

JUNE 1995

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STUDIO SOUND

AND BROADCAST ENGINEERING

INTERNATIONAL PRO AUDIO
AND POSTPRODUCTION MAGAZINE

DIGITAL RECORDING

Modular multitracking with the Nagra-D

Optiview Digital Audio Previewer

US nonlinear update

Console First

Amek 9098 exclusive review

Trading Studio Places

The rise of CTS; the demise of The Manor

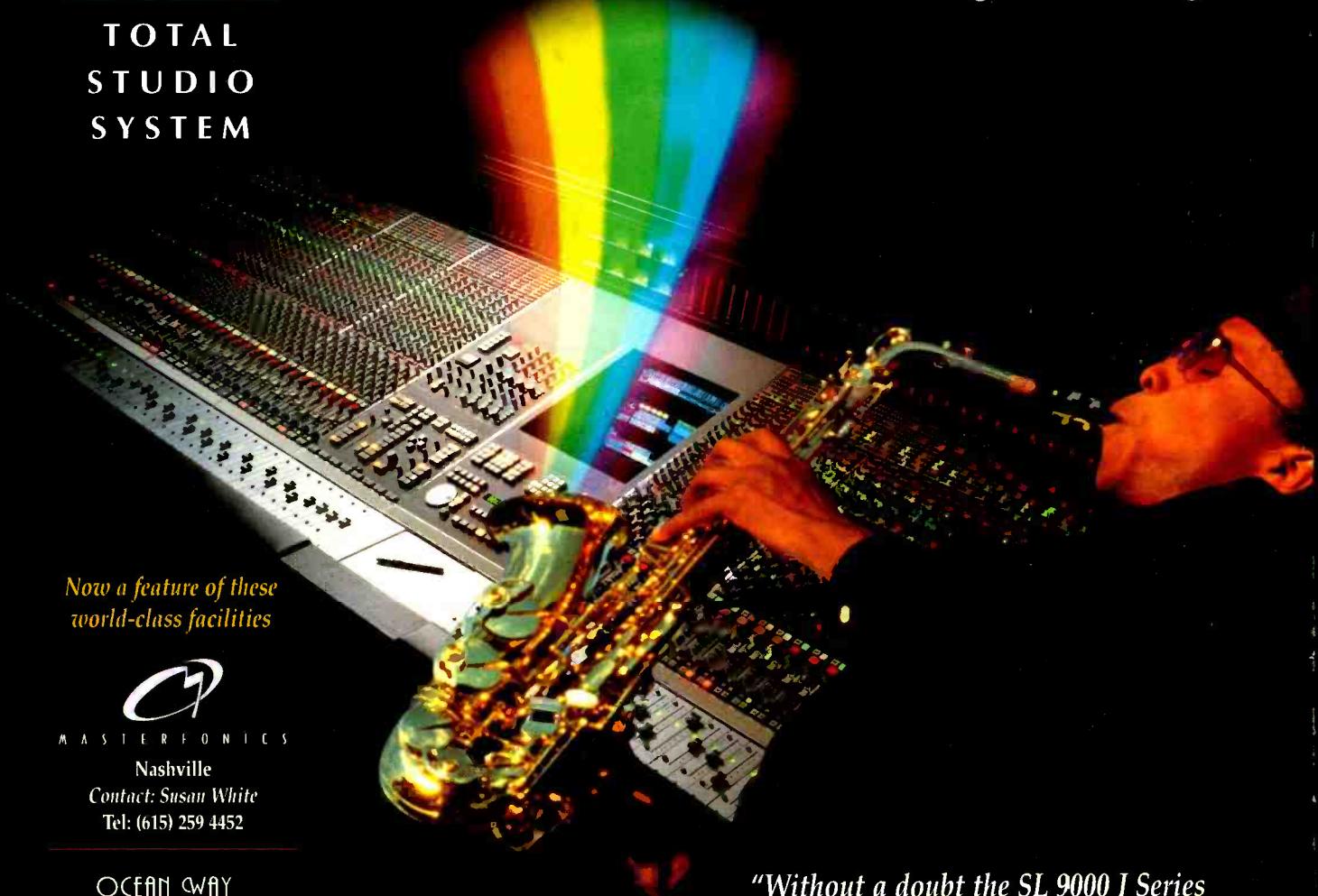




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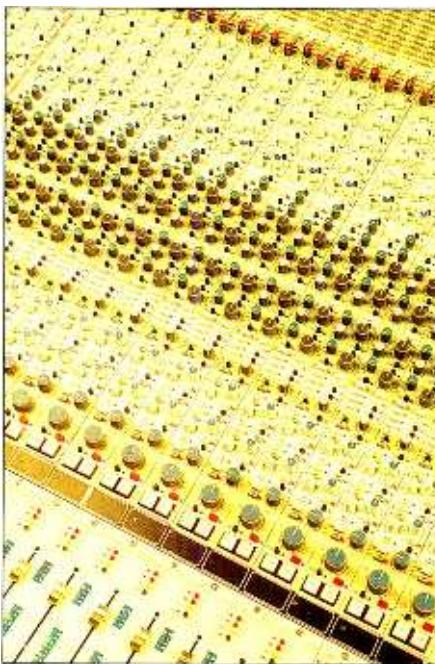
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Technical Ecstasy

I have a problem with women—I am attracted to their imperfections. Show me the 'perfect' woman and I will show you a study in polite disinterest. Maybe I'm alone in this, but I cannot help but conclude that these imperfections—flaws—play an essential part in giving people their character. No flaws; no fun.

I have a reassuring feeling that I am not alone, however. Taking a parallel look at music, it is easy to find examples of less than perfect performances making exciting records. 'Flaunt the Imperfection', as China Crisis would have it.

The musical parallel does not stop here; removing a further veil, we can see how readily the sound of the electric guitar was readily transformed by deliberate use of distortion. The grind of Hammond organ, too, found renewed favour after its key contacts had silted up with dust. (And anyone involved in synthesiser design around the time that the hi-tech keyboard industry tried to replicate this characteristic 'key click' on Hammond substitutes will have few doubts as to the value of certain sorts of imperfection.)

Discarding the veil between instrumentation and recording reveals the apocryphal Valve Sound. Although it was always popular, the rise and rise of digital technology has spawned a new school of valve devotees. Even prior to this, much costly R&D effort was being expended in trying to emulate the 'warmth' of the valve in other, alternative technologies. But what is this characteristic warmth if not another example of imperfection?

While the pursuit of perfection remains—quite rightly—very high on the list of our priorities, let us attempt to make a few timely rationalisations and observations.

Seeking excellence in equipment design and music production makes sense—it gives us relatively definable goals and allows us to structure our efforts whether they be in artistic or scientific directions. The discovery of profitable digressions from readily definable ideals is far harder to script since it is usually almost impossible to distinguish between those applications of disorder which lend themselves to artistic ends and those which do not.

Being able to recognise the intrinsic value of a product regardless of its technical merit is essential. Whether you risk over-producing a song or refining a circuit design past its ability to deliver optimum audio quality, the art—for it cannot be a science—of knowing when to stop is a precious one to master.

Then there is the 'x' factor. Almost everyone chooses to believe that there is more to audio than mics, tape and music—there are particular ambiances offered by particular recording locations, secret mic configurations, magic monitors and so on. The closer we get to properly understanding some aspect of our work, the more anxious we seem to become to find ways of maintaining its 'black art' status.

The mysteries of womankind are unlikely ever to reveal themselves to men, yet men are destined to waste lifetimes trying to quantify them. Similarly, through our attempts to demystify recording science we have proven ourselves at least equally adept at identifying new problems to solve. In spite of our high ideals and intellectual pride, the one real constant, it seems, is the thrill of the chase. ■

Tim Goodyer

Cover: AMS Neve Capricorn in CTS' new studio room

Photography: Nik Milner



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World Events

June 1995

- June 1st, **1st German Television Conference**, Leipziger Messe, Leipzig, Germany. Tel: +49 341 223 2141.
- June 5th, **BKSTS Visit: CRL**. Tel: +44 171 242 8400.
- June 5th–6th, **Apple New Media Forum**, Los Angeles, California, USA. Tel: +33 93 39 74 39; +1 800 260 9099.
- June 8th–10th, **2nd Annual South American Pro Audio Expo**, Centro de Extension, Santiago, Chile. Tel: +56 2 635 1994; +1 914 993 0489.
- June 8th–12th, **China Sound Light and Music**, Beijing Exhibition Centre, People's Republic of China.
- June 8th–13th, **International Television Symposium and Exhibition**, Montreux, Switzerland. Tel: +41 21 963 3220.
- June 10th–12th, **12th ShowBiz Expo West**, LA Convention Centre, Los Angeles, USA. Tel: +1 714 513 8400.
- June 13th, **UK AES Conference: Data Reduced Digital Acquisition for Broadcasting**, Imperial College, London, UK. Tel: +44 1628 663725.
- June 13th–15th, **REPLitech International**, Santa Clara Convention Centre, Santa Clara, USA. Tel: +1 914 328 9157.
- June 13th–16th, **ExpoShow 95**, St Petersburg, Russia. Tel: +70 812 271 4147.
- June 14th, **MultiMediaMania**, Technopark Zürich Auditorium, Zürich, Germany. Tel: +41 465 2111.
- June 14th–15th, **Apple New Media Forum**, New York, USA. Tel: +33 93 39 74 39; +1 800 260 9099.
- June 19th–20th, **Radio Festival Trade Exhibition**, International Convention Centre, NEC, Birmingham, UK. Tel: +44 1491 838575.
- June 21st–23th, **Audio Technology 95—The APRS Show**, National Hall, Olympia, London, UK. Tel: +44 1734 756218.
- June 21st–23rd, **7th Japanese Regional AES Convention: Advanced Audio Technologies for Audio-Video and Multimedia**, Sunshine City Convention Centre, Tokyo, Japan. Tel: +81 3 3403 6649.

July 1995

- July 6th–7th, **IBC Conference: Digital Audio Broadcasting**, Marriott Hotel, London, UK. Tel: +44 171 637 4383.
- July 12th–14th, **Pro Audio and**

Light Asia 95

- World Trade Centre, Singapore. Tel: +852 865 2633.
- July 13th, **UK AES Conference: Sensaura—Three Dimensions from Two Speakers**, Imperial College, London, UK. Tel: +44 1628 663725.
 - July 17th–19th, **WCA 95. Wireless Cable Association Show**, Washington Convention Centre, Washington, USA. Tel: +1 202 452 7823.
 - July 23rd–25th, **British Music Fair**, Olympia, London, UK. Tel: +44 181 907 8314.

PRO AUDIO AND LIGHT ASIA 95

Singapore. The organisers of Asia's largest professional sound and lighting show are anticipating a record show in keeping with the leisure and entertainment boom which is currently sweeping this region of the world.

'The rapid growth in respective areas of the entertainment industry, such as concerts, musical, franchise chains—such as the Hard Rock Cafe—karaoke clubs, discotheques and theme parks has made a major contribution to the significant growth of Pro Audio & Light Asia,' explains Ms Tan Sook Hoon, Project Manager for the show organisers, IIR Exhibitions (a member of the institute for International Research).

'To meet the growing expectations of patrons,' Ms Tan adds, 'owners have to spend money on sophisticated sound and lighting systems.'

'This in turn has created a great deal more interest in participation at Pro Audio and Light Asia, which provides a one-stop shop in the strategic location of Singapore to bring together those buyers and the sellers of the latest state-of-the-art technology.'

This, the seventh Pro Audio and Light event to be held, has attracted more than 250 individual exhibitors, 30% more than last year, with manufacturers representing 20 countries including two major national groups from Italy and the UK.

The 1000m² Italian Pavilion which accounts for 25% of the show space is sponsored by the Italian Trade Commission in cooperation with APIAD (the Association of Italian Discotheque and Theatre Equipment Manufacturers) with UK companies taking up 700m², including 450m² UK Pavilion, which is under the umbrella of PLASA.

Around 6,000 visitors are expected at this year's event—more than 60% of these from the Southeast Asia region. The show will also include an Audio Broadcast Technology section since last year's event attracted a 15% showing from the broadcast field. ■

Studio Sound will be attending Pro Audio and Light Asia 95

August 1995

- August 17th–20th, **Popkomm**, KölnMesse, Köln, Germany. Tel: +49 221 8210.
- August 25th–28th, **Beijing International Radio and TV Broadcasting Equipment Exhibition 95**, Beijing International Exhibition Centre, Beijing, People's Republic of China.

September 1995

- September 6th–9th, **1995 World Media Expo**, New Orleans Convention Centre, New Orleans, USA. Tel: +1 202 429 5350.
- September 10th–12th, **ECTS**,

Olympia Grand Hall, London, UK.

Tel: +44 181 742 2828.

- September 10th–13th, **PLASA**, Earls Court 2, London, UK. Tel: +44 171 370 8179.
- September 14th–18th, **IBC 95**, RAI Centre, Amsterdam, Holland.
- September 19th–24th, **Live 95**, Earls Court, London, UK. Tel: +44 181 742 2828.
- September 21st–24th, **Nordic Sound Symposium XVII**, Bolkesjø Mountain Hotel, Norway. Tel: +47 2 79 7730.
- September 22nd–24th, **ShowBiz**

- October 24th–26th, **REPLitech Asia**, Singapore International Convention and Exhibition Centre, Singapore. Tel: +1 212 643 0620.
- October 25th–28th, **Broadcast Cable and Satellite India 95**, Pragati Maidan, New Delhi, India. Tel: +91 11 462 2710.

November 1995

- November 1st–5th, **Audiovideo 95**, Lenexpo Exhibition Complex, St Petersburg, Russia. Tel: +70 812 119 6245.
- November 2nd–4th, **Broadcast India 95**, World Trade Centre, Bombay, India. Tel: +91 22 215 1396.
- November 7th–9th, **Wireless World Expo 95**, Moscone Centre, San Francisco, USA. Tel: +1 301 986 7800.
- November 9th, **20th Sound Broadcasting Equipment Show**, SBES, Metropole Hotel, NEC, Birmingham, UK. Tel: +44 1491 838575.
- November 21st–23rd, **Visual Communications 95**, London, UK.

December 1995

- December 5th–9th, **Expo Comm China South 95**, Guangzhou Foreign Trade Exhibition Centre, Guangzhou, Peoples Republic of China. Tel: +86 1 841 5250; US Tel: +1 301 986 7800.
- December 6th–9th, **Communications India 95**, Pragati Maidan, New Delhi, India. Tel: +91 11 462 2710.

January 1996

- January 5th–7th, **Showbiz Expo East**, New York Hilton & Towers, New York, USA. Tel: +1 513 8400.
- January 30th–February 1st, **SortExpo 96**, Santa Clara Convention Centre, Santa Clara, USA. Fax: +1 303 745 5712.

February 1996

- February 13th–16th, **Expo Comm Mexico 96**, World Trade Centre, Mexico City, Mexico. Tel: +1 301 986 7800.

September 1996

- September 18th–23rd, **photokina**, KölnMesse, Cologne, Germany. Tel: +49 221 8210. ■

For your World Event to be included, or updated, contact the Editor during your nearest appropriate time window.
Fax: +44 171 401 8036.
E-mail: cz73@cityscape.co.uk.

International News

In brief

● EBU European standards

The EBU have become joint publisher with the ETSI, of European Telecommunication Standards covering broadcast transmission systems. The EBU entered into a standards-setting partnership with the European Telecommunication Standards Institute in 1990, when the EBU-ETSI Joint Technical Committee (JTC) was established. As a new service to the EBU and the broadcast industry in general, the agreement will facilitate the provision of timely and accurate standards information to all end-users.

EBU, Switzerland.
Tel: +41 22 717 2221.

● World Marketing making Waves

Waves have appointed World Marketing Associates as their sales representative for Europe and the Middle East. Waves is a software company specialising in signal processing and user-interfaces, including

plug-ins for Adobe *Premiere* and the Digidesign *SDII* and TDM systems.

World Marketing, UK.
Tel: +44 1637 877170.

Waves, US. Tel: +1 615 588 9307.

● New SPARS membership

SPARS have opened a new membership category to represent the entire profile of the pro-audio industry more fully. The new Individual Membership is limited to individuals who provide a professional service to the recording industry, and are not eligible for membership in any other category. These may be independent engineers, producers, designers, insurance brokers and so on.

SPARS, US. Tel: +1 407 641 6648;
800 771 7727.

● AMS Neve man's new venture

Jim James, former Marketing Manager of AMS Neve plc, is to set up a new marketing agency, East-West Communications, based in Singapore from this month. The agency is intended to meet the needs of professional audio, video and multimedia manufacturers who are trying to communicate with their existing and potential customers in what

James describes as the most dynamic region in the world, Asia Pacific.

East-West Communications will offer a full range of services including market research, PR, direct marketing and event management, and hopes to remove the frustration of working across the barriers of time zones, distance and culture by virtue of a base in Singapore.

AMS Neve themselves have already contracted the new agency for press relations activities.

East-West Communications, Singapore. Tel: +65 226 5165.

Nashville Mill

Music Mill, one of Nashville's most respected recording studios, has undergone a renovation, with architectural design and acoustical consultancy handled by Russ Berger Design Group of Dallas. The facility consists of two studios, two mix rooms and several corporate offices, and have not been upgraded for 14 years. To meet Chief Engineer Todd Culross' requirement that the rooms 'need to sound, feel and look better', Berger's group reconfigured Studio B to maximise square footage and acoustic performance.

The studio now houses a new API Legacy 56-input console with Massenburg automation, a Sony 3348 DASH machine, and Genelec 1033A monitors. Work is still in progress on Studio A and the remainder of the facility.

Russ Berger Design Group Inc.
Tel: +1 214 661 5222.

Glenn Miller comes to light

Lost recordings of Glenn Miller dating from a few weeks before his disappearance have been unearthed, remastered and released as a double CD. The whole project was compiled using the *SADiE* disk editor.

In 1944 while Glenn Miller was in London he was commissioned by ABSIE (American Broadcasting Station in Europe) to record a collection of big-band numbers in Abbey Road Studio 1 for propaganda broadcasts. Unfortunately, the broadcasts never took place and the recordings languished at Abbey Road until they disappeared 25 years ago. BBC Radio 2 *Dance Band Days* Presenter, Alan Dell, and Engineer Ted Kendall have since unearthed the recordings in good condition.

Kendall received a 1/4-inch tape copy of the recordings made from the metal stampers of the original wax 12-inch 78s, which he digitised into *SADiE* before compiling the playlist with the help of CEDAR noise-reduction technology. Kendall commented: 'The quality of the performances was good to start with as Glenn Miller had the pick of all the enlisted musicians in London at that time. We know that metal parts (probably stampers, with ridges rather than grooves) were archived

for many years, but have since disappeared. Neither they, nor the man who was thought to have made them, have been heard of for a decade. We have had to work from a tape copy made some twenty years ago. The audio needed a lot of ticks and pops taken out and quite a bit of EQ work with *SADiE*'.

The double CD has already been released on Conifer Records and is on the way to going gold, with a US release to be agreed soon.

Studio Audio and Video Ltd.
Tel: +44 1353 648888.

BSA go international

Broadcast Systems Associates, the Glasgow-based maintenance and systems company, are seeking to offer their services to every size of broadcast organisation both locally and internationally. BSA currently hold a contract with Scottish Television plc to provide electronic maintenance for virtually all areas of broadcast maintenance, and have won contracts to provide major new installations including three refurbished ENG edit suites, a sound dubbing and transfer area, an LMS programme and commercials playout area, a presentation control room and

a graphics suite.

Building on this success, BSA have now met the criteria to be appointed as a Sony Broadcast Service Company specialising in the Betacam range of products. In all other respects the company is independent of manufacturers or suppliers and can offer impartial advice and recommendations for the procurement of equipment.

Broadcast Systems Associates, US.

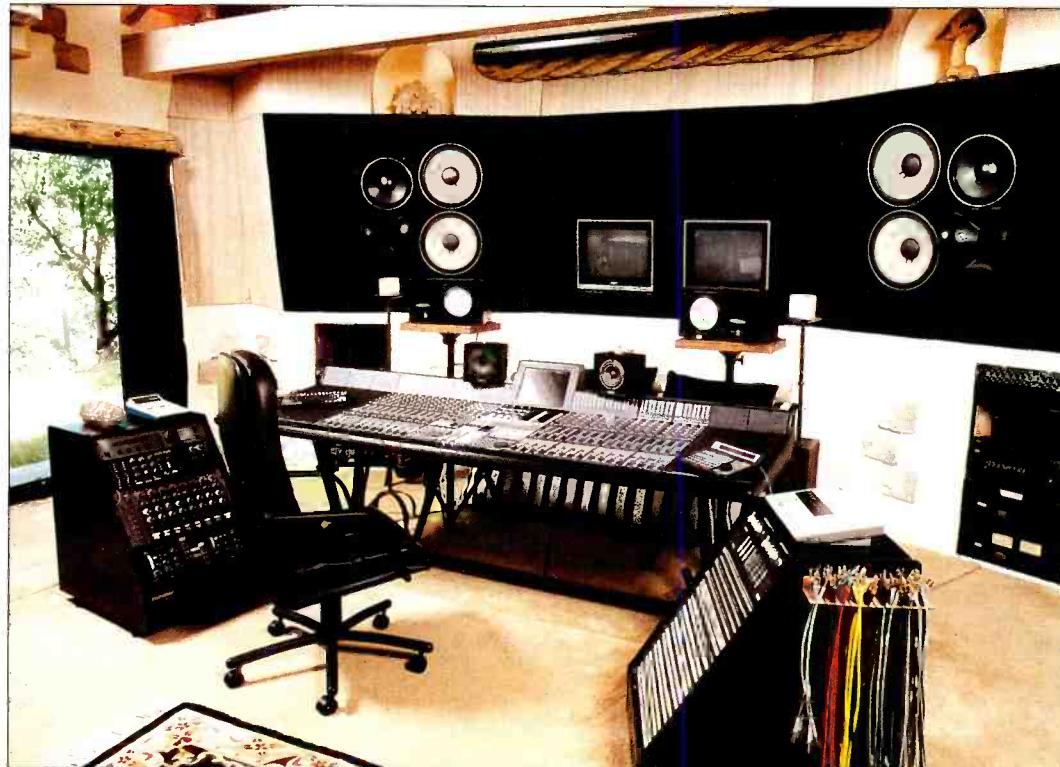
Tel: +1 141 221 6662.

Sony enter high-end mixing

Sony Broadcast and Professional have announced that they have embarked on a major initiative to position themselves as suppliers of digital mixing systems to recording studios. The results of a development programme going back to 1988 are expected to be seen in September in a digital, multitrack, music recording and mixing console aimed at premier music and TV-film soundtrack-production facilities. The console is the work of Sony teams based in Oxford, UK and Atsugi (Japan), and prototypes have been evaluated by recording professionals from the US, Japan and Europe. It uses a new generation of digital signal-processing



US: Whitney Houston's modest demo studio has grown into BKB Studios, a fully equipped rehearsal and recording studio. BKB is a 6000ft² industrial space remodelled to provide three tracing rooms, a 58 x 38ft rehearsal room and two 20 x 20ft rooms. The studio control room is fitted with an SSL 4040E-G Series console with automation, Studer A827 and Otari DTR900 recorders and 24 tracks of ADAT, and has visual access and tie-lines to all three rooms. The rehearsal room PA rig comprises a Crest Century LM Series 40:12:2 console, with 13 Crest amplifiers driving Maryland Sound Inc monitors, and is designed to be 'road-ready'. **BKB Studios, US.** Tel: +1 201 703 0073



US: Producer-Engineer David Tickle has reopened his studio following extensive remodelling and a name change. The Journey Room's equipment includes a custom Euphonix CS2000 56-fader console, Augspurger TAD monitors, vintage Pultec, API and Neve equalisers, Tascam DA-88s and a JBL overhead projector with 8-foot retractable screen. Tickle, known for his work with 4 Non-Blondes, U2, Peter Gabriel, Joe Cocker, George Michael and Blondie, has had the room finished with an open cross-beam ceiling, raw silk wall-treatments, and laser lights to illuminate natural crystals.

David Tickle, US. Tel: +1 818 880 4077. **Euphonix, US.** Tel: +1 818 766 1666.

hardware and has a powerful interface to Sony DASH multitracks. **Sony Broadcast and Professional, Europe.** Tel: +44 1256 483646.

NVISION en route to Singapore

NVISION Inc have supplied a collection of routing, synchronisation and terminal equipment for installation within Four Media Company's new state-of-the-art digital production centre in Singapore, which opened officially in May. The new 20,000ft² facility includes a production stage, video control room, audio control room, central machine room, graphics production suites, standards conversion suites, and four on-line edit bays, in addition to network origination areas for satellite uplinks. A major client for the new complex will be MTV, who recently launched two separate 24-hour services tailored specifically for the region. The NVISION router systems will enable switching between digital audio equipment within 4MC's facility without pauses, clicks or pops, while the terminal equipment will perform any conversion, distribution and delay functions required for the facility. The synchronisation products will provide a clean video and wordclock sync throughout the plant.

NVISION, US. Tel: +1 916 265 1000.

Audio System Engineering MSc

The University of Essex have instituted a new taught postgraduate course leading to an MSc in Audio Systems Engineering. The course is aimed at students who have a particular interest in audio engineering, electronics and auditory perception and wish to consider a career in audio systems design and research. Close links with the Centre for Audio Research and Engineering at the University's Department of Electronic Systems Engineering ensure that the course has a strong research ethos.

University of Essex, UK.
Tel: +44 1206 873333.

Sennheiser Oliviers

BBC TV's broadcast of this year's Laurence Olivier Awards used 20 Sennheiser SK50 beltpack and SKM5000 hand-held radio transmitters, and an 18-channel EM1046 receiver system. The Sennheiser UHF system, which the BBC selected to re-equip its TV-OB unit last year, was at the heart of a massive 34 channel radio system

configured by BBC TV-OB for the production. The event was recorded live on 2 April at London's Shaftesbury Theatre and transmitted the following evening.

'12 years ago you couldn't have confidently handled a production like this with radio mics,' commented BBC TV radio microphone specialist Richard P Kemp during rehearsals. 'But in recent years we've seen the development of receivers capable of being more and more sensitive and, more importantly, selective. Transmitter signals have also become cleaner and more stable and there's a far greater degree of miniaturisation.'

'There is a big difference between doing a TV show in a theatre, as opposed to a theatre show. You have one day rehearsal rather than a week, so the equipment needs to be very flexible. With the Sennheiser systems, you've got accurate visual monitoring of RF levels, audio levels and peak—essential with such short setup times. Putting on a TV production like this in the West End, there are not the same guarantees as with a fixed site; we've got radio cameras and five radio talkback systems (on both VHF and UHF). This is not a clean RF environment. We've done many outside broadcasts now with the Sennheiser systems: *The Royal Variety Show*, *Sports Review of the Year*, *Joy to the World*, to name but a few. All of these have, like this, been public performances where we've been providing a feed ►

Contracts

● Millenia Bowled Over

Hollywood Bowl Sound Designer
Joseph Magee has chosen the Millenia Media Quad mic preamp for the Bowl's newly upgraded sound-reinforcement system. Forty channels of Quads have been installed for use as on-stage preamps, with line-level outputs feeding the front-of-house consoles.

Millenia Media, US.

Tel: +1 916 363 1096.

● TL Audio Dep out

DEP International, UB40's Birmingham based recording facility, have recently purchased a TL Audio 8.2 valve mixer for Studio 1. It joins a TL Audio Dual Valve EQ and is being used for a variety of tasks including direct-to-tape recording and outboard equalisation.

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

● ARX in China

Australian ARX Systems have concluded a distribution agreement for China with Hong-Kong-based industry giant Dah Chong Hong Ltd. Founded in 1946, Dah Chong Hong is wholly owned by Citic Pacific, a major trading arm of the People's Republic of China. Employing over 400 people, Dah Chong Hong are active in electronics, foodstuffs and automotive industries, being the distributors for Honda, Nissan and Isuzu.

Dah Chong Hong, Hong Kong.

Tel: +852 2808 6111.

ARX Systems, Australia.

Tel: +61 3 95557859.

● Turbosound victory

The recent celebrations in London's Hyde Park on the anniversary of VE Day were presented to half a million people, including crowned heads and prime ministers, via a huge Turbosound Flashlight system, installed by Britannia Row. More than 120 Turbosound cabinets included left-right clusters of 24 TFS-780s and bass stacks of 24 TFS-780Ls each side. Performers including Dame Vera Lynn and Cliff Richard received on-stage sound from an in-fill system of Flashlight wide boxes and Floodlight downfills.

Turbosound, UK.

Tel: +44 1403 711447.

● East 17 by Tube

East 17 will be taking Drawmer valve equipment with them on their current world tour. Lead vocals from Brian Harvey and Tony Mortimer will be fed straight in to 1960 Mic Preamp-Compressors and then via 1961 equalisers.

Drawmer Distribution, UK.

Tel: +44 1924 378669. ▶

Contracts**• Ampex in Egypt**

Ampex Media Corporation have announced an exclusive one-year agreement with the Cairo-based Egyptian Radio and Television Union (ERTU) to provide the Middle East's largest programme producer and broadcaster with over \$1m of Ampex professional audio and video tape during 1995. The contract includes 42,000 398 Betacam SP video cassettes, as well as major quantities of 196 1-inch and 289 S-VHS video tape, plus 478 and 467 R-DAT audio products.

Ampex Media Corporation, US.

Tel: +1 415 367 3889.

• Deltron scrum down

All the audio in the South African Broadcasting Corporation's coverage of the Rugby World Cup has been brought to you via Deltron XLRs, thanks to an exclusive contract won by Spectratech, Deltron's Southern African distributor. Airtime, the OB arm of the Corporation, chose the connectors and adaptors because of their combination of strength and a simple, versatile colour coding system.

Deltron Components, UK.

Tel: +44 181 965 5000.

First UK Tactile

Stirling Audio have delivered the first Tactile Technology console in the UK to audio postproduction house VideoLondon Soundstudios. The M4000C will be used for broadcast documentaries and voice-overs, ADR post sync recording and corporate video productions.

Tactile Technology, US.

Tel: +1 310 802 1500.

T Squared, Japan.

Tel: +81 429 34 7681.

Stirling Audio, UK.

Tel: +44 171 624 6000.

• Man from Atlantis

Tokyo's Atlantis Studios have recently installed a Soundtracs Solitaire production console, supplied by Soundtracs' exclusive Japanese distributor MTC Japan. The 32 patchbay version *Solitaire* has moving faders and VCA automation, which is synchronised to Atlantis' sequencing and video-editing systems. Atlantis' range of work includes music production, audio-for-video and video postproduction.

Soundtracs, UK.

Tel: +44 181 388 5000.

Mr. Yasutake from Atlantis with *Solitaire*

to the auditorium PA as well as to the OB van and these systems have performed faultlessly every time.' Sennheiser Electronic, Germany. Tel: +49 51 30 600 366.

SoundField at Notre Dame

A unique performance of Gregorian Chant and Grand-Orgue has been recorded exclusively with *SoundField* microphones at Notre Dame in Paris. The artists were Schola Gregoriana under Dr Mary Berry, with organist Philippe Lefebvre. The recording, engineered by Brian Johnson and Ken Blair, was recently released on the Herald label, sponsored by Rolls Royce. Brian Johnson exclusively used *SoundField MkIV* and *MkV* systems, one suspended from the cathedral roof for the organ and another for the singers, with no dynamic processing or artificial reverberation. Brian Johnson comments: 'The ability to change the position and polar patterns of the microphone remotely from the *SoundField Control Unit* is invaluable when recording in environments like Notre Dame.'

SoundField Research, UK.

Tel: +44 1924 201089.

APRS Training and Education

The APRS is to step up its involvement in training the professional recording and sound industries. Chairman Adrian Kerridge has invited David Ward of Gateway to co-ordinate the activity, focusing on encouraging the development of training appropriate to the industry—the many courses currently available, it is felt, do not always match industry needs. Furthermore, music and recording technology play a key part in the new UK National Curriculum for Music, and in this field too the APRS represents a unique pool of expertise from which teachers and pupils could benefit.

'The team I am assembling,' says Ward, 'will look not only at training at entry level but at schemes for studio staff in creative and technical functions—and in management and administration too. Orientation courses are also needed for other sections of the industry—for instance,



Australia: Tom Misner, founder and Director of SAE, has opened a new commercial facility in Sydney, described as 'a truly world-class mastering facility' and the only new large recording studio built in Sydney in the 1990s. Centrepiece of the complex is Studio One with a new 40-input Neve VR Legend with full Flying Faders automation. Recording options include SR analogue and digital tape and hard disk, and the effects racks are said to be the most comprehensively equipped in Australia. The room, designed by Misner with TEF alignment and measurement by Graham Thirkell, is based on the LEDE expanding room principle with sidewall deflectors and RPG rear wall diffusion, and incorporates a Sigtech Room Analyser for an accurate monitoring environment.

Mirage Studios, Australia. Tel: +61 2 211 3915.

record company staff who book studios and negotiate the production of cassettes, CDs and vinyl.'

APRS, UK. Tel: +44 1734 756218.

Quintessential Sound

A striking collection of current recording technology was used to produce PGM Recordings' first audiophile releases, *Ricercar—Keyboard Music in Germany before Bach and The Buxtehude Project—Volume 1: Sacred Cantatas*.

Quintessential Sound Inc's Director and Chief Engineer Gabe Wiener and Assistant Engineer Michael Mikesell used minimalist mixing techniques and 20-bit recording to capture the performances and the acoustic of the churches and halls in which they were recorded.

Ricercar was recorded with a Schoeps KFM-6 stereo microphone, two FM Acoustics M-1 preamplifiers, a Prism Classic 20-bit A-D convertor, and a Nagra-D recorder. The Buxtehude Project also required two Schoeps MK-41 hypercardioid microphones, with two more FM Acoustics preamps and a further Prism convertor.

Editing was on Sonic Solutions, and the finished version was redithered to 16 bits using the Meridian 618 digital processor.

Quintessential Sound, US.

Tel: +1 212 586 4200.

Sony on air

Sony's new WRT867 wireless mics saw heavy use in a broadcast from Birmingham's (UK) ICC of Andrew Lloyd-Webber songs recently. In all, 22 channels were required for the live show which featured Michael Ball, Elaine Page, Rea Moore and other stars of the original productions.

The WRT867 system will see less respectful service on the forthcoming Rolling Stones European tour. Vocalist Mick Jagger was the first to try the new system and subsequently specified its use for the tour. In true Stones tradition, one of the original mics has already been repeatedly 'abused' but has yet to put in a poor performance.

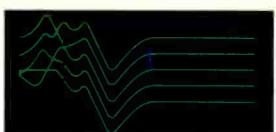
The mic systems for both of these events have come through UK-based company, Raycom.

Sony Broadcast and Professional, Europe. Tel: +44 1256 55011.
Sony Corporation, US.
Raycom, UK.
 Tel: +44 1789 400600. ■



DN3698

HAND HELD REMOTE
C O N T R O L L E R



Remote, but in Control.



www.americanradiohistory.com

The new DN3698 Hand Held Remote Controller expands the power – and unlocks the creative potential – of Klark Teknik's DN3600 Programmable Graphic Equaliser and DN3601 Slave Equaliser.

It brings fast and easy access to a maximum 98 channels of Klark Teknik equalisation from one, light hand held unit, powered by high capacity "D" type rechargeable batteries.

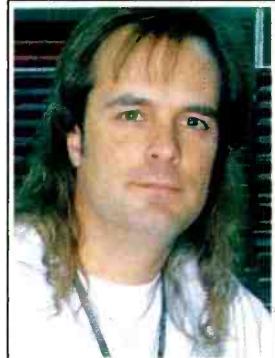
The DN3698 gives leading sound engineers faster system control in every type of venue.

Two thumb wheel encoders and dedicated function buttons, clearly labelled, give instant access and adjustment of every parameter. A large LCD display and two 7 segment LED's ensure that vital information such as EQ, mix and memory are available at a glance.

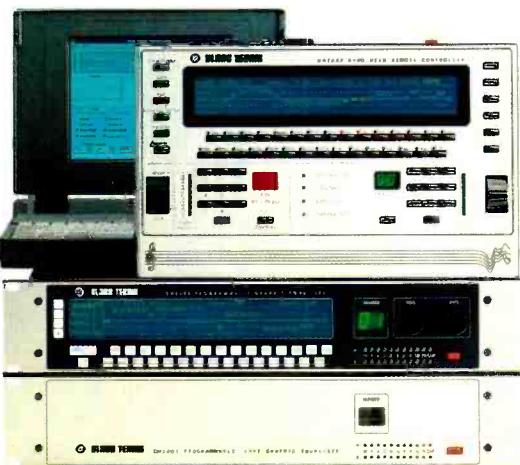
The DN3600 and DN3601 "More EQ" functions – low and high pass and notch filters – can be accessed directly, and "Curve" mode provides a true representation of the frequency response created by the graphic faders and "More EQ" filters.

An optional 2U Docking Station integrates power supply with MIDI to RS232 conversion for single cable operation up to 100 metres in length. Or choose our radio link for full two way wireless communication up to 300 metres.

With the DN3698 you can be remote, but always in control.



Jim Yakabuski F.O.H. Engineer
for Van Halen on tour with
the DN3698



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Klark Teknik PLC, Walter Nash Road, Kidderminster,
Worcestershire DY11 7HU, England.
Tel: (01562) 741515 Fax No: (01562) 745371.

Plug in To The Possibilities

Peavey Architectural Acoustics announces the all-new MMA™ Series Modular Mixer Amplifiers, packed with more features and occupying only two rack spaces. Flexibility abounds, with eight modular ports and an auxiliary input for a total of nine inputs, two mute busses, Peavey SPS™ (Speaker Protection System), and signal activity illuminators. More security is afforded by the recessed EQ Bypass and Contour Switches and optional tamper-resistant caps.

With nine inputs available, the MMA Series Modular Mixer Amplifiers from Peavey give you plenty of options in designing your sound system, and the ongoing ability to alter that design for future needs. To customize your MMA Amp, Peavey Architectural Acoustics has a full line of quality plug-in modules, from mic preamps with compressors to various auxiliary inputs to telephone paging. And with the Peavey exclusive AUTO™ modules, you get an eight-channel powered automatic mic mixer.

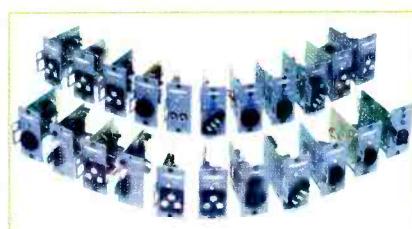
For your sound contracting needs, plug into all the possibilities the MMA Series Modular Mixer Amplifiers have to offer.



Only Two
Rack Spaces!

Peavey Plug-In Modules

AUX R+	Line Level Input w/ RCA Jacks & Muting
AUX S+	Line Level Input w/ Screw Terminals & Muting
AUX SR	Line Level Input w/ Screw Terminals & Remote Volume
BTM S	Bridging Transformer Input w/ Screw Terminals & Muting
GEN S	Signal Generator w/ Screw Terminals
MPE S	Electronically Balanced Mic Input w/ Muting & Screw Terminals
MPE SO	Electronically Balanced Mic Preamp w/ Screw Terminals
MPE X	Electronically Balanced Mic Preamp w/ Muting & XLR
MPE XO	Electronically Balanced Mic Preamp & XLR Connector
MPT S	XFMR Balanced Mic Preamp w/ Muting & Screw Terminals
MPT SO	XFMR Balanced Mic Preamp w/ Screw Terminals



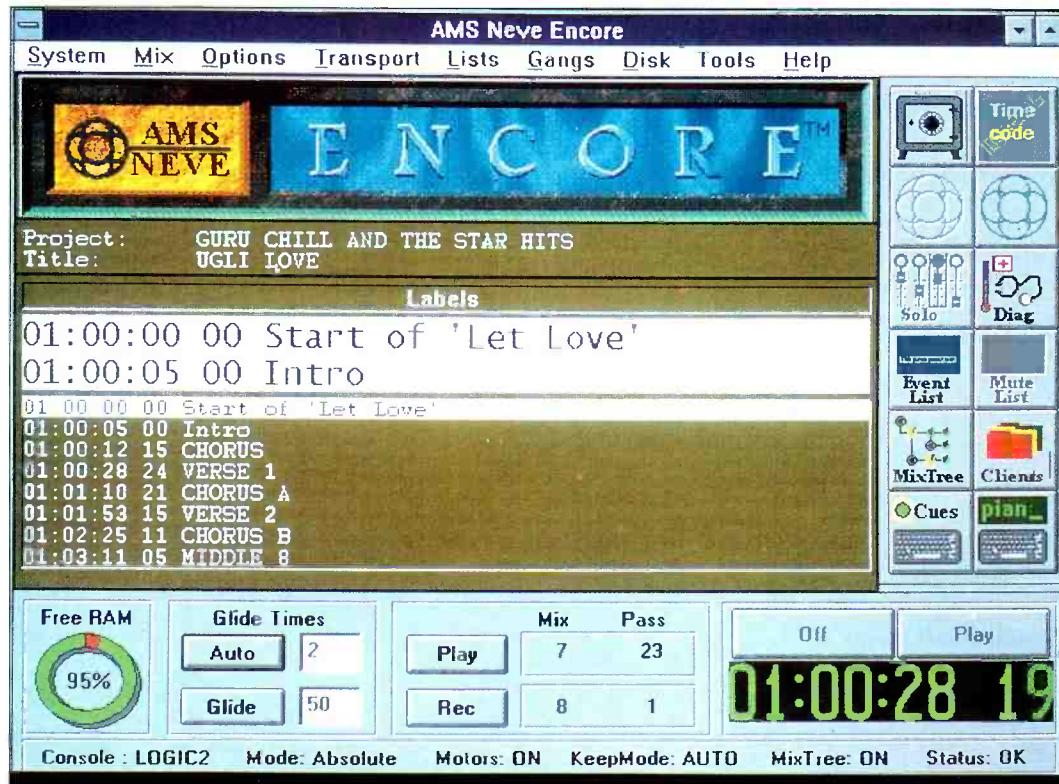
MPT S1	XFMR Balanced Mic Preamp w/ EO & Screw Terminals
MPT S AUTO	XFMR Balanced Automatic Mic Preamp w/ Screw Terminals
MPT SR	XFMR Balanced Mic Preamp w/ Remote Volume & Screw Terminals
MPT X	XFMR Balanced Mic Preamp w/ Muting & XLR Connector
MPT XC	XFMR Balanced Mic Preamp w/ Compression & XLR
MPT XO	XFMR Balanced Mic Preamp & XLR Connector
MPT X1	XFMR Balanced Mic Preamp w/ EQ & XLR Connector
MPT X AUTO	XFMR Balanced Automatic Mic Preamp & XLR Connector
TLO S	XFMR Balanced Line Output & Screw Terminals
TLO X	XFMR Balanced Line Output w/ XLR Connector
TPM S	600' Input Paging Input w/ Muting & Screw Terminals

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The main screen of *Encore*—AMS Neve's new console automation system

Antex digital audio adaptor

Antex Electronics Corporation's new SX-11 is a low-cost playback-only digital audio adaptor supporting apt-X encoding as well as other features of the popular Antex SX-26. Using the Texas Instruments advanced floating point TMS320C31 DSP, the SX-11 supports both ISO-MPEG-1 Layer I-II and Dolby AC-2 compression formats, effectively delivering compression rates up to 16:1. Balanced and unbalanced analogue outputs are provided along with AES-EBU and SPDIF outputs, and there is a built-in EEPROM-based software security system, allowing systems integrators to disable software or reset it to demo mode if a particular board is not present.

Antex Electronics Corporation, US.
Tel: +1 310 532 3092.

AMS Neve Encore

At Audio Technology 95, AMS Neve are launching *Encore*, a powerful new console automation system. *Encore*

brings together the development paths of the company's various automation packages to enable engineers moving between studios to concentrate on the creative aspects of the job rather than refamiliarisation with a console. At the same time, user-selectable modes have been added to make users of other automation systems feel at home.

Encore is available on new V-Series consoles and can be retrofitted to replace the existing PC and coprocessor cards in *Flying Faders* installations. AMS Neve comment that this underlines their continuing commitment to this product range. *Encore* is also available on *Logic 2* consoles, and the icon driven graphical interface can be set up to follow *Capricorn* syntax.

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

Cubase Audio v3.0 for Mac

Steinberg's latest upgrade to *Cubase Audio* for the Mac is v3.0, adding time stretching-harmonisation in the Wave Editor and visual editing of the Master Track in the Audio Editor. The new program will provide up to 16 tracks through Apple Sound

Manager on a Power Macintosh, and continues to support Digidesign *Audio Media* and *Session 8*. In addition, it incorporates a TDM patchbay, allowing a selection of TDM plug-ins to be used at any point in *Cubase*'s audio chain. Shortly to be released is Steinberg's *Virtual FX* rack, their own TDM plug-in with five effects including reverb, auto-panning and spatial enhancement.

Steinberg, Germany.
Tel: +49 30 211594.
Fax: +49 40 211598

Audio Technica mics and cans

Audio Technica will show several new items at Audio Technology 95, with two new models of studio headphones at the top of the list. The *ATH-M40* has been aimed specifically at the professional monitoring and mixing market, and has a flat, extended low-frequency response down to 5Hz, while the *ATH-D40* features an enhanced LF response from 20Hz–500Hz, making it ideal, according to AT, for use with predominantly low frequency sounds such as bass and drums.

Existing *ATM11*, *31* and *33* microphones are being replaced by ▶

In brief

● Crown amplifiers

Crown have introduced the *D-75A* and *D-45* power amplifiers, both 1U-high units for a variety of broadcast and professional applications. The *D-75A* is an update of the popular *D-75*, delivering 40W per channel, and the *D-45* is a new addition to the line offering 25W per channel. Both feature detented front-panel controls for precise repeatability, barrier block outputs, and Crown's IOC (Input-Output Comparator) indicator that provides an alert if distortion exceeds 0.05%. They are backed by Crown's unconditional 3-year 'no-fault' warranty.

Crown, US. Tel: +1 219 294 8000.

● Barco Digital Video Link

The latest product range from Barco, best known for their video monitors and projectors, includes an optical link designed to transport digital video signals over long distances without loss of quality. The range will also handle analogue video and audio signals, which share the familiar fibre-optic advantages of low loss, immunity to external interference and optimal electrical isolation between transmitter and receiver. The Barco system will carry two signals, each consisting of one video and four audio channels, on one fibre simultaneously without crosstalk.

Barco nv-Broadcast and Cable, Belgium. Tel: +32 56 233211.

● Sennheiser radio mics

On the Sennheiser stand at Audio Technology 95 will be the new *EM2004UHF* 16-channel switchable true diversity receiver unit. This switchable frequency variant of the *EM2003* features the same specifications but with the added versatility of 16 selectable channels within a 24MHz window, adaptable over the whole UHF frequency spectrum. The new unit is expected to maintain price parity with the fixed frequency model it replaces. Also on show will be switchable channel VHF systems, including the *EM2004VHF* receiver and the *SKM1032* switchable 6-channel hand-held VHF transmitter, together with its *SK2032* beltpack version.

Sennheiser Electronic, Germany.
Tel: +49 51 30 600 366.

Sennheiser, UK.

Tel: +44 1628 850811.
Sennheiser Electronic Corporation, US. Tel: +1 203 434 9190.

● RADAR tracking

Otari have announced two new digital multitrack interfaces for the *RADAR* tapeless digital multitrack. The *ADATLINK* is a plug-in compatible PCB providing direct digital in and ▶

outputs for the ADAT format, while the UFC-24 (universal format convertor) can also be used independently to copy signals between ADAT, DASH, PD and Tascam's TDIF formats.

Otari, Germany. Tel: +49 21 591778.

● **Pro-Bel digital comp-lim**

Pro-Bel's stand at Audio Technology 95 will feature their new digital audio compressor limiter, designed for transmission and postproduction operations with special emphasis on DAB applications. Already chosen by the BBC for their experimental DAB service to be launched later this year, the unit uses a sophisticated algorithm to look ahead at the incoming audio and automatically adjust the level according to predefined rules.

Pro-Bel, UK. Tel: +44 1734 866123.

● **P&G motorised joystick**

New from Penny & Giles at Audio Technology 95 is a unique motorised joystick, aimed particularly at film and television postproduction installations.

The concept provides automated panning control for surround sound applications, enabling the programmable movement of spot effects. The joystick features a dual-axis design with a touch-sensitive finger grip, which performs the same function as the touch-sense facility on a conventional motorised fader.

P&G, UK. Tel: +44 1495 228000.

● **HHB at Pro Audio and Light Asia 95**

HHB's successful DAT range is joined by the DDS90M, a 90-minute DAT tape developed for use in mass data storage and backup applications, while the recordable CD blanks now include the CDR74, a 74-minute disc compatible with the new generation of 6x speed writers. Showing for the first time in Asia will be CEDAR's DH-1 De-Hissler, the latest in the series of real-time audio restoration processors.

HHB Communications, UK. Tel: +44 181 962 5000.

● **Tapeless Audio Directory 4**

The fourth edition of Sypha's popular and comprehensive *Tapeless Audio Directory* is now in print. Covering over 200 nonlinear audio recorder-editors, the *Directory* breaks up the subject into a series of accessible areas—including hardware and software specs; networking; future development and costings—making it a valuable reference work for those looking to invest in this area of technology.

Sypha, UK. Tel: +44 181 761 1042.

● **Yamaha D2040 control**

Procase have released the FX2040 Apple Macintosh software control program for the Yamaha D2040 digital crossover-filter. The program provides ►

upgraded versions providing battery and phantom powering. The range comprises the omni ATM10A, the cardioid ATM31A, and the ATM33A, designed for instrument recording and voice reinforcement.

Audio Technica Ltd, UK. Tel: +44 1132 771441.

Emagic Logic PC 2.0

Emagic have announced the release of *Logic* 2.0 for Windows, which is available as a free update for existing users or as a complete package. It comes with a new manual dedicated solely to the PC platform including information on installing MIDI cards and IRQ settings. Enhancements to the system itself include full colour support, MIDI groove templates, improved tempo functions, automatic-mapped drum notation, guitar tablature, grace notes, multibar rests and a new score layout tool.

Emagic, Germany. Tel: +49 4101 4765 44.

KRK video shielding

KRK Monitoring Systems are now offering the option of video shielding on all of its close-field monitors. Designated with the letter S, the K-RokS, 6000S, 7000BS and 9000BS are all compact, high-powered, full-range KRK monitors with the drivers shielded with a mu-metal can.

KRK Monitoring Systems, US. Tel: +1 616 695 5948.

RE ISDN audio codec

New from RE is the RE 662 and RE 663 ISDN Codec. The pairing encodes and decodes a mono, stereo or 2-channel program using ISO-MPEG Layer II standard or the G.722 protocol. It features three built-in terminal adaptors and inverse multiplexing to split-combine the ISDN B-channels into one virtual channel. This enables it to handle the 384kb of bandwidth (the equivalent of six ISDN B-channels) that is required for CD quality sound. Also featured is the ability to equalise different time variations between the different ISDN connections.

RE, UK. Tel: +44 1734 731119.

Audio Design postpro mixer

Audio Design's digital minimixer prototype will be on show at Audio Technology 95, with production units scheduled for October. Aimed at the specialist recording and postproduction markets, the mixer provides two AES inputs (with SPDIF coaxial and optical options) which are treated as four mono channels within the mixer and mixed to a stereo master output control. Four post-fader routed outputs are available through AES 1 and AES 2 auxiliary outputs.

Sample-rate conversion and emphasis stripping automatically handle different operating standards, and incoming sample rate-lock and emphasis are displayed for each AES signal pair. Each of the two split channels from each pair provides phase reversal, a +12dB gain mode, channel mute, a pan pot and a long throw professional fader.

Pairs of channels can be operated in stereo, and a 21-position switch provides delay from 2-360ms on each pair to time-align spot mics with a main pair and meet video frame-delay requirements (1-9 frames). The four post-fader outputs can be routed to any channel of the two AES outputs, complete with processing, with D2 format video work in mind. Output sample rate is switchable onboard or synchronised to either of the inputs, and word length is selectable with noise shaping for 20, 18 and 16-bit formats. A number of the units can be connected in series so as to give multiples of four channels.

Audio Design, UK. Tel: +44 1734 844545.

Meek modules

Those intrigued by Keith Spencer-Allen's recent review of the Joe Meek compressor should look out two new products in the same line at Audio Technology 95. The *Joe Meek Voice Channel* comprises a high-quality microphone amplifier with a specially wound input transformer to Ted Fletcher's design, a mono compressor with all the features and adjustments of its stereo big brother, and an ▶



KRK's monitors now come with video shielding



He spent a fortune on a moving fader console. Then he discovered the Soundcraft DC 2000.

Steady yourself, the price of moving fader consoles just took a tumble. Available in a variety of configurations, with or without patchbay, the Soundcraft DC 2000 integrates powerful automation into a highly specified mixing console. And, thanks to our revolutionary C3 Console Control and Communication™ system, digital noise is effectively eliminated.

Its touch screen facilitates machine control for

all industry standard formats, including the Tascam DA-88, Alesis ADAT and Sony 9-pin, and offers a host of other time (and money) saving features.

The DC 2000 slashes the cost of equipping a sound-for-picture facility and suddenly makes adding a second or third room a real possibility.

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control of up to eight D2040s which may be configured as a number of subgroups and controlled accordingly including such facilities as labelling, muting and soloing 'in place'. Control data may be recorded, edited and saved to disk allowing transfer of control between systems.

Procase, France.

Tel: +33 1 39 47 8462.

• **Rolls on the tube**

The Rolls Corporation RP220 Tube Preamplifier is a stereo 2U-high rackmount unit accepting both mic and line-level inputs. The unit has volume and gain controls, individual mic-line switching LED output level meters and phantom power. The valves hiding inside the RP220 are a pair of 12AX7As and a pair of 12BH7As, with 'absolutely no solid-state devices whatsoever in the signal path'.

Rolls Corporation, US.

Tel: +1 801 263 9053.

• **D/ESAM cast by Warners**

Warner Bros' recently completed Video Operations Facility has seen nine Graham-Patten D/ESAM 800 Series digital audio mixers installed. Five of

Enhancer. The *Vintage Equaliser* is a 1U-high rackmount unit with another mic-line amplifier supplemented by what the manufacturers describe as 'a classic in equaliser design which is remarkably similar in performance in all respects to a most famous mixer channel of the 1970s.'

Interstudio, UK.

Tel: +44 1923 258266.

SADiE in the field

Studio Audio and Video are showing a portable version of the SADiE digital audio editor at Audio Technology 95, based on a Pentium PC in a portable case with three drive bays. The usual 2.1Gb SCSI drive has been upgraded to 4Gb offering nearly 13 hours of audio capacity, and the onboard RAM is 8Mb expandable to 128Mb.

Also featured will be a new hard-disk recorder from Rolec known as the SADiE mobile, which fits into a SADiE external drive bay and acts just like another SCSI drive with no upload time. 16-bit linear recording

gives around 100 minutes of stereo at 44.1kHz, and the system will operate at 32kHz and 48kHz as well.

Studio Audio and Video, UK.

Tel: +44 1353 648888.

Klark Teknik EQ remote

Klark Teknik have launched a hand-held remote controller for the DN3600 Programmable Graphic Equalisers and slave units. The DN3698 features a large LCD screen, dedicated function buttons and two thumbwheel encoders for fast access of up to 98 channels of EQ from a single control surface. It is powered by D-type batteries and can be connected directly to the Pro MIDI loop, and there will be an optional 2U-high rackmount docking station for protection and integrated power supply with RS232 communication, allowing operation via a single cable of up to 100 metres in length. The optional radio link will achieve full wireless communication, with a range of up to 300 metres.

Klark Teknik, UK.

Tel: +44 1562 741515.

It's Sleek.
It's Reliable.
It's Ergonomic.
It's Dead.



Presenting Foundation 2000RE. The ultimate recording/editing plat-

form, and a darn good mousetrap. Foundation is the fastest, most intu-

itive non-linear audio platform on Earth. No cursor. No mouse. Just

an amazing array of

delightfully direct con-

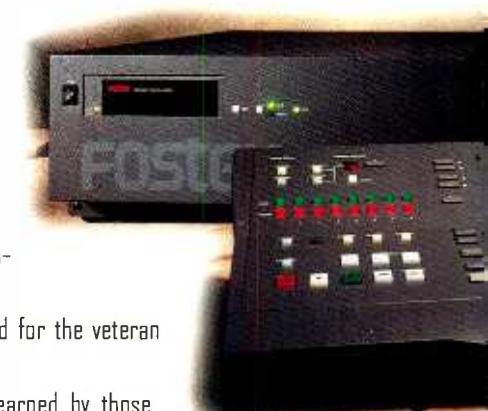
trols, including a solid

brass jog wheel and touch-

sensitive screen. Designed for the veteran

engineer — yet easily learned by those

new to digital—Foundation's joys are revealed the moment you begin



using it. For starters, the superb 16-

channel audio quality is perfect for



beyerdynamic's new U600 radio mic system

ION-MIDI integration

The comprehensive Tascam DA-88 control system offered by the Canadian Soundmaster ION-88 system has been extended through the release of the ION-MIDI unit. ION-MIDI allows ION-88 user to add

control of MIDI devices to the platform which already supports 1,024 tracks of DA-88 and other film-video hardware.

The Integrated Operating Nucleus (ION) is intended to provide a single, integrated control system for a wide variety of studio facility types. The company's *ION Studio Operating Environment* now includes Reverse Lock, allowing locking to suitable machine transports when running in

reverse, including sync to varispeed —as is often required for film and video working.

Soundmaster Group, Canada.
Tel: +1 416 741 7057.

beyerdynamic

The new U600 system is the latest in beyerdynamic's growing range of UHF wireless systems. It features a synthesised true-diversity receiver in a 1U-high half-rack format, and can operate 64 frequencies on one TV channel, grouped in four banks of 16 frequencies. The receiver incorporates a multipurpose LCD screen which shows all parameters of transmitter and receiver, including channel and frequency, RF and audio output and low transmitter-battery level. The bodypack transmitter also incorporates an LCD channel identification read-out.

beyerdynamic, UK.
Tel: +44 1273 479411.
beyerdynamic, US.
Tel: +1 516 293 3200. ■

these have been installed in new all-digital telecine suites, two have been installed in on-line edit suites alongside Accom Axial 2020 edit controllers, and the remaining two are in DAF (Digital Adaptive Format) rooms. Based in Burbank, California, the facility handles a variety of services including film-to-tape mastering and editing, and accommodates external clients in addition to serving the Warner Film and TV divisions.

Graham-Patten Systems, US.
Tel: +1 916 273 8412. ■



DIESAM 800 at Warners', Burbank

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One wheel everyone can get behind.
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Neumann KM 184

One of the unsung heroes of the microphone world was the Neumann KM 84. Never accorded anything approaching legendary status, it has nonetheless formed part of the standard armoury for most of us at one time or another, with its ability to deal with most eventualities more than competently. You know where you are with a KM 84, and at a push you could mic up a whole orchestra with them and no-one any the wiser. Its passing in favour of the more modern *fet100* series went curiously unmarked, but evidently enough fondness for it survived for it to be reincarnated. Neumann's latest offering is the KM 184, to all intents and purposes a KM 84 capsule with 100 series electronics.

The *fet80* series of which the original KM 84 formed a part were not a truly modular system in the manner of, say, AKG's 451, 460 and *Blue* ranges, but the KM 84 itself was part of a small subset of the series which did have interchangeable capsules offering the KM 84's cardioid pattern, the KM 83's omni, and the KM 85's cardioid with bass rolloff. The newer 100 series offers far more flexibility, but Neumann point out that the KM 184 is not strictly part of the system but a one-off designed to carry on the KM 84 tradition while exploiting the advantages of the newer electronics. Although its capsule assembly unscrews from the familiar fine Neumann threads, it cannot be swapped with any of the other microphones. Neumann regard the KM 184's design as effectively integral, and reckon that this simplified construction allows them to sell it at an attractively low price. As this very small simple microphone still costs in excess of £500 in the UK, this is a comment that could only have come from a company who described their *TLM193*, at a hair under £1,000, as 'for the budget conscious'.

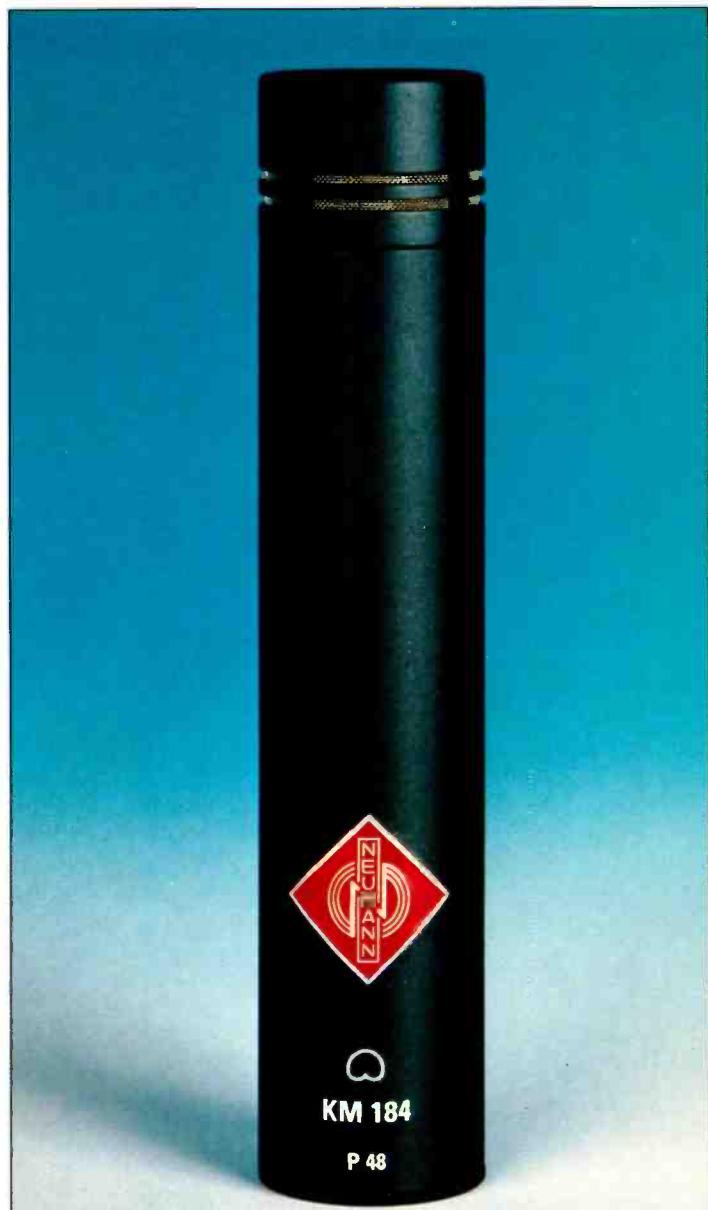
What you get for your money will be comfortably familiar to anyone who has known and loved the KM 84. The kit comes in a well-presented but instantly disposable cardboard box, and includes a decent pop shield and a similarly acceptable stand mount. The mount features (unusually for a

microphone this size) a little locking knob for avoiding droop, and comes with a metal thread adaptor. The microphone is virtually identical in size to its predecessor, and finished in the current Neumann grey.

The main obvious difference is the lack of a 10dB pad switch as fitted to the KM 84, but this is a benefit of the new electronics as even without it the maximum SPL for 0.5% THD is quoted as 138dB; the KM 84 could only handle 130 even with the pad in. The other specs show smaller improvements, with a frequency range (Neumann never seem to give frequency response figures with specified dB limits) of 20Hz–20kHz where the KM 84 only went down to 40Hz. Curiously, signal-to-noise and equivalent noise figures are, in fact, 1dB worse than the KM 84, although the A-weighted equivalent SPL due to self-noise is 2dB better at a creditable 16dB. Of interest to those using battery phantom supplies is the KM 184's reduced current consumption, at 2.3mA.

Just as the KM 184's appearance is immediately familiar, so is its performance. The KM 84 always seemed to represent just about the best that a small-capsule condenser in its range had to offer, with a neutral clarity whose inevitable slight lack of depth only became truly apparent by direct comparison with a large-diaphragm model. The sound of the KM 184 is instantly recognisable as the same flavour, but with subtle significant improvements brought about by the new electronics and reflected in the specifications. It is audibly quieter, with a particular reduction in HF noise, and its sensitivity—up to 15mV/Pa from the KM 84's 10—no doubt contributes to this. The sonic characteristic remains clear and clean, with plenty of extension at the top, but is at the same time a little smoother and more open. There is a marked increase in low-end depth and warmth, which is quite remarkable for a microphone this small.

The KM 84 was always a particularly effective jack of all trades, and the slight improvements in the KM 184 make it even more so. For general use on a wide variety of instruments it never disappoints, and in fact often surprises with the completeness of sound it delivers. Particularly interesting was the result on drum overheads, used either as a crossed or a spaced pair, where its extended HF and headroom gave excellent results. Used as a crossed



A welcome replacement for the much missed KM 84

pair on a grand piano was also rewarding, with a remarkable fullness at the bottom. While it would be nobody's first choice for vocals it turns in a creditable performance, making it a good standby for this as well. It has a familiar tendency to pop at the slightest provocation when used close, which the supplied filter deals with as well as can be expected.

Neumann have always been big on tradition, with an impressive number of classics to their name and a readiness to continue with a winning formula rather than change for the sake of change. It is hard to think of anybody else's models which have had such a long life as, say, the

U87, little altered for decades and yet still a firm favourite. The KM 184 reflects this background, and is in every way a worthy successor to the little microphone so many of us know so well. ■

Dave Foister

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S/Link v2.0

As users begin to take file transfer for granted in the wider world of personal computers, The Synclavier Company have developed a software package that promises to hasten the era of wider choice for users of professional tapeless audio systems. Their *S/Link* software package is an audio file transfer and translation program for importing and exporting mono or stereo files between different audio platforms from a wide range of manufacturers including Digidesign, Sonic Solutions, Fostex and Doremi, as well as between any OMF compliant systems.

S/Link runs on the Mac or Power Mac platform and uses between 1.2Mb and 2Mb RAM during operation and 1Mb of hard disk space. The Mac should have a floating-point processor unit (FPU) or FPU emulation software, Sound Manager 3.0 or later, Apple System 7.0 or later and optional QuickTime. Although *S/Link* runs on a Mac platform, it can access both Mac and non-Macintosh volumes via the SCSI bus or extended devices such as diskette drives, third-party SCSI controllers and networks.

The software is provided on diskette and is simple to install. Unless otherwise directed, *S/Link* is installed in its own folder automatically created on the desktop. The program is started in the same way as any other Mac application, by double clicking on its icon. On start up, it scans the SCSI bus and displays a window showing the SCSI slot of each device found, and this is followed by a Device Directory window that shows all devices found. It gives the device name, the device

type such as drive, CPU, CD-ROM and the SCSI ID.

The controls presented to the user are similar to standard Mac hierarchy and operation. By double clicking on a device in the Device Directory, its contents are displayed and are represented by icons such as folders or documents. Any sound files with commonly used file formats are displayed with a speaker icon.

However, in case there may be sound files present which are not immediately recognised by *S/Link*, clicking on a MAGNIFYING GLASS button will cause *S/Link* to perform a 'deep scan' of all files in the current directory to see if any are indeed sound files. A FILTER button can be used to display only sound files, and a SORT button allows files to be sorted according to any one of nine fields such as name, size, type, sample rate, channels (1 for mono, 2 for stereo), length in seconds, bit size, format (offset or 2s-compliment) and any compression used.

Any selected sound file(s) can be auditioned via the Mac's internal loudspeaker or audio port by pressing the space bar, and the audition volume can be adjusted from a pull-down menu on the tool bar. Files can also be auditioned over networks, although the playback quality may be inferior if using slow devices such as AppleTalk.

To create a copy of a file for translation into another format, a duplicate command is used. This causes the Transfer window to appear. The user can give the copy another name or rely on the system default of the original name followed by the word 'copy'. The format of the copy can be chosen from

a current selection of 13 types including OMF, Doremi Dawn, Sound Designer I and II, Windows WAVE, Amiga IFF-8VSX, AIFF, AIFF-C, System 7, QuickTime, Sun, NeXT.au, .snd, Creative Labs VOC and Raw sound file. Depending on the format selected, appropriate conversion options can also be chosen such as sample width, sample rate and compression, and these each have a pop-up menu on which *S/Link* will again only offer values-types as appropriate. By pressing the TRANSFER button, a translated copy of the sound file will be created in faster than real time and stored within the current directory.

To transfer a file, its icon is simply dragged to another directory or folder. This again causes the Transfer window to appear whereby translation options can be chosen. In addition, depending on the destination device, *S/Link* will only offer appropriate options, for example a transfer to a *Synclavier PostPro* will not offer the option to convert to a Windows Wave file since the *PostPro* does not support this format.

Batch or multiple file transfers can also be made, allowing all selected sounds to be translated to the chosen file format and transferred in one pass. Conversely, only a region of a sound file need be chosen for translation-transfer. By pressing the SET button in the Transfer window, a waveform of the sound file appears with various display and replay options and a region can be highlighted and auditioned. This feature is particularly useful for

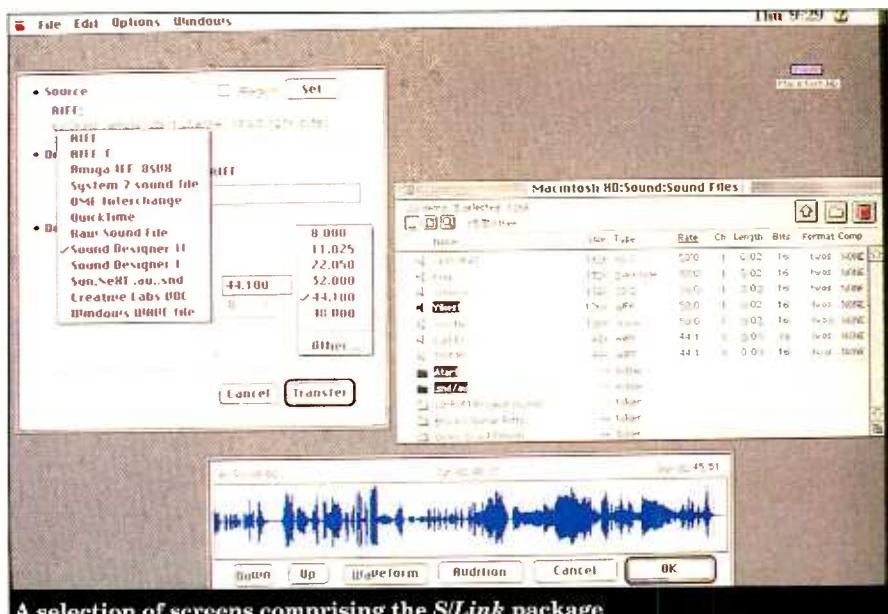
space saving and extracting sound effects from long sound files.

Another useful feature is the Sound Doctor window. This allows any file of any type to be auditioned and/or recovered. This means that file formats not currently supported by *S/Link* can still be imported and translated into a supported format. It also means that files that are not, in fact, sound files can be auditioned and converted, allowing the user to possibly discover an unusual sound effect by auditioning a PICT, text, application or even spreadsheet file!

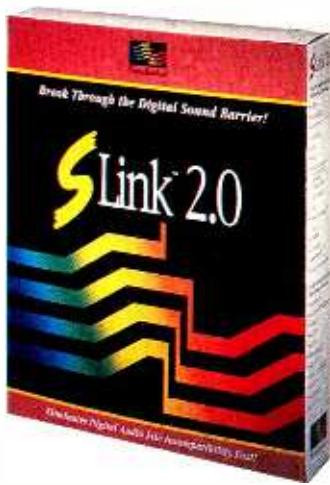
S/Link is a very simple package to use and is an extremely useful tool for both professional audio and multimedia applications. The user guide is clear and helpful, deals with practical issues and is reassuringly honest about *S/Link*'s limitations in terms of audio reproduction for auditioning purposes if certain options are used. Indeed, a few glitches were experienced when a file was translated into a compressed format, but as the guide reassured, these are not transferred as part of the file's data. Not being in a position to verify this without a Unix workstation using G721 compression, I have to take The Synclavier Company's word for it, but I have no reason to doubt them. ■

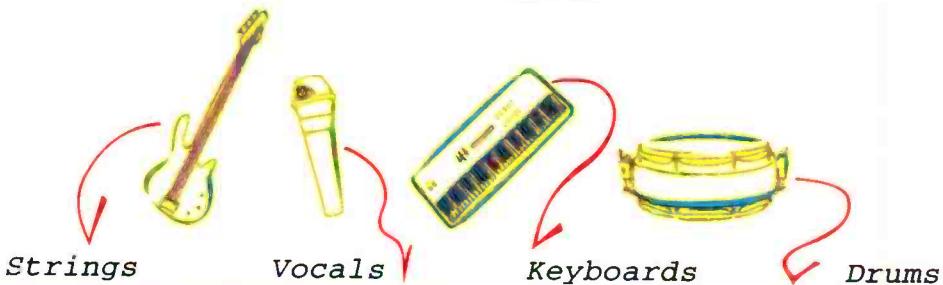
Yasmin Hashmi

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A selection of screens comprising the *S/Link* package





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warm up
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Steve Oppenheimer
Electronic Musician Editors' Choice (Equalizer/Filter)

“ Specs be damned, how does the thing sound? One thing is certain, we didn't hear a \$150 difference between it and the [competitor]. The Peavey, simply put, knocked our socks off. It's nice and smooth, and has plenty of beef and bite. Some of our tweedy synths have never barked bigger. One listener dubbed the Spectrum 'a big, fat pig' (a compliment, by the way). Another enthused: 'This is cool. I want one.' ”

Greg Rule
Keyboard magazine

FEATURES—

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- 100 Programmable Locations
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- Filter Frequency Velocity and Key Tracking

- MIDI Controllable
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- Great Price!

RFS SMAC

In the April 1995 issue of *Studio Sound*, I looked at a new American device for remotely aiming microphones in the studio. Attached to a microphone stand, *The Positioner* gives pan and tilt control down a single tie-line, and I commented that given suitable suspension points it could come in useful for slung microphones, a field where its only existing competition already lies. The competition is the Slung Microphone Aiming Control (SMAC) available exclusively from location hire experts Richmond Film Services, they of the warehouse full of Nagra-Ds fame.

Anyone who has been involved in location music recording in a church or hall will be familiar with the fun offered by the activity of slinging microphones: draping bits of string over gallery rails, tying them round dusty pillars, or dropping them out of stage lighting grids which haven't had a visitor apart from the pigeons and the rats for years. Once you have slung a microphone array, you often feel strangely reluctant to get it down again to make adjustments to the direction in which it is pointing. It is amazing how perfectionist principles can seem less important under such circumstances. Those who have tried it will know what a difference those final few degrees of tilt can make to an orchestral balance, particularly with 90° figure-of-8s, yet the prospect of getting those microphones down and back up again can make it easy to forget.

What is needed, not just to save time but to add otherwise impractical precision, is some means of remotely moving the microphones, most importantly in terms of tilt, left-right direction is usually easy to set before hauling the rig up but the vertical angle can only be guessed, depending as it does on the final height of the array and the angle at which it chooses to dangle once hoisted. Even if the setup is correctly judged to begin with, the changing strains as the strings become taut can be enough to alter the orientation.

These are the problems the SMAC is designed to address. It consists of a large heavy motor housing, with a selection of hooks for attaching suspension strings on the top and three microphone attachment bolts below. Its weight alone is a positive benefit, as it greatly reduces the effect of the microphones' own centre

of gravity on the final attitude. Its total of six slinging hooks allow 2-point suspension either front-back or left-right, 3-point suspension and full 4-point, with an additional eye for a separate safety line if local regulations require it.

The microphones attach to the bottom bar, which resembles a type of stereo bar except that it has three captive $\frac{3}{8}$ -inch bolts, one placed centrally and one fixed at each end. The centre position is obviously ideal for a single-point stereo microphone, but the outer pair are only suitable for stick-type models assuming coincident operation is required (unlike the rather odd array featured in the publicity photograph). Side-fire microphones such as 414s are less easily accommodated; if the capsules are to be as close together as possible one must be attached to the centre bolt, which looks ungainly and risks upsetting the centre of balance and pulling the whole affair crooked. It would be good to see the outer bolts running in slots, as on some stereo bars, allowing for different types and sizes of microphone.

The big plus point once the SMAC is rigged is its wireless operation. Unlike *The Positioner*, it uses infrared remote control, designed with ease of use and multiple microphone arrays in mind. The small, lightweight remote carries a single joystick for adjusting the microphones' vertical and horizontal angles, together with a few switches which give away the system's versatility. Two toggle switches select the channel the remote transmits on; with two groups of three channels this means up to six SMACs can be rigged in the same room and controlled independently from a single remote. A large button on the remote will light an identification LED on the receiver set to the currently-selected channel, together with another LED if there is enough capacity left in its batteries to operate the motors. Battery life is estimated at about three weeks, thanks to an automatic standby system; the batteries in the motor unit are eight C cells, explaining its size and weight. The only disadvantage of the remote system is that line of sight (through glass will do) is required between transmitter and the front of the receiver, making it impossible to make adjustments while listening to the results in the control room. This is not such a problem, as orientation can generally be judged perfectly well by eye once the rig is in position.

Movement of the unit is at a sensible speed, neither too fast for delicate adjustment nor slow enough to be frustrating. It treats the microphones quite gently, never jerking sufficiently to cause them to move on their mounts. It inevitably makes a noise while moving, which is too loud to allow movement during recording but not loud enough to distract musicians during a rehearsal.

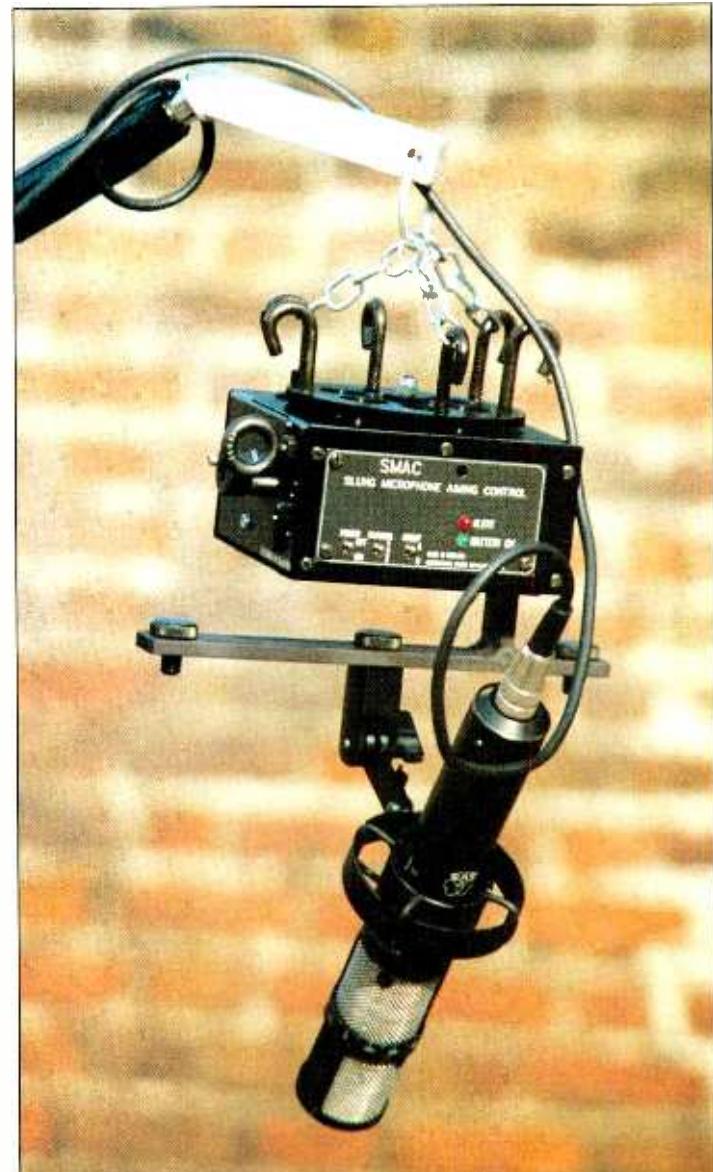
The SMAC kit as supplied is comprehensive, with the two units, a reel of string and a stand mount in a rugged flight case. The stand mount allows the SMAC to be suspended from the end of a large boom stand of the type often used in orchestral sessions; these too can be bothersome to get down and back up, and the

carefully-chosen sweet spot can easily be lost, so the same advantages apply.

Perhaps Richmond would like to consider producing a bigger version, with little winches built in so that the unit could pull itself up and down and from side to side, making those critical but time-consuming adjustments so much easier. Meanwhile, anyone who is in the habit of slinging microphones could find the SMAC becoming one of those pieces of equipment that they will wonder how they ever managed to be without. ■

Dave Foister

Richmond Film Services, The Old School, Park Lane, Richmond, Surrey TW9 2RA, UK.
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The suspension of disbelief—RFS' SMAC mic control system

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Superb timecode-based off-line editing facilities include the Cue List, which can trigger both console and external MIDI Events, and the Mix Processor, which includes Repeat, Merge, Shift, Erase, Trim, Swap and Copy operations on mix data.

AMEK RECALL

Stores the positions of non-automated knobs and switches - up to 10 console surfaces can be stored in each Title. Selective recall and auto-scan provide rapid identification of only those controls you wish to reset. Graphic displays and AMEK's unique talking Voice Prompt Guide you rapidly through the Recall operation.

AMEK VIRTUAL DYNAMICS

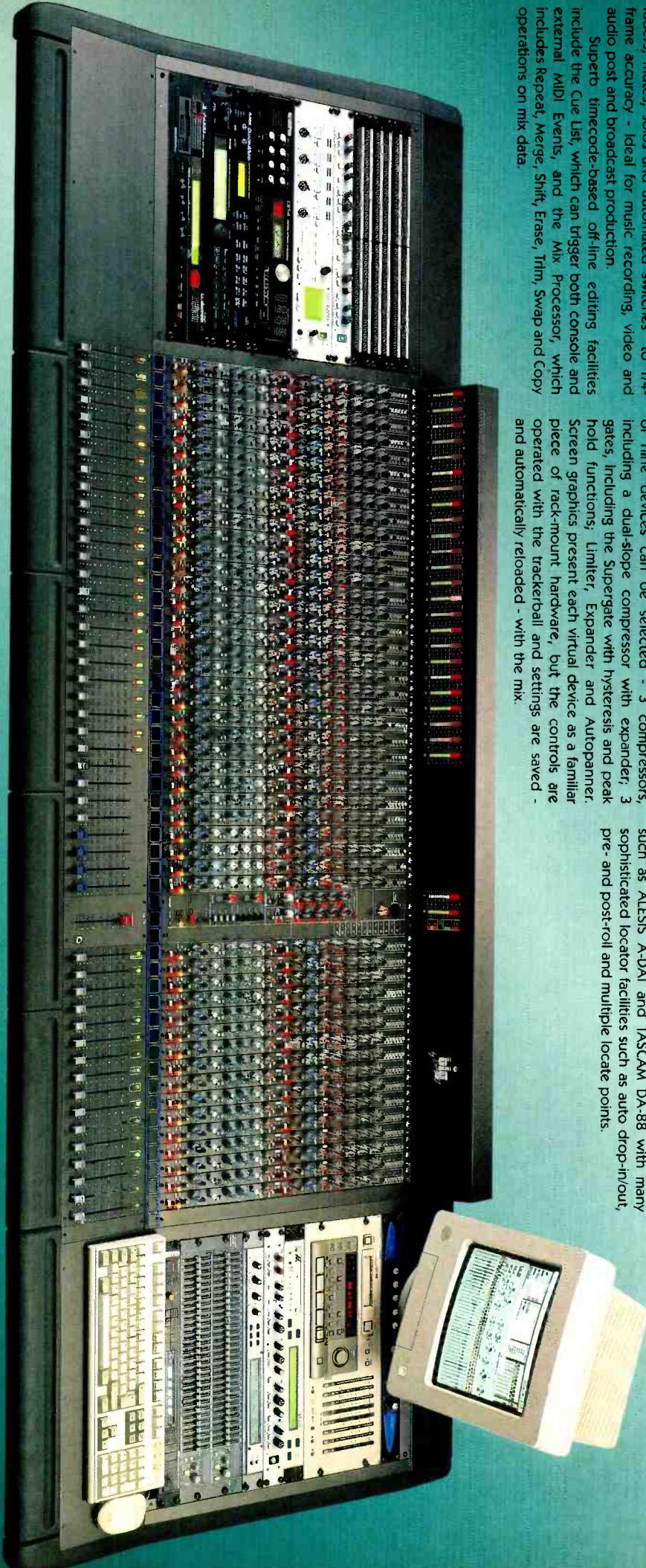
VIRTUAL DYNAMICS provides powerful and extremely flexible gain control on each channel. One from a choice of nine devices can be selected - 3 compressors, including a dual-slope compressor with expander; 3 gates, including the Supergate with hysteresis and peak hold functions; Limiter, Expander and Autopanner. Screen graphics present each virtual device as a familiar piece of rack-mount hardware, but the controls are operated with the trackball and settings are saved - and automatically reloaded - with the mix.

AMEK VFX (Visual Effects)

This incredible new programme will be released in SUPERTRUE during 1995. Outboard effects devices by many of the most famous manufacturers - such as Eventide, Lexicon, Roland and TC - can be controlled directly from the console via MIDI. AMEK's graphics templates simplify operation by presenting multi-level menus in the form of knobs and switches, allowing instant access to all programmable parameters.

AMEK MMC

MIDI Machine Control is now implemented within SUPERTRUE and allows operation of popular recorders such as ALESIS A-DAT and TASCAM DA-88 with many sophisticated locator facilities such as auto drop-in, pre- and post-roll and multiple locate points.



by Longley

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Kinshaw Perception

The idea of audio professionals appropriating consumer gear for their own use is nothing new—we've been doing it for years. Look at Quad amplifiers, a ubiquitous workhorse for low-power applications for decades in spite of their awkward input sensitivities, and victims of any number of modifications and mutilations to shoehorn them into a world for which they were never designed but whose requirements for rugged reliability and simplicity of function made them very attractive.

Quad apart, the number of pieces of equipment that have crossed the divide remains small, perhaps because of the mutual hostility that often seems to exist between the worlds of pro and consumer audio. The professional sometimes tends to regard the hi-fi fraternity as oddballs who will buy any wacky idea so long as they have been led to believe it will improve their sound in an indefinable (read inaudible) way, while the buyer of top-end hi-fi appears to regard recording engineers as a bunch of cloth-eared techno-freaks whose sole aim in life is to impose their distorted view of what the world should sound like on an public they disdain.

Fortunately, there are those who realise that we share a common goal of faithful reproduction of sound, and that the professional world will absorb new ideas when their worth has been proven, even if we were a bit slow off the blocks with oxygen-free

cables and multistrand speaker feeds. One small company hoping to cross over deliberately rather than by accident is a Cornish hi-fi specialist called Kinshaw, named (sort of) after founder and designer Peter Hawkins.

Kinshaw have established a strong reputation for excellence in design and good over-engineered build quality in a small range of hi-fi separates which between them form no more than a high-quality signal path—Kinshaw do not make signal sources as such. Their phono preamplifier (complete with separate heavy-duty power supply) has made a particularly strong impression, and together with a D-A convertor, balanced line driving preamps and power amp forms the *Perception* range. The image of the *Perception* units, with several quirkily individual ideas, a distinctive, wilfully functional appearance, and the kind of performance that gets them talked about, separates them from the mainstream and puts them in the esoteric league, belying their comparatively modest prices.

The *Perception* power amplifier has also attracted attention, and not only from the home users. It too has an unusual combination of features which invite its consideration as a professional amplifier, a prospect already suggested by some professionals who have used it and actively being explored by Peter Hawkins. The most immediately obvious detail suggesting it may be more appropriate for pro installations than some amplifiers we already use is the presence of XLR inputs—not too rare a sight these days on consumer audio except that these work properly. Many manufacturers are sprinkling

a few XLRs around in the hope of lending an industrial flavour to their products, neglecting to point out to purchasers that they are actually unbalanced and wired in parallel with the phonos next to them. Happily this is not the case with the Kinshaw equipment, which takes a lot of trouble with balanced inputs and outputs. The sensitivity of the *Perception* remains a little on the high side, however, although we should be used to that; still, an input attenuator of some sort would not go amiss.

The central distinguishing feature of the *Perception* amp is not, however, its external detailing; it is its heavy use of FET circuitry. Peter Hawkins background is in instrumentation design, and this led him to adopt his own unusual approach to amplifier design which he believes tackles low-level detail rather better than conventional methods. The trade-off is the necessity, as stipulated by Hawkins, of warming the amplifier up before serious listening, by which he means about half an hour, not of idling but of actual playing of music. He stresses that the difference this makes is subtle, but worth waiting for, and my own experience of the amplifier backs this up. As a guide to how long the unit has been operating, an array of LEDs provides increasing illumination for the PCB visible behind the smoked perspex front panel—a feature designed for the consumer which I suspect we could live without, particularly as it works off a simple timer and therefore gives no real indication as to the state of the circuitry.

In fact, even before the warm-up time has elapsed, the amplifier turns in a remarkable performance. It has

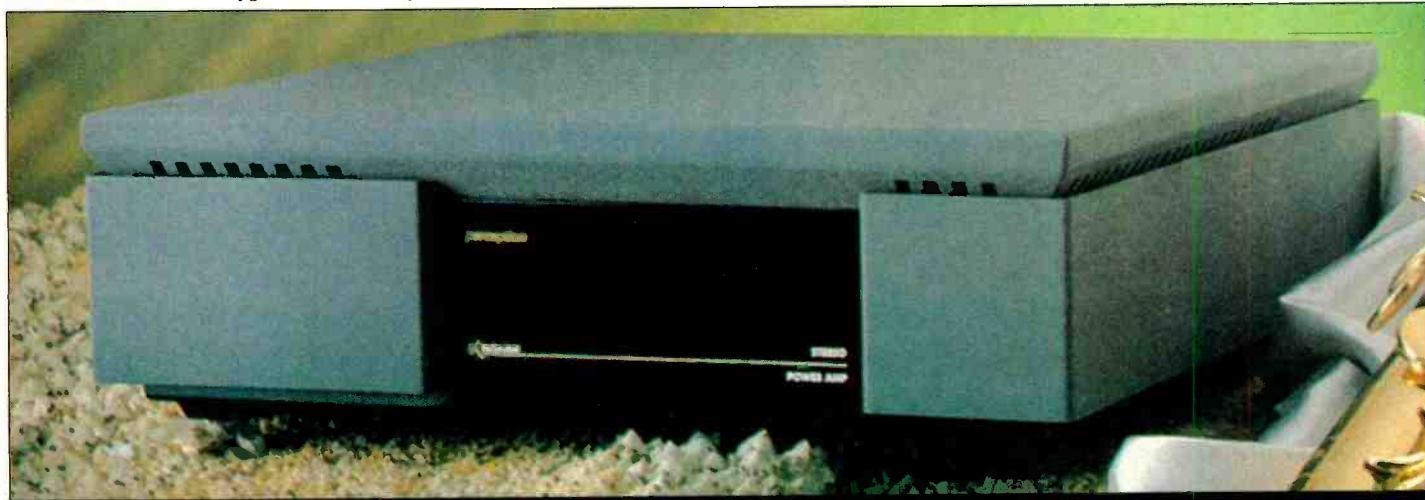
a transparency and openness which is refreshing and allows extended listening without fatigue. It has the quality always sought in amplifiers and so often lacking, of presenting no apparent obstacles to the sound—you feel confident that you are hearing everything that is there to be heard and nothing else. I used the amplifier for some considerable time to drive the monitors in two separate studios, and they were the most comfortable sessions to listen to I can remember, although there was never any feeling that the monitoring was flattering the sound. At 150W per channel the amplifier is modestly rated for monitoring, but not so modestly as other more familiar boxes; in practice, in a moderately sized control room its power capabilities are more than adequate.

Opening up the cabinet reveals an impressive piece of work: construction is a sensible combination of modern machine techniques and hand wiring, and features fully separate power amp boards and the biggest toroidal mains transformer the case could have accommodated.

The *Perception* seems to me to represent an interesting example of the practical benefits of a fresh yet soundly based approach when used in a real-world context. Kinshaw equipment is doing well with the hi-fi buffs, and, perhaps, once again their ideals and ours may be seen to overlap. ■

Dave Foister

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Kinshaw's *Perception* power amplifier—high-end hi-fi principles turn in a pro performance

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**TLA
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Korg Wavedrum

The world of synthesis in its many forms is currently at one of its most exciting stages for a good number of years. In among the general melee off samey-sounding tone boxes and sound generators, a number of products stand out head and shoulders above the rest purely because of their ability to create genuinely different and innovative sounds using methods that certainly are not run-of-the-mill at the moment.

Visible from a distance are Yamaha's VL1, Roland's VG8 guitar system and, to a lesser extent, E-mu's *Morpheus*. All of these share a curious 'you've never heard this before nor can you imagine it without actually hearing it' property but they are also united in drawing heavily on player approach and technique as integral parts of the tone creation process. What they amount to is playable 'new' instruments with inflection potential in a land where such things have largely been neglected in the search for larger onboard sequencer memories, masking digital effects and sound cards that guarantee that your synth will sound identical to anyone else's.

An area that has not quite kept up with this line is percussion. There have been numerous successful attempts to provide the drum kits of a continent on a single sample CD for stimulation and triggering from sophisticated drum pads but you don't get the impression that this is being taken anywhere from the performance and instrument angle.

Enter the Korg Wavedrum, a percussion synthesiser that creates sound using a State Variable (SV) synthesis system that generates a diverse range of sounds and expressive playability. The playing strength and technique of the player is directly reflected in the sound that results so it is not merely another arrangement of dynamically sensitive sound-source switches. The source sound on the Wavedrum can either be taken from a PCM waveform table or it can be taken in real time from the sound that occurs when you hit the thing. This last point ensures that not only are different players going to sound different on the same Wavedrum but also different Wavedrums will sound different from each other.

The method of synthesis takes in



The latest musicians' technology to arrive in the recording studio—Korg's Wavedrum

analogue, FM, additive, nonlinear and the buzz word of physical modelling in 62 types of algorithm each of which also includes elements that determine the tonal character of the resulting sound such as the size of a guitar body or the depth of a snare shell. Parameters are assembled in 100 internal memories.

The Wavedrum has a 10-inch drum head complete with tension bolts and gets its information from a sensors beneath it. Controls and outputs are presented around the edges of the drum. There is a stereo line output, an expression pedal input, rim sensor input (for rimshots), a remote editor connection for extended access to functions, a full complement of MIDI connections, BANK and PROGRAM selectors, phones output and LEVEL pot, HIGH and LOW global tone controls, OUTPUT LEVEL pot, and parameter selector and value controls. Tuning and decay are accessible along with one sound edit parameter for adjustment from the Wavedrum surface along with a 'window' display.

The optional remote editor permits parameters of algorithms to be adjusted, named and transferred via MIDI to other devices or assigned for external control and uses a large LCD with soft buttons beneath it. Pages

cover setups for such things as the sound selection, pedal assignment, pressure sensitivity and output level.

Icons are presented beneath algorithm numbers which indicate special characteristics associated with it such as whether the rimshot is active; whether the algorithm is a pressure-type meaning that a sound or an effect will be produced by pressing the head; or whether it is a friction-type algorithm which means that the head can be hit or rubbed. There are also algorithms that generate different notes each time the head is struck (you can, in some cases, select the musical scale from a list that includes pentatonic, Okinawan, Indian-type, whole tone, major, or tonic and consequently play musical phrases) or a continuous phrase will be generated with each strike.

Algorithms are provided for such things as electric bass, temple bell, Moroccan Bendir drum, congas, large double-headed drum, Indian drum with Tambura drones, baraphone, small metal percussion, berimbau, large drum with vibrato, sitar and tambura, tabla and baya, gongs, bodhran, talking drum, bottle blow, snappy snares, toms, dixeridoo, analogue electric drums, koto, xylophone, plus various other arrangements that includes an

ensemble of five snare drums and various other kit configurations that permit more than one sound to be played from the Wavedrum skin.

One of the appealing things about the Wavedrum is that it is well focused in what it attempts and does not pretend to be all things to all men. High power users already include percussionist Sheila E, Take Five Musical Director Chester Thomson, UB40 percussionist and vocalist Norman Hassan and Living Colour drummer Will Calhoun.

It all points towards an innovative and highly responsive new playing surface for drummers and percussionists that gives them an instrument with which to challenge some of the developments that have been made in synthesis for other types of musician. The creative potential for a kit's worth of Wavedrums is positively staggering. How strange therefore that is should be Korg of all manufacturers that is addressing this sector of the market. ■

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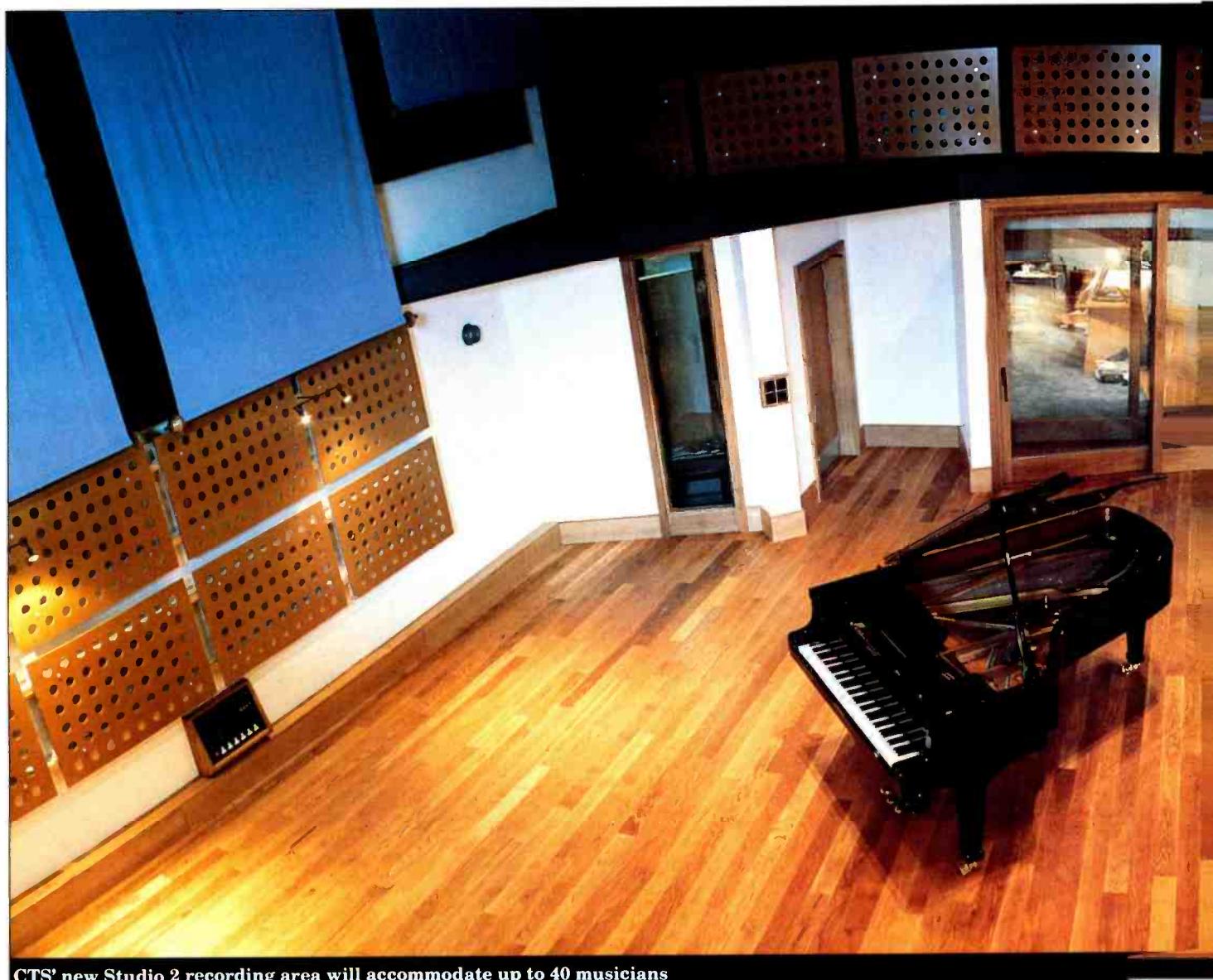
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CTS' new Studio 2 recording area will accommodate up to 40 musicians

CTS STUDIOS

The latest developments at London's internationally renowned CTS film and music facility involve a new *Capricorn* studio room. Zenon Schoepe talks to CTS' Adrian Kerridge

CTS Studios' new Neve *Capricorn* room went on line in May and continues the association between the studio and the brand name that has remained strong over the years. It also resurrects the connection between CTS and digital desks which started when it was the first studio in the world to go digital with the Neve *DSP* in 1984. They were ground-breaking times but anything but stress-free according to CTS Director Adrian

Kerridge who inherited the desk when the Lansdowne team bought CTS in 1987.

'The *DSP* was way ahead of its time,' he says. 'Of course it had lots of faults, but when it worked it was quite incredible.' Predictably this first encounter has had an influence on the desk selection process for the new Studio 2.

'We had learnt a lot about digits at CTS through the *DSP* and we also knew what AMS Neve were up to as some of our engineers here were privy to the development of the *Capricorn*, but we knew from our experiences with *DSP* that it would be a long road,' he explains. 'I now firmly believe that digits have come of age in terms of acceptability, technology, performance and reliability. Reliability is down to hardware and software. From my experiences of software I know that you can't always get it right first time around, it takes time to bed down and get solid. *Capricorn* is a very solid console and since it's been in here we've had no troubles.'

Studio 2, home of the 48-fader desk, 160 signal paths, is described as a multifaceted room for music albums, television and film sound, with Dolby Surround Sound monitoring. It slots into the CTS complex in Wembley, which has four studios, in addition to other ancillary facilities. The jewel in the crown undoubtedly remains the large natural acoustic Studio 1, with its Neve VRP and a recording area for up to 120 musicians.

Studio 3 houses a DDA while Studio 4 has an early Neve 8038 of a similar type to that originally in Studio 2 which



went stateside to make room for the *Capricorn*.

'For the type of work we're doing in that studio, we needed to take ourselves further into the 20th Century,' states Kerridge. The opportunity was taken to rebuild Studio 2 completely, courtesy of Recording Architecture to provide a middle-sized live area, for up to 40 musicians, with natural daylight, incorporating an interesting balcony plus large isolated drum booth and vocal booth all finished off with a delightful floor of prime American oak.

'We've achieved a very good low frequency response with the ATC SCM200 speakers and the new ATC SPA 24-850 amplifiers in the control room,' enthuses Kerridge. 'They're totally amazing. We had ATCs in the old room and I'm biased because I'm a great fan of ATC. We've had excellent results with their monitoring systems and I saw no reason why I should change. We've got a very precise image across the room.' Surround-sound monitoring is provided by ATC SCM10s.

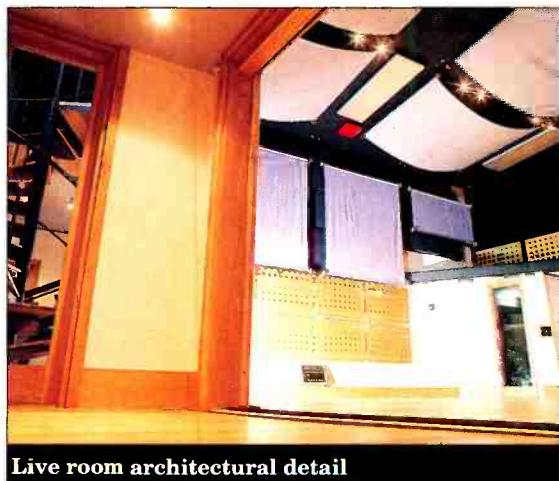
The studio can run in NTSC or PAL at the flick of a switch with a variety of picture sources and video monitors handling 5:4 and 16:9 TV formats.

Although the decision to revamp Studio 2 had been mapped out a year before, the decision to go with the *Capricorn* was not a foregone conclusion. 'I'd heard a lot about *Capricorn* at that time and it wasn't all positive but I decided to go see for myself,' explains Kerridge. 'Because it's such a high-end console, at the time we also weren't sure if we could afford the money. Our business is Johnny Pearson the composer and myself—

we're not some big corporate with a black hole in to which we can pour money—so the business decisions we make have to be the right ones. There's very little leeway to make mistakes.'

He admits that they did talk to other major mixing-console manufacturers but still weren't sure whether they wanted to go digital principally because of what they had heard. There was, however, a turning point for Kerridge.

'There were several things that attracted me to *Capricorn*', he recounts. 'As an engineer who has been around in the business for a number of years, I came through a music and engineering school of making a lot of pop records in the 1960s and 1970s. That required a degree of creativity for creating and processing sounds with what were the very limited external processing resources available in those days. I'd run out of hands so we used to mix in sections or have four hands on the console to create an effect which was never precisely repeatable. I used to have this dream ►



Live room architectural detail

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Studio 2's 48-fader *Capricorn* desk keeps the company of ATC SCM200 monitoring

that wouldn't it be wonderful if I could dynamically automate mixes on things like EQ and processor movements. We have now come to the stage with digits that it gives the engineer this ability to be enormously creative and *Capricorn* is an enormously creative and powerful tool. I also don't have to worry about the electronics of it as it's totally transparent to my creativity. That is basically what I require.

The other thing is that working in the commercials world with such things as jingles as we do in Studio 2, those projects are produced by committee,' he continues. 'They then go to the client who says he doesn't like something so they have to come back and remix it. What could be better than popping in an optical disc, making that adjustment and then taking it away again?

'One of my guys here said to me yesterday that once you've worked with *Capricorn*, working with an analogue console is like going back to the Stone Age, and you can see the point if you think about how long it takes to reset all the controls on a 72-fader board,' says Kerridge. This he believes is a very real issue in any studio that needs to set a room for a string of different sessions as this is wasted, unchargeable business time, and soon adds up and in his opinion, in this matter alone, *Capricorn* will give a much improved production turnaround.

However, it's not the only desk that can do this. 'It isn't,' he agrees, 'but are the other desks that do it as flexible as the *Capricorn*? We believe not.'

'Speaking to other engineers I realise that some of them have a negative attitude towards *Capricorn* and maybe the competition has had a negative attitude towards it too. I believe that some of the gifted-eared engineers are frightened of this technology,' he claims. 'That's a controversial

statement to make but if you are frightened or apprehensive about this so-called 'complicated' technology then defence is the best form of attack. If those guys really took the opportunity to take their blinkers off and use their skills with sound and thought about the operation of it all, then I think they would look at it in a different light.'

He admits that when he first saw *Capricorn* three years ago he was acutely aware that it was not what he was used to. However, he now underlines the fact that the configurability of the desk permits CTS to arrange the desk to suit the way an in-coming engineer wants to work, be it inline or group desk with a specifiable number of cue and aux sends. This ability is a strong selling point for the concept of the console—it can be preprogrammed for a freelance engineer, who can then take away their individual configuration on a disk, ready for their next visit.

Flying blind

Kerridge is aware that the majority of the benefits that he has cited so far are essentially user benefits and he's keen to extol the virtues of the sound quality aspect. He blind-tested all his engineers on a big band DASH recording that he had mixed through an analogue desk and the *Capricorn* which he had them had edited together into a composite master. Extended and repeated listening revealed a preference among the listeners for the *Capricorn*.

'What this means is that it gives us the freedom of all this craftsmanship that I talked about earlier plus musically I don't have a problem with it,' he states.

He's also unimpressed by those who claim that the analogue desk will remain unreachable for ►



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- ATC SCM200 (Power Amps SPA24-850)
- ATC SCM10
- Yamaha NS10M
- Sony PCM 3345
- Studer A800 III
- Dolby SR/Dolby A
- Panasonic SV-4100 Dolby x 2
- Denon 790 x 2
- Denon DCD-1015
- Lexicon 480L with classic cart
- Lexicon PCM80
- EMT 140 ST plates
- Eventide DSP4000
- Roland R880
- Yamaha SPX990
- AMS 15-80
- AMS RMX16
- BSS DPR901
- Drawmer DS201
- Urei 1176 x 2
- DBX 160 A
- SRC at SMPTE—MIDI
- Urei click box
- Lynx 2 synchronisers
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- Destripalys
- Dolby Surround Sound Encoder and Decoder

some time to come by digital desks in terms of absolute sonic quality.

'I'm going to get myself into hot water here but how do you measure the sonic quality of a desk? Some engineers say you need a bandwidth in excess of 46kHz to hear the harmonics in a wide-band audio signal—well maybe a dog can but I can't,' he laughs. 'I agree there is a harmonic structure of higher frequencies but if you take a cymbal at its pertinent point you get that structure going up but they are very low level harmonics. It is important to have a wide bandwidth on a desk and in analogue, of course, you get that but nobody has come to me in this industry and proven to me that wide bandwidth alone is the contributing factor to good sound. If it's got low distortion, good transient response and good phase response then it's going to sound good. Bandwidth is not everything.'

As one of the founders of desk manufacturer Cadac in 1968 his comments are, unsurprisingly, in line with those of cofounder and desk designer Clive Green. 'We were of one accord about sound, about choosing the centre frequencies for EQ based on a musical scale,' he explains. 'We were very clear about the optimum Q in those days because we experimented and listened. We were very hot on transient response and noise and distortion. We came to the conclusion that bandwidth was not the be all and end all and we further came to the conclusion that the two key factors are transient response and phase shift in a mono signal path (as opposed to group delay).'

Consequently, he believes that with a digital console the most important things are the convertors and the transient response of the analogue input-output stages.

'People say that digits are cold and clean and I would agree with them but they're only like that when you have very heavy CRC errors in the recording because that changes the sound,' he continues. 'I've seen installations of digital equipment where nothing is referenced to an external wordclock—if they're not then you've got problems, especially with 20-bit, and I know that from our tests with *Capricorn*.'

Processing delay is another popular bugbear for the anti-digital-desk brigade. 'The total delay on the console is 793 microseconds. I think I've got pretty good ears but I can't hear that. Ask all the people out there what the time constant delay is on an analogue tape machine in the EQ circuitry.'

'You see it's fashionable to knock it,' he retorts, 'but look at the IEC standard on analogue tape machines, look at the rise time of the curves of NAB at 30ips and 15ips. Are they aware that you only start to hear a perceived change in sound after 5ms. I certainly don't have a problem with 793 microseconds.'

Kerridge believes the market appeal of *Capricorn* is potentially enormous as some of the clouds of mystique lift. 'I told Mark Crabtree (AMS Neve Managing Director) that I didn't think they'd pushed *Capricorn* enough and if they have pushed it then I didn't think it's got to the right ears and nobody's really told people what this desk is all about,' he says. 'I also told him that I was glad that they as a firm have not neglected their roots in this industry in this country.'

'In fairness to them there was the AMS and Neve merger and then the move up to Burnley and it must have had an effect on the later development stages of *Capricorn* in what you might call 'getting it right'. Even so Kerridge was certainly not deterred by it.'

'Being a bit long in the tooth, I learnt many years ago not always to be first with my snout in the trough and I figured on this one that we would sit quietly and wait,' he says. 'We saw a lot of the competition.'

'I'm a great believer in doing your homework behind your office desk,' he adds. 'Plan it properly technically, talk to the people that are going to put it in, learn and prepare for any technical pitfalls that you may run into. It's been no easy caper this, especially with 25MHz of MADI zazzing around everywhere and you can imagine the EMI being chucked out of those cables. Learn, don't do dumb things on installations like multiple earthing and running MADI lines next to microphone leads or bunching them together so they interact with each other. Be sure everything is locked back to a single wordclock source.'

While obviously delighted with the design and installation of the new Studio 2 and especially the *Capricorn*, Kerridge's enthusiasm for the technology is only eclipsed by his enthusiasm for the job. ▶

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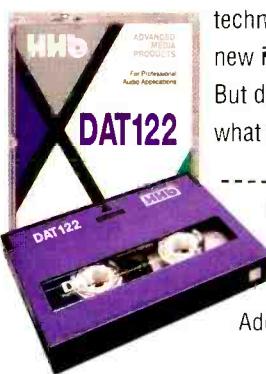
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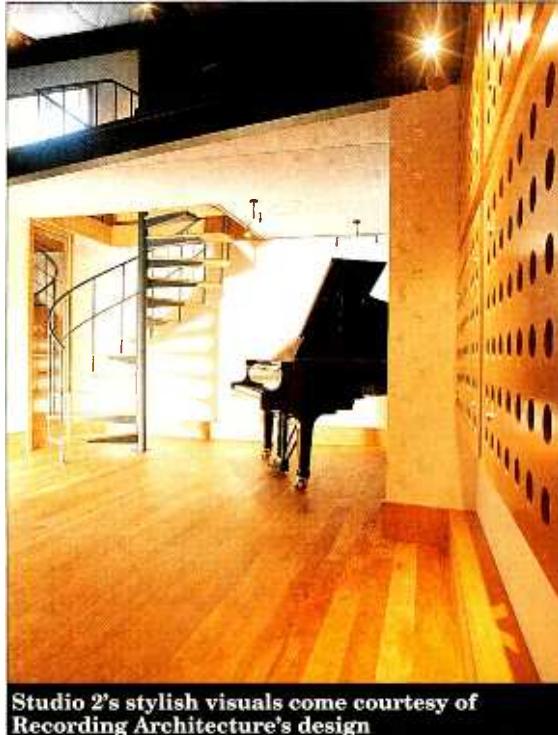
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Studio 2's stylish visuals come courtesy of Recording Architecture's design

'Let's not forget that we're in the business of making music for people on a wide variety of work,' he says. 'It's a big chance, it's a big investment, but I'm very confident that we've made the right decision.'

Certainly, work for CTS Studios is thoroughly international, and Kerridge feels that Studio 2 will provide ample support for expanding this aspect of the business. The studios' ISDN lines have been kept busy, handling projects ranging from ADR work for a West Coast film soundtrack—it was cheaper than flying the actress out to LA—to music mastering direct from Australia. Having a Dolby Surround system compatible with Studio 1 will enable direct-to-picture mixing and overdubs to be transferred to Studio 2, freeing up Studio 1. Picture formats include low-band and high-band U-Matic, together with Beta SP and 35mm mag film. With the *Capricorn*, work in Studio 2 can obviously stay in digits all the way to the dubbing theatre, as projects can be mixed onto ADAT or Tascam DA-88, or back to 48-track digital if required. The studio's Studer 48-track also offers the ability to lay down 24 tracks at 24-bit, taking full benefit of the *Capricorn*'s quality potential. ■

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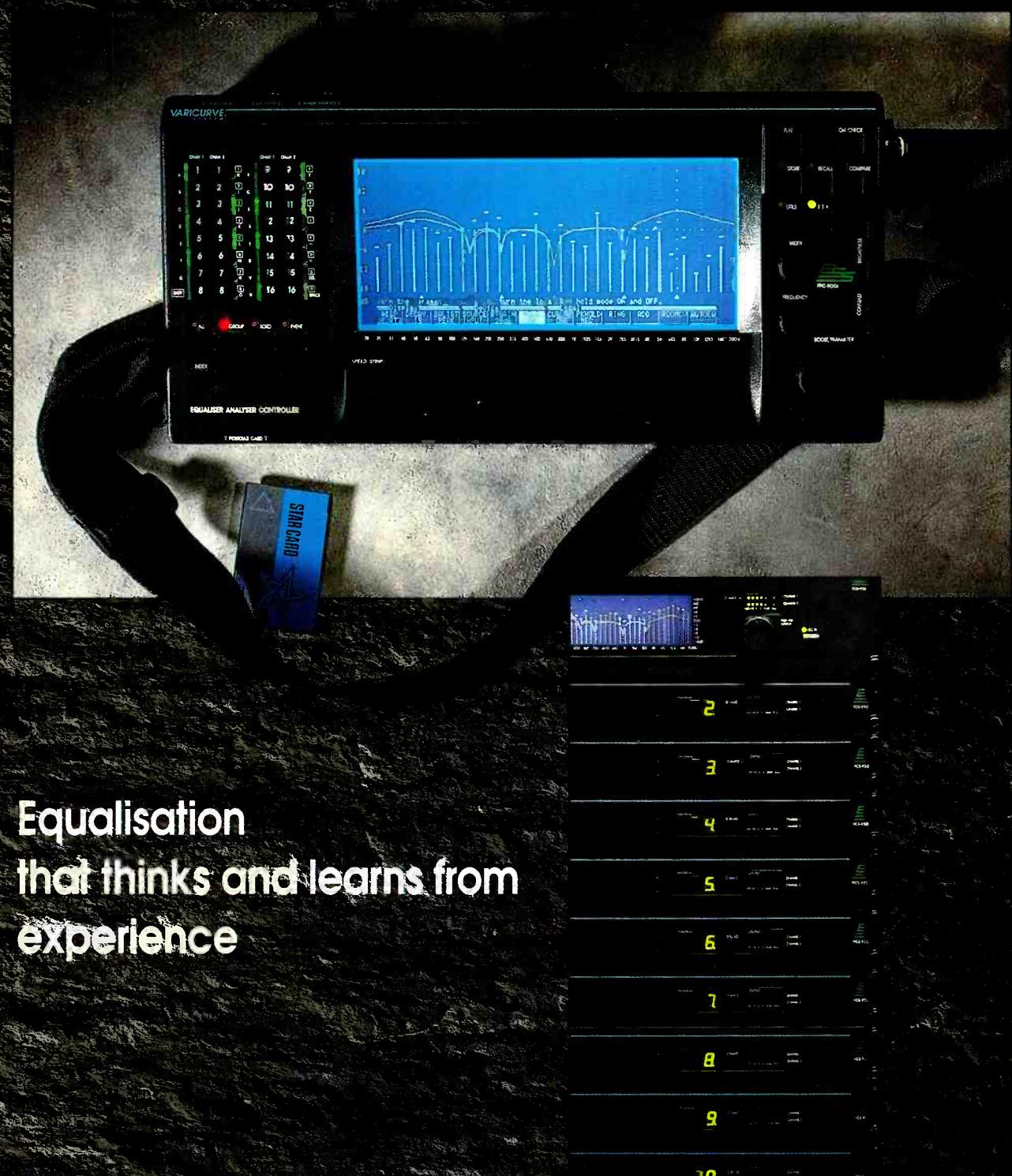
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LA CONNECTION

Workstation manufacturers kick the development ball into the users' court. Yasmin Hashmi takes a straw poll on the West Coast of the US

With nonlinear technology, be it for audio or video editing, it used to be the case that manufacturers led the user in developing applications and features. Now that the obvious benefits of the technology are taken for granted, the tables have been turned and users appear to be leading the way. With larger facilities in particular, the problems concerning archiving and the movement of material between multiple studios are more pronounced, and it appears that manufacturers must address these issues if the technology is to move forward.

The requirement for multiple access to programme material can arise for a number of reasons—sharing a common library, passing material through various stages of postproduction, and the need to make different versions of the same material, for example. Furthermore, it may be necessary to have the material readily available for future revisions.

One solution is to use removable media such as M-O discs or removable hard drives. However while this may almost be as simple as swapping a reel

of tape, it is not as cost-effective and neither does it make the management of material any easier. Perhaps a more convenient solution therefore, is to use a network with appropriate database software, that either allows material to be accessed from a large central store, or the transfer of material between remote storage sites. However, whether material is transferred physically or electronically, the devices sharing the material must be compatible.

As the land of superlatives, there is, perhaps, no better place than America to examine how nonlinear technology can be applied in the extreme. However, in visiting three unique larger facilities in Los Angeles recently, it became evident that users of disk-based systems ultimately face the same issues, whether using that technology for audio or video applications. In some cases, nonlinear technology meets with practical requirements, but it is also evident that there is still some way to go before the editing process can become completely tapeless. Developments at the following West Coast facilities highlight some strengths and weaknesses of the technology, and give an indication of some possible development paths.

Pacific Ocean Post (see *Studio Sound*, January 1994) consists of two buildings, one for video and the other for audio. The video side of the business is around eight years old and is mainly involved with commercials. The audio side has been in operation for one-and-a-half years, has six studios dedicated to commercials, two to theatrical work and one to ADR-Foley. Recently, the actress Stephanie Beecham used the ADR-Foley stage for a pilot called *Legends*, Brian Banks used Studio A with a 4-handed *Logic 2* console for mixing the music to an Apple Mac commercial intended for Europe, and Kenny Loggins used the conference room for an unidentified project.

Every POP studio has at least one AMS Neve *Logic* console and a

24-channel *AudioFile*—except the ADR-Foley studio, which has a digitally-controlled Euphonix console and is soon to have a 'floating' 24-channel *AudioFile* on wheels. Commenting on the choice of the *Logic* console and *AudioFile*, Director of Sales Sandy Brainard emphasised that all rooms have to be compatible because of later remixes, adding: 'It's working out beautifully, it's been a comfort to clients to go into any room and instantly recall their mix as if they've never left.'

As far as transferring the audio material itself is concerned, POP's 'Neve Doctor' Nick Garside explains that currently Exabyte and diskette are used to transfer the audio and events list respectively to another room, but that 'the next stage is to use removable hard drives and then networking'. On the other hand, Engineer Tim Clayman goes on to add that a server operating as a central library would certainly be useful for episodic television music and sound effects, but may not be as important for his particular clients who make commercials, since most of the material they use is self-contained.

CBS Television City used to be the production arm of CBS only, but around eight years ago it branched out and is now a one-stop production house, providing everything from office space to satellite transmission for corporations such as CBS, ABC, NBC and HBO, as well as independent syndications such as the talk show *Geraldo*. Dan Sullivan is Manager of Videotape Technical Operations, and with 13 on-line suites, two $\frac{3}{4}$ -inch off-line suites, three Avid rooms, a Video Toaster room and a finishing room that includes a Lexicon *Opus* at its disposal, his department produces around 7,000 promos a year for prime-time television, as well as several shows.

The Avid systems are used for off-lining the shows, but as far as the promos are concerned, these are still done using linear on-line since, as Sullivan puts it, 'The lifetime of a promo is very short and we don't have the time to digitise'. He goes on to explain that a number of different versions must be produced simultaneously, and that the announce and text are added at the last minute since these often have to be updated. TV City have had the *Opus* since 1990, and it is used for music, sound effects and sweetening.

The three Avid rooms comprise TV City's own room and two rental rooms. ▶



Laser Pacific's Emory Cohen: 'So convenient to do business that you won't go elsewhere'

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The TV City Avid is used for off-lining smaller shows and for digitising the material for larger shows to be edited in the rental rooms, both of which have 60Gb storage towers plus removable storage for transfer between the rooms.

Ideally, Sullivan would like a central storage solution such as the BTS Media Pool, whereby various flexible modules could be plugged in to provide whichever user-interface suits the operator-customer. Storage would have to use serial digital component format, since with 17 different tape formats in operation, TV City would require a system with backward compatibility. In addition, Sullivan notes 'The real problem with digital is that tape is still the only economic archiving medium, so a solution providing high speed transfer of data from tape to a random access medium would be very popular'.

Although Sullivan acknowledges that nonlinear technology is the way of the future for TV City, he is keen to point out that the decision about which equipment to use lies in the hands of directors and postproduction supervisors and/or producers, and that for promos in particular, his clients are still mainly demanding linear editing.

Laser Pacific comprises three facilities, one each in Burbank, Hollywood and Vancouver. Although the company support production, their primary business is postproduction for prime-time television programmes.

In terms of technical facilities, Laser Pacific have five telecine rooms, eight on-line suites, three tape-to-tape (or grading) rooms and a wide variety of duplication and conversion facilities. They also have a notable reputation for proprietary systems, including the Super Computer Assembly motion picture processing lab and the Spectra picture editing system. In addition, they have a number of *WaveFrame* systems for which, as President and Chief Operating Officer Emory Cohen modestly points out, Laser Pacific were the first customers—Cohen himself being responsible for defining the system's original specifications. All postproduction sound at Laser Pacific is done in the digital domain, and the *WaveFrame* is used for sound editing, looping, foley and dubbing, with three synchronised systems used for direct playback from the dubbing stage.

This season Laser Pacific will be working on around 50 television movies or miniseries, as well



CBS Television City's Dan Sullivan:
'Tape is still the only economic archiving medium'

as on a large number of pilots. Their clients include CBS, Viacom, ABC, Paramount and Columbia, and the aim according to Cohen is quite straightforward: 'We want it to be so convenient to do business with Laser Pacific that you won't go elsewhere'.

The last 1½ years have seen Laser Pacific using MPEG compression and currently the Hollywood and Burbank facilities have sound and picture links via ISDN with a T1 line running alongside. As far as the picture is concerned, Cohen aims to have links with larger customers so that they will be able to view from off-site, and while most of the special effects equipment is in Burbank, an editor in Hollywood could still participate. As for audio mixing and rerecording, the company plan to install a server for the audio by the summer, and Cohen maintains that next season they will have a link to one of their largest customers so that they can participate in the run of the mix while remaining in their own screening room.

The ultimate target for the company is to have a central machine room, linked to remote 'virtual' control rooms located conveniently to customers. According to Cohen this will have the added benefits of more effective scheduling and better utilisation of equipment. Furthermore, he envisages that the construction of such a solution will commence within the next 24 months.

Unlike Laser Pacific, most facilities are not in a position to pioneer solutions such as those outlined above. Instead they rely on manufacturers, some of whom have already developed network systems with high-speed, tape-based, archiving for in-house multi-access or devices for wider area transfer using ISDN.

Further, unlike Pacific Ocean Post, many facilities may not have the luxury of fitting their premises with the same compatible system throughout. Some may be in a similar position to TV City, where a large number of different formats must be accommodated, be they used in-house or externally.

Fortunately, professional-quality digital audio does not suffer from the same compression requirements as digital video, and the number of source and mastering formats used for audio is quite limited. However, the choice of nonlinear audio systems is greater than for video, and in addressing the possible need to accommodate a range of file formats, an increasing number of manufacturers are cooperating to allow third-party file import and export. In addition, there are initiatives such as OMFI (Open Media Framework Interchange)—see 'Open Systems Interchange', *Studio Sound*, May 1995—and a growing number of general-purpose, file-translation, software packages available.

Ultimately, however, whatever the solutions may be, what the user wants is to store and organise material in a convenient and cost-effective way and perhaps to move on from random access to wider access. ■

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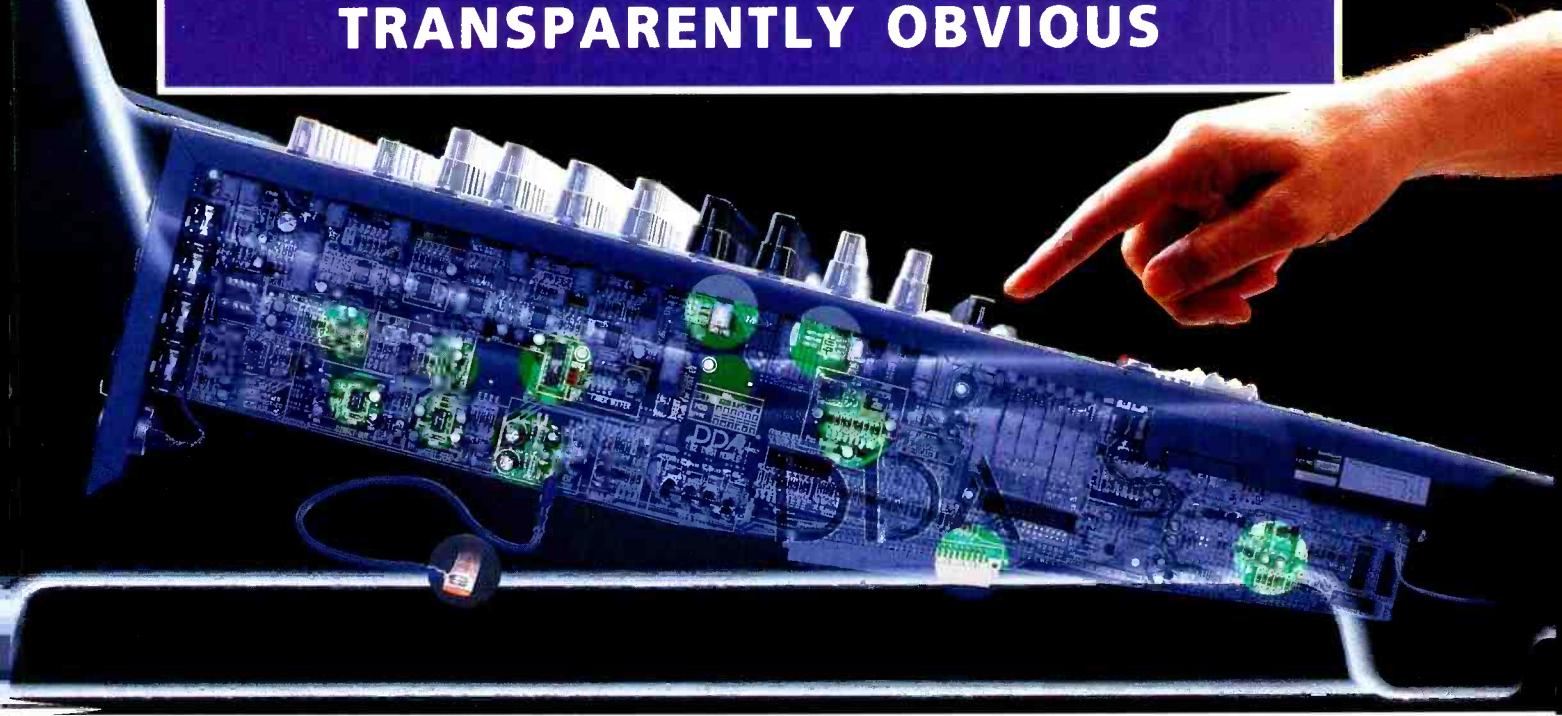
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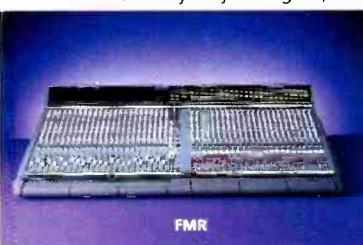


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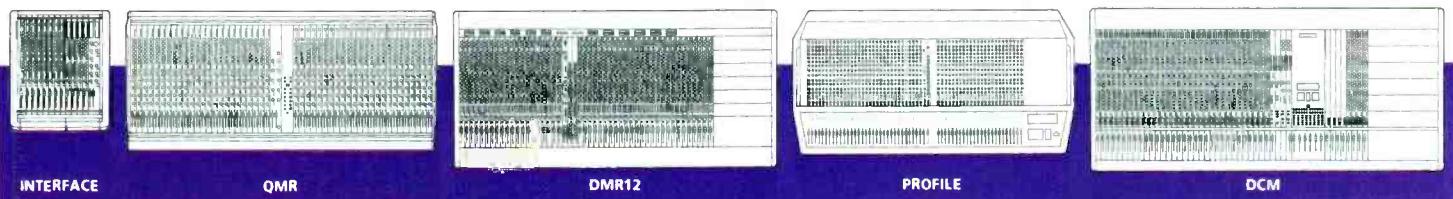
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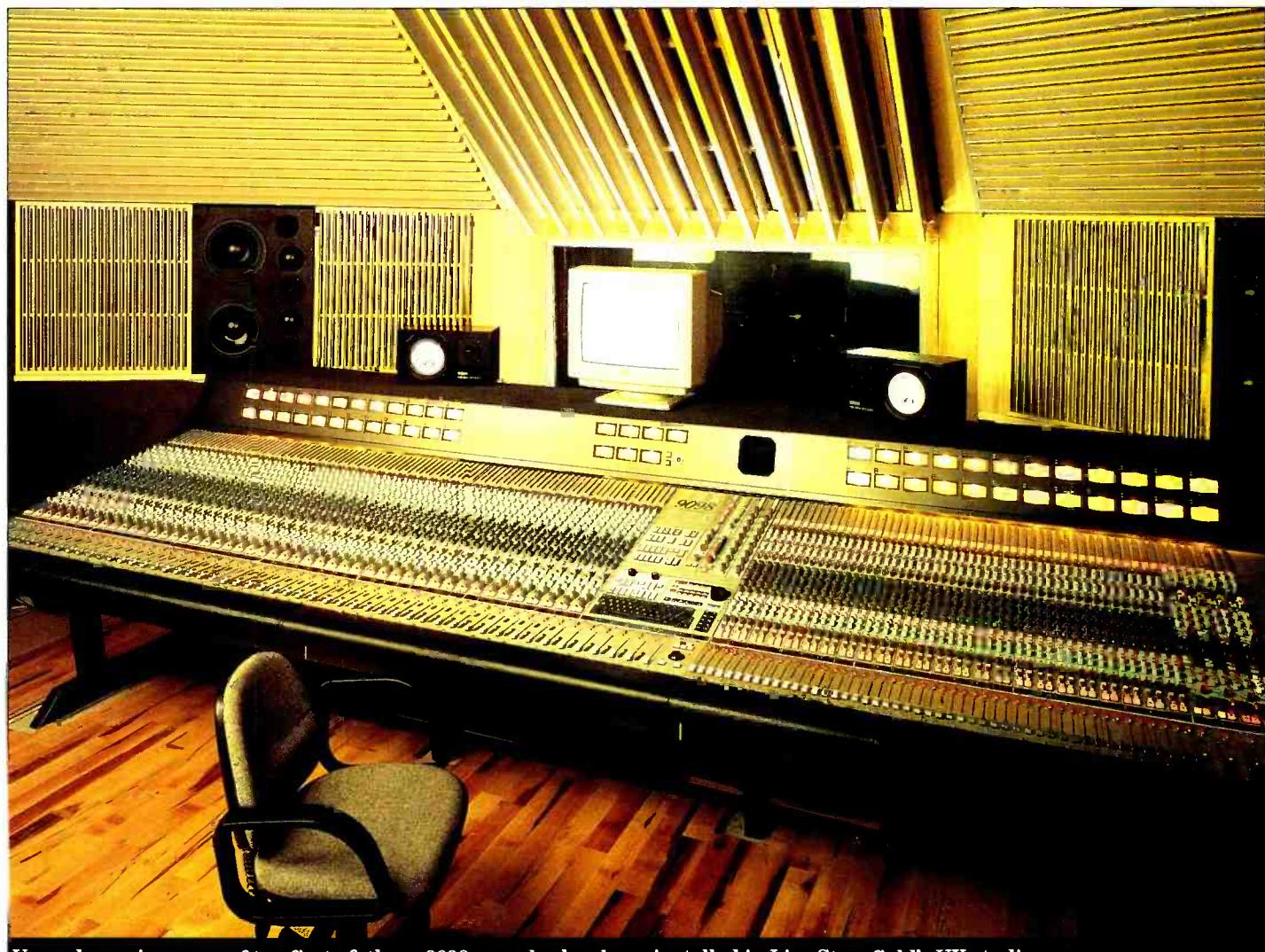
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AMEK 9098



Up and running—one of the first of three 9098 consoles has been installed in Lisa Stansfield's UK studio

When you think of top-end, large scale, traditional analogue consoles, three manufacturers names quickly spring to mind—AMS Neve, Focusrite and SSL. For many years these companies have ruled the 'super-console' roost and their products have become studio status symbols all around the world.

Now a fourth company has joined this elite group with a brand new console that offers the very best of British design from the world's most famous and respected analogue console designer.

Amek's Rupert Neve-designed 9098 console has been three years in the making, and the first desks have now been commissioned at Lisa Stansfield's

Rochdale Studio and CBC Canada (two consoles). The 9098 bears all the hallmarks and pedigree associated with Rupert Neve, who has no hesitation in claiming that it his best console in over 30 years as a designer.

But there is a question mark—is this the right time to have designed a top-end analogue console from the ground up? With buyers' eyes focusing more keenly on digital alternatives, and console manufacturers introducing new exciting digital products (including incidentally Amek who will announce a digital console later this year), will high-end analogue sales begin to drop off? Rupert Neve believes not.

"While digital is an excellent delivery medium, it has not yet come of age when

it comes to initiating the highest quality audio source signals. Almost inevitably these originate in the natural world which is an analogue domain. There is much work to be done on convertors and sampling rates before the bandwidth ►

Rupert Neve's 9098 design combines audio excellence with ease of operation. Patrick Stapley takes an exclusive look at the latest high-end analogue console



The 9098 centre section showing the considerable depth (just under five feet) of the desk and track ball for control of screen-based functions

and resolution which I typically specify can be achieved—these are key factors in establishing quality audio performance.

'Just as a photograph taken on a throwaway box camera can never produce high-quality artwork, the audio quality at the beginning of the chain determines the final result. The underlying rationale behind the 9098 is that analogue is still the ultimate originating medium and in my mind will continue to be so for some considerable time to come.'

In typical Rupert Neve style, the console is impressively over-engineered at every stage, from the rating of power supplies to the no compromise performance of Class A amplifiers. Amek's Jeremy Wilson who worked on the 9098 alongside Rupert Neve admits to being quite astonished by the console's specifications.

'Apart from the desk's frequency response which disappears into "dog land" and beyond, the noise figures are quite unbelievable. I've been

making consoles for the last 15 years and I have to admit that when I came to measure the 9098 I thought it was broken—the bus amplifier for example measured down at 103dB which is absolutely ridiculous—these are the kind of figures you associate with cable measurement and I can't imagine digital being this good for a very, very long time.'

The 9098 is a monster, and proportionally reminiscent of the original Focusrite *Forte* console (also designed by Rupert Neve) having a front-to-back depth of just under five feet. A typical 88-module console incorporating 48 mono inputs, eight stereo inputs, 48 monitors, master section and double patchbay, is 17 feet long.

With a desk of these proportions, considerations obviously have to be made about ease of installation, and Amek have replaced their traditional one-piece welded, tubular steel chassis with a sectional frame. This consists of a number of

bolt-together sections which can be assembled in various ways to produce straight, curved or L-shaped designs while at the same time enabling the desk to be delivered in sections for easy installation into sites with restricted access.

Module width is also much greater than any of Amek's previous consoles (*Hendrix* is 35mm, the 9098 is 45mm) to allow for the sheer number of controls. No dual-concentric or multifunction controls have been used, the philosophy being that every function should have its own, easily accessible knob or button—this philosophy also extends to indicators and every switch on the desk has either an associated LED or built-in lamp.

A lot of work has also gone into the aesthetic aspect of the console with many alternative face plate and knob colours being tried out before Rupert Neve was completely satisfied. A major criteria was to avoid harshness and give the desk a light and airy look—important for such a large surface area. Also, the console has avoided white legends on dark backgrounds, and like conventional print, uses black on light backgrounds which Amek say is easier to read.

The 9098 is supplied with Amek *Supermove* which provides moving-fader automation for all faders, up to 18 automated switches per module, and a Recall system. Also included is the company's *Virtual Dynamics* package and *Superloc* machine control. Amek can supply the console in any number of configurations to suit the customer and three types of input module are available—Mono, Stereo and Dual. Application wise, the 9098 is aimed at music studios, broadcasters and postproduction with a number of features included for film work.

Inputs

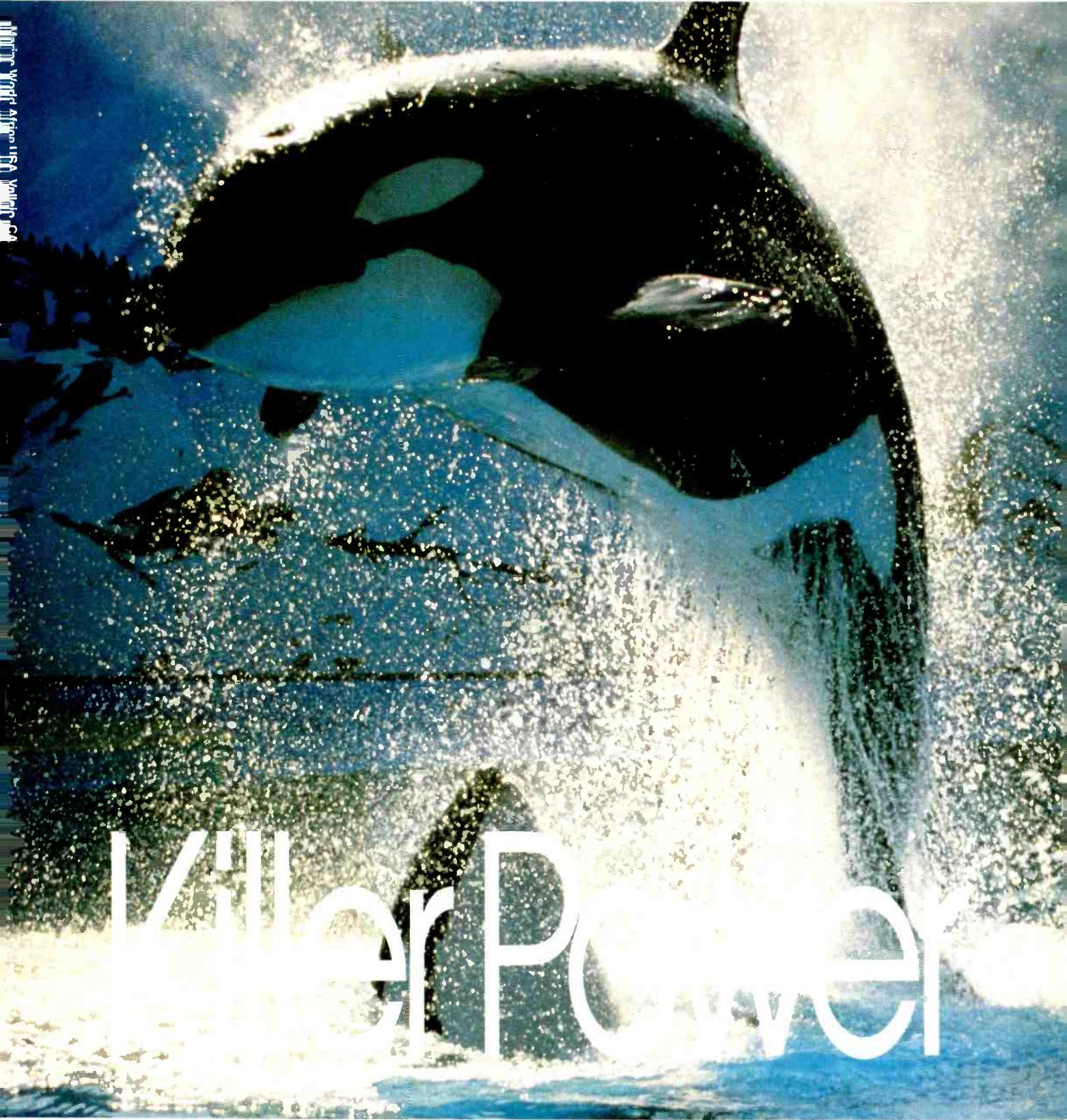
When confronted for the first time with a console of this scale, it can be a rather daunting experience. However, the 9098 has been designed to be logical, with its split architecture and familiar signal paths, and when one gets used to the sea of controls, it is actually a very easy console to operate. Anyone familiar with previous Rupert Neve designs will rapidly feel at home.

The input module can source between four inputs—Mic, Line, Tape and Sub (selects the associated bus signal allowing the channel to be used as an audio subgroup). Mic and line amplifiers both use Rupert Neve's TLA (Transformer Like Amplifier) designed to mimic the behaviour of a transformer without the penalties. Gain is provided from two pots: a 12-position MIC GAIN providing up to 72dB of boost in 6dB steps, and a centre detented TRIM pot offering ±6dB of fine control for the mic input, and +18 to -6dB for line level signals (Line, Tape or Sub). Phantom power and phase invert switches are included, but due to the range of the mic amplifier, no pad is necessary.

The next point in the signal path is the pass filters (HP: 22Hz–300Hz, LP: 4.3kHz–25kHz). Both are continuously variable, 18dB/octave designs with independent IN-OUT switches, and can be switched into the side chain of the *Virtual Dynamics* system—for example to modify the ►



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ANALOGUE CONSOLE

keying operation of a gate.

The 4-band equaliser, as one would expect, owes a lot to Rupert Neve's original designs incorporating the kind of curves he first developed back in the 1960s. This is not simply old circuitry bundled into a new console, but takes full advantage of new technology and ideology. For a start, the components used here are far superior to those available 30 years ago, frequency ranges have been extended well beyond the threshold of hearing in line with Neve's belief that ultra high frequencies have a significant effect on the way we perceive sound, and a far greater selection of facilities (some unique) have been included.

In fact, a great deal of functionality has been packed into this equaliser. Bottom and top bands have six switched frequencies (LF: 30Hz, 48Hz, 66Hz, 100Hz, 160Hz and 270Hz; HF: 2.5kHz, 3.8kHz, 5.7kHz, 9kHz, 13kHz and 20kHz). The low band can be switched between shelf and peak, while the high band has the unusual feature of a rotary control that allows continuous transition between shelf and peak. Both bands have relatively steep curves but these can be changed using Glow and Sheen controls as Neve explains.

'Traditionally, my EQ curves have been fairly steep sided and here they are just 6dB per octave. The GLOW and SHEEN controls broaden the curve in the LF and HF respectively so that in a peak response it's rather like having a very low Q; in the shelf position it produce a gentle rising curve that goes slowly up to the shelf and then just keeps on going. They are designed to allow for very fine adjustment of the overall equalisation.'

The two peak-response mid bands are identical apart from frequency (LMF: 20Hz–200Hz, HMF: 500Hz–5kHz) and like the LF and HF bands have 18dB of cut-boost. Q is continuously variable and a 'times five' facility shifts frequency range such that the HMF changes to 2.5kHz–25kHz. A Notch facility is also provided which can be tuned using the Q to give up to 30dB of very accurate, narrow band attenuation.

Apart from an automated EQ IN-OUT switch, two other switches are provided enabling the Mid Range and LF-HF sections to be removed from circuit independently, thus preventing the signal from passing through unused electronics.

This is a very satisfying equaliser to use, with all the precision and musicality that one would expect. It offers both power and subtlety, and is extremely versatile having additional features to the System 9098 EQ outboard unit that preceded the console last year (see *Studio Sound*, June 1994).

Two insert points are provided each with automated IN-OUT buttons. Insert 1 is selectable post EQ-post fader, and Insert 2 can be selected either pre EQ or to feed the dynamics side chain. Insert returns are electronically balanced while sends are transformer balanced. Insert Send 1 can also be selected as the channel direct output which will be discussed a little later.

The channel has 14 auxiliary sends that feed to 16 auxiliary buses. Sends have been split into two sections—two Stereo Cues placed below the equaliser, and one Stereo and eight Mono Auxes placed above it. The idea behind this arrangement is that the Cues will be used for foldback and need

to be positioned closer to the engineer than the more static Auxes which will act as effect sends.

The Cues have separate level and pan controls, but can also be individually switched to mono so that the pan becomes a second level control. Both cues have access keys to the 48-track routeing matrix and Cue A can additionally send to the ABCD stereo buses—when this selection is made the channel output is disconnected from the ABCD buses although not from the main 4-channel (LCRS) mix bus. The Stereo Cues and the Stereo Aux have SFP (Stereo Follow Pan) buttons that substitute their pan pots for the main channel pan. The Stereo Aux send also contains a switch that removes it from Aux 5 and 6 and assigns it to Aux 15 and 16, thus allowing 14 sends access to 16 buses. In common with the stereo sends, the eight Mono Auxes (7–14) have individual, automated mute switches and pre-post switching in pairs.

The MUTE and SOLO buttons are prominent, illuminated switches placed side-by-side at the base of the module. Solo mode is dependent on master selection (see later), and a SAFE switch is included to protect the channel against Solo In Place muting. The Mute is a soft ramping FET design which avoids clicks when switching mid signal—particularly relevant to bass signals.

The desk is equipped to deal with a variety of pan modes and the channel has two pan pots—a Main Pan and a Surround Pan—with a common IN-OUT switch. Pan modes are assigned globally to the input channels via master switching, and there are four principle modes—Stereo, Quad, LCRS, and Stereo Surround. In Stereo, only the Main Pan is operative feeding a Left-Right output; in Quad the Main Pan feeds left-right while the Surround moves between Centre and Surround; with LCRS selected, the Main Pan governs Left, Centre and Right while the Surround pans between front and back; Stereo Surround, operates as LCRS but utilises Cue A to provide the stereo surround control.

Routeing in the traditional manner is sited at the top of the module with 24 track-routeing buttons and a shift key that switches between 1–24 and 25–48. Below these are the ABCD stereo bus selectors. The main LCRS mix selector is positioned in the pan section at the bottom of the module.

The input module also contains a small output section with a rotary level control. In normal operation this control is bypassed, however if the CAL-LEVEL button is pressed the pot acts as a group attenuator for the relevant bus. The section also includes a DIRECT button which replaces the mixed group output with the channel output, and a SEND button which makes Insert Send 1 the direct output. In addition there is a MIX MINUS button which removes the channel output from the Mix Minus bus (an optional feature requiring additional cards)—if MIX MINUS and SEND are selected together, the Mix Minus feed is output via the level control.

The remaining channel facilities are a READY switch for multitrack machine arming, and two switches for the *Virtual Dynamics* system—one to switch the VCA in-out of circuit, the other to position the processing pre-post EQ. The moving-fader system also has a VCA associated with it, for overlaying updates etc, but this will ►

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Amek 9098—a brand new classic from Rupert Neve

normally be bypassed. The fader block contains switches and indicators for automation, along with metering for dynamics gain reduction and channel PFL level.

The stereo version of the input module features two inputs—a Stereo Input and a Stereo Effects Return. Both inputs have full access to bus routing and can individually send to the 16 auxiliary buses. The Stereo Input is basically a slimmed-down version of the mono input with simplified 4-band EQ, auxiliary sends, insert capability and so on. It can cater for and convert both A-B and M-S inputs, and includes a Width control which affects the amplitude of the S signal, thus collapsing the stereo image or producing 'out of speaker' effects. The stereo module has no mic inputs, but mic amps can be patched across from standard inputs if necessary.

The monitor

The 9098 monitor section has been condensed by incorporating two channel strips side-by-side into one module. The layout of the controls is very similar to the inputs, although of course simpler due to the reduced space. Monitor channels can be used either in the traditional split monitor sense, or as additional line inputs having full access to the multitrack and stereo buses. These dual modules also benefit from *Virtual Dynamics*, automation and selectable solo modes.

Three inputs are available—Line, Tape-Group, or Sub—which share a single gain control (-6dB to

+18dB) and phase switch. The EQ remains 4-band but has been simplified so that the LF and HF are fixed as shelving filters each with two frequencies (46Hz-100Hz and 4.8kHz-10kHz respectively). The mid bands are swept between 160Hz and 2.7kHz, and 1.2kHz and 18kHz with a 2-position Q switch. Although not as highly featured as the input channel, the quality of the equaliser remains identical and it produces excellent results. Also included is a continuous high-pass filter.

All 16 auxiliary buses are available to the monitor, although sends have been reduced to 1 Stereo Cue, 1 Stereo Aux and 2 Mono Auxes. The Stereo Cue is selectable between buses 1-2 or 3-4, the Stereo Aux between 5-6, 7-8 or 15-16, while the Mono Auxes can be selected to 9-10, 11-12 or 13-14. Each pair of sends can be switched pre-post and have an automated mute. In addition the Stereo Cue has access to the 48-track routeing and includes an SFP switch.

One switchable insert point is available which can be set pre-post EQ—there is no switchable access to the dynamics side chain, although this can be patched if required. The *Virtual Dynamics* are positioned post EQ, and an IN-OUT button is included to remove the VCA from circuit.

Panning is straightforward stereo and is unaffected by any of the master panning modes—when selected to the LCFS bus, only the L-R channels are fed. The same motorised fader and local automation controls are fitted, although PFL and gain reduction metering have been removed from the fader panel. ▶



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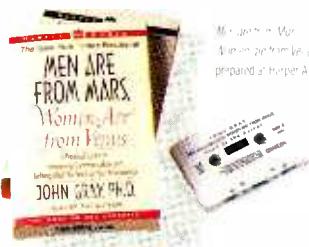
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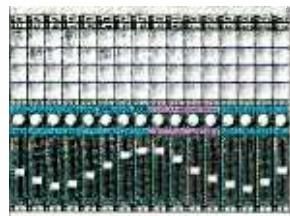
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Central facilities

The central section of the console is eight modules wide and contains seven modules of assorted sizes—Matrix and Control Room Speaker Facilities; Solo, Status and Monitor Sources; Odd Numbered Cue and Aux Masters; Even Numbered Cue and Aux Masters; Oscillator, Meters and Communications; *Superloc* and Main Speaker Control; and a Qwerty keyboard. Below these are a group of transport keys, a 2-button track ball for controlling screen-based functions, and six stereo moving-fader masters for the four Stereo buses and LCRS bus.

The Stereo buses have a dedicated matrix section allowing them to be individually routed to the main LCRS bus and/or submixed between themselves.

The 9098 has six master status configurations that globally set the console overriding local switching. These are—Record, Mix, Direct, Broadcast, Film and Reset.

Record selects Mic-Line inputs to the channel input modules and cuts any outputs to the mix bus—the monitor modules source Tape and output to the mix bus. Mix selects all modules to input Tape and outputs to the mix bus—it also assigns Cue A to the multitrack routeing. Direct is like Record except all the input channels route directly to tape avoiding the mix amplifiers. Broadcast selects Mic-Line inputs to the channel input and outputs to the mix bus, it also switches Cue A to the 48-track routeing pre fader to allow for simultaneous, independent multitrack recording. Film is similar to Mix but also configures the console so that Solo and Mono selections apply to the centre speaker only. Reset clears down all settings on the console. In addition to these switches, Master Group and Tape switching is individually available for the channels and monitors, and Pre-Post switching for all Cue A channel modules can be globally set.

Provision is made for five control-room speaker circuits—two main (LCRS), two near field, and an internally mounted set for return talkback and AFL-PFL monitoring. Due to the length of the console, a main speaker Image Shift control has been added allowing the left-right image to be moved to match the seated position of the engineer or producer. LCRS channels can individually be muted and phase reversed, while the monitors as a whole can be monoed, dimmed (level settable) and muted. There is also the facility to route the Centre and Surround signals to the nearfield monitors, thus allowing them to be used in conjunction with the main stereo speakers to create an LCRS setup—this is, of course, is useful where a main 4-speaker setup does not already exist.

Control-room monitoring controls have been placed in easy reach of the engineer as have the communications buttons which offer a comprehensive selection of destinations. Also included is a traditional slate with 33Hz tone, a reverse talkback facility, auto cue, and Multi Path which allows the user to address a group of destinations from a single button. The communications buttons can operate either in momentary or latching modes to suit the user.

No talkback microphone is supplied with the console, and a mic will need to be connected to the XLR socket next to the central metering.

The solo system is controlled by 10 master switches. There are three solo modes that apply console wide—PFL, AFL and Check (Solo In Place). When working in Check mode, modules can be protected from SIP muting either by locally selecting local SAFE buttons, or by switching all channels or all monitors into Safe mode from master switches. A Solo Upfront facility allows the user to mix back some of the monitor signal so that soloed signals can be heard in relation to the rest of the track. Solos can globally be set to operate as latching, interlocking or momentary switches, and a Clear function will remove all solo selections from the console. The solo system may also be controlled by automation, and a SOLO to AUTO button makes this connection (see later).

Control room and studio monitor sources are independently selected between two banks of switches containing Internal and External source selectors—selection is non-additive. Selectors are also provided for two stereo foldback circuits and these are additive offering a wide choice of sends plus overall level control, AFL and mute.

The centre section of the console is fitted with six vu meters, four for LCRS and two for stereo, and each group has an associated selector panel providing eight possible sources. The Peak indicators incorporated in the meters can be threshold adjusted, and separate controls are provided for setting central and channel meters. Similarly, the sensitivity of channel peak indicators can be globally adjusted.

A 6-frequency oscillator appears in the centre section with routeing to Mix, 48-Track and Patchbay.

Automation

The *Supermove* moving-fader system incorporated in the 9098 is derived from Amek's *Supertrue* automation which has been featured in the *Mozart* and other Amek desks. *Supermove* thus benefits from an established system, inheriting a host of well-proven features. The major difference between the two systems are the statuses required for moving-fader operation; otherwise facilities such as automated switch control, off-line editing functions, event triggering and so on remain identical.

The system uses a 486 high-speed PC with high resolution 20-inch colour monitor—these are included with the console. Operation is from local controls (each fader has four status switches with indicators) and from the screen using the built-in track ball and keyboard for user input.

The system utilises both servo faders (Penny & Giles 3000) and VCAs in the same way as SSL's *Ultimation* to allow updates to existing dynamic data. Fader status can be switched between Read, Write, Touch Write (fader switches to write on touch and glides back to previous level at a user-defined rate on release), VCA Update, Servo Update, and Isolate.

The two update modes are globally set from the screen. VCA Update operates like a conventional Trim mode so that any new moves are combined with previous moves. Servo Update acts as an ►

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offset mode such that if the fader is moved all previous moves will playback relative to its new position. In both update modes, all previous switch data will be played back and any new events will be added to the mix.

The system allows channel elements to be protected, so, for example, an auxiliary mute can be overwritten without affecting other switch or fader data on the channel. The automated switches on the channel are the mute buttons for Cues and Auxs, EQ In-Out, Dynamics In-Out, Insert 1 In-Out, Insert 2 In-Out, Channel Mute, Solo and Solo Safe. As previously mentioned the SOLO TO AUTO switch in the centre of the console has to be selected before solos can become automated. The SOLO buttons will then perform in SIP mode either causing channels to mute or shut-down under VCA control (user settable).

Associated with the automation is a full console Recall system, allowing manual reset of nonautomated controls, and up to 10 console setups to be stored for each Title. The system may be set to various levels of accuracy and includes a Mask facility that allows functions to be ignored so that just specific groups of controls to be reset. Apart from the graphic display, a voice recall system can also be utilised—Rupert Neve talks you through the controls—however, although a novel idea, it does have a tendency of becoming intensely

irritating and the facility has been disabled from the consoles delivered so far.

Dynamics and machine control

The virtual Dynamics package has also appeared in Amek consoles for some years. The digitally controlled system is available to both channel and monitors offering one of nine possible dynamic processor types for each module. Control of the system is via the screen where the various 'devices' are displayed as control panels with conventional knobs, buttons and indicators making for intuitive adjustment. *Virtual Dynamics* settings are stored with the mix thus providing another level of automatic reset.

Superloc machine control is provided from a dedicated panel in the central part of the console, and provision is made to control up to five machines. Ten locate points can be stored, and dedicated function keys have been included for autolocate and cycle functions. The system also features a Jog-Shuttle wheel.

Conclusion

The 9098 has been well worth the 3-year wait. Not only is it good to see additional competition in the

high-end analogue console market, but it is also very good to have a brand new classic from Rupert Neve.

The desk blends the best of the old and new, with traditional design concepts benefiting from 1990s technology. This is most certainly a console for the 'golden-eared' and its exceptional, over-engineered performance will appeal strongly to those on the trail to sonic perfection.

Although a colossus of a console, the 9098 is straightforward to use, and a lot of attention has been paid to ergonomics and the logical arrangement of controls. No compromises have been made to channel functions, and the integration of proven Amek automation, recall, dynamics and machine control all further enhance operation.

There is no doubt that Mr Neve designs exceedingly good consoles. If his assumption is right that top-end analogue desks will beat off digital competition for some time to come, then the 9098 has every chance of being adopted where people really care about sound. ■

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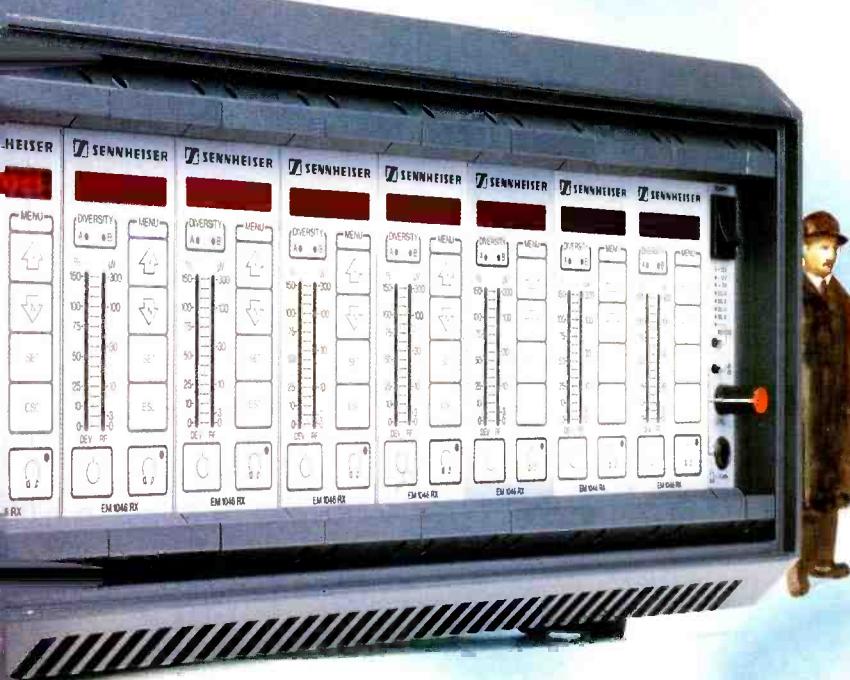
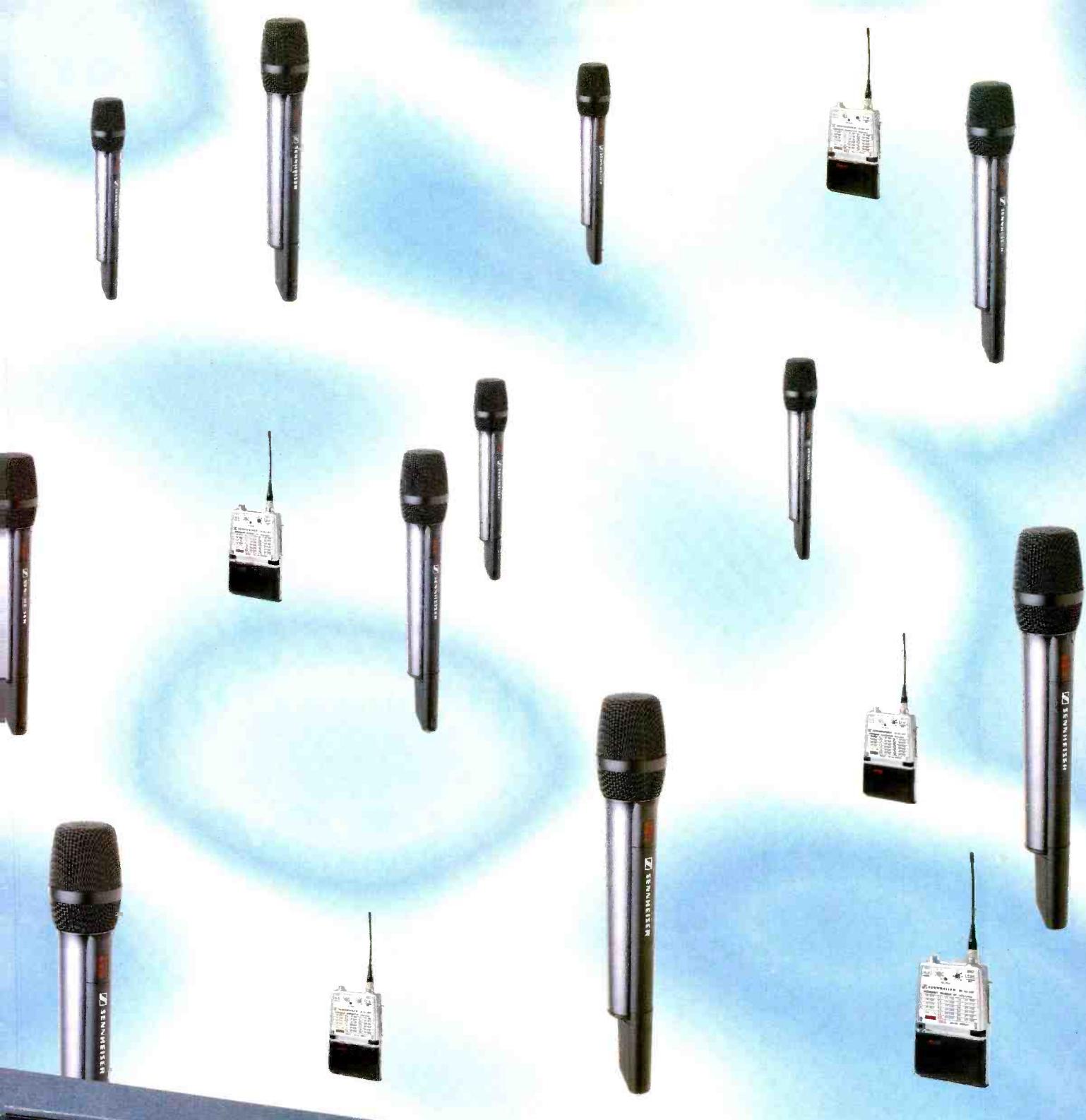


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There are some live applications, however, where such sonic limitations do represent a compromise. The reinforcement of classical music places far greater demands on the fidelity of the PA and the microphones feeding it than your regular rock gig. When the

requirement is for reinforcement for a classical performance that mixes orchestral instrumentation with electronic instruments and a rock-style rhythm section, there are apparently contradictory requirements for high audio quality and high on-stage sound levels, and microphone spillage. Add to these, the likelihood of a seated audience listening in critical silence.

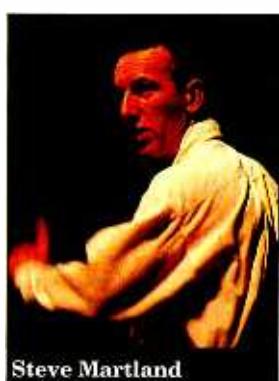
Such are the problems that face Ian Dearden (rated among the UK's top classical sound engineers) when charged with ensuring that classical composer Steve Martland's musical performance is delivered to his personal satisfaction. The same sonic standards were applied during a series of concerts as he is used to achieving on his recordings for BMG Classics.

Martland at 35, is one of the country's most successful living classical

composers. Often portrayed by the media as an *enfant terrible* for his constant public harassment of the arts establishment for their exclusive patronage of outmoded 1960s atonality, at the total exclusion of works by younger composers, and as a leading critic of Government education policy resulting in the loss of free access to music tuition in state schools.

Originally signed to Factory Records, alongside the likes of New Order, The Happy Mondays and Durutti Column, his subsequent move to BMG Classics has not been marked by any dilution of his desire to extend the reach of his music beyond conventional classical boundaries, his latest recording, *Patrol*, having been made with Blue Nile Producer, Calum Malcolm. His compositional style is as informed by the rhythmic vocabularies of rock and progressive jazz as it is by classical traditions of tonality and harmonic structure; he even released an album of arrangements of Mozart serenades and arias on Factory Records.

The Steve Martland Band are even younger than the composer; and it is easy to forget, watching them, that although they all have played extensively in rock and jazz bands, these are sight reading classically trained musicians. There again, that is ►



Steve Martland



Martland fronts the ensemble at the Edinburgh Festival Theatre

almost certainly the idea. 'Band' in Martland's case refers to a 'big band' line-up, as opposed to any Hanoverian meaning of the term. Bass guitar, drums, guitar, piano, synths, marimba, strings, the tightest horn section this side of Phoenix, and Martland himself front of stage, conducting the whole deafening ensemble. Martland's compositions are imbued with a percussive vibrancy and an easy brilliance that belies the complexity of his music and the demands it places on the musicians. Martland's music is also required to be played at volume.

At the desk

A classical soundman's lot, at least in Ian Dearden's case, is not an obvious one. Working extensively with the ENO and at the National Theatre, he is often designing sound for productions that can require anything from 'invisible reinforcement' to the 'weaving in' of FX, samples and triggered electronics, or even the composition of dedicated scores. He has also worked on the production of all three of Harrison Birtwhistle's operas (at The Coliseum, Glyndebourne and the Royal Opera House), the first of these, *The Mask of Orpheus*, requiring 'two 32-channel mixing desks and a mix engineer who could read music, in order to balance a lot of electronic sound and amplified singers with a huge orchestra', and with American minimalist composer Steve Reich. Live sound for The Steve Martland Band is perhaps the most straightforward engineering job currently on his CV, and it is one that hinges almost entirely on his engineering skills and the quality of the equipment.

'It's been something of a new experience for me to work with what is essentially a big band line-up, requiring general amplification rather than introducing amplified effects within a performance', he explains. 'There's always the risk, with Steve playing "classical" venues, that the theatre management won't understand the requirements for a band like this. You'll get there and there will be a suitcase of mics that just doesn't cover it; there won't be the balance and range of microphones to deal with the different

instrumental groupings; so you always end up having to improvise and compromise; deciding whether the piano or the marimba will get the only two condensers. There will be a useful range of dynamics a couple of 414s and three or four shotguns, for amplifying the stage, theatre style.'

Mic technique is something that Ian Dearden knows a fair bit about, having been introduced to the subject while studying Sound Recording and Production, under classical Producer Tryggvi Tryggvason, as part of his Masters degree in Composition, at the University of East Anglia in the UK.

The optimum situation, of course, is to use high-quality condensers throughout. There is an acoustic depth to the band of this size and you don't want to use mics that are going to flatten that out but mics that will improve the clarity while maintaining the on-stage perspective. I try, therefore, to use very little EQ. I'm not against EQ, but if the mic positions are right, high-quality condensers will enhance the colours of all the different instruments without any additional help. With low-quality mics, I'm going to have to do more work on the desk and that's going to bring the noise floor up in the entire system. It might be amplified music, but it's still being played in venues where people sit and listen, and there are very quiet as well as very loud passages. The less I have to do on the desk, the sonically the better.'

Help was provided by Sennheiser UK, responding to an approach to support this year's season of Martland Band concerts across the UK, Europe and the Far East, with the offer of the pick of a whole range of microphones of serious quality. First concert venue of the season was the impressive mix of restoration and new that is the Edinburgh Festival Theatre; once the much loved old Empire Theatre, then relegated to the ranks of Mecca bingo and left 'dark' for many years after that. A fully restored Edwardian auditorium with extended new backstage facilities and a brave new glass and light street frontage. PA for the night comprises the theatres own EAW installation and a Soundcraft 8000 console; a system described by Dearden as being 'of good enough quality to allow the improvement in ►

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microphone quality to shine through.'

'Working with Sennheiser meant that we were able to put into practice all that which we thought really could be achieved with the live production', Dearden continues, 'it meant being able to deal with a many long-standing problems and achieving what I really wanted to achieve in terms of sound, without interfering with the visual presentation of the band.'

Mics and men

Inviting a sound engineer into the Sennheiser stock cupboard, to take his pick of what is on the shelves, you might expect him to come away with a handful of Neumann U87s, but Dearden is not the kind of engineer to be bound by convention, nor tempted to simply endow all with the famous Teutonic glow. And although his solution was not entirely devoid of Neumann warmth, he was in search a modern day less opulent approach.

'We worked out a range of solutions which, apart from an overall hike in sound quality, included microphones with greater sensitivity, allowing players to stand further away and be less constrained by their mic positions, clip mics for some close perspective stuff and some radio for total freedom of movement.'

Seven MKH40 cardioid RF condensers—among the world's quietest and most sensitive microphones yet capable of handling very high

SPLs—formed the backbone of the selected mic kit. Stereo pairs were the order of the day, for piano (Steinway baby grand), marimba and kit overheads: 'We had the whole lid off of the piano and the mics firing into the soundboard, arranged as a spaced A-B pair—one coming right in and reaching over the bass strings, the other over the high strings and about a foot above. The problem is always in attempting to achieve an open resonant sound and trying to avoid spillage. Leaving the lid off allows the sound to bloom.'

It's on instruments like the piano and the marimba, where we used a stereo pair of MKH40s again, that a high quality studio mic like this really comes into its own, picking up the full timbre and colour of the sound without making it sound artificially loud. A combination of accuracy and sensitivity. With the marimba, the same problems as I have with the piano are all the more accentuated, given that it is right down in among the rest of the band and so much closer to all the other instruments. You might think that you would mike it from below, but the resonating tubes are all stopped up, to funnel the sound back up at the player. It is important therefore to ensure that the mics are not obscuring the line of sight between the player and the conductor and, even more problematic, that they are not in the way of the beaters which are about 300mm long and really get swung up and down the full length of the

instrument when playing fortissimo. You have to be well above it cover the entire six-foot length, which the MKH40s managed to do with absolute clarity.

'Steve's music is extremely rhythmic and tightly pulsed, antiphonal, and the kit is therefore critical. The beats have to be heard exactly in the right place, so we need to avoid an overly reverberant approach. I basically use the mics to pull the kit right into the mix, using them to provide clarity rather than volume. Two MKH40s again provided the overhead signal for cymbals and were so effective that they also ended up supplying all that was required for the toms, so that I didn't open up the spot mics I had positioned on them in line with normal expectations, even when using high quality condensers. The MKHs gave a really tight, clear sound, dealing beautifully with transient and resonant response. I used yet another MKH40 on the hi-hats—for sheer speed and brilliance nothing captures a hi-hat like a top-class condenser and the 40 coped effortlessly with all the transient peaks coming thick and fast.'

A surprising inclusion in Dearden's kit was the MD504, Sennheiser's new low-visibility/high-SPL model, surprising because it is a dynamic. Designed to withstand pressure levels in excess of 160dB, it was originally intended to deliver a signal comparable to the famous 421 but appears to have rather exceeded design expectations. Dearden chose them for snare and the more demanding ►

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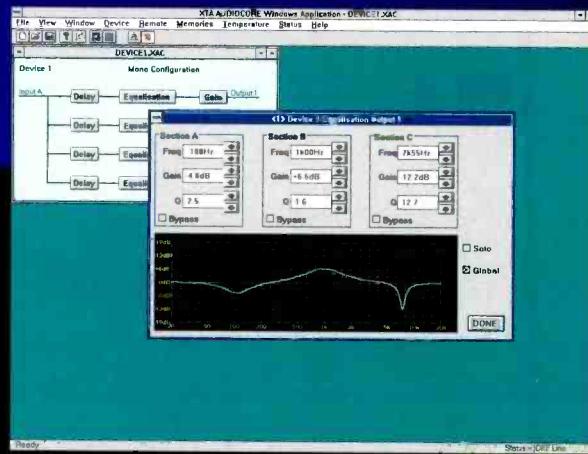
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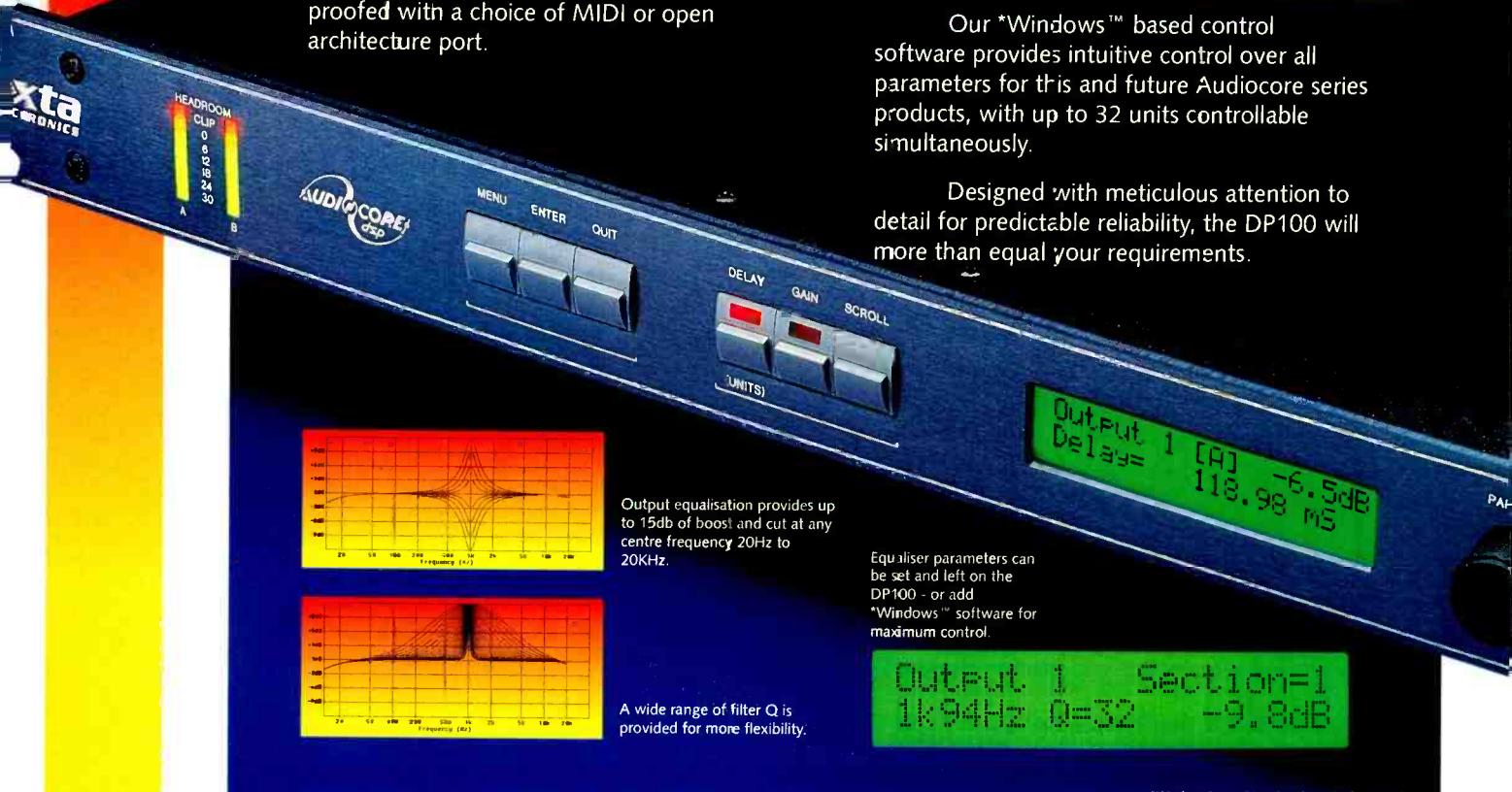
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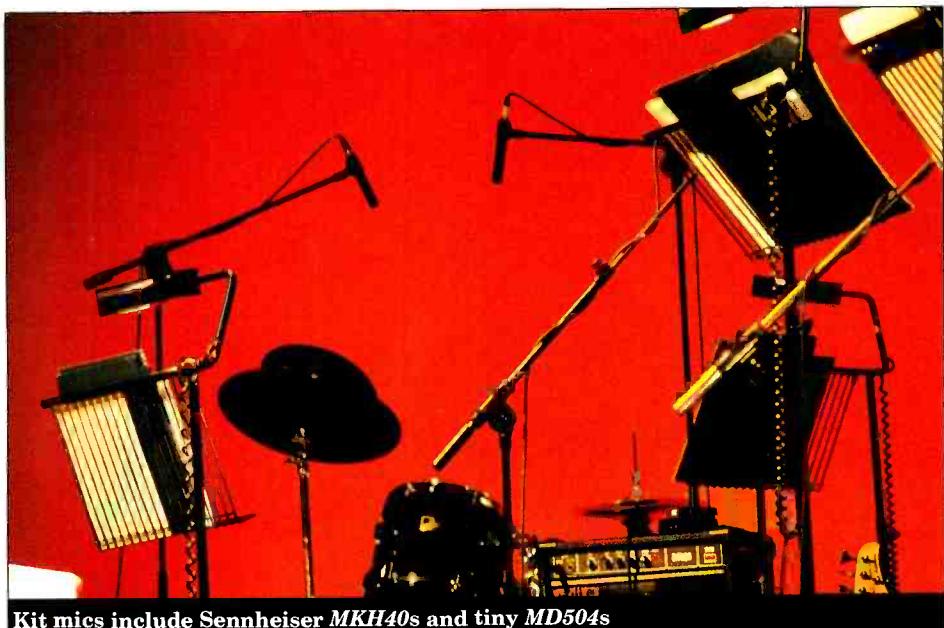
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Kit mics include Sennheiser MKH40s and tiny MD504s

aspects of the horn section.

'It's a lot of sound from a little mic, dealing effortlessly with extremely high SPLs and yet delivering real clarity in the top end so that I didn't have to create anything at the desk. I used them on

trumpet and trombone, which produce the highest SPLs on stage, particularly the trombone when producing short loud staccato notes, which is a lot of the time in Steve's music, it really pushes it. I was surprised how they maintained the lustre on

the trumpet—giving all the shine and the edge of the sound; usually a dynamic on a trumpet will just muddle everything out. These were really close to what I would have expected from a good condenser, without having to worry about any distortion.'

For the alto, soprano and tenor saxophones, Dearden weakened and opted for a couple of Neumann KM140s for a combination of high-end clarity, good SPL handling and 'Neumann bloom'. Martland Band strings present Dearden with several contributory difficulties. 'Strings' in the Martland Band consist of a solo lead 'fiddle player', augmented by the Smith Quartet for certain pieces. It is the Smiths whose performance of compositions by Purcell and Martland forms the opening half of the programme for this series of concerts. 'There's a problem in that the band are just so loud that on strings free-air mikes will just pick up so much spillage, and with its a real problem getting the violin player to stay close enough. It's also a problem in the scoring because it is assumed that it will cut through the thick wind textures, so the solution has to come from the amplification.'

All round solution was the MKE2 condenser clip mic, hard wired with the K6 power unit for the Smith Quartet, seated and radioed up with a belt pack and receiver for the lead violin. 'With the clip mic on the bridge of his instrument it really cut through without his having to overplay and force the sound. He could also move around as much as he ►

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Ian Dearden at the Soundcraft 8000

liked. And a high-quality condenser clip mics is simply the only way you're ever going to get a string quartet into the mix. They have to be rhythmically articulate, they're playing counterpoint parts that require them to be heard at the same level as the brass, piano and rhythm section.'

do the job. The sound levels we work at are problematic when it comes to free-air miking of piano, brass and strings, but that situation is still very remote from the kind of on-stage levels you're going to get with Motley Crue. Even in theatres like this, a lot of the bass actually comes directly

An area where Dearden did not diverge from common practice was in the more traditionally rock 'n' roll sections of the Band, where conventional dynamics remained to handle bass drum, bass guitar and guitar, in particular Sennheiser's flat MD509, a design long favoured for such applications.

'With the bass and guitar, MD509s were simply dropped into over the Gallien Kreuger cabs. They're a great clutter-saving device when you have a stage setup as tight as this, and they're very robust, sound fine and

from the stage, miking is very subtle and only required to give more presence and space. With the guitar the same is pretty much true, with reinforcement primarily used to bring forward solo and key harmony parts.'

One final performer who could hardly be left out of the picture was the man himself. As conductor, Martland does not restrict himself to the obligatory bow and occasional standing ovation. He makes a point of introducing his music to his audience and delivering a good deal of polemic from the podium; in this instance returning to the subject of free access to music education in state schools, pointing out that almost everyone on stage tonight was there as a direct result of such access. Normally tied to a stationary mic position at the podium, and having to make it obvious to Dearden when to open and close the mic, at the Edinburgh Festival Theatre tonight an SK50 belt pack and MKE2 clip mic gave him the freedom of the entire stage.

The resultant performance was suitably impressive. ■

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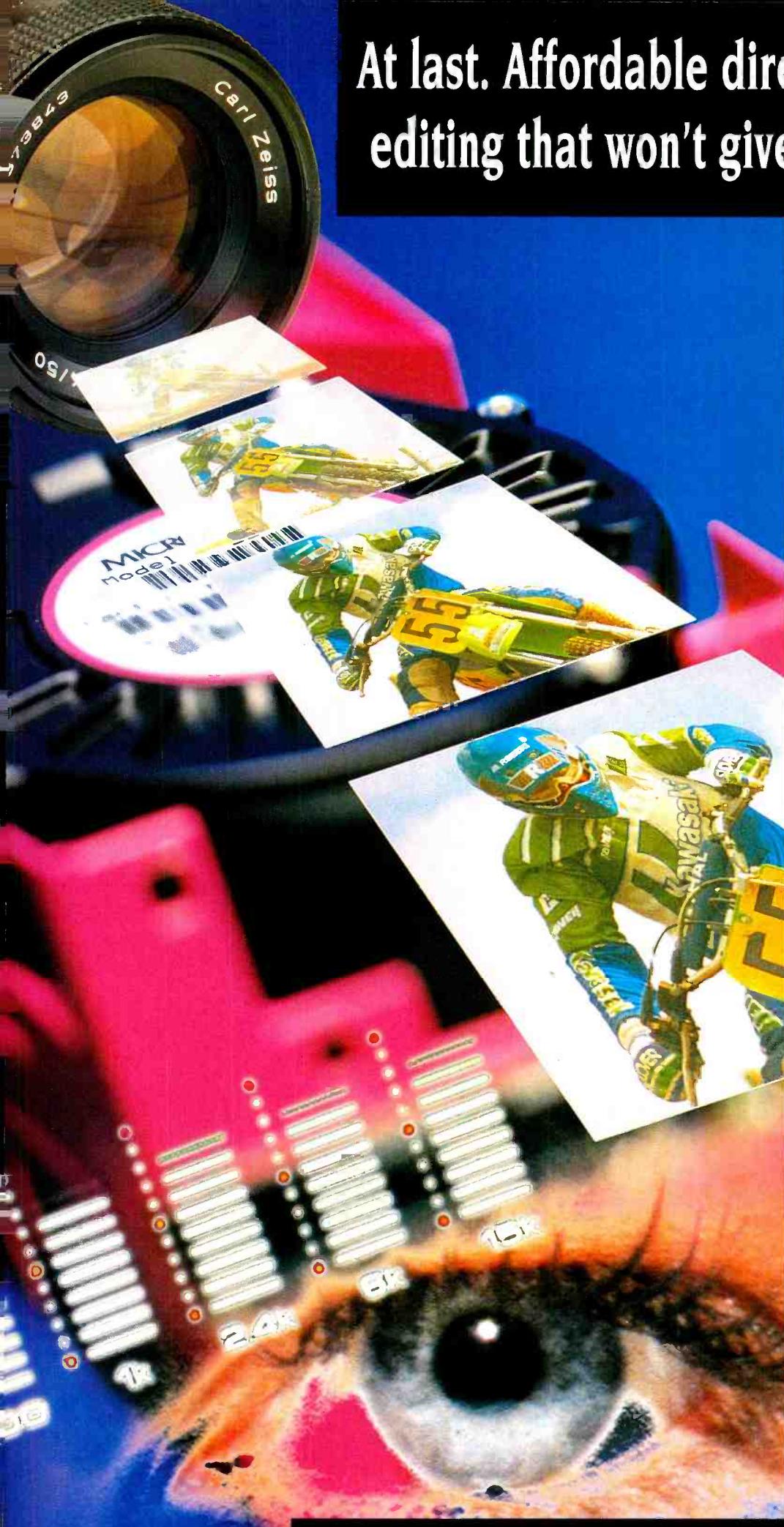





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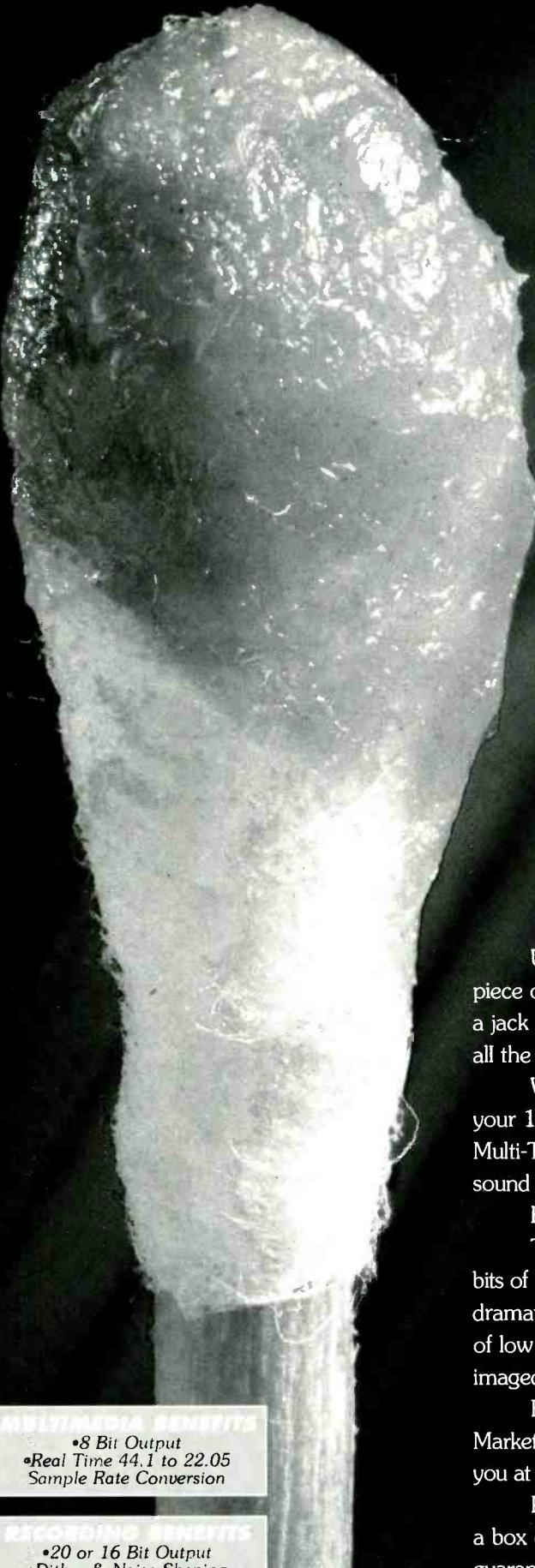
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Battlefield—Britten's *War Requiem* being recorded in St Paul's Cathedral in London

My first experience of the Nagra-D, some time ago, left me both impressed and puzzled. I was confronted with a machine obviously built in the best traditions of Nagra analogue recorders. It combined bomb-proof build quality with exemplary sonic performance but seemed curiously reluctant to give up its secrets. The D's use of yet another digital format makes it something of an enigma; is it different for the sake of being different, or is it a good enough format to find its place in the scheme of things despite its exclusivity?

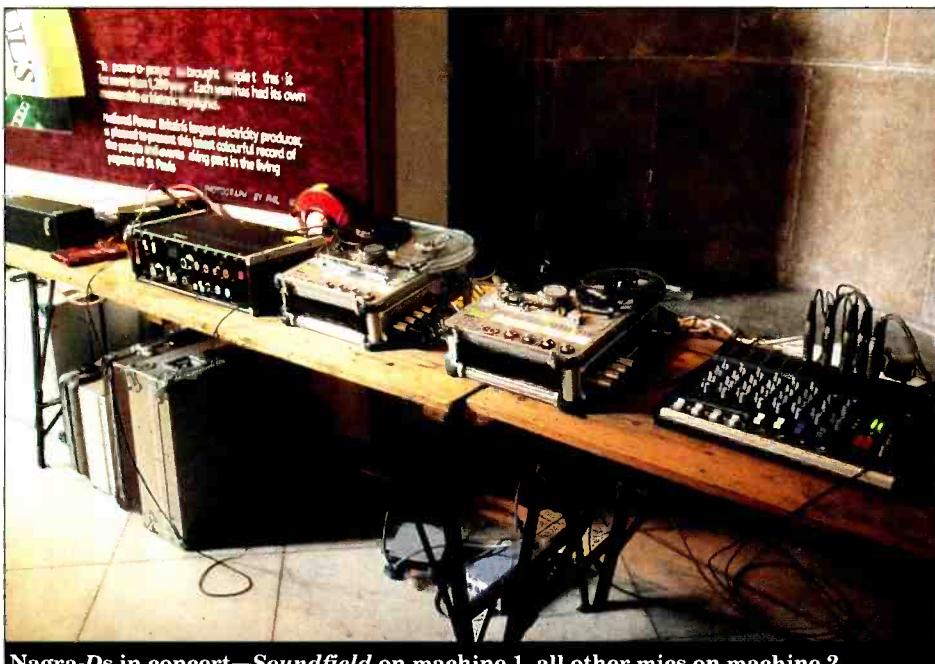
I was also using what was clearly a heavy-duty location recorder, designed for over-the-shoulder, sound-for-picture work, in what was then a less familiar role, that of location classical recording, where many of its features made it the ideal choice for the job while others seemed superfluous. Perhaps the biggest

jolt was the fact that I could not just stick on a reel of tape and get on with the job. The display kept flashing, not very helpfully, 'no directory' and I had to resort to the manual just to start recording. This is, perhaps, a surprising response from one who advocates the wider reading of manuals so enthusiastically, but I did expect to feel more comfortable with the machine more quickly. Having said that, the

manual was, and is, very helpful, clear and well laid out.

The point is that the Nagra-D is such a complete recorder that it is hard to see how its range of functions could be handled other than by the now-famous scrolling menus on its little display. Additionally, the effort involved in finding your way round it is rewarded with a host of features and options and unbeatable versatility. This has ►

As digital location multitracking struggles to enter the nonlinear domain, various tape-based alternatives prevail. Dave Foister casts a pair of Nagra-Ds in the role of modular, multitrack, field recorder



Nagra-Ds in concert—Soundfield on machine 1, all other mics on machine 2

become more and more the case as the system has developed, with the implementation of the originally planned ideas such as the use of directories of information about the tape. One of comparatively recently introduced capabilities is that of synchronising multiple machines, and recording a large-scale performance in St Paul's Cathedral gave me the chance to put it through its paces.

Classic performance

Of all the various types of recording job, the one most likely to end up straight to stereo is classical-music recording, partly through a desire to keep the overall signal chain as short as possible and partly because it lends itself so well to the techniques involved—it is more or less essential to establish a balance and then stick to it. Obvious difficulties arise, however, when proper monitoring is difficult or impossible, and this is one of the usual reasons for the use of multitrack. This was the case in St Paul's, where the equipment had to be set up in a side aisle to record a performance by the Guildhall School of Music and Drama's orchestras and choir (under Richard Hickox) of Britten's *War Requiem*, a work whose forces suggested something more than a purist pair would be required. Monitoring would be on headphones with the live sound from the performance very audible at the equipment position, making mixing little more than guesswork. The solution was clearly to leave as many options open as possible for later mixing, and a pair of Nagra-Ds (giving eight tracks) provided an elegant solution.

The main microphone was a Calrec *Soundfield Mk III*, whose B-format outputs were recorded raw on the first Nagra. This, as devotees will know, would allow the entire configuration, polar patterns and angles, and the rotation and tilt of the microphone to be freely adjusted on replay. The

rest was kept as simple as possible, with an AKG 414B-ULS on each soloist's position and an AMS ST250 behind the main stage for the St Paul's choristers. The stereo output of this plus the 414s filled the second Nagra.

Setting up the Nagras for the job was simplicity itself. Their switchable line-mic inputs and phantom power allowed for the different output formats of all the microphones I was using (the *Soundfield* is line level and the *ST250* somewhere in between nominal mic and line), and all went direct to the machines themselves, with a simple mixer used for monitoring and a rough mix to DAT. Full synchronisation of the machines is achieved without any external hardware other than the Lemo-terminated cable

to connect the two time-code sockets together. For the sake of completeness, we also slaved the second machine's digital clock to the first even though in this case no digital sources were involved and digital mixing was not contemplated. With the first machine generating code and the second recording its output the setup for multitrack recording is complete.

The recording went smoothly, made all the less stressful for the Nagra's enormous capacity—even in 4-track mode it can record two hours continuously on seven-inch reels, for which it ideally needs an extension platform and a special reel cover. This means that even with a long work like the *War Requiem* reel changes are not necessary. In fact, the only aspect to worry about (assuming suitable microphone positions) was level; even this is made easy on the Nagras, partly because of the meters' peak-hold facility and partly because all four recording level controls can be electronically ganged together.

Playback for mixing was almost as straightforward to set up. The same time-code link is established as for recording, and Machine 2 is configured as slave to Machine 1, whereupon its built-in chase synchroniser takes over, making the pair behave almost as a single 8-track machine. Lockup is extremely fast, particularly if the second machine has been given a chance to park first—winding is not synchronised. The fact that the time relationship remains precisely constant was proved by the stability of the delays necessary to time-align the soloists' microphones with the main pair, which were simply set and forgotten.

Nadcom

Checking the tapes back in the control room gave me the chance to look at the Nadcom software, which provides control over, and information about, the machine and any recordings made on it. The software runs on a PC, a mere 286 will do, and an adaptor is provided to convert RS232 to RS422.



A lone Nagra-D showing peak-hold meters. Recording level controls can be ganged for multimachine operation

The control port is a standard 9-pin connector, and the machine will respond to both Sony and Ampex protocols, the Nagra protocol being an extension of Ampex. The software provides full transport control, with various screens of information. The most straightforward is an interactive control panel, with a huge time-code read-out, a similarly unmissable panel showing the current transport mode, and a set of four level meters complete with peak hold. At the bottom is a section which is present on all screens, showing which function keys operate the transport modes and a status panel with read-outs of all the various types of running information, including time code or user bits and error occurrences.

The time-code screen shows no less than seven time-code values, complete with user bits and frame rates, simultaneously, covering all the possibilities of external, tape, generator and offset values among others. These read-outs are also displayed in a smaller form on the time-code menus screen, where adjustments to the time-code operation can be made.

Virtually every parameter of the machine can be set up from the computer on the various *Nadcom* pages, and there is even a diagnostic page showing the measured values of over 40 internal parameters—supply rail voltages, motor voltages and currents, tension arm positions and so on. But the most interesting page, and the one which makes use of the Nagra-D's unique facility for recording, on every reel of tape, detailed information about its contents, is the Directory Management page.

The difficulty mentioned earlier about not being able to start recording as readily as I expected on my first job with a Nagra-D was caused by my failure to realise that each reel needs to be formatted before use. This is not a long-winded process requiring the whole reel to be preformatted before it will accept data, but a matter of recording a Directory area at the head of the tape which will store up-to-date information about the contents of the reel each time it is used. The Directory will log takes and timings automatically, and also note the occurrence of errors and overloads together with the precise time at which they occur. It has to be said that the chief practical use for this facility on the machine alone is as a friendly and intuitive autolocator, but hook it up to *Nadcom* and it really comes into its own.

The computer can display a complete list of takes, with time-code positions, durations and date stamps, and allows them to be named, which the machine alone cannot do. It also indicates the presence of any problems within the take, which at this stage it simply calls Drops, and the peak level achieved during the take. The display can be expanded to show more information about the Drops, including whether they are overloads or data errors, with the duration of the problem in frames in both cases. Any problem can be selected on the screen and the machine made to find it, then play it back with a bit of preroll to assess how bad it is audibly. This level of frankness about errors is quite remarkable, and perhaps made possible by the infrequency with which they occur on the machine. In more than an hour and a half of the



Inside view of the orchestra

War Requiem I had one over (my fault and inaudible, particularly as it was on the soprano soloist's microphone) and the merest scattering of errors, all of which were well below typical DAT rates and hardly troubled the correction system. The machine will warn of unrecoverable errors (which it labels, rather alarmingly, Fatal) but these are only likely to be caused by rough handling of the tape and I experienced none of them. A separate page goes into yet more detail about errors, plotting them as a graph against time. The listing of takes and error reports can be printed out for storage with the session documentation, but as all the information is stored on the tape itself this facility is pretty much redundant.

A pleasurable few days with the Nagra-D and all that goes with it was topped off with a 4-channel Ambisonic playback of the *Soundfield* tape alone, which to all intents and purposes placed the audience back in St Paul's. The combination of the

Soundfield's capabilities and the sonic integrity of the Nagra-D created an awe-inspiring audio experience which genuinely made the hairs on the back of the neck stand up.

With its ruggedness and portability as a machine, its robustness as a medium, its sound quality, its synchronisation and system integration possibilities and the enormous control offered by the *Nadcom* software, the Nagra-D deserves to find a home in virtually every audio application. Had I the money (always the crunch, although the machine is worth every penny) I would regard it as an essential acquisition. ■

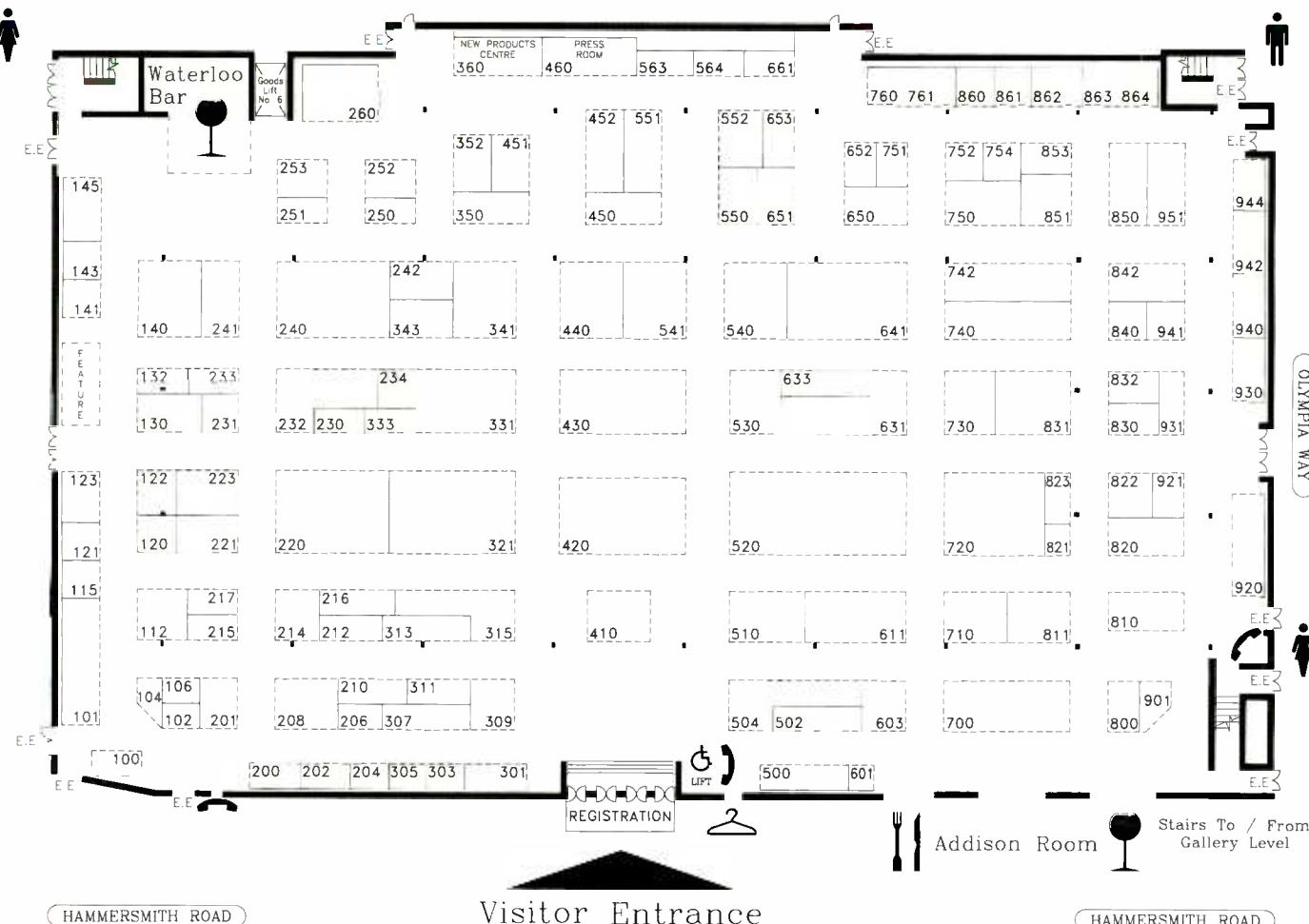
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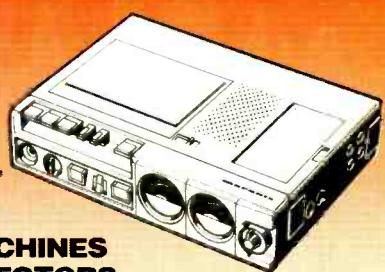
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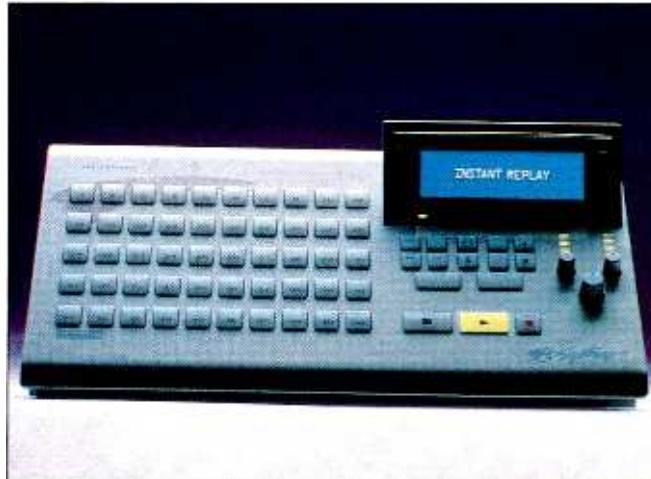
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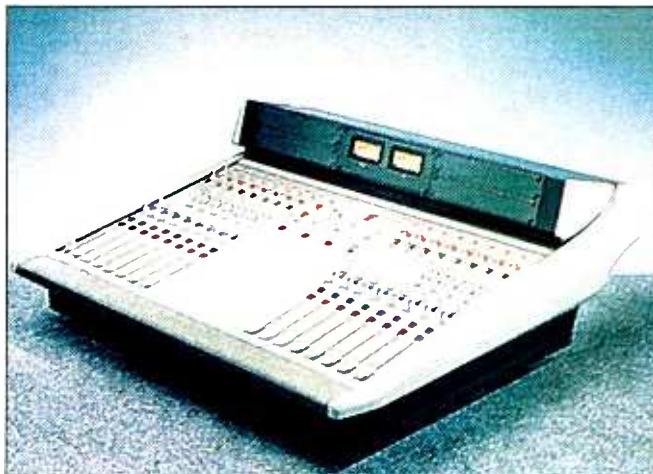


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OPTIVIEW

With cost-effective digital recording systems gaining popularity, the requirement for professional editing solutions increases. Patrick Stapley assesses the *Optiview* previewer

Although Ad Systeme's *Optiview* has been around now for a couple of years, with over 70 systems installed in French dubbing theatres, it is only recently that sales have begun to pick up in other territories, particularly in the UK where it initially got off to a sluggish start.

'It's strange,' comments Louis Austin whose UK company The Home Service handles distribution of *Optiview*. 'It seems to be a system that sells through word of mouth more than anything else, and all my recent sales have come about purely from personal recommendations. I think it's a product that people really have to sit down with and use before they fully understand the advantages it has to offer.'

The system was developed in France by Pierre Antonini who is also the brains behind *Optifile* console automation—interestingly before entering audio, he was a systems designer for the European Space Agency. However, it was through a request for a customised audio previewer, from an *Optifile*-equipped film studio, that *Optiview* was born.

Optiview is a remarkably simple system designed to make the job of mixing sound to picture very much easier and faster. It comprises a 1U-high processor unit with built-in diskette drive, small remote control box and a VDU. What it does is to provide a multichannel scrolling display, giving a five-second preview of recorded audio. So rather than relying on screen action, or trying to memorise cues, the dubbing mixer benefits from precise visual indicators showing where audio components start and finish.

Like a hard-disk editing display, *Optiview* shows audio as bars moving horizontally in their respective tracks. These move from left to right (or right to left if preferred) taking five seconds to

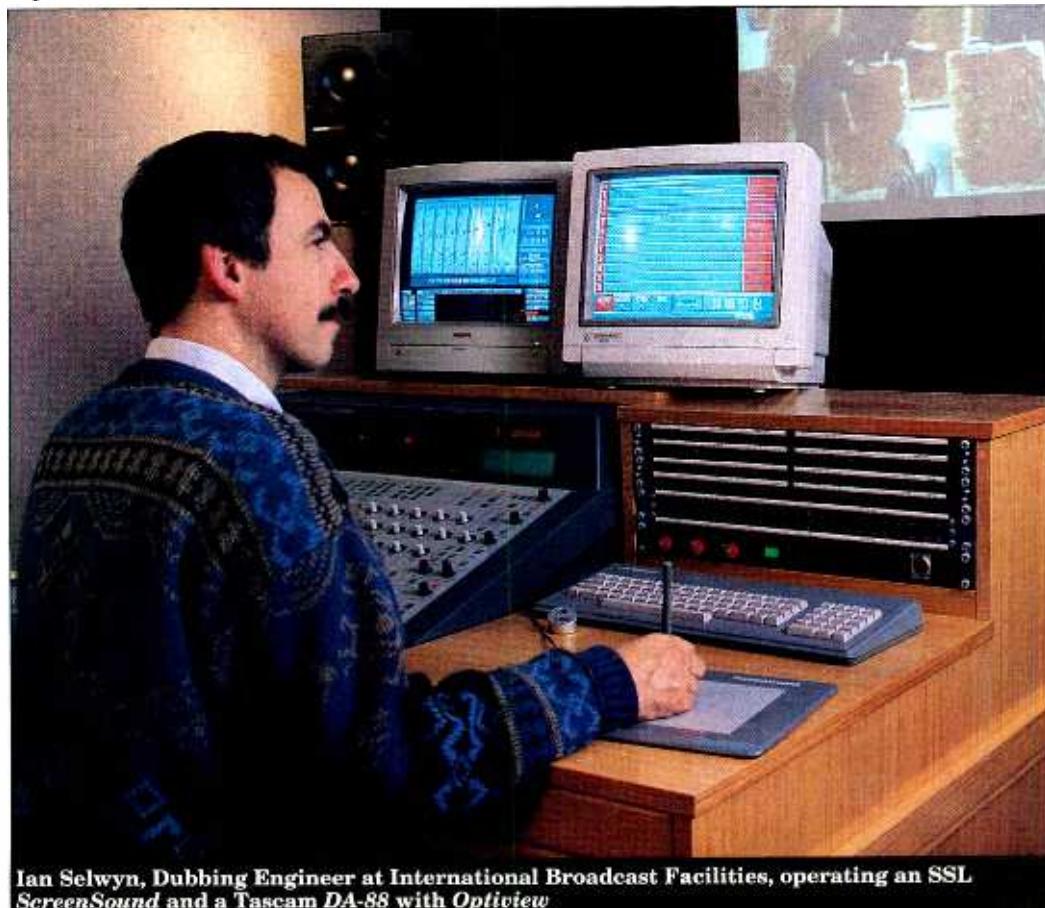
pass through the preview section into the Postview area of the screen (coloured red). The transitional point between the two areas is the Now Line which graphically behaves like the replay head of a tape machine.

Although very similar to a DAW (Digital Audio Workstation) display, *Optiview* is not merely duplicating the same information. Most HD systems display audio as recorded blocks or segments, however what they do not

necessarily show is what the audio is doing within that block. In other words the information is nondynamic and does not indicate where things start and finish—for example a dialogue track could be shown as a continuous block, where in reality it contains sections of silence between lines.

It is this dynamic information that *Optiview* presents to the operator in a clear modulated display. Although some DAWs do now include this capability, it should be remembered that *Optiview* is a dedicated system with specific functions, that interfaces to any recording medium whether hard-disk based or tape based.

Audio connects to *Optiview* via three D-Sub connectors each catering for eight tracks paralleled from the output of the recorder or recorders; time code connects via XLR and the system can be set to read all normal standards. Audio is stored in RAM with enough memory for around two hours of recording. The system works on a ►



Ian Selwyn, Dubbing Engineer at International Broadcast Facilities, operating an SSL ScreenSound and a Tascam DA-88 with *Optiview*

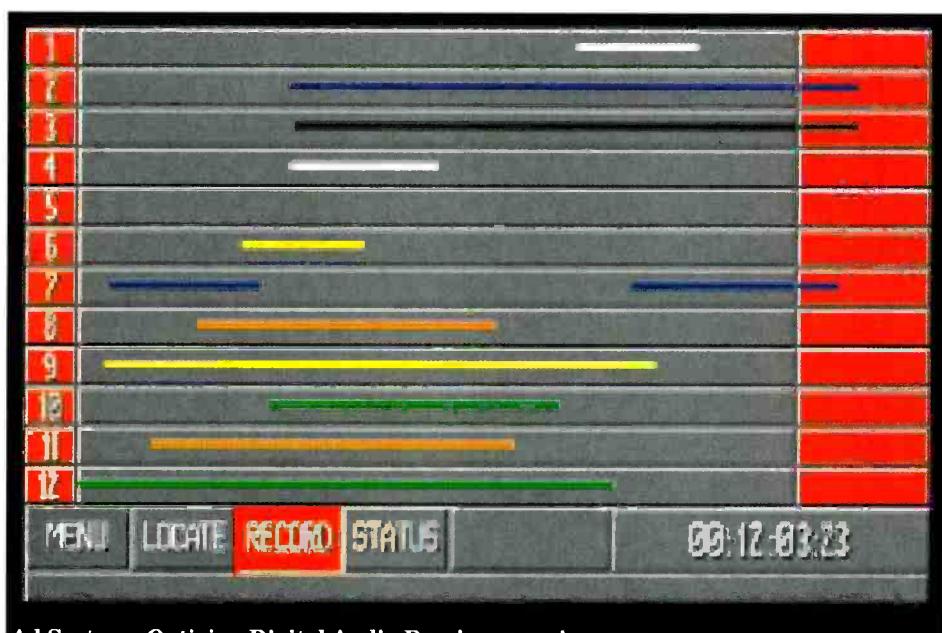
continual update basis, rerecording the output, from whichever type of recorder it is interfaced to, for each pass, thus the information displayed on the screen is always current.

In Use

A postproduction facility that has recently invested in *Optiview* is London's IBF (International Broadcast Facilities). IBF use the system alongside an SSL *ScreenSound* (v4.1 not fitted with Sift), Tascam DA-88 recorder and Yamaha DMC1000 console at their Covent-Garden-based video facility.

'Working with *Optiview* has made the postproduction process much more efficient here,' says IBF's Head of Sound Ian Selwyn. 'If I'm working with chequerboarded audio that's come out of a video suite, it allows me to see the component parts very precisely during a mix. You don't often get cue sheets these days and to a large extent *Optiview* provides us with an automated replacement.'

I find that I work a lot quicker using the system, for example if I've got an M&E which requires a new voice-over, I can record the commentary simultaneously to *Optiview* and *ScreenSound*. I can then go for a final mix in one hit because I can see exactly where the new commentary is coming up and duck the M&E around it. It acts as an excellent time saver, and clients do notice that jobs



Ad Systeme *Optiview* Digital Audio Previewer main screen

are being turned around faster because of it.'

Optiview displays up to 24 tracks of audio which are divided between two screens. At IBF, 16 tracks

(eight from *ScreenSound* and eight from the DA-88) will usually be shown, with the two screens being flipped to view all 16. The order that tracks ►

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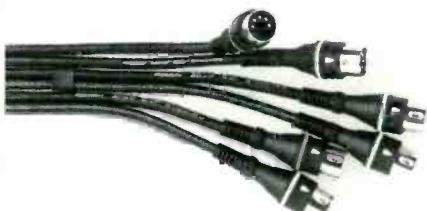
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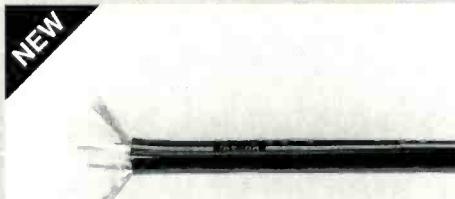
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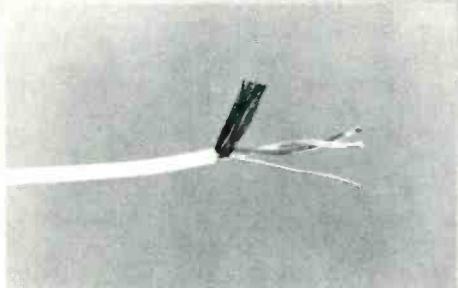
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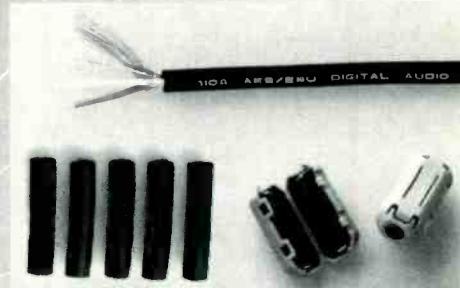
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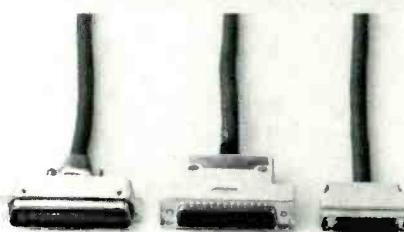
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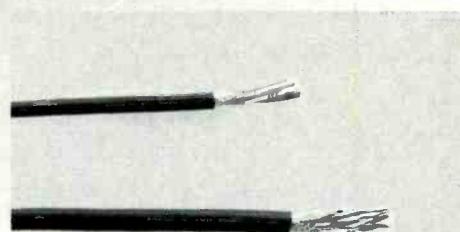
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appear can be altered to suit the user, so for example rather than displaying 1-12 on the first screen, it could be arranged to show tracks 1, 2, 11, 12, 19, 17, 6, 7, 8, 3, 4, 22. Tracks may also be colour coded so that the bars within them adopt one of 12 colours selected from a palette window. This facility allows channel types to be more readily identified, so Dialogue bars for instance could be coloured blue, Effects red, Music green and so on.

As well as the Preview display, *Optiview* has an Input screen that shows vertical bar-graph levels for all 24 tracks. Apart from acting as a useful 24-track PPM metering system, the display also shows the position of Trigger thresholds. Once audio exists in the system the way it is represented on the Preview screen will depend on these Trigger settings. The default threshold is -15dBm for each track, so only signals above that value will appear on the Preview screen. However, the Trigger can be adjusted either globally or for individual tracks between -36dBm to +6dBm allowing the user to define how much information will be displayed. For instance a dialogue track could be set so that background atmosphere is ignored, or a very dynamic effects track could be set so that the quietest elements register. The user can basically set up exactly what he wants to see on a track-by-track basis. Ian Selwyn, however,

tends to work with one global setting.

'I always set the threshold to minimum because I like to be able to see low level atmospheres. For example, if I've got a twin track from an edit suite with chequerboarded audio, I really need to be able to see where the atmosphere starts and finishes to give myself as much time to mix over as possible. Also, with commentary it's very useful to view things in this kind of resolution as it allows you to see the extraneous noises an artist might make during recording like paper shuffle—you can then just key them out as they come along. Very occasionally I'll use a higher threshold on commentary if I want to see just the dialogue and nothing else, and then I generally use it in the default position.'

Each track on the system may also be switched from Write to Read. This enables tracks to be 'frozen' remaining visible even if they no longer exist on the recorder. The facility has a number of uses and at IBF is frequently used during foreign language dubs. 'If working with more than one language, it can be useful to keep the English version on one track with the foreign version next to it. By having the two side by side it allows sync comparisons to be made very easily,' says Selwyn.

Another feature of the system is the ability to enter bars directly into tracks (independent of any audio) as user cues. These can be used as prompts

for cueing-in effects changes, EQ changes, desk snapshots and so on. Ian Selwyn has also come up with another application for the facility which he anticipates will be very useful.

'I've purposefully had lines put into our commentary area so that we can use *Optiview* to directly cue artists' he explains. 'The idea is that rather than artists having to learn where all their cue points are, we can program in bars so that they can see exactly where they have to come in and out. I haven't put it into practice yet but it seems like a good idea.'

The user-interface for *Optiview* is a small remote box with four function keys and a jog-shuttle wheel with direction-speed indicators. Each F key relates to on-screen virtual keys allowing access to the different displays and functions. The jog-shuttle wheel serves a number of purposes: it selects through parameters, acts as a locate tool (allowing points in the Preview display to be accurately located), and inputs-deletes user bars—can also delete bars in tracks set to Play. Also contained on the *Optiview* screen is a prominent time-code read-out, and a remaining memory gauge.

Another facility incorporated into the system is a record delay function. This has been designed for interfacing digital machines that mute their audio output until they are up to speed, like the DA-88 used at IBF. Because *Optiview* normally begins ►



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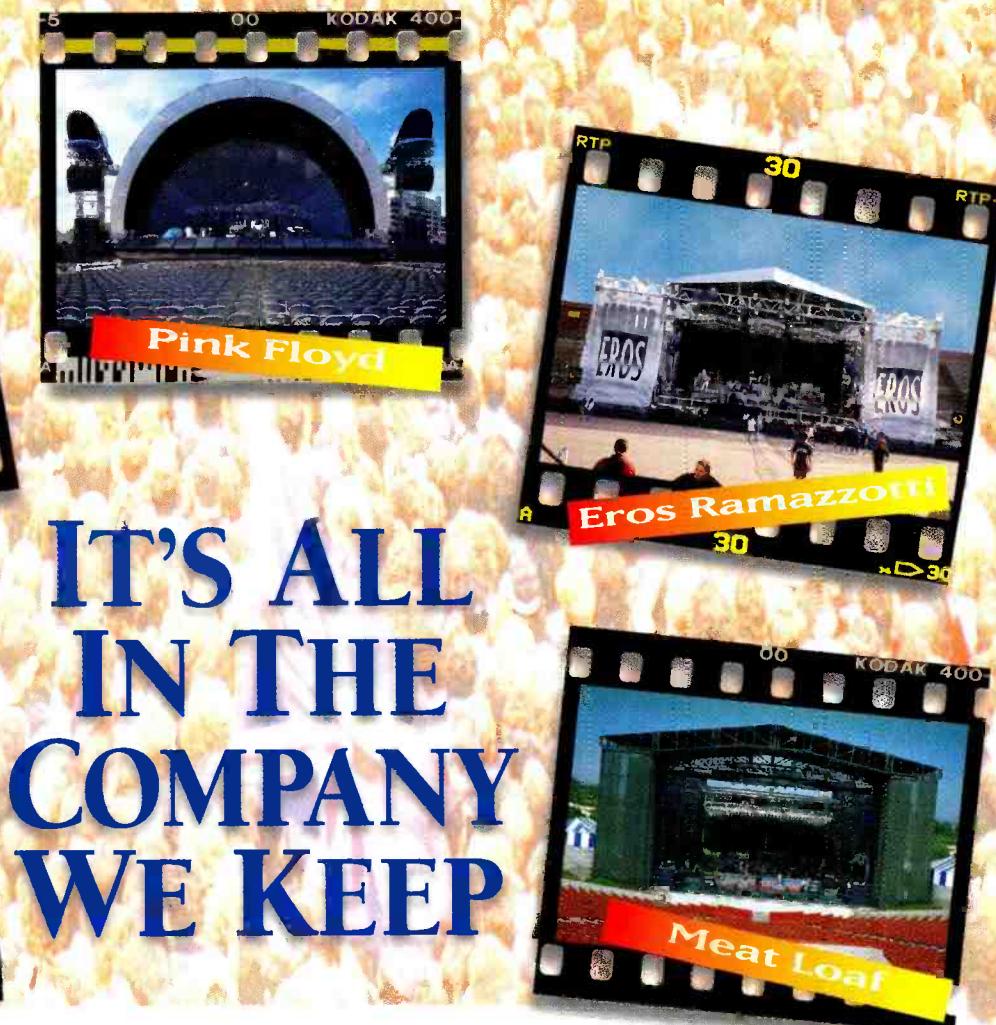


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Perfectly partnered with *Optiview*—Tascam DA-88s as used at International Broadcast Facilities

recording as soon as time code is present, this would introduce holes in the display each time the system updated. By setting the correct delay the recording process becomes seamless—the delay setting is defaulted to, thus saving a reset operation every time the system is switched on. Similarly when machines are slaved together, *Optiview* can be configured to start recording once the machines enter lock—obviously if the system recorded prior to this, tracks would be displayed out of sync.

All *Optiview* data can be saved to the systems internal 800k diskette drive, and this includes all settings for thresholds, Read-write status, time code format, delays and so on. One disk is used per project, and disks can be used to load user setups.

Being able to backup to floppy has proved very useful, because if you've got a complicated run which you've made various changes to, you can restore it in a matter of

seconds. I quite often do a run the night before a dub and stick it onto floppy knowing that the following morning I can just hit the go button and everything will be there immediately. For longer projects I generally archive a floppy along with it, but on jobs with short running times I don't usually bother as by the time you've got everything ready you can have run audio into the system anyway.'

Conclusion

They say that simple ideas are often the best ones, and I think *Optiview* (at £2,350 in the UK) proves the point. The simplicity of the system and ease of operation make it an excellent background partner for all kinds of video and film dubbing setups, particularly as it can now interface with dedicated film preread systems such as MWA and Sondor. The system has a variety of uses, and as IBF have demonstrated, can significantly improve efficiency and speed up throughput. ■

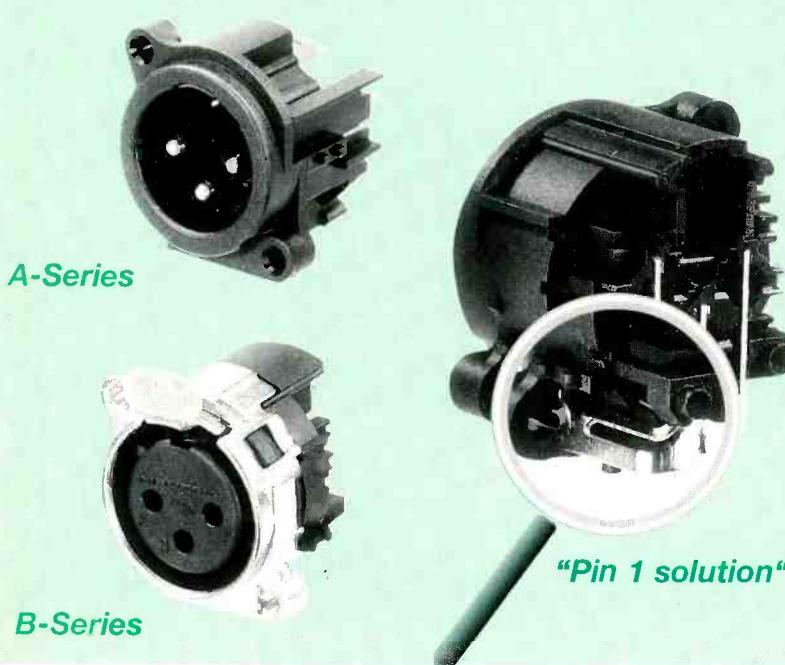
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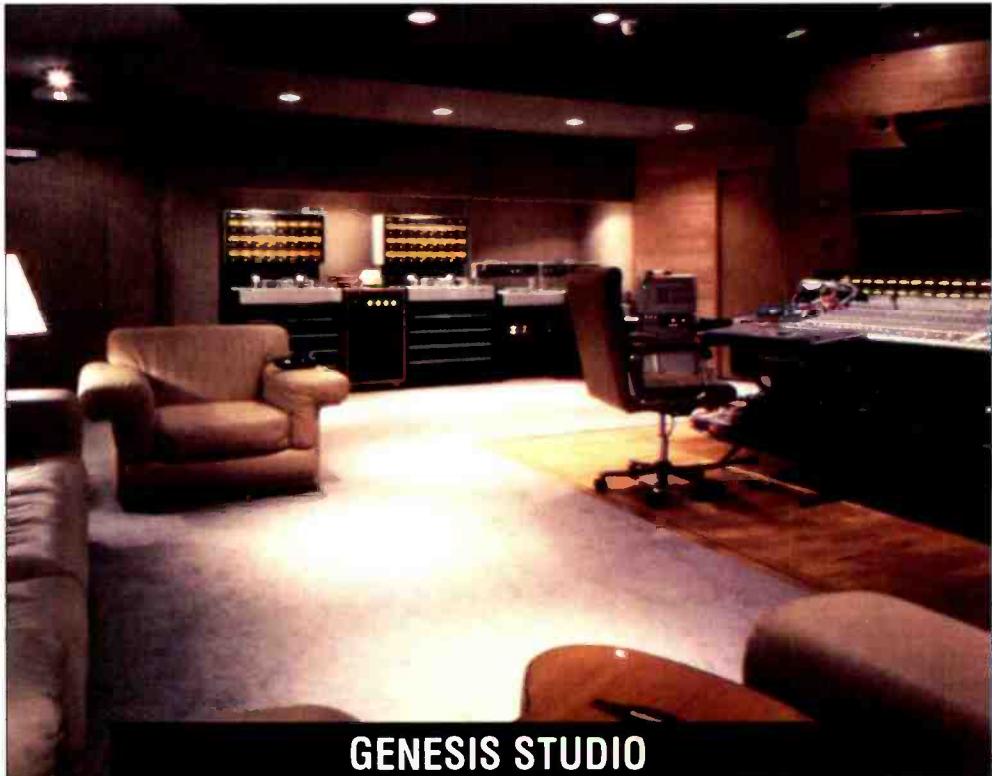
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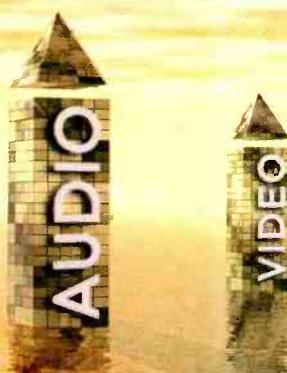
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THE MANOR 1971-1995

Following its recent closure, Philip Newell offers an insight and personal history of one of Britain's best-loved studios

As the *Sunday Times* newspaper put it on 16th April this year, The Manor was, perhaps, the World's second-best-known studio after Abbey Road. Whatever the business reasons for its closure by new owners EMI, I feel that the fundamental reason was a lack of will to keep a special and somewhat unorthodox studio alive.

Conceived at a time when only a fledgling Rockfield, in Wales, could claim country-studio status, The Manor produced some truly wonderful recordings by the World's greatest artists, producers, and engineers. Yet it was born of one of the funniest farces ever to grace the music business.

Tom Newman saw Richard Branson as the perfect source of contacts and funds for the building of a recording studio which he hyped to Branson. They duly bought The Manor House at Shipton-on-Cherwell in Oxfordshire with a £35,000 loan from Richard's aunt Joyce—who reportedly screwed her nephew with extortionate interest. Newman then talked Branson into setting up a record label and talked an insecure Mike Oldfield into signing with him. To cut a long story short, Newman's intent had been mainly to line his own pockets with little regard for the futures of Oldfield or Branson. Ultimately, all he achieved was to help them both on their way to becoming multimillionaires without achieving the same for himself.

By late 1971, The Manor Studios had been cobbled together, though neither Tom Newman, Ivor Taylor, or Simon Heyworth—the main perpetrators—had much, if any, experience in multitrack studios. It became apparent to Newman that somebody needed to know what they were doing and offered me the job of Chief Engineer. He invited me to leave Pye for a 60% pay cut—but people were deserting Pye in droves, to go to the new De Lane Lea complex in Wembley and morale was very low. My boots and hair were perfect entry credentials for Virgin, so I accepted on

the condition that the recording system be made more orthodox.

The Manor opened for business on 3rd November 1971, with the *Let's Make Up and Be Friendly* album by the Bonzo Dog Band. Newman engineered so I posed as a rep from the mixing console company, ostensibly to show him how this new desk worked. He quickly saw that recording was not as easy as he had expected, so for the next album—John Cale's *The Academy in Peril*—I engineered with Simon Heyworth as Tape Op.

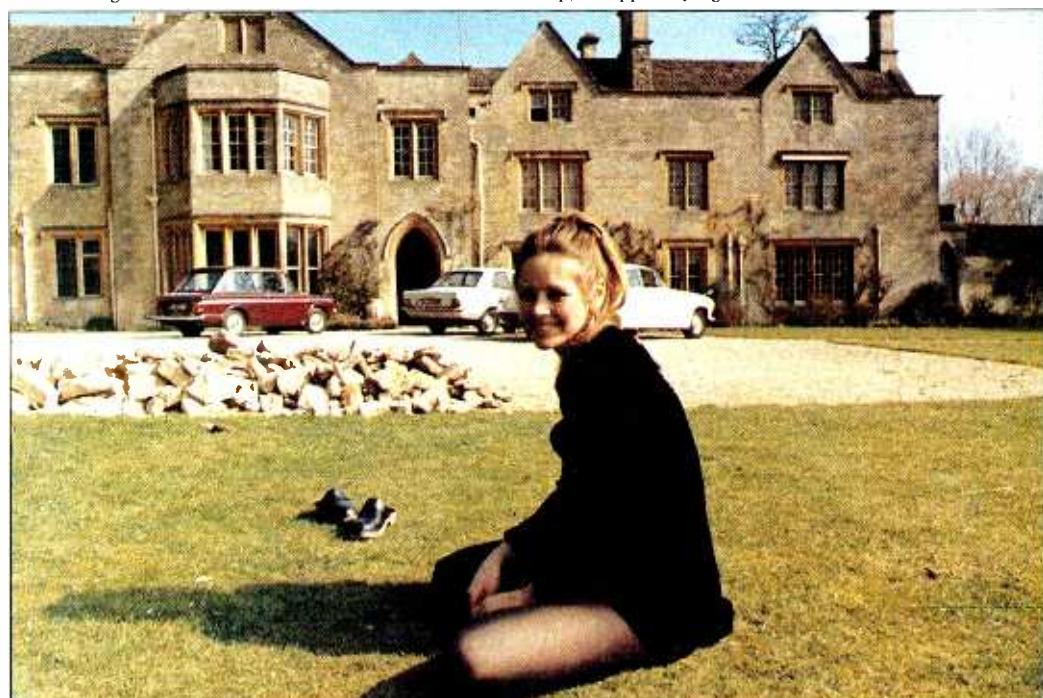
Throughout 1972, The Manor existed as a second-division studio, though through Newman's enthusiasm and Branson's nerve it attracted first-division clients. The location was beautiful and bands could concentrate on their playing, then relax in the surroundings until needed for overdubs.

This put a totally different complexion on studio life, when compared to hanging around in the reception areas of city studios.

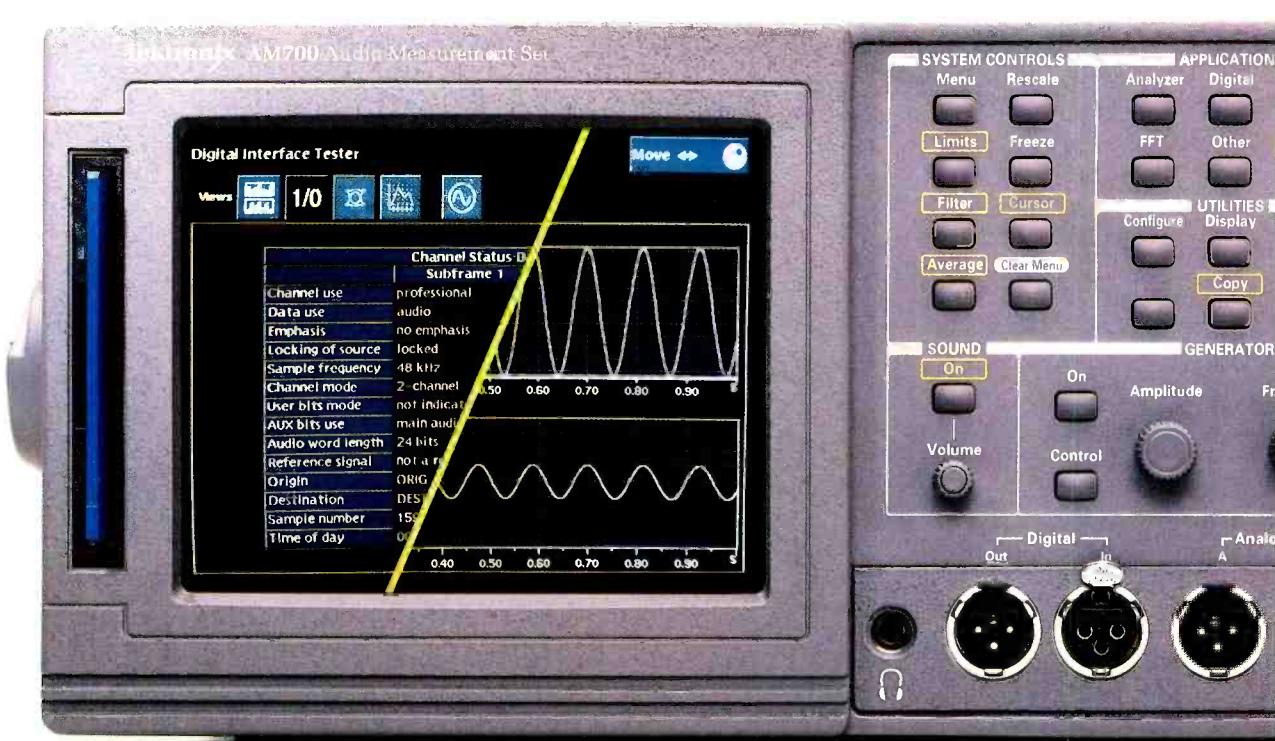
Upward mobility

But I was missing my days with Pye's mobile recording unit, so I began to build a mobile in a van which I had parked in The Manor's 35-acre grounds. This was around the time when Newman began work with Mike Oldfield on *Opus I*, which was the working title for *Tubular Bells*. Professional friction between Newman and I was intensifying as I didn't see how I could improve the professionalism of the place, with Oldfield making the place look untidy.

Unable to remove that irreverent and irrelevant little nobody, I concentrated on my mobile, though I was actually in and out of the *Tubular Bells* session quite regularly—nobody in their right minds would have gone about the recordings in the way that they did, but I helped out and even lent the young maestro my bass guitars, when he couldn't afford to rent any. However, as the session built up, I stopped trying ►



1971—one of The Manor staff, Mundy Ellis, on the lawn. Note Hillman Imp, Vauxhall HB Viva and Jaguar in the drive



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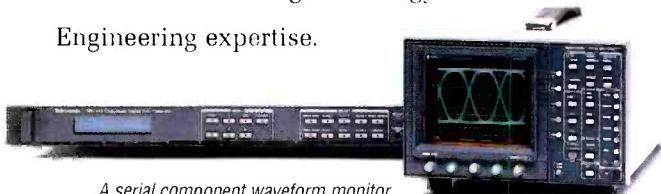


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1975—state-of-the-art automated *Helios* console. Note *Pandora Time Line* in distant equipment rack

to get him thrown out of the studio and began to wonder what I had been opposing.

By late 1972, Tom Newman told me that Branson was not happy about my work with the mobile—the implication was that I was about to be asked to leave. To my surprise, on New Year's Eve 1972, Branson asked if I would hand over to him all of my recording equipment, and promise not to work for anybody else if he provided me with what I would need to build the finest mobile in Europe and gave me shares in the company. The sticking point was that this would leave me as Technical Director, in a company whose Managing Director was my good friend Tom Newman with whom by this stage I just could not work. Settlement was reached by the formation of a new company, The Manor Mobile Ltd, of which I would be MD.

By July 1973, the Manor Mobile was operational and *Tubular Bells* was in the shops—the Virgin Records label had become a reality. The Mobile had bought the first operational 24-track tape recorder in Europe and I made what I believe was the world's first 24-track mobile recording, of the Anglo-Australian-French band Gong. The Mobile was on the road with Queen, John Martyn, Leonard Bernstein and the LSO, Gary Glitter, Crosby Stills, Nash & Young, Joni Mitchell, The Band, and artists of similar calibre. Meanwhile, the success of *Tubular Bells* had created the pressure for a rapid follow-up—*Hergest Ridge* recorded with Tom Newman engineering once again.

But bad feelings were flying about. The pressure was on at The Manor, because the technical superiority of the mobile unit was plain for all to see. It was building a great reputation as, perhaps, Europe's leading mobile facility. By Spring 1974,

we had a second unit on the road, rebuilt from the truck which we had bought from Pye with its Neve Series 80 console rebuilt to 24-track.

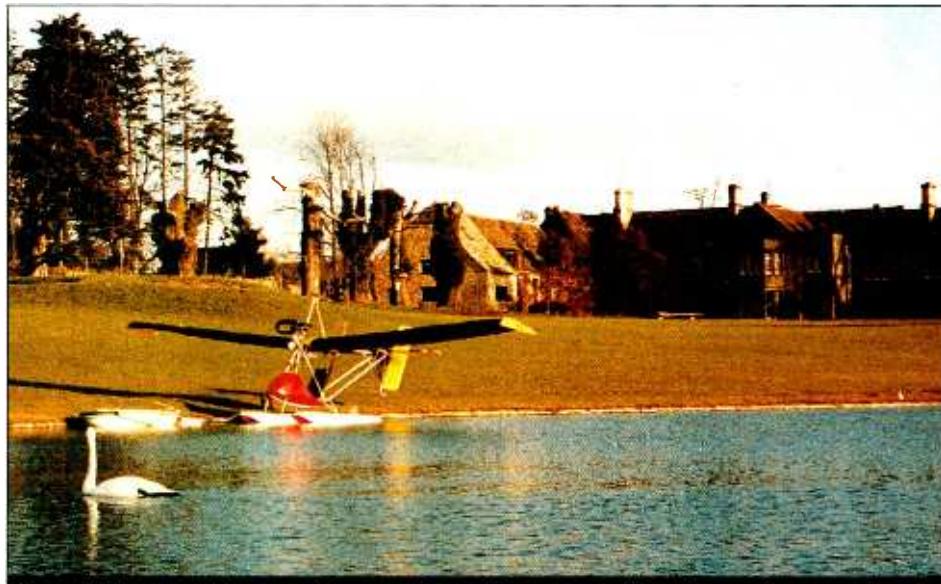
Tom Newman resigned from The Manor after endless conflicts with Branson, and I was invited to take his place as MD. We incorporated The Manor and The Manor Mobile under a holding company held jointly by myself, and Virgin Holdings, which was owned by Richard Branson and Nik Powell (who now owns Palace Pictures).

At this time, Barbara Jeffries called to book The Mobile for a recording of Alvin Lee. During the mixing at Hook End Manor—then Alvin Lee's home and studio; now owned by Trevor Horn)—she asked me if there were any jobs going. We needed somebody in the office and she accepted my offer but soon became Manager of both Manor and Mobile. It became apparent to Branson and Powell that she would make a better MD than me. I had staffed the companies with first-rate recording engineers, Mick Glossop at The Manor, Alan Perkins on Mobile 1, and Chris Hollebone on Mobile 2. We also had excellent maintenance engineers. It looked as though I had just rendered myself redundant.

In late Autumn of 1974, Powell came to The Manor to see me, looking somewhat solemn. He said 'I'm sorry, but unless you can think of a good reason to the contrary, we no longer need your services. We will meet again in a week, and decide what is to be done'.

Perhaps that was when my writing skills were inspired, because I began to write a report about the state of the companies, and the prospect for the future—and what I could do in the vacant position of Technical Director of the holding company. ►

RECORDING STUDIO PROFILE



Circa 1981—a seaplane provides an alternative to recording. A new live room is being built at the left-hand end of the studio

I got a three-month extension, plus the chance of a trip to LA, which I would pay for should it come to nothing but which they would pay for if I convinced them it was worthwhile.

I had proposed to Virgin to take The Manor to the top. Dave Hawkins—then with Scenic Sounds, and UK representative of Westlake Audio—had shown me the work of Tom Hidley at Westlake who had just

built Threshold studios in London, for the private use of the Moody Blues. I flew to LA to meet Tom Hidley and took along Simon Heyworth to do some quadraphonic trial mixes, to use on a Gong album, and to get the feel of the new style of the rooms.

I returned to the UK having visited various Hidley studios in California and Toronto. A powerful new proposal was then written for Branson and Powell, and six weeks later, I had the job, 12 months to see how it worked out, and the okay to return to Hidley to draw up detailed plans. Barbara Jeffries was confirmed as MD of the Studio division, as it had become, with me as Technical Director of the same division. That year, the second mobile unit was stripped and the equipment put into Mike Oldfield's house for what was to become the *Ommadawn* album, in which I became heavily involved. Oldfield was a very serious proposition by this stage, as *Tubular Bells* had only eventually been dislodged from its No 1 slot in the album charts by *Hergest Ridge*.

The new Manor

By march 1975, the new plans for The Manor were drawn. A 'revolutionary' automated mixing desk was ordered from Helios; digital delays (almost unknown) were to be installed along with fully quadraphonic Westlake monitoring and a new ►

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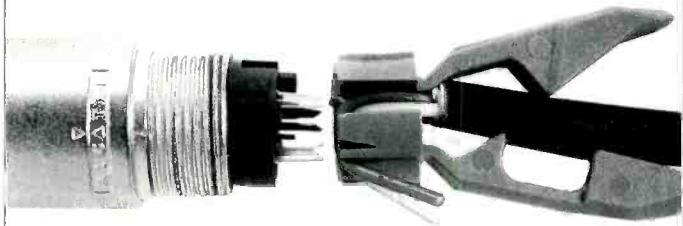
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Audio



1975—Richard Branson in birthday mood. Penny Robinson on the left now runs all ex-Virgin studios for EMI

24-track machine with Dolby A and dbx. Work was scheduled to begin at the end of May, and to be completed by early July—although a 6-week total refit was unheard of in those days. The studio was to be reversed, with the control room downstairs next to the house, instead of upstairs away from the house. I fought to keep to the schedule but a dock strike held up a lot of the imported materials and Helios were late with the desk. By early August, we held the opening party in Branson's usual style, but the hype was unnecessary as visitors were awe-struck.

The control room was state-of-the-art, and almost pure Hidley and the studio was built by a team of British cabinet makers, under the guidance of Mike Yamma and Steve Boreki from the US.

In the new studio we were able to get some great if occasionally idiosyncratic sounds which were unattainable in conventional studios and musicians often commented that the atmosphere was more conducive to playing. All of this reinforced the philosophies applied to the original Manor studio. So in the rebuilt Manor, I decided to be a little unconventional myself, and design a studio for musicians.

The biggest mistake was the incorporation of a highly absorbent drum booth. Separation had become a by-word for 24-track recording, to allow the maximum potential for postprocessing of the recorded instrument. It took some time for us all to realise that the drum booth designed for maximum drum-to-drum separation, also soaked up all of the response from the drums themselves. They sounded lifeless, and felt lifeless

to the drummer, who usually hated playing in there.

The original studio had a small window into the control room, another of Newman's whims, but we had all liked the change from night to day, the change in the seasons, and the change in the weather. Somehow, going back to the customary entombment in a studio seemed unthinkable. Hidley's control-room design precluded an outside window, so I opened big windows into the studio itself, and unconventional as it was at the time, everybody loved it.

Another departure from the norm was the sliding glass door between control room and studio. To the best of my knowledge, that was the first use of such a system in a front-line studio. Tom Hidley and I had wracked our brains as to how to provide easy access in a listed building where only minor modifications would be permitted. I had seen the sliding doors in his demo room in Wilshire Boulevard, and realising that the sound isolation was adequate asked what he thought. The main problem that we foresaw would be one of acceptance, rather than performance.

The studio room itself was a success, as it was coupled to a control room which was sufficiently neutral to allow what the studio room was doing to be properly heard, and taken advantage of by appropriate microphone positioning. Vic Smith (now Vic Coppersmith-Heaven) was, to the best of my recollection, the first producer to use the room, and it was three months of solid bookings before I got the chance to use it myself, when mixing the quadraphonic version of ►

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Oldfield's *Ommadawn* album.

Little changed in the next five years and under Barbara Jeffries' overall control, the place was booked solid with some of the World's top artists. Queen recorded *A Day at The Races*, Gene Simmons and Cher, Elton John and Kiki Dee recorded there as did, Bill Wyman, The Stranglers, Public Image, XTC, Jack Bruce, Spandau Ballet, Van Morrison, Mott the Hoople, Saxon... The list is long; my job was secured.

From that time onwards, The Manor was always stacked with the latest 'quality' equipment. The Ampex AG machines were changed for the first *ATR 104* and *102s* for

mixdown, and the automation systems were constantly updated.

The next significant development came in 1980 with the addition of a large, Oxfordshire sandstone live room. After the belated acceptance of my, now renowned, stone room in Townhouse 2, it was decided that The Manor needed more studio space, and the 1975 Hidley drum booth had become nothing more than a store for flight cases. After a battle with the local planning authorities to build to an extension on to this listed building, I designed a room based on my room in Townhouse 2, the famous Phil Collins *In the Air Tonight* room. It was not an immediate success, and I learned a



1975—Jacky Byford (who provided the inspiration for *Tubular Bells* extended bass riff) with Johnny Piranha

sharp lesson that bigger did not always mean better, and ended up having to install a sub-ceiling to control it a little more. After that, it became a useful addition to the recording space, and was well used until the studio's closure.

But it was the staffing policy that was the key to the Virgin success story—CVs didn't count for much. Whether candidates held PhDs in recording techniques or had been selling bananas on a market was of no importance, but their showing at interview was.

People were special because the place was special and the artists were made to feel special. It was a place of high creativity, and had to be both professional yet relaxed at the same time. Perhaps its demise was on the cards as soon as EMI bought Virgin, because its staffing policy ran so contrary to EMI's 'graduates only' philosophy and more formal general approach.

Men and money

Richard Branson was nothing, if not imaginative. This was another part of the Manor's charm. He was constantly looking for something to create a continuous stream of interesting developments so that the place never became stale.

For one of Branson's 'over the top' manor parties, we had a quarter-mile go-kart track and a boating lake, plus Geoff Westley's hot-air balloon trips, and for either that one, or the one before, Branson had the ladies that worked in the house dress in French maids' costumes, with black fishnet stockings and very short dresses. Nobody ever said 'No' to him: there was always schoolboy naughtiness about him, coupled with a huge sense of enthusiasm and fun.

One of the problems with the floating of Virgin on the stock exchange in the late 1980s was that whimsical (inspirational) decisions can be very difficult to quantify in terms acceptable to the board of a public company. I believe that this strangulation of creativity was the driving force behind Richard Branson buying Virgin back ►

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into private ownership.

During the 'public company' phase, I approached him about investing in research for digital signal processing of room acoustics. Unfortunately, with the restrictions of a public company, the time needed to draw up reports, make projections, and gain approvals, not to mention the cost of doing all of this, ensured that the project died before it ever existed. The same problems applied to The Manor, which was driven not only by belief in it by its staff, but by a determination from all concerned to make it work, but also an ability to adapt to changing requirements. Policy decisions could be reversed on the spot. It had great autonomy and

independence under Branson's chairmanship.

In late 1981, in conjunction with Tom Hidley, we made modifications to the control room ceiling, to try to improve the linearity of the very low frequencies, but control rooms in general were becoming much larger. Unfortunately, The Manor, constrained within its listed building, was unable to follow suit. Soon after I sold my shares in Virgin in 1982, the rear monitors were removed, to make more space for equipment, as by that time, it was realised that the quadraphonic concept was well and truly dead.

I left Virgin in 1982, for a variety of professional and personal reasons, but nothing to



1972—Tom Newman and the various attractions of The Manor

do with Virgin *per se*. Branson and Powell gave me a 'generous' going away present, plus my company Corvette Stingray in addition to my personal Rolls-Royce, (which I had had for 11 years since swapping it with Newman, for the remains of my 1972 mobile) plus the cheapest Bentley that I could find in *Exchange and Mart*.

The Manor still had 13 years to run, and to its last day, it was essentially as Tom Hidley and I had built it in 1975, which is something that I feel proud of, because 20 years in the first division is quite an achievement in these days of in-built obsolescence.

I don't recall recording in The Manor after 1978. Most of my recording and production from then on was on live work. The Manor was first and foremost a recording studio, so I mixed my live recordings in The Townhouse after its completion. For one or two people mixing for eight hours a day, to tie up The Manor for that is something of a waste. As for the Rolls-Royce, I eventually sold it in 1983, when needing quick cash to pay for the ever increasing studio bills for a record which I was independently producing. The artist, of all people, was Tom Newman.

Perhaps EMI and The Manor were just never meant to be. EMI are too hog-tied with bureaucracy to run a company which had been driven by inspiration, dedication, and a lot of heart. You simply cannot discuss such things with accountants. I was heartbroken for Nyx Darke and her dedicated staff who had given the facility their all, and who were shattered by the announcement of its closure and the loss of their jobs.

To any employers finding themselves with the opportunity of taking on any ex-Manor personnel, my advice is to take them, because they are of a very special breed of self-motivated, flexible, capable and, above all, committed people, without them The Manor would not have been what it was. ■

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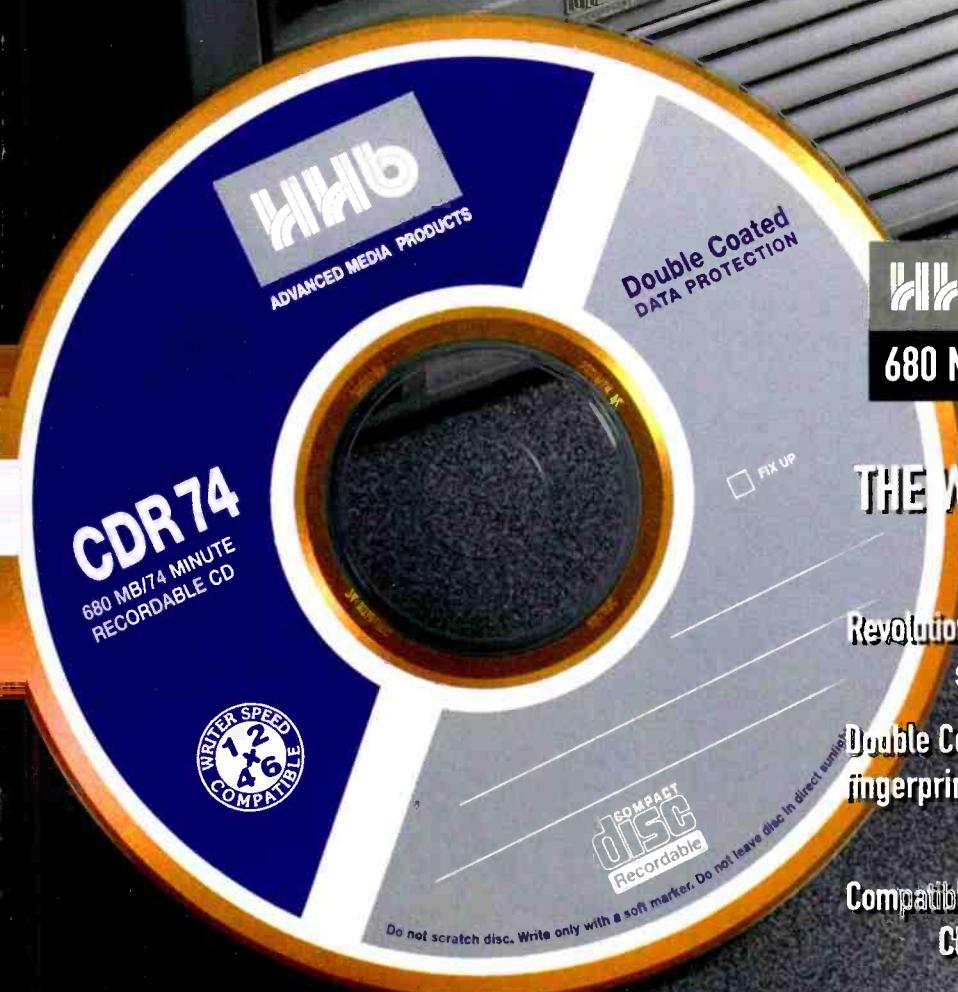


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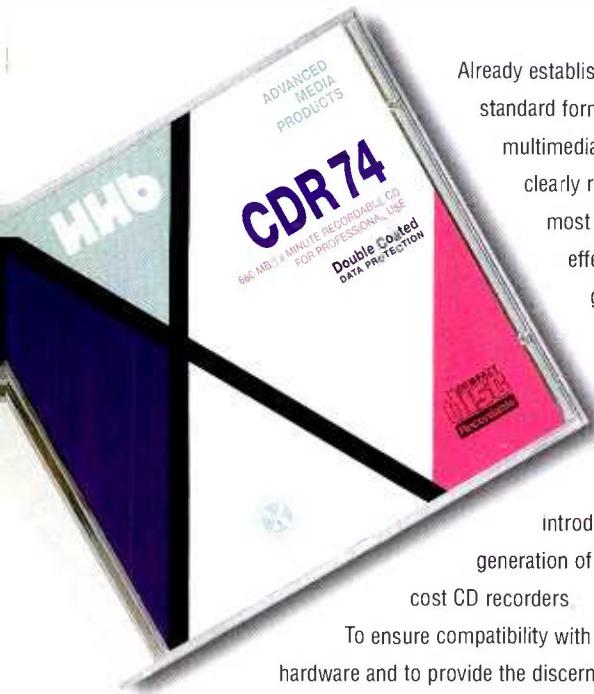
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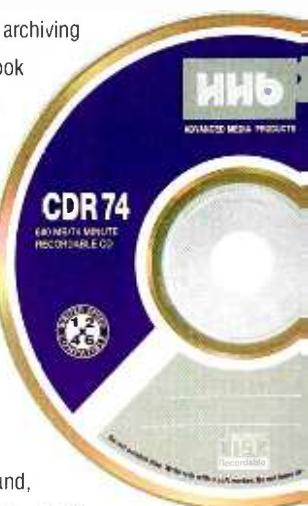
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HHB DAT TAPE

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The enthusiasm shown by a myriad musicians for new and exciting digital and computer equipment is seldom matched by the depth of their pockets. Odd indeed is the personal studio owner who is not looking for some kind of discount.

Except for the largest hand-built consoles and other, similar audio equipment, pricing has little to do with cost of manufacture. For example, let us assume that a DSP delay, equalisation, limiting and compression 'black box' marketed by a large Japanese concern sells at a suggested retail of \$945. Such a unit may cost the equipment manufacturer \$300 to construct—assuming factoring in the cost of all of the parts used, labour in assembly, engineering and so on. Many manufacturers then add 50% to the cost to cover administrative overhead, research and development and to generate profit for the Japanese parent company. This brings the 'intermediate' price up to \$450.

The equipment is packed in a specific box designed for the product and shipped most usually by sea to the target market for the product—in this case, the US. The product is imported by the American subsidiary of the Japanese parent and then subjected to a 25% surcharge to cover the cost of shipping, warehousing and distributing the product plus profit for the Japanese subsidiary in America. This brings the price up to \$562.50.

A regional distributor stocks and warehouses the item in order to supply the area's audio dealers. This adds 15% to the total—now \$675. At the authorised equipment dealer, there is a 40% markup to cover all of the dealer's costs profits. This closes the internal product price spiral at \$945.

The point of all of this is that there is significant latitude in the pricing ladder—not to mention the distribution of equipment to other countries with even more latitude (and lassitude) to deal with!

Over the years, alternative studio equipment supply routes have evolved—with their own strengths and weaknesses.

Bootlegged gear, for example, represents a major risk to the equipment buyer. No matter how large and/or reputable the seller, many manufacturers will refuse to support equipment sold through what they see as illicit channels. How the equipment arrived there in the first place is usually not suspicious. Some dealers regularly trade equipment they do not carry with dealers who do. The outcome is enhanced stock for all concerned. Frequently, equipment dealers must have a specific piece of equipment to 'bid' on an installation for a government agency such as an arena or convention centre, a school or a military facility.

The bottom line here is that no matter what the dealer tells you, if a piece of equipment is sold by someone not authorised to carry it, parts-specific service, tools-jigs-manuals-repair training and so on are not readily available. No matter what the price advantage, if you must buy through this channel, verify that you can service the product yourself or that there is guaranteed support somewhere.

Alternatively, grey market equipment is equipment of foreign manufacture that is most likely to have entered the 'grey' retail channel from another country rather than being imported by the

Martin Polon

Golden opportunity or grey liability? The art of buying audio equipment exposed

authorised distribution arm of the company in question. This is most prevalent with camera gear and hi-fi equipment but the advent of small, powerful studio equipment for the worldwide musician marketplace has brought another category of 'grey' to the stores.

Grey products are usually—although not always—identical to equipment sold in the US. Since the currency trading relationships, free trade agreements, tariffs, duties and profit expectations vary so wildly from country to country, there exists the potential for considerable savings.

Many small and large studios buy hi-fi-grade speakers; DAT and cassette recorders; power amplifiers and other appropriate items available as grey. Similarly, there are mixers, 2-track recorders, DAT machines, and other items emerging in the marketplaces of other countries and arriving grey on American shores. If you think that manufacturers of personal and project studio gear have no sense of humour about bootleg transfers between dealers, they are positively 'rip-shit' about grey market items. Unless the product specifically has a 'World' warranty, factory service is utterly circumstantial.

It is not unusual to find odd groupings of studio equipment at the 'flea markets' that exist on weekends in most major US cities. This is usually resembles equipment discarded from a project studio—or even big league studios. The people selling the equipment, almost without fail, know little or nothing about studios or audio. Prices will

In the Internet Usenet newsgroup devoted to discussions of professional and project studio audio, there are dozens of advertisements for the sale of a broad range of audio equipment

be somewhere between ludicrous and sublime, but almost never in the appropriate range.

As you walk the aisles of the flea market, you will find that most of the electronic equipment here is displayed on truck beds and seems to have been taken out of service by cutting cables rather than parting connectors. You may get the feeling that you are not dealing with individuals for whom honesty really is the best policy. If you purchase such gear and the police find you at a later date, you are likely to lose what you have bought and not get your money back.

Although certain electronic events are labelled 'flea markets,' they are far removed from those discussed above where studio gear shares the stage with outboard motors, underwear and used books. The 'electronic flea market' is most usually run by clubs for amateur radio operators and vendors are strictly regulated. Result: no problems with stolen goods. The problem here is that one frequently has to evaluate audio equipment on a 'what you see is what you get' basis. There are no AC power outlets available and you have to take equipment condition on good faith.

In the Internet Usenet newsgroup area devoted to discussions of professional and project studio audio (`rec.audio.pro`), there are dozens of advertisements for the sale of a broad range of studio audio equipment. The quality of offerings ranges from unmissable to DOA. The problem is in accurately identifying which is which. As with all of the Internet, anyone can post and anyone can read. That makes the question of paying for and shipping sale items, a kind of 'which came first—the chicken or the egg' or if you prefer 'the payment or the gadget'.

Newspaper ads represent a similar prospect as the above but out of cyberspace and in hard copy.

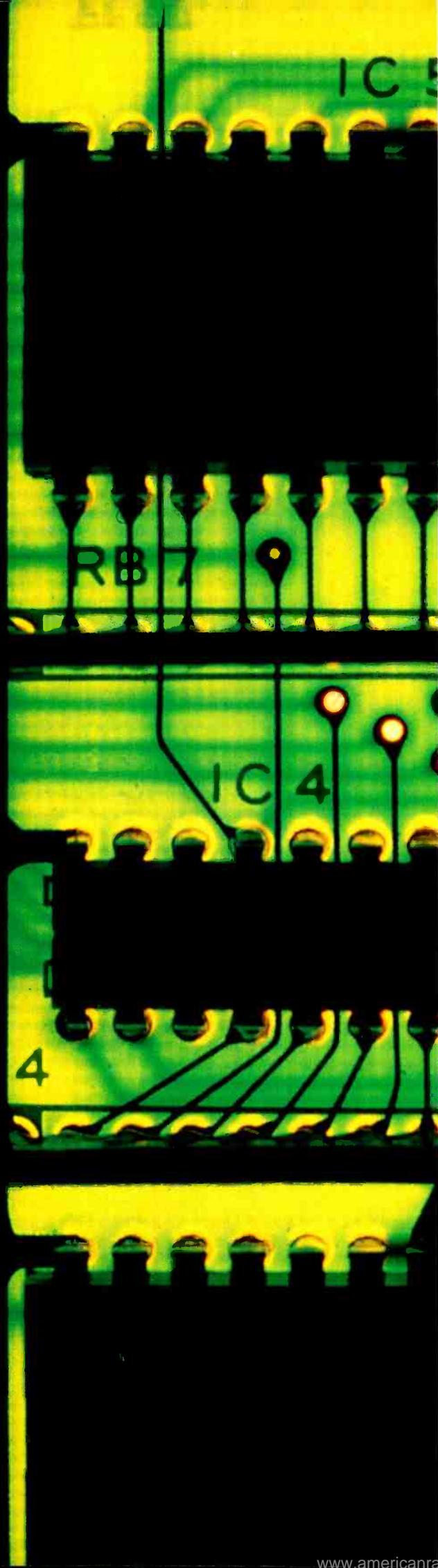
At music events and trade shows, new products are sold at as much as a 50% discount. The price is right, the quality is high, but as to the advisability of buying what may be hijacked goods, you must again consider the options of becoming a receiver of stolen property.

Equipment is sometimes pawned to generate cash. The pawn figure is usually a ridiculously low appraisal of real value. After a set period of time passes during which the equipment cannot be sold, the item(s) in question can be bought out of pawn—usually at very reasonable prices. The ability to check out the equipment and to return broken or defective items simply does not exist in a major way in this environment.

Sales through established studios is certainly a safer opportunity than most of the others, but it is clear that equipment is likely to be well used. Most, but not all studios will be honest about the condition of the equipment they sell to retain credibility in the marketplace.

Estate, bankruptcy or government sales always offer a secure line of purchase, but usually with no way to ascertain usage or condition of equipment. The best deals come from agencies such as the DEA and the US Customs.

The bottom line here is that you generally get what you pay for. Beneath the bottom line is knowing not only your equipment, but the channels through which it can be bought. ■



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You have to feel sorry for Channel 5 in the same way you would for the unwanted, unloved child of a large family. But this attitude seems strange at a time when people are gearing up to bombard the viewing public with even more TV channels, while only occasionally asking the question: do they actually need this?

Channel 5 was envisaged as a less tightly regulated version of the ITV network, with an even more populist approach but a nationwide brief, as opposed to the regional responsibilities of the individual ITV companies. Critics pointed out that the satellite channels, particularly Rupert Murdoch's Sky, were already pumping out such fare, but the decision to go ahead had been made. So the technology lobby weighed in: due to the crowded nature of the frequency spectrum, C5 had been squeezed in where possible, and allocated channels 35 and 37 UHF. This meant that only 74% of the population would be able to receive the service in the conventional way, and many of those would have to retune their VCRs to avoid interference. Others would also have to invest in a new aerial.

Things were not looking good at all. The ITC duly advertised the licence in 1992, judging the applications on the size of a monetary bid, and the quality of the proposed service schedules. Sniggers went round the industry when only one applicant bothered. These sniggers turned to guffaws when the ITC decided that the sole applicant, Channel 5 Holdings, was not capable of sustaining the service for the duration of the licence. A damning conclusion for any consortium to bear, but it must have been worse for C5 Holdings, given the weighty line-up of companies behind the name: Thames TV, its parent company Pearson, Time Warner, Associated Newspapers and Canadian station City TV.

Over a quiet beer in vaguely disreputable pubs around London's media enclaves, the industry, and attendant hacks, pondered the significance of this outcome. Well, we all thought, so much for Channel 5. Goodbye, farewell, amen. But, we were being rather naive. After all, didn't we all get involved with television precisely because it is such an unpredictable business? In July 1994, the Department for National Heritage, which is responsible for broadcasting, announced that it was resurrecting the idea of a fifth channel. The then Heritage Secretary, Peter Brooke, wrote to the ITC proposing an analogue C5 that could reach 60% of the country, with perhaps 80% serviced by digital simulcasting. There was also talk of a number of digitally-delivered local services, while also simulcasting the four existing terrestrial stations.

Although it is a Government appointed quango, the ITC has shown a pleasing tendency to follow its own counsel in some cases. The Commission obviously could not see the point of going through all this again, saying that, because channel 35 of UHF was no longer available, having been slated for digital TV, coverage had been reduced to 50%. There were also doubts about digital terrestrial, given that the Government would have to put new legislation in place for this to happen.

These doubts and problems were disregarded, and the licence was re-advertised. The deadline for

Kevin Hilton

With additional TV channels high on everyone's agenda, is Channel 5 in danger of becoming a farce?

applications was 2nd May and this time four groups pitched in. There are plenty of familiar names vying for C5 now, some of them for the second time, which may or may not count against them, bearing in mind that they are not in cahoots with the same people on this occasion. The four hopefuls (in no particular order, other than this is how they appear on the ITC press release) are as follows.

First there is Channel 5 Broadcasting, comprising European media group CLT, with TV stations in France, Germany, the Netherlands, Belgium and Luxembourg, plus interests in European radio, publishing and TV production; MAI, an international concern involved in media, financial services and market research, who own Anglia TV and control Meridian Broadcasting; American investment firm Warburg, Pinus Ventures; and, an old friend, Pearson, including Thames TV, Australian soap expert Grundy International, and the Financial Times and FT TV.

Next comes New Century Television, offering the combined skills of BSkyB, plus the satellite aerial installation subsidiary TeleAerial Satellite; equity investor Goldman Sachs; Granada Group, including both Granada TV and LWT, plus the high-street rental chain; European media group Kinnevik, who are already bidding for ITC licences through satellite services aimed at Scandinavia but transmitted from London; PolyGram, one of Europe's leading film companies, which owns the ITC library (thereby having access to such classics as *The Saint*) and a stake in Andrew Lloyd Webber's Really Useful Group; and media group TCI, with interests in 58 broadcasters around the world, including 37% of cable operator Telewest, controlling shares in 12 cable and satellite channels, and 20% of ITV contractor HTV.

Then come UK TV Developments, CanWest, Canada's biggest independent TV broadcaster, who also have minority holdings in Network Ten Australia, TV3 New Zealand, and Chilean national TV network, La Red; Scandinavian Broadcasting System, owner of satellite-to-cable services in Scandinavia and Belgium, plus part of Finnish national network MTV3, and commercial radio station Radio Sata; Ten Group, owner of Australia's Network Ten; independent programme producer SelecTV, who have an enviable roster of British comedy and light drama shows, including *Lovejoy*, *Love Hurts*, *Goodnight Sweetheart* and *Pie in the Sky*; and Royal Exchange Trust Company.

On to Virgin Television (Virgin; Paramount TV,

with access to Hollywood product, United Paramount Network (America's fifth channel), and the programmes made for the US networks; European consumer electronics giant Philips; investment trust Electra; making a second appearance in this list, HTV; and, another name from the past, Associated Newspapers, which will restrict its shareholding to 5% to abide by cross-media ownership rules.

As ever, the headline grabber on the day of the deadline was Rupert Murdoch, who upstaged even the ultra-media-friendly (on his terms, at least) Richard Branson. This he did, not by staking out his claim and preparing to become the ultimate global media baron, as he has tried to do in the past, but by treating the whole affair with something bordering on disdain. New Century TV only bid £2 million, which can be interpreted in a number of ways: it is all Murdoch thinks C5 is worth; he is Rupert Murdoch and he should get the gig regardless of the money; he is not taking it seriously but has to be seen to take part; he does not think that TV channels should be decided on money alone (the least likely of all these); or, this is a smoke screen and he is up to something else.

Of the other bids, both Channel 5 Broadcasting and Virgin offered £22,002,000, while UK TV Developments went over the top with £36,261,158. The proposals roughly reflect the characters of each group: New Century are terse, arrogant and with few details; C5 Broadcasting appear as painfully keen and desperate to impress, with a fulsome plan, including news, current affairs, drama, religion, arts and community-consumer advice; UK TV give plenty of detail, but come across as a reworking of both ITV and Sky One; while Virgin have the same warm, bearded, cuddly personality as their front man, hitting all the right media-friendly hot-keys.

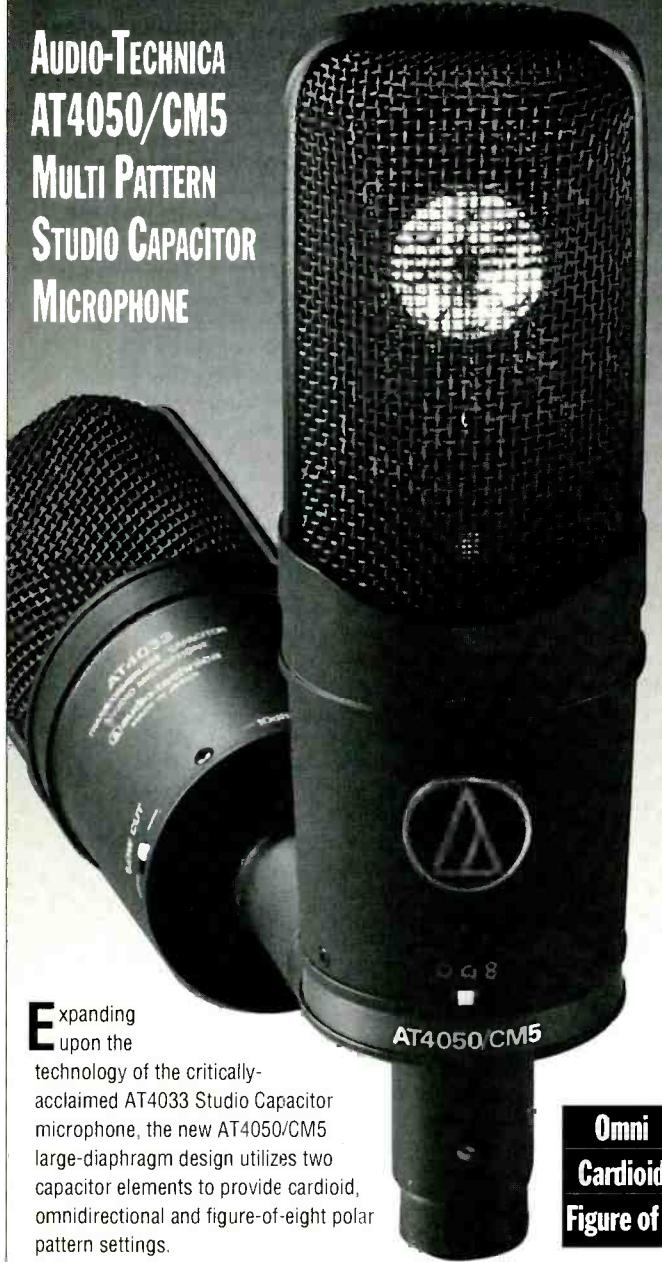
Technology features heavily in all the proposals, but the broadcasting centre aspect is glossed over, regardless of the fact that the successful applicant will have the chance to build perhaps the trendsetting studio complex, using compression, automation, and disk technology. The areas that are of the greatest concern are domestic reception, and transmission. Each bidder includes some expert in consumer electronics or aerial-VCR installation, and proposes a free service of retuning, plus a helpline. The affected areas will be London, Birmingham, Leeds-Bradford, Glasgow, Bristol and Cardiff, plus smaller transmitters around Redruth, Cumbria and West Wales.

Each applicant has wisely brought in a partner specialising in cable-satellite, which will give them extra reach beyond conventional RF methods, which will now provide 70% coverage due to various jiggling around of frequencies by the Radiocommunications Agency. NTL have already been approached by two of the groups to lend advice.

The ITC have to assimilate all of this information and are hoping to make a decision by 30th November. If everything goes ahead, Channel 5 should go on air no later than 1st January 1997, although it is going to have to be very special if it is to make an impact in the crowded ether two years hence, let alone survive the competition. ■

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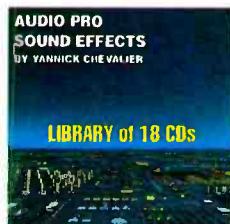
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EARLASH

Have the effects of loud music been deeply misrepresented? Ben Duncan exposes the experience and research efforts of the supporters of loud music

As a sound engineer, you may be concerned about your hearing—either because it ‘ain’t as good as it was’, or because you keep hearing worrying stories. But ideas of enforced SPL restrictions in studios, as well as out on the road, may worry you even more. In a recent *Studio Sound* column¹, Martin Polon insists that ‘energy is energy’, and from this, that loud music must ultimately be energetic enough to be dangerous to humans. *Reductio ad Absurdum*, nobody seriously disagrees with this. An SPL of 260dB alias a million times that of the ‘energy exposure’ received off a good live band would doubtless pulp most planetary life forms except cockroaches—as surely as Mega-Joules of energy in any other form. Yet long before this point, the sound involved would no longer be music. The demarcation is vital. Fig.1 puts very high SPLs into a graspable context, showing pressures at the eardrum. The highest level, 140dB, is usually only encountered on stages a few feet from a multi-kW side fill or FOH PA, and amounts to 0.03 pounds of (rms) pressure per square inch—about the same as gentle finger pressure.

Positive SPL effects

What is experienced and appreciated by those working creatively with music at high SPLs? There is the magnification of sonic detail and a fresh perspective that can assist production excellence. Tonally, above 110dB SPL, human hearing develops a nearly ‘flat’ response, reflected in the appropriateness of ‘c’ weighting for monitoring such SPLs. Some kinds of dance production are unperformable without adequate SPLs. Without these, ‘feel’ cannot be produced or guided. Low bass is barely audible before 80dB SPL, and at least 105dB Laeq SPL is needed in order to bring low

bass alive. Still more is required to experience the physical impact and visceral feel. So even if low bass is able to reach 125dB SPL, the dynamic range made available for bass ‘texturing’ is barely 15dB.

For music above about 95dB Laeq, there is an adrenaline rush, comparable to the energising effects of amphetamines. If the rush is accompanied by some kind of pleasure, it’s all the more likely to become addictive. But the ear-brain combination can soon accommodate the level. So then the rush runs out, and going louder is one natural reaction to get it back again. The outcome is well known enough: some engineers can never get enough

level. At least in the studio, there is a possibility of adopting a disciplined alternative approach (see sidebar: The Case for Deregulation).

Concert SPLs

In the past couple of decades it has been those designing and using innovative touring PA systems—more than any others in the pro-audio community—who have had the opportunity to explore the limits of musical loudness, as bigger and more efficient PA systems have been built. In 1988, I certified to the *Guinness Book of Records* that Turbosound in concert with Britannia Row Productions, had assembled the then world record upfront PA of 475kW, at Castle Donington, for The Monsters of Rock festival. But was the sound of half a million watts so especially loud? Having about ten times the lowest approximate useable power (50kW) radiating into almost the same segment of space, loudness of 475kW should at best roughly double (at mid frequencies), while SPL readings should go up 10dB. Yet in line with previous experiences, the anticipated multiplication did not ►

HOLISTIC CONSIDERATIONS

What happens to people’s ears over years or even hours cannot be separated from what they eat and what kind of environment they are in. As we age, or are stressed, and with anything less than a perfectly healthy diet, the amount of protective chemicals in our bodies decreases from the optimum. It follows that readers’ ability to withstand damage from all kinds of sound energy is highly variable, by day and by person, even without genetic factors. The average bodily ability to protect and repair is likely potentially far higher than any studies might suggest, because most 20th Century humans involved in sound engineering operate in an increasingly and diversely polluted and stressful urban environment. As with all knowledge about health, there is a dangerous loop here: out-of-context knowledge about the risk to hearing, or the risk of being sued for an employee’s loss of hearing, or even the risk from the pollution produced by lorries delivering ear protectors, could all add to the kind of stress that could itself exacerbate or trigger tinnitus or other auditory illness.

In the experience of many sound engineers, the likelihood of any ear damage or mere stress at any practical high SPL reduces substantially with each of following considerations:

1. You have accommodated the sound psychologically—it did not appear abruptly at a high level and you have some control over its level, and so on.
2. The sound (music + PA or monitor system

+ acoustics) has no irritant qualities and there is no other aural or sound-related discomfort.

3. Your system is healthily fed and vitamin C levels are replenished in particular.

If anyone is unfortunate enough to traumatised their ears enough so they have been left ringing or hurting or have stayed shutdown for more than a few minutes after closedown, the ideal is to recognise they need a rest and protect them from any exposure to loud sound for a healing period of some hours, days or weeks.

Once it is recognised that working in a high SPL soundfield involves being empowered with a naturally occurring amphetamine substitute, then the mix of set of colleagues (and clients) monitoring at increasingly high SPLs in the studio or on stage can be seen afresh. Instead of being some sign of acute deafness, it is actually no more than another variant on human addiction-to-pleasure, less illicit and morally dubious than some, and also one harder to get into. In this way, those of us compulsively seeking high SPLs can be seen as being worthy of acupuncture, group therapy, or any other kind of positive rehabilitation scheme. Equally, should not future tests of hearing damage include control groups taking alternative remedies (a herbal remedy for tinnitus is Mullein oil), high-tech vitam in and enzyme supplements, and other creditable healing options? The irony of this is, of course, that loud, bass rich, music is one of these. ■

quite work. At this level, a number of different limitations can come abruptly into play.

As a result, the loudest live sound has not become much louder since bands like Ted Nugent and Iron Maiden set their respective records in the 1970s and 1980s. A violently thrashed drum kit still peaks at about 140dB SPL, full stages are still about 75-feet wide and instrument amplifiers (tube or transistor) are hardly much louder than Jim Marshall's state-of-the-art combo was in 1966.

Nor have PA system sound levels spiralled far beyond a point that was first reached 20 to 25 years ago. The reasons have little to do with SPL legislation. An already loud-enough PA costs substantial money to warehouse, insure and truck. Even a modest a 10dB SPL increase (assuming the starting point is a modern, efficient horn-loaded system) requires either a nigh impossible tenfold increase in PA speaker efficiency, or else a tenfold increase in PA power output and speaker handling—and the accompanying hike in size, weight and running costs. Then try fitting it into the already overcrowded stage wings and an overcommitted tour budget. The point is that beyond a point, the cost, size and weight of high SPLs quickly spirals into orbit. With present technology, continuing and wild increases in SPLs beyond 140dB are not a problem. For the most part, all that has happened, is that there is far more loud sound about, and far greater availability of equipment that can generate SPLs up to (say) 115dB Laeq or 140dB peak—gear that was once in the province of just a few hire companies and studios

Front-line experience

Over the past 15 years, Tony Andrews, original founder of Turbosound, and partner John Newsham, and their team, now functioning as Funktion One Research, have helped to develop some the world's loudest music PA systems. Early in their quest to design PA speakers that did not hurt when they were loud (as so many did in the early 1970s), they noticed, even with SPLs peaking at 130dB or more, three crucial truths. They were not the only ones either. Many readers who have used their ears and exercised minds will have observed that:

Clean systems seem 10dB–20dB quieter than they read on an SPL meter.

Clean systems do not cause much, if any, TTS (Temporary Threshold Shift—when ears 'shut down'). A temporary shift caused by significant aural stress. Recovery to full hearing acuity varies between minutes and days and depends on severity and state of health.

Clean systems do not leave your ears ringing.

It was also observed that loudness can disproportionately magnify every sonic defect. Experience also confirmed that dissonant kinds of distortion (for example, odd harmonics above the 5th) change quite abruptly, from adding useful edge and sharpness at moderate levels, to being harsh and metallic, then outright painful, above about 100dB SPL.

Andrews: 'After having succeeded in running up

a new PA to theoretically "dangerous" SPLs and it didn't hurt us, it became obvious how much quality of SPL could radically alter the experience.' (Some acoustic handbooks have exaggerated notions about the dangers of 140dB SPL.) Gross distortion has not been the topic of many AES papers.

Andrews' experience at hundreds of gigs is that it 'fills in the gaps', increasing average energy levels. Because there is more happening, it sounds even louder than it already is. Ultimately, it approaches clipped white noise. Meanwhile, bad sound in auditoria has giant spikes and components that 'hang on'—causing a prolonged wash. But with accurately produced music, the gaps really can allow repeated high SPL peaks to be accommodated by the ear without complaint. Funky dance music and dub reggae, for example, can be listened to comfortably for far longer than 'grungy' heavy metal, at a given very high (above 120dB peak) SPL.

These experiences have been informally corroborated with many other sound engineers. The broad consensus is that poor quality in sound, principally incoherence caused by the presence of high adverse harmonic and inharmonic (such as intermodulation) 'waste' products created by bad audio technology, greatly increases aural stress and the likelihood of damage. Without these gross kinds of distortion that cruder PA systems still manifest, music peaking as loudly as 130dB c-weighted, can be an exquisite experience.

Along with other reasoning PA practitioners, the team at Funktion One discovered long ago, mainly by common sense, that discomfort to high SPL (or any other energy) is the body's alarm bell, dim at first but positively sounding. Pain mainly happens during or after the damage—like the 'oil is low' lamp coming on in most cars. The reflex is (or should be) to either immediately protect the ears, or to leave a venue or room if one feels uncomfortable.

Andrews has his finger on the flaw in the 'deaf musicians spell danger for audiences' shock headline argument. The well publicised deaf rock musicians have probably never been more than a few times in front of a front-of-house system in their lives. Musicians with hearing damage are no surprise. The monitors that they willingly expose themselves too are far louder and today far more aggressive than any FOH system. Side-fills and wedges are designed or selected to have high levels of harmonic distortion—for intelligibility, the Pay Attention factor, because it is the only thing that will get through high instrument levels on stage.'

Partner John Newsham adds 'Some harmonic distortion ►

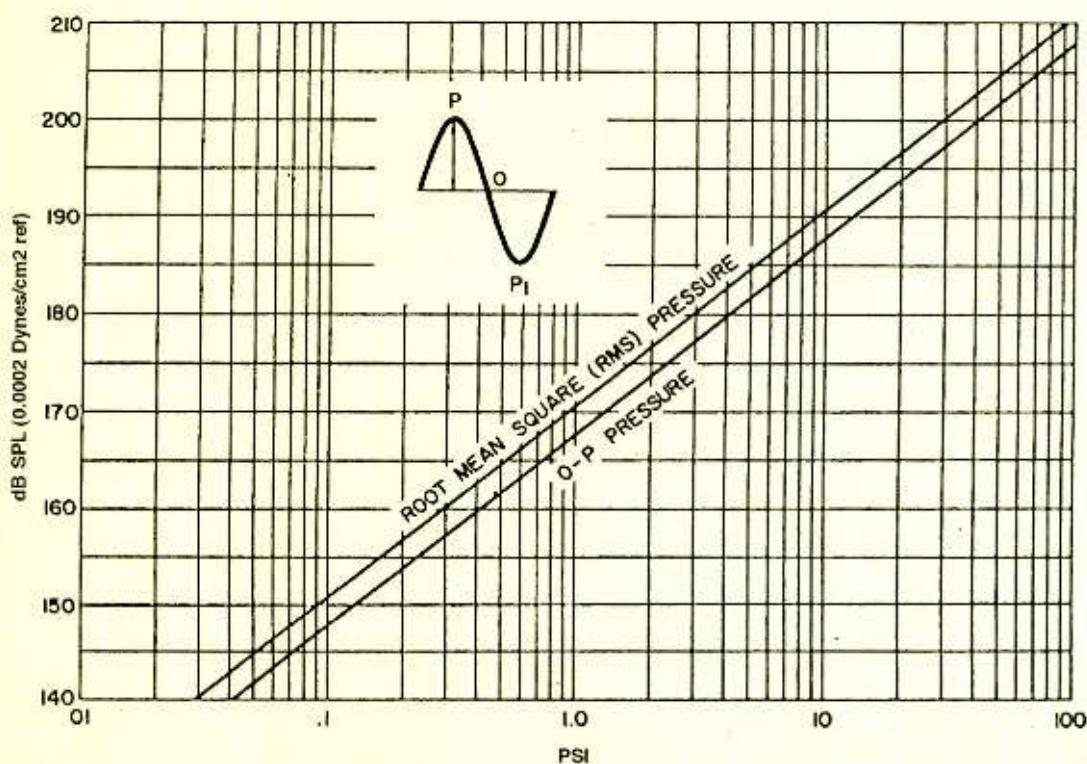


Fig.1: Conversion chart, decibels to pounds per square inch



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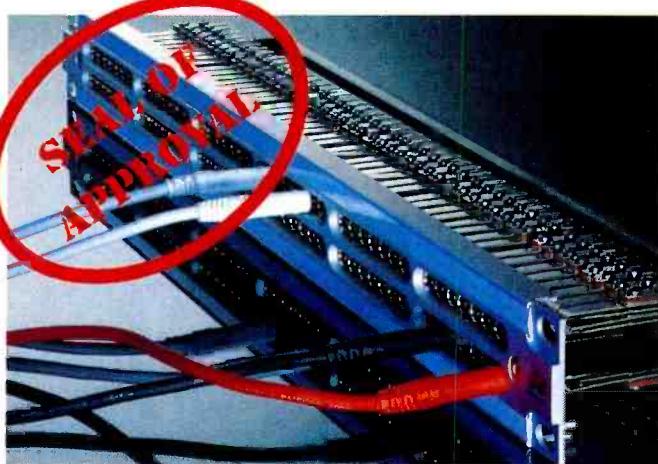
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seems to be helpful for vocalists to pitch. So stage monitoring is destined to be less pure than FOH sound. Still, today's monitors are far less aggressive. There is less ear pain on stage and we notice less shutdown after a show.'

Andrews continues: 'If musicians had paid attention to excess discomfort when they first had monitors in the 1970s, and asked why this was happening, they could have had better equipment earlier, and even the same buzz, but much less risk of damage. But with the monitoring levels and the distortion needed by some artists, we're not able to say that anyone can continue to play with their ears surrounded by kilowatts of backline and side-fills, and not expect to suffer some hearing loss—as sadly some people don't react protectively to an uncomfortable feeling in their ears. What the authorities should equally be asking, is how is it so many other people manage to live and work amidst loud music for years without harm?'

For a loud mix

John Newsham has toured with some of the loudest acts around, including many months on tour with the band Trust who were supporting Iron Maiden in the 1980s. Yet his hearing remains excellent: 'I like a level of around 100dB Laeq to feel right when mixing. I've done tours with Maiden where it's been crushing. But never a ringing ear. It's not just distortion, but spectrum. The very narrow peaks or spikes caused by room problems are perhaps a hundred or a thousandth of an octave wide. So they can be very high, without registering on any sound analyser or meter I've seen. Sometimes you can almost hear the air breaking up—the crackling noise you hear when a

POSITIVE SPL MANAGEMENT SUMMARY

The following plan encapsulates what has long been adopted by a number of experienced British sound engineers (author included) who value their ears but also resist negating the pleasurable:

Ear pain or discomfort at high monitoring SPLs indicates most often either a problem with reproduced sonic quality, for example, caused by overloading signals, acoustic chaos from excess SPL in the room, or dissonant distortion in the equipment; or aggressive source material with hard-edged envelopes. Health (as little as a bad cold) and mind-state can also be involved.

Take monitor levels down by a peg or three (3dB–4dB when live; or 10dB or 12dB in the control room), slowly if necessary, for a while after the 'rush' of high levels are wearing off or thin. The original high SPL may then be resumed after a while, until its benefit lessens again. This discipline prevents levels spiralling up. In live performances, an audience will not readily notice slow level changes. The full power of a system is best remembered when it is used for only 30 well-chosen climatic seconds, or when it arrives at this point in the final six minutes of a concert. ■

NASA rocket is launched—and still not see any spike on the spectrum analyser'

Newsham proposes that sound engineers get into a positive mind-set when mixing: 'When I mix, I work at identifying the parts of the sound that are or especially will be painful. Then I EQ them out, before building up the level, and also identifying new sounds that will be painful or damaging with higher SPL if I don't tackle them first. In other words, I recognise there are "hurt" frequencies, and work to remove them. Overall level can then be increased for a loud but nonaggressive sound. Broad-band metering is just not selective enough to decide whether a mix is too

loud. To assist the ears a new sound level meter is needed that can detect and identify the SPLs of narrow band peaks. It would serve as an "aggressor-meter". FFT tools such as MLSSA, TEF and Audio Precision can perform this but to assist the ears, real-time analysis tied in with appropriately powerful and controllable system EQ is essential. To the best of my knowledge, Meyer's SIM system is the only one achieving this.'

Turning tide

Those who feel the swathe of 'do gooding' is progressively tending to seal off almost every form ►

Bask in the warm glow...

The image shows two vintage Drawmer audio units against a backdrop of palm leaves and a bright blue sky. The top unit is a 'VACUUM TUBE EQUALISER' with 'DRAWMER 1961' printed on it. It features two sets of frequency controls (LOW-PASS and HIGH-PASS) with scales from 5 to 40 kHz, and E.Q. switches labeled 'SOFT' and 'ON'. The bottom unit is a 'VACUUM TUBE COMPRESSOR PRE-AMPLIFIER' with 'DRAWMER 1960' printed on it. It has a METER section with V.U. and G.R. indicators, and a POWER section with 'STEREO LINK' and 'ON' buttons. Both units are black with silver-colored knobs and switches.

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of letting off steam (from boxing to loud music), Ken Dibble's paper on MIHL (see sidebar: The Case for Deregulation) will be welcomed as a damning rebuttal that is long overdue. If workplace noise 'action levels' in studios and venues were increased and there was no rise in hearing loss statistics, then for the next stage (and excepting environmental disturbance to the neighbours), it might be made a Health & Safety offence in the UK to play or monitor above the limits only if an employee finds the levels uncomfortable or experiences any TTS whatever. Success would hinge on good employer-employee relations, but would allow the cleanest sounding

systems to operate unhindered by mutual agreement. Tony Andrews takes a similar stance: 'There are more parameters to sound than anyone yet has measurements for. But if we had measurements, a just law would be to simply say the better the sound quality, the louder it can get'. Then loudness in a venue or studio would be a self-regulating non-problem. ■

References

1. M Polon, 'US Perspective', *Studio Sound*, January 1995
2. K Dibble, 'Hearing Loss and Music', *JAES* April 1995
3. D W Robinson & L S Whittle 'Disco and pop music as a source of NIHL', Nat.Phys.Lab Report to HSE, AC66, 1974.

THE CASE FOR
DEREGULATION

In a paper 'Hearing Loss & Music' presented last year at the 96th AES convention in Amsterdam, Ken Dibble of Ken Dibble Acoustics reviews the literature to ascertain the relationship between exposure to loud music and hearing impairment. This research had been driven by BEDA (British Entertainment and Disco Association), who were concerned that in a worthy EC Directive protecting people at work from noise exposure, music was to be treated as noise for the purpose of setting maximum levels. Subjective experiences described and arguments made in Dibble's paper closely parallel and support the case being made here.

The paper is a convention of citations of authorities who are quoted after their various studies as regarding hearing loss through music as an exaggeration. The report of J L Fletcher is worth repeating until it rolls off the lips. A US audiometrist, in 1972 he compared the hearing of 200 rock musicians and fans with 'ordinary people', then concluded in apparent exasperation: 'Knowing the levels and durations of exposure these persons receive in that pastime it is almost unbelievable that no clearly observable losses could be found.' Remember, that was at a time when PA systems were generally far more aggressive sonically, than most are today. Subsequently, Dibble brings to light other experts' evidence in defence of music: The begrudging '...loud music appears to be somewhat less damaging than noise of a supposedly equivalent energy' (Medical Research Council, UK) and more positively by two German audiometrists 'DJs developed less TTS after exposure to music, than to noise of equal intensity and spectral form'. The last word goes to a UK audiologist working at the Royal National Throat, Nose and Ear hospital, in London, speaking in 1993: 'In the context of pop music the resulting hearing loss is less prevalent than nodules on the larynx of vocal performers'. He was talking in terms of maybe seeing one or two in 100,000 annual patients.

Given the failure of most studies to demonstrate Music Induced Hearing Loss (or MIHL, as opposed to Noise IHL or 'NIHL') with any statistical significance, Dibble's paper concludes by recommending that a new and extensive survey of aural health should be made, to get better and more up-to-date data. At the same time, he restates the practical conclusions of a 21-year-old report by Whittle & Fletcher at Britain's National Physical Laboratory, a world centre for scientific standards. Their report on behalf of the UK Health and Safety Executive concludes that there is a difference between noise and music as regards hearing loss. The proposition is that the maximum Laeq for employees' music exposure should be raised 3dB provisionally—with a view to further increase once reliable data can be researched'. ■

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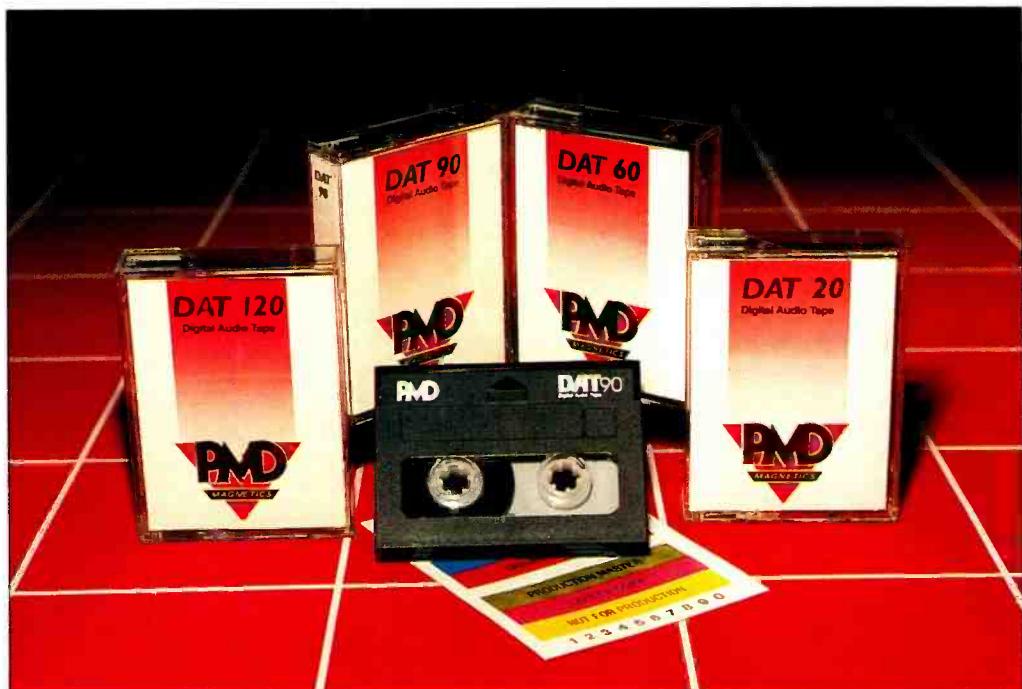
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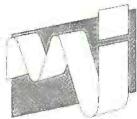
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Around ten years ago, STC—in one of their rare and short-lived flashes of enthusiasm to communicate—asked me out to a research centre in Harlow to see an exciting new development. The company were working on the extreme miniaturisation of mechanical sensors and transducers, by fashioning them from silicon using microchip manufacturing techniques.

Etching lines in the silicon wafer left little flaps and tongues hanging like a spring-board. With very little mass, these tongues moved freely and varied electrical parameters such as capacitance. So the chip became a motion sensor, accelerometer or microphone. I never heard anything further from STC about their mini mics—or anything else for that matter.

I was reminded of the scheme when I visited Motorola's semiconductor division in Phoenix, Arizona recently. The company previously supplied 60% of the sensor chips used in smoke detectors and now had its sights set on the market for miniature mechanical sensors. Like STC, Motorola make a tiny silicon membrane but their new initiative is to integrate it with semiconductor circuits on a single chip.

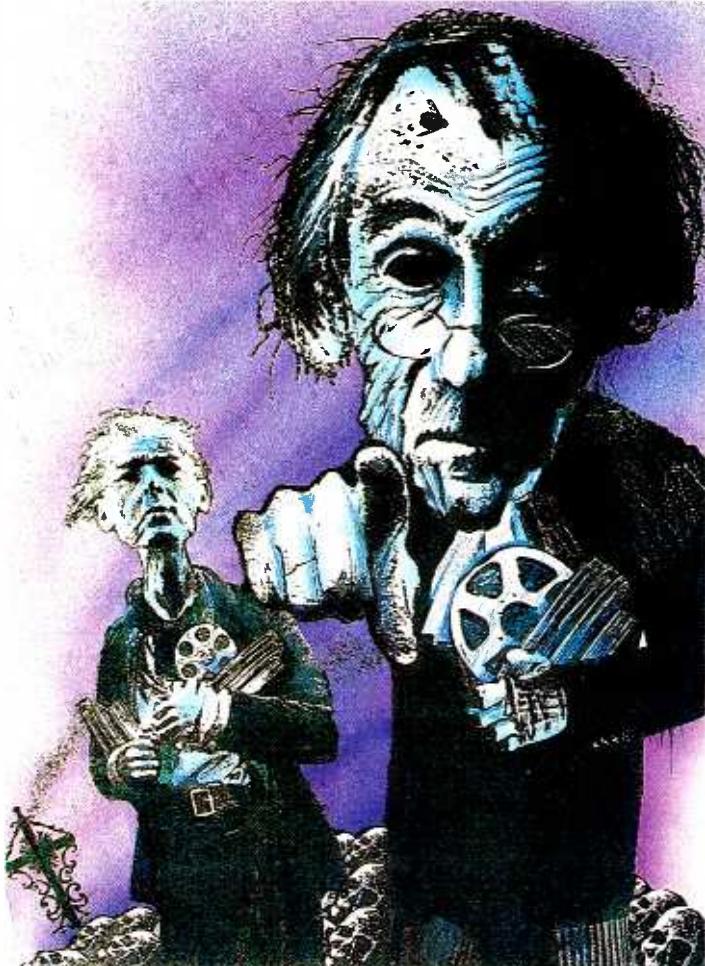
If the chip is submerged, it can register water depth by pressure. Alternatively, it can sense motion, and shut off a gas supply when there is an earthquake. Accelerometers also sense shock waves and trigger the inflation of a safety air bag in a car crash. Medical sensors will monitor blood pressure.

Of particular interest is the fact that Motorola believe that it may be possible to make miniature microphones with this technology. Because the silicon membrane measures only two or three microns and has virtually no mass or inertia, it has a near-linear response over a wide frequency range. Motorola are currently building a factory in Toulouse (France) specifically to build silicon-chip sensors.

"There are now around 1,800 manufacturers trying to make these devices", explained Motorola's John Trice, when I asked how it differed from what STC had planned. "But 95% will soon decide to do something else. It needs someone big to make it happen".

Too true. When I tried to phone STC, the switchboard told me I was now talking to Farnell Electronics.

With single-chip sensors, it would be easy to make a multimicrophone surround-sound array, at a truly



Barry Fox

Mic miniaturisation and the convolutions of copyright

single point in space. Everything now depends on the ability of a micrometre silicon wafer to work at low frequencies, over a wide amplitude range.

In the UK music users have to deal with three copyright bodies. The PRS (Performing Rights Society) collects money for composers, by taking lump sums from the users and distributing the total fund on a pro-rata basis such that more popular composers get a larger share. The MCPS (Mechanical Copyright Protection Society) collects fees for the use of artists' recordings. PPL (Phonographic Performance Ltd) collects another share for the record companies. Obviously they all could and should save money on administration by sharing a common database. But it is not yet happening.

From 1st July, the administration is to get a lot more complicated—this is the date on which all copyright in Europe harmonises. Copyright protection is to extend to 70 years after the death of the composer or author. This neat notion slips off the tongue easily, but the practical implementation is, to quote those

involved, a nightmare.

Here are the facts: in October 1993, the Council for the European Communities issued a Directive (93/98/EC: *Harmonising the Term of Protection of Copyright*). This Directive obliges all European countries to pass laws which give 70-year copyright protection from 1st July 1995. The British Government will amend the Copyright Designs and Patents Act 1988.

The new Directive honours the original intention of the Berne Convention on international copyright. That intention was to reward authors, and the first two generations of their descendants, with the chance to earn royalties. The Conventions set a minimum limit of life plus 50 years. The UK and US adopted the 50-year rule, but others did not. Most significantly, Germany opted for 70 years protection after the author's death.

In October 1993, just as the EC was issuing its Directive, the European court of Justice was issuing its judgment on a case brought by pop musician Phil Collins against a German record label. It had issued a recording of a live concert Collins had

given in the US.

The record company's defence was that the concert had taken place outside Germany, Phil Collins was not a German subject and thus had no rights under German copyright law. The Court cited Article 7 of the Treaty of Rome, which 'bans any discrimination on grounds of nationality'. This gave Collins the same rights as a German subject.

It follows that any material that is still within copyright in at least one European country on 1st July 1995 immediately and automatically qualifies for the new extended protection of life plus 70 years. This applies even if copyright has previously expired.

So, if an author died less than 70 years prior to 1st July 1995, copyright is extended in all EC countries to 70 years with revival from the dead in those countries, such as the UK, where shorter rights had expired.

Non-European countries will only get the same deal if they also extend their local copyright laws to 70 years. The US is sticking with 50 years, so gets no extension or revival of rights for US authors in Europe.

The Directive also sets a minimum of 50 years for the copyright life in all types of recording. There will be no change in Britain, because the UK already gives 50-year protection for records—so 'public domain' record companies, which rerelease recordings that were made more than 50 years ago, can continue to operate unaffected. But they will have to pay royalties on the music if the composer has come back into copyright, thanks to the 70-year rule.

There remains a question over who owns the extended or revived rights and who will get the royalties. Will it be the original copyright owner or the heir or whoever owned the rights when they expired?

The British Government's copyright agency (which is part of the UK Patent Office) has produced a Consultation Paper which sets out the position far more clearly than the convoluted documents published by the EC. I particularly like the subtle jibe where the Brits refer to the Brussels bureaucrats' '27th "whereas" clause in the preamble to the Directive'.

The Consultation Paper suggests one very smart option. This is that when copyright is revived from the dead, the general public should be given the new rights. This would satisfy the Brussels Eurocrats' honour while completely negating their Directive. ■

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