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- Rode NT3
- Fostex NF1-A
- AMS Neve 88R
- Sonifex Courier
- Chord SPA 2232
- Yamaha DME-32
- Lexicon MPX500
- Steinberg Nuendo
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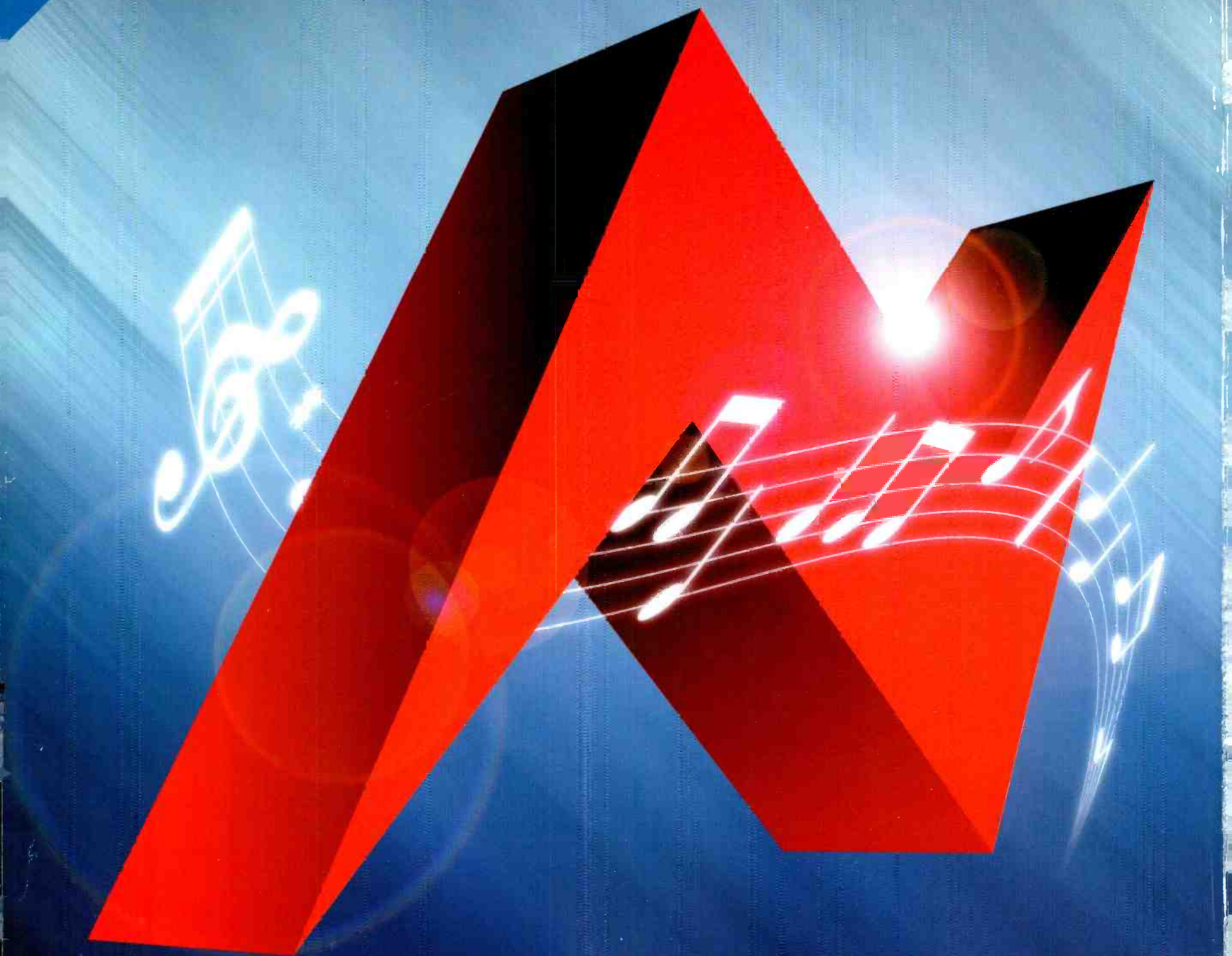

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Be wary of the fridge

IMAGINE THIS. The home of the future is dominated by UPVC wipe-clean furniture and worksurfaces, devoid of junk and accessories all your possessions are tied into your mobile phone (the number given to you at birth) and it's integral credit facilities (PIN number also given to you at birth), illuminated by mood associated lighting and plasma display fronted windows that portray long-since extinct antelope frolicking at the end of your 12th floor virtual garden. Pride of place is an unobtrusive white canister that doesn't look dissimilar to one of those small fridges that were once popular issue in bedsits in the last century. It contains the central storage for your home, what equates to your computer, your billing records and accounts, your photo albums, even your answering machine and phone call logs, and your entertainment system.

The idea of such a central domestic server has been mooted for some time with a disproportionate amount of discussion directed to the likely precise size of the 'fridge'. Putting aside the frivolity of suggesting that UPVC will ever make it as an interior material—everyone knows it will be photo-veneered Beech—the server idea has taken many steps closer to reality and with it have come fundamental challenges to the business we are in.

Technology already exists that will allow you to record programmes selectively from the television in a manner that learns your likes and dislikes and adapts its recording accordingly. On-line video library access

is a logical development along with access to the world's broadcast output—a type of TV sans frontiers. Personally I like the idea of having an end-to-end *Cheers* evening of my creation or uninterrupted coverage of a very few choice sporting events, but this will only be possible because I will exercise a right to give the commercials a miss. This simple action undermines the basis upon which the majority of TV programming is funded.

Commercials are a necessary evil in the economics of broadcasting. Without it you very quickly arrive at the predicament of most state broadcasters the world over—subsidised, overstretched and hamstrung. Am I missing something or will this be a disaster?

Zenon Schoepe, executive editor

Hard of hearing

THE INTENDED INTRODUCTION of a watermark to DAD-Audio and SACD releases has caused a frenzy of finger pointing and finger wagging. From common interests and commendable roots, the whole watermarking debate has become progressively more heated with every email and magazine issue. Now the dogs are off their leash, and professional pride as well as professional interests are on the line. Part of the crucible has been fuelled by selective listening tests, themselves an extremely subjective issue.

It's easy to intellectualise about listening tests. About how and why they're conducted, and what the likely results will reveal. About the best course of action to take for any given set of results, and the probable resultant response of those concerned. When the listening experience confounds reasonable expectation, however, it can be a completely different ball game.

As you enter the listening room, the comfort zone surrounding the statistical exercise is replaced by the certain knowledge it is not only the system that is now on trial, it is you. There can be only one victor, so you sit carefully, square up to the speakers and prepare to press the button that determines which of you it will be.

This isn't the popular interpretation of the situation, of course. The acceptable face of the listening panel closes its eyes in quiet confidence about the abilities of its ears, and prepares its mouth to talk modestly about its ability to discern most—if not all—of audio's idiosyncrasies. We are, after all, a sophisticated lot, well versed in mixing the heights of modern technology with the mystical properties of art. We affect scientific authority, flirt with celebrity and know how to party. To be intimidated, let alone bettered by a listening session, would be a betrayal of almost all we hold precious. Yet beyond professional altruism, beyond even your value as a statistic, there is your personal duel with the machine; wetware vs hardware.

In the event of a particularly uncomfortable listening test, there is an option: simply to leave. In the case of the London leg of the watermarking tests, ample excuse was offered by inappropriate listening material and noisy hard drives. And the option was taken up by at least one participant.

After the event, we look to restore the status quo—the tests were part of our business, essential quality control over rampant technological progress. We can all be congratulated. But we know that, however fleetingly, the only objective was to be able to discuss the exercise with your colleagues with the authority of 'one who heard'.

Then let the battle resume...

Tim Goodyer, editor

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Dana Jon Chappelle, Engineer / Mixer.

"The MT's sonic warmth and purity, rock solid automation, and speed of operation sets a new standard in recording -- giving us the best of both the analogue and digital worlds."

Martin Böhm, Owner / Chief Engineer, MG Sound, Vienna.

"In live shows like TFI Friday and Party in the Park, featuring a number of bands in quick succession, the instant reset on the MT is a tremendous advantage. The familiarity of the SSL control surface makes for a much gentler learning curve, and, of course, the sonic quality is a given."

Will Shapland, Senior Recording Engineer, Manor Mobiles.

"..with the MT, at last there's a digital console for someone like me who truly loves music."

Bruce Swedien, Engineer / Producer.

"...the console's great. Not only does it provide outstanding automation but it sounds amazing - with a level of warmth not normally associated with digital."

Patrick Mühren, Engineer / Mixer.

"Nobody had to show me how it worked."

Lou Gonzalez, Owner, Quad Recording Studio.

"I can honestly say that I find the MT to be more transparent than an analogue console."

Thierry Rogen, Owner, Mega Studios, Paris.

"I loved the clarity of the overall sound and the separation of the stereo image. SSL know everything about ergonomics and for me, the MT is not the best *digital* console in the world, it's the BEST console in the world."

Yves Jaget, Engineer, Le Voyageur Studios.

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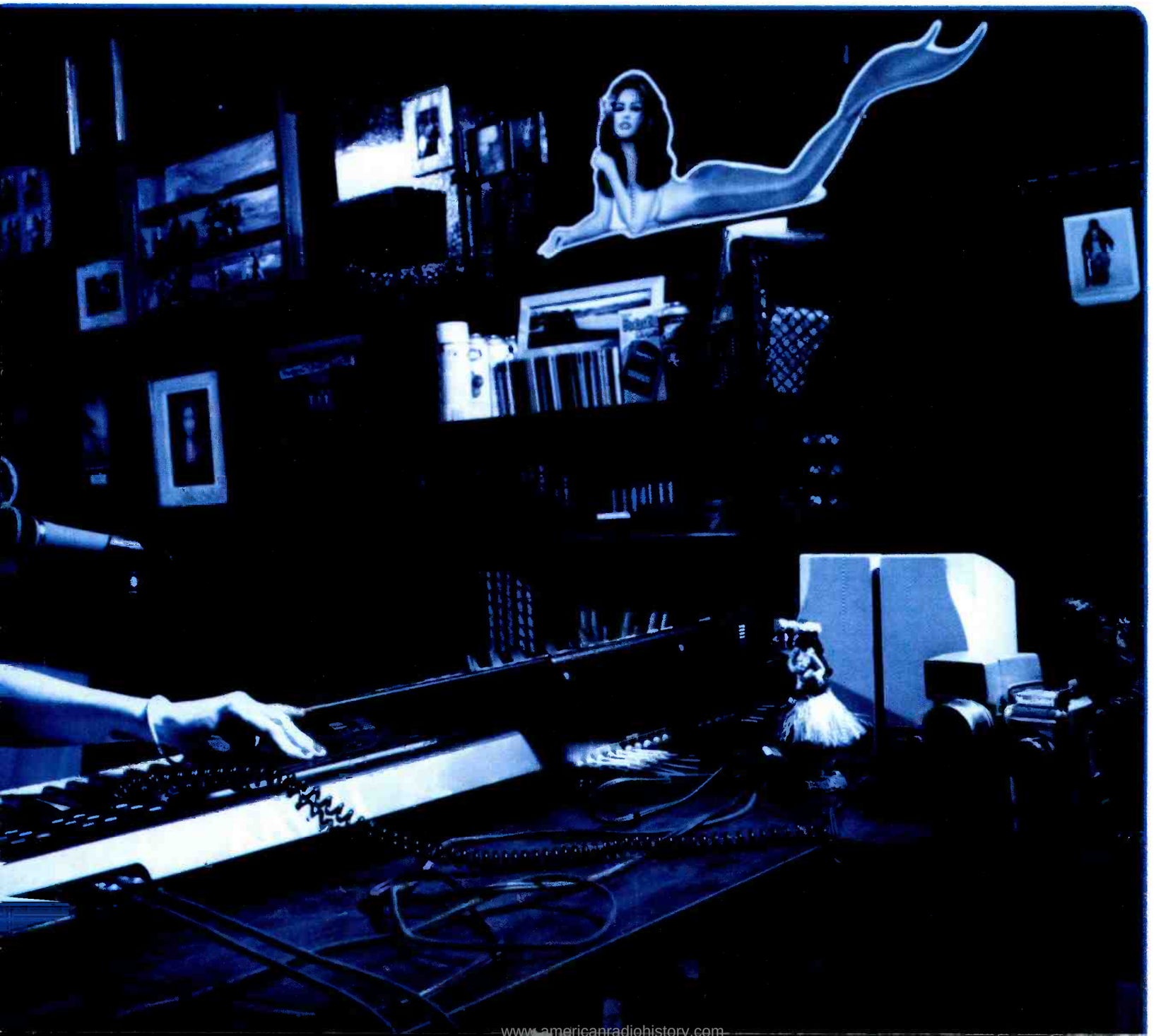

CONTRACTS

New York's NRS recording studio has expanded from its Hurley location and now has a complete digital facility in Catskill, NY. Additional equipment includes a Mackie D8b digital mixer, Avalon mic preamps and compressors as well as a 7-foot Yamaha C6 grand piano. One of the first records completed in the studio was *Nobodies* by Norwegian pop star Steinar Albrigtsen. Other recent projects include the completion of Rick Danko's posthumous recording including guest appearances by fellow bandmate, Garth Hudson and Eagle's guitarist, Joe Walsh, and the Jazz Mandolin Project mixing their debut album Xenoblast.
Email: MOONART416@aol.com

London post facility Wild Tracks has opened Studio 7, equipped with a 108-input, 24-fader Amek DMS console, DAR SoundStation DAW and Tascam DA-88 digital recorders. The new studio has been granted Dolby's Dolby

Commercials license and has already produced on-air promos for the FilmFour, OnDigital Discovery and Paramount digital television channels as well as various commercials.
Wild Tracks, UK. Tel: +44 20 7734 6331.
Amek, UK. Tel: +44 161 868 2400.

Portofino recording facility, Mannastudios in Italy, has purchased four Miller & Kreisel Tripole Surround systems for surround monitoring in its control rooms. Marinastudios has been developed with the design team from LucasFilm and is the first music studio complex in Italy applying the THX PM3 standard for multichannel mixing. Further sounth, Denmark's Sun Studio has also installed an M&K 5.1 system—MPS 2510P speakers for LCR, MPS 2525 tripole surrounds and an MPS 5310 powered subwoofer.
Email: info@marinastudios.it
Net: www.mkprofessional.com

Burlington, Vermont. CBS affiliate WCAX-TV3 has taken a 64-channel Euphonix System 5 console for a new news studio. The studio will handle four major news programs per day, including an Early Morning show. When not being used for live news programming, it will

Yamaha mLAN plan

FROM SEPTEMBER, Yamaha has put in place a licensing campaign for its mLAN (music Local Area Network) technology, and says that it expects agreements with about 20 companies to be in place within the year.

'Prospective partners will be electronic instrument manufacturers, makers of professional and general audio equipment, software developers and marketers,' says Masatada Wachi, managing director and general manager in charge of Yamaha's Business Development Group. 'We will provide technology transfer programs, mLAN connection management specifications, patent usage rights, and logo usage rights in addition to Yamaha's implementation of standards required for mLAN, all tailored to the needs of the licensee.'

mLAN is an IEEE 1394-based network interface protocol designed to enable interconnection of electronic musical instruments, professional and general audio equipment, and computers. Using mLAN, multitrack audio and MIDI data as well as file and control data can all be sent over the IEEE 1394 bus, popularly known as FireWire, which supports data transfer rates of 100Mbps, 200Mbps and 400Mbps and a maximum cable run between adjacent devices of 4.5m. Yamaha says that theoretically a rate of 200Mbps will support approximately 100 channels of audio data and up to 256 ports. FireWire, which is already supported natively on Apple B&W G3, G4 and even some iMac machines, is a peer-to-peer, or nonhierarchical, networking protocol. This means that any connected device can initiate data transmission to any other connected device.
Net: www.yamaha.co.jp/tech/1394mLAN/

MP3 or AAC?

MP3 MAY BE THE FORMAT that every major label loves to hate, but they've been slow to get behind an alternative. Latterly Microsoft has been making great strides with its Windows Media Audio format, but is the music industry prepared to put its online future in the hands of one company and its proprietary format—especially when that company is Microsoft? Or is there no alternative?

Recent announcements by BMG and Universal that they are to use AAC audio compression for commercial music downloads answer both questions. The AAC (Advanced Audio Coding) format was developed in the mid nineties by AT&T, Dolby Labs and Sony in conjunction with the Fraunhofer Institute, and is an international ISO-IEC standard as part of both the MPEG-2 and latterly the MPEG4 specifications. Licensing is handled by Dolby.

AAC was first used for online music downloads by the AT&T-backed a2b music, while Liquid Audio subsequently added support for the format in its Liquid Music System. Nonetheless it has been in the shadows for some while, having neither the grassroots appeal of MP3 nor the powerhouse backing of Microsoft to propel it to prominence. But that has begun to change this year, following the launch by Dolby in March of a technical marketing program to evangelise AAC.

Recent months have seen a spate of companies announcing support for AAC, including chip-maker Texas Instruments, portable audio player developer S3-Rio, music distribution platform developer Preview Systems and media encoding company LoudEye, culminating with the recent Universal and BMG announcements. In all, four companies—ARM, Cirrus, Fraunhofer and TI—have announced AAC decoder implementations for use in consumer electronics applications. Meanwhile, AAC has been adopted by Japan as the format for all of the country's digital broadcast systems, while the US is considering use it for IBOC digital radio.

MPEG2/4 AAC provides more sophisticated perceptual audio coding than MP3 (MPEG-1 Layer III), and as such is capable of delivering better-quality audio while requiring around 30% less bandwidth-storage. In addition it can support up to 48 channels of audio along with sample rates of up to 96kHz, and can achieve ITU-R broadcast quality for a 5.1-channel audio programme at 320kbps.

Meanwhile, significantly for downloadable audio, a comparative test of seven Internet audio codecs by the EBU concluded that 'The AAC codec is the only one in the tests which was evaluated in the range "Excellent" at 64 kbit/s, for all the audio items evaluated.' But the particular appeal of AAC to the major labels is that, unlike MP3, it's only available in a secure format (and currently only with Liquid Audio's secure music system), plus it supports DRM, encryption and watermarking technologies. With the backing of the majors, then, AAC could yet become the de facto downloadable audio standard for the music industry.

Metropolis masters DVD

WEST LONDON'S METROPOLIS RECORDING complex has revealed plans to introduce a DVD authoring service on-site, among other enhancements including a revamped A&R booking service called Solutions. Metropolis already has an established 5.1 surround mastering facility, making it one of Europe's first DVD audio-ready studios. Mike Gillespie, newly recruited at Metropolis as part of a team of specialist DVD producers, spoke exclusively to *Studio Sound* about the service:

Q: *How did Metropolis arrive at the decision to introduce DVD authoring?*

DVD authoring is already well established at Metropolis Mastering in New York. The US market is more advanced, and Metropolis in London has been watching developments with interest. We are now keen to apply that experience to the European marketplace. New York is a very successful operation.

Q: *What will the platform be?*

They have a Sonic Solutions system in New York but the exact inventory for London has not yet been decided—beyond the fact that we will probably have a Sony video encoder. We're looking at all the systems currently on the market.

Q: *How will authoring complement your existing services?*

Metropolis has a great reputation for mastering and already has 5.1 mixing and mastering as an established service in London—we were one of the first to do so. Authoring is the natural next step. Obviously there's a synergy with 5.1 mixing; clients will get a superb audio service, unlike any other DVD authoring service with the possible exception of Strongroom. We're in a position to advise and educate the market about the importance of audio.

Q: *Which do you foresee are the important DVD markets?*

Film distribution is definitely shifting to DVD, but some record labels are showing early signs of accepting the format too. It's a very cross-media technology—Playstation, film, record companies. In the manufacturing plants we re seeing VHS and even CD machinery being ripped out in favour of DVD.

Q: *How are you going to attack these markets?*

My background is in record companies—V2 and Warner Music. My brief is to develop record company business. But we'll also have DVD producers coming into the fold who have film experience, and those who have corporate and advertising experience, and games. We're recruiting a team as we speak.

We're also bringing in graphics and multimedia talent; there's very much an emphasis on creative services. Creativity will drive the technology, not the other way round. We're not in the market just to transfer mounds of VHS onto DVD. We will educate the market towards high production standards.

Clients are in place for a September-October launch. The 'white room' area at Metropolis will accommodate the new service, in keeping with the studio's diversification strategies of recent years.

US: Santa-Monica-based postproduction facility POP Sound has installed a 96-input AMS Neve Logic 2 digital console in its upgraded Studio H. Studio H will be further developed later this summer for digital television and home theatre mixing. The new console is already in use mixing television and radio commercials including for Pepsi and Coors. The Logic 2 will also be used to mix documentaries, music and variety specials. The purchase marks the ninth AMS Neve console for POP which also owns two Logic 1s, three Logic 3s, and three Logic 2s, one of which is configurable for simultaneous use by multiple operators.

Playtime for XG

YAMAHA CHOSE THE RECENT ECTS 2000 interactive entertainment trade show in London to unveil game audio-development tools and SoftEffects, a real-time software effects suite, for Windows PCs and Sony's Playstation 2 (PS2) console.

'Games which previously had to rely on the low-quality effects processing found in hardware on various games consoles can now benefit from a world-class set of DSP effect algorithms from a professional music company rather than a standard middleware developer,' comments Yamaha's Nick Howe, who adds that the company signed up almost 30 games developers to its effects SDK program during the 3-day show.

Yamaha is a game middleware licensee for the PS2, and is currently modifying its 24-bit XG effects technology, as used in its keyboards, modules and soundcards, to run on the PS2 hardware as real-time audio middleware. The company is also developing a middleware audio tool, to run on the PS2 development system, which will interface with the effects.

At ECTS Yamaha also showed DirectX versions of the SoftEffects running in a multitrack demo, complete with real-time control of effect parameters. The effects are currently being converted by the company from the original DirectX DirectShow format to DirectMediaObjects, enabling compatibility with the DirectX 8 version of DirectMusic. Game environments will be able to control the effect parameters in real time through the iMedia parameters of DirectMusic Producer.

The SoftEffects package initially consists of some 40 effects, including familiar XG reverbs, phasers, flangers and compressors as well as new algorithms such as Environmental 3D ('pseudo-surround') reverb. PC game developers who license SoftEffects for inclusion in a game will also get them as DirectX plug-ins for use in Windows-based audio production software.

Breaking broadcast boundaries

World: An innovative online initiative will see London-based broadcast provider NOW (Network of the World) broadcasting live via satellite-to-cable distribution on AsiaSat 3S in 63 countries, offering synchronised delivery of both Web and TV programming. The initial broadcast will run live via satellite-to-cable distribution and free to air, on AsiaSat 3S in 63 countries to a potential 135m households while simultaneously being available globally on the World Wide Web. A key feature is the assured synchronisation of simultaneous Web and TV broadcasts.

The venture will see Philips Digital Networks providing digital broadcast cameras, and switching, routing and control equipment. Announcing the order, Bill Leadbetter, account manager at Philips Digital Networks in the UK said: 'We are particularly proud to be associated not only with one of London's newest facilities but with one that is challenging the very model of traditional broadcasting, and in doing so is bringing the convergence of the Web and the broadcaster closer together.' NOW will initially generate four hours of live online content seven days a week.
Net: www.news.philips.com

In a parallel move, ARIA will initiate live global in-flight broadcasting later this year. A joint venture between Live Inflight Video Entertainment and Inmarsat Ventures, ARIA will use the existing Inmarsat satellite network Aero H/H+ satcom antennas to relay live 24-hour news from BBC World and sports coverage from Trans World International, with further channels and data services to follow. Inmarsat president and CEO Michael Storey commented, 'Using the satcom antennas that are already fitted to most long-haul airlines and many corporate jets will minimise the additional onboard equipment needed.' ARIA chairman and CEO Mike Stevens added, 'Our joint venture will set the introduction and standard for bringing live TV to aircraft while in flight.' Market analyst Frost and Sullivan forecasts the IFE (In-Flight Entertainment) market to be worth US$2.2bn this year growing to US$4bn by 2005. Net: www.airiaglobal.com

AES president sets agenda

US: AES Fellow Roy Pritts assumed the office of President of the Audio Engineering Society during the 109th AES convention in Los Angeles. The new president sees the coming year offering potential for the organisation in education, membership growth and retention, standards codification, and image building. 'Participation, not just attendance,' is how Pritts sums up. The attendance figures for the annual AES conventions represent a sizable portion of the audio community yet the number of convention attendees who are not yet members is a concern. Asked what might be done to enhance the perceived value of membership, Pritts replies, 'A participatory membership will tell us what they perceive as value, then we must respond with appropriate recognition, reward, encouragement—a sense of pride in belonging to the AES.' The year will also see the AES developing resources for local and regional meetings, more rapid response in addressing hot-topics with regional meetings, and moving towards extending college credit for participation in society events.

Pritts, who has arranging and performance experience, has served as a

CONTRACTS

handle prerecords and other duties. Initially, the station will broadcast standard-definition digital television, but has future plans to explore the creative opportunities offered by high-definition broadcasting.
Euphonix, US. Tel: +1 650 855 0400.

Reykjavik's audio facility, Hijo-Setning Ehf, has purchased and installed three Fairlight MFX3plus digital audio workstations, two Fairlight ViVid nonlinear video recorders and a Fairlight MediaLink fast audio network. One of Iceland's technologically progressive studios serving all sectors of sound-for-picture, the 3-room facility has made a name for itself dubbing English language film and television content for customers including Dreamworks, Warner Bros. and Disney.
Hijo-Setning Ehf, Iceland.
Tel: +354 550 4501.
Fairlight, Europe. Tel: +44 20 7267 3323.

New York's National Video Centre has taken delivery of two Zaxcom Cameo SV digital audio mixers for its Discreet Smoke and Avid Symphony suites.
Zaxcom, US. Tel: +1 201 652 7878.

Munich's Instant Records' mix room boasts a new 16-fader, 160-channel Soundtracs DPC-II digital console with Fairlight MFX3 editor. Also in Munich, Geising Team post house has installed the country's first AMS Neve Libra Post console replacing a Soundcraft desk. Instant's room has already hosted TV commercials for Audio and BMW, and on-air design for MTV Europe while Geising's is working on independent cinema releases.
Instant Records, Munich.
Tel: +49 89361 92486.
Soundtracs, UK. Tel: +44 1372 845600.

Geneva-based Television Suisse Romande has specified a 24-fader, 48-channel SSL Aysis Air digital console for installation in a new news studio where it will be used with an SSL Hub Router for planned expansion.
TSR, Switzerland.
Tel: +41 22 708 8411.
SSL, UK. Tel: +44 1865 842300.

France Television broadcaster Voyage has installed the country's first Fairlight Prodigy system. Voyage's production work ranges from documentaries and magazine programs to advertising production for clients including parent company Pathé, France's largest film distributor. Paris-based Duran has installed a Libra Post console in its Mix 2 serving drama and other TV programming.
Voyage, France. Tel: +33 1 5805 5805.
Fairlight, Europe. Tel: +44 20 7267 3323.

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London's Hear No Evil has purchased a pair of Genelec 1037B active studio monitors for its main control room. The purchase complements the Genelec 1031 5.1 setup and ensures 'a continuity of sound in the control room'.
Hear No Evil, UK. info@hearnoevil.net
Genelec, Finland. Tel: +358 17 813311.

Los Angeles' Blue Room is home to music composer John Van Tongeren's production facility and a newly installed Martinsound MultiMAX EX multiformat monitor controller which is driving a PMC 5.1 monitor setup, powered by Bryston amps. Noted for hits with artists such as Chicago, The Pointer Sisters and Al Jarreau, and TV series including The Outer Limits, Van Tongeren is now using Yamaha 02R consoles and recording onto Tascam DA-78 MDM recorders.
Blue Room, US. Tel: +1 310 442 7197.
Martinsouund. US. Tel: +1 626 281 3555.

Canadian remote recording outfit LiveWire has added a customised Ampex ATR102 1-inch 2-track analogue tape machine to its inventory. Modified by Pennsylvania-based ATR Service, the machine is the only such 102 in Canada and is available for mixing and mastering sessions. The British-based Telegenic scanner OB vehicle has installed a 36-channel Calrec C2 console as part of

forensics consultant, and has provided numerous presentations and written articles for various societies and in the trade press, is perhaps best known as a veteran educator. He currently serves as a Professor of Music Engineering at the University of Colorado at Denver and has been on the staff of the University of Massachusetts-Lowel, the University of Miami, and has lectured at several European universities.

Music meccas merge

UK: London's Milo Music is leaving its Hoxton headquarters in order to merge with Orinoco. The move will create a more streamlined operation and provide clients with a group of studios that will be able to follow the recording process from basic preproduction to mixing. The move was prompted when Milo discovered plans for the construction of a 5-storey building next to its flagship studio. The prospect of 12 months of extreme noise sealed the decision to move.

Tom Astor's south London Orinoco studio opened in 1984 and has since seen artists including Oasis and the Chemical Brothers pass through its doors. When Milo's Henry Crallan met Astor the solution to Milo's problem became clear. Milo will be rebuilding Studio One in unused space at the Borough HQ of Orinoco to provide

Czech Republic: A 16-channel TL Audio VTC console has been installed the studio of leading Czech singer and producer Ladislav Krizek, above left, with engineer Roman Masha Sandor, in readiness for his new album, *Marvellous World*. Studio Kreyson has also taken a range of TL Audio outboard

THE MOTION PICTURE

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CONTRACTS

a major refurbishment. The installation is part of the 'digitisation' of the scanner which sees considerable use on BSkyB's rugby coverage. The C2 is Telegenic's third Calrec following S2 analogue mixers in articulated OB vehicles in 1996 and 1998.
LiveWire, Canada. Tel: +1 416 975 0905.
ATR, US. Tel: +1 717 852 7700.
Calrec, UK. Tel: +44 1422 842159.

Spain Santiago de Compostela-based Bren Entertainment is to adopt AMS Neve's StarNet networking system serving its two Logic 3 workstations and AudioFile SC editing systems. Part of the Filmtel Group, the facility will work on TV and film animation projects using StarNet to enable audio transfer between audio suites and animation workstations.
Bren Entertainment, Spain.
Tel: +34 981 528 200.
AMS Neve, UK. Tel: +44 1282 457011.

Three Audient ASP8024 consoles are now in use with UK-based location specialists. Soundtrack Productions' first

ASP8024 session was Cendrillon, a 'Salon opera' recorded in Rosslyn Hill Chapel due for release towards the end of 2000. B&H Sound Services recorded of the Mountbatten Festival of Music at London's Royal Albert Hall. The session used all 60 mic channels of twin ASP8024s for flown mics, spot mics and radio mics to Genex 8-track for surround and simultaneously to DAT via a Prism Dream convertor.
Soundtrack Productions, UK.
Tel: +44 118 940 2461.
B&H Sound Services, UK.
Tel: +44 1733 223535.
Expotus, UK. Tel: +44 1923 252998.

The American division of Italian state broadcaster, RAI, has chosen a Stage Tec Cantus digital console and two Nexus audio routers for its main NYC radio studio where it will be used for feature productions and dubbing. As the 20th RAI Cantus, the console will serve the Italian community in North America via satellite.
RAI, Italy. Tel: +39 6 36 86 62 91.
Stage Tec, Germany.
Tel: +49 951 972 2525.

a tracking room to run alongside the existing Neve Room and The Toyshop MIDI programming room. In addition Milo will continue to operate Matt Johnson's (The The) The Garden studios in Shoreditch along with the seven rooms it currently runs in premises off Hoxton square.

China syndrome

UK: SoundField Studios, has launched China Cones, a ceramic antiresonance platform designed to reduce 'parasitic' oscillations in audio systems.

'The completely passive units requires no electrical connection or cables,' explains SoundField Studios director, Jonathon Miles. 'When placed under a component, China Cones resonance reduction properties result in vocals and instruments that are clearer with more realism, dynamics and focus. Improved inter-transient clarity allows the listener to hear ambient information that is essential for accurate perception of stage depth, width and unwavering stereo image.'

Miles claims that because the ceramic used has a natural resonant frequency well beyond the range of human hearing, the product has the ability to improve sound quality without audible side-effects. 'It improves the resolution of each component by absorbing and dissipating a portion of the resonant field that radiates from all analogue components. Benefits will be heard across the full frequency bandwidth,' he says.

The hand-made Cones are arranged in a triangular pattern underneath the equipment with the tip pointing downwards, preferably against a firm relatively vibration-free surface. SoundField recommends Cones for use with speakers, amplifiers, power supplies, CD players, DAT machines, crossover units and so on. A 'twin pack' containing six Cones (for a pair of speakers) costs £140 (UK inc VAT). A single pack of three Cones costs £70.
Net: www.chinacones.co.uk.

Preview in advance

US: Dolby's AAC Internet audio format is to be used by California-based Preview Systems' record label, service provider and retailer to distribute audio on-line as part of its the ZipLock for Music digital goods commerce platform. Capable of offering a 30% reduction in data rate over existing formats, AAC also allows music providers to adjust data rates to offer alternative file sizes. Preview Systems' adoption of AAC acknowledges music company and record label support for the format.

Systems built around AAC are intended by Dolby to provide secure and efficient distribution of audio, as opposed to the unlicensed sharing of files and inconsistent quality often experienced with MP3 audio. 'We are very proud that a music delivery marketing agency as prestigious as Preview Systems, has selected AAC technology for secure Internet music delivery technology,' said Ramzi Haidamus, Technology Business Strategist at Dolby Laboratories. 'With its superior sound and increased compression efficiency, AAC is the ideal technology for secure Internet music delivery.' Net: www.aac-audio.com and www.previewsystems.com

Harry Thumann

THE AUDIO WORLD LOST another pioneer in August this year with the death of Harry Thumann, founder and owner of Countrylane/Key One Studios near Munich. Though not as well known as other audio luminaries recently departed, Harry was much of the same breed.

Like a lot of people in the seventies, Harry was a Renaissance Man starting out as a drummer while getting a thorough grounding in audio in German broadcast. When touring lost some of its glamour he decided to put his musical and technical experience to work for his own benefit and started his first studio in a bedroom at the family home. Harry is an unsung hero in the story of the development of the SSL 4000 Series of consoles, but he participated in its development and took the first one for this studio. Premises for a studio

Future Post in Soho

THE FUTURE FILM GROUP is currently in the process of constructing what it claims will be the largest theatrical surround mixing studio in London. The facility, to be called Future Post, will combine a film dubbing suite with adjacent TV and voice-over cording and mixing studios, and is located in the heart of Soho. Postproduction supervisor Steve Cook spoke exclusively to *Studio Sound*.

Q: *Who's behind this plac*

'Future Film Group was started about three years ago to put money into UK movies and coproduction movies. A lot of the coproductions are films made overseas, and this facility is being established to post them. A lot of our work, for example, will come from Canada.

'We're building an ADR-Foley theatre, a TV mixing stage and a very big, state-of-the-art dubbing theatre. And when I say big, it's as big as anything you'll see at Pinewood or Shepperton—so it's unique for central London.

Q: *Was it easy to find space like this in Soho?*

'It just came along at the right time. It was originally a Victorian restaurant, and was the headquarters of The Moving Picture Company for about 20 years. They've just moved to a new place in Wardour Street.'

Q: *Is it just those three studios?*

'No, combined with the mixing studios we're going to have 12 edit suites which can be used for picture editing, sound design, tracklaying, and so on. But we are going to be specifically involved in feature films—in Dolby Surround, Dolby Stereo, Dolby EX, Dolby Digital. Our prime source material will be theatrical, 35mm-projected pictures, and there will be the TV work on top of that.'

Q: *Are you adopting the same mixing platforms for film and TV work?*

'The big dubbing theatre will have an AMS Neve Digital Film Console—192 inputs, all the bells and whistles, the biggest film console in London. We're also putting a Libra Post in the TV room, and in the ADR theatre you don't need a large console so we're going to put in an 02R—and some very expensive mics...

'The monitoring is all JBL cinema products, even in the TV room where we'll have a 5.1 configuration. The ADR room has a simple LCR package. We wanted uniformity throughout the complex, and it's all being supplied by Roger Patel at Everything Audio.'

Q: *How do you intend to remain as compatible as possible with the outside world?*

'We've got stacks of Akai DD8, and Tascam DA-98. We're going to start off with Akai because that's the common denominator in the industry. If it comes in from Shepperton or Pinewood, it will come in on that format. If it was from Goldcrest or De Lane Lea, it would be on that format. We don't want to set ourselves outside of that loop. But we are talking about having a server for the entire complex, which must be able to access a sound FX library.

Q: *What is the de facto standard for digital audio at the moment?*

'In the main film category, if you sta with the tracklaying side, the one platform everyone talks about at the moment is Pro Tools —which is a very important step up from Avid's AudioVision. The AMS Neve AudioFile is still there in the background with a solid user-base. So we're going to have AudioFile in the TV room, set up for tracklaying, and we'll probably have one Pro Tools in the building. The other rooms will be left empty so that editors can bring in their own favoured system.'

Q: *And who's in line to use it all?*

'The staff will be all top people, but I'm afraid at this stage I can't tell you who they are. Suffice it to say that we've got the three key elements to make a successful post facility: the location; the right equipment; and the right people.'

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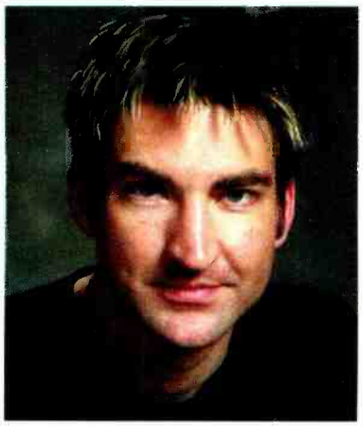
APPOINTMENTS

The Harman Music Group has appointed Robert Benson its vice president of marketing and sales. After securing his BA at the University of Massachusetts, Benson spent seven years in senior management at Sony Recording Media.

Amek has announced the appointment of Chris Griffin to the position of Automation Specialist. Griffin will provide on-site customer training for Amek's Supertrue system,



which is standard on all Amek recording consoles. He will also assist sales, demonstrating Amek's Media 51, Rembrandt, Galileo, and 9098i consoles.
Email: amek@amek.com

Mediaspec UK has recruited former CTS Studios senior technical engineer, Antony Conner. Having worked for Dolby Labs as a technical engineer, Conner spent four years with CTS before taking on his new role as technical manager of Mediacspec's southern operation, managing installations and overseeing advanced technical services.
Net: www.mediaspec.co.uk

Euphonix has named Christopher M Pelzar as vice president Eastern Region. Formerly, Pelzar was director of sales for that region, in addition to serving as director of Broadcast Systems Sales. He continues to oversee the management of technical and operations staff based in Euphonix' New York office. Prior to joining Euphonix, Pelzar served as VP, Eastern Region with AMS Neve following three years as VP sales with Digital F/X based in Mountain View, California, and acting president/VP of sales with Waveframe. In the early eighties he owned Pelzar Associates, a New-York-based independent representative firm specialising in professional audio sales.
Net: www.euphonix.com

with live-in accommodation were found in Germeering near Munich and Countrylane studios were born and is still going strong.

Always quick to embrace new technology, Harry Thumann recognised the potential of MIDI and used Commodore 64 computers with MIDI cards controlling a system that evolved into a huge MIDI-controlled synthesiser installation including a plethora of synths and modules, plus a Fairlight II and Moog 3C modular system. This led to a string of albums of Rondo Veneziano, which married both acoustic instruments and synthesisers. He also had a run of what he called 'dog records' marking the adventures of Wondererdog. More seriously, his album *Andromeda* is still a must for synthesiser buffs.

With the introduction of the Yamaha DMP-7 digital mixer, Harry built a second control room housing six (or was it seven?) DMP-7s as an integrated digital console system interfaced with a rebuilt Neve broadcast console for, as he put it: 'the best of both worlds'. The cost of video was also tumbling and so Countrylane moved into AV production and started producing its own telefilms.

As a professional, Harry shone in two areas: he was immensely jovial and had the ability to make MIDI-controlled productions swing. You never felt they were locked to a soulless clock. He was also well known for smoothing over problems in the studio by calling a break for the justly famous Countrylane cocktails when tantrums were about to ensue.

Harry will be missed by a lot of people but his wife, Jolette, and children, Harry Jr, Isabel and Julian, will keep the torch burning and bring the productions that he was working on to the light of day. And you can bet that he and Colin are planning some upgrades for St Peter's studio.

Dolby's Tucker

Ray Dolby was today presented the John Tucker Award of Excellence for his outstanding contribution to the broadcasting industry at this year's International Broadcasting Convention (IBC) in Amsterdam. The John Tucker Award is given in acknowledgment of an internationally significant contribution to an innovative aspect of electronic media by an individual or group of people.

'I am honored to receive the John Tucker Award this year,' said Dolby, chairman and founder of Dolby Laboratories. 'Throughout the 35-year history of my company, we have endeavoured to contribute useful and lasting technologies in professional recording, the cinema, consumer electronics, and broadcasting. I am indeed grateful to the IBC for this acknowledgement of our efforts in broadcasting.'

UK: A no-compromise mobile, known as the TArdiS, has been commissioned by Total Audio Solutions. Based on a Volkswagen LT46 chassis, TArdiS is designed around a 48-input Sony DMX-R100 digital console, the first in the UK to be installed in a mobile. The desk is supported by 24 tracks of Tascam DA-78 multitrack and a Sony MX-2424 HD recorder, as well as a pair of Sony PCM-700 DAT recorders. Monitoring is by PMC, while effects are courtesy of a Sony DRE-S777 sampling reverb processor and DPS-V77 effects unit. TAS is also investing in a Land Rover 110 support vehicle for the mobile which is also an off-road location vehicle. A 16-track digital recorder, preamps, mixing and communications facilities are shoehorned into 42U of custom racking, driven by the vehicle's own generator and power conditioning. Net: www.totalaudio.co.uk

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SPANISH GOLD

There is a grass roots revolution underway among Spain's recording studios. **Tim Goodyer** visits Bilbao and finds Tio Pete at the heart of a plan to take on the world's recording business.

IF FRANK GEHRY'S DESIGN for the Guggenheim Museum brought the art world's attention to the northern Spanish city of Bilbao, a series of pure-bred studios promises to do the same in the world of music recording. Where the Guggenheim employed a foreign architect to provide the backdrop for the locals to prove their worth the studios have adopted a similar strategy, enlisting British designer Philip Newell to set the stage for Spain to compete with the world's finest facilities. The trail leads from Planta Sonica studio built by Philip Newell for Sergio Castro in Vigo back in 1985 and continues through Area Master to Calma Estudios in Manacor (Mallorca), Garate Studios near Donostia (San Sebastian), on to Coruña, Grenada and beyond. Along the way it passes through Tio Pete, in Vizcaya near Bilbao. 'When Sergio first tried to tell local people how a studio should be they didn't understand,' comments Newell. 'But in its five years of life, Planata Sonica sent a shock wave through the north of Spain. So Tio Pete sprung out of Area Master, which sprang out of the hole that was left in Vigo by Planta Sonica, Kaki went to Tio Pete before beginning work on Garate and the owner of the studio we built in Mallorca went to Area Master... Recently we had an approach from an Italian company based on what has been built at Tio Pete. There's a chain reaction going on that's changing the industry here.'

The love child of local musician Carlos Zubiaga Uribarri, Tio Pete began life modestly. After spending 16 years playing guitar with Mocedades—picking up a significant following in Spain and South America, and second place in the 1973 Eurovision Song Contest—he assembled a private studio to fulfil his 'passion for sound'. His enthusiasm saw Zubiaga equip to the highest standards, amassing an enviable collection of classic mics and outboard, and, although the old studio was small and technically poor, its ambience attracted regular visits from big Spanish artists as well as providing a popular demo service.

Newell's recollection is somewhat more frank. 'Tio Pete wasn't even a studio, it was a pile of very nice gear and an Amek Angela in a garage,' he smiles. 'There wasn't even any division between the live area and the control room—there was just a curtain. And there was a carpenter's shop behind that generated 50dB of noise when the saws were running.' The acute lack of parking space sealed its fate and Zubiaga sought a new site and a more professional facility. 'In the beginning we just wanted to move to better premises,' Zubiaga confirms, 'but after talking to Philip we realised that we could build something much more serious. In his book, *Recording Spaces*, we found a design that was exactly what we wanted and there was just 1m difference in the ideal design and the space we had available at the new location. The only other deviation from the book was the interior decor that we chose ourselves. Philip had carte blanche to build the facility itself.'

Common to Planta Sonica and Tio Pete are a Raindirk console, Reflexion Arts monitors and a progressive approach to acoustic design built on the 'nonenvironment' approach. 'The nonenvironment design is the best way I know of getting compatibility between rooms of different shapes and different sizes,' states Newell of his philosophy. 'The recording studio is there to record musicians, the musicians are not there to play for the recording studio to record, and unless you get the studio right, there's almost no point. There's no point in making a fantastic recording of a mediocre performance, you've got to get everyone in the mood, have everything working smoothly and the right sort of environment.

'Tom Hidley said to me that, in the world of motor cars, Ford is much more important than Rolls-Royce,' he adds. 'What he meant was that if we can get these small rooms to sound great, we're actually doing more for the industry than he is with his big rooms—there are flagship facilities, but there are workhorses as well. Things come back from the walls faster and at a higher level in a small room, so it doesn't sound like distinct echoes, it's coloration. How do you get these down? You can never get small rooms to sound like big rooms unless they're totally anechoic, but we're trying to minimise the differences between them. The market is in small rooms, there's no doubt about it.'

Most of the equipment that regales the new Tio Pete came from the old studio and includes classic Neumann M50, U89, U67 and AKG D12 mics. Outboard encompasses old Neve mic preamps, and Neve and dbx comp-limiters, Lexicon and AMS reverbs while instruments span Fender Rhodes pianos and Roland TR909 and 727 drum machines to Zubiaga's considerable collection of guitars. Not limited to old kit, the equipment list is growing steadily with a new tc electronic Finalizer and D2 delay already occupying rack space. Alternatives to the main soffit-mounted Reflexion Arts 234s come in the form of KRK 9000B and PMC AB-1 close fields. Recording is taken care of by Otari MX80 and Tascam DA-88 multitracks, and a variety of 2-track and DAT machines. 'This all comes from spending time in other studios and reading magazines—because in a region where you are away from the main centres of recording the only opportunity to learn what is going on is to read,' Zubiaga explains.

It is perhaps unsurprising that surround sound was never a major consideration for the new studio design, but digital consoles have found favour in many modern facilities. Why not Tio Pete?

'Digital desks aren't attractive at this time,' states Zubiaga. 'We grew up with buttons and that's the way

we like to work. The Raindirk Symphony console was the result of advice from Sergio and Philip because the Angela we had before was old and in poor condition. We spoke about either having a brand new desk that would be less well specified or a secondhand high-profile desk. We talked about having an old Neve or Solid State Logic desk, but there was a 48-channel Symphony available in Germany and that was Sergio's recommendation. Philip checked the desk over after it was installed and found no problems. It has a very low noise floor, it was within our budget and it's proved reliable. Maybe in the future, if there is a good reason to look again at digital desks, we will reconsider but so far we're happy with an analogue console. Similarly, nobody is doing 5.1 work here at the moment except for film and television work in Barcelona and Madrid. We understand that the recording industry is starting to ask for 5.1 and we would consider that too if it doesn't mean too much disruption of the studio.

'It is our passion for the sound of a recording that necessitates equipment of this quality,' Zubiaga continues. 'If we can work at this level and make a profit, we're happy. Running a studio in Spain, even the big ones in Madrid, is like masochism. No-one makes a lot of money running a recording studio. Film studios are big business, but not recording studios. People like Jose and myself are dangerously unaware of some of the costs of running the studio, so we rely on Cristina to keep everything in check. She's much more cool and practical than us and takes care of our financial viability.'

'I like working with people with passion,' comments Newell. 'I'm still a record producer at heart and designing and building a studio is a lot like producing a record. When I'm producing I much prefer working with a committed band than a bunch of session players, and that's what it's like working with these people. I can't get as much satisfaction out of working with business people who are only looking at the business and what the business of the studio is going to be. Every studio is a little work of art; it's a sculpture that I leave behind.'

From its origins as the guitarist's hobby, Tio Pete has evolved through its early days of attracting professional interest to a capable, world-standard recording studio. It has also brought Zubiaga's children under its spell, with Cristina taking on management and financial roles and Carlos Jr dividing his time between maintenance and engineering duties alongside house engineers Jose Lastra and Angel Lázaro. At this point in time, it may be Cristina's role that is most crucial to the studio's development as it needs to attract custom from outside of the region and probably outside of mainland Spain.

'The main aim now is to make people outside the Basque country aware of the studio,' Zubiaga agrees. 'We have already had a band from Madrid come and do a session here. We know we can be competitive with studios abroad and hope we can attract foreign artists eventually.

'I spend time with the record companies selling them the studio,' Cristina elaborates. 'In the Basque country there are four or five local record companies and there are the usual ten multinationals based in Madrid so I say "hello", show them the pictures and the equipment list and try to convince them to use the studio. The best thing we have is the price compared to Madrid's studios and we have accommodation included, but we are waiting for the "breakthrough" project.'

'Because most of our clients sing in the local Basque language, a big record only sells 5,000 to 10,000 copies,' Zubiaga explains. 'The majority of artists coming to record here are recording in the local dialect which is a limiting factor. Places like Seville survive purely on the strength of their local music, because flamenco is internationally recognised as being the Spanish music—it's what we do best in the world. So if this studio were in Seville we would be selling records all over the world, but nobody else around the world is very interested in the music being made in the Basque country. The Basque population of Spain is about 2.5m; Basque speakers in Eskadi (the Basque country) number less than 1m. While it remains provincial, the recording industry here has to survive on these economics so a studio will do anything to keep busy.'

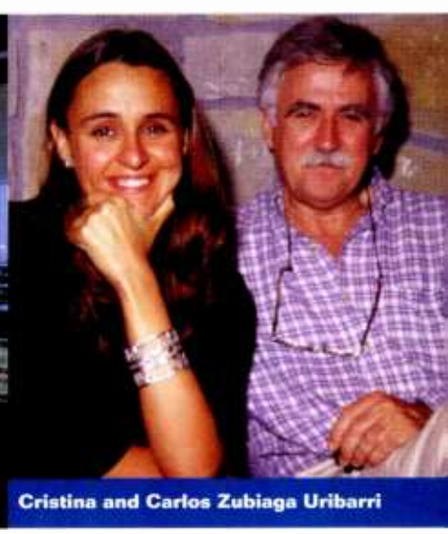
'I think it's possible to sell the facility abroad, but maybe we have to sell it to other areas of Spain first,' Cristina muses. 'It's a shame but even most Basque musicians don't understand what we have here. Sometimes I wonder why we have spent so much time and money.'

Zubiaga shows no such concern, however. 'This is a professional studio,' he asserts. 'We have invested a lot of money but the studio is now busy every day and is covering its costs above that investment and will recoup the investment itself. In the last three or four months we have been doing some bigger productions that should attract more attention to the studio. Most of the artists we record here are big locally, but it's like in Nashville where nobody outside knows what's going on.'

'There is a mind-set in places like Britain that means people don't realise what's here,' Newell observes. 'That's one of the things that has to be overcome. All it would take would be a couple of big name artists to come over and suddenly people would realise. But the cost of an air fare to Bilbao and the cost of hotels here is really insignificant in terms of the cost of recording in London and in most of the facilities there is somebody who can speak English.'

There are signs that the tide is turning. The Granada facility currently has a British producer working there and people from the Real World label recently recorded Spanish star Carlos Nunez at Vigo's Area Master—and were surprised at the results.'

'It's immodest for me to say this,' says Sergio Castro in deference to his involvement in the project,' but I have no doubt that this is one of the best, if not the best studio in Spain. And, although it's small compared to some of the studios there, the facility being built in Madrid might be the start of the real push to bring Spain to the world's attention. The studios in the north are not commercial in the sense that you find a commercial studio in Madrid or in London. Those studios are there to make a profit every day and they are operated by engineers to a timetable. Most of the people in the north are or were musicians, some of them very famous, and they want to remain in the music industry because that's what they love. In a way, these people don't have an alternative; we haven't been to them and sold them the idea of their studio, they've come to us and asked.



Cristina and Carlos Zubiaga Uribarri

'So we've been surrounding Madrid; we've been planning the attack. And when the people there realise the potential of the studios elsewhere in the country, and when we have the chance to build a big studio in Madrid, this thing is going to really take off.'

If and when it does, Carlos Zubiaga Uribarri's Tio Pete facility can expect to be onboard. Best of all, there a space upstairs that is ready and waiting to become a new hobby studio to replace the old one that he lost when he traded up for a place on the international stage. □

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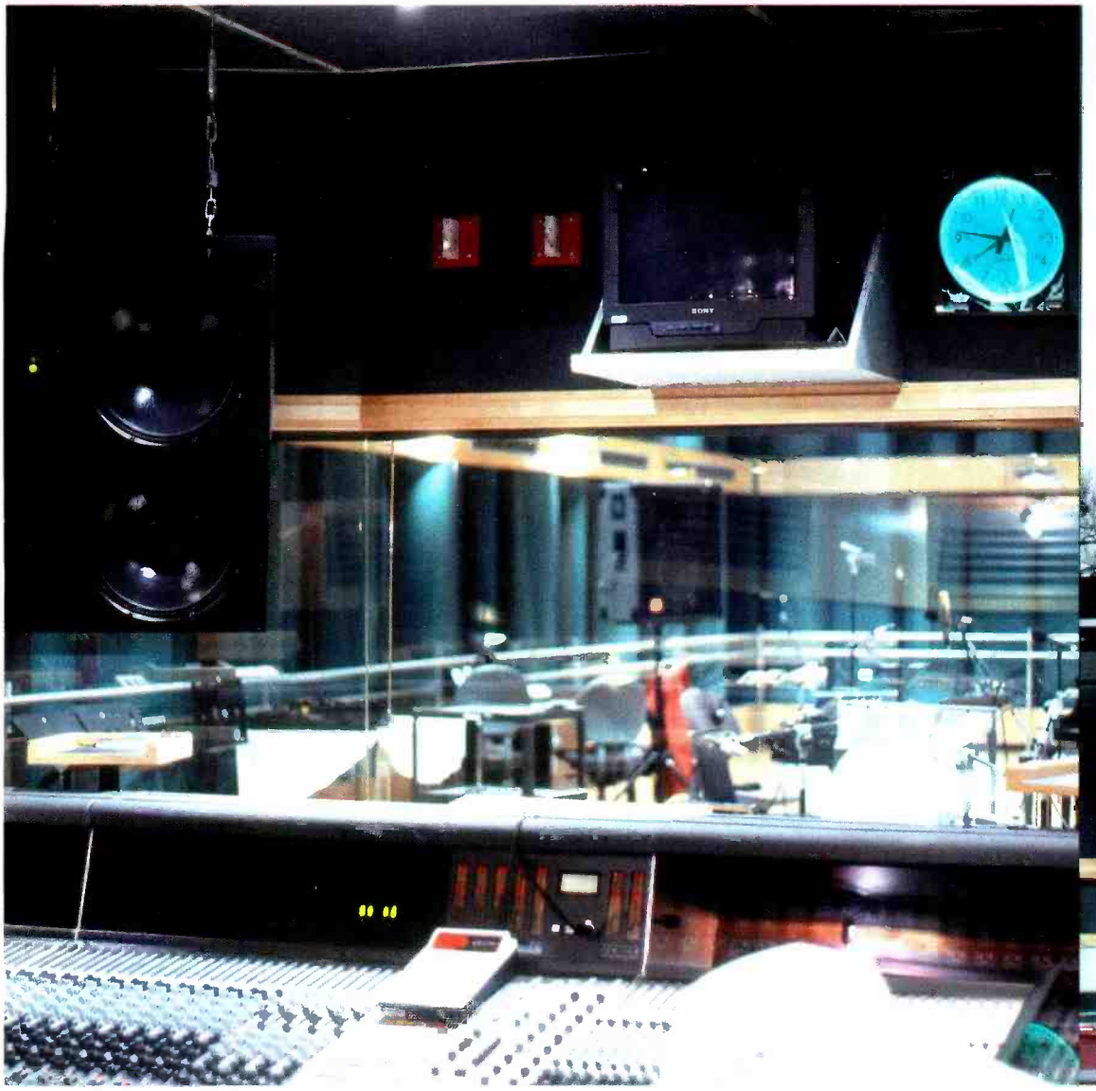
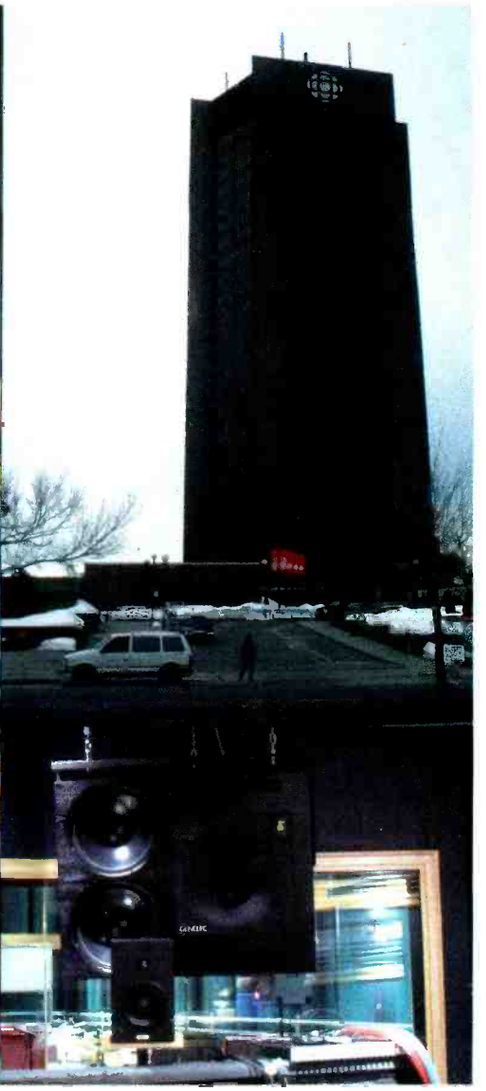
Tel: +34 94 676 1011 **Fax:** +34 94 676 1410
Email: tiopete@euskalnet.net





BIG COUNTRY RADIO

SRC plays a pivotal role in CBC's broadcasting remit. **Zenon Schoepe** reports on developments at Radio Canada's Montreal base

TAKE A COUNTRY almost a tenth larger than the USA and scatter a population of 29m (around a tenth of the USA) over its area concentrating it in a few centres. Add a smattering of in-grained cultural diversity, two main languages and a few minor ones, throw in some political issues and call it Canada. Serve it with a broadcasting infrastructure and call it CBC.

It's a simplification of the reality that faces the Canadian Broadcasting Corporation, although even the name cannot allude to the complexity that the national broadcaster faces. A long-time major player on the world broadcasting stage, CBC's structure remains difficult to grasp for an outsider and even generates shrugs of incomprehension from the natives so enormous is its remit. Committed to serving the needs of the English speaking majority and a French speaking minority, the Corporation has not been spared the ructions of the political factions that represent them. That is has survived says much about the professionalism and craft skills of its broadcasters whose long history played such an enormous part in shrinking the country's enormous land mass.

CBC is a broadcasting structure made of many parts, regionalised into centres as broadcasters are throughout the world but also paralleled for English and French speaking TV and radio services. There are even affiliated stations, newsgathering and distribution channels and delivery issues that are recounted with a casualness that flies in the face of the logistical problems that must exist given the enormous distances involved. It's why the softer option is look at a small part of the structure and see how it performs and interacts.

Quebec is the crucible of the French broadcasting activity and Montreal serves as major regional centre in its own right although the headquarters for French speaking operations is in Ottawa.

Montreal's monolithic broadcasting building houses French TV and radio operations, but it's to the radio that we gravitate. Serving news-current affairs and classical channels the operation also outputs an international world service channel and minority language broadcasts.

Classical concert recording is a speciality at the radio station strictly speaking referred to as SRC (Societe Radio Canada or just Radio Canada) to signify its French language output. Concerts are recorded in halls in Montreal or in the station's own studio and exchanged with their English broadcasting counterparts in Toronto and the act is reciprocated.

hot property

POST PRODUCTION

MUSIC RECORDING

FILM SOUNDTRACK

silk sound

soho - london

Following two years of extensive evaluation, planning and construction, White Lightning, owners of the 'The Bridge', 'Space' and 'Silk Sound', have now successfully completed the total refurbishment of the first of seven new Soundtracs DPC-II rooms.

A tribute to their status of being encompassed within one of Soho's most prestigious post facilities, the new suites unobtrusively yet practically combine the cutting edge of audio technology with truly stunning decor, furnishings and client comfort.

Commenting on their choice of consoles, Rick Dzendzera their Group Technical Director quotes, "The DPC-II consoles provide an excellent solution for the various sized rooms and applications, great features, good looks and on an industry standard platform to boot"!

Owner Robbie Weston simply says, "It was a pleasure to sign the cheque"!

DPC-II

digital production console

SOUNDTRACS

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FACILITY

Jewel in the Montreal radio's operation is Studio 12 which was renovated some five years ago and was one of the first buyers of Amek's 9098 flagship analogue desk in its original split incarnation. The desk works alongside a large and adaptable recording area that finds favour with jazz recording sessions, but also makes classical sessions a possibility. Designed in-house the recording area has variable acoustics (0.5s to 1.7s reverberation) and a selection of booths. Aside from commitments to the broadcaster's own needs, which include CD releases, the studio is also available as a commercial facility.

The broadcaster has opted for an unusual way of mounting its newly acquired Genelec 1035 monitors which rather than being soffit mounted, as is most usually the case with these enormous boxes, has opted instead to suspend them via thick steel cables from the ceiling.

'We tried the 1034s which are great for TV work but not ideal for a room like this that is handling this sort of work particularly with regard to the amount of bass required,' says chief technician at SRC Michel Lardie who adds that in the same way that the variable acoustics in the live area maximise flexibility and versatility the Genelecs were the best alround performers. 'We weren't satisfied with the other solutions we we're being offered,' he says. 'We made tests with many different brands. There are very simple reasons why we have chosen to hang them, we wanted them and the only alternative would have been to build a wall specifically for them which would have been too expensive. We made listening tests and the results are good, although we had to make changes to the control room acoustics in the rear wall bass trapping to accommodate them.'

The radio also has a second production studio equipped with an old Neve and JBL monitoring which is used for lesser projects and this older room represents something of a time warp containing impeccably maintained outboard in keeping with the 20-odd year vintage. But the tidiness and presentability of all SRC's rooms has more in common with the commercial sector than it has with the tired, often worn and institutionalised theme that is too frequently associated with hard-working broadcast facilities.

Digidesign Pro Tools is employed for documentary postproduction and drama with Sonic Solutions used for the music editing. You'll also find two Lexicon Opus rooms still earning their keep on drama and documentary work and tied in with their own Foley stages. Current affairs and news edit suites are built around Dalet systems which is the editor of choice at CBC for this type of work with around 200 dotted throughout the broadcaster's centres in Canada.

There are around 30 of these suites in the Montreal radio station, although this number is in the process being reduced as the broadcaster is in a state of change.

With early retirement being actively encouraged by the management, strikes have also taken place in response to changing work practices due to the introduction of new technology with unions acting to protect jobs. Similarities are drawn to what occurred sometime ago at the BBC in the UK with its process of stripping back and leaning out. Montreal is being seen more in its capacity as a broadcaster than in its role as a production centre.

Political pressure is clearly also at work with shifts in the power base of the different language speaking factions. It is always unsettling to witness the erosion of established broadcast infrastructures that have taken years of work to create and sustain. CBC seems better equipped than most to endure any set backs and to maintain its standards. □

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New TV channel p' nned for 2001

The members of the Tele des Arts consortium (Radio-Canada, Tele-Quebec, BCE Media, ARTE France and L'équipe Spectra) have been granted a license for a television arts channel giving francophones their own service devoted to all forms of art.

The arrival of this new channel is expected to generate major new investments in independent production in Quebec and Canada and coincides with ARTE France's commitment to invest in coproductions with Canada yielding international exposure.

The broadcasting schedule will include specials, documentaries, news, new programs from Europe (such as ARTE's THEMA shows) and will feature music of all types, dance, theatre, the visual arts, literature, and film. Scheduled to air in 2001 distribution is expected to be broad through cable and other systems.

PREVIEW

AMS Neve 88R

The first all-new analogue music-production desk from the AMS Neve stable in 20 years, **Zenon Schoepe** gives an exclusive overview of the 88R's capabilities and promise

LET'S FACE IT, it doesn't happen that often these days. The launch of an all-new large scale analogue music-recording console was never a frequent occurrence, yet it has now taken on the regularity of significant astral alignments. Aside from the concentration on digital, few manufacturers now actually have the resources or the inclination to pursue this rare beast despite the fact that it still occupies a pivotal role in the music production chain.

So here we are, 20 years after the launch of the original Neve V, AMS Neve has announced the 88R all-new, large-scale analogue desk. Unveiled at the Los Angeles AES Convention last month, the first desk will be installed at Claude Sahakian's Plus XXX studios in Paris later this year.

The timing is interesting because, although the venerable V has been tweaked, added to and embellished over its career, most recently to VX and VXS status, it could be argued that a more significant rethink has been wanting for some years particularly as SSL has been active in this manner in its analogue endeavours. AMS Neve argues that holding back, for whatever reason, has at least allowed multichannel features and user-requirements to become clearly apparent and as such the 88R is designed to perform in this sphere from the ground up.

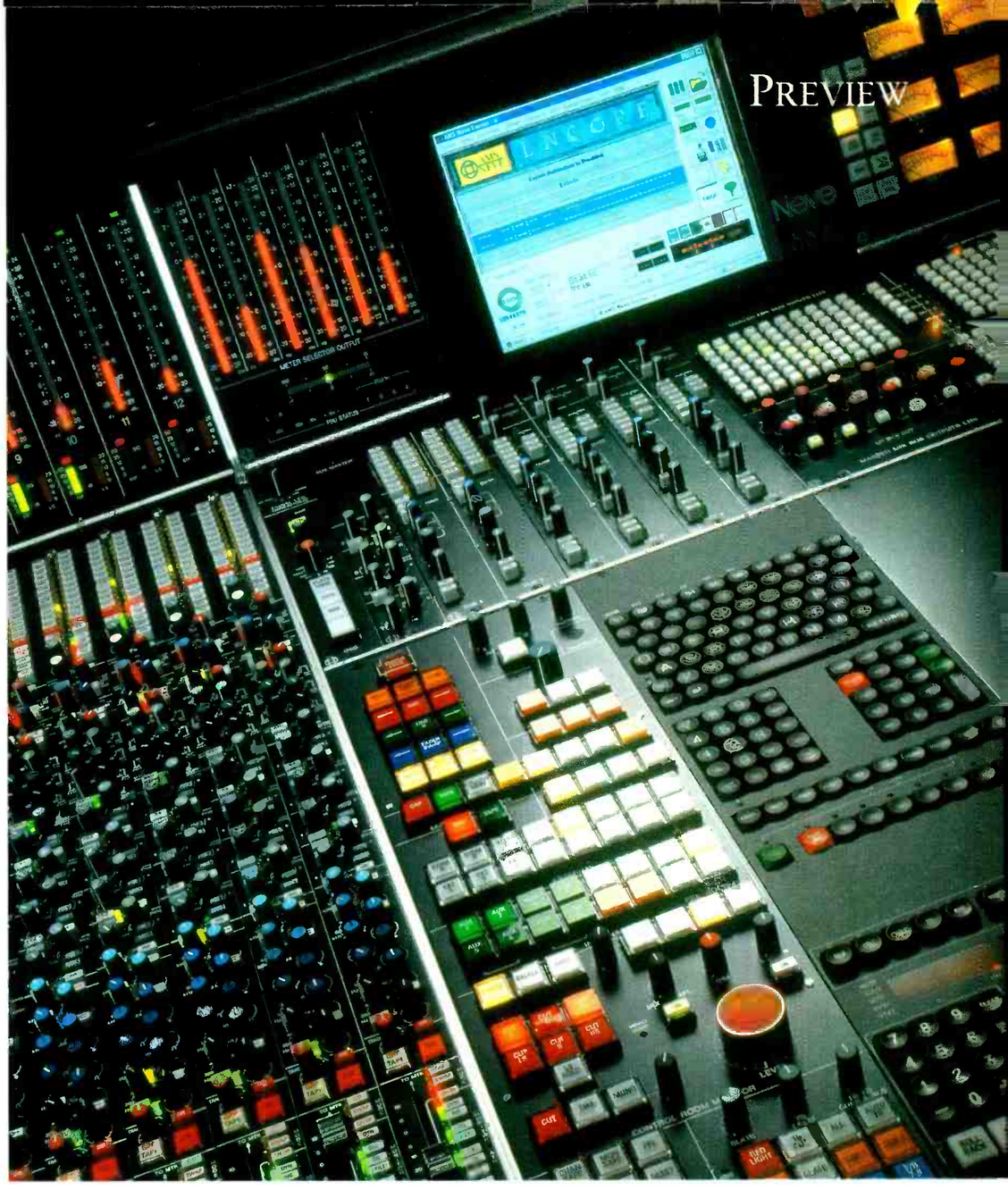
The title follows old Neve naming formalities with the 88 representing the series and the R standing for Recall. It will be available in the standard sizes of 48, 60 and 72 strips with customs on the cards for 84, 96 and 108 configurations. The price is said to be largely in line with what a VX would cost you, knock for knock, although there are a number of reasons why it is important to not compare the two too quickly or too closely as the new board outstrips the old in the value-for-money stakes.

For starters it features a completely new electronic design and therefore is not a direct descendent of any previous (AMS) Neve console in this respect, although the manufacturer says that it has taken its stimulus from a 'number of previous products'. The gist, my friends, is that, although they have redesigned and replanned the internals they have chosen to map these to a surface that will ring bells of recognition for anyone who has ever earned a crust behind a V. The EQ, for example, is based on the Spectral Formant EQ from the V, but the electronic design is new and means that performance has been increased to the inclusion of ±20dB of gain on the bands. Similarly the manner in which the bands overlap has been increased over the V model in the LF-lower mid area. But the section is still 4-band fully parametric, plus high-pass and low-pass filters.

Bandwidth through the desk is greater than a V at 100kHz and noise wise it is quieter through the use of more modern op-amp technology, there's also new transformer technology on the mic amps.

While analogue activity at AMS Neve hasn't exactly been strident over the last few years we need to be reminded that aside from the 55 series desk, the BTC console and the highly acclaimed 1081 outboard units have been bubbling away in the background and involving the two original Neve designers behind the 88R who between them are said to have some 60 years' experience in designing analogue Neve products.

It is clear that AMS Neve wanted to build on the familiarity of the V in the 88R—much as SSL has managed to retain operational continuity across its analogue range. Consequently the 88R strip's



outward similarity to a V is fairly immediate with closer inspection confirming the observation still further. It comes in that retro Neve dark blue and the clustering of controls and the ordering of sections is V inspired. However, from a distance the whole package looks different enough avoid any unfortunate confusion. You won't mistake an 88R for a V in a standard studio brochure shot.

It's a 48 multitrack configuration with independent pan controls for the monitor and channel paths that are LCR and there are switches for wide and narrow divergence. It runs to one LCR and five stereo buses and you can go for an optional scoring panel that will amount to what was previously referred to as S status.

Mic related controls are tied in with two options for the channel strip: traditional mic-line or a dual-line input. This choice serves to reduce the number of mic inputs for mix rooms, for example, and the changeover switch between the two signals is automated. And you can still have mic inputs available to you on dual line inputs because remote mic pres are an option. Three mic pre choices are available: the regular 88R preamp, the 1081 remote controlled preamps or the rather special option of AIR Montserrat desk series mic preamps which have been recreated specifically for this board. Nice idea.

Filters are very similar to those on the V followed by the aforementioned changes to the EQ. EQ is switchable into the side chain of the dynamics and can be switched pre or post dynamics. The dynamics section's gate has been altered to a softer knee with increased sensitivity while the compressor benefits from a wider range in its threshold control and tweaked attack and release times.

In response to user feedback more flexibility has been added to the aux section and the eight sends from the strip are all pre-post switchable and mono and stereo switchable from a global selection screen. An aux to multitrack mode adds a feature that many far more affordable desks have been sporting for years albeit without the 88R's access to 48 buses acting as sends. Aux cuts are automatable.

The small fader is motorised and automatable in precisely the manner of the large fader with all modes available to it. You can now also put the filter section into the monitor path along with the EQ, dynamics and insert. Completely independent routeing is available for the channel and monitor paths while very significantly OD (overdub) buttons on the strip punch multitrack machine tracks in to record.

The desks busing system includes the tools needed for multichannel work and a master reassign panel deals with the main buses of the desk for up to 7.1 operation. Important point here is that you can split the desk in half around the centre section which gives you an LCR and five stereos on the left-hand side and an additional LCR and five stereo buses for the right hand side. The reassign panel takes the left and right side buses and recombines them on eight outputs of the desk. It's a clever twist that expands the attraction of this console beyond the realms of straightforward stereo music production. Mode selector keys switch between surround modes.

The desk comes standard with 5.1 monitor section and has the ability to pick up all of the sources available to it and it's extremely well equipped in this sense and should cover all bases for DVD work, for example. Those who need more can go for the scoring panel option.

It's VCA-free throughout (aside from those in the dynamics, of course) and sports a 24-step passive attenuator for the loud dial. Cue capabilities have been enhanced to give a variety of studio monitor and artist can permutations enabling, among other things, the sending of post EQ cues to the artist and to determine what the engineer is hearing pre and post the punch point.

The main fader-panel area houses the global automation controls for the Encore automation which was introduced for the V fairly recently, presumably to pave the way for the new desk's arrival. One of Encore's core aims is to ensure that Flying Faders users retain operational clues and feel comfortable with it and it's been extended on the 88R to include RSI (ready, safe, isolate) for the events on the strip—aux cuts, EQ bypass, insert, and channel AB input. The new desk also boasts a global events panel which permits the activation of events RSI in a variety of ways—global aux cuts, for example.

Size-wise, the board weighs in nicely into the big proper analogue desk category, although the frame is noticeably less deep top to bottom (not front to back) than a V reflecting a more informed attitude to acoustic considerations. Heat management is also said to be better in terms of air flow through the desk and the newer components used are said to amount to a desk that also runs cooler than its predecessor.

What we have here is flagship analogue desk that draws on the popularity of layout and features of the V it replaces with all the indicators suggesting that it will also be true to its sonic lineage. But it is a new design and should be regarded as such—the integrated multichannel capabilities and the subtle and blatant additions to the features list add up to a 2k console and not an eighties one.

The V was never going to be an easy act to follow, the fact that it has been followed at all speaks volumes about the relevance of high end analogue in this day and age. AMS Neve has displayed restraint on the one hand with a very convincing interpretation of modern user-requirements on the other. It's a difficult balance to strike yet my gut feeling suggests it's about right. I'll watch it's progress with intense interest and I can't wait to see one driven in anger. □

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Yamaha DME 32

The launch of its DME 32 digital mixing engine is going to see Yamaha answering a lot of questions from a lot of different people. **Rob James** has some answers and a few questions of his own

YAMAHA HAS GOT SOME EXPLAINING to do. For a start, what, in its opinion, is a digital mixing engine? And what, exactly, is the DME 32? Ready answers include 'a 3U-high rackmount box with removable feet', and 'what would you like it to be?'

In fact, the DME 32 is the closest thing I've seen to a digital erector set that does not run on a PC. Although primarily aimed at the installation and sound reinforcement markets, it will undoubtedly find a number of uses in recording and sound-for-picture. Up to 32 channels of input and output, and a large palette of processing components make the DME 32 a real problem-solver, and up to four machines may be cascaded together for larger systems.

The DME 32 uses the most recent generation of DSP hardware catchily tagged, 'DSP5 and DSP6'. DSP5 was specifically developed to provide the large scale routeing and patching for consoles like the PM1D. DSP6 is the successor to DSP3 which handles all the processing in the current Ø-series consoles. The new chips will also be found in the AW4416 (44-channel mixer with 16-track recorder).

As development costs of custom digital hardware can be horrendous, the only economically viable way to produce custom silicon is to spread the R&D cost over a range of products. If you get it right, there are huge benefits. The 'hard-wired' approach is almost invariably more reliable than any PC hosted application and providing you can sell enough, the end-user price can be highly attractive. Yamaha is arguably the best example of a manufacturer succeeding at this. The Ø-series mixers neatly illustrate the point; one reason for their success being the price-performance ratio which has been achieved by using the same DSP processors in a range of other products—the Pro-R3 reverb, the DSP factory included.

Yamaha has written proprietary DME Manager software to programme the DME 32 which runs on the Windows platform only. In this context, Yamaha's term for a collection of components and their connections is 'Configuration, while 'Scenes' are comprehensive snapshots of components variable parameters, similar to the scenes used on the Ø-series mixers. Once programmed, configurations, each with up to 99 scenes, may be downloaded to either of the two onboard memories in the DME 32. Configurations may equally well be uploaded to the PC for storage or editing. Alternatively, they may be saved and loaded onto standard Type II PC memory cards. (PCMCIA).

Software installation follows the usual Windows pattern and caused no dramas on the three machines I tried. (Two desktops and a laptop) However, it is somewhat sluggish on anything less than a PIII 450. When launched, the software attempts to find a connected DME 32. If unsuccessful, (because there isn't one, for exampe), you can work off line. If you do, you are presented with the main Window and an almost empty, pale blue Configuration. The only items present are the pull-down menu bar and a 'thermometer' showing DSP usage and the DME 32 unit number. Scrolling down reveals four of these, one for each possible unit. Modules are added in Edit mode and connections between them are made in Cable mode. You can change modes in several ways, choosing from the pull-down menu, clicking on an icon in the tool bar or the floating tool palette.

Similarly, components may be chosen from a pull-down menu or from the floating Component List. Whichever you use, placing components is a matter of clicking and dragging. Appearance and size of Components and Controls may be changed by right clicking and selecting 'properties'.

It is also possible to create User Modules These are constructed and internally wired in the same manner as a Configuration. Once saved with an appropriate name these can be used within other Configurations, saving a considerable amount of time.

In Cable mode operation is similar—Wires are added by clicking on a node and dragging to the destination node. Multiple connections of all nodes may be made by clicking in the body of a component and dragging into the body of the destination component. For selected adjacent nodes 'lasso' the source group and drag to the first required node in the destination.

Components and cabling may be freely edited, but once a configuration has been designed, it must be compiled before it can be saved or used. If too many components have been used you will get a message saying Compile Failure and the reason. One annoyance is the grid and snap settings are not stored and are only available at 100% magnification. After you have created a masterpiece with nice straight wires and carefully lined up components and saved it, the next time you open it, some wires will have kinks in them. It's not terminal, but it is irritating. Double-clicking a component opens its control window where its parameters can be edited and sets of parameters saved as Scenes. If desired, once a Configuration is downloaded, DME Manager can directly control the DME 32 using the Run Mode Controller window.

Providing the Configuration and Scene are not protected, editing is also possible using the front panel controls, although for anything other than quick tweaks this will be laborious. Configurable password protection has been well thought out, allowing user control where desired, while preventing access to other areas.

Mini YDGAI Card Options

MY8-AD	Analogue to Digital	8 channels 20-bit 128x oversampling 8 balanced Jacks
MY4-AD	Analogue to Digital	4 channels 24-bit 128x oversampling 4 XLR
MY4-DA	Digital to Analogue	4 channels 20-bit 128x oversampling 4 XLR
MY8-AT	ADAT I-O	8 channels 16, 20 or 24 bit 2 TOSlink optical
MY8-AE	AES-EBU I-O	8 channels 16, 20 or 24 bit 25-pin D-sub
MY8-TD	Tascam TDIF-1	8 channels 16, 20 or 24 bit 25-pin D-sub BNC wordclock out

To give some flavour of the DME's speed and ease of use, it took me around five minutes to make a 16 x 16 matrix configuration, save some scenes for various routeings, compile and download the result to the unit. More complex configurations can take a while, but the results are worth the effort.

DME 32 ships with a large selection of components. The subjective quality of the sound is excellent. If you like Yamaha algorithms you will love this—the emphasis is on accurate, clinical, sound surgery, so if you want dirty, analogue grunge then you will need to look elsewhere. There are, however, a couple of surprising omissions—in a product intended for the installation market I would have expected to find a network port of some description, probably 100 base-T Ethernet, to allow central control of many units. I was also expecting an MLAN port, but was doomed to disappointment, although a mini YDGAI MLAN card will be available in the future.

While it is perfectly possible to design a configuration for say, a 6-band, 6-channel equaliser for surround use, linking the parameters is time consuming and uses up 31 of the available 32-parameter link groups. Similarly, there is no simple way of properly linking the side chains of multiple dynamics components to produce a 5-channel limiter. There is sufficient processing power to construct such configurations, but I would love to see some surround specific components, especially reverb, dynamics and pitch shifting. If Yamaha chooses to do this it will have a configurable surround effects processor at a fraction of the cost of other units as well as all the other applications.

Further DME 32 components are already being planned and include a possible and, potentially particularly useful, 32 x 32 router. There are also plenty of opportunities for third-party hardware controllers using the GPI, MIDI and serial ports. I can easily imagine the DME 32 being used as the basis for a sophisticated surround monitor control system with downmixing and even loudspeaker crossovers all controlled by third-party hardware. Neither are the possibilities here limited to on-off functions—by connecting a 10kΩ linear pot, rotary and slider controls may be remoted. With a 32 x 32 router component you could make a 128 x 32 router and format convertor with four units.

There are many other possibilities.

AD 824 and DA 824

AS MIGHT BE EXPECTED, these twin 2U-high rack mounting boxes with removable feet share many characteristics. Both are 8-channel devices with balanced inputs and outputs on XLRs and TRS jacks. The DA 824 allows the use of both outputs simultaneously where on the AD 824, inputs are XLR and there are balanced analogue insert I-O jacks. Each unit has a single mini YGDAI card slot. If the AES option is chosen, the units may be sited up to 200m from the controller. A splitter Y cable is available to enable the use of a single AES 25-pin sub-D cable to connect in and out. Word clock connections are BNC with switched termination on the inputs. The AD has clock out and the DA clock through, since the AD may be internally clocked. Convertors on both units are 24-bit linear 128x oversampling with a quoted dynamic range of 110dB.

The DA 824 has three rows of eight LEDs to indicate PEAK, NOMINAL and SIGNAL lighting at -3dB, -14dB and -34dB respectively referenced to full-scale output. A further LED indicates when the unit is locked. The maximum output level may be set at +24dBv, +18dBv, +15dBv or +4dBv by changing internal switches.

On the AD 824 the three rows of LEDs represent the same levels below peak as the DA 824 and are accompanied by keys and LEDs used to select the channel for analogue gain adjustment and to switch 48V phantom powering. A small slide switch and LED is used to indicate and turn on (or off) master phantom power. An adjacent key is used with the channel select keys to switch phantom on individual channels. Once switched on a red LED lights above the channel select key. A bright 3-digit display indicates gain for the selected channel. Analogue input gain may be adjusted in 6dB steps, remotely or by using the rotary control next to the display. Relay clicks indicate the analogue gain stages are switched in three ranges which helps to keep the noise figures healthy.

The first thing to catch the eye is the huge, bright, 2-digit Scene No Indicator where two LED dots indicate if current settings match the last recalled scene. The 48-character green LCD is used to convey information in five groups: Configuration, Scene, Component, Parameter and Value. The panel has legends which reflect this, and the last three have associated keys and LEDs which select the relevant section of the display. Two further keys and LEDs handle protection, for restricting access, and utilities, which activates housekeeping functions,. Four LEDs indicate 44.1kHz or 48kHz sample rates, Lock status and Emergency. This lights and the outputs are muted when the GPI input assigned to emergency is activated. A USB socket is fitted, and, although not activated in the current software version, this will provide another connection to PCs.

The data wheel is a bit small and sits above the USER DEFINE key and associated LED. This enables quick access to a single parameter. To the right are < > cursor and increment, decrement keys which work in conjunction with the display and data wheel. The numeric keypad is currently used purely for Scene numbers with RECALL and STORE keys either side of the zero key. The final items are a PC card slot for Configuration and Scene storage and the neatly recessed, press button, mains switch. Word clock In and Out are on BNCs with switched termination on the In, followed by MIDI In and Out

Next along is PC-CONTROL, a 9-pin sub-D switchable between RS232 and RS422 protocols. A further 9-pin

DME 32's Components

The DME 32's Components are divided into groups. In many cases there are several versions of a component for different numbers of inputs and outputs. Some are complete audio processors such as mixers and effects, others are individual parts, faders, pan controls, switches and so on.

The groups are:	
Automatic Mixer	2:1 ,4:1 or 8:1
Cascade	Up to 32 cascade buses
Crossover	2-way, 3-way and 4-way types with Bessel, Butterworth, Linkwitz-Riley or Adjustable Gain at the cutoff frequency plus 12dB/octave, 24dB/octave, 36dB/octave or 48dB/octave slopes
Crossover Processor	2-way ,3-way or 4-way with delay, crossover, 3-band PEQ and compressor on each channel
Delay	1 input, 1-8 outputs. Multi-tap with independent delay and level on each output
Delayed Mixer	2, 4 or 8 inputs 2, 4, 8, 12 or 16 outputs. Variable delay on each bus send
Dynamics	Compander, Compressor, De-esser, Ducker, Expander, Gate (all mono or stereo)
Effect	Reverb (7 types), Delays (5 types) or Modulation effects (11 types).
EQ	2-band, 3-band, 4-band, 6-band or 8-band parametric and 7-band, 15-band or 31-band graphic
Fader	1, 2, 4, 8, 12 or 16 channels
Filter	High-pass, low-pass, band-pass or notch
Input-Output	Represents the slots. Four blocks of eight ins and outs
Matrix Mixer	2, 4, 8, 12 or 16 inputs and 1, 2, 4, 8, 12 or 16 outputs
Meter	1, 2, 4, 8, 12, 16-channel versions
Misc	Remote Gain Trimmer for up to 16 AD 824 convertors. Oscillator with 10Hz-20kHz sine wave, pink and burst pink noise.
System Mute - Mutes all outputs from one button.	
Pan	LR, LCR, Surround 2+2 (LR, LsRs) Surround 3+1 (LCRS) and Surround 5.1 (LCRSLsRsSub)
Router	Any permutation from 1, 2, 4, 8, 12 or 16 inputs and outputs
Switch	1, 2, 4, 8, 12 or 16-channel versions
User Control	Allows controls from several components to be grouped in a single control window.
User Module	Allows construction of custom components up to 16 inputs and outputs. Modules may be named and saved for future use.

Com port is used for remote control of analogue input gain on a Yamaha AD824 A-D convertor(s). Two 50-pin 'half pitch' connectors are for cascading machines. Four Euroblock connectors (plugs supplied) allow up to 16 GPI ins and outs. Finally, four mini YGDAI card slots provide a wide variety of I-O options. Internal processing is 32-bit with internal clock at 44.1kHz or 48kHz. External rates from 39.69kHz to 50.88kHz are supported.

Apart from the obvious uses in fixed installations, the DME 32 has a great deal of potential for other purposes—as an accompaniment to an 02R for instance. However, in this early version of DME Manager there are some frustrations and rough edges which I hope will disappear in subsequent releases. The router components provide an example as there is no way of changing the labelling of the inputs and outputs to anything meaningful. There are also a few things missing which would make the DME 32 more desirable for other applications. These are almost all 'just software' issues.

At the asking price, the DME 32 makes sense even if you only programme it once and use it as a dedicated processor. If Yamaha continues to develop the software as I would expect, it will become easier and more convenient to programme and will have even more components to choose from. If this happens, and once its virtues are appreciated, I think the DME 32 will become indispensable. □

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Beyerdynamic Opus 83, 69, 65 & 51

A new range of cost-effective microphones from German experts beyerdynamic brings new alternatives to most areas of recording. **Jon Thornton** reports

THE LAST TWO YEARS have seen the majority of the major microphone manufacturers take advantage of their accumulated experience in microphone design, and couple this with modern manufacturing methods in order to provide new ranges of reasonably high performance microphones at an attractive price point. The Opus range from beyerdynamic is the latest of these, and consists of a range of wired and wireless microphone systems aimed at both the studio and live performance markets.

The Opus 69 is billed as a 'high performance' dynamic microphone. Comparisons with the ubiquitous SM58 are inevitable, and initial impressions would seem to suggest that this microphone is aimed squarely at that market.

Build quality is good, and the Opus 69 feels substantial and rugged enough to cope with any knocks that life in the studio or on the road could throw at it. Handling noise is minimal, and good off-axis rejection with a supercardioid polar response helps extract maximum gain before feedback in a live situation. Documentation quotes a frequency response of 95Hz–14kHz, but this is for distant sources. In reality, this is a microphone that sounds better close up. Distant sources sound more than a little on the thin side, with very light bass and a high-frequency response that starts rolling off above 10kHz. Bring proximity effect into play and the Opus 69 starts to sound much more substantial, with sources 10cm or 15cm away sounding reasonably natural in the low and mid ranges. A gentle presence lift in the mid adds some life to vocals in particular, although the effect is a little subtler than with other dynamic microphones. Used closer still and the bass end lifts significantly—perhaps a little too much for some male vocals. It doesn't sound exactly like an SM58, but it does perform well enough to make it a real alternative for some voices.

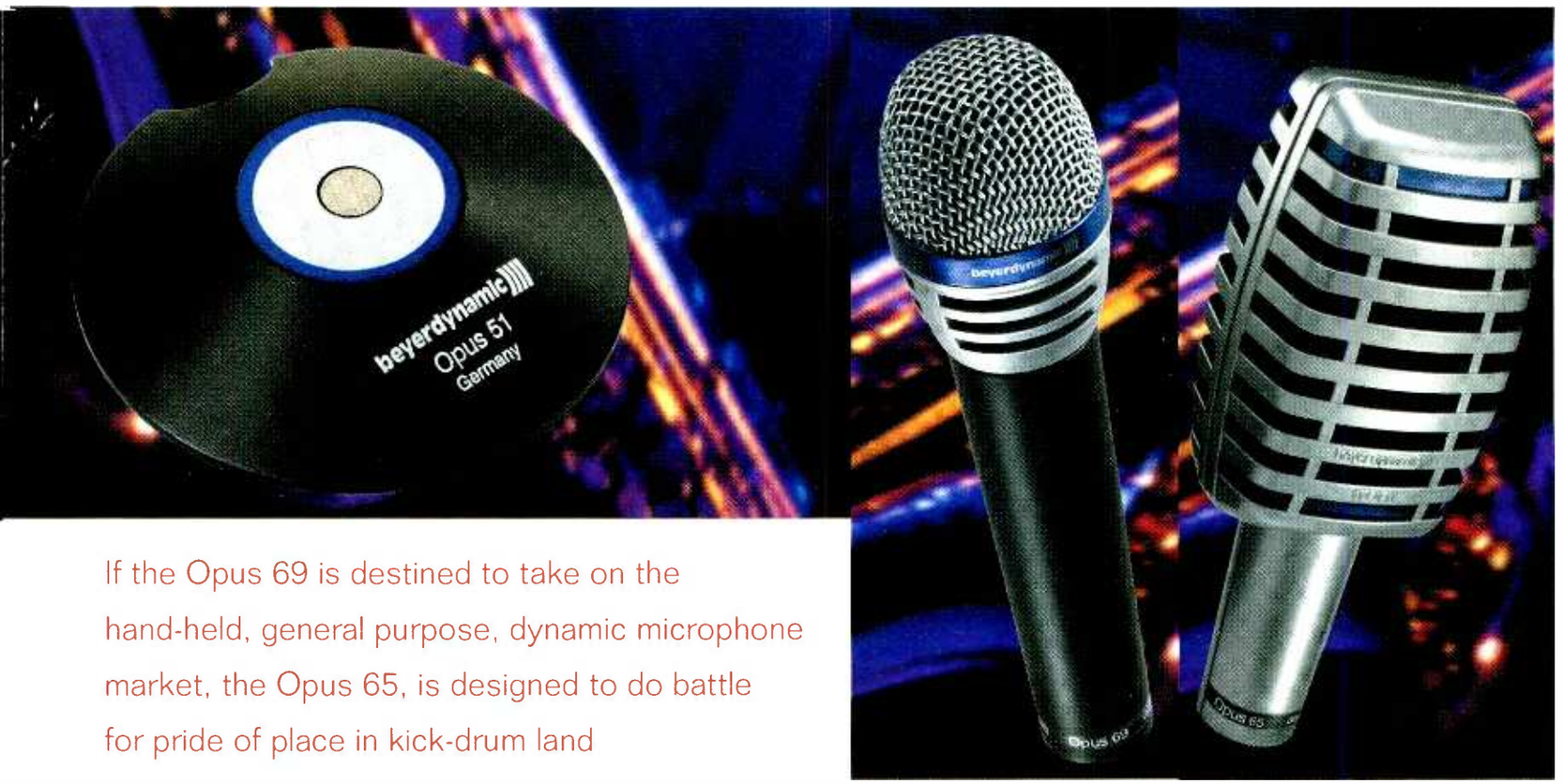
If the Opus 69 is destined to take on the hand-held, general purpose, dynamic microphone market, the Opus 65, is designed to do battle for pride of place in kick-drum land, although it would be eminently suitable for other close miked, high SPL applications.

The 65 has a hypercardioid response, chosen says beyer, to aid with the rejection of unwanted resonances in the kick drum shell. The caveat to this, however, is that microphone placement becomes fairly critical if you are to avoid 'one-note' effects from the kick drum sound. In use, the microphones flat packaging helps in this respect, enabling it to be placed snugly and accurately up near the front skin of the kick drum. A nice touch that more manufacturers should adopt is the unequivocal labelling of which side is the front.

Again, the Opus 65 sounds at its best when used close to sources, and the sound 'out-of-the-box' is marvellous. Plenty of low-end punch, a slight dip at 500Hz and peaks at 2kHz and 5kHz work well in producing a tight, contemporary kick drum for pop and rock work. The tight pickup pattern does help to a degree in keeping stray resonances in check, although it's no substitute for good tuning and damping in the first place.

Every engineer has their own favoured microphone for kick drums, largely chosen on the basis of what they know will get a good sound quickly. Although the Opus 65 wouldn't be my immediate choice for the slightly more open kit sound in jazz, for general rock and pop it works very well, and is sure to find many friends.

The Opus 83 is a back electret studio condenser, with roughly the same dimensions as beyer's classic M201 dynamic. The microphone's construction seems fairly sturdy, and fortunately the ports on the body seem to have more metal area between them than the M201, which should make it less susceptible to



If the Opus 69 is destined to take on the hand-held, general purpose, dynamic microphone market, the Opus 65, is designed to do battle for pride of place in kick-drum land

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damage around this area. Frequency response is quoted as being reasonably flat between 60Hz and 20kHz (±2.5 dB), and a cardioid polar pattern places it firmly in the category of general purpose studio condenser.

What is distinctive about this mic, particularly at this price point, is the degree to which its polar response remains fairly consistent across a wide range of frequencies. Although it will, of course, tend to an omnidirectional response at very low frequencies, beyer's own measurement data indicates a reasonably consistent cardioid response 125Hz-8kHz. In use, this data is borne out by a remarkable lack of coloration from off-axis sound sources. With this in mind, a single Opus 83 was initially setup as a drum overhead. Although nowhere near as open or detailed sounding as a large diaphragm studio condenser, it produced a reasonably natural sound, with plenty of HF without sounding too splashy or forced. When compared with a large diaphragm condenser, some of the transient detail of the cymbals tended to be rounded off, although this might not be a bad thing in some applications. Low frequency response was also a little dull by comparison, not only with large diaphragm microphones, but with other small diaphragm back electret designs.

Most back electret designs are never going to win any prizes in the self-noise stakes, and this little Opus is no exception. With quiet sources at a distance and plenty of gain on the desk noise is of a high enough level to be problematic, which would rule out the 83 from critical distance work. While it wouldn't be my choice as the only condenser in the microphone cupboard, as a general-purpose, small-diaphragm microphone, it performs reasonably well.

The final microphone tested is a boundary, or pressure zone design. Smaller than many equivalent models, the Opus 51 has a circular backplate measuring just 70mm, with the back electret capsule mounted centrally. A 4-pin, captive LEMO plug connects to the CV1 power unit, which in turn provides an XLR output and will power the microphone from any standard phantom source. If required, a separate battery compartment is available for the power module that will allow it to be used if no phantom power is available.

The polar response of the Opus 51 is hemispherical, and frequency response is quoted as 30Hz-20kHz (±3dB). The response is reasonably flat except for a quite noticeable lift around 10kHz, that lends an audible brightness to most sources. Used again, in the first instance, on a drum kit as an ambient room microphone, the Opus 51 returned a reasonably natural sound, although struggling at times to capture some high frequency definition. In many ways, the sound of the Opus 51 is similar to that of the 83, although perhaps more brittle sounding. At a distance, the hemispherical response makes you very aware of the room sound—fine if the room sounds good, but otherwise dictating extra care in positioning. Closer to sound sources the Opus 51 sounds as good as other boundary microphone designs in this price range. In its favour, though, is the relatively small footprint of the backplate, which is sure to find favour in those applications where discretion is as important as ultimate sound quality. □

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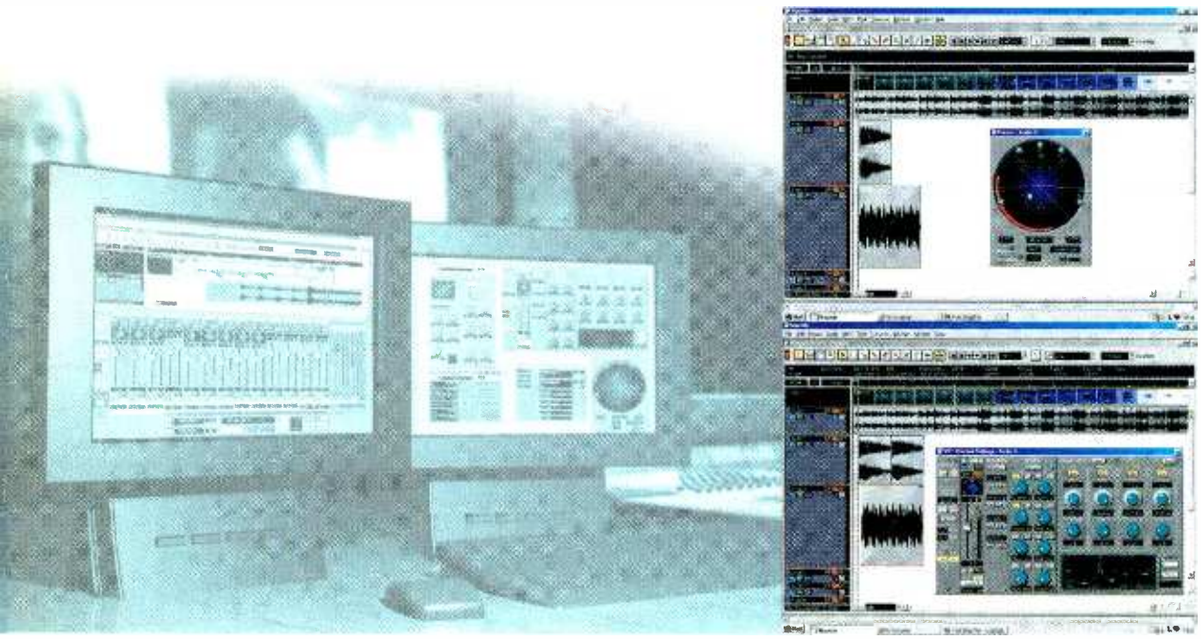
Steinberg Nuendo

Issuing a serious challenge to Digidesign's Pro Tools and other established contenders, Steinberg's Nuendo makes a dramatic, if late, appearance. **Rob James** tries the Media Production System



NUENDO HAS TAKEN a very long time to arrive. When first announced it was intended to be hosted by one of the high powered (and high priced) Silicon Graphics workstations. One reason Nuendo is so late is the decision to change platforms in favour of the Intel-Windows hegemony. Steinberg's basic proposition is this; they believe the PC platform is now sufficiently powerful, and their programming so efficient, it is possible to design a serious, professional workstation without any additional DSP hardware

I had a complete system for the review with a rack-mount twin Pentium 550 PC, Nuendo 96/52 audio interface card and Nuendo 8 I-O both made by RME (of Hammerfall fame), a Timelock Pro wordclock and time-code synchroniser made by Rosendahl and a Nuendo-badged Apogee AD8000 convertor. This all worked well straight out of the box, but I thought it fairer to use my usual review PC, a P3-450 running Windows 98 with 256MB RAM and 7,200rpm DMA33 disk and, in this case, a Creamware Pulsar card used for I-O. This should make for a more objective assessment since this machine is routinely used with other software following a similar approach.

Installation was completely drama free, although Nuendo, like many other Steinberg products uses the accursed dongle for copy protection. Once installed, with audio patching completed and word clock sourced from a Rosendahl Nanosyncs, I loaded one of the supplied demos to find my way around.

Nuendo, like Pro Tools uses rendered fades and crossfades. The necessary calculation is done offline and a new file created for the duration of the fade-crossfade. On playback the software performs an invisible edit to and from the rendered section. There are both advantages and disadvantages with this approach. On the plus side, once rendered, little or no DSP effort is required and required disk bandwidth is reduced. Even a very long crossfade requires only one audio 'stream' from the disk. Also, the result will be identical whatever system is used to play back the material. On the downside, a complex project will give rise to hundreds, if not thousands, of extra files. Another problem is the time taken to render. On a very fast machine this will be insignificant except on very long crossfades, but on a more normal PC, crossfades across several tracks will take more than real time to crunch. This may not seem like much of a problem, but if the first attempt does not produce the required result any adjustment of the parameters requires the complete fade to be rerendered even when auditioning. My every instinct is against rendering. Like data compression it is only necessary because the technology hasn't quite got there yet. In the long term it will be seen as anachronistic, meanwhile it is a pragmatic solution to restricted processing power and of course, Pro Tools does things this way.

Video support is restricted to playback and limited editing of Windows AVI files.

I am not going to attempt to quantify the number of simultaneous tracks, eqs and plug-ins possible since individual circumstances vary so much. Suffice to say I found the performance on my own machine to be among the best I have found to date, outgunning considerably more expensive hardware DSP-based solutions. The programmers have undoubtedly succeeded in their aim of writing more efficient code. When running on the twin processor Windows 2000 machine the performance was even better, although not by the margin you might expect. Best of all, when you do approach the limits, Nuendo fails gracefully. The graphics slow down and eventually stop, user input is slow and eventually ignored, but Nuendo doesn't crash (at least, not on me) and the last thing to happen before it stops is audio gapping.

Cubase VST and others of its ilk approach audio recording and editing from the MIDI sequencing angle. As a non musician this is something I have never been comfortable with. Nuendo reverses this approach and concentrates on audio, although, as you might expect, there are MIDI sequencing functions and Video as well.

Nuendo follows a project approach to managing the numerous files. A project folder will typically contain the project file with an .npr extension and folders for Audio, Edits, Fades and Image files. The project file can point to files outside the project folder, but it makes sense to keep things tidy. Raw recordings are referred to as Audio Clips and the instructions as to where and what to play back are called Audio Events. Several events may be gathered together to form an Audio Part. This allows actions such as moving and copying to be applied to all the events in the part at once.

The Project Browser window resembles Windows Explorer, but is, in essence, a means of directly manip-

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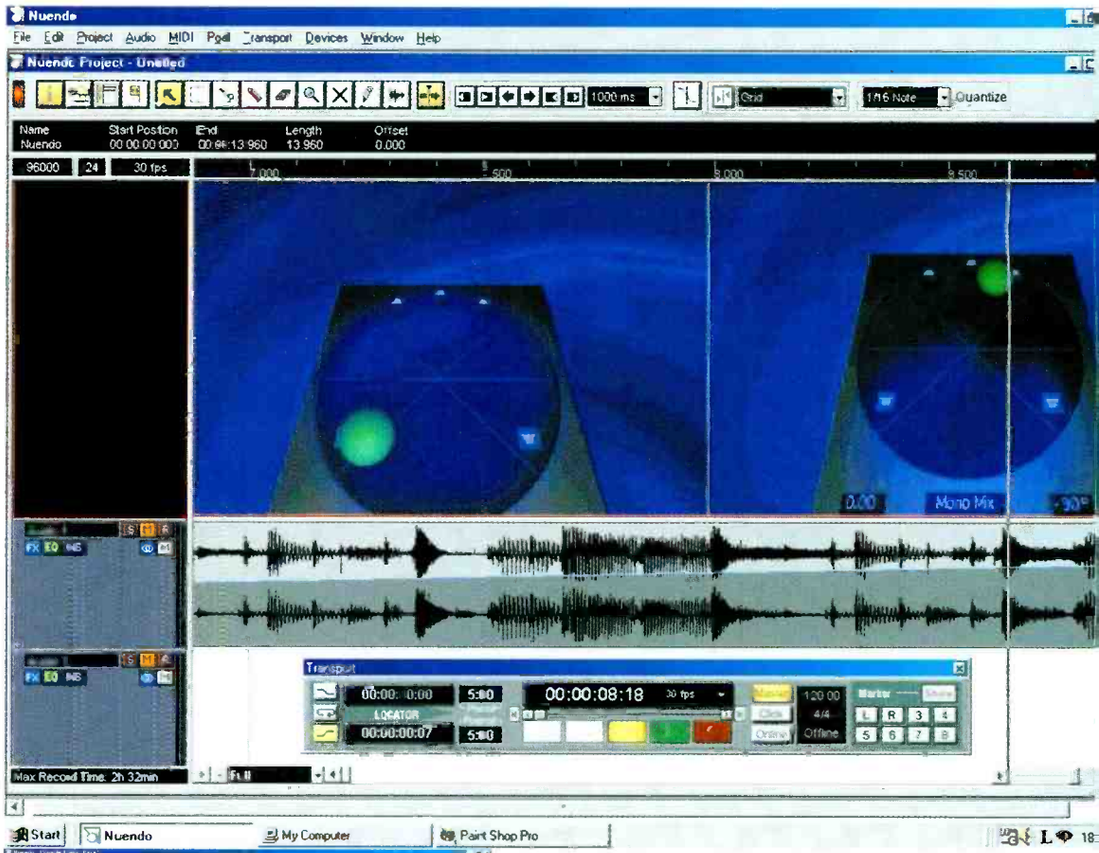

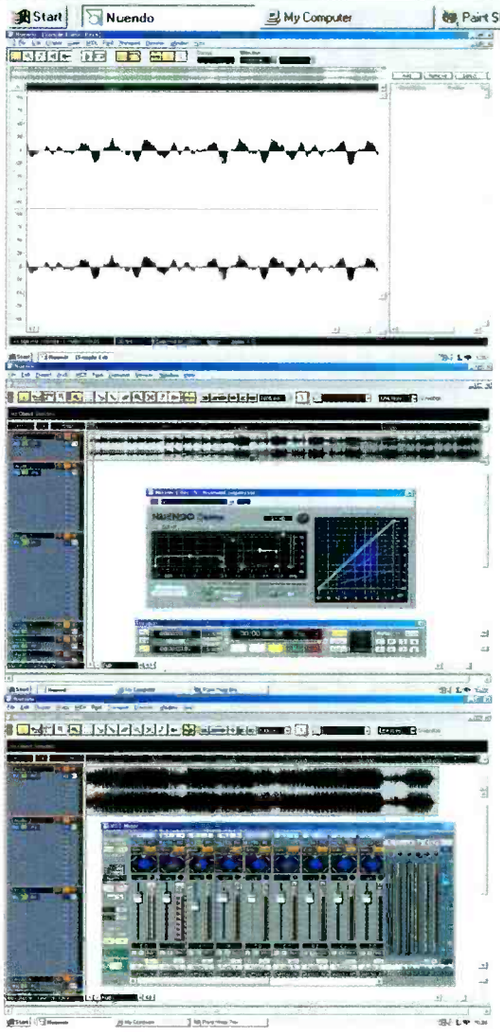

ulating the EDL in a partially graphic form. This is, potentially, a real 'power user' feature. The graphic representation is familiar horizontal tracks representing the whole project in the Project window. The cursor may be fixed or moving and using scrolling tracks does not seem to incur the same processor hit as in many other systems. Scrub, although limited to a single track, is unusually responsive. For every track, a channel is created in the VST Mixer window. This follows the popular approach of imitating a hardware mixer on screen. All the things you would expect are present. Each audio or group channel comes with eight effect sends, up to four insert effects and 4-band EQ. Surround panning is an option, although there is no direct way to bleed audio to the LFE channel. There is also no divergence. These shortcomings are addressed by the optional Surround Pack plug-ins.

On the other hand a number of high-quality VST effects are included in the basic package including a matrix encoder-decoder for LCRS surround. In surround modes the master effects slots are equipped with proper patching to handle the new special surround format VST plug-ins.

Comprehensive automation of almost every parameter in the mixer and suitably enabled effects is displayed on Automation Subtracks. Each Audio and Group Channel gets its own subtrack that displays one parameter at a time. Plug-in automation tracks are added manually. Parameters are automated by moving controls on screen or clicking and dragging points on the automation line.

Editing, down to sample level, may be undertaken in the Project window. All the usual tools are present and considerable thought has gone into providing features which will aid productivity. Events may be grouped for joint attention or a range selected. Shuffle enables two events to exchange positions on the track. The underlying audio in an event can be 'slid' chang-

ing its sync without altering either the position or length of the event. Detect silence splits events, non-destructively removing 'silent' portions of the project.

The Audio Part Editor window has an interesting and useful feature dubbed 'lanes'. This allows adjacent events on a single track to be displayed as if they were on two tracks which makes it much easier to see what is going on.

The separate Sample Editor window allows you to deal with complete Audio Clips and enables waveform drawing.

There is a lot of functionality here, but most of it is fairly intuitive which helps keep the learning curve reasonable. The only thing I really missed is a way of locking events in time while allowing other moves. There is a way of achieving this by clicking, holding SHIFT and dragging. Once the event has moved either horizontally or vertically its movement is restricted to that plane until the mouse is released. The trouble is, apart from being rather cumbersome, it is still too easy to inadvertently move things out of sync.

To judge by the system they supplied for review and the price of the Surround Pack, Steinberg seems to be pitching Nuendo as a high-end product, whatever that means these days. This places it in competition with Pro Tools. Steinberg has undoubtedly succeeded in producing a flexible, credible and seemingly reliable system without the use of dedicated hardware DSP. Latency is commendably low and the whole system feels responsive enough to attempt on screen mixing without the usual frustrations. There is a wide range of high-quality VST and DirectX plug-ins available at reasonable cost including exotica like Soundslogical's Wavewarp and Steinberg already has a considerable and loyal user base. Digidesign should be feeling decidedly nervous.

The Nuendo pitch is persuasive, invest most of your money in high-quality peripherals such as convertors and synchronisers and take advantage of the rapid developments in PCs to provide ongoing increases in horsepower at relatively low cost. Although the Nuendo software on its own is considerably more expensive than other products with the same premise, this is really not the point. You need to compare the costs of complete systems which will actually do what you require. Steinberg is making it easy to 'one-stop shop' for a complete, turnkey system. If Nuendo is backed up with the levels of support professional users require then the price looks entirely reasonable. Anyone looking for a professional, 'traditional' screen-based workstation should pay Nuendo very close attention indeed. □

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Innova Son Live series

A long time supplier of digital desks for the live production environment, the French maker has redefined its range to address different requirements. **Zenon Schoepe** reports

INNOVA SON REMAINS ONE of the rare recent startup successes of the pro-audio business having stepped rather timidly into the spotlight in 1996. Progress with its digital-desk technology for the live production environment, which has been embraced consistently by broadcasters for OB applications in addition to the core market of live sound, was slow initially due to the manufacturer's decision to go with largely custom-configurable systems in the first instance. While this wasn't a choice route for volume production it did give the French company a good feel for user requirements and paved the way for the acceptance of its simple yet powerful approach to live production needs.

More than 150 systems have now been delivered and while custom configurations remain at the top of its range the company has moved into series production with the introduction of four new models. In order of increasing price and complexity there's the Compact, the Essential, the Grand and the Large Scale all of which share identical sonic performance and are based on the same processing core that has remained a constant on the company's products (see *Studio Sound*, February 1999).

The Compact is 32-channel to 15 mix buses which boasts a Link feature that enables two desks to be connected for running 64 channels and 30 mix buses. Prices start at around 40,000 Euros for what is the cheapest product from Innova Son and it's also the first desk from the company that is totally self-contained and has all the boards and I-Os integrated in the desk frame. Novel features on this tidy little board include a flip-up screen and the ability to remove very quickly the PC block and slot in a new one.

The Essential is in essence a more affordable version of the Grand made up of one console surface and one mix box with options available for a stage box or channel-style processing on the outputs. The Grand is the same size of console with 48 channels and 24 mix buses, but with an integrated stage box and processing on the outputs. It also permits the user to control the crossfade between snapshots on a dedicated fader and the Grand is the basis for Innova Son's entry into truly large-desk territory with what it terms the Large Scale. Using the Grand's 48-channel worksurface some extra switches add two layers (called A and B) to the console working in conjunction with extra rack processing to realise 96-channel operation to 48 sub groups and mix outputs that can be mixed together to 24 new mix buses that creates a complete matrixing system on Layer C.

This does not represent a next generation of processing from the company so much as a combination of what is effectively two desks into one bigger one by doubling the processing involved.

A convenient feature of what Innova Son is calling 'premix architecture' is the ability to combine subgroup control and direct channels together on the Layer C worksurface for manageable hands-on control of enormous mixes.

The beauty of the Large Scale for OB applications, for example, is that it doubles the number of inputs in exactly the same original footprint, which if we are being honest about it, is not that big to begin with in comparison to alternative designs. All premixes created on the A layer, for example, are also available as direct outs adding to the flexibility and interconnectivity possibilities in large live production situations. You can also run it with two stage boxes each handling 64 inputs for 128 inputs plus 48 physical inputs at the mix position with the selection stored in a snapshot. Again full channel processing (EQ, dynamics and delay) are available on all outputs. Just how elaborate you choose to go on the input side dictates the price of the configuration, but Large Scale prices start at around 150,000 Euros.

Innova Son is ingenious in its approach to modularity and interchangeability which pays dividends for users who own more than one system. Because the same cards are used throughout the range it is quite possible to borrow cards and I-Os from one system to expand the capacity of another to handle a larger job while still permitting the stripped out system to perform in a reduced capacity on a less complex job. But then the company is at pains to point out that it believes that digital technology should be about allowing users to apply the correct module and processing capability in the appropriate configuration for the job in hand. This interchangeability also means that spare parts can be cannibalised should a fault ever occur.

All models in the range retain what I consider to be class leading user-interface for live production work. Compact, simple and wonderfully well prioritised. It's a smart move from a smart company that should see the user-base grow considerably. □

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NEW TECHNOLOGIES

Maycom reveals the HandHeld

Maycom has unveiled the solid-state HandHeld recorder that combines stereo recording with MPEG Layer 2 encoding with a high-tech design. The recorder comes standard with an internal microphone and records on removable Flash memory. An optional docking station operates as a battery charger, has stereo inputs and

outputs, and is equipped with USB for high-speed audio transfer between recorder and computer. Standard applications can be applied for viewer and browsing functionality and will allow a user-friendly interface between the recorder and the existing radio automation system. Maycom products are fully compatible with the major systems used in the broadcast industry such as David, Netia, Dalet, Co-Star and Capsat messenger. Maycom, Netherlands. Tel: +31 481 377740.

New Neumanns

Neumann introduced two new products at AES. The 150 Tube microphone uses a new, sphere-mounted, all titanium capsule with 'state-of-the-art' specifications and is an omnidirectional pressure microphone with a transformerless output designed for high end orchestral and acoustic recording. The True Precision P2 Digital Preamp is a high performance, 2-channel mic pre with 24-96 digital output, multichannel optical output routeing, MS decoding, stereo phase coorelation display and front panel discrete FET DI inputs at a realistic price. Neumann, Germany. Tel: +49 30 4177 240.

HHB MOs

HHB has announced the complete upgrade of its 2.6Gb and 5.2Gb Magneto-Optical discs to deliver sustained and increased data transfer rates. Central to the new specification of 100% certification is a rigorous testing procedure that ensures that the initial number of bad sectors on a disc is below a stringent maximum. Then these already minimised bad sectors are identified and noted in a Primary Defect List (PDL) during low-level formatting, such that the drive is not required to search the disc surface for bad sectors when writing data. The result is that high data-transfer rates are sustained when writing 'on the fly' delivering critical advantages in high-resolution digital-audio recording applications. As was the case with their predecessors, the new HHB MO2.6Gb and MO5.2Gb continue to carry a lifetime warranty. The new HHB MO media is supplied in stackable slip cases and can be identified by a 100% Certified stamp on the disc shutter and packaging. HHB, UK. Tel: +44 208 962 5000.

Pro Box enters Senior league

Audio & Design has launched the Pro Box 12 Senior, a new version of the Pro Box 12 AES reference generator. The new video sync and AES reference generator aims to solve sync transfer problems by acting as the definitive clock source. The product has an oven Crystal

REVIEW

Sonifex Courier

With its promised updates onboard, Sonifex' solid-state portable recorder is ready for the big time. **Neil Hillman** revisits the Courier

EARLY LAST MONTH, the veteran radio journalist Godfrey Talbot died. He was the first 'British Broadcasting Corporation observer accredited to Buckingham Palace' and earned the kudos of a remarkable first when, in 1969, her majesty Queen Elizabeth II gave a candid radio interview on her memories of London. He remains the only person to have ever recorded an interview with the Queen during her reign. At the time of the birth of Prince Charles, Talbot broadcast to a nation from the permanently wired site of the plinth at the foot of Victoria's Memorial; at the heir's investiture as Prince of Wales, he broadcast proceedings from a broom cupboard in Caernarfon Castle. Talbot was there when the Beatles received their MBEs.

Before this however, he was a war correspondent in the Middle East and Europe; with Monty's 'Desert Rat' eighth army as Rommel sought entry through the gates of Cairo. He and Belinda—his mobile recording truck—sent regular dispatches for the Overseas

Service News from places like El Alamein, Monte Cassino and the Piazza Venezia in Rome, from where he described the sight of the deposed Italian leader Mussolini hanging by his heels from a girder in a petrol station. We can safely conclude then that Godfrey Talbot knew a thing or two about location news reporting and recording. So what might this man have made of the current facilities on recorders available to today's news reporters?

The Sonifex Courier is one of a number of solid-state mono-stereo, mic or line input, recorder-editors available employing PCMCIA hard disks to store full-bandwidth digital audio. Back in 1997 at its launch, I wrote that the Courier's success would be governed by Sonifex' own ability to get a reliable product into the marketplace; and to meet its published targets of providing updated software versions, free to download from its website, which would greatly improve the specification of the machine from our test model offering v0.99 software. Version 1.0 software provided MPEG Layer 2 and uncompressed .WAV recording, instant upload to external editing workstations and top and tail editing. The stated intent from Sonifex was that v1.5 would give full graphical scrub wheel editing while v2.0 would bring audio file transfer via modem, ISDN or GSM mobile telephone, and dialling from memory. The last planned update was with v2.5, and was to enable live audio transfer by either ISDN or a standard telephone line. Impressively, Sonifex has been most industrious in the intervening time, with almost two dozen upgrades being made available to owners to download from the website, with catalogued bug-fixes detailed in the update notes.

What started as a device with much promise has now matured into a well-rounded and versatile machine. The latest v2.5 machine's feature a 32kHz sample rate for ISDN live connection supported by Telos Zephyr codecs. A 56kbps connection can be selected through the ISDN menu or by simply appending @56 to a telephone number. Among the myriad of new features progressively introduced have been support for 1Gb and 2Gb disks; new file types AIFF, DAVE2000, and ENCO-DAD; a record style option for Dual Level Mono where Left is the normal left input and Right is as the left input with -12dB's attenuation and multimark editing of files. Timer mode options allow play to show count-up or count-down, edit can show track position or total kept audio duration, and as promised, proper scrub-wheel functions are available when editing.

Still, the first impressions of the machine are of its incredible lightness—it is just 1.4kg fully laden—and its interesting styling; with an uncluttered front control panel. The weight saving has been gained by the use of ergonomic moulded plastic for the casing and by the adoption of 6V domestic-semipro 8mm camcorder batteries as its portable power source; but for its lack of the weight the device is robust. A mains unit that adapts to any pin configuration via four adaptors, allows power to be taken from any outlet in known Christendom accepting voltages between 100V and 240V and simultaneously charging the fitted battery if necessary.

Editing is still the stuff of basic cut-and-paste and the screen resolution is not perfect for scrubbing along the waveform, but the ability to cleanly top and tail soundbites easily exists and that is predominantly the most a journalist needs. Its flexibility in communicating that edited material through analogue phone lines, via ISDN links or taken as a file from its PCMCIA disk into a workstation merely reinforces its suitability as a radio journalist's faithful servant. With an entry price of around £1,500 (UK) it punches above its weight against the likes of Nagra's Ares-C, Mandozzi's DART, Maycom's Digicorder, Eela Audio's Reportable and of course, the new PMD680 from Marantz.

Godfrey Talbot had the ability to withstand long and arduous tours of duty. His longest assignment lasted six months on a Commonwealth Tour and included broadcasting from a canoe in Nigeria and commentating precariously from the back of an Indian elephant. He and a Sonifex Courier would have been a perfect combination. □

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Tel: +44 1933 650700. **Fax:** +44 1933 650726
Net: www.sonifex.co.uk

NEW TECHNOLOGIES

AES 11 Grade 1 and dual mains-power supply and will autodetect and derive synchronous digital reference clocks from video inputs of PAL-SECAM 25, NTSC 29.97 and 30 fps, LTC, AES or Word Clock reference sources. Four buffered AES-EBU outputs and five word clock outputs are available simultaneously on the near panel, together with a selectable word clock-superclock output for Pro Tools users. Front panel selection allows AES-EBU and Word clock outputs at 32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, and 192kHz rates with jitter performances of less than 0.2ns.
A&D, UK. Tel: +44 118 9844545.

TeleCast Seems busy

Norwegian manufacturer TeleCast has adapted the Seem Seeport portable mixer for use in satellite OB vans. Following filter modification, the unit can now be used near a satellite transmitter without RF interference, bringing the mixer in line with German Pflichenheft requirements. Seeport can be configured for a wide

range of applications and is available with 8, 12 or 16 input channels and with 2 or 4 outputs.
Telecast, Norway. Tel: +47 33 447200.

Codec introduction from Systembase

The C450xr is the latest addition to the Systembase range of professional Digital Audio Codecs for real-time broadcasting. Features include 22.7kHz stereo audio at 384kbps with fully automated ISDN backup and remote management. The enhanced features of the C450xr have been designed for digital audio broadcasting. Temporary and permanent contribution circuits can be

delivered to a DAB Multiplex, avoiding the requirements for complex encoder synchronisation schemes. The C450xr provides near transparent audio performance, enabling a DAB MPEG multiplex to encode the digital audio without the effects of cascade coding.
Systembase, UK. Tel: +44 1256 882797.

Sonic Foundry debuts Vegas Video

Sonic Foundry has released Vegas Video, a nonlinear video and audio editing system designed for video editors working with Digital Video and video destined for Internet, Intranet, and multimedia applications. Vegas Video offers unlimited tracks of video and audio, with each track featuring its own A-B tracks, advanced compositing tools, automatic crossfading, keyframeable filters, transitions, and other effects. Multiple media

Who Needs Another Mic Preamp?

"...the finest sounding preamp I've ever used...as close to being the perfect preamplifier as possible. It is made well and it sounds unbelievable."

Russ Long, Nashville based producer/engineer, Pro Audio Review, June 2000

"The 1100 is the sweetest, cleanest, warmest, most flattering preamplifier I've ever used."

Jon Barry, Radio Personality, WMXB (FM), Richmond, VA

"The Aphex Model 1100 is a good example of something different... A work of art...The results were astonishing, providing an awesome sound that was natural, dynamic and absolutely free of noise."

George Petersen, Editor - Mix Magazine, April 2000

Model 1100
Discrete Class A
2 Channel Tube Mic Preamp
with 24-Bit 96kHz A to D
from Aphex Thermionics

Yes, the Aphex Model 1100 Thermicnic Preamp is different - it's a completely new design filled with Aphex proprietary circuitry. These inventions, combined with the absolute highest quality components, provide accuracy, clarity, detail, and depth that have never been available with any preamp, at any price.

The Reflected Plate Amplifier™ tube circuit imparts all the wonderful characteristics of a conventional tube circuit without any of the sonic drawbacks. The MicLim™ provides up to 20dB of limiting on the microphone output- before the preamp gain- allowing hot levels without fear of overloading. And the Drift Stabilized™ 24bit / 96kHz A to D converters make the transfer into the digital domain at the highest possible resolution. Specs? How about –135dBu EIN! This means that the Model 1100 adds less than 1dB of noise to the output of a microphone!

There are many mic preamps on the market, but if you're looking for something different, with awe-inspiring performance and unique features, you need another mic preamp–you need the Aphex Model 1100.

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Lexicon MPX500

An icon of exclusivity and the well-healed, Lexicon has married its top activity with drives to the entry level. **Zenon Schoepe** muses over the attraction of the colour blue

IN THE SAME WAY that you can't pose as a mic-meister unless you have at least one (non) working valve model in your cupboard you're no effects connoisseur without a Lexicon in your rack. The way into Lex ownership has been getting easier, possibly too easy for those who desire a PCM, but there's a strong argument for investigating lower cost quality boxes to serve as 'bulk' rather than 'star' processors.

In terms of price, the MPX500 falls just about midway between the entry level MPX100 and the more sophisticated MPX1. As such I am pleased to see a consistency and logic to the way that this range has been developed, but that's been the case with the way the company has structured its business further up its food chain. Products that slot in to a series are always more convincing than those that undercut and outperform a more expensive model that was only released nine months ago. It builds confidence because the manufacturers looks like they know what they're doing and it imparts perceived value.

You get real connectors screwed in properly to the back panel of the MPX500 with TRS jack and XLR balanced I-Os plus phono SPDIF I-O. There's a footswitch for tap tempo entry and bypass and MIDI in and out-thru which are pressed into mapping front panel controls to MIDI.

The feel is great, positively geared dials, an unmistakable click to the switches, a perfectly adequate bright display and you've got that particular shade of blue to screw into the rack that you hope tells others a little bit about you and may even be mistaken for something altogether more expensive by the uneducated eye. There's a typical Lexicon-style front panel layout with four continuous dials acting as soft controls on associated on-screen parameter values. A larger dial selects presets and can be pushed to make or pushed and turned to change banks while buttons access the edit pages and system functions, such as digital I-O settings, output levels, and global dry-wet mix. A BYPASS switch bypasses or mutes according to how you set it and a LOAD button loads a selected preset and its LED flashes to tell you if another is cued up. STORE activates the storage routine while TAP can set tempo-ed repeats on programs that understand them or, when held down, can work tempo out for itself from input level dynamics or allow a value to entered manually. All switches incorporate LEDs to signify activity while a single pot trims input level displayed on bar graphs on the LCD. That's all you need to know, you can work one yourself now.

The 24-bit MPX500 uses the manufacturer's Lexichip and is a dual channel device for two independent effects in parallel, cascade, split mono and dual mono precisely how being dictated by the configuration of a given program.

Editing procedures say more about a unit's accessibility than any other aspect of its operation and in this respect the MPX500 is smart. Programs have up to 16 parameters which amounts to four pushes of the EDIT button to access the consecutive pages of four parameters. Sixteen parameters is just about the limit that my own personal RAM can handle and keep track of when tweaking on this sort of paged process. Thankfully not all programs have the full quota of parameters, but most of the really good ones do. To the designer's credit I found the parameter grouping largely related. The left-most edit knob is additionally endowed with a type of 'fast' tweak function that is preset to control a collection of parameters (not all ones that you would otherwise be able to access) simultaneously for instant 'more or less' results.

There are 240 programs drawing from plate, gate, hall, chamber, ambience and room reverbs, delays, a selection of modulation effects, pitch shifting and modulation and a host of dual combination packages. Out of the box they're good—a few late night jazz Woodbine ones to make up the numbers—and they're only a starting point because editing is very approachable and there's a solid predictability to experimentation. High point has to be the reverbs, the small rooms and ambiences are superb. You can put these across drums and nobody would raise an eyebrow. I bought the hall and the plate as well and the box can also be made to do that special Lexicon eighties thing of a top-end-reverb sheen devoid of any muddling mid or low end information that just sits on a mix. The combination effects are harder to evaluate as they're down to personal preference.

This little Lex is not without competition in its price range, but its an measure of technology that this area of the market can now count character as part of the package. Taking performance pretty much for granted we are left with the tease of deciding on the character that most pleases. The MPX500 has stacks of class and character, it has the name on the front, and its lineage is discernible and blatant at times. A remarkable achievement and cheap enough to buy by the brace. Exceptional value for money. □

Contact:

Lexicon US. Tel: +1 781 280 0300
Pure Distribution, UK. Tel: +44 207 624 6000

NEW TECHNOLOGIES

formats can be added on the same track at the same time without conversion or rendering. To complete the multimedia solution, Vegas Video also hosts the full line of audio processing capabilities from Sonic Foundry's Vegas Pro audio editing software. In addition, Vegas Video delivers correct aspect ratios that depend on the pixel shape for each medium including D1, D2, and DVCam, de-interlacing, and the ability to render out to broadcast video resolutions. DV capture and print-to-tape tools are included and work directly with the Windows OS and supported 1394/OHCI cards. Vegas Video allows direct save applications to RealSystem 7, Windows Media, QuickTime, MP3, and other formats. Sonic Foundry, US. Tel: +1 608 2563133.

RTW provides conversion

A range of new convertor systems for broadcast, recording and mastering have been shown by RTW. The line up of the 1200-3U series includes different combinations of A–Ds, D–As and SRCs. All modules support 24-bit and 44.1kHz, 48kHz as well as 96kHz. The configuration can be changed and RTW's gas plasma peak meter or audio vectroscope can be included. Connectors are XLR, D-Sub or VG 64-pin. Aside from the convertors RTW also offers digital source selectors and monitor selectors for up to

24 AES-EBU channels, the 1250-3U. A new line of 'console-tailored' audio vectorscopes has also been shown. The first model, the 10810, which is based on the SurroundMonitor 10800, has been designed to fit perfectly into Studer's D950 consoles as far as dimensions and colour matching are concerned. It is equipped with two TFT-colour displays—the screen on the right is used for 8-channel multistandard peak meters while the other screen can be switched between a 5.1, a 3.1 or a 2.0 (stereo) audio vectorscope or a 32-band RTA or a AES-EBU status monitor.
RTW. Germany. Tel: +49 221 709 1333.

V1.4 for Alpha 100

Calrec and Nine Tiles Networks are developing a wide area audio networking and distribution system for the Alpha 100 digital desk. The system uses Nine Tiles' Audiolink AES3-ATM encoding system that enables AES3 audio to be distributed via ATM switches and networks. The first application will be the development of remote mic preamps for the Alpha 100. Calrec Audio has updated software for its all-digital Alpha 100. Version 1.4 software builds on enhanced software unveiled earlier this year and the focus is on production and on-air applications in providing 48 multitrack-matrix outputs, 20 auxiliary buses, eight audio groups and four main outputs. The Alpha combines user-friendly ergonomic controls with a high degree of reliability for on-air use. All desk functions are memorised to snapshots and full system reset is achieved in less than 60ms without audio interruption.
Calrec. UK. Tel: +44 1422 842159.

GT AM11 & AM40

The Groove Tubes line in microphones lends Alesis a high profile presence in the professional recording studio. **Jon Thornton** fires them up

GT MICROPHONES IS ONE of the latest examples of the Alesis Corporation's apparent desire to secure a foothold in virtually every facet of pro-audio manufacturing, with product ranges in digital multitracks, mixers, amplifiers, monitors and now microphones. The history of GT, though, is a little more complex, stemming as it does from the well-known and hugely respected Groove Tubes brand. In 1998, Aspen Pittman partnered Alesis to form GT Electronics, in the hope that these same principles could be applied to equipment manufactured in higher volumes with the attendant cost savings. Two are put to the test below.

Despite its pedigree, the AM11 is not, in fact, a valve microphone. Instead, its electronics are based around class-A FET topology, with the aim of giving it as close an electronic signature to a valve design as possible with the attendant benefits of solid-state electronics in terms of ruggedness and power requirements. In other respects, the AM11 is a simple, uncluttered design. Featuring a fixed cardioid pattern, the microphone is side addressed, in keeping with its intended application as a studio vocal or instrument microphone. Emulating classic European microphone designs doesn't appear to end at a cosmetic level—a 1-inch diameter, 6-micron gold evaporated mylar diaphragm and solid build quality both point at this microphone's design inspirations.

In use, the AM11 is straightforward. A switchable high-pass filter (-12dB/octave below 75Hz) and -10dB pad are provided—and GT claims that its 'active pad' design helps to reduce preamplifier gain without raising either the noise floor or distortion levels. Set up for a session featuring a male pop vocalist from Portugal, the AM11 demonstrated an immediate warmth in the low mid range so reminiscent of classic FET microphones. Frequency response is quoted as 20Hz–18kHz (±1.5dB), with the 6-micron diaphragm and lack of GT's high frequency extension disc technology rounding off the top end of the response in pursuit of that 'classic' sound. In reality, the top end still had a presence to it that never sounded strained, just ever so slightly closed in—and never in an unpleasant or unmusical way.

Get too close to this microphone and proximity effect can see some voices transformed from warmth into gravel and finally into mush. Although not tried on female vocals (the Portuguese vocalist was much too enamoured with it to let me move it to another room), the AM11 appears suited to some voices better than others. Despite this, it has obvious applications for all manner of instrument miking, and comes complete with a nice protective hard case. If you want a versatile, characterful addition to your microphone collection, the AM11 is well worth an audition.

GT Electronics' AM40 tube microphone is fairly unique. A slender, end-fire condenser, (it measures just over 3cm in diameter) its design makes it eminently suitable for close miking and getting to those hard to reach places in the band's setup, yet contained within that body is a true tube electronics package more usually associated with larger, side addressed designs.

The microphone tested here was fitted with an AMC1 cardioid capsule. Removing the mesh windshield by unscrewing it allows the capsules to be changed, with omnidirectional and supercardioid capsules also available. Power for the AM40 comes from the PSM power supply unit, which connects to the microphone via a locking 6-pin XLR connector. A 25-foot cable is supplied with the AM40, although if necessary multiple cables can be daisy-chained together, with GT claiming that the power supply will regulate itself in these circumstances to avoid undercurrent problems. The valve used in the AM40 also uses a 6V plate voltage, rather than the more usual 12V, which runs cooler thus generating less thermal self-noise. A standard 3-pin XLR provides an audio output from the power supply unit.

The AM40 makes use of a ¾-inch diameter, 3-micron gold evaporated mylar diaphragm with a quoted frequency response of 50Hz –20kHz (±1.5dB) for the cardioid capsule. Set it up in front of an acoustic guitar, and in reality the bass extension seems better than that quoted—GT doesn't quote a measurement distance in its technical documentation though, so perhaps proximity effect helps out, but without ever sounding 'lumpy'. While never pretending to be a tube fanatic, I can hear the GT5840M subminiature valve doing its stuff here, with an almost imperceptible grain to the sound in the high mid-range and a high frequency response that isn't completely transparent sounding, but doesn't sound boxed in either. On vocals, although not as full sounding as a larger diaphragm condenser, the AM40 still works well with full voices, lending them an up-front, intimate quality.

A switchable -15dB pad and high-pass filter (12dB/octave below 75Hz) complete the AM40's specification, and come in useful for its next stint close in on a snare drum. Again, low-frequency extension is almost too good at this distance, and needs checking back with the HPF, and the AM40 picks out transients well, but definitely adding something new and not unpleasant to the sound. THD is quoted as being 0.13% @ 1kHz, so there's the scientific explanation...

The AM40 has succeeded in what I think were its aims—to widen the adoption of tube technology both through affordability, and through its design encouraging use in a broader range of applications. Putting a valve mic on a snare drum wouldn't have been my first instinct last week, but somehow it seemed the right thing to do with the AM40—with great results. That's as good a definition of success as any. □

Contact:

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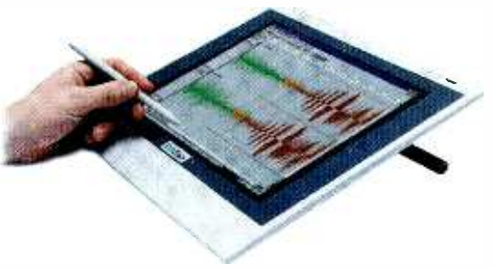
Sound Technology, UK
Tel: +44 1462 480000 **Fax:** +44 1462 480800

NEW TECHNOLOGIES

RADiA, Edit Slate and MLP for SADiE

SADiE's release of its RADiA DAW coincides with the arrival of the Edit Slate work surface display that the manufacturer says will give its users with an easier method of editing and the ability to produce smoother fades. Edit Slate combines a high-quality LCD display and a touch-sensitive graphics surface, allowing the user to



work directly on the LCD screen with a pen controller. SADiE has also announced an agreement with Meridian Audio Limited that enables it to sell the Meridian MLP professional encoder and integrate it into its workstation products enabling SADiE users to create audio content for DVD-Audio.
SADiE, UK. Tel: +44 1353 648888.

DK-Audio adds spectrum analyser

A third-octave spectrum analyser has become a standard feature of the MSD600M/SA Master Stereo Display from DK-Audio alongside the FFT-analyser. Whereas the FFT-analyser is widely used as an accurate measuring tool, the new third-octave analyser shows the energy distribution of the signal. The analyser has 30 bars and a range from 20Hz to 16000Hz. Presentation is in colour on the TFT LCD, and may even be shown on an external VGA monitor. Maximum level of the signal is continuously indicated in a contrast colour 'behind' the actual presentation.
DK-Audio, Denmark. Tel: +45 4485 0255.

SSL updates

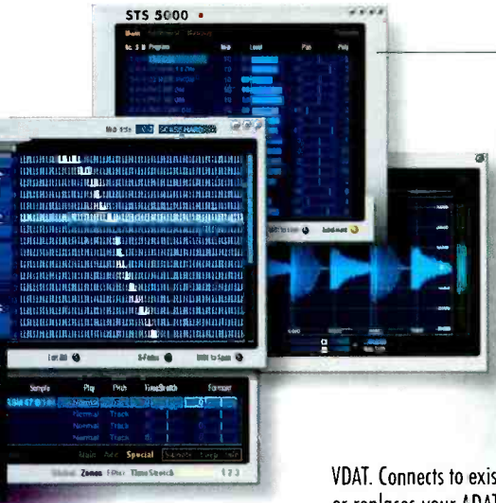
SSL has announced AudioBridge as a development of its HiWay and Freeway multichannel networking technology that extends the system capability to include digital audio via CAT3/CAT5 and wide area networks. It provides eight digital audio I-Os in a 1U. V4 software for SSL's Avant postproduction and film console adds new grouping options that enable controls such as

panning and EQ to be linked. The addition of PenPoint panning also gives operators the option of screen-based surround panning using simple pen and tablet operation in addition to operation from channel pan controls and physical joysticks. The Virtual Paddles feature available with V4 provides additional monitoring and recorder control from a smaller number of physical paddle

+++ NEW+++THE SCOPE STUDIO PRODUCT+++SCOPE /SP (Studio Package)+++

SCOPE /SP Highlight #1

SP-Mix. The first virtual digital mixer which can compete functionally as well as optically with the big professional consoles.



SCOPE /SP Highlight #2

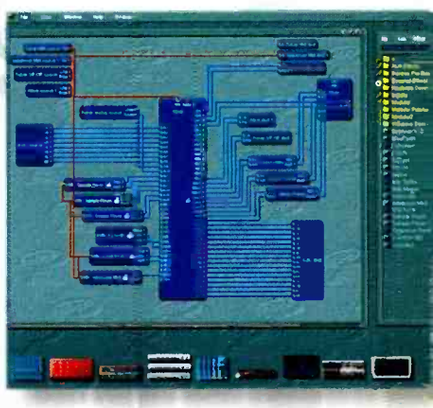
STS-5000. The most powerful software sampler ever. Realtime time stretching and pitch shifting with formant correction. 25 different filter types. Also handles 32-bit / 96 kHz samples. Up to 64 stereo voices. Compatible to the major sample libraries.

SCOPE /SP Highlight #3

VDAT. Connects to existing Alesis ADATs (and BRC if available) via the 9 pin interface. Supplements or replaces your ADAT setup without annoying winding times, unnecessary tape wear or creative error messages. Up to 128 tracks. Combine virtual and "real" units. Remote-control VDAT via your "real" BRC. Work on tape only when you need a compatible tape copy. Pretty slick, huh?

SCOPE /SP Highlight #4

The SCOPE board, with its fifteen DSPs, is your personal time machine. SCOPE /SP puts you years ahead of native systems. Both hardware and software can be expanded still further at any time – in modular fashion, with great flexibility. Only the power of a SCOPE system makes virtual software technology tangible.



One year after unveiling the SCOPE development system, CreamWare now presents the eagerly anticipated studio product SCOPE /SP. Now you don't have to be a developer to take advantage of all the amenities which SCOPE technology offers.

SCOPE /SP truly is a milestone in studio technology. The system offers all of the advantages of the software world, bolstered by the indispensable power and performance of dedicated hardware. Finally, you can seamlessly merge the possibilities of the latest software technology with your existing studio environment. SCOPE /SP will change the way you think about software.

Thanks to advanced DSP technology, SCOPE /SP is entirely latency-free. Via virtual cables you can make any desired routing - even connect software instruments to any other audio signal within your studio. The SCOPE /SP tone generators not only offer superb sonic quality, you can also play and use them "live" like any other instrument in your studio.

SCOPE /SP can be integrated perfectly into any imaginable studio configuration. You won't need any special drivers or a budget for the training of system administrators. The term "compatibility problem" will soon be a foreign word to you. Simply connect the SCOPE /SP hardware I/Os (and thus the system's software devices) via normal audio cables - just like you do with all of your other gear.

All of this makes SCOPE /SP not merely a uniquely powerful upgrade to any ProTools™ configuration. Thanks to its powerful features, SCOPE /SP is the key to the digital future for any audio studio.

STUDIO PACKAGE

+++ NEW+++THE SCOPE STUDIO PRODUCT+++SCOPE /SP (Studio Package)+++

For more information please contact www.creamware.com | info@creamware.com or your CreamWare dealer.

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Røde NT3

As relative newcomers to microphone manufacture, Rode has built an impressive reputation in record time. **Jon Thornton** expects the NT3 to add to it

THE AUSTRALIAN COMPANY Røde has built up a strong reputation over the last few years as a manufacturer of extremely competitively priced studio condenser microphones, whose sonic qualities have engendered a strong following from recording engineers of all backgrounds. The NT3 is the company's latest offering, building on the success of the NT1 and NT2 models.

Out of the box, the NT3 bears a striking resemblance to an AKG C1000, with its thick body, power switch and space in the body for a 9V battery to drive the electronics should phantom power not be available. A small red LED above the power switch indicates the state of health of the chosen supply—a quick flash on switch-on indicating all is well, a longer period of illumination suggesting that the battery should be replaced or phantom supply checked.

Initial impressions of build quality are that it is very good—despite the fact that the tiny badge above the power switch fell of as soon as I unpacked the microphone. Construction is heavy-duty cast nickel throughout, and the mesh head—usually the Achilles heel of these designs, seems very sturdily welded indeed.

Perhaps because of its similarity to other microphones, I have to confess that I set the NT3 up in front of an acoustic guitar convinced that I knew roughly what to expect—and was completely taken by surprise. Great bass extension, a smooth response and a level of high frequency detail that had me double checking that I had the correct fader open. A quick glance at the technical documentation started to explain why. The NT3 is a true, externally biased condenser microphone, with a ¾-inch diaphragm and J-FET electronics package—putting it in a completely different league from the many small diaphragm, back electret condensers at the budget end of the market.

Polar response is hypercardioid, and quoted frequency response is 20Hz–20kHz (±4dB). Closer inspection puts that figure better in context at 35Hz–20kHz (±2dB), and, although by no means flat, (the published figures show a wide dip around 7kHz, and peaks at 4kHz and 15kHz), in use the NT3 sounds very flattering on a range of sources. Used on male vocals, it delivers quite a warm sound, with a very gentle bass tip when used close in. The peak at the upper end of the microphone's response does tend to exaggerate sibilance slightly, but nothing that a slight shift off axis won't cure. On brass, too, the NT3 fares well, although the lack of a built-in pad does make positioning less flexible with high SPL sources.

The NT3 is generally very quiet in terms of self noise when powered from a 48V phantom supply. Unfortunately, I was unable to test it when running from a 9V internal battery, although the suspicion is that it wouldn't turn in as good a performance in this respect when self-powered.

I was quite taken by this new Røde, and it's served to remind me never to take things—especially microphones—at face value. A switchable pad and high-pass filter would be particularly welcome enhancements, but as an affordable studio condenser with a sensible balance between accuracy and character, it would be a great addition to any microphone cabinet. □

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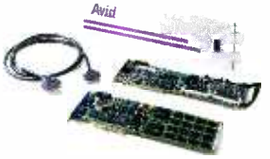
NEW TECHNOLOGIES

switches. Aysis Air Mobile is a compact-format console for OB vehicles and space-restricted studios. Using the standard Aysis Air software, the console's channel layering function enables a fully specified 96-channel console to be fitted in a 48-fader frame less than 2330mm wide.
SSL, UK. Tel: +44 1865 842300.

Pro Tools 5.1 debuts

Digidesign has debuted Pro Tools v5.1. Major additions include integrated multichannel editing, mixing and processing, with support for all popular surround formats. These new surround features may be accessed via existing supported control surfaces, or by Digidesign's EditPack option for ProControl users. EditPack features two touch-sensitive motorised joystick panners, a QWERTY keyboard and trackball, dedicated edit buttons and encoders, and high-resolution multichannel metering. Editing and mixing enhancements will increase ease of use and functionality, including support for multichannel and stereo tracks, and multiple levels of undo. Avid interoperability steps forward with the addition of basic video editing with AVoption and AVoptionIXL, Avid Unity support, native support for BWAV files and support for off-line media. Digidesign's Machine Control option has been enhanced with improved ballistics and support for 9-pin remote slave mode for control of Pro Tools transport and track arming via external devices.



A familiar feature for AudioVision owners, the new Universe Window within Pro Tools TDM provides quick and easy visual overview to a session. Digidesign has added Reverb One to the TDM Plug-In family and the company will be making a fully-functional version of Pro Tools v.5.0 software available for free download. The version will feature 8 audio tracks, 48 MIDI tracks, and two channels of I-O via standard Sound Manager /WAVE drivers on any third-party hardware.
Digidesign, Europe. Tel: +44 1753 658496.

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Fostex NF-1A

Studio Sound's 'bench test' loudspeaker reviews continue with the NF-1A. **Keith Holland** reports

The Fostex NF-1A is a 2-way, active loudspeaker featuring a 160mm woofer with an unusual cone and surround, a 20mm soft-dome tweeter and built-in amplifier and crossover electronics. Fostex describes the cone of the woofer as a 'hyperbolic paraboloid diaphragm', and the surround as a 'up-down roll'. Visually, the cone has 5 sets of 'peaks' and 'valleys' arranged circumferentially with the outside edge remaining circular, and the surround has alternate sections of concave and convex rolls; the combination giving the loudspeaker a unique and distinctive look. The tweeter is mounted above and slightly behind the woofer (to aid time-alignment) along with a large reflex port on either side of the front panel. The cabinet has overall dimensions of 240mm wide by 338mm high by 330mm deep and appears to be very solidly constructed. The rear panel of the cabinet has a heat sink with vertical fins and features a sensitivity control, a tweeter level control (-3dB to +3dB), a high-mid attenuation switch (on-off, centred on 3kHz), a high-frequency switch (-3dB, 0dB, +3dB, above 10kHz) and a low-frequency switch (-3dB, 0dB, +3dB, below 60Hz), along with the usual IEC-type mains power socket and both balanced and unbalanced signal input sockets. The review was conducted with all controls in the 'flat' position. No amplifier power ratings, maximum output levels or crossover data were supplied with the review loudspeakers.

The on-axis frequency response and harmonic distortion for the NF-1A are shown in Fig.1. The response lies within ±4dB from 70Hz to 20kHz with the exception of a deep, narrow dip in response at 750Hz. The high-frequency response is also somewhat ragged. The low-frequency roll-off is very steep being approximately 8th-order with -10dB at about 48Hz. Harmonic distortion levels are low, however, peaking to -40dB (1%) of 2nd harmonic at 60Hz. The horizontal off-axis response (Fig.5) is well controlled with no evidence of mid-range narrowing and no side-lobes below 15kHz. Fig.6 shows that the vertical off-axis response is less well controlled with a lobe at 3kHz pointing 15° upwards, as well as the driver interference notch at 3.5kHz which is characteristic of most non-concentric loudspeakers. The dip in response at 750Hz is evident at all angles off-axis which suggests a driver-electronics problem rather than it being due to interference or diffraction effects. The time-domain performance of the NF-1A is shown in Figs 3 to 7. The step response in Fig.3 demonstrates very accurate time-alignment, but a mid-range ringing is clearly present for about 10ms after the transient. This ringing is also evident in the waterfall plot (Fig.7) at 500Hz and 750Hz. Fig.2 shows the acoustic source position for the NF-1A. The low-frequency components of transient signals are delayed by about 12ms compared to the mid- and high-frequencies which represents an apparent shift to around 4m behind the loudspeaker; this is a consequence of the rapid, 8th-order low-frequency cut-off. The waterfall plot shows that the low frequencies delay very smoothly however, with little evidence of 'delayed' resonances. Also evident in the source position plot is a wiggle in the phase response which corresponds with the dip in response noted earlier at 750Hz. The power cepstrum (Fig4) shows some evidence of an echo after about 120µs, followed by smaller echoes at 340µs and 530µs. Overall, the performance of the Fostex NF-1A is a mix of good and bad points. The low harmonic distortion, controlled horizontal directivity and accurate time-alignment are let down by a ragged frequency response which, even if the narrow dip in response at 750Hz is ignored, fails to lie within ±3dB limits. □

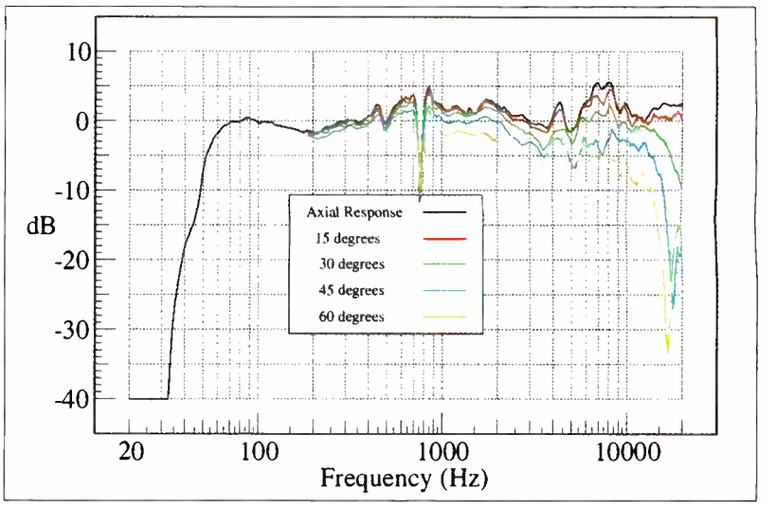

Fig.5: Horizontal Directivity

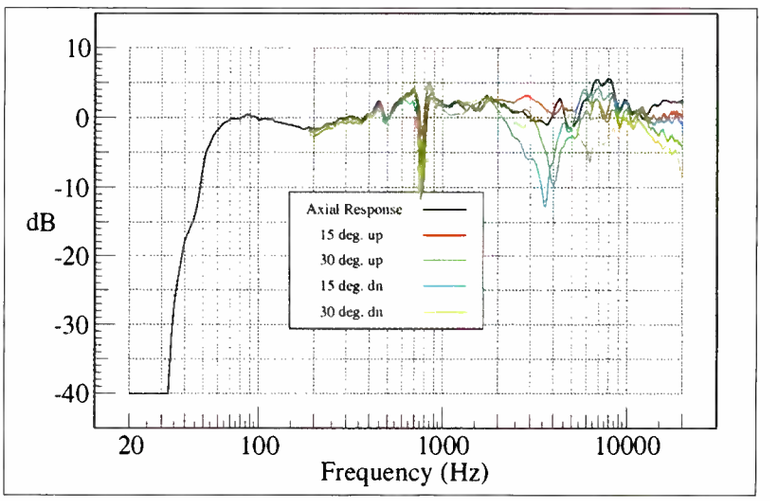

Fig.6: Vertical Directivity

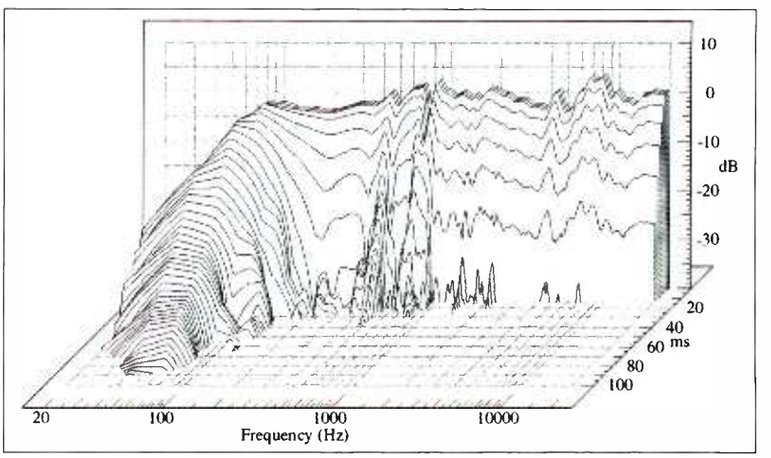

Fig.7: Waterfall

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Methodology

Studio Sound, April 1998, page 14
Net: www.prostudio.com/studiosound/apr98/r-tannoy.html

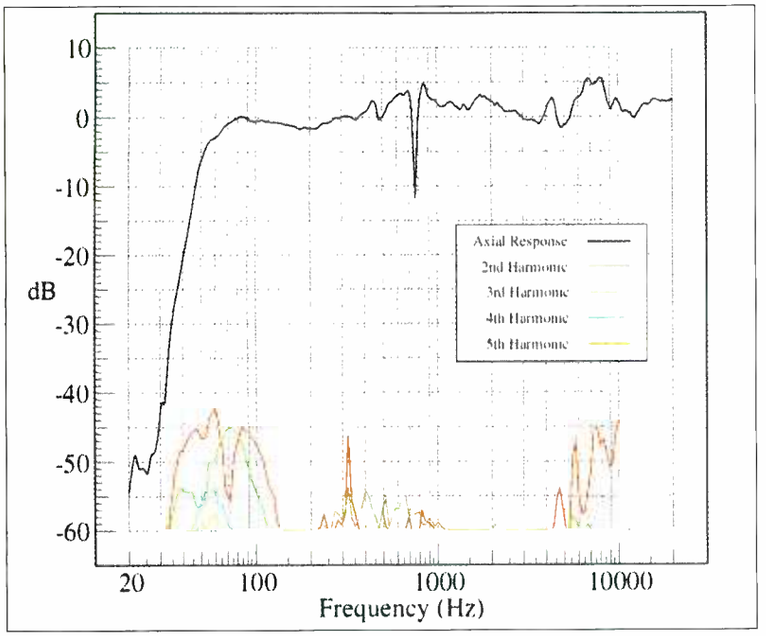

Fig 1: On-axis Frequency Response and Distortion

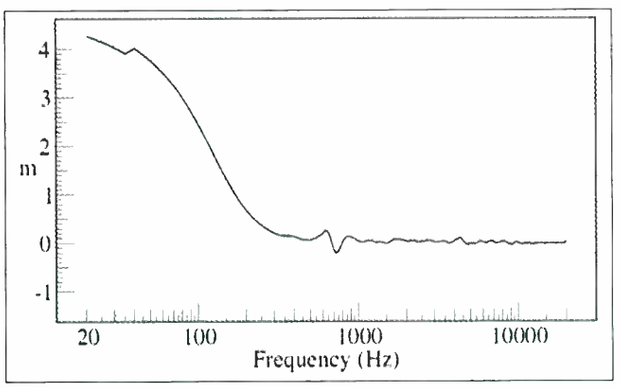

Fig.2: Acoustic Source

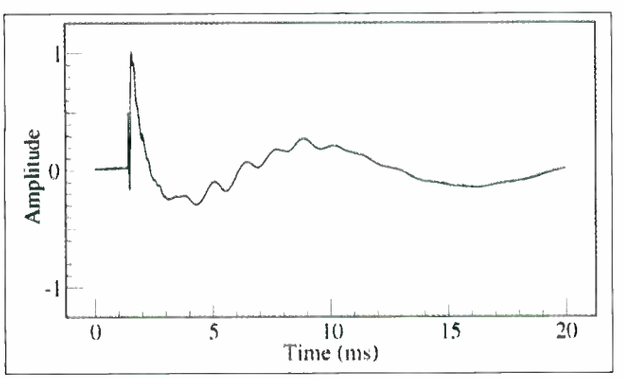

Fig.3: Step Response

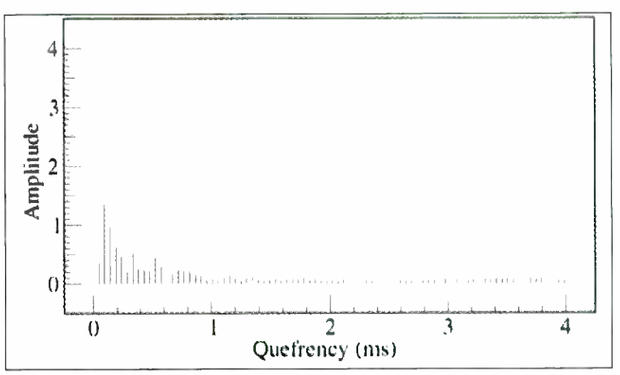

Fig.4: Power Cepstrum

Chord Electronics SPA-2232

Studio Sound's 'bench test' amplifier reviews continue with the SPA-2232. **Paul Miller** reports

DESIGNED AND BUILT in unusual surroundings—a restored Pump House in Kent—Chord's amplifiers have made an impact in both domestic and professional markets. This has largely been achieved by making a virtue of the necessity for low temperature, high efficiency operation and adopting a case style that's very functional and visually distinctive. I'm quite sure that if the same amplifier were dropped into a utilitarian, black rackmount box, then the brand would not have achieved the recognition it enjoys today. And as equipment suppliers to Abbey Road, the Royal Opera House and Solid State Logic, to name but three, Chord clearly understands the importance of strategic marketing.

Chord also appreciates the need for high power, low-consumption amplifiers like the SPA-2232 featured here, which, though hardly cheap at £2,326 (ex-VAT), is both remarkably capable and surprisingly lightweight at just 18kg. Balanced (XLR) inputs are provided with two pairs of 4mm binding posts, per channel, for the speaker outlets while two small potentiometers are embedded into the front panel, permitting some adjustment of overall gain. Set at maximum this equals +27.7dB or x24.3.

There are two key features to the efficiency of the SPA-2232 and, indeed, its partners in the range. Principal of these is a high frequency, switch-mode power supply, now revised to include *three* mains transformers. Two of these feed the dual-mono amplifier channels while the third, common-mode transformer, counterbalances any asymmetry between the positive and negative rails caused by transient demands in power. Eight pairs of lateral-structure MOSFET power transistors spread the load across each channel while a sliding bias topology attempts, largely successfully, to minimise low-level crossover distortion without compromising high-level efficiency.

And there's no doubt the SPA-2232 can sustain very high levels indeed, even if its 435W (8Ω) and 585W (4Ω) dual-channel power output figures are a little below Chord's 450W/700W specification. I suspect the latter are derived from a single-channel running by the seat of its pants. These figures also refer to midband performance because, as Fig.1 indicates, there's a progressive limit to the power sustainable at higher frequencies. At 20kHz, the output is limited to ~320W not only by increasing distortion, but also by the intervention of Chord's protection circuitry.

Nevertheless, Chord's 500W, 750W and 900W figures for burst power into 8Ω, 4Ω and 2Ω loads are actually very conservative, for the SPA-2232 will sustain 602W, 1195W, 2178W (33.0A) and a massive 2295W (47.9A) into 8Ω, 4Ω, 2Ω and 1Ω loads respectively over a 10ms/490ms cycle. Translated into a dynamic *voltage* output, Fig.2 demonstrates the tremendous load-tolerance of the SPA-2232 when driving 8-2Ω. Clipping is also well defined into all loads with no progressive VI-limiting to cause shifts in distortion with output. However, small modulations in distortion are evident by the 'rough' appearance of the black (8Ω), red (4Ω), blue (2Ω) and green (1Ω) traces across the amplifier's 69V dynamic range.

Distortion is low at typically 0.01% through the midband, but, as Fig.3 reveals, there's an increase to 0.028% and 0.0425% at very low and high frequencies, respectively. Importantly, however, Fig.4 shows this trend is very consistent with power output, varying between 0.008-

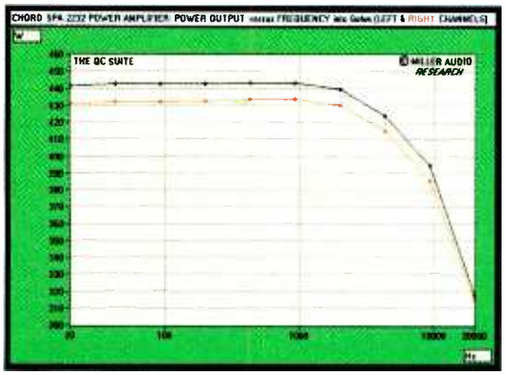

Fig.1

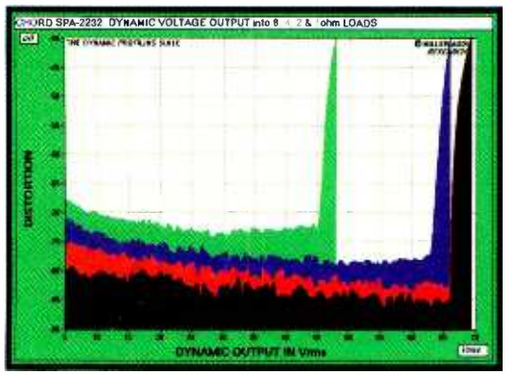

Fig.2

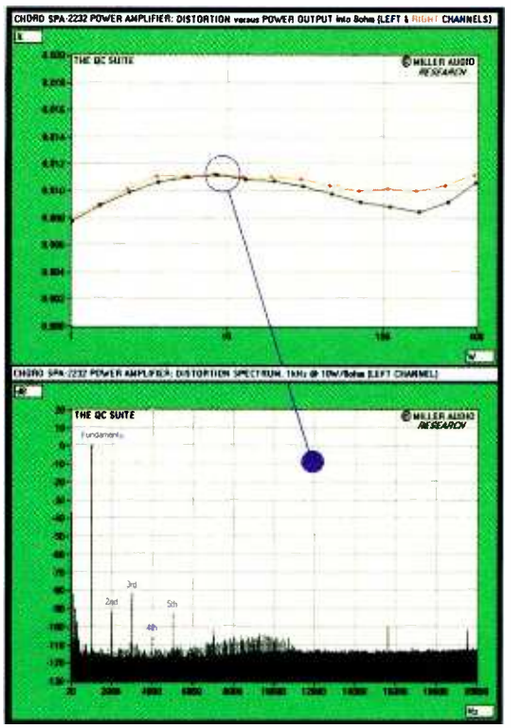

Fig.4

Fig.3

Fig.5

0.011% from 1-400W into 8Ω at 1kHz—an indication that the sliding bias topology is working optimally. Of course, there's more to distortion than the 2nd-5th harmonics illustrated on the lower plot of Fig.4. Equally obvious are the high frequency switching artefacts derived from the ~70kHz power supply, either through direct or indirect RF interference or, as is more likely judging by the 50/100Hz line spacing, an indication of PSU modulation.

A linear power supply may have encouraged a 'cleaner' noise floor, but with a substantial penalty in both weight and heat. Indeed, though the SPA-2232 is cooled by two low-noise DC fans and a thermal management system, even if these were to fail there is sufficient convection cooling to keep things ticking-over. In fact, Chord is sufficiently confident of the amplifier's thermal stability that it even produces a version *without* fans to order.

Fortunately, any switching spikes are sufficiently low in level not to compromise the respectable 82dB A-wtd S/N ratio (re. 0dBW), even though the -63dBV residual noise is a little higher than that obtained with the Stellavox and Yamaha amplifiers recently. Chord's inductive output network does lift its source impedance at higher frequencies above the 0.02Ω specification (Fig.5). But this is no disaster and, as the (black) response trace indicates, has no impact on the overall system response when driving essentially nonreactive loads.

Subjectively too, the SPA-2232 sounds positive and relatively neutral, though there is some suggestion of hardness through the upper midrange and treble that's independent of level. Of course, during high-level monitoring, the SPA-2232's sense of grip and assertion is of genuine benefit and a marked contrast with the rosier perspective of the Manley amplifiers featured two months ago. Like Manley, Chord has its niche, albeit a very different one where high power, excellent load tolerance, low working temperature and a quick and lucid sound are valuable assets. □

Contact

Chord Electronics
Net: www.chordelectronics.com

Methodology

Studio Sound, June 1999, page 27
Net: www.prostudio.com/studiosound/index.html

Power Amplifier: Chord SPA-2232

(Rated Specification, in brackets where given):

	20Hz	1kHz	20kHz
Max Continuous Power Output,			
0.5% THD into 8Ω(one channel)	420W	435W (450W)	315W
1% THD into 4Ω (one channel)	-	585W (700W)	-
Frequency Response @ 0dBW	0.0dB	0.0dB	-0.15dB
Dynamic Headroom (IHF)	+1.5dB (600W)		
Maximum Current (10msec, 1% THD)		47.9A	
Output Impedance	0.025Ω (0.02Ω)		
Damping Factor	320		
Unbalanced Input			
Total Harmonic Distortion			
(0dBW, 1kHz)	-82dB (<-75dB)		
(2/3 power, 1kHz)	-80dB (<-75dB)		
Noise (A wtd, re. 0dBW)	-81.8dB		
(re. 2/3 power)	-104.5dB (<-103dB)		
Residual noise (unwtd)	-63.1dBV		
Input Sensitivity (for 0dBW)	117mV		
(for full output)	2390mV		
Input loading	100kΩ (100kΩ)		
DC offset	+0.9mV / +0.6mV		
Serial Number	None		
Retail Price	£2,326 (Ex-VAT)		

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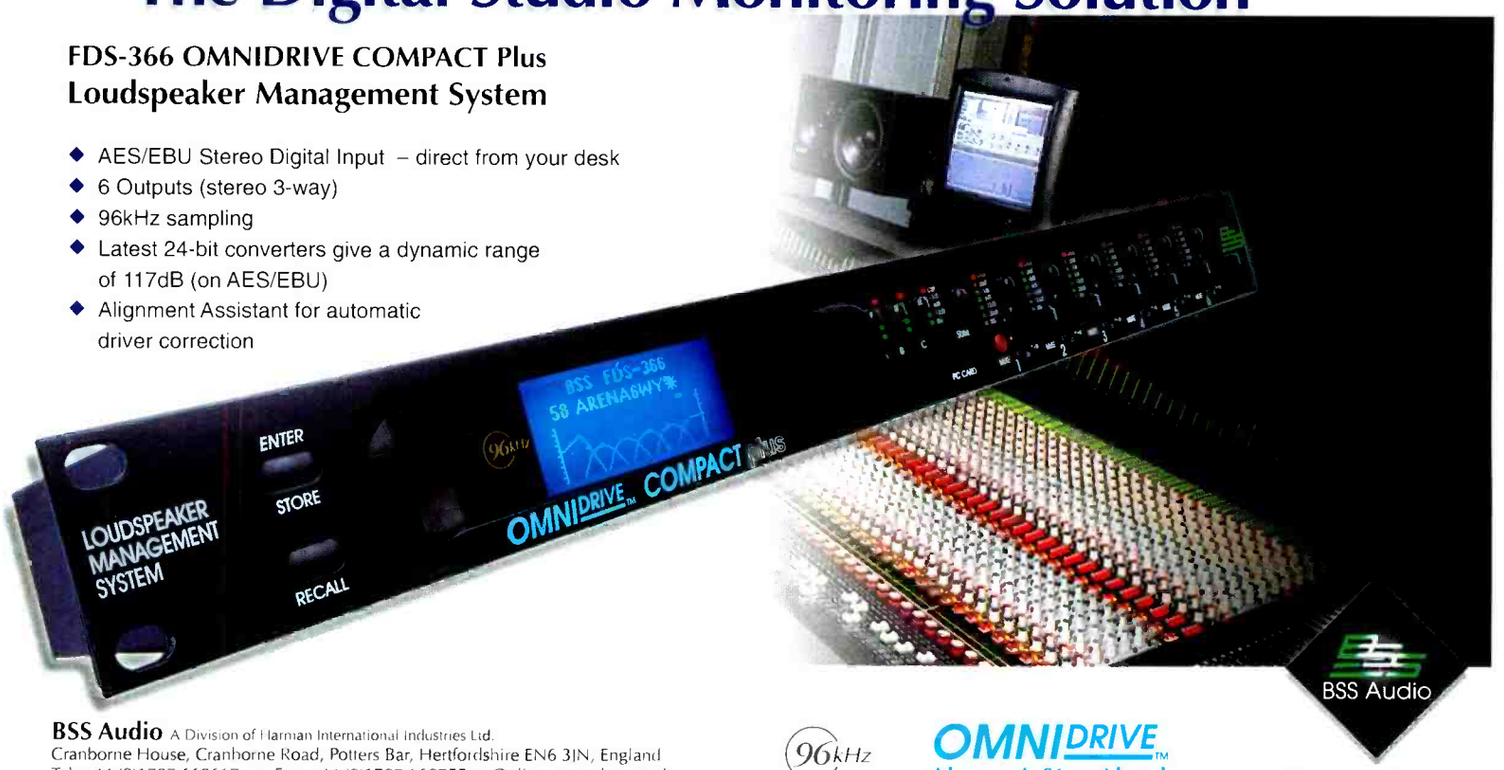

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RICK NOWELS

Currently enjoying a long run of success with high-profile artists on both sides of the Atlantic, Rick Nowels took time out to tell **George Shilling** about songs, singers and success

RICK NOWELS IS ONE of the hottest writers and producers around in chart pop. An American who has enjoyed success on both sides of the Atlantic, *Studio Sound* caught up with him in London during a recent excursion where he was working on a number of projects, including further writing with Gregg Alexander, his partner in recent successes including The New Radicals' 'You Get What You Give' and Ronan Keating's recent No.1 single 'Life Is A Rollercoaster'.

Nowels' break came when through a family friend Stevie Nicks heard a demo of one of his songs and decided to record it. Jimmy Iovine encouraged Nowels to produce it himself, it hit big, and he subsequently was to write and produce a number of hits with Belinda Carlisle. More recently he cowrote songs for Madonna's last album, and has had his second UK No.1 this year with Mel C's 'I Turn To You', to name but a few of his successes. Now something of a 'hit single' specialist, Nowels can seemingly do no wrong. He is understandably guarded when talking about stars he has worked with, and has rarely been interviewed, but he spoke frankly about a number of production and studio issues.

How does production relate to songwriting?

The production came straight out of being a songwriter. I started off being a songwriter and most writer-producers produce just to realise their vision of the song. When you write a song, you have a vision of how it should sound, and everybody wants to produce their own material. If you write a song you have a picture in your mind of how you want it to come out, so I would say everybody who writes a song is a producer. Some get more opportunity than others, and some have more ability than others.

From whom have you learnt the most about record production?

I learned a little bit from everybody. Any time you're around anybody who's great, you learn something. To me, the two really brilliant people who have a really cosmic thing around them are Stevie Nicks and Madonna. Any time you are around someone like that, you learn. I had Thomas Dolby in the studio once, and I listened to what he did.

I got my start from Jimmy Iovine and Shelly Yakus and I learned a tremendous amount from them, it was my first foray into big-time record production, and I got to hang out with them for three or four years in the late eighties. I watched what they were doing, and they were making the biggest records of the day at that time. Jimmy knew that big songs were the

Pop Vox

TO ME VOCAL RECORDING IS QUITE STRAIGHT AHEAD. So you get a great old tube mic, whatever makes the voice sound great. You get six inches away from the microphone and sing, and have a good singer. It's all about emotion. There's no mystery to it. A song is telling a story, and what you want from the person is to really hear the story, and where it touches you. And that's when you have a final vocal.

A lot of vocals from early takes or demo vocals end up being my final vocals, because it's before the artist has really had a chance to think about it. You get a lot of honesty on tape with early vocals. And you get a certain vibe that you never repeat again. The vocals sometimes start sounding more professional, but maybe they lose a certain vibe or a certain magic that they had. As soon as you start making music you want to make sure you are getting good vocals on tape. Because you never know where your lead vocal's coming from. And again it's just all about a good performance.

The best thing to do is get as many vocals on tape while you're writing the song, then nobody realises you're doing lead vocals, you get a free lead vocal out of it, and everybody's inspired. Then you hit it another day, official lead vocal day and they'll do six, seven or eight. Comping seven or eight takes usually does it. I like them to sing the whole thing, to get the flow, the whole story. Having sung the first verse and chorus, you're going to sing a second verse advancing the story, as opposed to punching-in.

important thing. The hit singles define your record. Jimmy gave me the confidence to go from being a guy who made demos in the studio to a guy who made records. Jimmy ran A&M Recording Studios in LA with his engineer Shelly Yakus who has done many many great records. In that environment you just listen and absorb.

What is special about your approach to recording and mixing?

It's that I work on good songs. It doesn't mean anything unless you've got strong songs. In recording and mixing you just try and capture what you have written. Everybody has their own way of making records —I just have my own way of making records. I don't think I just have one style—most of my stuff flits around stylistically, I have a wide palette of taste, and certain genres I like to work in, but again it's all popular music, it's all melodies and it's all words...

How do you approach producing other peoples' songs?

It's like making a little movie. You have four minutes and make it work from beginning to end. You have to start from one place and build and keep the thing moving forward, keep the interest, make the choruses happen, get a great vocal—there's no difference. If you're making a record—you know what it takes to make a 4-minute record.

What is your strongest skill?

I am a musician. I am a keyboard player and a guitarist, and a singer and a harmony singer, so I come strictly from a musical place. I bring musicality to the party. And I know arranging. I know music, I've listened to a lot of records and I understand different genres. So I understand what goes into a Miles Davis record, and I know what goes into a Petula Clark record and I know what goes into a Phil Spector record. I can hear the colours that are used in there.

How do you get the most from artists?

You just try and make them comfortable, be who you are, be encouraging. They're there because they are special; they wouldn't be in the recording room unless they had something to offer. You plug in to what makes them special and back that up. A lot of artists get insecure, there's a lot of pressure, it's an ugly world out there in the music business. You want to make people feel confident so they can be as creative as they can, and feel confident in what they do.

How did you prepare for working with Madonna?

I prepared a lot of beats. I knew about it for about a month before, so I went through a lot of old records, and old film scores and sampled ambiences and just programmed so I had an arsenal of beats. She came in with a book and did a lot of writing on the spot, so I don't know how much she prepares her concepts.

Do you have any favourite studio equipment?

I'm the wrong guy to ask about serial numbers. I don't really give a shit about technical stuff. As long as everything works and sounds good. I mean, it's hard not to have stuff sound good when you walk into these places [Whitfield Street]. You just use your ears. To me it's about the creative stuff; that studio stuff —it all works.

Do you consider yourself technical in the studio?

No, I consider myself anti-technical. I know what everything does, and I own a studio but I don't run it. My experience in the studio is sitting in front of a piano or a guitar, so I don't twist buttons or sit at the board. I like having a great engineer who does it.

Do you have a regular engineer?

I've worked with Steve McMillan the most over the years, we met during the Belinda Carlisle *Heaven and Earth* record and he's mixed most of my records. But I've mixed with other guys who are great too, Mike Shipley, Chris Lord Alge mixed my first record 'I Can't Wait', Ash Howes here in the UK mixed the Dido record with me. And Randy Wine from A&M who works with me all the time.

How long do you spend on a mix?

Two days. A day to set it up and get the whole vibe right, then the second day to tweak it out and bring it home.

Doesn't Chris Lord Alge mix in half a day...?

I mentioned Chris because I did my first record with him, which was a hit, and actually back then it took us three days to do it! But I gather he goes very quickly now, and we're going to be mixing another record shortly.

And during the mix how much of that time are you in the room?

Well, I go in at the beginning and explain the concept of what makes the record speak to a mixer. I'll say the song is voice, there's piano, there's a drum part, there's a guitar part, that's your record, everything else fills in the blanks, the main thing is to drive the record, and then I leave the room. I've worked with Steve McMillan for years, and he does a phenomenal job. When you've mixed with someone for 12 years, you know that they're going to get on the right path. I let them do their thing, and let them get on with it, and then I come back to it and listen and give them my notes. I always let them go for four or five hours to get their sounds together and get the balance together. So I have to be there for the first night and all of the second day.

Do you put down different versions of a mix?

Well you have to get your definitive mix. You have to say, 'This is your single mix'. And then of course you put vocal up, vocal up-up, vocal down, a few alternatives, but ultimately all that stuff is just a safety net. You have to say, 'Here's your record'.

And generally that turns out to be the one?

Yeah, well, actually, that one with the vocal up!

Do you use a programmer?

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[1] non SCSI bus protocol, such as IDE, might seem attractive to your accountant but no-one is ever likely to bring their session in on it.

[2] use of the optional TL Sync™ further enhances control and sync capabilities.

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There's a guy named Charles Judge who I've had a long relationship with, I worked with Charlie in the eighties, and he's a brilliant keyboard player. 'Programmer' means different things, over here there's programmers who aren't musicians, but Charlie is a musicians' musician, he's a brilliant keyboard player, and a synthesist, and he can do anything from esoteric electronic sounds to playing strings. If you say 'Stravinsky style' or 'Copeland-esque' he'll do two different things, or if you say 'Make it like Kraftwerk' he can do that, so he's brilliant. We worked together for many years, then we stopped working together for a while, because he moved to San Francisco, but he's down in LA again now, and I'm happiest when I'm working with him.

Do you have a favourite studio?

I've worked in a lot of studios, most of the studios in LA, New York and London. Any high-end studio that has great microphones and a nice room, it'll work. Whenever you work in studios that were around in the fifties or sixties, that's kind of exciting. When you go to LA to United Western, the Beach Boys, the Mamas and Papas and all those California records that were done in the sixties were recorded there, big live wooden rooms, it's old-fashioned, looks like those album covers back in the sixties like Sinatra. So any time you can work in those old classic studios, they have an aura, they have a vibe about them. They feel cool, with all those gold discs everywhere. And it's fun to walk into a giant tracking room and have a grand piano. Most of the time you're sitting behind speakers doing detail work—when you're actually tracking a band that's like five percent of making a record, actually having all the musicians playing together. But they all work, they're a generic experience —SSLs, or Neves are great but they all look alike. The studios work, but the Pro Tools doesn't work, half the time. Half my life is waiting for fucking computers to start up.

So you prefer analogue tape?

That's a big question in my head now, I find working on tapes far more satisfying because you know you've got something. I like computers to sequence stuff, but storing everything on computers, I'm not sold on it. It's a great editing tool, and if they don't crash —most people are making records in Pro Tools now, but I've had a lot of experience with them crashing, lots of downtime, and it blows the flow in such a big way. So I'm trying to work on my system, but right now my thinking is make it on tape, and use the Pro Tools as an editing thing, edit the stuff and then get it on tape, then at least you know it exists —I don't trust things that are in cyberspace.

Does using hard-disk recording affect the way you make decisions?

You don't sing background vocals on all three of your choruses, you just do one and fly it in, so it lessens something spiritually because you don't get to hear each one slightly different. There's a lot of tweaking and interesting processing you can do, and that's great. But they were always tweaking things 30 years ago. With everybody using this stuff, you get the same effects, that Cher vocal thing, you hear that on every record now.

What do you find most difficult about making records?

There's a few difficult productions I've had where you get deep inside the woods on a song. I tend to make epic productions—I listened to too much Phil Spector when I was a kid. We put a lot of stuff on tape, then you try and sort it out to get the special stuff, and sometimes the first layer and the fifth layer make it, but you have to go through the third and fourth layers, then dump them, and that's what makes a unique sound.

Aren't you sick of the unsocial hours this work entails?

No, I find this job very social. I get to meet fantastic people. It's always interesting; it's the opposite of unsociable. I get to meet talented people all day long, the cream of the crop, constantly challenging me to keep up and keep my head together. □

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FIRST WE LISTEN

THINKING ALOUD

Interpreting the brain's functions in terms of sound and music is a thought-provoking brief and an involved and convoluted process. **Neil Hillman** lifts the lid on Tele-Cine's brains

SITUATED SOMEWHERE BETWEEN the brachialis anticus muscle and breasts—at least in the index of *Gray's Anatomy*—the human brain with its 3lb weight and hard-boiled-egg consistency, occupies a particular fascination for most of us. The problem for science documentary makers is that by its very nature, the story of the brain is a complex one. For instance, start with the phrase, 'The brain, or encephalon, is that portion of the cerebrospinal axis that is contained in the cranial cavity', and try to make it accessible without reducing the accuracy of the information, and you start to get an idea of what challenges must be overcome.

A major documentary series produced by the renowned BBC Science department has brought a fresh approach to this subject in a series of six 50-minute programmes, shown in the UK on BBC 2 and airing worldwide through a variety of programming outlets. The series is presented by Professor Susan Greenfield, an eminent Professor of Pharmacology at Oxford University, and explores the grand themes emerging from the latest brain research.

London's Tele-Cine was called upon for its postproduction expertise, particularly in audio design, and Tele-Cine's head of sound and chief dubbing mixer, Steve Cookman was the man responsible for creating the soundscape that helped to illustrate the internal workings of the brain. Steve joined Tele-Cine in October 1999 from Molinare and has a wide variety of experience encompassing drama, documentary and feature-film mixing work. He was awarded the International Monitor Award for Sound for the animated feature-film *Fallen Angels* in 1998. He started his career at Odyssey recording studios as a sound assistant in 1983, and his subsequent credits include BBC's *Horizon*, LWT's *South Bank Show*, *Pie in the Sky*, *Time Team* and Billy Connolly's tours of Australia and Scotland.

'The initial brief for *The Brain Story*'s sound came from the director Sam Roberts, and one of the editors, David Fairhead, as we viewed the programme in its early stages of editing. At that time there was no music, so many of the "dream-like" and "thinking" sequences were somewhat bare. We were asked to try and "fill" these sequences as much as possible—our job was to decide with what. Once the music arrived, usually well before the tracklaying began, our job was made easier as we could use the music to try out our fx design on'.

The project was a subtle departure from other programmes Cookman had mixed. 'At Tele-Cine there had not been anything quite like *The Brain Story*, science-based with a presenter—although we do work on other programmes for BBC Science, such as the *Horizon* series or Channel 4's *Equinox*.

The series material was a combination of DigiBeta, 16mm and Super-8 film with a variety of original archive footage, and the audio-post began with an auto-conform using CMX3600 lists from DigiBeta to AMS Neve AudioFile. There were two lists for each programme, Tracks 1–4 and Tracks 5–8, as CMX 3600 only supports four audio tracks. The lists were split into: Sync-sound 1, 2 & 3; fx 4 & 5; and music on 7 & 8; with everything taken in as stereo as the conform included a mixture of M+S stereo atmosphere tracks and A/B interviews. The conformed material was then tidied, smoothing out all the edits.

This was undertaken by one of Tele-Cine's 'tracklayers' who once the conform was tidy, set about laying in atmos and fx tracks.

The original series material was all shot on DigiBeta, and the voice-over from Professor Susan Greenfield was recorded with a Neumann U89 microphone fed into an AudioFile.

Tele-Cine's head of sound and chief dubbing mixer, Steve Cookman created the soundscape that illustrated the internal workings of the brain

Cookman worked closely with composers Christian Henson and Marcos D'Cruze, to develop the blend between musical and real-life sounds interspersed with special audio effects. The music was supplied on DAT, which the editor dropped into his off-line and later audio-post conformed from.

So how much of the original sound was Cookman able to use, and how much work was needed to match the 'clean' voice-over with that of the ubiquitous hidden personal microphone used in the presenter's location Pieces To Camera?

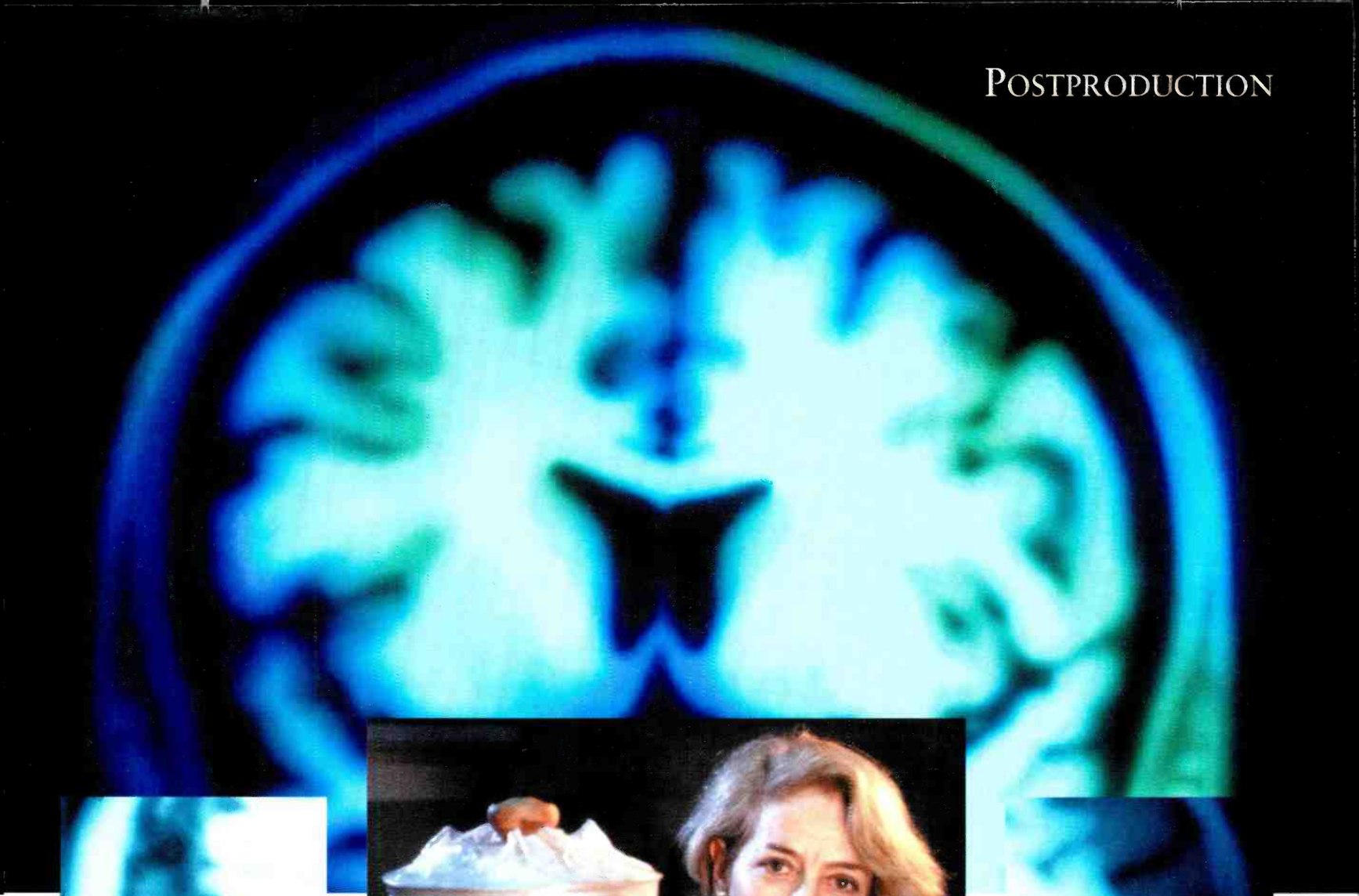
'I would say we used 80% of the original sound,' he reveals. 'Certainly all sync. PTC's, some of which were recorded in busy markets, or by flowing water. So a little tweaking of EQ, was needed at the mix stage; but some of the field sound could not be used simply due to too much noise. There were also a few sound problems with tapes that were recorded near the Wailing Wall in Jerusalem. The original recordings were very sibilant, so there must have been a problem with the kit on location—we had to use the tapes however, as they had an important section of Susan Greenfield's dialogue to camera'.

Cookman believes problems such as these were made easier by the combination of Tele-Cine's AMS Neve Logic 2 and S16 AudioFile hard-disk editor-recorder. 'Extensive use of the equalisation and compression available on the Logic 2 desk was required to clean up these tapes, but the kit is fantastic. I mixed the series on this setup. The power of the console was very useful, as we could try any number of permutations for mixes. The console also has 90 plus inputs—a few too many for this programme—but it made the mixing easy as I could display all the tracks—a rarity for virtual desks'.

And how does a dubbing mixer go about creating a smooth transition from personal-mic to studio-mic?

'I wanted to keep the voice as "full" as possible, so it stood out from all the fx and music, as some of the narration had some fairly complex facts to portray and I did not want people to lose interest through unintelligibility,' Cookman explains. 'The PTC's needed to be warmed up to match, and so the voice received a little brightening at 4k and 11k with the Logic's compression set at +7 threshold at 3.5:1. For TV I find moderate compression overall usually works well, as the actual broadcast process seems to add compression of its own'.

The dub was done after the tracklay, with the stages being: conform first, track lay second, voice recording third and finishing off with the final mix. The tracklaying comprised of the laying-in of various atmosphere's, followed by spot fx, with the last pass encompassing the sound-designed audio. Commentary was recorded towards the end of the tracklay, and



was then merged into the event list for final mixing. The fx were backed-up to Exabyte for safety and the removable hard drives taken from the tracklay room and plugged into the dubbing theatre. The series audio was produced in stereo, mixing to DAT for both final and M&E and creating a 'splits' DA-88 of sync, fx, music and narration. The conform took about nine hours, the track lay around eight. The sound design took anything from five hours to 12 hours, with the mixing itself taking about eight hours per episode.

On the high-speed and slow-motion sequences, the music was laid as early as possible to allow the audio fx to be built into the music. There was much layering and varispeeding of sound using the AudioFile's Reelrock record function, followed by delays and pitch shifts to blend in with the music using an Eventide DSP4000. Almost from the outset, Cookman had a feeling of what he wanted the soundtrack to achieve.

'For many of the pictures we wanted to lay sound which would help the music to convey ideas such as the travelling of a thought or emotion through the body,' he says. 'The music was excellent, so we concentrated blending the sounds together. For example for a sequence which was high-speed footage passing through sections of London, we tried to punctuate the sound so that we heard many different types of sound quickly—bursts of car horn, car pass-bys, odd voices, trying to emulate the rapid thought processes of the brain. Some programmes required more sound design work than others depending on content; whether it's computer beeps, slo-mo raindrops, or detuned traffic and footsteps. The slo-mo pictures can consume time because if you take the audio literally it can sometimes sound comic, so some creativity is required. Slo-mo crowd can sound like groaning hags—not too pleasant. Speeded-up traffic can sound like a demented radio-controlled car. Using pitch changers and stretching the audio can help on these occasions. The voice took about four hours to record and though Susan had never recorded a voice-over she sounded great; I think her lecturing must help. She was a little nervous to begin with but soon settled into the swing of things'.

Steve Cookman's resulting soundtrack is both inspirational and a testament to how good sound for the small-screen—and for programmes of this genre—can be. But don't take my word for it, hear it for yourself. Because as *Gray's Anatomy* suggests that the weight of an idiot's brain is seldom more than 23oz, it could simply be that I am feeling a little light-headed by it all. □

BROADCAST BRIEF

Newly-appointed *Studio Sound* consultant **Chris Wolters** introduces himself and his audio broadcast background and discusses the challenges he believes are facing the broadcasting industry

I'M 47 YEARS OLD NOW and started my career in music recording some 25 years ago. My interest in sound started when I was 14 years old when sound, recording and everything that even remotely related became a passion. In 1988 the first commercial TV station in Flanders (the Flemish-speaking part of Belgium) became operational. Although nobody believed that a commercial TV station could be successful at the time (because Belgium already had some 25 TV channels), I strongly believed in it, and it became a welcome new direction in my life.

I was hired as a sound technician in October 1988.

In February 1989 after three months of hectic construction work, VTM started transmitting and after only four months on-air VTM was breaking even. The station's success became an example for commercial broadcasters throughout Europe and soon its personnel had to be divided between three buildings around the city of Vilvoorde. In 1992 we started building again and in July 1993 everyone was re-united in a new building at the Medialaan in Vilvoorde. I was promoted from chief engineer to head of sound operations and was responsible for the audio infrastructure of the new building.

In 1994 VTM started a second TV channel aimed at a young public: Kanaal 2—designing a complete TV station from scratch and supervising it up to completion is a unique experience, I can assure you. Concurrently, VTM was looking to set up a complementary radio station, but for many reasons we are still waiting. In the meantime, we started a network of small local stations. Since radio is sound, I wanted to be involved in the radio project and became unit manager for radio transmissions.

At the moment we have two networks of small local stations that transmit with low power. One network already existed, Top Radio, and a second, Radio Mango, was created last year. The programmes originate in the studios at VTM and both are sent to local stations via satellite uplink. There are some 70 locations that capture TopRadio or Radio Mango via satellite receivers. It is hardly a national network but it gave us the opportunity to learn the trade and to gain experience for the eventual startup of a national commercial radio.

During the last month, I've been busy sound engineering for a TV programme from the Dutch Endemol group called *Big Brother*. We wanted a different approach for the sound capture (60 microphones and 27 cameras are used) which meant installing and supervising the whole thing in about four weeks around two Roland VM 7200 mixers.

Also, since 1996 I have taught a course called 'Sound Recording Technology' at the post-graduate division of the High School in Mechelen. This is a course for people who already have a High School or University degree, but who want to specialise in audio-visual media.

As a result of all this, I believe that there are a number of challenges already facing the broadcast industry in the coming years—although some might find this a philosophical approach.

First, due to fierce competition not only between commercial stations but also between commercial and public channels, it will be necessary to work as cost-efficiently as possible while keeping technical standards as high as possible. This means we have to be prepared to go downmarket without crossing the border between professional and semipro or consumer equipment that appears suitable but isn't build to last. The choice of equipment has never been so great, and we must take care not to degrade the audio chain with low-quality items. In broadcast, the ruggedness of equipment differs from other audio situations because of 24-hour, seven days a week, nonstop and sometimes abusive, operation by nontechnical people who haven't the faintest idea of cost.

Second, we must keep our feet on the ground. This may seem obvious, even flippant, but it is neither: many people in this trade are literally being led by ongoing changes in technology. Some even think that traditional TV and radio broadcasting will soon be overtaken by Internet or similar computer related mass communication. I don't believe so—though I may be wrong—and to do so is to change focus from the basic delivery of the highest possible sound and picture quality to competing in a rat race of new technologies. I have nothing against new technologies (on the contrary), but they have to suit the demands of professional people. They should not force their way in because everybody is seduced into using them. After all, it's people who do the job. A good ear, a solid knowledge of the basic rules and the quest for perfection will do 99% of the job. I have never encountered a good recording engineer who didn't consider the job a combination of art and craft.

Then there is finding the right people for the sound department. This is probably a problem in all trades, but because of the multitude of broadcasters and the fatigue of the viewing and listening public, a lot of the glory that was associated with broadcast work has faded. There is not much pioneering work left to do and the enthusiasm of young people is mainly based on choice of jobs and the related salary. There is a lot of choice, so why should you work long days or nights in a broadcast environment with lots of routine jobs while other jobs in the media (like Internet and multimedia) are much more appealing? Besides, the hunt for efficiency and performance is as present in a broadcast station as it in other areas, so we'll have to hunt for those boys and girls who have an affection for the profession, combined with some degree of basic knowledge and the will to deliver perfection. I get a lot of applicants who have one of these qualities, but the combination of all qualities is unusual and schools that deliver people like this very often emphasise music recording—it's a lot more fun, I agree. This may be a hint for recording schools as a commercial station like VTM doesn't have the luxury of training new people extensively.

Finally, let's face it: broadcasting always has been big business and still is, but the margins are getting smaller. While most broadcasters once had the luxury to take time for testing and evaluating and could then decide on the best, this era has gone (for most of us). The more competition, the more cost cutting, the more automation, always faster production with less money, less people and we're still going down. This means that the biggest challenge for us will be within our own organisations: keeping some degree of quality, retaining knowledge with not just one or two people, but with the majority, convincing the management that there is a difference indeed between professional work (be it innovative or just plain all right) and mediocrity. If you feed people a continuous stream of mediocrity, they will accept it as the norm. That's the real danger that lurks quietly within our organisations and I'm not only talking about content, I'm talking about sound and vision quality. To make the best (professional) selections there, that's our job. That's where technology comes in again making things do more for less to a certain degree. And that brings me back to my first point. □

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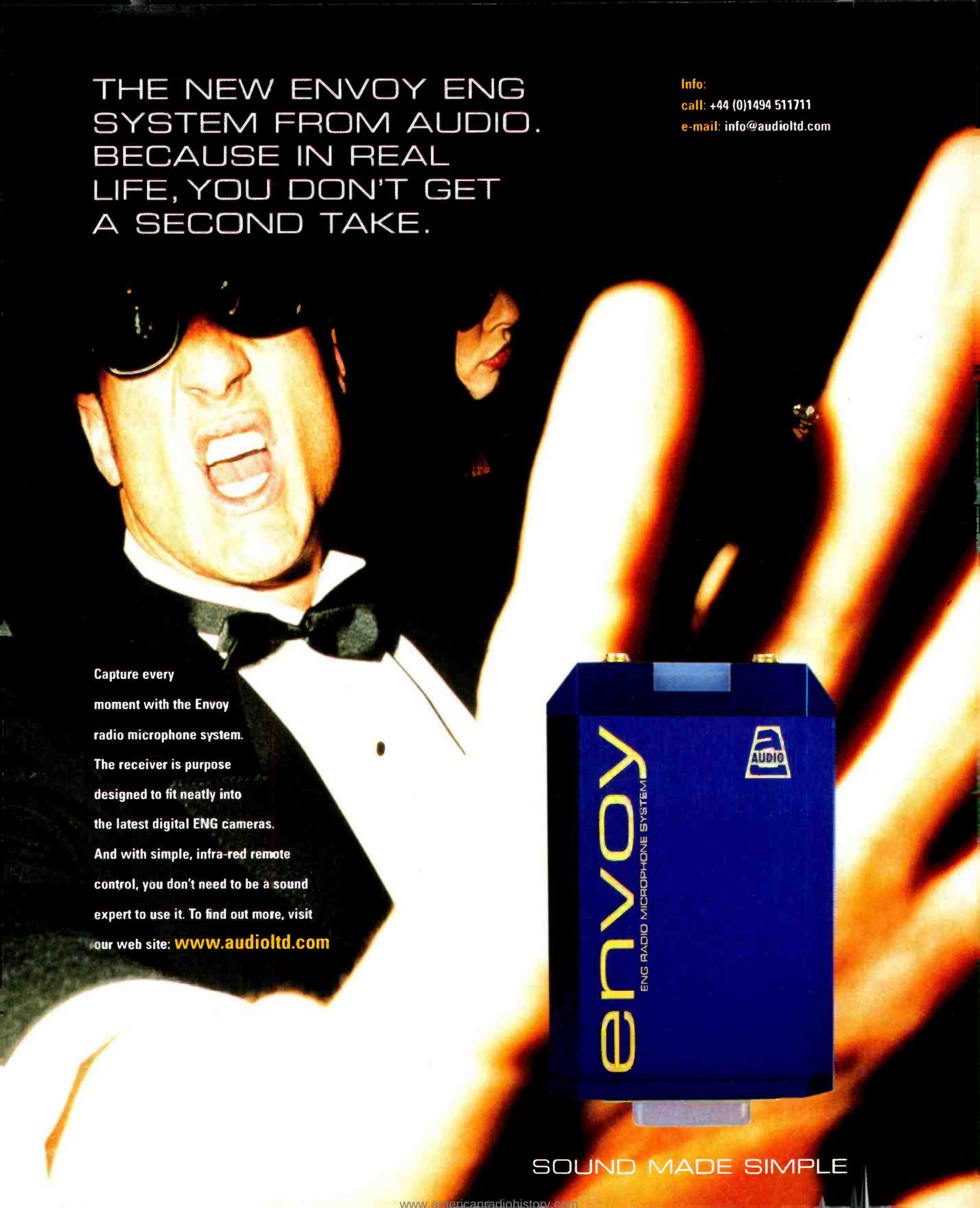

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CONNECTING THE FUTURE

ISDN's use by professional audio is about to come under attack from the Internet and the on-going introduction of terrestrial and mobile broadband IP-based technologies. **Simon Trask** investigates its continued suitability, viability and longevity

REPORTS OF ISDN's impending death are nothing new. A *Wall Street Journal* article from 1996 trumpeted its demise at the hands of faster and cheaper technologies, complete with a Gartner Group analyst proclaiming, 'I think it's time to write the obituary on ISDN'. But four years on and those faster and cheaper technologies are finally becoming a reality, and the issue is indeed not so much whether ISDN will be replaced as when. All of the ISDN audio equipment manufacturers I spoke to see ISDN being replaced by broadband IP-based technologies for audio transfer. But when is a central, not an incidental, consideration—not least for the many companies already invested in audio ISDN technology, and those wondering whether they should start out with ISDN or IP.

'It's a concern that we hear a lot,' says Tom Scott, CTO of San Francisco-based audio networking veterans EDnet. 'As we start to see more and more broadband Internet-style solutions for communications, people are continually asking us "I'm paying for two or three ISDN lines to be able to communicate with recording studios, and here I'm getting a DSL or a cable modem that runs nominally at an even higher rate, so when am I going to be able to use my DSL for communications?".'

Of course the US has had a couple of years' head start over the rest of the world in rolling out ADSL and cable modem technologies. Hence Scott was already addressing this issue back in 1998, when he wrote an article for the company's newsletter *The Buzz* entitled 'ISDN versus xDSL and Cable Modems, or Services That are not Appropriate for I/P (Yet)'. Today the Ednet web site has a Q&A page on the subject, headed 'Can I Use DSL Instead Of ISDN?' (www.ednet.net/drnet/drnet.html). US-based ISDN audio equipment developer Telos has also addressed the issue on its website, in an article written by Rolf Taylor, an applications engineer for the company, titled 'DSL versus ISDN: The Real Truth About High-Speed Connections' (www.zephyr.com/techtalk/dsl.htm).

The conclusion of Scott's article was that 'the ISDN connections of 1998 and the equipment investment in ISDN audio gear will last users for quite a few more years', while Taylor, with an eye to Telos' own technology, concludes in his piece that 'Zephyr and ISDN is the way to go for most broadcasters' remote audio needs, and probably will be for quite some time to come'. Today, Scott says that the content and conclusions of his article still hold true: 'Even though you might believe, because there's a lot of coverage, that things are happening at astronomical speeds, not too much has happened in the two years since 1998.' Reassuring words, perhaps, for those worried about their investments in ISDN being overtaken by the proverbial rapid pace of technological change.

Among the audio ISDN manufacturers and users I spoke to, estimates of ISDN's remaining lifespan for audio applications ranged from two to ten years—a measure of the difficulty of predicting the 'staying power' of a technology in this day and age, and perhaps especially that of a telecoms technology. For while the actual pace of change may not match up to the rhetoric of technological advance, the once stable and predictable telecoms market is undergoing dramatic changes, not least in the seismic shift from traditional point-to-point circuit-switched to IP packet-based networks. In the UK, BT's buildout this year of an IP network to siphon off Internet data traffic from its analogue PSTN network is seen by many as a prelude to the inevitable transition of voice traffic to IP networks and Voice-over-IP technology, with an attendant shift away from time-based to unmetered charging as is happening with dialup and with broadband (ADSL and cable modem) Internet access. Some long-distance operators are reportedly already starting to route international voice traffic over the Internet. Meanwhile, broadband 'always on' fixed wireless, or wireless local loop, services are just starting to appear as an alternative to the terrestrial copper local loop —for instance Sprint Broadband Direct in the States and Atlantic Telecom in the UK. The mobile phone market, too, is moving away from narrowband circuit-switched connections to broadband IP-based 'always on' technologies with the introduction this year of GPRS (General Packet Radio Service) technology—itself a prelude to the introduction of 3G, or third-generation, UMTS (Universal Mobile Telecommunications System) networks offering bandwidth of up to 2Mbps and IP packet-based transfer of data and digitised voice traffic.

Within this shifting landscape ISDN currently figures as a higher-speed dialup alternative to analogue modems for general-purpose Internet access, and as a point-to-point digital data delivery method for specific applications such as file transfer, teleworking, videoconferencing, and of course real-time audio delivery for the recording, broadcast and film industries. From this it becomes clear that ISDN's future viability and longevity will be determined by the extent to which and the rate at which (a) it will be replaced by the new generation of broadband technologies for Internet access, and (b) circuit-switched point-to-point applications currently handled by ISDN are displaced to the Internet, or to alternative managed IP networks. A major consideration in networked audio transfer is whether that transfer needs to be in real time or not. The strength of point-to-point ISDN for audio transfer is its real-time delivery capability, and, depending on the application, also the attendant capabilities of duplex operation and remote equipment synchronisation. Indeed, in conversations with audio ISDN manufacturers and users for this article, the current real-time advantages of point-to-point ISDN over Internet-IP networking were highlighted by everyone. As EDnet's Scott puts it: 'ISDN as a bidirectional, very predictable, very-high-quality way to communicate still has no competitor in the IP world. There's a big difference between synchronous communication, which is what ISDN is, and the Internet, which is inherently shared. With the Internet you're sharing the hops across the country with all sorts of other traffic, and this makes IP traffic what we here call "nondeterministic". You cannot predict from one second to the next what the traffic is going to be. Whereas ISDN is isochronous, meaning that the connection is clocked to a very exact timebase, so there are no gaps, no pauses, no waiting. The stream of bits from one end to the other is an absolutely full pipeline. With an ISDN connection, once you dial up those calls and you've locked the codecs together, you own that connection, there's nobody else going to share it, and so you're guaranteed the quality between, say, Tokyo and Johannesburg until you decide to hang up the call. The Internet has quite a way to go before we'll see that kind of ubiquity and that kind of

The H20 suite

Simon Bohannon of London-based ISDN audio specialists H2O

predictability.'

Maino Remmers is a Dutch freelance radio journalist who uses ISDN to file reports, either on location (64kbps) or from his home studio (128kbps joint stereo), to Dutch national radio's technical facility in Hilversum. On location he uses a Youcom ReporterMate and either an Inmarsat satellite phone or, if it's available, a landline (ISDN lines apparently being commonly available in homes and businesses in the Netherlands), while in his home studio he uses an Akai DD1500 with time-code capability for editing and playout and a CCS CDQPrima ISDN audio codec for transmission. The radio station dials into Remmers' ISDN connection and initiates a live transfer. 'They call me, it beeps and we can send,' as he explains succinctly, highlighting transparency of operation as a plus factor for the ISDN audio codec market. ADSL, he says, could be a step too far for radio journalists:

'In past years you had a microphone, a tape recorder and that was it. Nowadays, a journalist has to use the Dalet system to edit his work, or Cool Edit, you've got to know how to work with ISDN, how to work with the ReporterMate, you have to know something about MPEG Layer III, or ISDN. So when it becomes far too complicated, I've got a lot of colleagues who will say "Another system, now it's ASDL or what is it? Okay, that's enough, I want to be a journalist, not a technician, so stop with it". There is a borderline there, I think.'

Wilfried Hecht of audio-codec equipment manufacturer AVT concurs: 'Journalists should take care of reporting, not of the technology. As we learned, it's very important with audio codecs for ISDN or other networks to be able to handle them in a simple way. Our 7kHz ISDN Telephone, which we've sold for seven years, is so popular because it can be controlled as a phone. Everybody can use a phone, so there's no need to have a technician. Therefore we also developed the 15kHz ISDN Telephone, which has the same philosophy behind it.'

At present, Internet/IP-based functionality is typically associated with complexity. Professional ISDN audio users will need the same transparency of operation with IP that they have now with products such as AVT's.

Another factor to consider is audio quality. 'All of these [ISDN] codecs do change the sound,' says Simon Bohannon of London-based ISDN audio specialists H2O. 'People tolerate it because ISDN is the only way of doing real-time transmission at the moment. And frankly it's the only way of doing it in the near future, because we haven't got broadband services which would take uncompressed audio.' Remmers bemoans what he calls 'the ISDN sound' of location-recorded and transmitted material, which for Dutch national radio is all at 64kbps. 'If there's a possibility [with broadband IP] that the quality will get better, and if the equipment is not too complicated, then certainly it will be a step forward.' For location-based filing, broadband IP-based 3G mobiles with bandwidth guarantees (see QoS below) could one day be an attractive alternative to (64k) ISDN satellite services, in terms of both quality and cost. But this is looking ahead two or three years.

Touching on another important factor, Remmers elaborates on the changing environment within Dutch national radio: 'We don't use tape any more in Hilversum. The analogue machines, well, they get very dusty in the corner of the studio. These days it's all Dalet [French editing package], the whole broadcasting system uses it. And also Cool Edit and Pro Tools; there are different systems, it depends on the programme you're doing.'

Tom Scott adds: 'As we see more and more workstations coming into the marketplace and people recording on workstations and creating files rather than tapes, we see people using the Internet to deliver a file from place to place.'

Indeed, with the transition of studios and radio stations to computer-based or dedicated digital audio systems and the inevitable correlate of networked file storage, a process of 'network logic' suggests that

locally networked environments become nodes in a wide area network—whether that network be the public Internet (network of networks) or a private managed IP, Frame Relay or ATM network.

'I certainly believe the Internet will offer us more and more tools for postproduction to get materials from place to place, and we're anxiously awaiting those tools as they come along, to be able to supply

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ISDN REMAINS a most confusing term with the Integrated Services Digital Network promising high-speed delivery of media content. Like a lot of companies, The Tape Gallery, as an audio postproduction studio specialising in TV, Cinema and Radio Commercials in the heart of London's media industry thought how it could exploit it.

Clients would often need sound tracks sent in a hurry to other offices around the world and the only way it could be done then was by courier. With time differences and last minute pick up times it could take at least two days, and that's if it didn't get held up in customs. So ISDN was well worth investigating, although expensive to lease the lines but the expense meant that few other companies could justify it.

We took the risk feeling sure that it would only grow and over the years it certainly has. We are now connected to the Internet via a fibre optic link ATM that enables us to exchange data with similarly equipped companies at 155Mbs. Client connections range from ISDN, ADSL, ATM, T1, or even 56k modems.

This high speed network has also enabled us to send video and stills as well and the capability has increased bookings with as many as six separate long distance voice over recording sessions a day. When Kathleen Turner was appearing in London's West End, she would often be called in to re-record her voice for the various movies and projects that she had on the go in other countries and ISDN gave us the bandwidth to enable film directors in LA to hear her and direct her performance live.

A more adventurous use of ISDN involved bringing together Peter Allis and his Golf commentating partner. The only problems being that Peter was in London, his other half was in New York, and both voices needed to be directed from a studio in Los Angeles. Not only could we send high quality audio everywhere but we also managed to synchronise and control all three video machines from London

Once clients realised they could send audio and record artists almost anywhere in the world quickly and efficiently, the demand for video grew. Using MPEG 1 and 2 compression technology we now do the same for video, sending finished commercials to directors and clients for approval. Music composers in the outback of Canada use this service for receiving commercials from advertising agencies. They then score the music and send it back to us for the advertising agency to comment on.

ISDN has enabled Tape Gallery to realise its sound effects assets on a worldwide basis and created The Sound Effects Library Limited (http://www.sound-effects-library.com). It's an on-line database of sound effects and music samples that allows users to audition, purchase and download sounds instantly. This also led to the voice gallery, an interactive voice over casting database that lets you hear audio from the top UK-based voice over artists. I've predicted that in 3 years our investment in high-speed networks will provide an increase of over 300% on the group's turnover.

I'm also looking at ways to expand our five studios to some 5000 on-line virtual studios. Instead of clients trekking into Soho they will be able to access facilities from a PC over a high speed network. With the increase in the desktop media authoring clients will be able to book the studio by the hour probably from as little as £5 and they will be able to run their own movie on their desktop and synchronise the picture to a virtual track laying interface. They will then be able to call, audition and purchase sound effects and music samples and in the traditional way hire outboard special fx units or plug-ins for echo, time compression expansion, etc. They will also be able to mix via a virtual console and book a voice over artist on-line for adding narration.

This is not a pipe dream, all you have to do is look at Rocket networks and see the collaboration in the music industry. The technology is there now via ISDN (or whatever you want to call it). We just await the software.

them to our customers,' says EDnet's Scott. 'But, ISDN as a bidirectional, very predictable, very high-quality way to communicate still has no competitor in the IP world. The types of connections where we see what's called Quality of Service, or QoS, where you get a guaranteed connection, seem to be coming not from the direction of the Internet-style connections that you might have at home, but from the ATM backbone connections, or connections for a corporate Wide Area Network, where a big company with a lot of communications needs may connect its offices together with an ATM connection. This is obviously much more expensive than the Internet, however it does offer a certain amount of predictability, and there are ways to pull clocked signals out of those connections, so that you could use an isochronous, or synchronous, type of codec on there. However, we have very few people that can afford to do that, so far. Certainly the audio world doesn't have enough dollars in their bank accounts typically to do that. We work closely with a supplier that has a very elaborate ATM Internet backbone [Savvis], but when we look at the cost of extending that backbone to the client, it's still

outside the economic picture that recording studios in particular are ready to pay. Of course those services may get less expensive in the future, in which case they may lend themselves to this kind of use.'

'In IP-based networks, control of the traffic will be extremely important, and the ability to assign priorities to services,' says Detlef Wiese, founder and president of Mayah Communications, which recently introduced the ambitious and trailblazing Centauri Audio Gateway product range. 'IP v6 is planned to be introduced with this feature of assigning priorities, which I think will also change costs, so you will have differential levels of Internet service. If you want to do really serious professional applications, maybe distribution to a transmitter from your radio station, or a studio-to-studio link with multichannel sound for reviewing by another producer, in such cases you want to get some guarantee, and guaranteed bandwidth, with the possibility to assign such priorities, this is something which should open the Internet really for professional applications, even live feeds.'

As anyone who has used the Internet will know, currently (under IPv4) there are no guarantees on bandwidth. However, the trend over the next couple of years is towards differentiated levels of service within IP networks, through complementary developments in the form of IPv6 flow control and traffic class, Assured Forwarding 3-level 'traffic precedence' (mod-

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elled on the Committed Information Rate bandwidth management feature of Frame Relay networks), and the direct path routeing capability of MultiProtocol Label Switching (as opposed to the current hop-by-hop routeing used by IP networks). The mobile phone technology developers intend to make IPv6 the basis of 3G services, both for its vastly increased IP address space and its QoS capabilities.

Meanwhile, other developments will facilitate reliable delivery as well as change the economics of IP bandwidth. Indeed, an article in Forbes magazine, entitled simply 'Meltdown' (www.forbes.com /forbesglobal/00/0703/0313026a.htm), has argued that long-distance and international calls will become 'zero cost'. Implementation of D-WDM (Dense-Wave Division Multiplexing) technologies is enabling massive growth in backbone and metro network bandwidth by dramatically multiplying the carrying capacity of fibre-optic cables. For instance, Nortel Networks' OPtera D-WDM technology, which is being rolled out now in optical networks, provides 160-channel D-WDM—it multiplexes 160 channels of light onto a single beam. Each of those channels carries 10Gbps of data, for a total per-fibre capacity of 1.6 Terabits. Nortel says that this is enough to support simultaneous transmission of 360,000 distribution-quality versions of a film, or simultaneous Internet connections to 28m households. This September, BT will start an upgrade of its core national network to an IP architecture, using Nortel's OPtera equipment at the transport layer, with completion scheduled for next April—though this from a company which has just delayed its consumer ADSL rollout yet again.

ADSL is asynchronous, meaning that the upstream and downstream data rates aren't the same. For instance, BT is making 512kbps, 1Mbps and 2Mbps downstream rates available to businesses, but the maximum upstream rate in all cases is 256kbps; other ADSL services in other countries may only be 128kbps upstream. In addition, ADSL is a contended service, meaning that you're getting shared rather than fixed bandwidth. The figures quoted are optimum, or best-case, figures, depending on the overall Internet activity of the ISP's users at any given moment. In the case of BT's wholesale offerings (currently the only ones available in the UK), the business services are contended at 20:1 and the consumer services at 50:1. In effect these define worse-case bandwidth scenarios (unless the service is oversubscribed by the ISP) rather than real-world performance. Of course, being on the Internet means that contention is also a fact of life within the network (currently, anyway). Which is fine for non-time critical—that, is non-realtime applications like sending files as email attachments or making them available for download via (password-protected) FTP or web sites. EDnet and H2O both use the Clipmail system from Telestream for store-and-forward sending of master-quality audio files over the Internet. In

THE TAPE GALLERY bought a Musicam CDQ2000 in 1991 and at the time the biggest problem was finding suitable studios that were similarly equipped. For quite a long time, the 'Users' Directory' was a very thin volume, and originally consisted largely of broadcasters, or studios in Japan none of whom were particularly helpful.

As a new technology it was quite difficult to win over clients, who were wary of the technology and its cost implications. Early sessions were hampered by problems of configuring the CDQ system, particularly for connecting with US studios whose ISDN lines operated at different data rates. Client confidence wasn't helped by episodes such as when a New York engineer offered to 'put a blanket' over the voice-over's head to cut down the noise of traffic that could clearly be heard during a link-up. Another issue during the early days was the implication of Ednet's closed network of subscribers. Using a modified CDQ unit, Ednet attracted a large number of users, mainly in The States. Significantly, though, the CDQ-equipped Ednet subscriber was restricted to connecting only with other members of the Ednet network. While there were initially some advantages to joining Ednet, membership soon became something of a liability as the number of unaffiliated (and therefore incompatible) studios grew. Eventually Ednet modified its subscribers' CDQ units to allow them unrestricted access to the growing community of ISDN studios around the world. When APT's Prolink became available in 1992, The Tape Gallery was again the first company in the UK to acquire one. Using six ISDN lines rather than two, the APT had a slight but perceptible advantage in terms of audio quality over the CDQ, and its time-code option was a great tool for sessions working to picture. This advantage over the CDQ system was partly redressed by the Colin Broad ISDN synchroniser, which converted RS232 (which the CDQ could transfer) to RS242. This unit was successfully used to enable advertising agencies

this case, instead of dialling up a phone number, the Clipstream system connects to an IP address.

Making streaming audio files available from a website for auditioning purposes is a possibility (and again these can be hidden behind password protection), but currently there are issues about audio quality and (despite buffering) stream reliability. Simon Bohannon of H2O, which has a RealNetworks G2 streaming server, comments: 'At the moment the quality of the audio is not sufficiently good for mix approvals.' EDnet's Scott adds: 'It takes a certain amount of work [to set up streaming], and for a recording studio to set up to do it, they might find that they're spending as much in labour as they would for an ISDN phone call, and it might be easier to do it over a piece of gear rather than over a computer.' However, this might begin to change with products like Mayah's Centauri (see below).

Another issue is duplex operation, which in terms of the Internet is down to software rather than any inherent bidirectionality. Comments Scott: 'For better or worse the Internet is not very good for 2-way communication at this point, it's much better for one-way. But in those cases where you need to give real-time feedback, just the economy of being able to get that done quickly and efficiently means there will continue to be a very strong market for the real-time codecs, even if non-real-time transmission over the Internet becomes free and real easy to do. What you need for certain types of task is a long-distance hi-fi phone call, and that's where ISDN comes in handy.' However, with the growing impetus of the voice-over IP market, the trend towards merging voice and data into unified IP networking environments, and the aforementioned trend towards providing differentiated levels of service, real-time, 2-way communication will become increasingly important.

Unlike point-to-point ISDN calls, ADSL is an 'always on' technology, and as such has no time-based metering, meaning that 24/7 Internet access is provided for a fixed monthly fee—around £100/month for a 512/256kbps ADSL business connection contended at 20:1. This might seem attractive compared to time-based charging for calls. There again, as EDnet's Scott points out: 'Typically the per-minute charge concept fits the economics of a recording studio better than maybe a $500 a month charge for high-speed Internet access. They'll even mark that charge up and it goes on the bill to the client, because the client says "Oh yeah, sure, I was on the air for 45 minutes, I expect to get a bill for it".'

In addition to its conventional ISDN audio work, which it charges on the conventional studio-time model, H2O also provides audio and video file format conversion services, for which it charges on a different basis. "You still have an element of studio time, for prepping the material into whatever format's required, but then there isn't a transmission time, so we sim-

such as Bates UK to remotely conduct TV recording sessions without leaving their offices.

By the mid-nineties, ISDN had become a routine and frequently requested service. Clients now took for granted the ability to record artists in any part of the world, and directories of ISDN-equipped facilities ran to thousands of entries.

As frequently happens with new technologies, as soon as clients began to depend on ISDN as a solution, at times they also overestimated its abilities to help them out of tricky situations. 'What do you mean you don't know any ISDN studios in Reykjavic?' There are two big advantages of real-time ISDN transfers using codecs such as the APT and CDQ. Working in real time gives a sense of security during ISDN transmissions, in as much as if it sounds okay during the transfer, then it is okay. Secondly, the ISDN users' directories have become a very reliable source of compatible, and professional, facilities.

However, these two aspects also highlight a couple of disadvantages of ISDN for audio. For example, while there are now thousands of studios using ISDN, if there isn't a facility in the relevant location, then you're basically stuck. Also, an operator is needed to receive a transmission, whatever time it comes over.

As an alternative to dedicated audio ISDN codecs, more and more transmissions are now using high-speed Internet connections. Using this technique, audio (and video) files can now be sent either as email attachments, or can be posted to FTP sites.

In this way, the problem of time differences is avoided, and we no longer need to rely on expensive facilities to receive audio—a PC and an Internet connection is all that is needed at the other end. This method of file transfer can also do away with any type of data compression, as transparent as it may be in the audio codecs.

With the increased viability of using the Internet for data transmissions, ISDN is no longer the only way forward for audio transfers in postproduction, but it is nonetheless an invaluable tool.

ply bill on a per megabyte basis,' says Bohannon.

So how are the ISDN audio codec and equipment manufacturers reacting to the various developments that are bubbling away?

Comments Emma Wickens, marketing manager at apt: 'Our apt-X technology can be used to transfer audio over any digital network. Currently our products address leased line and ISDN applications. The current product range, the BCS384 and the NXL384, are for use over ISDN, T1, E1, X.21 network, any fixed digital links, basically, and the technology can be adapted to be used over any digital network. There are always new markets, and the Internet is a large market. The technology could be adapted to it, but at the moment it's something we're not focusing on.'

'What we are offering now and what we are developing are ISDN audio products for live audio transmission,' says Wilfried Hecht of AVT. 'These units can also be used for file transfer, but using ISDN channels. For the Internet we are not planning right now to have an audio product, because for Internet transmission you can use a normal PC with MPEG Layer II and Layer III software encoders and decoders, so there is no need of having a dedicated audio codec in our opinion.'

Bert van den Brink, Senior R&D Manager at Maycom, says that the company's current priority is its hand-held MPEG digital recorder, which is due to be launched at IBC in September. However, beyond that the company is 'looking more at the Internet than at ISDN. You have to look at the future, and I suppose the Internet is the future. We have several ideas, but I prefer not to say anything about them at the moment.'

Meanwhile, with the aforementioned Centauri Audio Gateway, Mayah Communications is moving beyond the dedicated ISDN audio codec. Explains Detlef Wiese: 'We want to show how audio codecs can migrate to audio gateways. As well as conventional ISDN audio codecs—because it's important that we cover today's real-time audio applications in the broadcast and studio environments—such devices should have audio via IP, with TCP, UDP, management via Internet browsers, SNMP, in order to be really applicable in IP-based networks, maybe ATM and other networks. The Centauri is also a plug-and-play audio server, which means that it can take an audio IP input, or an AES-EBU input, convert this and encode it to a low bit rate, and then stream it on the Internet using UDP with MPEG Layer II, MP3 and MPEG 2/4 AAC.'

Mayah is leading the way with adoption of MPEG AAC, which provides low-delay coding options, CD-quality audio at 128kbps, and multichannel coding capability. AVT will also be supporting AAC in its 15kHz Telephone. Multichannel coding will become increasingly important as music moves into the DVD-Audio and SACD era, and AAC could help out here. High-resolution audio will also place greater demands on network bandwidth, and in the longer term the bandwidth scalability of IP networks will prove more amenable to these demands than will ISDN.

'I think that ISDN has probably reached the limit of what people are prepared to do with it in relation to price,' says Marcus Brooke of Sonifex, whose products include the Courier ISDN portable audio recorder. 'New technology will provide the answers to higher bandwidth, I'm sure of that.'

'It's important to be in a position where you can change,' says Mayah's Detlef Wiese. 'But also it's important that when you do so you don't move into a corner. You have to keep your eyes open.'

'You've got to be investigating these things, because the world doesn't stand still,' adds Simon Bohannon of H2O. 'The Internet is the way forward, realistically you have to accept that, but until somebody can convince me that I can get guaranteed bandwidth then I see that there's going to be life in ISDN yet.'

Indeed, while the pervasive trend is towards IP-based networking, the Internet-IP world has a way to go before it can provide a practical real-time alternative to ISDN for professional audio use, let alone a compelling one. In contrast, the ISDN audio market has maturity, reliability, familiarity, pervasiveness, convenience, and a sizable invested user-base working in its favour. Taken together these factors indicate that point-to-point ISDN audio will be around for a while yet. □

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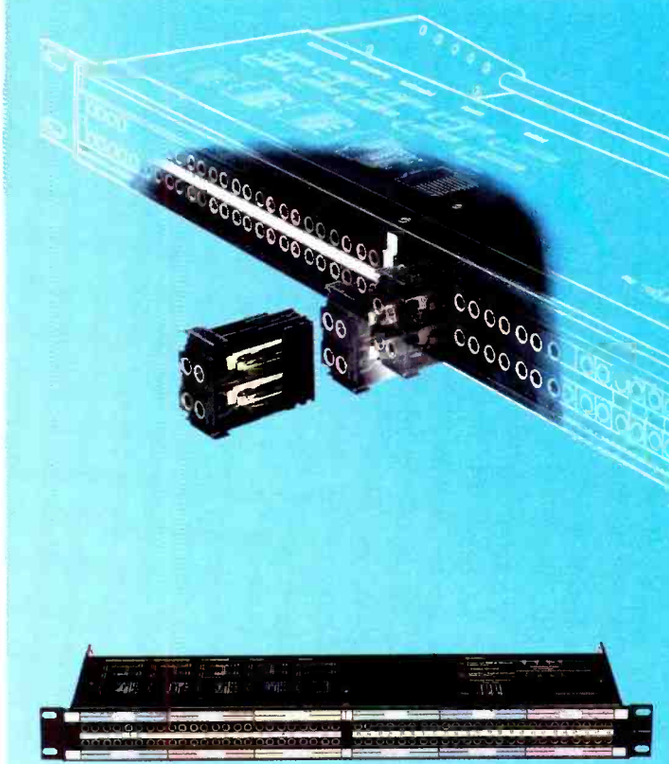

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NET SERVICE

As the Internet makes increasingly attractive promises to studio operators, **Martin Polon** examines the options and obstacles of getting connected

MANY STUDIOS—whether mothership operations or the barest of basement project rooms—have adopted the Internet. It is not unusual to find a computer with the necessary Internet connection to allow live, real-time studio-to-studio connectivity in each room of a large recording facility. Connection may be via telephone line and dial-up modem, cable fibre-optics and cable modem, or a special digital telephone line modem with the requisite ISDN or subscriber loop including user dialup. Certain state-of-the-art recording studios involved in remote film scoring have 'T' grade one (or above) high bandwidth 'steerable' connections of the highest quality. Lines such as these are similar to those used by large computer Internet service providers.

All the studios and audio facilities currently on the web will have installed a 10/100 Ethernet card to enable the necessary high-speed connectivity from the modem to their PCs (Macintosh computers have such options built-in). Smaller studios may have only one or two such Internet setups, but the availability and options offered for the studio and to the customer remain the same as long as the connections are of the requisite bandwidth.

All of this web connectivity enables studios to exchange audio—as samples or compressed digital information—in addition to allowing them to work in real time with musicians in different geographical locations.

This advent of 21st Century technology has revolutionised the art of recording. However, it appears that the C20, 'There is a free lunch, but it is almost always inedible', also holds true in the 21st Century. Internet reliability for the connected user of any kind seems to vary wildly from about the 92% to the 94% percentile to as low as 50% of the user usage requirements.

That there is no such thing as 100% connectivity to the web is to a large extent the result of 'web politics', which are very much connected to what might be called international technology politics. In short, who funds what and with how much? At this point, the web exists as a co-operative arrangement of private enterprise providers. The arena of Internet service provision (ISP), has no or at least precious little government financial involvement, mandating service or availability or for that matter any level of guaranteed access.

It is curious that, with the Internet changing the technical landscape of our lives and business futures, it remains virtually unregulated. In contrast, the provision of natural gas, water and electricity remains heavily regulated and in some cases actually provided for by governments in the Western World. The world of the Internet is as much driven technologically by specifications and technical dynamics established by the handful of companies that almost exclusively control the manufacture of web servers, routers, switches and a variety of other Internet service provision products as anything else.

Unavoidable service outages include routine maintenance of the various Internet servers and routers at odd times during the 24-hour, 7-day cycle, software upgrades by the ISPs themselves, wiring changes and upgrades, power outages either at the ISPs' headquarters or in various subutilities of these carriers, other categories of random failures of the web infrastructure and so on. In general and usually in the specific, these failures are unavoidable and not repeatable. There is no ongoing pattern—effectively, you have to grin and bear them. Then there are the continual failures occasioned by Internet service providers. These can become extraordinarily vexing and remain insoluble for months at a time. These failures fall into the following categories of service provision.

'T' Circuits: These break the rules about the lack of regulation, since a combination of Governmental forces and-or the fiat of competitive business forces serve to regulate the provision of these circuits, and the 'T' circuits provide to all users (such as recording studios) the same high-reliability, high-bandwidth, high-capacity and high-cost data channels. These services are used by Government agencies, large businesses and Internet giants the size of Yahoo! and AOL—as well as by smaller entities. If the 'T' channels are not directly provided by the so-called Government regulated telephone companies—than they are provided through the telephone companies by third parties.

It is estimated by some analysts that cable modem Internet connections are only about 10% as reliable as ISDN connections, which are about 10% as reliable as 'T' carrier connections. So it may be safe to say that 'T' lines are about 100 times more reliable than Internet service provided over cable television circuitry. In addition, 'T' lines are usually owned by someone big and powerful who is paying between $200 and $2,000 per month or better for these specialised services. The bottom line is that if there is an outage, a call to the telephone company or to the third party who is reselling the 'T' services will usually bring a speedy and satisfactory outcome. 'T' services, however, account for only a very small percentage of studio Web activity despite their prominence in large studio-to-studio live projects.

ISDN: ISDN services represent a technology whose time has come and gone for most users. Due to both the marketing timidity and a lack of confidence in low pricing by the regulated telephone companies, ISDN was and remains priced at a level that makes it uneconomical for most users. With the advent of DSL, very few users will persevere with ISDN, especially with ISDN services costing $50 for a 128kbaud service and more than double for 256k baud service. In contrast, DSL (Digital Subscriber Loop) connection at approximately 700kbaud (12x conventional telephone modem) costs on average $50 per month and 1.6Mbaud DSL service (30 times conventional telephone modem) costs in the range of $100. Cable

modem Internet connections and their prodigious speed of 6Meg per minute (100x or better the 56k rate of ordinary telephone modems), cost as little as $30 to $40 per month—but the caution 'You get what you pay for' does apply.

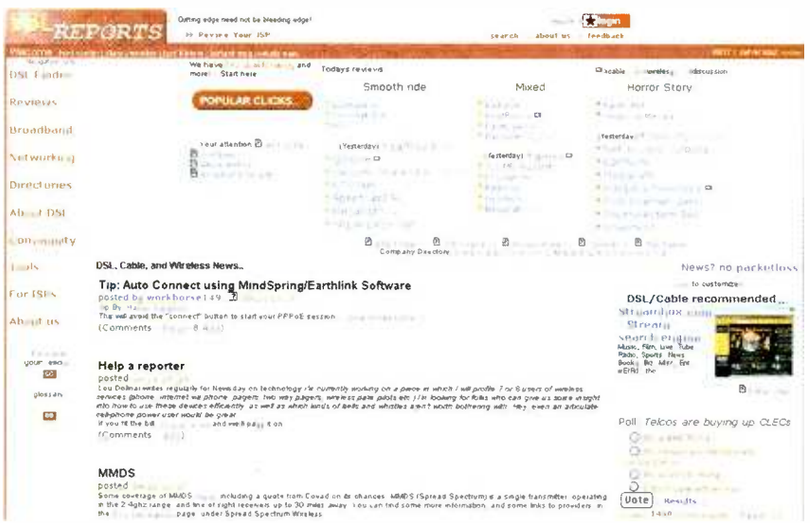
What does keep many studios connected via ISDN is the availability of a style of making connections the same way that the telephone allows users to dial specific phone numbers. In this way, point-to-point real-time connectivity is established between Studio A and Studio B at a price considerably lower than that for similarly configured 'T' lines.

Failures on today's ISDN circuits have proven to be few and far between, but it is also true that the technology is one of the oldest for making such high-speed connections and is well proven. In addition, this service is provided by or for the regulated telephone companies and a call to the appropriate repair service usually gets circuit restoration in a relatively short time period.

Dialup telephone modem service: Known to many as POTS (Plain Old Telephone Service), this is the least expensive option for the small studio. Unfortunately, it is also the least cost-effective option—offering the slowest connection and loading speeds, most susceptible to service interruptions, most prone to user concentration jam ups at ISP ports and associated 'access denied' warnings. In general, the only successful recourse is to switch service providers in the hope of achieving lessened user-competition and better service, or switching to faster and higher-priced service providers. Such telephone modem services typically can be purchased for as little as $6 per month in bulk purchase and top off at about $20 per month.

Cable modem services: Ostensibly, this is the most attractive form of Internet service available to the recording studio, as long as real-time interaction is not needed. It is relatively inexpensive, being priced at about twice the rate ($40-$50) of the best dialup telephone services. It offers among the highest speeds available (6Mb to 10Mb per minute) with relatively high bandwidth. It can be connected for Internet operations all over the studio complex, using the same coaxial or fibre-optic technology that allows users to place television sets in every room. The cable modem that is used to connect to the cable pipeline is also relatively inexpensive ($200 to the $300 price point), frequently supplied either free or at a nominal charge by the cable company.

It is also the most easily obtained form of Internet service in that, if there is a cable line 'passing' the studio by, then an Internet connection can most likely be obtained. It also is highly desirable outside the US where cable television 'physical plants' are brand new and offer the highest level of technology and service. Also, in many countries outside the US and Canada, telephone lines are 'balanced' with analogue loading coils and inductors, rendering digital copper service (ISDN or DSL) a much more difficult option to provide without reconstruction.



Unfortunately, Internet-user interaction with the cable modem service provider almost always deteriorates. Based on a simple notion that the more successful a cable provider is, the more customers will be load the various loops that make up the overall cable system. As these loops load up with Internet users, they become an increasing source of the competition for what is known in the cable trade as 'the lease' or the ability of the cable system 'head end' to recognise any users' computer address and thus grant Internet service. In other words, the busier the cable system, the less likely a user is to get connected and to stay connected at peak times. In addition, older cable plants as in the US, become much more problematical with providing 24/7 service trouble free.

Cable companies are in general non-regulated as to Internet service and frequently have customer support desks manned by those who may be less sophisticated than the average studio owner-operator. There are PC and Mac utilities that can help studio staff trouble-shoot their connections to the web, which is helpful since in general, the cable technical help desks cannot 'see' the connection from the studio to the web. Getting the cable technicians to accept user diagnosis is not the easiest thing to do. In fact, one studio pundit commented that the rules that apply in hospital also seem to apply to cable companies. 'Never listen to the patient' seemed to apply equally as well with cable Internet problem troubleshooting

DSL Services: The new kid on the block, digital subscriber loop (formerly known as asynchronous digital subscriber loop or ADSL) has become a popular alternative to cable modem service—especially for those frustrated by continuous seemingly unfixable cable modem outages. Provided either by telephone companies or those third-party companies who resell the DSL from the phone company, the service is always on and never shared with anyone else, which is more than anyone can say of cable operators. But, as a newer and lower-priced alternative either wholly or partly routed through the phone companies' copper connections, the nicest thing that can be said is that many studio users find themselves on the wrong side of the DSL learning curve.

The bottom line is that there are too many connections being established daily with too small a support infrastructure in place. As the Internet technology matures, so will the capacity of the providers to deal with failures that they have promised 24/7 response on now—but which they are currently unable

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MP3 DELIVERS

Audio post and commercial music have already been benefiting from the format's convenience and ubiquity, and new services are cropping up to further exploit it writes **Dan Daley**

NAPSTER MAY HAVE CROWDED MP3 out of the headlines, but the music file format is quietly and steadily making headway into professional audio. The controversy that has embroiled it for the last year or so is an imbroglio that has included a $multi-bn civil litigation brought (and for the most part, won) by the Record Industry Association of America on behalf of its constituency of major record labels. (Fitting irony: of the five major label groups—Sony, Time-Warner, EMI, Universal and BMG—only Warner is US-owned.) While they appear to have won in court, though, the main result of the suit has been to put MP3.com —the main user of the format as a music distribution system, specifically the search engine MyMP3.com —and the record labels into a round of negotiations that, for about $100m, will make them partners instead of adversaries.

But while MP3 has been wreaking havoc in the music industry, it's finding a niche in professional audio, particularly in jingle music and television scoring markets in the US. Commercial music facilities are beginning to embrace the format as the perfect mode in which to transfer temp music files, creating a dialogue between music house and client until the final is ready to roll out the door.

Like DAT before it and to a lesser extent thus far Sony's MiniDisc, MP3 started life as a consumer product but has found significant applications in professional audio. DAT was ultimately quashed as a consumer format after its introduction in the late eighties, mainly by record companies concerned that the tape format would enable digital cloning of their product. Litigation culminated in the 1991 Athens Agreement on digital media—which established a tax on recordable digital media which would be distributed among copyright holders—but which came too late to save DAT in the consumer market. (It's place there would be usurped six years later in a very large way by CD-R.)

However, first Sony and later a host of other equipment manufacturers found that recording studios and audio post facilities loved the compact digital tape format, and it has become a standard for mixes, audio archives and transfers. MiniDisc followed a similar, if more downmarket career path; though with only limited success in certain markets (mainly Japan) as a recordable consumer audio format, MD has found a successful niche as the engine for inexpensive multitrack audio recorders in the musician market.

Peter Lee, sales director for codec maker Dialog 4 in Ludwigsburg, Germany, notes that MP3-based music files could develop along the same lines as did DAT a decade or so earlier, replacing cassette and MiniDisc, particularly in broadcast, as a cheap, reliable and universal recordable format. However, he adds, the difference is that MP3 remains a file format, which lends itself to much faster transmission via ISDN lines and through other transmission means, such as between workstations using Dialog 4's forthcoming Music Taxi network, that moves files on LAN systems within facilities. But the quality difference remains between MP3 and uncompressed audio in the professional realm, and he's not certain how that will play out in the long run. 'For just listening and auditioning, MP3 is no problem,' he says. 'But for editing, MP3 is not as accurate as a linear file.'

But in the postproduction business, MP3 is already catching on and proliferating. Its use at JSM Music in Manhattan is typical of how the format fits into the technology picture: music files are sent via MP3 between the facility's composers and clients as writers bid on commercial projects, and as they amend, update and tweak jingles and music beds. 'We're only using it for temp files at this stage, but there are certainly far more of those than there are finals,' explains Jim Harned, senior engineer at JSM. Harned is emphatic that MP3 is not used for final versions since it's relatively high compression ratio gives its audio output less than broadcast-quality results. But the speed and facility with which MP3 files are exchanged has significantly expedited the processes of creating music, getting it approved and, on the purely business end, of landing jobs in the first place.

'The difference between a 2-hour download of 10 to 15 uncompressed music files and the 20 minutes it takes to send an MP3 file has the potential to get us into the clients' mind faster,' Harned says. 'That has two benefits: first, it makes it easier and faster to successfully bid on projects; second, it allows us to send over a lot of examples of our existing work, which often has just what the client is looking for and that helps us exploit our existing catalogue.'

The benefits are tangible from across town or across the ocean—MP3 files were used by JSM to keep their New Zealand and Singapore agency clients abreast of how their recent spots were coming along. 'That's particularly useful when you need to keep certain cultural sensitivities in mind as you create the piece,' says Harned.

JSM sends its finals over the Internet as well but for the finished version, uncompressed AIFF files are used, and are sent, as stereo interleave files in the MacBinary format, via secure FTP sites. 'That takes two hours, versus two days for Federal Express,' says Harned.

At Interface Media Group, a Washington, DC post facility, vice president for sales & marketing Adam Hurst is also a fan of MP3. 'The format provides much more flexibility and helps when there are tight deadlines.' Interface senior audio designer Grahame Davies elaborates, saying, 'The relatively high quality of MP3 means that when it comes to having custom music created for spots, the turnaround for changes has dramatically decreased. We have already used MP3 with local composers and a couple of music houses in New York City for a number of spots and on a few bumps for PBS too. Clients are excited about the ability to continue to make changes right up until the last moment; for example, we can digitise the spot to MP3, with or without temp music, and let the composer hear where the hits or turns need to be, so he or she can make fine adjustments to the score. We can just go back and forward until the client is happy.'

MP3 has applications for library music too. Says Davies, 'The possibilities when it comes to music libraries are wonderful. Sometimes you need a cut that sounds like, say, the theme to the Addams Family or the national anthem of Guatemala—something specific you just don't have in the library; soon we'll be able to call up a library, pay by credit card, and download the cut. Digidesign recently released a utility that lets us create MP3s straight out of Pro Tools, saving us a number of steps and keeping quality as high as possible.'

Libraries will doubtless move towards the Internet and MP3 or other download formats to remain competitive. The speed that the Internet offers is simply undeniable. But there are legal issues to be aware of. JSM's Jim Harned says using MP3-formatted library music is a relative rarity at the moment, due to its lower quality. But as bandwidth and quality increase commensurately, turning to downloads for finals will become more common. As will the same legal pitfalls that are currently plaguing the audio download business. 'You'll have to be better aware of the source of the music and sounds you're using,' says Manhattan music business attorney Jeffrey Jacobson. 'Until there's a foolproof way to watermark audio over the Internet, the potential for claims arising from misuse of copyrighted material is a very real one.'

Partly for this reason, not everyone is convinced that MP3 is the way to go with commercial music. Howard Schwartz, owner of commercial recording facility Howard Schwartz Recording in New York, cites security issues with MP3 for avoiding the format. Instead, HSR has established a proprietary Internet-based transfer system based on the FTP format. 'MP3 is big with kids and the record labels, but we haven't had any real demand for it,' says Schwartz. 'Most email systems have a cap between 20Mb and 40Mb on [attached] files and the agency server fire-

walls won't let files bigger than that through so we came up with Spot Drop about seven months ago.' Using Spot Drop, the completed and in-progress spots are posted as FTP files on a leased server; agency clients are then emailed an entry access code. HSR charges $50 per use for the service.

Even with this approach, Schwartz notes that the use of Internet-based systems for moving commercial audio, including other proprietary systems such as Rocket Network and radio commercial service Spottaxi.com around, is catching on mainly with the younger cohort at agencies and studios. 'The old guys don't want to know about,' he says with a laugh. 'But there are a lot of ways to move the audio around now before it ever gets on the air. And for temps, for checking sounds, instrumentation, placement or elements and mixes, most of it works on the Internet. Everything short of broadcast.'

For Rocket Network, MP3 is one of several audio file formats that the company's proprietary software can accommodate in the process of building a virtual network of Internet studios. According to Willy Henshall chairman and cofounder of Rocket Network, 'We use a plug-in scheme that uses a variety of codecs, including Q Design and MP3. We integrated this to enable the quick transfer of audio files for review and approvals between users on the Rocket system. At the end of an Internet recording session, the user transfers and receives the full-fidelity source file. MP3 is not our final delivery system, but is an integral part of the services we offer.'

On the subject of how MP3 fits into the grand scheme of pro-audio's future, Henshall says simply, 'I see MP3 as another consumer format similar to analogue cassette quality.' However, Rocket's PR manager, Sara Perkins, puts more perspective on it, noting that, 'What Rocket does is in the creative end of the music recording process; then you have software systems like Liquid Audio which prep the audio files for the Internet; then MP3 is part of the distribution process for the Internet, leading to various websites where music is stored and retrieved.'

Ironically, recording studios that are orientated towards music production seem for the most part to have been slow to react to MP3 so far. At least based on informal surveys over the last year, this writer has encountered less than a handful of commercial facilities that are offering any MP3-based services to clients; their response to the new technology has been, very much that of the major record labels, reactive rather than proactive. The few who have considered the issue cite MP3's compression as a quality deterrent.

But there is one narrow market sector that seems to be leading the way for studios in this regard: the commercial facilities that have evolved from the project studio model of the early nineties and which have entered the for-hire commercial realm. They are generally equipped with the cost-effective technology platforms, such as Pro Tools and Sonic Foundry, and their operators are younger, in their twenties and thirties, and both conversant and comfortable with the notion of integrating the Internet into their studio operations.

One studio that represents the quintessence of this, so far, small group is Antarctica, a 2-year-old recording studio-website creator company in Nashville, where the predominance of country music has caused the city's vibrant, but outgunned, alt-music culture to embrace the edges of technology perhaps more so than is done in other major markets in the US studio owner John Trevethan recently completed a mix for an upcoming Jimmy Buffet record at the studio, and the mix was posted as an MP3 file to a private section of Buffet's website for his approval. Trevethan has been doing the same for independent bands, as well, and some of those have gone further than just using MP3 as an approval format. 'In a few cases, the bands have asked us to send the MP3 version directly to a CD plant,' says Trevethan. That trend is on the rise, he adds, citing an ongoing promotion by the company MP3.com in which recording artists can have single CD-Rs burned, printed and drop-shipped directly to the buyer on demand, a service for which MP3.com charges half of whatever the artist is charging the buyer, with certain minima. 'Most independent artists think to themselves, 'Fifty per cent is still way better than what I would be getting from a major label. And MP3.com takes credit cards right over the phone.'

When MP3.com takes in a file for transfer to a physical media, it decompresses the file and brings it close to the Red Book CD specification in terms of sonic quality. That, says Trevethan, is good enough for many artists on the indie circuit. 'As a lot of customers say, it is still a lot better sounding than a cassette,' he observes.

MP3-based services are still a relatively small part of Antarctica's business, but Trevethan expects them to grow as the use of the web increases and as the record industry as it's been known for the last 70 years continues to rapidly disintegrate. 'The threshold of what's quality and what's not is changing,' he explains. 'The same thing that happened with gear over the last decade is now filtering down to the music itself. People can't hear the 'million-dollar difference' anymore between records made for a quarter of a million dollars and ones made for $25,000 or less. And really, the quality loss is only about 10% of what it would have been if the CD had been made from a glass master.'

In the music end of the pro-audio business, it appears that the smaller, younger studios are the ones who are best adapting to the new exigencies of the technological and economic models that MP3 is presenting the industry with. That it is already taking place on a regular basis in the advertising end underscores the relative youth of that industry and the target audiences it's looking for, particularly in the States, where it seems every other new major-label recording artist is still an adolescent and the number-one artist on the country charts—that bastion of tradition and historical refuge for fogies of all ages—is 11-year-old Billy Gilman.

The Britneys and 'N Synchs of the music business may be just cyclical phenomena, the ephemera that makes pop culture what it is. But the effects of MP3 on how music is perceived (as a product, or more recently, a commodity), sold, distributed and now made in the first place, is almost certain to be lasting and pervasive. As Antarctica's Trevethan points out, 'We're living in the middle of a revolution, no doubt. And it's starting to impact our end of the business. We can't just sit back and watch the record labels scramble anymore. We're scrambling now. That's why, even though I sympathise with the artists who come to this studio to make music and then see it nicked off the net with MP3, I'm glad Napster came along. We needed a new model for this business. It's been running off the old sheet-music model for over a hundred years. It's time for things to change.' □

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Sammy Peralta loves music. That pure and simple fact comes through strikingly clear as he sits at his keyboard tinkering with half-written tunes. Sammy's background includes work with talents including Tito Puente and Willie Bermudez. "I have to be careful because I can get so lost in the music, I sometimes forget I have a family that would like a little of my attention too".

One last point: Sammy Peralta's new CD ***On the One*** featuring Lenny White was mixed entirely with LSR monitors.

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Drowning in watermarks

The ripples from the SDMI watermark listening sessions are threatening to swamp the issues and drown the participants writes **Barry Fox**

I'M DROWNING IN DATA from the audio-watermarking@egroups.com bulletin board, but will try and wrap it up so that we can all get on with other things. Unfortunately the wrap-up makes a very untidy parcel.

In mid August, participants finally got the official results of the Watermarking Technology Listening Demonstration held at the Sony Music Studios, Whitfield Street, London early in July. Odd, because the SDMI and Verance had been quoting the results for a month beforehand. And SDMI boss Leonardo Chiariglione now says the tests were nothing to do with the SDMI and that, although Paul Jessop of the IFPI was there saying he represented the SDMI, he was not an SDMI spokesman. The results were signed off by Paul Jessop and Malcolm Davidson of Sony, the company that is promoting Super Audio CD, which does not use an analogue watermark.

Jessop and Davidson say the tests were intended to 'allay fears' about audibility. The equipment used was a Power Mac 8500 computer with Sonic Solutions music editing software. Although the music was 'tested' at 24 bits and 96kHz, how it was recorded remains unclear and there was no testing at the DVD-A rate of 192kHz. Complaints about the quality of music material are dismissed as coming from four people only and having 'no bearing on the results'. No mention is made of Tony Faulkner's complaint that the dCS 954 convertors were flashing error lights and occasionally muting, probably because of clocking problems.

The only admission to date is that 'one listener felt that the laptop hard-disk fan was slightly annoying', but 'this only came on intermittently prior to the disc going into standby mode'.

This was certainly not the case when I sat in on a test. The hard-drive bearing whirred all the time, with changing tone from the servo. I was told it could not be turned off. Neither Paul Jessop nor Malcolm Davidson were present, so how can they dispute what I heard with my own ears? Martin Colloms, James Mallinson, Andrew Harrison and Tony Faulkner complained, too. Colloms also complained about hum. The way this has all been glossed-over makes it hard to swallow the assurance from Jessop and Davidson: 'We take seriously the comments and statements made about these listening demonstrations, and will consider all suggestions on merit for future work.'

Twenty-seven people took part in 880 trials, and audibility rate was 50.57%. Two people refused to take part and a third gave up after one piece of music. 'Unfortunately,' says IFPI-Sony, 'these listeners have attracted the most media attention and their experience has caused much confusion in the press... the London listening tests of the Verance watermark showed that statistically the participants could not hear the embedded signal.' The 50/50 result is the same as tossing a coin. Says Andrew Mason of the BBC's Research and Development Department: 'The results did not prove the mark was audible. This is not the same as proving it is inaudible'

Mason reminds that we saw no proof that there was any watermark there to decode...

A 50-50 result from tests that compare butter with margarine, proves either that 50% of housewives prefer butter or 50% prefer margarine. Or as Francis Rumsey of the University of Surrey puts it: 'The results could have been generated by a deaf monkey pressing buttons'.

Ian Shepherd reckons the results should have read: 'A small group of male self-proclaimed audio professionals, listening on unfamiliar monitoring, to unfamiliar musical samples for an effect they had never heard before, were unable to reliably identify this effect, when listening to four samples of one or two minutes length, having on average only two minutes to make each judgement (ignoring the time taken to figure out what the effect they thought they were listening for actually was).'

Michael Bishop of Telarc wonders what the results would have been with female listeners. Dr Gilbert Soulodre, of the Advanced Audio Systems Communications Research Centre in Ottawa, thinks that if the SDMI and DVD Forum are serious about testing they should adopt the procedures laid down in ITU Recommendation BS1116. The first step is to find material that is most likely to expose defects of a system, if they exist. This is the way the BBC has always worked. Try to break a system, and if you can't, it works. The watermarkers seem to have adopted the opposite approach; they have adopted a system and now want to prove they made the right choice.

Personally I remain convinced that the London event was a time-wasting stunt. That's why no-one from the DVD Forum or 4C Entity (whose tests last year lead the Forum to adopt the Verance system for DVD-Audio) even bothered to attend. But those who took part as listeners had to give up working time or risk being branded as someone who couldn't be bothered to attend.

There are now only two real issues. Will the music companies pay Verance the high royalty rates charged to watermark music—or will they save the money and use the absence of a watermark as a selling point, like 'no added colouring' or 'grown without pesticides'? Will DVD-Audio be such a monumental commercial flop that the whole watermarking debate becomes the audio equivalent of arguing about the number of angels that can dance on the head of a pin?

Says APRS director Peter Filleul: 'The London Tests only came about as a response to the disquiet expressed by respected professional sound engineers. Producers and engineers resent being treated as after-thoughts who can be palmed off with hastily prepared palliative actions. We invited many of the attendees and the whole testing exercise seems to have posed as many questions as it has answered. There has been an almost universally ambivalent reaction to the conduct of the tests and even more consternation about how the results are being interpreted. People are surprised they all seem so proud of 50%'.

Will they save the money and use the absence of a watermark as a selling point?

At this rate, where are we going?

The days when a facility's rates offered an indication of its profitability, or that of the industry, have gone, writes **Dan Daley**

THIS BEGAN AS A DISCOURSE on the topic of studio rates. But as I mulled the subject over, I realised that I felt like the guy on the military base in South Dakota who, having been alerted that armed Soviet missiles were about to impact on his base, wondered if he had enough petrol in the car for his weekend shopping. Aside from the fact that it's basic human nature to use the mundane to maintain order as the world falls apart around you, it's also increasingly apparent that the matter of studio rates has definitely entered the realm of the quotidian as the studio business undergoes upheaval.

The whole issue of rates is rapidly becoming more irrelevant as an industry-wide measure of anything meaningful. When hit records can and are made in environments ranging from the palatial to holes in the wall, when the sonic quality of the end result is only marginally different between a £5,000 desk and one costing 20 times as much, with a download-crazed audience on whom even that marginal difference is completely lost, the only thing rates provide is an indication of whether any given studio is making a profit at any given time. Rate overviews no longer tell us anything about the industry as a whole; they're only useful to the banker to whom you are submitting an application for a loan to buy more equipment that the rates can't amortise anyway.

At one time, when there were fewer large-platform technology choices and everyone in a particular market faced the same sort of overhead conditions, rates were the economic equivalent of a local weather report. Collect the daily or hourly rates at a representative handful of facilities in, New York or Los Angeles or London, and you'd have an idea of how the market as a whole was faring. With data from the key national markets, you could infer the status of an entire country's studio business with relative accuracy.

Not anymore. If you think I'm overboard, apply the same logic to other industries. Take the airline business, which like the studio business has a relatively small number of high-end platforms (aircraft) to choose from and which, again like the studio business, promotes the latest and biggest of them as part of their overall marketing strategies. Could you tell the relative economic health of a particular airline from what it charges per seat? Of course not. The same two seats on the same plane on the same flight can cost wildly differing amounts, depending upon when you bought the ticket, who you bought it from, how you paid for it, and so on. A half-full aeroplane with full-fare ticket-holders can be a better return on investment than an aircraft completely full of discounted holidaymakers.

To this economic optical illusion you have to add the

compound problem of competition. Since the airways in the US were deregulated in 1978, scores of new airlines have popped up, most offering fewer frills in exchange for cheaper tickets. Now consumers can shop price and service, and look for the mix of the two that best suit them.

The aircraft industry has yet to come up with the flying equivalent of a Mackie 8-bus, but it's evident that that business was no longer a playing field with clear rules, much less a level surface. In the contemporary studio business, a £2,000-per-day room should make more profit than a £200-per-day one, but that's not often the case anymore. Profitability depends upon far too many factors. The ability to accomplish about 90% of what goes on in music and postproduction today can be accessed by a much wider range of facilities offering a much wider range of equipment and services. And the overall condition of the entertainment industry, which the studio business ultimately serves, has to be taken into account, just as airlines have to know that full overall employment means more people with disposable income for travel. And at the moment, the entertainment business is consolidating like crazy and focusing on cutting production budgets for all but the largest acts. Simply put, rates alone are no longer a meaningful way to measure a market's viability.

What is? At the risk of sounding trendy, the most useful measure I've seen lately is 'innovativeness', whether it's in the business plan or in technology. Innovativeness is the economic equivalent of the Darwinian adaptability that some species have managed in the face of dramatic change, and others haven't. I've heard snickers in Nashville about both Emerald Recording's cobbling together of a local empire by acquiring various facilities around town, and Sound Kitchen's so-called Home Depot approach to the studio business, offering workaday-type rooms at every day discount prices. And I've heard the admonitions about The Hit Factory's attempts at eastern seaboard hegemony in its take-over of Criteria in Miami. But right or wrong, these facilities have taken relatively dramatic and definitely proactive steps to adapt to a radically changing business landscape. More power to them and to all facilities that attempt these adaptations. Same for Internet-based ideas like Rocket Network, which has the potential to further alter the traditional studio business.

Checking studio rates used to be knee-jerk part of examining the studio business. Hand-cranking the engine used to be a normal part of starting a car. Both have evolved out of the everyday picture. But cars and studios are still with us, and will be for a long time to come. Evolution hasn't undermined the need for either yet. But don't think of the term 'innovation' as some cheap catchphrase on a dot.com commercial. In this business, it's more than a concept these days—it's survival.

Sex, lies and videofeeds

If George Orwell's Big Brother sought to control the populous, his TV namesake seems more intent on populising voyeurism and taxing technology writes **Kevin Hilton**

THERE IS SOMETHING in the human psyche that allows the mind to be easily distracted, a disproportionate interest in minutiae or trivia is merely an excuse not to concentrate on what is truly important. The current interest in delivery is a classic example of this. Delivery is hugely important in its own right, otherwise I would not be now writing a column dedicated to the subject; but it is a means to facilitate something else. If we focus too much on the mechanics, the other elements can be forgotten and the emphasis shifts unnecessarily.

The International Broadcasting Convention is a technology show, but it does attempt to balance mechanics with creativity by incorporating the Le Nombre d'Or wide-screen television awards. One of this year's winners was the documentary *Mozart in Turkey*. Producer-director Mick Csáky commented after the presentation: 'Our film is a human story but without the technology we couldn't have made it.'

An opposite view was put to me a week or so before the show by Niclas Bergman, managing director of the Edithouse postproduction facility in Sweden. He was returning to IBC after skipping the 1999 event because he felt there was too much emphasis on compression and hard-disk servers. 'It will be interesting to see whether people are thinking about how to make the content better,' he said. 'This business should not just be about how to send the content.'

The trick is being able to use the latest technologies to make and-or enhance material that has the head-start of decent content, namely good ideas, acting, writing and direction. The IBC indirectly highlighted this issue through a television programme that has transcended the usual boundaries and become a phenomenon. This is not unusual in TV: the conclusion of *The Fugitive*, the Who Shot JR? episodes of *Dallas* and the Who Murdered Laura Palmer? tease in *Twin Peaks* all sucked viewers around the world into a parallel world.

But those were dramas. This new phenomenon is a drama in the sense of the human tension and conflict involved but is ostensibly a fly-on-the-wall documentary spliced with social experimentation and a game show. *Big Brother* is an uneasy, voyeuristic mix of all these elements, relying on modern TV and surveillance technology to provide 24-hour coverage. The programme first appeared on Dutch TV, so it was fitting to be in Amsterdam during IBC with many British visitors furiously telephoning, emailing and texting friends back in the UK to get the latest news about what was happening in The House.

Another important factor has been the Internet, which has enabled the true fans to watch the human guinea pigs at any time they wish, with the ability to select camera angles and microphone feeds. This Webcast superseded the main, traditional TV coverage when the drama that viewers knew was unfolding finally climaxed. Nasty Nick, the contestant beloved and trusted by his fellow house-mates, was in reality a mendacious, would-be Machiavellian cheat, something the TV-Internet audience knew pretty much from the beginning.

His duplicitous shenanigans were discovered by his fellows over a weekend, but the TV programme waited until mid-week to reveal what was going on. Those accessing the website knew exactly what this was and consequently traffic increased. When he was unmasked as the liar he was and finally decided to leave The House, the server could not cope and crashed. There is the conspiracy theory that the feed was deliberately cut because some of the other contestants decided to exact physical revenge on their former nominal leader.

By the time the fully edited TV special cataloguing these events was aired, everyone in the UK knew what had happened. The Webcast had alerted the newspapers and TV and radio news. Nick's departure was even screened on a massive videowall in London's Piccadilly Circus. All of this underlines the potential power of Internet broadcasting, but it also highlights the shortcomings. Internet connections are nowhere near powerful or robust enough to sustain this kind of usage. It is also a totally linear activity, forcing the viewer to sit through hours of live coverage.

When the TV special was aired, it was like a true drama, because the crew had had the luxury of time to polish the production. But the question of content remains. *Big Brother* is the televisual equivalent of a car crash. You know you shouldn't watch, but the temptation is too strong. When I first saw it I was immediately reminded of an early seventies TV play, *The Year of the Sex Olympics*, written by Nigel Kneale, creator of the *Quatermass* series. In a dystopian future, a family go to a deserted island. Unbeknownst to them they are being filmed for a 24-hour TV show—and there is a murderous lunatic on the loose too. Presumably a true version of this will be coming to a PC near you very soon. □

Big Brother is an uneasy, voyeuristic mix relying on modern TV and surveillance technology

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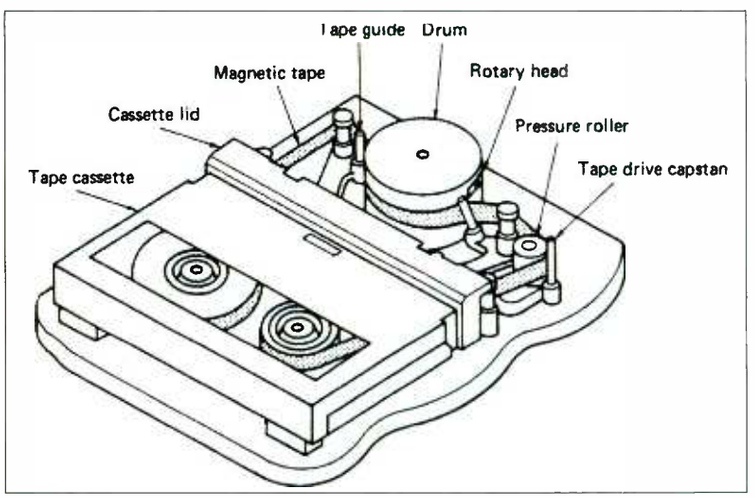
R-DAT

Our look at digital tape continues with the pocket rocket format. HHB's **Paul Isaacs** looks at its workings, peculiarities and its maintenance

IN 1987 SONY LAUNCHED the DTC1000ES and in doing so established DAT recorders as viable replacements for digital audio processors. The advantages were high sound quality, size, storage capacity and lower hardware and media costs.

There were problems in the early days because there was no confidence monitoring and as a precaution most professional users always recorded in duplicate until 4-head recorders were developed. The first 4-head DAT was the Fostex D-20 in 1991 and features included time code and improved error correction. Sony followed with its 4-head 7000 series and these were the first to be able to record to the IEC time-code standard.

Portable DAT recorders followed such as the Sony TCD-10, Casio DA-2, Panasonic SV260 and the even smaller HHB1 PRO. In 1992 Stellavox came out with the Stelladat portable 4-head recorder and from 1993 the Stelladat was manufactured by Sonosax who developed and improved the recorder. HHB produced the PDR1000 and PDR1000TC in 1994 which went on to become something of a standard in location recorders.



Improved reliability, more features and much lower price made it the format in most professional recording applications. DAT had superceded reel-to-reel analogue.

How does DAT work?

DAT is a 16-bit, rotary-head, digital-recording system based on the rotary-head system used in video recorders that required a high bandwidth for the video signal and the first experimental recorders were developed by Sony. Data is stored on digital audio tape using magnetic principles. A digital 1 might correspond to a microscopic N-S magnet and a digital 0 to the inverse, a S-N magnet.

Two or four magnetic heads are mounted inside a rotary drum. In a 2-head DAT recorder these heads are positioned 180° apart on opposing sides of the drum. However, unlike video, DAT stores data in bursts—digital audio from the input is stored in memory and then written to tape at a higher rate than used for sampling, leaving gaps in between. The tape does not have to be always in contact with the heads and is therefore not wrapped 180° around them, making tape loading and unloading far simpler. The tape wrap angle in most recorders is 90°, this reduces friction and wear on the tape and head particularly when spooling at high speeds.

The data density on a DAT tape is extremely high. The data rate to and from the tape is 9.408Mbs and with a tape speed of 8.15mm/sec the size of the data is microscopic. This high data rate comprises the linear PCM data (32k, 44.1k, 48k samples/sec x 2 channels x 16 bits), sub code data (for example Absolute time ABS, ID information, and so on) additional data for error correction purposes, and 8-10 modulation converting 8-bit bytes to 10-bit words with desirable physical characteristics for storing data on tape.

To increase the head-to-tape speed, the drum rotates at 2,000rpm, in the same direction as the tape motion. This rotary drum is also at a slight angle to the tape, producing long, narrow slanting tracks of information on the tape. As each head is about 20 microns wide and each tape track is 13 microns, there will always be some overlapping of the tracks. The track from the second head will always partially overlap the track laid down by the first head. To prevent interference between adjacent tracks, each of the heads is at a slightly different angle to the tape track ±20°; this angle is known as the azimuth. This change of angle reduces crosstalk between adjoining tracks during replay, since any unwanted signal from a neighbouring track will be picked up at too low a level to be interpreted as part of the digital signal. There are also two linear tracks that run along the edge of the tape but these are rarely used.

Essentially there are four important areas of data stored on a track as it is scanned by the rotary head-drum. The main area is in the centre of the tape where the PCM audio data is recorded and either side is the ATF (area track following sometimes called automatic track following) and finally the subcode data that contains time information, start and end IDs and programme numbers and lastly the clock signal. The ATF signal controls the capstan speed and ensures that the head passes through the centre of the track being read.

The very success of DAT created problems as some customers started to believe that if it was digital it never went wrong and maintenance was not as important as it was with analogue recorders.

From the sixties to early nineties the most important part of preparation was cleaning the heads of the recorder, checking and adjusting frequency response in playback and record modes and checking the azimuth for phase alignment. With digital recorders you merely popped a tape in and possibly put some line up tone at the start of the tape. Wrong.

[illegible] DAT recording faults

1. Chewed tape.
2. Digital glitching. High error rates/drop-outs.
3. Tape transport problems, fast forward or rewind
4. Not loading/unloading.
5. Tape stopping, cleaning message or caution
6. Not recording, not replaying.
7. Missing IDs or A time
8. Will not replay tapes recorded on other recorders and vice versa.
9. Tracking

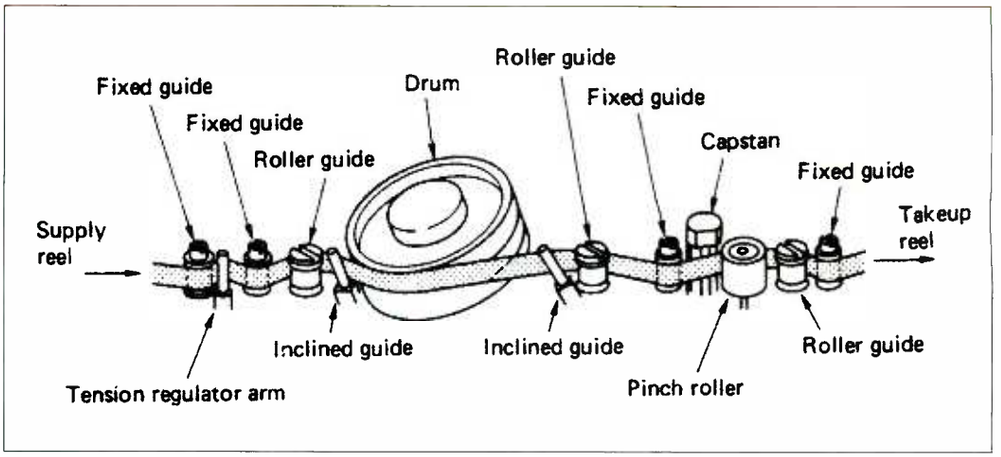
What these faults all have in common is that they are all due to mechanical alignment or wear and are largely avoidable if the recorders are serviced regularly.

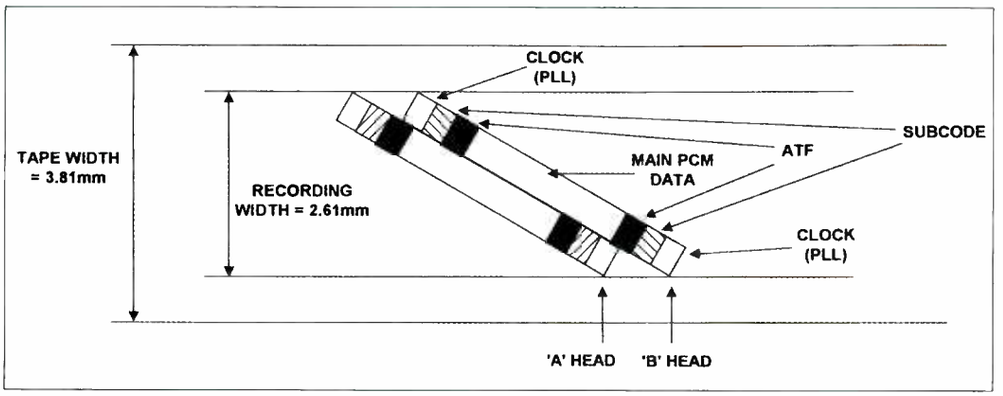
HHB recommends that a DAT machine should be serviced every 500 hours or at least once a year depending on how much usage the recorder gets. Incidentally the Panasonic SV3800 has a clock that records when the head is rotating and unlike many other DAT recorders that automatically unlace the tape and stop the head rotating after no function command has been received for several minutes, the 3800 will be laced up with the capstan and head rotating as long as there is a tape in the mechanism.

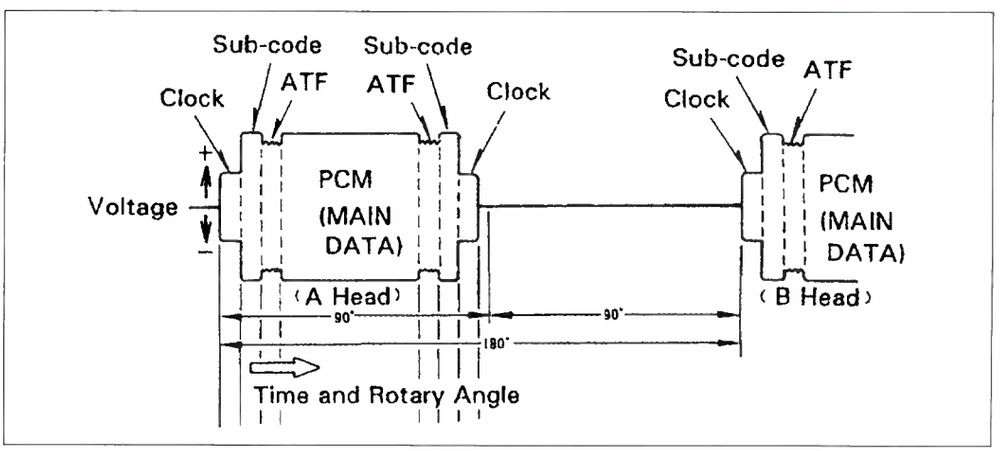
Even if the recorder has had little use it is still advisable to have it serviced annually because lubricants deteriorate with time and some rubber components age harden. Unlike an analogue audio signal that will often give audible clues that something is amiss due to misalignment, digital recorders will frequently just stop outputting or recording audio. This is often due to the error-correction system that can no longer correct the errors due to mechanical problems and the audio is muted. It is this intermittent muting that is often described as 'glitching'. However, before muting occurs, the error-correction system tries to 'interpolate' uncorrectable samples. It does this by making an educated guess as to what the missing samples are.

If the errors are too high, interpolation is impossible and audio muting will occur. To ensure that the tracking of your recorder is correct, try playing a tape recorded on your recorder on another other known

Ad Index







good machines and vice versa. Audio drop-outs, digital glitching or no audio at all will point to alignment or tracking problems.

All components in the tape path have to be correctly aligned, clean and within production tolerances to give optimum performance. Do not compromise performance by using cheap DAT tape, a good quality tape will not shed the metal particle layer that causes head wear, clogging and higher block-error rates.

Some recorders will display error messages to assist you in diagnosing a problem, always consult your user manual and where possible get it serviced as soon as possible. You may get away with a problem once or twice, but problems rarely rectify themselves. Many customers say 'it started to play up several weeks ago and now I have ruined a master copy.' A stitch in time!

In a standard service the following parts are checked, cleaned and aligned or changed as necessary: pinch roller, capstan, drum assembly, reel tables (not shown in diagram), tape guides and rollers. In addition the load and unload functions are checked together with fast forward, rewind and brake functions. After all these checks have been carried out the following adjustments are made: supply and take up reel tensions, capstan speed, automatic track find (ATF), drum phase and tracking.

Finally the recorder is put through a record-replay error-rate check and at HHB checked on a Sony PCM7040 for recorder compatibility.

It is imperative that the mechanism and especially the tape path is free from dust and contamination of any kind, otherwise the rate of data errors will be high.

It is essential that parts in the load-unload mechanism and tape-transport path move freely. For instance the tape guides must load the tape smoothly towards the rotating head. Lubrication can become more viscous over a time causing friction and not

allowing parts to move smoothly. This old lubrication has to be removed, the moving parts cleaned and relubricated.

A DAT mechanism is a high precision piece of engineering that is reliant on the quality, tolerances and the correct alignment of its components. Worn pinch rollers and capstans can cause tape slippage. Worn guides will cause poor tracking. Chewed or creased tapes are caused by brakes or gears that are worn. Data corruption is often a result of a worn head or capstan. It is therefore essential before any alignments are made that worn parts are replaced.

Alignment

In order to ensure good tape handling and tape packing, the tape tension has to be set correctly. Back tension, tension on the supply side should be aligned before and after all the other adjustments have been performed. Some recorders use electronic back tension control, for example the Sony DTC1000, whereas others, such as Panasonic SV3700 and SV3800, use mechanical control. Others, like the HHB Portadat, automatically control the back tension.

For the data on the tape to be written correctly, the capstan speed has to be set accurately at 8.15mm per second. The speed is usually monitored by sensing tacho pulses coming from the flywheel of the capstan. This is the speed of the capstan when recording on a blank tape. During playback of the recorded data, the capstan speed is modulated by a fine capstan speed control derived from the ATF system.

Tracking is a mechanical adjustment and is probably the biggest single cause of high error rates, glitching and incompatibility between recorders. Tracking is associated with the height of the tape against the head. There are two guides responsible for the tracking. They are the supply guide (lead into the head) and the take-up guide (exit or lead out from the head).

Drum phase is the time delay from the start of a head revolution to the beginning of the first RF signal, or some other predetermined point. It is essential that all DAT recorders are aligned to the same specification otherwise incompatibilities will occur. This line-up procedure is usually made by the adjustment of a potentiometer in the servo circuit.

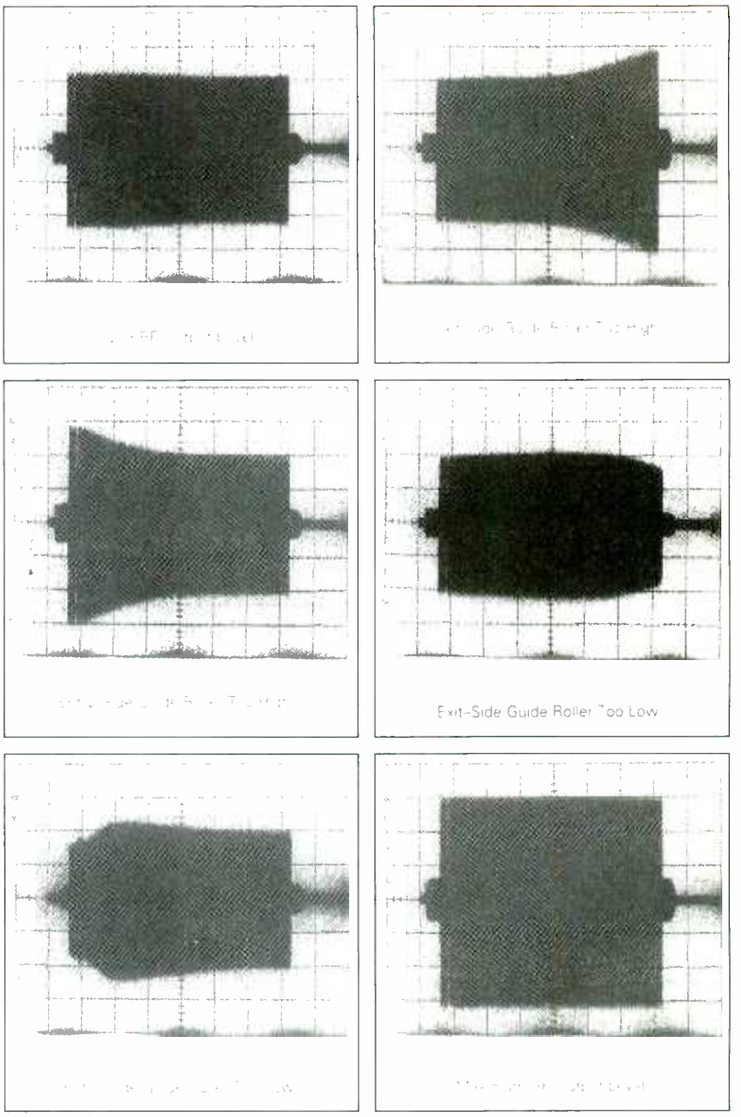
The clock information at either side of the RF waveform is used by the playback decoding Phase Locked Loop (PLL) to synchronise to the RF data rate. The fact that the data rate is so high and that tape, mechanical and servo tolerances can cause fluctuations in this data rate, means that there must be some system in place to clock out the data from the tape at exactly the correct rate. Otherwise the data will be decoded at the wrong time and this will result in high errors. A PLL is a well-known circuit, designed to lock itself to this external clock. Sometimes it is necessary to set the nominal clock frequency of the PLL.

The ATF system ensures that each head reads the centre of the correct associated track. This is achieved by ensuring that the ATF pilot signals (130kHz) recorded on adjacent tracks either side of the track that is being read are equal in amplitude. If they are equal in amplitude then subtracting one from the other will result in a tracking error equal to zero. If the head is not over the centre of the track to be read, this will result in the ATF signals on one or other of the adjacent tracks to have a higher amplitude than those on the opposite neighbouring track. Subtracting one from the other will result in a nonzero tracking error that can be used to control the speed of the capstan motor. The servo system will constantly adjust to maintain a tracking error equal to zero, thus maintaining correct tracking of the heads.

HHB has recommended to users who have their own service departments that is worth recording five or ten minutes of silence on every recorder about once a month and then analysing the RF waveform. This simple exercise will often give early warning of potential problems with DAT recorders.

The RF waveform will indicate whether the tape guides are set to place the tape at the correct height as it is scanned by the rotary head. The RF pattern diagrams will provide helpful information to point you in the right direction about what needs to be aligned or changed.

Correct tracking results in a stable rectangle RF waveform as above. Top and bottom edges should be parallel and PLL clock bursts on the left and right-hand sides should be as square as possible. If the tracking is correct, but the top and bottom edges are not flat, this is a sign of head wear.



Finally examine the tape packing, a smooth pack is a good sign. If the tape is doughnutting or showing signs of very uneven packing, then you have a potential problem. An uneven pack causes changes in internal tension in the tape and this can upset the servo logic and cause the tape transport to stop as the recorder is instructed to stop to prevent tape damage. If you have a problem that you think is a tape fault—think again. DAT tape problems caused by manufacturing defects are extremely rare.

Then examine the tape for clues with a small magnifying glass at the point where the problem occurred. Slide back the bottom covering plate while depressing the two slider locking lugs. This enables the front flap to be lifted and the tape can be examined. I have found it useful to use the end of a pencil that has a soft rubber eraser to move the take up or supply hub to examine a length of tape.

Look at the edges, are there any signs of damage to the lower or upper tape edges. Examine the tape for obvious crease marks or small pit marks, this usually indicates problems with the wear or dirt on the pinch wheel, capstan, or guides. Sometimes you may see grease contamination on the tape. If you should encounter this problem do not use the recorder or tape again until the recorder has been serviced. Grease contamination on the head could mean an expensive head replacement.

Talking of expense what does it cost to have a service on a DAT recorder? A regular service takes two to three hours for most recorders, so the labour cost will be between £110 and £160. parts will vary depending on the condition of the recorder and how regularly it is serviced, but allow for say a pinchroller, supply and take up guides and possibly brakes, about £55. An average price would be between £165 and £220.

Expensive? Not if your livelihood depends on it and you like to have happy and satisfied customers. The fact is that a regular service will cost more or less the same whether you have spent £600 or £4,000 on the machine. Customers who have bought at the budget end of the market do not like having to pay a third of the value of the recorder for one service and the temptation is to hang on until it goes wrong, usually catastrophically and embarrassingly in front of a customer. Unfortunately we now live in a society of rapidly changing technology and customers have difficult choices to make. Do I buy cheap and often because today's technology will be out of date next year or buy expensive and invest in maintaining the equipment because the technology is going to be around for a few more years?

Whatever your decision—regular servicing is essential. □

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CONVERGENCE

With audio, film, video and computers becoming inseparable, audio engineers increasingly find themselves working with other technologies. **John Watkinson** argues that an understanding of the basics always makes a job easier

ONCE UPON A TIME technology was difficult, rare and expensive. Equipment was in service which was little removed from the prototype and it needed constant attention to keep it in service. It was important to know how the equipment worked in order to use it within its limitations and to fix it. Alongside the high cost of the equipment, the cost of training and supporting skilled staff wasn't conspicuous.

In practice this led to specialisation and isolation. The audio industry had its own set of specialised equipment and terminology which was unrecognisable to the computer industry which in turn was unrecognisable to the television industry. Given that all three industries were dealing with information, that isolation couldn't last indefinitely. The invention of PCM by Reeves allowed audio and video to be expressed as data which was basically indistinguishable from computer data. PCM in itself didn't break the partitions between the industries, because it could not be adopted until it became economic. It was the microchip that did that.

Integrated circuits are to transistors what the printing press is to the typewriter. As manufacturers learn to pack more logic into a chip, several things happen (Fig.1). At the top of the market, new processes become possible which were previously impossible, or processes that used to take forever can be addressed in real time. At the bottom end, products that were too expensive become affordable provided that they are uniform and commoditised.

The first digital audio recorders were more expensive than their analogue equivalents but as time went by two things happened. First, the cost fell (rapidly) and second people started to realise (slowly) that what they wanted was solutions, not a particular technology. For example, editing is so much quicker when the material is stored on a disk drive. It was inevitable that it would subsequently become economic to edit video and movies on a disk-drive-based system. Audio and video editors are simply word processors with greater horsepower.

Alongside the reduction in cost allowed by microelectronics came an increase in reliability. In effect, the technology became advanced enough to adjust itself. This led to a change in the way products are used. With less operating skill and less maintenance needed, anyone could use the equipment. Without a need for full-time maintenance staff, the home audio studio became a reality.

Modern digital equipment doesn't need a great deal of technical knowledge to operate and so the skills needed have changed. Instead of a depth of knowledge in a narrow subject area, today a broader range of knowledge is needed. In today's audio industry, there has never been a greater number of ways to capture, process and deliver audio, and in many of these ways it is implicit that there will be associated pictures.

Changes in the television industry have paralleled changes in audio. There too the emphasis has changed towards digital equipment which is easy to operate and reliable. But television has been under greater pressure to change its ways. At one time, the viewer had to watch what was being broadcast in real time, but this changed with the advent of the consumer video recorder and will change again as disc-based video recording becomes consumer technology. Once the consumer has nonlinear editing, he or she need never see another TV commercial and this has some interesting consequences.

Another issue with analogue television broadcasting was the wide bandwidth required for one TV channel. With increasing pressure from genuine mobile services such as cellular telephones, terrestrial television has to go digital, not to improve picture quality, but to deliver the same service with less bandwidth. The vast majority of TV sets aren't mobile. Why use radio waves to communicate with a device which is constrained by a power cord?

When a TV set capable of receiving digital television broadcasts is analysed, it really doesn't contain parts or technologies which differ significantly from those in a personal computer which leaves us wondering why both are needed. We could move on and consider what would be possible if the advantages of both were combined.

With television in a state of flux, I don't see any point in coming out with a conventional treatment of how television works. Instead what I propose to do is to look from another angle. Today's television standards are a compromise and for various reasons are not optimal. If television has to change, then why not look at ways in which it could improve rather than dissecting it like a specimen?

Instead of just giving a load of facts describing today's television standards, I think it would be much more interesting to see why those standards are the way they are and to look at how the decisions were taken. Today we also have to take decisions and it is much easier to take them if we know why rather than what. To give an example, someone who only knows what may have learned that a certain process is impossible. They may continue to believe this indefinitely, while those who know why will understand that the impossibility was due to lack of suitable materials. As soon as these materials become available, the impossibility disappears, except in the mind of someone who only remembers the fact that it is impossible.

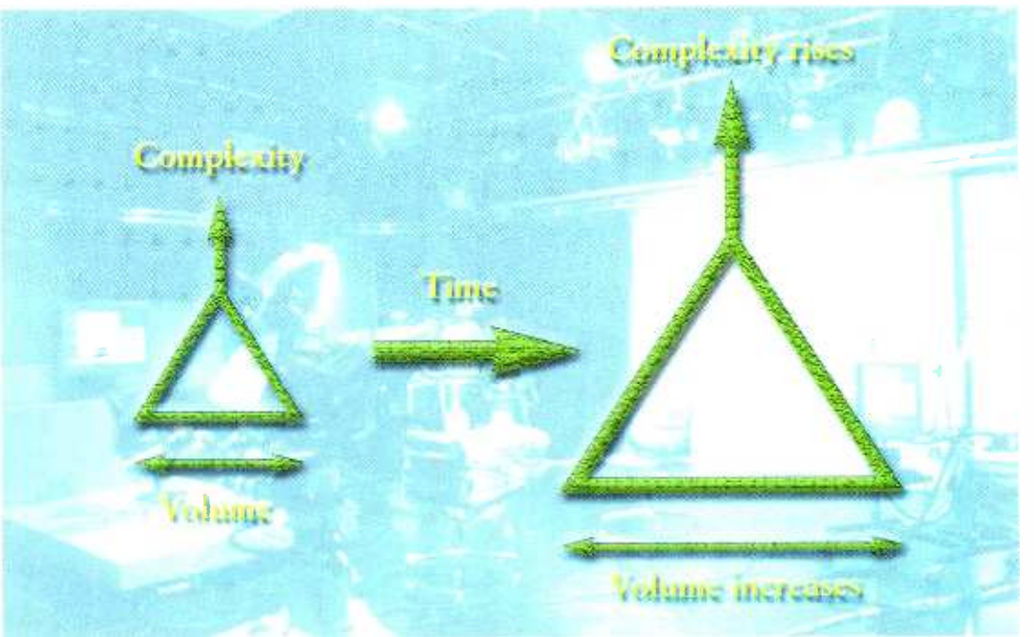

Fig.1: As time progresses, electronic equipment can get cheaper, or do more complex tasks

Normally the role of remembering obsolete facts is taken by politicians. The majority of politicians are classically educated and don't know technology from a hole in the ground. Despite that they take decisions affecting a technologically based society every day and many of them are scary. However, we must not rush to condemn ignorant politicians unless we can say we tried to educate them. Engineers in particular tend to be very poor at explaining what they do and why, especially in non-technical terms.

Fig.2 shows some areas of imaging technology which we will cover. The history of television is fascinating and was yet another area where we find a strong contribution made by Alan Blumlein who was equally happy with audio, video and radar equipment. Monochrome television led to colour television

and composite video. It also led to the monstrosity of drop-frame time code. Where did that come from and why is it needed? Stay tuned.

Imaging technologies such as film and video ought to pay attention to the human visual system, just as audio does to human hearing. Interestingly, the human visual system wasn't understood when film and television systems were designed. Designers worked empirically and hoped for the best. Acceptable then, but not today when we could do much better.

Computer graphics has produced one set of standards for digital imaging and television has produced another. Needless to say they are incompatible. Why is this and is it possible to convert between standards?

While in audio we strive for linearity, in video we strive for nonlinearity. Everything is distorted deliberately by a process known as gamma. Why is this and what does it achieve? Why does the brightness control ruin the contrast? Why does the contrast control affect the resolution? Colorimetry is another poorly understood subject. No-one knows why we see colour as we do, but with our imperfect understanding we can make imaging systems which reproduce colour fairly well. Not surprisingly different standards are used in computers, television, film and printing and this can be a minefield when attempting to converge technologies.

Video compression is a vital enabling technology. Without it there would be no DVD, no DV camcorders, no Internet video, no digital television broadcasting. Clearly this is a topic to consider.

When audio and pictures are just packets of data delivered by some arbitrary network, how is the correct sampling rate recreated at the destination and how is lip-sync obtained? In audio, hard-disk storage, DAT and compact disc can give the same sound quality so that it is impossible to tell what medium was used. Why then do film, CRTs, plasma displays and LCDs look different when all that should be seen is the original image? Clearly there is something non-ideal about these devices. Can it be put right or is it fundamental?

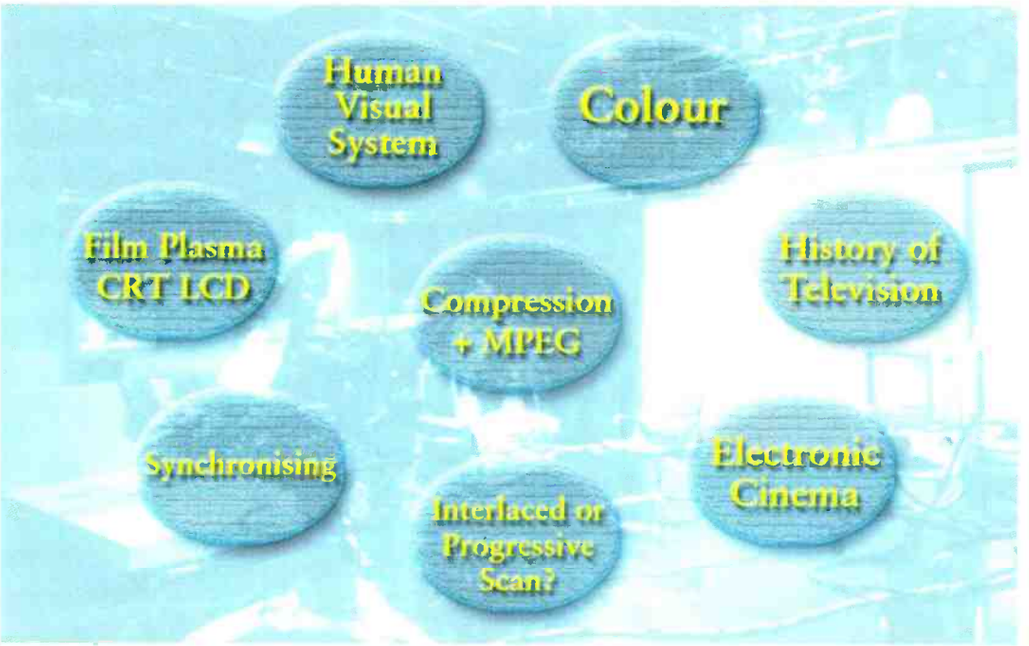

Fig.2: Some of the topics worth considering in imaging technology

Film is the oldest moving-image medium and is starting to become expensive. Despite the mythology the quality isn't all that good and electronic systems are catching up. When they do, electronic cinema will arrive with a bang because it is economically advantageous. Will electronic cinema deliver a new and better experience, or will it just be the same old stuff delivered by a cheaper mechanism?

This, then, is a taster of what is to come. One thing, however, hasn't changed and that is the approach: myths exploded within the hour or the next one free! □

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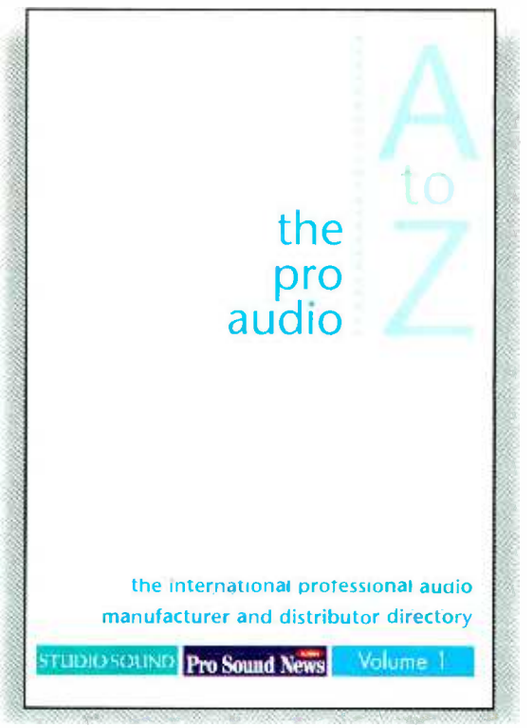

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17–18
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7–10
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8–9
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LETTERS

Fan mail

WITH REFERENCE to the review of the Amek Pure Path 'Channel in a Box' conducted by George Shilling (*Studio Sound*, July 2000). We thank George for bringing the slight fan noise that was present on the unit to our attention. Please publish this letter so that your readers are aware that we have now rectified this problem by installing a new 'super quiet' fan in the unit. Replacement fans are available to existing Channel in a Box customers.

Chris Ellerby, marketing manager, Amek, UK.

No compromise, please

I READ Zenon Schoepe's articles (*Studio Sound*, May 2000) on both the HHb MDP500 Portadisc and the Tascam MD-301 with considerable disquiet. While I have no doubt that the HHb machine is well made, full of features that a professional user would wish to use and is a good value piece of kit, I don't think the format itself can be regarded in the slightest as professional.

MiniDisc (along with all manner of other systems such as DAB, MP3, apt-X, AC3 Musicam, and so on) was designed as a final delivery format, and it does this job admirably. The trouble is, the industry has started to use these systems elsewhere in the chain, especially in broadcasting. In radio it is, unfortunately, not uncommon for a voice-over to be sent to a production house by ISDN (probably only at 128kbit), recorded onto MiniDisc, processed in some manner, recorded back to MD, sent to the radio stations by ISDN (albeit at a higher bit rate) then recorded onto the station's commercial playout system at yet another bit rate. If the subsequent broadcast is sent via a compressed system to the transmitter (or worse to DAB) the resulting audio is pretty awful. You can hear examples played on UK radio stations (including mine I am sad to admit) every day. Chris Woolf, in his article on digital radio mics in the same issue, points out some of the problems.

I know that readers will be saying 'but DAT was a domestic system that fulfilled a professional need, why shouldn't MiniDisc'. I argue that MD is different—at least DAT tried to preserve the original audio. MD, by its nature, deliberately alters it.

Studio Sound is a professional publication. Please don't let's give credence to the idea that MiniDisc is adequate for any sort of production audio. Just because it's cheap and convenient and sounds okay to the recordist after one pass doesn't mean it's good or correct practice.

John Sullivan, Head of Facilities and Engineering, Classic FM, UK

Zenon Schoepe replies:
You are absolutely right about the appearance of delivery formats elsewhere in the production chain and I share your disquiet at these developments. However, I can't take to your points on the the professionalism of MD as a format as I for one would prefer it above the timeless classic of compact cassette that it effectively replaces in identical applications.

Professionalism is too often attributed only to the existence of front panel legending proclaiming it or the higher end of the price scale. While it is true that the word and the price ticket frequently do co-exist on the same product, the reality is that suitability of a given box for a given task depends entirely on the discretion and skill of the operator. It's why the Uher became such a workhorse and why studio's bought 'professional' cassette decks with 3-heads, multiple motors, balanced XLR I-Os, and line up trims.

The problems lie in the inappropriate use of technology and if the combination of repeated use of ISDN, MD, processing, bit rate scaling and compression results in audio that is 'pretty awful' why identify MD as the culprit? The flaw surely lies in the production chain and those that have created it.

In my travels I get to see a lot of broadcasting audio facilities and the most contented and relaxed tend to be those that have thought and planned their production architecture through and implement it on a date having stuck resolutely to the previous 'primitive' solution until then. The ones with the chewed nails and the crazy eyes are always the ones that bolt-on bits on a regular basis. They're slipping on new seat covers, mirrors and a chrome rocker cover while the engine and transmission are shot and about to fall through the rusted supports.

I also don't like lossy compression systems on principle, but I also harbour an objection to being denied super-20kHz signals in other digital formats. I'm not mad about the dynamic range of cassette as well. DAT also had to endure the same abominations of the ill-planned production chain despite being higher born.

The credance of MD is in the using and used correctly and appropriately it is perfectly adequate for certain sorts of production work. The rugged portable machines can also be used to chock a wheel when the handbrake fails and its cheaper than using a DAT equivalent.

Essay, essay, essay

WITH REFERENCE TO Gordon Reid's Open Mic 'Maintaining the Standard' (*Studio Sound*, June 2000)—thank you Gordon! Your essay is great! It is now displayed in my office. Only one thing remains unexplained: The Director of the Really Quite Big Audio Inc is no engineer but a money man. Engineers have long understood that perpetual motion is impossible while others continue to base their efforts on their belief in unlimited growth at any price.

Joerg Wuttke, technical director of Schoeps

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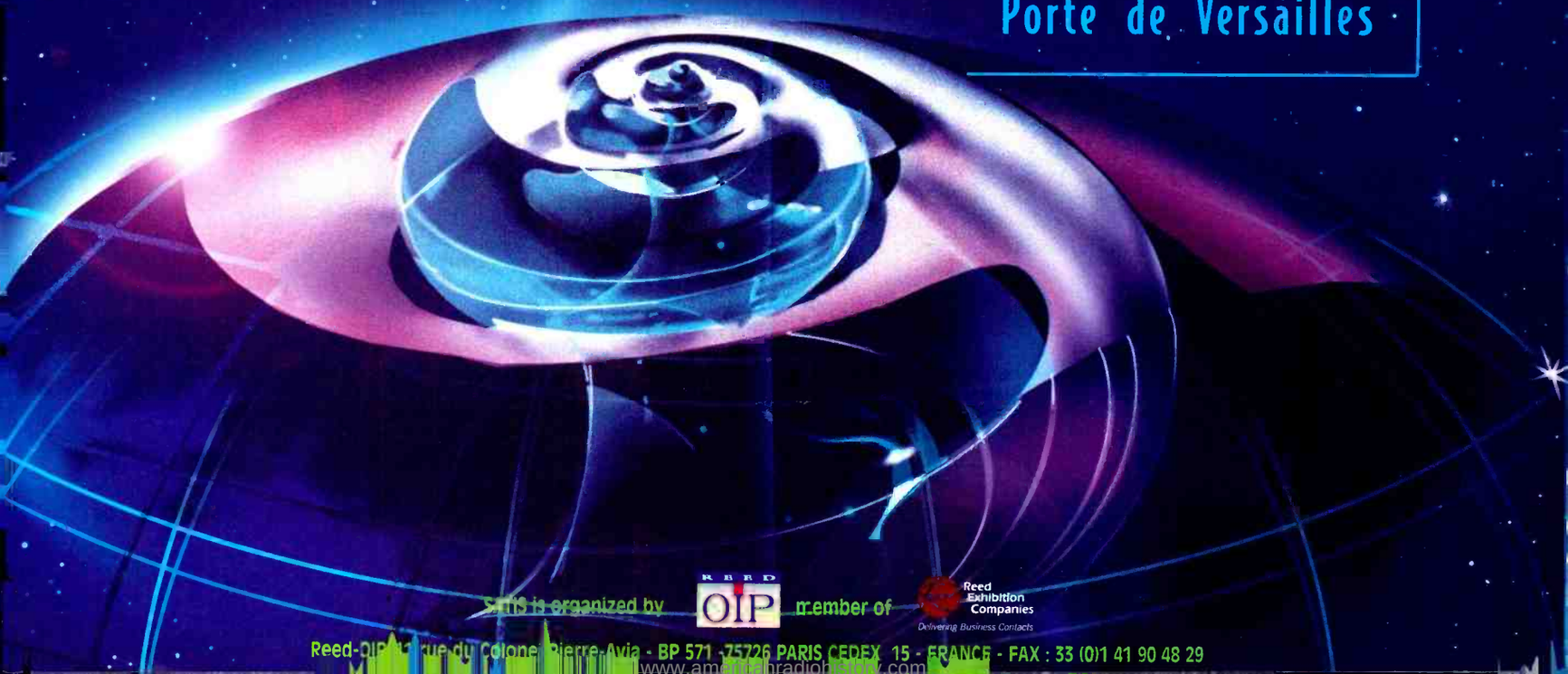

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THE WISH LIST

< Continued from page 98

Sony ECM55BP (4)
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Sanken COS-11 (2 grey, 2 black, 2 flesh-coloured)
DPA 4060BM (2)
Countryman (3 white, 3 flesh-coloured)

'On *The River Wild* the rate of attrition was horrid and the Countryman stood up far better to the conditions than the Tram. Having said that, the best-sounding of all the mics that I've used down the years is the ECM55, which matches much better to a boom microphone. The Trams, the Sankens, the DPAs and the Countryman, on the other hand, are specialised mics which we can hide, and I love the Sanken COS-11s because you can stick them behind buttons and pop them up through buttonholes. The capsule on them is vertical as opposed to horizontal, so it's an incredibly slim microphone.'

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Soundcraft LM1
SQN-4SB

'For years I had a portable Neve, but unfortunately Neve merged with AMS and they don't make small mixers anymore. I used that Neve for 10 or 12 years, and I loved it because you could never overload the front end. The headroom was extraordinary and it was a beautiful-sounding machine, but of course it didn't have all of the routeing or the amps that we require today. We're now having to feed different outputs to different people—directors want a particular feed, dialogue coaches want a feed relating to their own artists, the script girl just wants to hear the dialogue and not the effects, and so the auxes and the routeing of each channel become very important.

'The CS208 is a 4-channel main output mixer and I really love it, but a minor criticism is that the routeing is a bit awkward and so that is why I would like to make some modifications. The Soundcraft LM1, on the other hand, is a mixer that I'm using at the moment and I also use one for playback, while the SQN is a little stereo mixer that has everything on it in a small package and which I can use in car situations or other confined setups.

'That having been said, one mixer that I've left out is the Diva digital. It's probably the way to go, but it's kind of unproven, and so I don't want to put it on my wish list until some of its small bugs have been squashed.'

Recorders

Nagra-D 4-track digital (2)
Nagra Ares-C PCMIA (flash memory card)
HHB Portadat
Dell Inspiron 7500 portable computer with Digital Performer
Sony MiniDisc recorders (2)

'I still consider the Nagra-D to be the Rolls-Royce of digital recording right now. I mean, if there was such a thing, I would like a 24-bit, 96kHz, solid-state recorder with an analogue sound... I guess what I would really want would be a 4-track, analogue, Dolby SR recorder in a small package. You could go straight to digital afterwards, but for the original recording you would have wonderful headroom, clarity and silence, while also being very transparent. However, as that doesn't exist, the Nagra-D is the next best thing.

'The Ares-C is to be used mainly for playback—it's a brilliant little machine—while the Portadat is for FX recording, the computer is for playback and editing, and the Sony MiniDisc is also for playback.'

Monitoring & Playback

Sennheiser receivers (10) and Sennheiser transmitters (2)
HH VX500 amplifiers (2)
Bose 802 speakers (4)
Bose system controllers (2)

'All of this stuff goes with me because there's no playback and then suddenly there'll be a need for playback. You know, somebody might want some mood music.'

Utilities & Accessories

Including 60 flightcases; two recording-playback trolleys; 40 10m and 4 100m lengths of Canare low-noise star-quad cable. Also headphone amps, mic stands, cables and batteries, wet clothes, umbrellas, loud-hailers, a director's chair, a printer and a screwdriver. This comprehensive list also includes cue lights made by Ivan Sharrock's own Raspberry Sound Services, loop-induction earpieces and ArriMagic Arm mic clamps. □

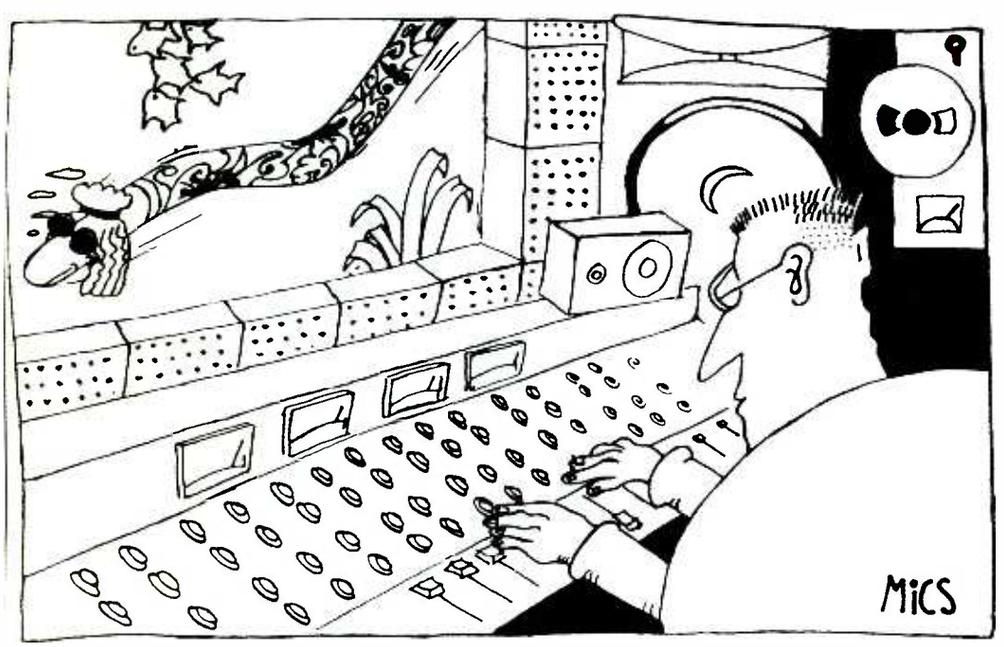
THE BALANCE SHEET

Total expenditure: £158,350

Wise yet refreshingly prudent, Ivan Sharrock has come in nearly £200,000 under budget. Unfortunately, however, a gift is a gift, and so the extra cash is his to do with it whatever he pleases...

'I think I'll use it to immediately go into R&D and build my own very state-of-the-art mixer,' he muses. 'This will have the front-end headroom to cope with actors who are quite frankly undisciplined a lot of the time, whispering a line when you're recording on digital -30...'

ROCK 'N' ROLL ANIMAS



Beatsound was a bit run down but Cedric loved its sixties eel

All Time Fishy Top 20

Pike and Tuna Turner
Mackerel Jackson
Tangerine Bream
Spencer Davis Grouper
Minnow Ripperton
Squid Vicious
Barbel Streisand
The Happy Mondace
McFadden & Whitebait
Skipjack Tuna Overdrive
Salmon Dave
Emerson Hake & Palmer
koi d Lang
Culture Chubb
Dave Shark Five
Thelonius Monkfish
Fishbone Ash
Golden Herring
Skate Bush
Eric Clapton (is Cod)

THE WISH LIST

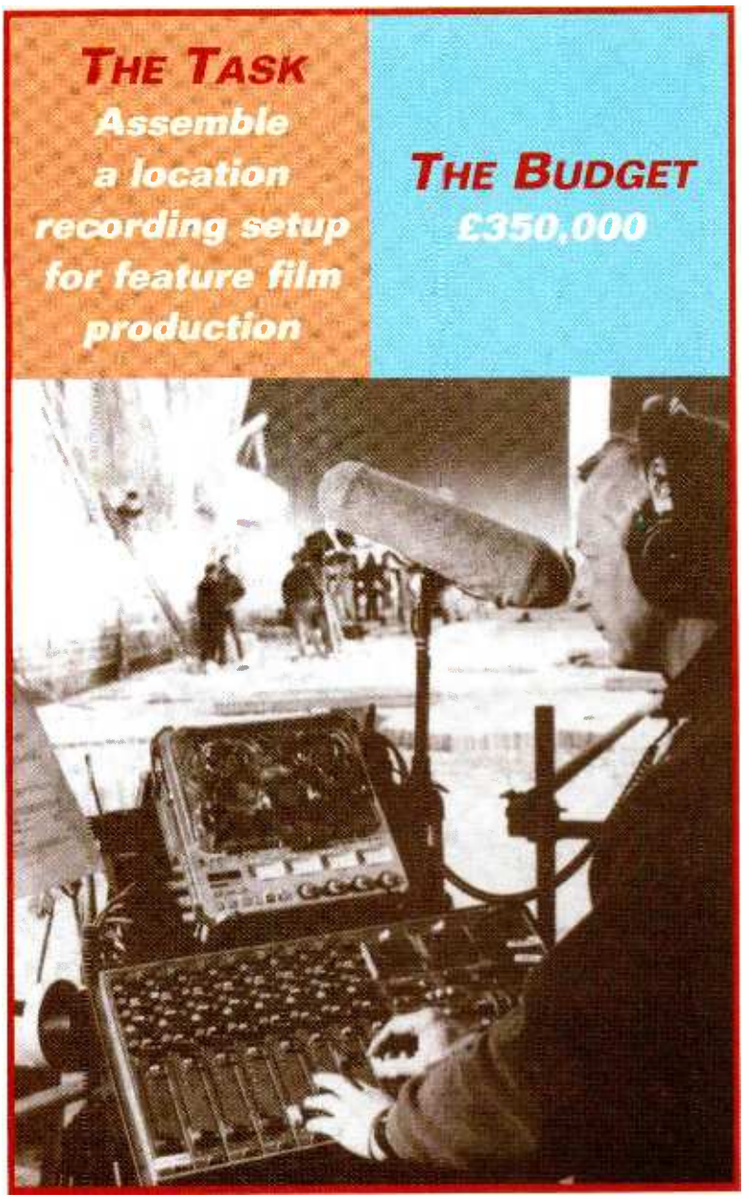
IVAN SHARROCK'S LOCATION RIG

Leaving the comfortable confines of the mix room described by Tim Palmer last month, **Richard Buskin** explores Ivan Sharrock's ideal location recording setup

AS AN ACCLAIMED production sound mixer on both sides of the Atlantic, London-based Ivan Sharrock has a list of feature film and television credits that stretches back to the mid sixties. He has worked alongside such notable directors as Bernardo Bertolucci, Stanley Kubrick, Joseph Losey, John Landis, John Frankenheimer, Ron Howard, Kenneth Branagh, Harold Pinter, Frank Oz and Anthony Minghella. And as for the film credits, these include *The Last Emperor*, *The Shining*, *Little Buddha*, *Frankenstein*, *An American Werewolf in London*, *The Talented Mr Ripley*, *Dirty Rotten Scoundrels*, *Willow*, *Stealing Beauty*, *The Sheltering Sky*, *Galileo*, *Flash Gordon*, *The Holcroft Covenant*, *The French Lieutenant's Woman*, *The Medusa Touch* and *The English Patient*.

For his setup, Sharrock wants to cover as many bases as possible. 'In the feature film business you encounter directors with different requirements for everything that you do,' he explains. 'For all of the preparation, you never quite know what you're going to come up against from day to day, and so I need a set of equipment that will take care of 99% of those situations. There might be a huge playback scene or a scene where you have more than a hundred loop induction ear-pieces for people singing or dancing to playback and you obviously can't always cater to those kinds of specialised circumstances. But I tend to carry enough equipment for a small scene that may be suddenly thrust upon me, and then if something is really big I'll probably know about it in advance and have the opportunity to hire what I need. You just can't carry everything for every situation.'

For the purposes of this exercise, Sharrock is going to do his best. Of course, £350,000 may not seem like the most generous sum of money with which to send him on a spree, yet he is quietly confident that he can get much of what his heart desires and stay under budget.



Microphones:

Sennheiser MKH60 shotgun mics (4) with Rycote accessories; shockmounts, foam windshields, basket windshields, high wind covers, wind-jammers and short flexible microphone tails.
Sennheiser MKH70 gun microphones (2) with Rycote accessories as above.
Schoeps CCM41L miniature hypercardioids (4) with Rycote accessories.
Schoeps CMC541U hypercardioids (4) with KC5 active cables, GVC swivel connectors and accessories.
Neumann RSM191 switchable (M+S/XY) stereo shotgun.
Beyer and AKG dynamic mics (120), covering most musical ad hoc situations.

'I use Sennheiser microphones generally for exterior situations. I very rarely use the long shotgun mics, because for dialogue you're invariably getting too far away from the artists and picking up the background noises. In a quiet setup it would sound wonderful but very rarely today do you find yourself in that situation, and therefore if you're getting so far away that you have to go for something other than a shotgun mic you'll inevitably end up with a boom and radio mic. At the same time, I don't use the Schoeps hypercardioids for exteriors because they are so sensitive and will pick up wind sounds and so on. However, I love them for interiors because, whether they're fixed or on boom, they have a reasonable attack and are excellent quality.

'The stereo Neumann is a 3-capsule mic which is infinitely variable in terms of its attack. For feature films I use it in XY mode for effects and can vary the angle of the stereo. I don't use it in M+S mode because of the problems that we encounter with surround sound. As for the dynamic mics, I carry them because every so often you need a hand microphone for somebody in a scene where, for instance, you have a reporter asking a question. They can also be used for small musical situations featuring bands, or simply as props.'

Radio Microphones:

Audio Ltd RMS 2020 UHF transmitter-receivers (8) in two 4-way racks with dipole and yagi aerials.
Audio Ltd 2-way rack for in-car and hand-held situations.

'On *The Last Emperor* I hardly used any radio mics at all. We were working in the middle of Beijing, China, and it was so quiet that practically everything was shot on the boom. However, coming back to the West the noise level is so high that you end up using radio mikes all of the time, and this is particularly true if it's a period film as you've got to get rid of the 20th Century. As much as I love them all, most actors and actresses don't project anymore. The best ones from a sound person's perspective are those with stage experience but in most other cases they speak much as they would in everyday life, and I find the Audios to be very good in overcoming that problem. I know some people use Sennheisers and I used to use Micron, but I think the Audios are terrific. They are so easy to use. Still, artists are always complaining about the size of radio mics, referring to the transmitters as battery packs—"Oh hell, where am I going to put this?"—and so it would be nice if at some point the manufacturers could make them smaller.'

Lavallier Microphones:

Continued on page 96 >

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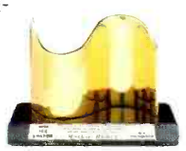

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