest format to be adapted for field recording. **Neil Hillman** asks if the latest small addition to the recordist's front pocket is the straw to break the camel's back

FASHION is a curious thing. Indeed, no one quite believes that being a fashion icon can be all beer and skittles, but the effort required by manufacturers to overcome the inertia of a whole market sector and convince it to become a dedicated follower of a new fashion must be colossal. But it can be done and has been done time after time; the rewards of success being more than ample recompense for the considerable amount of effort in the first place.

Success that breeds status, however, can also breed slothfulness and from the proceeds of the adoption of their global 'industry-standard' product, a manufacturer can expect all the trappings of the rich and famous, and adapt quite well to the tried and tested life-cycle of the star: firstly, a long vacation, then a sabbatical, some 'project' work and on to some pretty unfocused goofing around; before you know it they've put on weight, cultivated an unhealthy desire for recreational pharmaceuticals, got divorced and partied like its 1999—you see it all the time—until one

day the slumbering giant awakens fully clothed in a strange hotel; cleans-up, finds God and then preaches the new gospel in a sing-song voice.

The only ripple in the tarmac of that 6-lane freeway to Damascus is the fact that soundmen, be they location or studio based, are enquiring minds who will take a system apart for something to do in a lunch hour; we can't help it, it's in our genes.

'Hi Bob—you coming with us to the pub?'
'Nah—I'll probably just stay here and measure the third harmonic distortion on this Aural Exciter if you don't mind'

'Yeah fine.'

My chosen field of broadcast television sound must be the ultimate fashion victim—we even have a uniform for goodness sake so you can pick us out in bus queues. We are the ones in the desert Timberlands, black 501s and red Berghaus jackets, with bodies that have a definite list to one side. This comes not so much from the obligatory 4-channel mixer worn around our necks but from the various batteries, radio-mic receivers, Pro-Walkmans for interview transcriptions and wild-track DAT recorders now needed for a location video shoot.

In the same way that investments can go down as well as up, divorces arrive to the sweetest of marriages, usually when you thought you were at your happiest. In the late 1980s huge numbers of television technicians were thrown into the cold world of the freelance, wrapped only in old wage-slips to keep them warm, while some even managed—with consummate skill and timing—to get so fed up with the

whole shooting match that they left just months before a big pay-off.

So now an increasing number of the location recording equipment buyers actually became rather cautious about what new gear to acquire—this was personal money being staked, remember rather than the end of year capital budget underspend that was either used or lost.

Initial investment in peripheral recording gear for the freelance TV recordist was probably a Nagra 4S stereo 1/4-inch recorder. Collectively, as a sector of the market, we bought one. The upgrade to a time-coded Nagra was both pricey and bewilderingly complex, but we bought one.



And then along came DAT. 'Awful small tape and the spools turn worryingly slowly'. 'Mmm, it's a failed domestic product just being foisted on us isn't it?' 'Well, it's got a pretty faithful reproduction and the noise floor is so low'. So we bought one of those too.

Then came the time-code DAT and Hey-Presto! it was true digital field acquisition, edit-suite friendly, with long-play tapes that could store a week's rushes at a reasonable cost, and guess what? We bought one too.

But now we are being wooed yet again to invest in another format: MiniDisc. What implications does this have for the freelance recordist? Well, for a start, its goodbye to Bob getting a round in at the pub, he's got the MiniDisc recorder in bits.

When you drop into record, a laser zaps



essence, as is inevitably the case in a dub, of true source material being included in the mix.

Storage time of the media is roughly half that of a 2-hour DAT tape, at 74 minutes, but on the plus side again, record and playback head wear becomes a thing of the past. The message seems to be treat it like you would an analogue process.

The deciding factor ultimately will be cost and it is on this basis that MiniDisc is certain to raise its head over the next year or so and possibly sneak into that coveted mixer-bag pocket. Favourite among recordists in Britain at present would seem to be the Sony MZR30, with SPDIF, optical or analogue inputs and optical or analogue outputs. The crowning glory of this being its retail price of only around £180 (UK).

There is a promise here that is worth watching out for. How long before the pro manufacturers spot it and join the party? ■

the disc up to a high temperature, sending the structure of the recording layer into a daze that then gets realigned by a magnetic field derived from the applied input signal. When you take away the laser's heat, rather like a small child pulling a face as the wind changes, the new shape stays, until you repeat the cycle, that is, but then it can be repeated all over again as often as you wish. Even though this process realigns the disc's substrate crystals by only a few degrees, it's enough to allow the detector to discriminate between either a North or South magnetic field. What a glorious system.

But is MiniDisc a credible professional product and should we find space for it in the front pocket of the overstuffed mixer bag?

Fellow location recordists and postproduction houses are certainly not too unhappy with the beast, but they have some qualified reservations. These range from worries over any duplication of a system that employs bit-reduction, as this one does, to the worry over

Some sound postproduction suites are almost happier to receive material on MiniDisc simply in terms of logistics as it allows faster access time than DAT to audition various tracks recorded on location wild, as this can mean the difference when time is of the essence, as is inevitably the case in a dub, of true source material being included in the mix

the quality of low-level signals.

Some sound postproduction suites are almost happier to receive material on MiniDisc simply in terms of logistics as it allows faster access time than DAT to audition various tracks recorded on location wild, as this can mean the difference when time is of the

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The Silicon Revolution

Talk of computers devaluing traditional audio technologies is cheap and commonplace. **Martin Polon** takes a reasoned look at the evolution of computers and the revolution of audio

THE CURRENT STATE of audio recording, processing and editing on computer platforms could be termed 'a wild ride with Mac'. Since the mid-1980s, computer workstations have begun to be a part of the fabric of, first, professional studio audio, and then, what we used to happily call semipro studio audio, but today refer to as personal and project (P&P) studio audio.

Needless to say, the transition to digital audio required the use of computers to process the zeros and ones that replaced 'chicken scratches' on analogue audio tape. Initially, these computers were built inside proprietary workstations that were incompatible with other similar products, and sometimes even with the similar product from the same manufacturer. The actual audio was recorded onto new technology tape running on digital audio transports also using computer chips, all of which evolved from various nations' space programs.

With the 1990s, there emerged the first permutations of complete recording software, from companies such as Digidesign, and the professional computer suitable for audio usage, from companies such as Macintosh and Silicon Graphics. The IBM-standard personal computer was saddled with an Windows operating system software (culminating in v3.1), that did not lend itself easily to audio evolutions. Even the arrival of early incarnations of Windows 95 did not gladden hearts in the audio world.

Partly as a consequence, the Apple Macintosh computer quickly became the king of the hill for audio-based computing. An excellent on-screen graphic interface, the ease of use with a highly evolved mouse device that enabled 'point and shoot' control of audio applications and the presence of NuBus slots

in the rear for recording and editing related peripheral cards all played their part. Though relatively expensive at the time, the Mac was still a more economical platform than its more sophisticated competitors. It also pioneered the SCSI (small computer systems interface) data transfer bus that allowed the simple and reliable daisy chaining of up to seven external devices—especially the, then, expensive hard drives to store the audio data. At that time, Macintosh accounted for more than 20% of the sales in the total computer marketplace.

This meant that by the mid-to-late 1990s, the Mac accounted for more than 85% of all audio usage. The current (1998) status of the Mac platform with slightly less than 3% of all computer usage and its implications for the future of successful professional audio applications on the Mac has become a question mark; although the installed base still accounts for more than 75% of all audio usage on personal computers.

Recent changes at Apple include installing former cofounder Steve Jobs as acting head of the company; the embracing of former Apple adversary and competitor Bill Gates in a cooperative agreement with Microsoft; overseeing Apple's destruction of its newly created clone marketplace

Recent changes at Apple have included installing former Apple cofounder Steve Jobs as acting head of the company; the embracing of former Apple adversary and competitor Bill Gates in a cooperative agreement with Microsoft; overseeing Apple's destruction of its newly created clone marketplace; the emergence of the fastest and most powerful Power-PC

chips (G3) on the Mac; the emergence of a new operating system (based on Next Step and Open Step) called Rhapsody; and other changes as well. All of this and other factors have created a best of 'worst of all possible worlds' scenario for those digital audio users wishing to stay with the Macintosh platform.

The other side of the equation has not been dormant. Hardware development of the IBM standard PC platform has proceeded at a pace greater than that of Mac, due to the intense

March 1998 **Studio Sound**

competition from various PC computer makers. Intel has continued to develop the Pentium chip and now has a larger and faster replacement pending as well as control of Digital Equipment Companies' (DEC) powerful Alpha chip. Microsoft has produced a server-workstation operating system called Windows NT, that has proven a worthy base for IBM standard audio softwares from vendors such as CakeWalk and Sonic Forge-Foundry. Steinberg has aligned with Silicon Graphics, Intel has invested money into Avid—current parent of Digidesign, Compaq, has purchased both former mini-computer industry behemoth DEC and main-frame leader Tandem to challenge a reborn and vitalised IBM. So the stage is set for the emergence of new technologies fuelled by computer industry competition and increased awareness, at the computer hardware and software manufacturer level, of the importance of the audio marketplace.

If these new Intel chips and PowerPC chips are manufactured with copper, they could well perform at Gigahertz speed (1000MHz) or better. The Alpha chip gone copper would equal or better that performance. These chips are expected by the end of 1998...

SEVERAL INNOVATIONS have emerged, and make possible quantum jumps in computing power. The first is the advent of copper as a manageable material for semiconductor makers (foundries) to use as substrate for central processor units (CPU) or microprocessor chips which previously used aluminium. Aluminium is not as superior a conductor as is copper, but until 1998, was much easier to work in making chips. A CPU consists of a series of millions of transistors laid down on a nonconducting board with a layer or substrate of aluminium or copper to make the connection to all of the transistors. The speed of the latest processor chips has hovered around the 333MHz figure for the G3

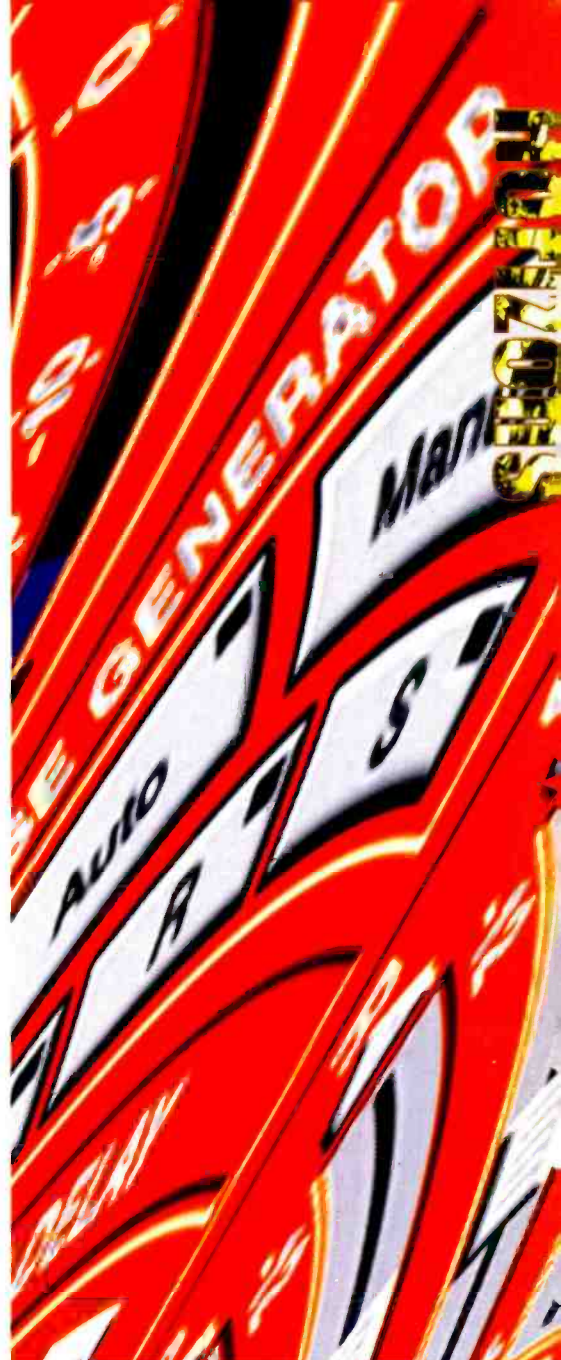
PowerPC and the Pentium II, with the exception of the Alpha chip that runs Windows NT at an earth-shaking 533MHz.

Intel is developing a new generation of chips using 64-bit 128-bit bytes of data at every iteration where current chips process only at the 32-bit/64-bit level. These IA-64 chips (supposedly code named Merced) will initially appear in servers and workstations; although the technology is expected to quickly find its way to desktop PCs.

Semiconductor manufacturing partners Motorola and IBM are developing a new version of the PowerPC called the G4, that will ostensibly equal or better the performance of the new Intel chips. The G4 does use different design parameters in its architecture which will require Apple Computer to redesign some portions of the Macintosh if it intends to use it for that platform.

If these new Intel chips and PowerPC chips are manufactured with copper, they could well perform at Gigahertz speed (1000MHz) or better. The Alpha chip gone copper would equal or better that performance. These chips are expected by the end of 1998, with copper fabrication possible either at that time or at some point in 1999.

The second innovation in microprocessor design is initially for the PowerPC chip family, but could evolve in other directions such as the innovation of 'going copper' suggests. It involves fabricating PowerPC chips with entire families of PowerPC processors mounted on a single assembly, in a similar way to the mounting of millions of transistors on a single chip. Although not as likely to emerge in the very short term, this innovation of diminution in fabrication size and mounting efficiency will increase computing >>>>



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power even more than mere speed increases.

The memory that is directly on the micro-processor to store certain basic repeatable operating instructions is known as level one cache. It has been relatively small, the range of 16k to 32k of RAM being the average. That amount is larger on the new chip families, further enhancing processor speed.

More important, level two cache, which is much larger and stores repeatable application code as well as operating system instructions typically in the 256k to 512k RAM level, will rise to 1Mb or better. Further, this RAM will be of a higher speed variety and located potentially on the same assembly with the processor for the time being, with direct fabrication with the processor on the same chip in the not so distant future. The idea being that optimum level two cache to processor performance which directly effects digital audio efficiency is accomplished with a minimum of distance between the processor and the cache.

Conventional wisdom in processor cache utilisation and design is to connect the two with the shortest physical distance and the highest possible data speed of the bus providing the connection. Unity, that is the same bus

Conventional wisdom in processor cache utilisation and design is to connect the two within the shortest physical distance and the highest possible data speed of the bus providing the connection. Unity, that is the same bus speed as the processor itself is the goal for level two cache

speed as the processor itself is the goal for level two cache. In practice, currently as well as for the future, a different processor to cache bus is used—separate from the computer's slower main bus or connection channel.

Currently, Macintosh cache design uses so-called backside cache directly mounted on the processor card. PCs use so-called pipeline and/or burst cache also closely connected to the processor.

ONE OF THE MAJOR speed blocks in any computer has become the main system bus of a computer. When processors ran at 100MHz or less, the nominal 50MHz computer bus speed was considered acceptable. Now, with 300MHz processor speeds becoming the norm and the future CPU chips discussed here potentially yielding three to four times that speed by the end of the year, the need for redesign of computer system architecture is well recognised. This is not as easily accomplished as it might seem because the larger more discreet components found on logic boards cannot be given increased speed without generating increased cost and necessitating a major sys-

tem redesign. For example, the new Macintosh G3 computers sporting 300MHz processors have undergone bus speed redesigns, but still can yield only 66MHz—up from 50MHz. That is a major improvement but does serve to illustrate the complexity of the system redesign problem.

In an era that now supports complete \$700 PC computers with PC manufacturers duelling over the \$1,000 or less marketplace, there is the likelihood that higher priced workstations and servers will get faster components yielding faster bus speeds before less expensive machines do.

Another not always noticed stumbling block to computer speed is the storage drives (both internal and external) used by the implemented digital audio workstation system. The overall hard drive capacity (in Mb or Gb); the spindle speed of each hard drive (in rpm); the access time (in ms); and the connection bus to transfer data rate to and from the computer (in Mb/s) are all important to overall computer system efficiency and functionality.

Ideally, the desired hard drive combination is storage capacity of 10Gb or better; spindle speeds as high as 10,000rpm or better; access time measured as 8ms or less; and data transfer rates of 20Mb/s or better. You will almost never find that combination in an off-the-shelf drive in an off-the-shelf computer—primarily because even with today's rapidly dropping prices for storage drives—that ideal drive combination could cost far more than the computer itself.

The data transfer mode itself can be enhanced IDE, but currently big and fast drives thrive with SCSI or enhanced SCSI modes on both Windows and Macintosh platforms. The Firewire system initially conceived by Apple and Texas Instruments is likely to become the future standard for those engaged in video, audio and multimedia and could become the data transfer standard for PCs as well.

OPERATING SYSTEM SOFTWARE and application software are the proverbial fly's in the computer ointment. To take advantage of the speed and internal efficiency that the new computers promise, code has to be rewritten to take advantage of the hardware advances. That that will happen is given, but the question is when. The future of computers using the new technologies opens the door to new or alternative operating systems as well offering true multitasking or increased power. Apple Rhapsody, one or more varieties of Unix, the BE, Windows NT 5.0, and other options yet to emerge fully, will further expand our options. Sun Solaris and other advanced softwares also offer promise.

The bottom line here is that we are going through a series of changes in both the basic technology of the desktop PC and Macintosh (and laptops for both platforms as well), that promise to be, for the first time in many years, truly revolutionary rather than evolutionary. These changes promise to similarly alter the way we record, process and edit audio. Even now, one can take a 'loaded' top-of-the-line Macintosh laptop computer to a concert with microphones and adaptors to record the event digitally on the unit's hard drive. As we progress to the more advanced stages >>>>>

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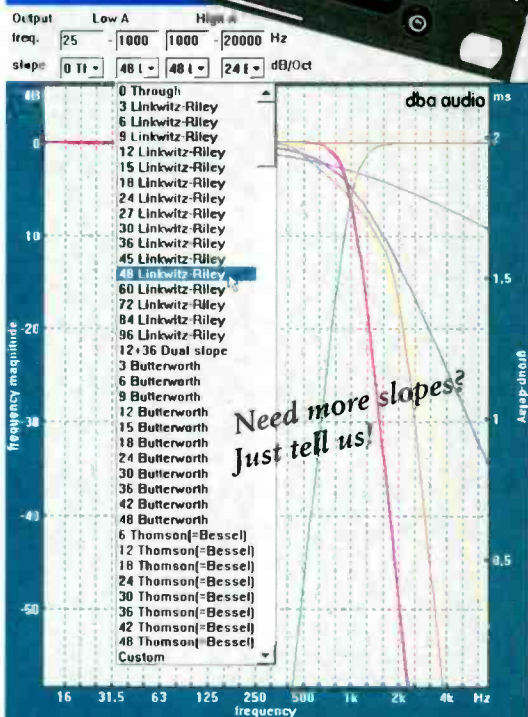
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<<<< of computer power that promise to be with us sooner than later, coupled with the software that will be re-written or created from scratch to take advantage of the new power and speed capabilities of the hardware, there will be no limit to the options offered by computers in the recording studio.

The final question, and, perhaps, the most difficult one to answer, is whether virtual digital audio technology will replace the conventional studio.

For an answer we must look from several vantage points at the hardware and how it is used. First, the use of a next or future generation laptop with portable-studio software and a big, fast hard drive could replace the small portable studio appliances combining mixers and cassettes or MiniDiscs to record. Software could be incredibly versatile, and the output could be stored on an DVD-RAM built into the laptop.

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The bottom line here is that we are going through a series of changes in both the basic technology of the desktop PC and Macintosh (and laptops for both platforms as well), that promise to be, for the first time in many years, truly revolutionary rather than evolutionary

DSP plug-ins to studio recording software. The plug-in virtual studio options running at speeds far in excess of today's machines could perform a range of digital signal processing (DSP) so sophisticated, that all after-recording and during-recording signal processing could be performed in real time by the software.

Desired effects not easily available commercially could be created with programs that would allow the user to 'mount' and use gates, limiters, compressors, psychoacoustic enhancers, spatial effects generators, graphic equalisers, shelving and boost equalisers, parametric equalisers, and so on, in whatever order, with settings variable by 0.1dB for each unit with the software field.

Editing is already almost exclusively the venue of the computer workstation, but the evolving technologies described above will complete that transition from tape playback and remix to virtual editing in most applications. Considering the advances being made in hard drive storage and the evolution of the RAID drive technology (Random Array of Independent Drives), especially in television applications today, the capacity needed to edit in a computer, say, a 16-track recording of a classical performance already exists. A single Gb of storage comfortably records one hour of 2-track audio. So 8Gb would handle 16 tracks and 16Gb would handle 32 tracks, and, of course, 32Gb would yield

March 1998 **Studio Sound**

64 tracks. That capacity of storage is available right now, even without RAID.

What the new generation of computers will bring to the party, is the ability to store and process in real time these large multitrack recordings without extraordinary cost and complexity.

As to the audio studio itself, the virtual recording studio will offer significant advantages to the personal and project studio owner who records several tracks and uses the facility for his or her own use. Little or no signal processing electronics will be needed external to the computer, due to DSP plug-in processing.

The major stumbling block to the larger users' adoption of 'virtual' mixing consoles is the current lack of smart touchscreen LCDs, that will allow 'finger fading' and similar access to all plug-in EQ, and other signal processing components in real time as offered by the recording software. Despite the fact that the increased speeds of the central processor units and associated system architectures plus advanced hard drives or magneto-optical drives in these new computers will allow virtually instantaneous response to any mixing input instruction, the so-called 'human engineering' issues will remain difficult to resolve.

In fact, the preference of recording audio professionals and musicians to use hands-on mixing and signal-processing equipment in traditional ways is ultimately the greatest limiting factor in the future development and

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adoption of the virtual studio on a state-of-the-art personnel computer.

This author began forecasting the advent of the digital studio in the pages of this magazine almost 15 years ago. Much of what was expected of virtual recording and virtual editing, those many years ago, has come to pass. It is interesting to note that at the same time, the birth of the personal computer running with 1MHz CPU chips, 4-bit or 8-bit processing 'words,' and 64 thousand bytes of random access memory revolutionised our technological society. Today, 15 years later, the potential for personal computer CPUs running a thousand times faster with 128-bit processing 'words,' RAM memory capacity 20,000 times or larger and concomitant operating system softwares and audio recording, editing or processing softwares are just months away. Yet the prospect of human beings working in audio losing their tactile contact with the recording process remains a difficulty to solve. ■

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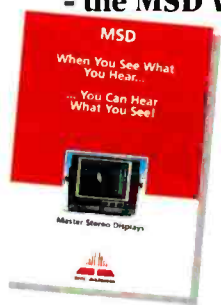
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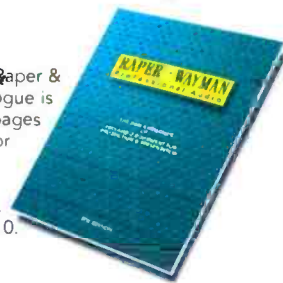


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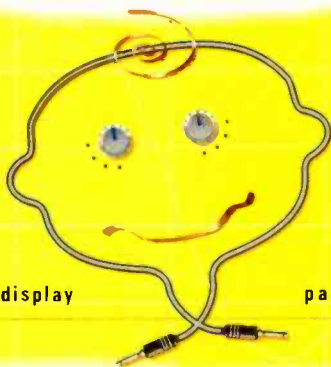
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US: Back to analogue, mono or musicians

The ultimate 'retro' movement would see bands of musicians pitching performances at a recording team writes **Dan Daley**

A JAZZ TRIO is doing gig in a small club. The pianist is plugging along, but out of the corner of his eye he notices, every now and then, that the bassist is swinging his Fender's headstock towards the drummer's head. This goes on for half the set; then suddenly, the bassist lunges over the kit and begins to throttle the drummer by the neck. The pianist hurriedly announces a break, jumps up and separates his two colleagues and pulls them outside. He turns to the bass player and says, 'What the hell was that all about?' The bassist replies, 'He kept reaching over and detuning one of my tuning pegs'. The pianist sees this as just light-hearted horseplay and responds, 'What's so bad about that?' To which the bassist replies: 'He wouldn't tell me which one.'

If you've heard it before, you're probably a musician. You're also probably over 35 and possibly baffled by hard-disk recording. You're almost certainly not making a living by playing in conventional recording studios any more on records other than your own. Two revolutionary things have occurred in our lifetimes: the advent of personal recording, and the introduction of affordable, reliable,

almost-good-sounding digital recording. And we've been blinded not only by science but by the reverse swing of the pendulum in response to these innovations.

The ability to record at home, and the ability to do so in a nondestructive, random-access environment, has radically altered the fabric of how contemporary music is created and recorded. The notion of a group of people sitting down together and playing ensemble has become pretty much a thing of the past in most cases. Sure, bands are back—for the moment, anyway, but a perusal of the Hot 100 shows that the hermetic auteur, in the form of the writer-artist-performer, is alive and well and will likely still be so after Oasis, Blur and the rest have self-destructed. Or in the case of Aerosmith or the Stones, simply expired.

The ability to make entire records without the interplay that comes with a group of individuals playing together has been both empowering and alienating. That's not news—the Back to Mono crowd of techno-Luddites have been quite vocal about the phenomenon and analogue tape and recording techniques have large cadres of

vociferous and rabid proponents. But analogue isn't enough; it still requires people on the other end of the microphone, and even analogue's boosters often lose sight of this fundamental truth. You can remain isolated even though you're using a Fostex B-16 and a Marshall amp.

What's happened is that the apprenticeship system that used to be the norm in the business has been almost completely overturned. The notion of 'job description' might seem quaint and limiting to some, particularly in an era when reams of self-help books and gurus—not to mention US Army recruiting campaigns—evangelise that anyone can be all that they want to be. So who wants to be a tape op for five years when you can go right to being the star?

Personal recording is giving voice to some very, very talented individuals. However, the ranks of musicians that once supplied the pools of composers, engineers and producers have thinned; musicianship is no longer a requirement. And in a very real sense, it's redefined just what constitutes recorded music. The evidence is all around and it's compelling. New York City used to have the most awesome collection of studio musicians in the world. (I'll get to Nashville in a minute.) Over 80% of national commercial spots and the better part of most pop and rock records were done by them, criss-crossing Manhattan by subway and cab, gig bags perched on their backs like battle standards. Los Angeles had its own crew—the Wrecking Crew, one genera-

Europe: Investing in rot

The life of laser discs, once infinite, is now a flexible and marketable commodity writes **Barry Fox**

IF A EUROPEAN MANUFACTURER of electrical equipment discovers a fault that could harm its user, start a fire or damage other equipment, it puts out a recall notice. Advertisements appear in the national press asking anyone with the affected model to return it for servicing, free of charge. The manufacturer does this because of laws on legal liability.

There have been several scares over the years on faulty disc pressing. The first, in the early 1980s, involved 12-inch laser video discs. The glue used to bond the two halves of the disc into a sandwich was letting air through. The analogue pictures just got fuzzier every day. The factories producing faulty discs tried to keep the problem secret, but the truth about 'Laser rot' came out and the bad publicity forced the pressing plants to clean up their act.

But by then, the late 1980s, some music CDs were starting to self-destruct. The inks used to print the labels were reacting with the lacquer seal, and letting air through to the aluminium reflective layer. This oxidised or 'rotted' the metal. In the first stage of rot, the error correction conceals the fault. When the rot finally gets too bad for the correction to cope, the disc stops playing. There has never been a similar recall notice, but hats off to Philips' PDO pressing plant in Blackburn, in

the North of England. It is now five years since Blackburn discovered it had quite a different production problem, and fixed it. But PDO still runs a customer support service (PDO Discs Ltd, Helpline, Freepost, BK1080, Blackburn, Lancs, BB1 5BR, UK. Tel: +44 1254 52448). PDO found that tiny traces of sulphur gas were seeping from paper and card used for the sleeve notes, getting through the lacquer seal and tarnished the silver metal. This reduced reflection and stopped some discs playing.

There was never any recall notice when Ampex discovered that some of its open reel-analogue tapes would become sticky, and refuse to play after a few years storage. The stickiness was caused by a chemical reaction between the base film, binder and moisture in the air. After we exposed the problem in *Studio Sound*, around 1990, Ampex held a trade seminar and offered a free service that removed the stickiness for just long enough to let an engineer make a new copy, and then junk the original.

Sticky tapes still turn up when studios and record companies go into their vaults and pull out an old master, hoping to create a new CD release. With a bit of bad luck they find that the tape makes a screeching noise when

played. The machine slows until it grinds to a halt, with all the contact rollers covered with sticky gunge. The Ampex fix, also adopted by Agfa, was to bake the tape in an oven. Not knowing this, one engineer recently experimented, using a vacuum oven to suck moisture out of hot tape. In fact a vacuum is not necessary, simple baking does the trick, by hardening the sticky binder just long enough to make a good copy.

In a neat twist, news now comes of a plan to make discs that deliberately self-destruct. Colorado company Ulide and Seek has devised a CD or DVD coated with a thin layer of plastic polymer that darkens when exposed to light. So the disc initially works perfectly but later refuses to play.

Rotting discs and sticky audio tape may not jeopardise health and safety, but it creates widespread distress and wastes victims' time and money. If the EC's Eurocrats in Brussels are looking for a new crusade, I'd say that what Europe needs now is a consumer protection directive that obliges manufacturers to advertise the existence of

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DISTRIBUTION

ISDN: the communications tool

Last month **John Watkinson** looked at the plain old telephone. However, when the telephone is digitised, 64 kilobits/second is used, but the potential is there to do more

THE INTEGRATED DIGITAL NETWORK (IDN) is based on a 64 kilobit per second digital representation of speech and that is how today's digital telephone systems work. However, digital transmission systems don't care what the data they carry actually mean; it's the job of the receiver to make sense of the message. Consequently, it's a small step from the speech data of IDN to a system which carries generic data. This system is called ISDN (integrated services digital network) and it's basically a use of the telephone system

tion consists of two twisted pairs: one for transmit and one for receive. The mixture of AC audio and DC dialling in the traditional telephone is abandoned. Instead digital signalling is used and the signalling data, known as the D channel and running at 16 kilobits per second, is multiplexed into the bitstream. A Basic Rate ISDN link has two B channels and one D channel multiplexed into the twisted pair. The B channels can be used for separate calls or ganged together.

Each twisted pair carries 2 x 64 plus 1 x 16 kilobits of data,

suffer hardly any loss at all, whereas high frequencies are received with reduced amplitude. In raw data, the number of ones and zeros is not necessarily equal and this causes DC offsets and low frequencies in a serial data waveform. After cable loss a DC component causes baseline wander so that the low amplitude high frequency signals cannot be sliced back to binary.

The solution is to channel code or modulate the data so that the transmitted waveform is free of DC and low frequencies. The same principle is used in the generation of the bi-phase signal used in time code, except that the code of ISDN uses less bandwidth for a given bit rate.

Fig.1 shows what the signalling waveform of ISDN looks like. A 3-level channel code called AMI (alternate mark inversion) is used. The outer two levels (positive or negative voltage) both represent data 0 whereas the centre level (zero volts) represents a data 1. Successive zeros must use alternating polarity. Whatever the data bit pattern, AMI coding means that the transmitted waveform is always DC free because ones cause no offset and any zero is always balanced by the next zero which has opposite polarity.

For wider bandwidth, the Primary Rate ISDN system allows, in many parts of the world, up to 30 B channels in a system called E1, whereas in North America a system called T1 is used which offers 23 or 24 B channels. Naturally the more bit-rate that is used, the more the call costs.

For compatibility with IDN, E1 and T1 still use individual 64 kilobit channels and the provision of wider bandwidth depends upon units called inverse multiplexers (I-MUXes) which distribute the source data over several B channels. The set of B channels used in an ISDN call do not necessarily all pass down the same route. Depending on how busy lines are, some B channels may pass down a physically different path between subscribers. The data arrive unchanged, but the time axis will be disrupted because the different paths may introduce different delays.

Fig.2 shows that the brains of the outfit is the multiplexer at the receiving end which has to combine the data from a number of B channels and apply suitable delays to each so that the final result is the original bitstream. The I-MUX has to put special time-variant codes in each B-channel signal so that the multiplexer can time align them.

AN ALTERNATIVE exists where a telco has made full use of the synchronising means within the networks. Where suitable control systems are implemented, once a single B channel call has been connected, the remaining B channels are logically attached so that they must follow the same routing, avoiding differential delays.

So far we have only established that a data communication path exists over ISDN. What can the audio professional do with it? Well, digital audio is data, and so audio can in principle be >>>>

For wider bandwidth, the Primary Rate ISDN system allows, in many parts of the world, up to 30 B channels in a system called E1, whereas in North America a system called T1 is used which offers 23 or 24 B channels

which allows dial-up data transfer between subscribers in much the same way as a conventional phone call is made.

As it is based on IDN, ISDN works on units of 64 kilobits per second, known as 'B channels', so that the communications channel carries the ISDN data just as easily as a voice call. However, for many applications, this bit rate isn't enough and ISDN joins together more than one B channel to raise the bit rate. In the lowest cost option, known as Basic Rate ISDN, two B channels are available, allowing 128 kilobit per second communication.

Physically, the ISDN connec-

plus synchronising patterns which allow the B and D information to be deserialised and separated. This results in a total rate of 192 kilobits per second. The network echoes the D bits sent by the terminal. This is used to prove the connection exists in both directions and to detect if more than one terminal has tried to get on the lines at the same time.

There is more to sending data over land lines than just connecting one and zero logic levels to a cable. Unlike speaker cables, ISDN cables are transmission lines and suffer frequency dependent loss. Low frequencies



Fig.1: AMI coding eliminates DC from the data signal

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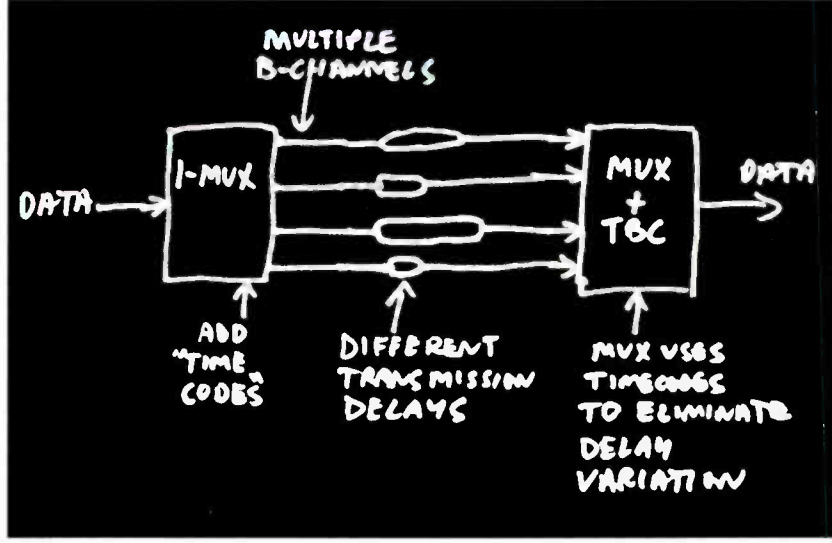


Fig.2: combining ISDN B-channels to increase bit rate requires a synchronising system

sent over ISDN lines. There is a small question of bit rate. One channel of high quality digital audio in real time needs over one megabit per second and ganging together vast numbers of B channels at equally vast expense is not a solution for many users.

There are two ways of getting the bit rate down: using compression in real time or sending uncompressed data at slower than real time. Compression relies on signal processing techniques which attempt to reproduce the original audio waveform using a lower bit rate than conventional PCM.

A simple way of understanding the problem is to consider that in stereo the spatial information resides in the difference between the two signals. Small errors in the individual channels can cause large errors in the difference signal

Lossless compression techniques reconstruct the original data without any change and so cannot produce any audible effect. However, the compression factor obtained will not exceed 2:1. Higher compression factors require techniques such as MPEG which take advantage of the characteristics of human hearing to remove those parts of the signal which are least audible. MPEG is a lossy technique and the reproduced waveform differs from the original. MPEG audio coding allows three levels of complexity. The higher the compression factor, the higher the level that is needed to contain quality loss. Within each level, the higher the compression factor, the greater the difference between output and input. These techniques work well for speech, reasonably well for monophonic music and rather badly for stereo. Not surprisingly, speech requires less bandwidth than music and distortions do not necessarily reduce intelligi-

bility. Music requires more bandwidth than speech and stresses compression systems more. If the level of artefacts is too high, it will be necessary to restrict the audio bandwidth entering the coder. This gives that lovely mellow AM radio sound.

Most coders automatically drop the audio bandwidth as the lower bit rates are selected. In mono, the compression artefacts emanate from the same place as the audio and the greatest masking is achieved. In stereo this is no longer true and a higher bit rate will be needed for a given subjective quality.

A simple way of understanding the problem is to consider that in stereo the spatial information resides in the difference between the two signals. Small errors in the individual channels can cause large errors in the difference signal. Compression has to be used intelligently to avoid disappointment. Even at 64 kilobits/second, speech quality will exceed that of the average telephone call because the MPEG Level 3 codec is more sophisticated than the IDN telephone coder. In mono music, 256 kilobits/second sounds extremely good, whereas in stereo even 384 kilobits per second produces audible artefacts. If you haven't heard these your speakers may be erring on the side of economy. For critical quality applications, compression may have to be ruled out.

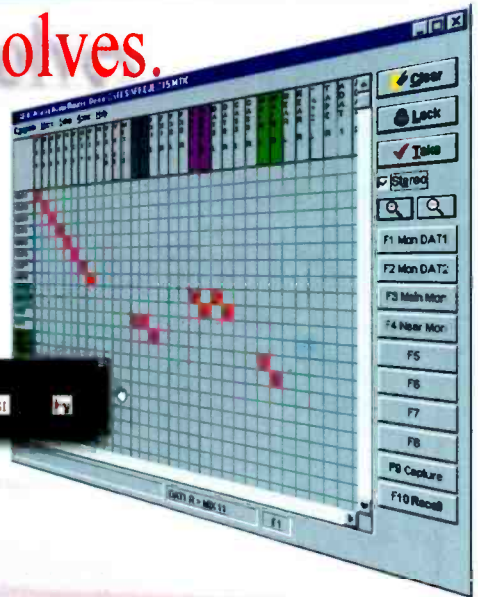
This leaves plenty of non-critical applications. ISDN is ideal for off-line working. Audio with moderate artefacts can still be used to give the band an immediate idea of the mix; a remote replacement for the compact cassette. Edit decisions can be made on compressed audio and provided the original audio recording is conformed, no-one will hear the quality loss.

The alternative to compression is simply to slow down. The PCM data is all transmitted, so there's no loss of quality. It just takes longer. The original data needs to be stored and received on a format that supports a reduced bit rate. Hard disks are ideal for this. Effectively the ISDN link is used for a transparent file transfer. It's quite possible to transmit a CD master this way, but sending a 48-track master tape might be a little tedious. Don't underestimate the bit rate of a tape on a motorbike. ■

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Hollywood dubbers

Poised to make a wholesale move from analogue to digital dubbing, the motion-picture fraternity is hesitant. **Rob James** relays the reasons from a recent AES workshop

WITH IMPECCABLE TIMING the AES held a workshop on the subject of digital dubbers just before the opening of the January's Los Angeles NAMM Show. The subject has taken on considerable significance over the last few months—I believe there are several reasons for the importance of this relatively obscure application to the whole future of digital recording.

To say that the film business is notoriously conservative in adopting new technology is unfair. Film people simply have very specific requirements that must be met before wholesale adoption of change. Some of these requirements are common to all, or at any rate the majority of film users, others are specific to particular in-house practices. It is the common factors that make digital dubbers relevant to the whole audio industry.

The principle requirements are reliability, universality, utility and cost. The machines must be at least as reliable as the film industry workhorse, the 35mm magnetic film recorder. This does not demand perfection or even close to it; rather, machines and recording media must be capable of operating for extended periods, and should be physically robust enough to put up with industrial handling and minimal maintenance. It is possible to play 3-track and 6-track 35mm magnetic film anywhere in the world where film production is carried out. A degree of 'fiddling' is acceptable since with the analogue formats there are variations in recording level, equalisation and noise-reduction standards, but the key, here, is that material created in LA, London, Munich or Paris should be readable in Bombay, Helsinki, Cape Town or Sydney without requiring extra equipment or inordinate amounts of engineering effort. This requirement cannot be answered by standardising on one storage medium. This would be far too restrictive since developments in the technology move far too fast. If everybody had standardised on 1Gb MO discs five years ago (assuming they had met the operational requirements) the limitations would now be obvious. An 'open' standard is required.

This is being addressed by the AES 31 and other initiatives, notably one from NHK Japan. The salient point is whatever standard emerges should be applicable to today's technology and, as far as is possible, tomorrow's. It should not matter what the audio is physically recorded onto, indeed if it is recorded at all. In other words, the standard should be equally applicable to network transmission.

As a first step in defining the required utility a digital dubber must be able to do everything a magnetic film recorder can do, at least as well, and hopefully better. This might appear deceptively easy to achieve, but, in practice, pushes the technology. Major modifications to operating practice to accommodate new technology are not acceptable to film people.

The cost element is, of course, the primary driver for the adoption of new technology. Magnetic film recorders are hugely expensive machines. A fully specified 6-track recorder with noise reduction can cost around \$50,000 (US). Magnetic film is similarly expensive—seven years ago, when digital storage was considerably more costly than it is now, a magneto-optical disc holding the same amount of material as a roll of 35mm film cost the same. Since then, the equation has drastically altered in favour of digital storage.

The early adoption of Tascam DA-88 digital tape recorders by many film facilities has effectively defined the standard number of tracks per machine as eight. To delve a little further into the required features of a digital dubber it is useful to consider the performance of a 35mm recorder. First, the machine must be able to play in sync backwards. The 'transport' must be capable of achieving sync ployout within 3s, or ideally considerably less, from any condition—stop, rewind, fast forward or sync reverse. Punch-in to record must be near instant and undetectable. Punch-out must immediately switch to that which was previously recorded, undetectably. Multiple punch-in, punch-out operations must be possible in quick succession. Audio must be played from a crawling speed up to at least four times playback speed. For recording digital soundtracks such as Dolby SR.D the machine should have a dynamic range well in excess of 100dB. Recording must be destructive.

For anybody with a little knowledge of how digital random-access recorders work, it will be immediately obvious there are considerable problems to be overcome to provide the functionality already described.

Because film postproduction facilities are now accustomed to using DAWs for tracklaying, there are other common requirements. Replay dubbers should be capable of playing material from a range of DAWs from different manufacturers, ideally in their native formats to avoid tedious and potentially unreliable conversion processes. Recording digital dubbers should record in a format accessible by a range of DAWs so that further editing work may be undertaken on premises, and so on. Tracks on a single machine must be able to be slipped in time relative to each other.

It must be possible to synchronise digital dubbers to various time-code formats and, crucially, various biphasic formats. Record, transport and monitoring control must be

provided on a parallel interface as well as 9-pin (Sony P-2 protocol). A moving track display should be provided, running horizontally or vertically and able to combine the information from several machines on a single picture monitor. Without this last requirement paper cue sheets must be prepared either printed from the tracklaying DAW or manually drawn. Both these options are time consuming and expensive.

It is becoming clear the next major requirement will be for networking so that resources may be shared within a facility. Again, fundamental to this is a format which is open and portable. It should not matter whether an operator has a Smith or Sumisu DAW; they must be able to exchange material with all other users.

To this list facilities will add their own specific requirements. For example in the area of remote controls. Users may require differing remote controls and/or multiple remote controls addressing the same machines. This, in various forms is common where multi-operator consoles are in use. Some European facilities value preread outputs highly. For readers unfamiliar with prereads they are a primitive form of moving track display. A row, or rows, of lights sited under the projection screen gives advance warning of the presence of sound on a given track. This is triggered from an extra replay head mounted a fixed distance in advance of the audio replay head.

A number of manufacturers have attempted to fulfil these requirements, but the Hollywood studios have yet to be sufficiently convinced to adopt the technology wholesale. All the major studios have evaluated various machines and bought in small numbers. At present many studios transfer the output from tracklaying DAWs to mag or other media in real time. This is expensive, wasteful and a source of potential quality degradation.

It is against this background the AES meeting took place.

It is against this background the AES meeting took place.

JAY PALMER of Universal Studios—who chaired the meeting—opened with an explanation that the technology was now delivering what had been promised for many years, and that it was a good time to pull together information from the manufacturers to assist the studios to decide the best way forward.

Before the proceedings were properly underway, a statement from Dolby Labs explained that it was withdrawing >>>>

For anybody with a little knowledge of how digital random access recorders work, it will be immediately obvious there are considerable problems to be overcome to provide the functionality already described

from the Workshop while it redefined the feature set of its product. Otari also withdrew since its product is not ready. Akai opened the presentations giving a history of the technology behind its DD8, and of the success of the format, with over 100,000 tracks in use worldwide, approximately 600 DD8s shipped and two-and-a-half years experience dubbing international feature films. Akai focused on the open architecture of the DD8 which allows it to work with any SCSI storage device and a range of disk and file formats (the DD8 can now read and write to Mac-formatted disks as well as performing OMF Imports). When combined with the DL1500 controller it can perform editing and reformatting of premixes on the mix stage. Akai also gave the first showing of a new small remote—the RC15—designed for 'in-console' use.

Tascam gave a highly detailed technical overview of the MMR-8 dubber, focusing mainly on its 20-bit/24-bit capability and file compatibility with Digidesign's Pro Tools. The MMR-8 has just started shipping and therefore, like Akai, Tascam were able to talk about experiences in the field with the MMR-8. Tascam also previewed the MMP16 (a 16-track player-only machine), though since product was not being demonstrated we don't know when this might be delivered. The MMR-8 offers no DAW-type functions, but does allow basic cut-and-paste editing from the front panel. Tascam also showed some endorsements from satisfied end-users.

Fairlight emphasised that its approach was rather different. Firstly, it believes the 8-track modular approach has a limited future, and since the MFX3 Plus DAW provides record facilities on the mixing stage, its DaD is a player only. Key features are that by providing 24 tracks per module and from one disk, costs per-track in machine terms and media costs are kept very low. Fairlight stressed that the DaD would work with any type of SCSI storage device and also signalled its intention of supporting other disk formats.

Genex explained that it had designed a dedicated 8-track MO disc recorder, that had no editing functions and, in fact, was not playlist-based in its architecture. This means that file compatibility with other devices cannot be high on the agenda, instead Genex explained that the GX8000 was not designed originally as a dubber, but to provide the highest possible sonic quality especially when used with external converters up to sample rates of 192kHz, the GX8000 has therefore been very successful for music scoring applications.

THE ADSEG GROUP, a technical off-shot of Sony Columbia Pictures, presented its long-rumoured dubber concept for the first time on this side of the Atlantic, and focused firstly on the choice of Iomega Jaz, suitably improved, for storage, and secondly on the networking capabilities of the machine, though it did not give a clear example of how the networking would actually work in practice. The ADSEG dubber was subject of many patent applications, and a detailed specification was given. The networking capabilities appear particularly comprehensive.

After the manufacturers presentations, Jay Palmer chaired a question-and-answer session with contributions from the audience. The subject quickly turned to file compatibility issues. Akai, Tascam (Timeline), ADSEG, and Fairlight, all expressed their ability, in theory, to support file formats directly from different sources, but concern was expressed from several manufacturers that they were not getting the co-operation they expected from some companies, and that this was becoming more of a factor than the actual capabilities of the dubbers themselves. The opinion was also expressed by some members of the panel that the AES31 specification runs the risk of being rushed through without proper consultation with users and manufacturers, and therefore might not actually deliver what people really need. An important first step was thought to be more direct co-operation to provide interim solutions now while the AES31 and other initiatives are given time to mature, the ADSEG team added that they felt that a useful first stage would be to standardise on a storage device (Jaz).

Jay Palmer (moderating the discussion), stressed that it was not appropriate to make

Many studios are investigating putting in networks for video, and that separate networks for audio may not be allowed for by studios who will expect audio to be fitted in to available bandwidth left on a video network

buying decisions solely on the basis of disk formats supported, and also made the point that the studios did not want to standardise on a particular storage device since this technology was moving so incredibly fast.

Since only Tascam currently support the Pro Tools Session format directly, and the ADSEG group, Akai and Fairlight all expressed their ability to work with Macintosh-formatted disks in addition to DOS, OS9, and so on, Digidesign was invited to respond from the audience as to why they were not being more co-operative with release of their Pro Tools Session file structure.

Digidesign explained that its policy is that a standard is needed, currently OMF provided that, but in future they would support the AES31 initiative. This response met with some scepticism from the audience and the panel. Firstly, it was pointed out that neither Protocols 4.x or Protocols 24.x actually support OMF Export. The Digidesign representative stood firm on the point, explaining it was Digidesign Corporate philosophy not to allow manufacturers to use their Session format, but to go via OMF, he did not seem to have an explanation why Digidesign themselves made it so hard to produce an OMF Export, (saving as Protocols 3.x, then using OMF Tool to create an OMF file). It was pointed out that in practice

Digidesign's current implementation of OMF was relatively useless since it provided no way of loading a Pro Tools Session into a dubber without having a Pro Tools system around, and that even that approach does not provide a way of making a 24-bit OMF file from Pro Tools 24.

Having explained how reluctant it is to release its file format to other manufacturers, Digidesign implied that the reason Tascam is allowed to use the Session File format is because it does not make a DAW, and that therefore Digidesign could form an alliance.

This confused the audience since they were hearing from Digidesign both that OMF was the solution for the industry, and then that direct use of Session files was the solution for the industry. One audience member described it as OMF—obstructive, manipulative, and something beginning with 'f'.

The file-exchange discussion concluded without any satisfactory outcome and the subject moved on to Networking.

Both the MMR8 and ADSEG dubbers support current networking technology, but both companies acknowledge this is not fast enough for true multichannel multioperator access to audio.

It was also pointed out that many of the studios are investigating putting in networks for video, and that separate networks for audio may not be allowed for by studios who will expect audio to be fitted in to available bandwidth left on a video network, such as serial digital.

HOLLYWOOD studios appear willing and able to make the change from magnetic film to digital dubbing, but there are still major issues over file exchange. It is a pity that certain manufacturers are holding up development in this area by being proprietorial about formats. The results are unfortunate to say the least. The otherwise perfectly credible Tascam MMR8 is hamstrung by lack of a track display and presumably Tascam is not permitted to fit such a display by the terms of whatever agreement it may have with Digidesign. I would be delighted to be proved wrong. Meanwhile several manufacturers—and therefore the whole film industry—are being hampered by the 'doggy in a manger' reluctance of others to release formats and the conditions applied by some of those who do. This is analogous to attempting to patent the way in which a book is laid out. Not the information in the text, nor the machine which prints it, but the fact it has an index that allows you to find things and is divided into paragraphs, pages and chapters which are numbered.

Of the manufacturers present, Akai and Tascam are delivering machines which very nearly fulfil the criteria for digital dubbers as described in the introduction, ADSEG may well also have a machine that fits the bill, but they are not yet delivering. Fairlight is delivering an equally credible but different approach, and the rest are either not really aiming for this market or are still catching up. The spin-offs from these developments will affect the whole digital audio market by providing file-compatible, reliable machines with enhanced performance. The sooner AES 31 is fully sorted, and ratified, the better. ■

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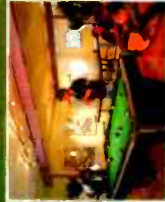
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- 2 Brauner VM1
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- 4 Calrec CM1050
- 2 Electro-Voice PL20
- 2 Electro-Voice RE1000
- 6 Micro-Tech UM70
- 1 Neumann M49
- (Valve Microphone)
- 2 Neumann U89 ip48
- 2 Neumann M149
- (Valve Microphone)
- 4 Ramsa S5
- 2 AKG C391B
- 6 AKG D130
- 3 AKG D190
- 1 AKG SE5E
- 1 AKG D224E
- 1 AKG D112
- 2 AKG D3500

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- 2 AKG C451
- 2 AKG C391B
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- 2 AKG D3500



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DSP and the lion

The Far Eastern high-tech initiative has finally escaped the exclusivity of the Japanese islands. **Dr Roland Tan Kim Chay** reports on Singapore's Centre for Signal Processing

THE FORMATION of the National Science & Technology Board in 1991 marked the beginning of direct government policy to promote R&D in Singapore to enhance its direct competitiveness into the next millennium. Under the first phase of the plan, S\$2bn R&D funding was committed for the period 1991-1995. During the first five years, 13 research institutes and centres in various technological areas were strategically set up. The number of research scientists and engineers grew steadily to an impressive 12 in every 10,000 working population.

For the second phase, the total budget was doubled to S\$4bn for 1996-2000. The ratio of RSE's to 10,000 working population is expected to reach about 65 during this period. Among the new research institutes and centres under the plan, audio processing has been identified as one of the key areas of research.

A small tropical island nation measuring only about 600km² with a population of 3m, the government announced in 1991 their plans to establish Singapore as a 'hub city' of the world, and to build a society that is economically dynamic, socially cohesive and culturally vibrant. Since then, internationally renowned musicians from Michael Jackson through Luciano Pavarotti to the Toulouse National Chamber Orchestra have performed to packed audiences here. Future generations of the Lion City, better exposed to live performances will be better able to appreciate high-quality audio. Moreover, with digital audio technology so readily available, high-fidelity audio is no longer the preserve of wealthy professionals—an observation verified by the fact that karaoke is quickly becoming one of Singapore's favourite pastimes. With growing affluence, there is also demand for high-end hi-fi, home theatre systems, multimedia systems (complete with karaoke, of course, a must for all newly-weds).

Established in January 1996 by the NSTB, the Centre for Signal Processing received S\$13m funding for the first three years and is hosted by the School of

Electrical and Electronic Engineering at the Nanyang Technological University of Singapore. The organisational structure of CSP consists of five groups under the leadership of its director, Professor Er Meng Hwa, and its R&D manager, Dr Tan Kah Chye. Besides the audio

CSP has recently become the first AES Sustaining Member in Singapore—not only lending support to the relatively new Singapore Section, but working towards becoming a major force in audio in the East

group, there are speech, image and video, adaptive signal processing, DSP hardware and implementation.

According to Professor Er, who has a strong interest in music and is also a keen karaoke singer, 'Our main objective is to become a national and regional focus of excellence on R&D in signal processing. The mission is to

promote and lead research and development, technology transfer, and training of R&D manpower in specific areas of digital signal processing technology so as to help enhance the competitive advantage of the electronics and IT industries in Singapore'.

The CSP audio group will soon have a surround-capable listening room complete with an analyser for sound demonstration and performing critical evaluation. Various playback options will be available along with multimedia capabilities. A separate soundproof room will also come with state-of-the-art equipment.

Although the Centre is just approaching two years old, it has already undertaken a number of notable projects. 'These include in-house as well as joint industrial projects, such as low bit-rate multichannel audio coding, 3D sound, digital audio effects, and audio test and measurement,' explains Dr Tan Kah Chye, who has more than 10 years R&D experience in DSP. 'Future plans are already well underway to develop our capabilities to provide expertise in other areas such as loudspeaker system design, psychoacoustics, and room acoustics. The rationale is to be able to lead the local industries in R&D audio and its allied arts.'

Development of the digital audio effects project comes as a PC sound card that is centred around a single fixed-point chip. It allows an interface to any electronic musical instrument and provides the solution of processing audio effects in real time using the PC as an 'effects unit'. In the project on 3D sound, a new algorithm was proposed that gave an improved ability to localise moving sources using a stereo headphone.

CSP has recently become the first AES Sustaining Member in Singapore—not only lending support to the relatively new Singapore Section, but working towards becoming a major force in audio in the East. Together, by taking an active interest in the AES, CSP keeps its staff abreast of the rapid development of technology and of its commercial applications. And obviously, we cannot be a part of an international community without being aware of what is happening elsewhere in the world. ■

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