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Studio sound

THE INTERNATIONAL TECHNICAL MAGAZINE FOR
PRO AUDIO, POSTPRODUCTION & BROADCAST

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The kit and the market

Steven Spielberg's *Twister*

ATC and The Ring cycle

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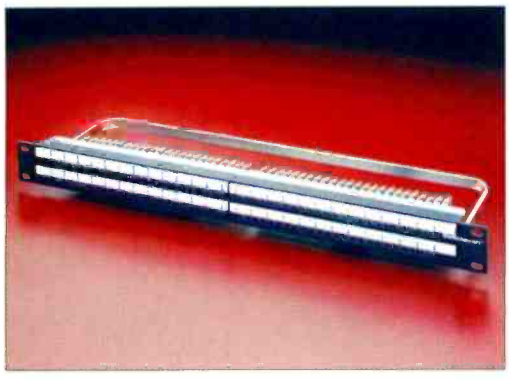

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THIS EDITION'S CONTRIBUTORS

TERRY NELSON started writing for *Studio Sound* twenty years ago. His activities include consultation, systems planning and studio design, while his special interests (apart from guitars and Hammond organs) include live sound and audio for film and multichannel broadcast.

YASMIN HASHMI and **STELLA PLUMBRIDGE** operate a UK-based independent consultancy to manufacturers and users of disk-based audio-video editing systems. Established in 1988 Sypha has published the invaluable *The Tapeless Directory* as well as various market studies.

JONATHAN KETTLE contributes a monthly audio column to *BBC Music Magazine* and edits *CYBERFi*, the world's first hi-fi magazine published on the Internet. Formerly Managing Editor of *Audiophile*, he has worked extensively in consumer audio journalism since 1977.

Lost in music

Back in my gigging days, one of the first lessons I learnt alongside P6 (for those who don't know: Proper Preparation Prevents Piss-Poor Performance) was that too little was invariably better than too much. A short set that left the punters hungry for more was likely to ensure that they came back next time, whereas a long one that left them sated was not. As musicians, we were enticing our audience to develop a taste for music that only we could satisfy. In short, music is a drug, and if you play music you're a dealer.

But the music habit is more sinister than this—if you're pushing music, you're already hooked on music yourself. There's a classic case study: one of the marks of a good pop song is that you want to play it again. Somehow the music makes you believe that you need more of it and it's this very quality that drives most of us to pick up an instrument in the first place. First we learnt to play a song we loved—badly and in a bedroom. We'd never heard it sound like that—at a stroke we had reduced something of mystery and beauty to an abhorrent shambles. It was a shameful thing to have done but it didn't stop us from doing it again. And again—with friends and in a bedroom. Now we shared a dirty secret and we needed to make amends, we needed to restore music's dignity. We didn't know it was all part of the plan.

But there are other routes into music addiction that extend its influence outside of musicians' circles and they all work through technology. The same technology you use every day. There are those, for example, who never mastered an instrument and had to settle for some other form of musical fix. To these, music first offered remixing; let somebody else provide the raw musical material, they reasoned, and you've got a form of vicarious musicianship and another addict.

More recently, music sought greater numbers of victims through MIDI. Here was a technology that allowed a generation of music enthusiasts to feed their addiction to music without the drudgery of learning to play an instrument. And now music is looking at interactive media since it has the potential to offer even greater numbers of weak-willed nonmusicians the same thrill that hooked you and me.

At every stage of music's development, the levels of playing skill and affluence necessary to become an active music addict have fallen. Music had us strip away the need for musicianship through expensive technology and then it had us reduce the cost of the technology.

Perhaps it's time to recognise that music is like a drug. But unlike most other potentially addictive drugs, prolonged usage does not necessarily cost you your wealth and your health. In fact, music comes from a family of drugs and that the next is already on its way —it's called video.

Don't look for help because there isn't any. There are no counsellors waiting patiently to answer help lines. There are no discreet meetings taking place late at night where we can confront our weaknesses together. Instead there are the hi-tech shrines that we call studios of one sort or another in which we satisfy our needs. And the magazines that reassure us we're not alone in our addiction.

My name's Tim and I own a Minimoog...

editor

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sound in

Interactive initiative

STUDIO SOUND is proud to announce that it has become a Media Partner in the forthcoming British Interactive Media Association (BIMA) Awards. The recruitment of some 15 commercial sponsors—including Philips Media Professional, Sonopress, Mayking Multimedia, *The Independent* and *Studio Sound*'s sister title *Data Production International*—represents part of BIMA's 3-year programme to develop the Awards as a major platform for showcasing the UK multimedia industry.

BIMA's Jane Callaghan commented: 'It is essential for UK multimedia producers that national and international business markets, and the general public, clearly understand the value, talent and content of what our people are producing.'

Presented as part of the forthcoming Multimedia 96 exhibition at London's Business Design Centre, the 1996 Awards have seen a steady increase in interest to date—almost 200 CD-ROM; CDi and Web-site products and media titles are competing for a total of 17 prestigious accolades.

'This is the largest number of entries we have received in over a decade of the BIMA Awards,' confirmed Jane Callaghan. 'BIMA is a nonprofit initiative operated by the industry itself, not a device for any event or publication. Clearly, the BIMA Awards are seen as the UK multimedia industry's main platform for recognition and achievement.

'This year's awards demonstrate that, although consumer multimedia continues to boom and garner the headlines, corporate use of multimedia is now widespread and still provides the bread-and-butter revenue of a large number of UK developers. Many applications in the Business category this year were also very inventive and clearly some of the most creative design today is finding its way into corporate programmes.'

Specifically, *Studio Sound* is sponsoring the Best Production Award for Sound and Music—in keeping both with the magazine's history in the pro-audio industry and in response to the convergence of recorded media. Through this initiative, *Studio Sound* is seeking to support BIMA's interest in furthering the interests of, and stands in, the emergent field of 'multimedia'. The entrants for this category are forwarded by the judges from the other categories where it is deemed that use of sound and music is particularly well conceived and executed.

The winning entries and the finalists will be featured at the BIMA Awards Showcase which is part of the Multimedia 96 event, on the morning after the Awards presentation. This special viewing area is being constructed and fitted with over 30 workstations, so that Multimedia 96 visitors can try out the CD-Roms, CDs and Web sites for themselves. The finalists and winners of the Awards for the best in multimedia production and publishing will be the subject of a unique snapshot view of the best in UK multimedia at the Multimedia 96 exhibition. The presentation of the final four short-listed entries for each award, plus the announcement of the winner, takes place before 700 leading figures from the UK multimedia industry attending the black-tie dinner at the Park Lane Hilton, London, on 17th June 1996.

The Multimedia 96 exhibition, featuring the BIMA Awards Showcase takes place the following morning. Callaghan continues: 'Visitors to last year's Multimedia show reported that they found the BIMA Awards showcase very useful. Those new to multimedia said it was an easy introduction to multimedia production and more seasoned practitioners were interested to see what was being highly regarded.

'We are delighted to repeat this opportunity for Multimedia 96 visitors to take the UK's leading multimedia products through their paces. We hope that it will act as an inspiration and encourage others in the UK to take part. The UK is in a strong position to become a leading region for multimedia production and the BIMA Awards are designed to support the potential for international success.

BIMA can be contacted on:
Tel: +44 1733 245700.
Fax: +44 1733 240020.

TIM GOODYER

UK: The soundtrack to MGM's cartoon sequel, *All Dogs Go to Heaven II*, has been completed on Sony 48-track digital and AMS Neve V48 console, and mixed for DTS at Angel Studios' Studio 3. Mark Winters' score was captured by Angel's resident engineer Steve Price. Angel Recording Studios, UK. Tel: +44 171 354 2525

ESCAPING an undignified demise, British console manufacturer Raindirk is set to 'make a new start'. The Belgian Amptec operation has teamed up with a number of private investors to buy all Raindirk assets which, with key members of the previous staff, will form the basis of a reorganised company.

The Symphony line of consoles will be continued, along with three new models: the Iceni music- tracking desk; the OB live-and-location broadcast desk; and the Montage film desk.

The new alliance will also see Raindirk participating in the manufacture of Amptec's new digital console.

Raindirk, UK: Tel: +44 1366 382165.

THIS YEAR'S SONY RADIO AWARDS brought together a host of the glamourous and talented souls who make the British radio industry the envy of the world. Although under attack from changing broadcasting legislation, the standard of programming was in no doubt as the list of categories and nominees mounted.

Details of the winners aside, the occasion demonstrated that quality of both programming and production was high on the priorities list as evidenced by Radio Awards Committee Chairman, John Whitney's speech which noted that, 'Unlike television, we do have this commitment to sound broadcasting'. Accepting the award for Station of the Year, BBC Radio 5 Live's Controller Jenny Abramsky further commented that 'Radio presents better pictures than television'.

The event's Gold award went to Richard Baker, the Specialist Music Programme award to Andy Kershaw for *Kershaw in South Africa*, the Phone-in/Debate award to Jonathan Dimbleby for *Any Questions* and the Documentary Programme to Maura Clarke for *War and Peace*. John Whitney also received a Radio Academy Fellowship.

TIM GOODYER

MAGMASTERS, the London-based postproduction house, has been sold following the company going into receivership in September. The collapse, that was widely anticipated by the post-production community, was attributed mainly to financial problems at the company's ill-fated Californian branch in Burbank which closed earlier this year.

'The Burbank facility should have acted as a booster rocket for

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gs

UK: A search for new artists is being launched by production company SUS to form the basis of a programme of new projects for the remainder of 1996. Led by producer David Yorath—known for producing overseas artists—the project aims to step up his involvement in the UK market with his own artist roster. The project is centred around attracting committed young artists who are switched onto the current scene and Yorath is keen to point out that he's not looking for metal bands or has-beens looking for a new lease of life [that rules out the Sex Pistols then—ed]. On a more serious note Yorath says: 'I feel that if a producer brings something to a label it is usually taken fairly seriously. What we are offering is 48-track residential recording, 24-track midi room and 20-bit mastering, together with creative production assistance.' Yorath, who also owns Surrey Sound Studios, is building on his successes during the 1970s and 1980s with artists including The Police, Eric Clapton, Hum, Siouxsie & The Banshees, as well as more recently, The Cranberries, Pulp and Radiohead. **Nick Smith**

Magmasters, but instead it turned out to be the brakes,' stated Magmasters Director Fred Rowe, 'Problems with early management and damage caused by the 1994 earthquake contributed to the studios becoming a drain on resources, adding to severe cashflow problems in the UK.'

Magmasters' assets have been bought by graphics and display company, Photobition Group plc,

News in brief

◆ California's prestigious Todd-AO Studios has recently added eight Fairlight MFX3 workstations to its arsenal—five 24-channel main frames and three 8-channel minis. The purchase coincides with the upgrade of five existing MFX2 installations to 24-channel MFX3 status. All systems are used for the facility's staple of dialogue and ADR editing, FX editing and dubbing.
Fairlight, US. Tel: +1 213 460 4884.
Todd-AO, US. Tel: +1 213 962 4000.

◆ London's Shepperton Studios has installed an AMS Neve Logic 2 console in its newly refurbished Theatre One. The 48-fader console is to serve TV and theatrical work and is configured for multioperator use—its first use was on a Spanish feature film called Calor.
AMS Neve, UK. Tel: +44 1282 457011.
Shepperton Studios, UK.
Tel: +44 1932 562611.

◆ Televizia Slovenia Lubljana has purchased an SSL 8032 on-air production console as part of the refurbishment of its Studio 4. Further east, in Japan a series of Axiom production consoles with integral hard-disk recorders and hub routers have been ordered by Asahi Broadcasting, TV Asahi 1 & 2, and Kyodo TV.
SSL, UK. Tel: +44 1865 842300.
SSL, Japan: Tel: +81 1 3 5474 1144.
TSL, Slovenia. Tel: +386 61 313390.

◆ France's Guillame Tell recording studio has ordered the first Sony OXF-R3 digital console as part of a fully-digital system. The console, along with two PCM-3348HR multitracks and a PCM-9000 M-O mastering recorder, will be installed in Studio B during June.
Sony, France. Tel: +33 1 4945 404000.
Studio Guillame Tell, France.
Tel: +33 1 4204 0505.

◆ San Diego-based Skywalker Sound has purchased four TimeLine Studioframe workstations. The new systems will run at v6.2 on Pentium machines and bring the facility's total of Studioframes to 14.
TimeLine, US.
Tel: +1 619 734 3036.

◆ UK-based postproduction house Hullabaloo is set to take the first delivery of an Amek DMS digital console. The DMS will be installed in Manchester's Cosgrove Hall Films complex and work in conjunction with an Avid AudioVision system and 16-track DPR which are surround-capable.
Amek, UK. Tel: +44 161 834 6747.
Avid, Europe. Tel: +44 1753 655999.

◆ Deutsche Telekom, Europe's largest telecomms company, has purchased 28 Orban Optimod-HF 9105A processors. Deutsche Telekom supply telecomms and broadcasting services worldwide and has already installed Optimods at transmitter sites in Wertachtal, Nauen and Jülrich.
Orban, US. Tel: +1 510 351 3500.
Deutsche Telecom, Germany.
Tel: +49 52 22 13 225.

◆ The Western Australian Houses of Parliament has taken a selection of ARX active MSX 2E mic splitters, Afterburner comp-limiters and SX300 amplifiers as part of a major refurbishment. The new sound installation will serve both broadcast and Hansard reporting functions.
ARX, Australia. Tel: +61 3 95557859.

◆ New York's Sony Music Studios has installed a Euphonix CS2000 console in a new postproduction suite. The 56-fader desk is fitted with ES-108a dynamics processing. The new studio has already seen a gruelling TV broadcast session and reported a trouble free initiation of the CS2000. Sony Music has also ordered an SSL SL9072 console for delivery in August.
Euphonix, US. Tel: +1 415 855 0400.
SSL, US: Tel: +1 212 315 1111;
+1 213 463 4444.
Sony Music, US. Tel: +1 212 445 1800.

◆ Moscow's APN TV has recently installed ten Tannoy 15-inch dual-concentric speakers. A further recent Russian Tannoy installation can be found at the Kemerovo Philarmony, home of the State Symphony Orchestra of Siberia where a 26kW SuperDual FOH system has replaced a Dynacord-Peavey system. The venue hosts a variety of musical styles as well as classical music.
Tannoy, UK. Tel: +44 1236 420199.

◆ BBC Bristol has ordered a 36-channel Calrec S-series console for its TV news production duties. The desk will be installed at the new Regional Bi-Media news centre which has been set up to maximise resources available to BBC TV and radio operations.
Calrec, UK. Tel: +44 1422 842159.
BBC Bristol, UK. Tel: +44 272 741111.

◆ Bruxells' Studio L'Equipe has expanded its complement of DAR workstations to eight—five Sabre Plus and three SoundStations—to handle its film dubbing and postproduction assignments. A further recent Sabre Plus placement is to Belgium's CEE post house.
DAR, UK. Tel: +44 1372 742848.
Studio L'Equipe, Belgium.
Tel: +32 02 735 0040.

◆ Television Malaysia has awarded a 3-year tape supply contract to the newly formed Quantegy. The contract follows a 'through evaluation of several competing product lines'.
Quantegy, US. Tel: +1 415 903 1100.

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soundings

in what appears to have been a seamless acquisition. Photobition will continue to run the 9-studio Soho facility and periphery businesses, now collectively known as Magmasters 3, with all existing staff including former Directors Fred Rowe and Steve Cook who have been appointed joint Managing Directors of the new company.

'The future should be very good for Magmasters,' said Rowe. 'Being in public-company ownership means there will be plenty of capital to put meat back on the bones as well as expand the business. It will also free-up Steve (Cook) and myself to actually run the company and go out and acquire new business.'

The demise of 14-year-old Magmasters Ltd, leaves a number of unpaid creditors, but according to Rowe 'material amounts' are not involved. 'The encouraging thing is that the vast majority of creditors have been very supportive for the future,' he commented. 'I think the industry realises that people have a bit of bad luck from time to time and it's up to everybody to rally round and help companies get off their knees and back into business as quickly as possible.'

Commenting for Photobition, Chairman Eddie Marchbanks said: 'Magmasters has gone through a period of stagnation over the last 18 to 24 months, but we're eager to get right behind it now and invest a lot of money to give it the push it needs. Magmasters fits very well into our business area and we're delighted to be part of what we consider as an exciting business with great potential.'

PATRICK STAPLEY

THE NORTH AMERICAN sound-contracting industry is in transition from the niche of sound system installation into the wider world of systems integration. Many sound contractors are now installing low-voltage systems, such as data, telecommunications, video, security, to ensure their business has a broad, firm footing. Over the past few years the National Systems Contractors Association has broadened its annual exhibition to include these facets of installed electronic equipment and systems. The recent 1996 exhibition was the largest event in the history of the NSCA with 8000 registrants and over 480 exhibitors attending the St Louis, M-O Convention Centre.

The presence of companies from the security,

GERMANY: BASF has announced a new awards scheme designed to encourage and recognise the combination of artistic achievement and social involvement. Called the Master Awards, this specifically recognises the achievements of producers, sound engineers and studios. Each time an award is made the UNESCO committee for Protection of the Cultural and Natural Heritages of the World will receive US$1,000 to be invested in the preservation of culturally valuable projects. The Master Awards scheme is open to producers sound engineers and studios involved in the production of an album that reaches No.1 position in a national chart (providing that the work was mastered or mixed on BASF media)

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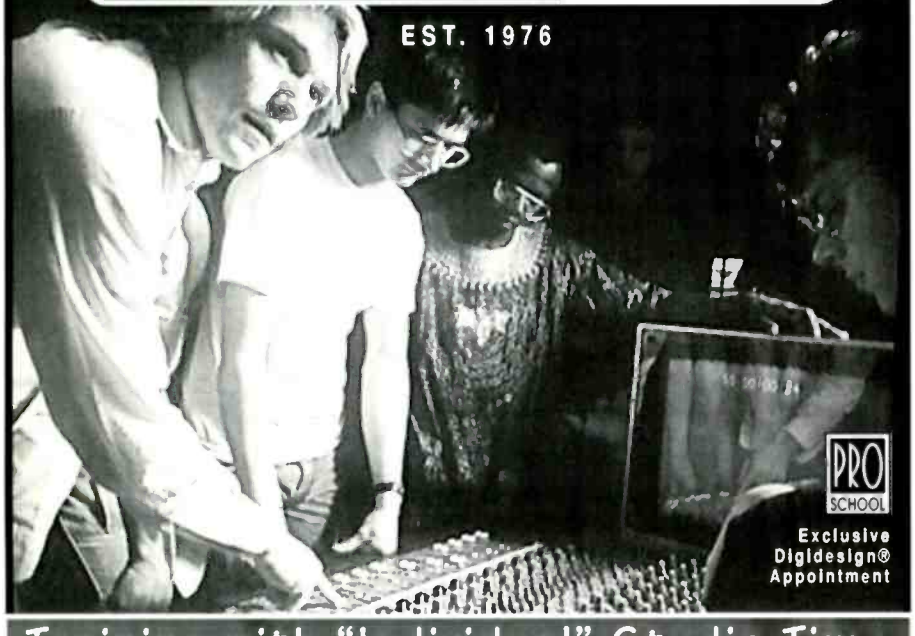

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residential, telecommunications and data did not distract most sound contractors from seeking out the latest audio gear, although this, too, is in transition. An aspect of this trend was exemplified in the most talked about new product at the show, which was entirely software based. Smaart is a new time-domain FFT-based audio measurement system from JBL Professional that focuses on the measurement of audio systems. The USS695 software includes two modules: one for real-time measurement of system response using a variety of signal types including programme audio; and a disk-based analysis tool for measuring the impulse response, magnitude over time, reverberation and a variety of other acoustical parameters. The software uses a Windows-compatible PC for processing the audio signals from nearly any 16-bit stereo sound card, including those in the latest generation of notebook computers.

Other innovations in the measurement of audio came from two companies already known for measurement equipment. The lasys electroacoustic analyser from AudioControl Industrial was created specifically for the sound system installer (or roadie) to make the critical measurements required to setup a sound-reinforcement loudspeaker system without the level of knowledge previously required to make accurate time-domain measurements. Direct read-outs in simple language make setting crossovers, equalisers and limiters into a go/no-go process with the sophisticated measurements buried behind simple menu-driven tests. The unit can also be used for driver and cluster alignment, polarity checking and delay setting.

The well-known TEF analyser from Crown International has been refined into a battery-operated, hand-held, LCD touch-screen unit with that is about the size of the previous model's user manual. Weighing less than two kilograms, the new analyser is based on the same DSP as the TEF 20. The TEF PAD currently provides ANSI standard third-octave and one octave, real-time, analysis, but will eventually support the full range of time-domain TEF measurements.

DSP-based signal processors were shown in a variety of packages and applications from the all-encompassing Peavey MediaMatrix to even smaller packages including the Miniframe and X-Frame formats and QSC Audio's MSP series that will offer multichannel rackmount processors for sound-reinforcement applications. There were also DSP-based products shown to their infancy to a chosen few in back rooms. These units will be chasing after the market of the mature TOA DACsys II loudspeaker processors, as they become available over the next year.

The NSCA Expo has always been a loudspeaker exhibition and this year featured two approaches, innovative designs and me-too concert systems. Community introduced their new M4 mid-range driver with diaphragm constructed of carbon- fibre in a resin compound. Renkus-Heinz introduced new TRAP-series array boxes that offered significant reduction in destructive interaction between devices plus low-frequency pattern control by frequency-shading multiple large drivers. There were also a surprising number of companies claiming to have products competitive with EAW's 850 series of concert-sound loudspeakers, including the unlikely entry of Altec Lansing into this competitive end of the loudspeaker business.

Although sound contractors in North America may becoming more interested in the other aspects of the installed electronic business and becoming more involved in software-based systems, it appears that the demo rooms playing music through a wall of loudspeakers drew the biggest crowds at NSCA Expo 96.

WADE McGREGOR

Right First Time

Brüel & Kjær

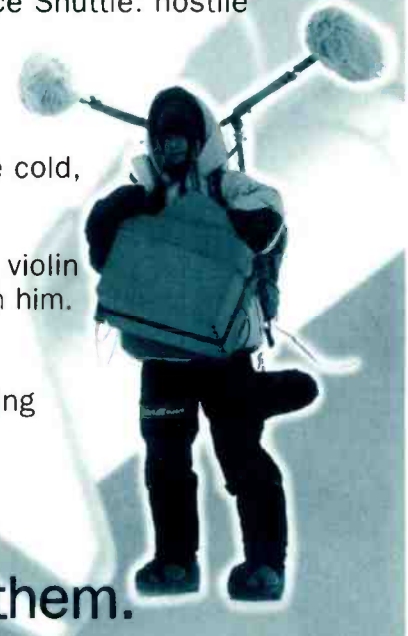
AES, Stand no. 2D1

B&K 4004 The microphone capable of recording the launch of the space Shuttle: hostile conditions on the launchpad, flames and chemicals showering the microphone and SPLs reaching 170dB.

B&K 4006 The microphone which survived -45° to record ambiences in the Artic: the nickel diaphragms of the B&K omnis resisted the cold, faultlessly recording winds of up to 90km/hour.

B&K 4011 The microphone that has to capture faithfully the sound of a violin worth £1.3 million: wherever Nigel Kennedy performs, he takes his 4011 with him.

B&K 4040 The microphone that combines solid state and tube technology to provide the definitive vocal mic: with only 100 units being made, one investor has locked two away in his safe.



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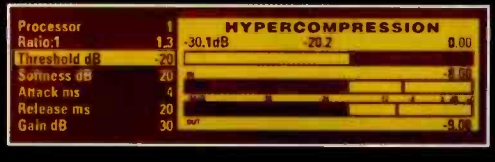

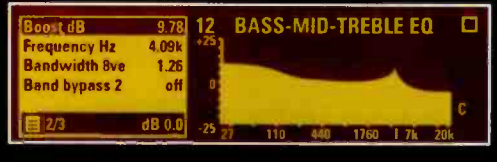

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Only a matter of time

The density of trade shows is rapidly approaching critical mass. What are the benefits and the costs—and what if the industry refuses to say no?

What I might loosely call the trade show enjoys a long tradition in, and offers a number of vital services to, our industry—I use the term 'loosely' because I want to embrace both conferences and conventions. In deciding whether to attend a show either as a visitor, a presenter of a paper or as an exhibitor it is obviously advisable to assess the potential benefits. Here I have tried to categorise those benefits to see if they represent good value—whatever that is.

There are two distinct types of information which circulate at shows: theoretical information about the state of the art, and practical information about available products. Academic success is measured by presentation of results, and so researchers are forced to give papers at shows. Business success requires—at least—that manufacturers bring new products to shows. Given these considerations, you regularly meet the regrettable polarisation where certain academics regard the presence of 'new kit' and the implicit manufacturers' profit motive as a threat to the purity of their research. Certainly, some manufacturers are purely interested in shifting boxes and scorn the 'egghead' contingent for having its head in the clouds.

Both camps are sadly wrong. The academic is increasingly forced to justify the host of his or her work and to find someone who will provide the necessary funding. Just as telling, is that the company which conducts no research will not be around for very long. It is only a matter of time before today's theoretical breakthrough becomes tomorrow's product. Equipment users are trying to make a living and need hardware to deliver what their own clients require. These users don't want technology *per se*, they want solutions to practical problems. In other words, what's in the box is irrelevant as long as the box does the job. The smart manufacturer will identify a new technology as a better solution and incorporate it in a product having a commercial edge. Consequently, I prefer shows in which there is a balance between academic and manufacturing interests.

The date of a forthcoming show focuses the mind as it approaches. If a new product is under development, the appearance of that product at a particular show becomes a development goal. Without that goal, the development of products is readily protracted. Refinements are continuously added—perfection becomes the enemy of the good. A show also serves a vital marketing purpose where users can request hitherto unavailable products and manufacturers can suggest possible new products, or demonstrate prototypes to gauge reaction.

On a personal level, a show presents a good place to keep in touch. I know a small number of critical places in various cities around the world—if I stand in one of these places at the right time, everyone I want to see will go by.

SO FAR, then, a show offers nothing but good. Clearly, without trade shows, we would be disadvantaged. However, attending a show is expensive. For the attendee, travel and accommodation are obvious expenses but less obvious is what I call 'lost opportunity': the work an attendee does not do because he or she is at a show. Shows are even tougher for a manufacturer. Floor space is particularly expensive and the stand itself has to be constructed; then there are shipping costs for equipment, graphics, travel and accommodation for the staff, meals, rental cars, taxis... The list is long. A major manufacturer may spend £0.5m to maintain a substantial presence at a show.

Now, if attending that show generates £1m, the manufacturer is winning; if the show is well attended, the organiser in winning because everyone wants to exhibit at a show that everyone attends. The host city is winning too—a significant amount of show 'spend' goes directly into hotels, restaurants, taxi services and, of course, the conference centre.

Unfortunately, this all-win situation has been allowed to drift out of our grasp. It's easy to see why. Originally, shows were organised to benefit the industry but now the motives are more numerous. As far as the city, the organisers and the convention centre are concerned, the more shows, the merrier. For them, shows equal income. This is a false assumption as there is only so much interest generated in a year—whether in terms of research or equipment. This is independent of the number of shows.

Indeed, more shows equals more expense for exhibitors and attendees alike. From the attendees' standpoint, direct expenses and lost opportunity problems mean that attending an ever-increasing number of shows is out of the question. The problem then is which one to attend. And what if the people you expect to meet are at a different show...

From the exhibitors' standpoint, the proliferation of shows is a serious problem. Many companies now have significant numbers of staff who do nothing but organise show appearances. The cost of maintaining a presence at all of these venues is such that it has raised the purchase price of many items of equipment. Why should end-users pay over the odds for their equipment in order to support a local building industry?

> From the exhibitors' standpoint, the proliferation of shows is a serious problem

One of the reasons that the 'tail' is now bigger than the 'dog' is that a single manufacturer is powerless to change the situation. No-one wants to be the first to stay away from a show in case they give away an advantage to a competitor. However, the signs are that this situation cannot last. It only requires a degree of cooperation between manufacturers to identify those shows which are parasitic rather than beneficial. The actions which might then be taken do not need spelling out. I believe this is more a question of 'when' than 'if'. Can our industry afford to neglect a simple opportunity to cut costs and increase profitability for both manufacturer and user in these stringent times?

John Watkinson

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Tell her about it

From its early days of serving the advertising industry, the recording-studio industry has become one of its most enthusiastic clients. But is this exposure to hype and hypocrisy pushing the studios off track asks **DAN DALEY**

There was a time when the relationship between the US recording industry and its advertising industry was quite different. Up until sometime within the last decade, the former was best regarded as a tool for the latter. And the former was quite happy about that situation. Who wouldn't be?

Advertising agencies routinely and unflinchingly paid top-of-the-card rates, billing costs back to their own clients with the requisite 17.65% value-added tagged on; agencies consistently wanted to work during the daytime, specifically the morning hours, usually, leaving studio owners with plenty of afternoon and evening hours for music recording clients who were far more prone to haggling but who were the *raison d'être* for being the studio business in the first place. But in the wake of the personal recording technology phenomenon, studios suddenly found themselves bereft of these very lucrative and, until relatively recently, reliable clients. Much of the advertising world has embraced composers who are also capable of recording their compositions as well as simply writing them. Personal recordists generally work more cheaply and there are more of them than there are studios. The upshot of this turnabout is that recording studios' interest in advertising is still as a source of revenue, but in a very different manner.

As I write this, I'm surrounded by sheaves of paper: brightly coloured, thick-gauge stock with brilliant 4-colour photos and nicely turned graphics and copy extolling the benefits of working at a particular studio. But, in true American style, this is not mere advertising. At a time when studios feel themselves to be quite literally under attack from changing technological and market forces, they have responded in a manner that would make Phineas T Barnum proud. Here's just a sample of what has come through the transom in the last few months:

New River Studios in Fort Lauderdale, Florida, offers a bright and inviting brochure, one whose first two pages proclaim 'Beaches, Shopping,' and whose introductory copy cites the studio's proximity to theatres, dining, recreation and museums, as well the facility's accessibility to the nearby river with its boat docks. The listing of the studio's audio capability (which is quite formidable) begins on page three.

The brochure for Nashville's October Studios, done in the form of a CD insert, gets to the technological meat a bit sooner, but one's eyes are more instantly grabbed by an exotic (arguably erotic) background done in Oriental reds and similar tints, featuring artwork from within the studio whose graphics (in the brochure, anyway) tend to win the competition with the photos of the equipment.

The brochure for Kingsway Studio, the private-commercial facility owned by Producer Daniel Lanois in New Orleans, would rival one from the Metropolitan Museum of Art. The artful photographs initially stress the antebellum house's interior and the manner in which the equipment is integrated into it, before moving into the realm of quasi-Impressionistic, with nudes-as-lamps in one of the bedrooms and a Picasso-esque rendering of a nude juggling fruit in another.

Pilot Recording's brochure is positively prosaic compared to that, a four-pager with nicely-lit shots of the meat-and-potatoes elements of the New York studio. But the Wired magazine-like graphics of the equipment insert reflect that studio's concession to the 'style' part of the style-vs-substance equation.

Recording Arts' brochures make up in frequency what they may lack in artistic detail. Owner Carl Tatz tends to use every minute not spent on the phone soliciting new business in devising new contexts in which to convey his core message, 'What a Great Studio'.

EACH ONE of these studios is a very good, with top-notch equipment and personnel; each one of these studios has come to the conclusion that simply being a good studio is no longer enough in a marketplace that is both crowded from below with ADATs and increasingly global in nature. Each one of these studios now has a relationship with advertising in a manner in which this industry has never before seen.

The brochures (and a few newsletters, another burgeoning tactic) are handy for my purposes at the moment. But the proliferation of studio web sites almost obscures them. For the most part, the web-sites are not nearly as inventive as their printed cousins nor necessarily any more effective (give them time, though). But taken in sum, along with a marked increase in studios taking print advertisements out in both national trade and local music and post magazines, these efforts represent something else: a level of creativity –you might even say a conduit for creativity otherwise, perhaps, untapped in an age of preset parameters–that subliminally illuminates each facility in ways that otherwise might have gone unnoticed. Like creative-writing exercises, anything that forces you to regard a familiar situation in a new way encourages a new perspective on it.

Failure of communication? Or is Billy Joel just so tough?

Necessity, in the case of studio owners who do not aspire to become freelance writers, has provoked interesting inventions, indeed. Advertising's effectiveness will naturally vary from one studio to the next, from one region and market to the next. But the fact that so many American studios have come to employ it so intensively in such a short time reflects more on their American-ness than on the implicit value of advertising. In a culture built on myths–from the western pioneers onward –it's natural to want to participate in myth-making. And advertising–as it has been defined and refined by Americans themselves–is a natural way to myth authorship. And in creating one's own myth, one recreates oneself. Once upon a time, you were as good as who recorded in your studio, or as good as your equipment, or maintenance or engineering talent. We live now in an age in which you might also be as good as your advertising. And that might not be all bad.

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DVD: the final format?

The history of CD can be presented as a catalogue of poor judgement and missed opportunities. Can DVD fulfil its promise asks **BARRY FOX**

When Philips first demonstrated CD in Eindhoven in the late-1970s, it was a 14-bit system and the disc was smaller than the 12cm discs of today. 'Make it larger to hold a longer playing time, with 16-bit resolution,' a very few of us begged. We were scorned for daring to question the 'magic carpet ride' sound of CD which seduced first-time listeners.

Philips teamed up with Sony and the disc size was increased and the code set at 16 bits. With hindsight we should have argued for a flexible system. The first players resolved far fewer than 16 bits but when D–A convertors finally caught up with the standard there was nowhere left to go; 16 bits is the ceiling. So studios must down-convert from 16-bit, 20-bit or 24-bit recordings. Systems like Sony's Super Bit Mapping make the best of a restriction that, with hindsight, should never have been imposed.

There are two ways of looking at the efforts now being made by Europe's Acoustic Renaissance for Audio to set standards for a new generation of high-density disc. The short-term view is that because Toshiba, Thomson and Time Warner are hell bent on launching DVD movie players later this year, without industry-wide software support, the system will flop. Consumers are now very unforgiving. Like a joke that falls flat on the first telling, there is no coming back for a relaunch if the first sales pitch fails. Without a kick start from the movie application, audio-only DVD will never have a chance.

The fact that Europe had to go to Japan to talk about future audio standards tells all you need to know about how things have changed since Philips made musicassette and CD the new music industry carriers. Note, too, how the new high-density disc is not even called a CD

The long-term view is that even if DVD fails because it is launched too early, and at half-cock, the format will be a roaring success with the computer industry as a high-density CD-ROM. Recordable DVD will be a wonderful high capacity backup store for hard-disk data. DVD may then sneak into the living room as a consumer player that plays movie discs without the needing a PC. The scene is then set for DVD to become a high-density audio-only carrier. So in forcing the DVD standards group to think ahead about future audio applications, the ARA is on a Mission from God.

Last October the ARA, lead by Bob Stuart of UK hi-fi company Meridian, went to Japan to talk to the Advanced Digital Audio Conference, a subcommittee of the Japan Audio Society. The Brits had three clear messages: an audio-only version of DVD should not use lossy compression (like PASC, Musicam, AC-3 or ATRAC). Coding should be flexible, with first-generation players always able to play future-generation discs, albeit with less resolution than future-generation players. The system should also be capable of handling multichannel sound, but with baseband stereo always available from m/c discs.

The fact that Europe had to go to Japan to talk about future audio standards tells all you need to know about how things have changed since Philips made musicassette and CD the new music industry carriers. Note, too, how the new high-density disc is not even called a CD.

THE CHALLENGE to the ARA's approach came form Sony, with the Direct Stream Digital 'bitstream' system which uses a very-high-speed stream of single bits instead of the long PCM words favoured by the ARA. Matsushita has proposed a system which is similar to DSD, but uses 4-bit words for the bitstream.

After a clumsy start, Sony 'clarified' the DSD proposal, saying that the system was developed for archiving, and DSD releasing is a distant concept. Doubtless this clarification was not unconnected with the fact that all the record companies, including Sony Music, are still watching sales of conventional CDs rising. The last thing they want to see is a consumer scare triggered by the promise of better CDs just round the corner.

In mid April, the ADA agreed a bullet-point list of recommendations. This read as a straight endorsement of DSD, with bitstream coding to be used both for archiving and consumer release. Japanese sources confirm this. But the ARA has a more optimistic view. This came through at European industry seminars held at the end of April at Harrogate, in the North of England.

The ARA expects to see a separate list of bullet points for release media, to supplement the first list which refers only to archiving. Says Bob Stuart: 'The specification is workable'. And he is happy with 'two victories'. The ADA proposal does not rule out multichannel sound and it recommends lossless coding.

Stuart acknowledges the help of both Pioneer and Philips on winning the lossless code recommendation, adding, 'We are absolutely happy about the use of DSD for archiving, but only for archiving because it takes up three times as much data space as PCM'.

All this has been achieved, says Bob Stuart wryly, 'while the AES is still having meetings about who is going to be on the committee to discuss the issue—by the time they have decided, it will all have been decided'.

'We don't understand the politics of the Japanese standards process. But if we did nothing there is a risk that a new generation will grow up thinking that music is video with AC-3 compression.

'The music industry told us that they only wanted Red Book time, 80 minutes per disc. They have enough difficulty filling a CD with music already. They complain that they are not being consulted on plans for a new format. Well, what I say to them is Edison did not consult with recording engineers.'

By exploiting the variable data rate which DVD uses for MPEG picture coding, lossless packing can save between 30% and 40% of disc space. The ARA wants eight channels of sound on the disc, at anything between 16 and 24 bits.

The time scale now is that the ADA will put its recommendations to the DVD Committee's Audio Task Force. This group will then take a year to come to a decision. Says Stuart: 'The fact that the audio specification will be not be agreed before the launch of DVD does not matter as long as there is a digital output or hose on the rear of the player which can deliver whatever signal is on the disc'.

The only immediate action needed is for the DVD Committee to agree on the use of two digital flags which the player will use to distinguish between video and audio discs.

If this happens, predicts Stuart, 'DVD can be the last format'.

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Walking the Dragon

The tide has turned on the regional divides that have traditionally dogged the music industry of the Asia-Pacific region, writes **JIM JAMES**

When John Rule came to Asia to seek his fortune in 1987 he found a place that was on the verge of an explosion of business in the sound-reinforcement market. But, as many others have found, exploiting the potential of the Asian market is about more than just being here.

John grew up in London and worked at Rak Studios doing all the unglamorous jobs, and soon discovered that getting out of the claustrophobic studio and living on the road setting up gigs was infinitely preferable. John was introduced to the techniques for rigging live sound and production by Smudger and Tim Summerhayes of Rak Mobile on the Pink Floyd's 'The Wall' concert, and well remembers the huge stack of Crown amps under the stage and the buzz of the concert. Before long he was hooked on the gig scene.

It seemed the natural thing to do; to take his expertise and move to the emerging market of Hong Kong. Along with brother David and partner Simon Fraser, they founded an equipment rental company which was subcontracted to larger A-V companies catering to the corporate market, doing events for product launches; fashion shows; and some big concerts throughout Asia, including China and Vietnam.

The Concert: 'Symphony under the Stars' Hong Kong 1994. The Rig: Meyer 4 x MSL 10s, Yamaha PM4000 and Soundcraft consoles

In setting up these events John invested in an early Soundcraft board; Bose and Nexo speakers; Carver amps; a 72-channel dimmer; and Astralite trussing. He relied on dealers and hire companies, often one in the same, to supply the rest of the setup.

'We were naive to think that having quality equipment would be enough to command a large chunk of the market. We found that companies were buying in gear and just running it into the ground–three of the 24 channels on the desk wouldn't be working or knobs would be missing–so in the end, out of frustration, we realised that we would have to commit to buying in a larger amount of the gear to provide the quality that we wanted to give our clients. However, at that time, cost was a chief concern and it was hard to sell quality.'

They discovered that buying the equipment they wanted was not always easy; often they had to bring it in direct from the manufacturers; sometimes because the products weren't sold yet in Asia, as in the case of aluminium trussing; sometimes because some of the dealers in the region operated their own event companies and were reluctant to sell to the competition.

This is a common function of how companies create a distributor network in Asia. Manufacturers appoint the agency to their biggest or first customer in that territory, yet it seems illogical to expect a company which is a user-operator to introduce a new product to his competitors. John found that introductions normally came with higher prices and longer lead times than travelling to Europe or America to buy direct.

THIS SITUATION is changing as the Asian industry matures and manufacturers become wiser. The original family businesses which saw the A-V market as an opportunity are now being run by these sons who have taken a genuine interest; or by professionals who are influenced by crews and skills that come in from the West; or by an increasingly sophisticated audience; or by modern venues.

Large venues, designed with entertainment in mind, are funded by the rise and rise of the film industry and CantoPop stars such as George Lam and Anita Moy, who are popular enough to put on concerts on a scale previously reserved for only a handful of international stars like Jackson, Turner and the ubiquitous Kenny G. Events are arranged by promoters who deal predominantly with agents, rather than record labels, a situation that may change as promotional budgets; TV exposure; and distribution outlets are seen as the keys to success, as in Europe and America, rather than the relationship between the talent and the minder.

One of the implications of this is also that it is virtually impossible to arrange a regional tour because promoters tend to organise events in one, or perhaps two, markets. What the big record labels are trying to do is to create regional artists via the vehicles of Channel V and MTV Asia, and retail groups like HMV and Tower are establishing outlets in all the major cities, but as John points out part of the problem is cultural–Asia is less homogeneous than Europe in terms of common languages, religion and so on–and part is geographical.

When you look at Indonesia, for example, there are over 13,700 islands, 185 million people and one major city, Jakarta. The only way to tour in Asia is by plane, with artists who are big enough to draw the crowds. This requires that passenger and freight planes are chartered, for rigs, cables and crew –underwriting a tour can get expensive. Supplying all the things that can be sourced locally is what Technical Production and Event Management Consultant, John Rule, and his company does, taking advantage of local knowledge and contacts with an unerring patience.

'One of the main problems for those coming out here and working with local crews is attitude. Aggressive management styles just don't work in Asia. We work as a buffer between a production company and the venues, knowing how to ask for things and who to ask; trying to not lose it when it doesn't happen. In my opinion if you haven't got patience and a sense of humour don't bother trying to work in Asia.'

The only country John Rule believes will be able to sustain a major road tour is China with 63 cities with over three million inhabitants, but for now the major venues are in Shanghai, Beijing, Guangzhou, Tianjin and Xiamen. The Chinese are keen to see Western acts; although according to reports the content of the performance is quite closely watched: exposure of flesh, profanity and anti-establishment messages are definitely not encouraged. For any young person who wants to follow in John's footsteps in a few years time they will find that there is the opportunity of a 63-date tour, over two years, up for grabs. Requirements: have patience will travel.

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AMS Neve LIBRA

Unapologetically targeting the mid-band of music tracking studios, AMS Neve has focused strategic elements of its R&D effort in an affordable and attractive digital console. ZENON SCHOEPE checks the balance

THE LAUNCH of the Libra console at the Copenhagen AES Convention was surprising for a number of reasons. First, Libra is a music recording desk—it pretends to be nothing else—yet it comes from a company that many suspected, following the merger by former owners Siemens of AMS and Neve, would stifle the music recording heritage of Neve in favour of AMS' more comfortable position and stronghold in postproduction. The second reason is that Libra is the cheapest large-scale, digital, music-recording desk currently available. A look around reveals that a lot of intelligent money is being sunk into the circa-£100,000 desk area. This has become something of a new price point above which there is a lot of smart analogue and digitally controlled analogue-console activity which undercuts the truly serious money of the established 'super desks' in both analogue and digital form. At prices starting at around £120,000 for a 24-fader configuration, Libra is currently the only digital music board playing in this part of the park.

'In the area of music, everybody would love to buy a Capricorn but it's too expensive and we can't make it cheaper so Libra was designed to bridge that gap'

Thus we arrive at the curious observation that AMS Neve should be launching its most significant new product since the Logic 3-AudioFile pocket-rocket combo into the less affluent digital music recording sector and at the popularly stereotyped starving families and studio staff that inhabit it. Yet it makes sense, and Libra is a significant development for AMS Neve—for while the postproduction price range and the production process itself is served by the company's Logic 3, through the Logic 1, and on to the Logic 2, the music-recording desks were confined to the upper echelons with the big analogue VRs and the digital Capricorn with no lower-priced option supporting them.

According to AMS Neve MD Mark Crabtree, this observation has been a cause of some concern although he alludes to the fact that while AMS Neve would have liked to have done something about this state of play earlier it clearly couldn't. Perhaps it's significant that Libra should arrive so promptly after the divorce of AMS Neve from Siemens into private ownership. The intention is to apply the company's considerable digital expertise to the studio band of more ordinary folk, rather than the absolute top end served by the Capricorn. Crabtree's concept for Libra came about while playing around with a fictitious wish-list desk that would best suit a project studio for his sons. Having opted early on for a digital platform because he wanted full dynamic automation, he found himself drawing together parts of the AMS Neve product range. The Capricorn was too big, but he liked the Assignable Facilities Unit and its multifunction switches, he liked Logicator pots, but the Logic 3 was too small and he wanted a fader per channel. What resulted in loose control-surface terms was a best of compilation desk with a chunk of Logic 3, a chunk of Capricorn, and a lot more of everything else around it. The Libra uses Logic series components because its a more scalable engine than the Capricorn, yet employs the latter's convertor technology, although Crabtree is at pains to point out that the control surface is unique to Libra.

'All these panels are new, we haven't just lifted things from the other desks,' he explains. 'We've listened very hard and the feedback we've got from users has been very important because Logic and Capricorn have been out there for some time now in their various application areas. In the area of music, everybody would love to buy a Capricorn but it's too expensive and we can't make it cheaper so Libra was designed to bridge that gap.'

There is also more flexibility in the price than the aforementioned sum implies as reducing the amount of controller surface on the 24-fader version, for example, could get the price down to the region of £100,000 and it's interesting to note that Tascam DA-88 and ADAT interfaces are supported by the board through a MADI

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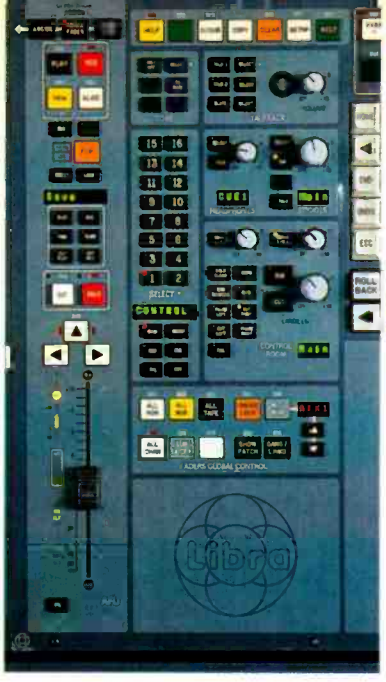

conversion module that will be applicable to any of the company's digital desks.

'MADI is a very important word you should watch for from this company because it is the link between other Lego blocks,' says Crabtree who, after only slight pressing, is persuaded to talk for the first time in any detail about AMS Neve's long-awaited networking plans in which Libra can play a part. 'What we've got is a thing called WorkFlow which is our cover-all term for interconnectability at AMS Neve,' he explains. 'That's split into three different areas, the first is the routeing of programme material from place to place from disk, which is called StarNet, where you can attach various disks, other people's disks, for moving data around. Next along from that is MADINet which is a MADI routeing system where you get MADI streams in, you strip them out, reform them and get them out the other end which allows you to route different studio signals from place to place. Finally, there is the machine control aspect called SynchroNet which allows you to get at particular machines.'

WORKFLOW is obviously geared towards situations where a great big desk sits at the end of a filmic or video process.

'What you're trying to do is bring all those elements together to that final stage, and our products, the engines, and the networking, are all designed to facilitate that movement backwards and forwards along this chain,' Crabtree says.

So is Libra a part of WorkFlow? 'Libra has Encore,' he replies, 'our generic automation system, which means it will be able to move to and from the other automation systems we have. If you wanted to get this desk into WorkFlow you could connect it to MADINet, but as a music console it's not really intended for the degree of interconnection.'

Part of the game plan for Libra is that it will appeal to studios that deal in passing trade and numerous engineers as AMS Neve admits that the complexity of a Capricorn or a Logic 2, in particular, lends itself to facilities that have the luxury of an in-house engineer dedicated to learning the intricacies of these more complex desks.

'It's targeted at people who want a music console but not the price to give them ultimate flexibility,' continues Crabtree. 'We didn't want the console getting in the way of the creative process. If you take a Logic—and people are using them very successfully for music—the flexibility of it, and it's ability to be split or in-line with routeing from here to there is wonderful if ☞

Left: Libra's centre section is surround-sound bus and monitor capable

> 'Encore is one of the most important parts of Libra and aids its accessibility as well as overcoming, at least in part, the situation where AMS Neve has to support effectively three different automation systems'

Below: Like the Capricorn, Libra makes extensive use of visual displays, one for Encore, the other for signal flow and track arming

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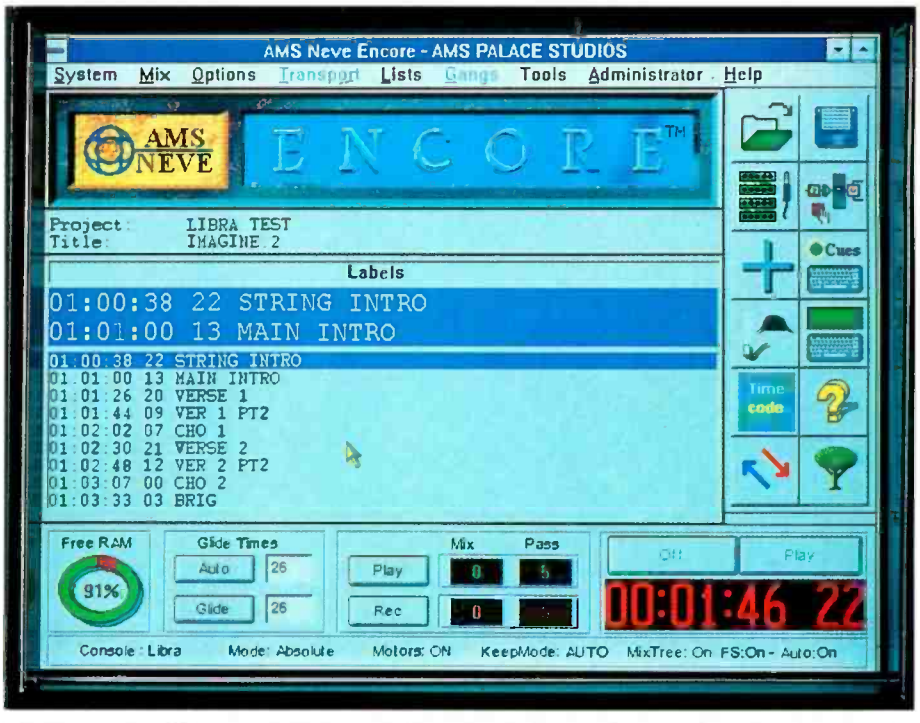
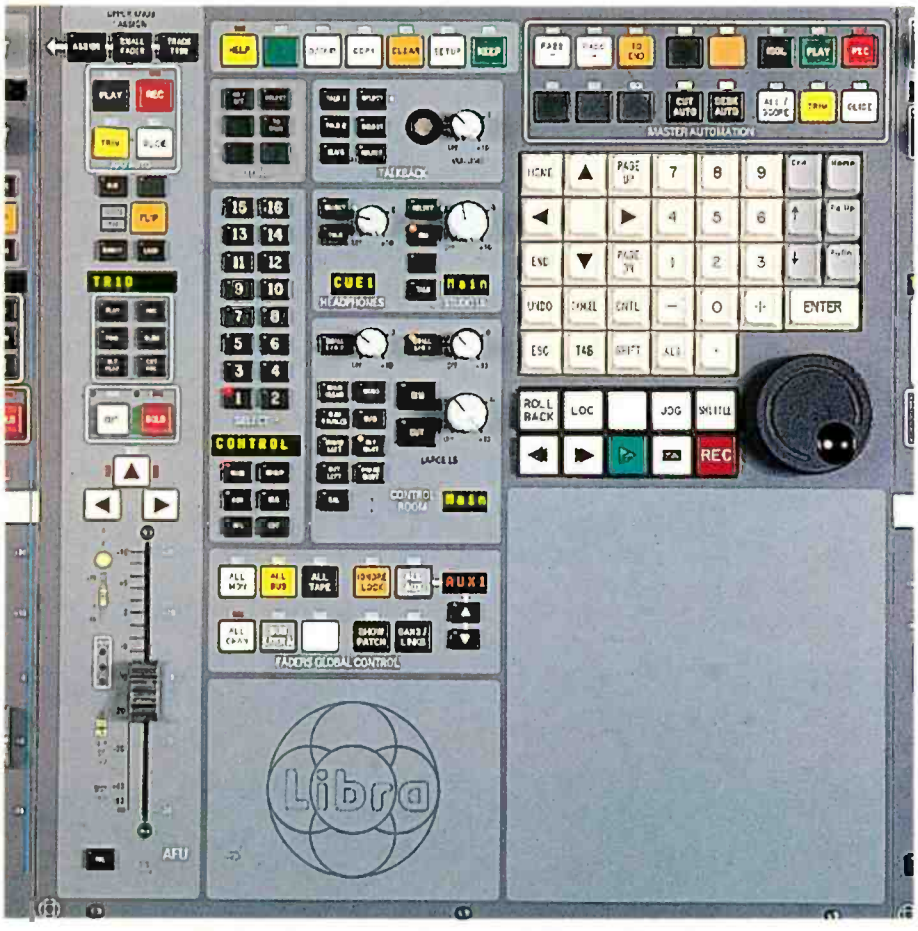
you want to do that. If you don't need that, and only want to record music, then this is it.' Encore is one of the most important parts of Libra and aids its accessibility as well as overcoming, at least in part, the situation where AMS Neve has to support effectively three different automation systems.

'If you move from an absolute parallel surface to an assignable surface there are a number of rules you need to understand. One of which is that you need to press an ACCESS key to give you the huge strip in the middle,' he says. 'The next thing that frightens people off is automation —they can deal with a slightly unfamiliar surface but the automation is what make or breaks a session. From the word 'go', Encore was designed to be an intimate part of Libra and we've taken our experiences with Capricorn, the Logic automation and Flying faders and put them all together to give an automation system that you can set up in Flying Faders mode, Capricorn mode, and modes that operate in a similar fashion to other manufacturers' automation. What we've found is that when people have really got to grips with a Logic, which is a more complicated console to understand than the Capricorn, they love it but there is a gap between sitting in front of it and going "Aaargh", and being proficient on it, and that's the danger zone. Libra has been designed to reduce that danger zone as much as possible while still giving the payback at the end of enormous flexibility. Again we've played long and hard with this—if there's a double push-button there's a box around it and there's colour coding, too, to relate you to automation functions —so rather than having to learn a whole set of different rules about the EQ, the dynamics and the routeing, we've tried to make one short set of rules cover a wide area.'



Detail of one of Libra's two screens—this one handles the Encore automation information

EXPLAINING the particular details of Libra is not the purpose of this article but giving the gist of what is on offer is. In popular fashion it has a separate control surface and remote processing and interface racks with these racks interconnected via MADI. The desk is essentially in-line in presentation with each strip carrying a record and monitor path each of which can have access to full EQ and dynamics. There's also an additional secondary input which can be used for extra returns which triples a 24-fader configuration to handle 72 inputs. The Capricorn style AFU provides the knob and switch per function control albeit through the use of Logicators, while multitrack buses are handled in groups of 16, any channel can be mono or stereo, and there's surround-sound busing and monitoring. You get two screens, one of which is dedicated to displaying signal-flow parameters and multitrack track-arming; the other dedicated to Encore. EQ curves and dynamics parameters can be shown on screen and a path-configuration page for ordering the processing is available in a manner similar to that on the Capricorn. EQ is the Logic's, 4-band, fully parametric arrangement.



The 'busy' centre section helps delineate Libra from the second division of project consoles

'Rather than having to learn a whole set of different rules about the EQ, the dynamics and the routeing, we've tried to make one short set of rules cover a wide area'

They've succeeded in doing away with hidden functions, there are no shift routines, and everything is on the surface simply one key push away.

Channel strips contain a small number of dedicated controls plus a lot of indicators to tell you the status of the selected path being looked at; plus signal present LEDs and dynamics indication. There are two Logicators per strip the bottom one being always the pan, the top one

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The use of the Logic-series logicators has helped to construct a control surface free of hidden function

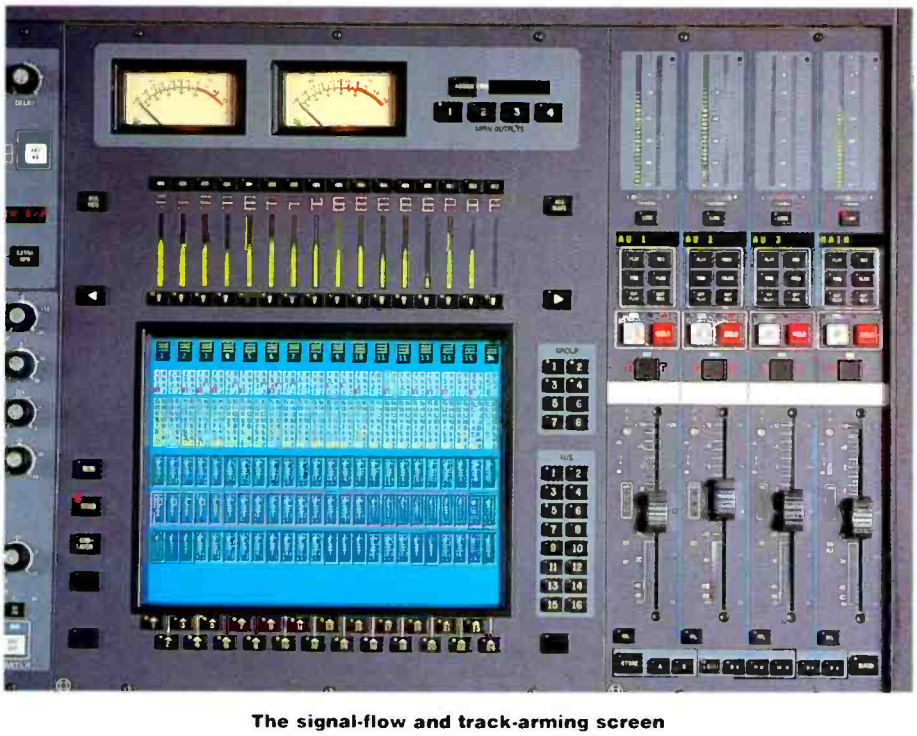
In honesty, the real benefits of digital mixing and the sort of facilities offered by the high-end products have been of only passing academic interest to the core of studios which have been forced to stand and watch progress pass them by

assignable for whatever you want by pressing an ASSIGN button and touching whichever control in the AFU you want to display across the board. The Capricorn's aux flip trick for assigning aux feeds to the faders is maintained as is the ability to rearrange inputs to faders for convenience and there are 16 mono or stereo auxes; eight mono or stereo groups; and four mono or stereo outputs which can be patched out to four different destinations. The monitor and master section is busy but then it's a grown-up desk panel. It's all very analogue in presentation and logic.

AMS Neve is a discernably more relaxed and open company since its very recent departure from the Siemens fold. You get the impression that somebody finally got around to emptying the car boot of concrete and adjusting the hand brake so it doesn't drag.

I'm impressed at how much sense Libra makes even after a cursory encounter. While distinctly compact it is not so diminutive as to look ridiculous in any decent-sized room. It looks the part, it looks serious, and I believe it is.

Libra will appeal to a lot of people purely on price. In honesty, the real benefits of digital mixing and the sort of facilities offered by the high-end products have been of only passing academic interest to the core of studios which have been forced to stand and watch progress pass them by on its way to the truly rich or the postpro community. Libra is applicable to these studios and they'll actually be able to sit down with it and open their hearts to what really is a stunningly clear presentation with enormous levels of control and convenience in the knowledge that they may just be able to afford it. Questions about digital multitrack upgrades and the alternative of DCA desks persist, but that's down to the business plans and choice.



The signal-flow and track-arming screen

It's a contentious point, but I believe that Libra will force the hand of other console manufacturers to respond at this price point much in the same way that the Yamaha 02R did further down market. It's good news for recording studios everywhere that have been hamstrung by the sort of investment previously required to take a digital leap.

Libra has the aura of established technology about it. AMS Neve has reapplied existing and proven technology that does not require the leather crash hat, flying goggles and pioneering yet forgiving spirit associated with early digital desks and I would have to include the early days of the Capricorn in this category. AMS Neve seems to be on top of this stuff now, it's a repackaging and redirecting exercise more than some introduction of revolutionary concepts and technology. It will be extremely interesting to see precisely how Libra is received and how many cheque books talk.

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Amek DIGITAL MIXING SYSTEM

The rush is now on to secure a share of the middle of the digital mixing console market. **ZENON SCHOEPE** assesses Amek's dynamically-based Digital Mixing System and its relevance to all areas of pro-audio operation

IF YOU'VE SEEN Amek's Digital Mixing System—or DMS console—evolving while doing the rounds at exhibitions, two things will have been apparent to you. Firstly, you will have spotted a work surface that looks almost 'retro' by digital desk standards, and secondly, you will have picked up on the claim that it is among the most expandable and variable in the configuration of its controller surface and processing power.

While what the DMS does is not necessarily that different from what any other manufacturer's digital desk does, Amek's people claim that the way they have met the design challenge is. The development of a DSP engine wasn't targeted specifically at digital mixing, and Amek makes it clear that it was out for horsepower that could be applied as desired rather than an application-specific device—and a digital desk was a natural progression for a mixing-console manufacturer. It should be said, however, that nobody will actually explain what other purposes Amek might have in mind for the engine.

What is clear is that Amek wants the appeal of the desk to be as broad as possible. To this end, the exhibition version has looked particularly well suited to broadcast, the first DMS was bought by postproduction facility (Hullabaloo in Manchester) while the control surface of the DMS has been employed by Fairlight as a front end for the mixing functions of its MFX3 DAW in its FAME—of which more than 35 have so far been sold. Options are still being kept open, and for good reason according to Amek Technical Director and cofounder Graham Langley.

> Dynamic Resource Allocation is part of this principle and will eventually extend to shared configurations in which the DSP may be divided between two or more control surfaces

'We've always found with our analogue products that until people start using them you don't know what market will take to them—a product can fall in a completely unexpected area,' he explains. 'We tend, with a digital console, to think it can go anywhere and your control surface almost defines the application. It gives us a bigger market potentially.'

THE SYSTEM consists of four elements: the control surface with host Pentium computer, the 32-bit floating-point DSP engine, I-O racks and an automated crosspoint matrix. These are configured to provide the advantages of virtual and hardware solutions as the mixer can be reconfigured on a task-by-task basis to suit an application within the constraints of the available signal processing and the number of I-Os. Dynamic Resource Allocation is part of this principle and will eventually extend to shared configurations in which the DSP may be divided between two or more control surfaces.

Dynamic Resource Allocation is an internal communication system that tells you if you haven't got enough DSP power to do what you want or re-allocates DSP there and then without having to reconfigure or reboot if you have. It's part ☞

Amek's digital initiative—designed to meet the requirements of a changing market

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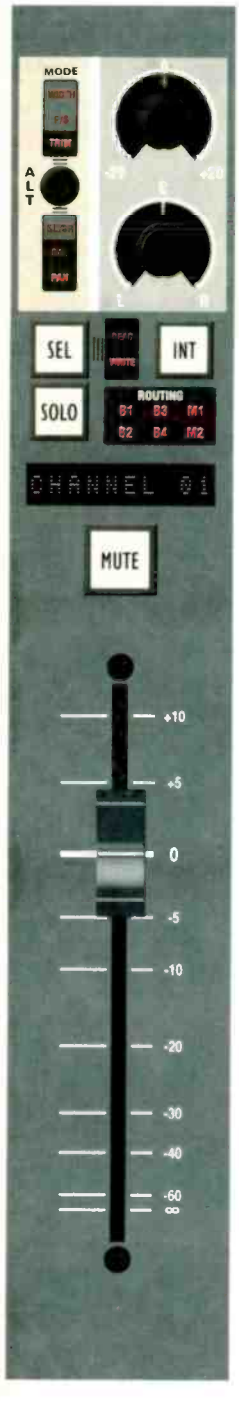
of the policy of getting as much out of what is there and keeping options open, with the biggest decision made at the purchasing stage when I-O and DSP is actually specified. According to Langley, modularity is the key: 'The point is that you can start off with a very minimal system, you can buy more processing and I-O racks. Having started with a little assignable panel which may be controlling, say, eight channels, the control surface can be expanded to give you more hardware channels, or you can add more processing power and use the same control surface to control 24 channels; you can go in every direction.'

Familiar concepts like input and output channels are retained. Inputs can be mono, stereo, LCRS or LCRSSB sets, may have mic or line inputs, or be dedicated to multitrack returns.



Fader panel detail

Mono, stereo, LCRS-LCRSSB group and-or main output modules can also be specified.

DSP power can be increased by adding more cards and Amek is at pains to point out that no ASICs or other custom components have been used.

Automation is based on the SuperMove moving fader system and combines full dynamic automation with snapshots and on and off-line editing with graphic displays and libraries of popular settings.

In traditional Amek fashion, the price of the desk on a like-for-like comparison with competing products lands it in the middle ground in a similar manner to Amek's analogue consoles.

According to Langley, the origins of the desk extend beyond the five or so years that have gone in to the R&D on the engine: 'We knew that eventually the market would go to assignable and digital consoles and we developed a face plate control surface layout probably ten years ago —certainly before the APC 1000 [Amek's first digitally controlled analogue desk] —which we put to various people,' he says.

A continuous process of redesigning the face plate has resulted in, what Langley claims, is now a desk that people feel comfortable sitting behind but still employs the original concept of modules that can be added or subtracted, depending on how people prefer to work: this concept was introduced 'long before most of the stuff was technically possible'.

> 'We didn't spend weeks designing I-O systems and interface chips because it was inevitable that these would be available off the shelf'
> —Graham Langley

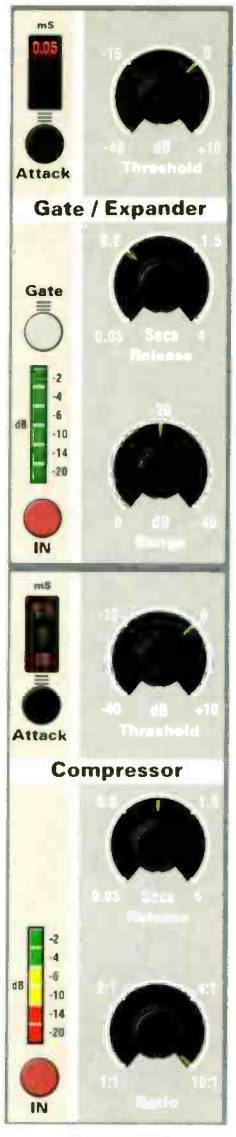
'It was a concept then, and we made no attempt to build a console,' Langley explains. 'Although we took on DSP engineers at the time and developed various bits and pieces and algorithms the main thrust was on the DSP engine and seeing what was happening with other people and the problems they were hitting. We didn't spend weeks designing I-O systems and interface chips because it was inevitable that these would be available off the shelf so we'd be wasting our time duplicating other peoples' efforts when they'd more than likely be better than something we could come up with ourselves. The whole architecture is hardware independent so we can develop new boards for the engine if the individual chips are upgraded by the manufacturer. Similarly if a significantly different device comes out we change the processor boards in the engine and move in that way.'

Langley adds that Amek doesn't have the purchasing power of Yamaha to create custom chips and has opted instead for AT&T DSP chips.

'We have some interesting ideas that nobody else has done yet because it forms a new platform for us to continue development on, particularly in developing application specific software in the same way we derived ShowTime automation for live and theatres from SuperTrue,' he continues. 'As this console finds new markets, new software will be developed. Potentially there could also be variants on the control surface. However, we're not about to make the digital equivalent of a 9098 which would be pointless anyway. We still maintain that the audio quality of something like a 9098 is dramatically superior to anything anybody can produce digitally,' he states. 'It's another reason why we've taken off-the-shelf technology because ADCs will get better and we can put those in as, and when, they get there. For the markets we're aiming at, this is as good as digital gets.'

AMEK CHAIRMAN Nick Franks agrees that the quality of digital even at its finest can still not challenge the best of analogue. 'Analogue is superior—demonstrably superior,' he says. 'Our perception was that broadcasters have all of their sources in digital and they don't want to go out of digital and then back again just for the sake of mixing it. Most of them are working with a relatively limited bandwidth for broadcast anyway so they're perhaps less concerned about the finer points of audio quality that recording people are interested in. They're getting pictures on the air and sound is just something that you have to have.

'There's also this aspect that there's a lot more signal traffic in broadcast production and these signals are better being shunted around in digital form and it avoids problems. So it's logical for broadcasters to want to be in digital,' asserts Franks. He adds that while the DMS at one stage looked as if it would find a niche as a digital replacement for the BC3, as things developed Amek realised it could do a lot more. 'There is substantial money in all these markets because what we all know is that television hours are growing, record production is a different thing.'



Dynamics panel detail

Franks won't rule out any potential market application for the DMS but admits to reservations about a push into recording.

'Making a recording version is in my view no radical change,' he explains. 'Calculation of algorithms is calculation of algorithms, a computer computes. If it puts out something that looks like a recording console then that's what it's doing. If you look at the studio business overall it's not very buoyant worldwide—this is not 1985. There are a number of digital desks for recording studios and none of them are selling particularly substantial numbers. It's something that I guess we'll do but it's interesting in terms of technology but not in terms of financial reward. Perhaps some of the other companies are making a lot of money out of selling digital desks to studios but I don't think so.'

Surprisingly, Franks admits to not having looked at the products of his competitors. 'I make a great point of ignoring them all. It doesn't interest me,' he says. It begs the question of whether he might be missing something. 'Yes you're right,' he replies. 'I might be missing something.'

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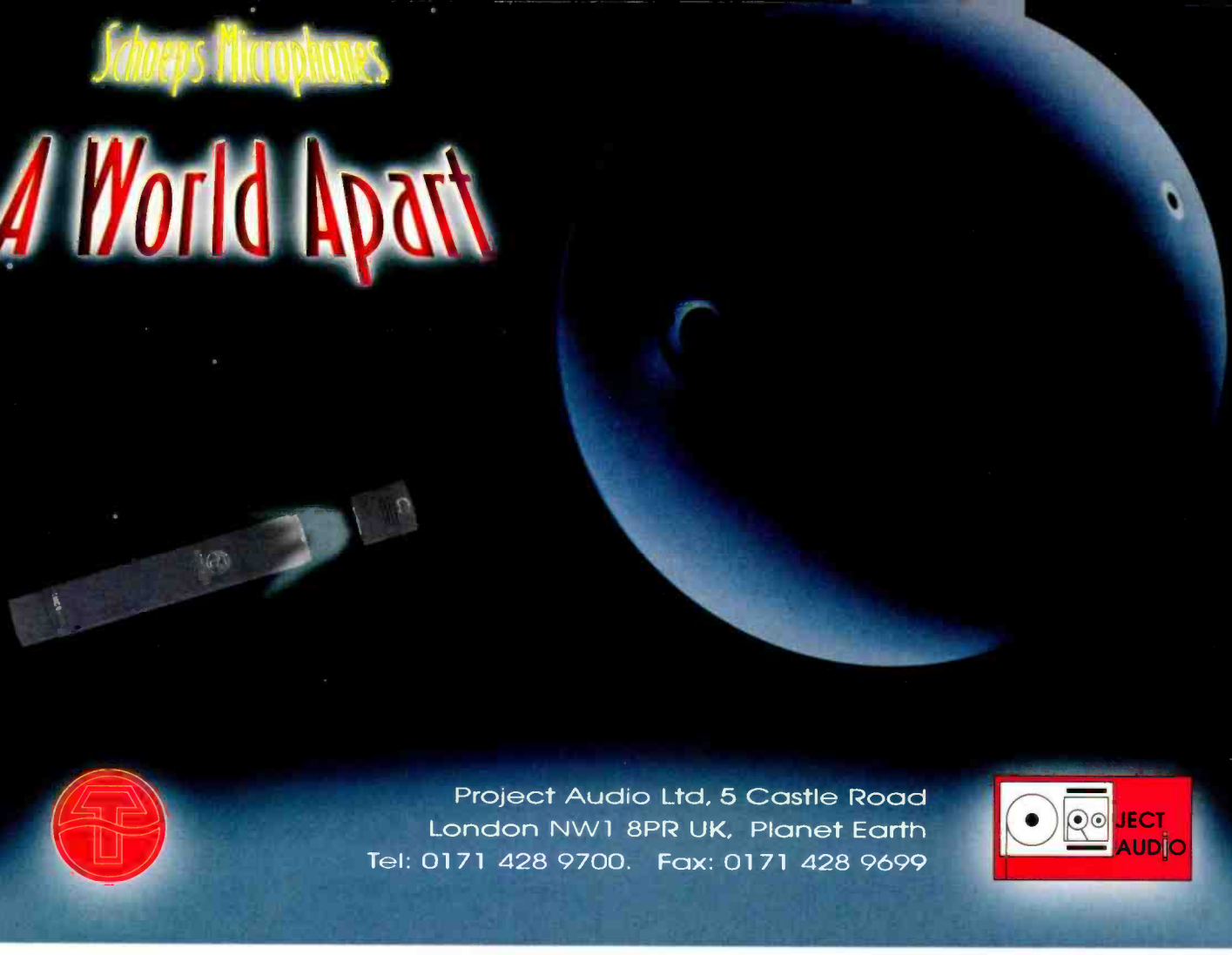

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AT ARTIST SERIES

Having gained respect at the high end of the mic market, Audio-Technica have produced a 'set' of more affordable microphones. DAVE FOISTER throws the lot at a session—and comes out smiling

AUDIO-TECHNICA'S microphones have made something of a splash in recent years, with the 4033 and 4050 making a deserved impact on the large-diaphragm, studio- condenser market. Now there is a new budget range of microphones, the Artist series, with the broad aim of covering both live and recording use. The range comprises three electret condenser models and a dynamic, all built to withstand stage use and with studio aspirations.

The condensers offer two cardioids and an omni, all powered either by phantom or an internal AA battery. This gives away the electret nature of the design, although the implementation is slightly unorthodox in that the permanent charge is on the fixed back plate, making it possible to use a much thinner diaphragm to improve frequency response and transient behaviour. The specs also make it clear that the performance with phantom power is substantially better than with the battery alone, with 14dB more headroom and consequent increase in dynamic range, lower impedance and slightly improved sensitivity. Nonetheless the battery option is bound to be useful in many applications.

The two cardioids appear to be electrically identical, the differences being in the acoustic design. The ATM33a is a straightforward stick microphone, while the ATM31a has a substantial windshield for vocal use; the head design also appears to make the cardioid pattern a bit more regular with frequency according to the published charts, although the 33 is still commendably consistent. The other condenser is the ATM10a, a simple and elegant omni design clearly built around the same preamp body, although this is not a modular system and none of the heads can be removed for swapping around. The microphones are as simple as it is possible to be, with no adjustable controls whatever; pads are claimed to be unnecessary and bass roll-off must be applied at the desk. All come with the same standmount, a rugged affair with a metal base which accepts the supplied thread adaptor for 3/8-inch stands, although for the larger cardioids both clips had to be tightened up to support the weight without drooping.

The ATM25 is the dynamic member of the family, and resembles a short, squat EV RE20. Its polar pattern is specified as hypercardioid, and although its frequency response is inevitably limited compared with the condensers it still claims to reach 15kHz, albeit at about 5dB down.

Called the 6-Pack, A-T's Artist series comes in an 8-space carry case

Its maximum SPL is not given, but it appears to be pretty much bomb proof in every sense. Its stand attachment is integral to the body and features a lockable knob to deal with its not insignificant weight. It too has no switches at all.

I TOOK THE PLUNGE and recorded a live jazz session almost exclusively with the Audio-Technica microphones: spaced ATM10a omnis over the kit, an ATM33a on the snare and the ATM25 on bass drum, with a 33 on tenor sax and a 31 on soprano. Upright bass was handled by a DI in combination with an ATM31a.

The results were spectacularly satisfying. Audio-Technica's claims for the microphones' ability to withstand high SPLs without distortion were unquestionably borne out in practice, despite the absence of pads. The omnis produced a clean open sound with surprising depth and an apparently well-matched stereo image, with no hint of distortion; pads were needed on the desk, but the output was not so hot as to risk giving trouble with a decent mic amp.

The two cardioid models gave a virtually identical direct sound, again with a good bass extension (everything I needed for the double bass) and a natural unstrained top end even half way down a saxophone bell. Remarkably almost, there was a distinct difference in the sound of the spill. The larger ATM31a sounded appreciably less coloured off-axis as would be suggested by the published polar plots, the 33's broad back lobe at 8kHz showing as a brightness in the ambient pickup. This would suggest that despite its apparently more specialised design, the ATM31a makes a better general-purpose microphone than the 33 unless bottom-end spill is a particular problem; for single overdubs where spill is not a problem at all then there is virtually nothing to choose between them.

The ATM25 dynamic certainly looks the part, and reassuringly it sounds the part too. It has the requisite ability to deal with the blasts and shocks of a close bass drum, with enough upper extension to make it useful for much more besides. Its unusually small size suggests several uses where some familiar big dynamics would be cumbersome, and its smooth extended sound gives it a condenser-like quality with all the mechanical advantages of the dynamic.

A nice touch is the availability of a canvas carrying case containing a block of chunky foam with cut-outs for eight microphones (curiously known as the 6 Pack), which can accommodate all the Artist Series in their soft pouches. This whole range is a very impressive addition to Audio-Technica's microphone armoury, with a sturdy enough construction to inspire confidence on stage and a performance worthy of the studio—among the most versatile workhorses you will find.

CONTACTS

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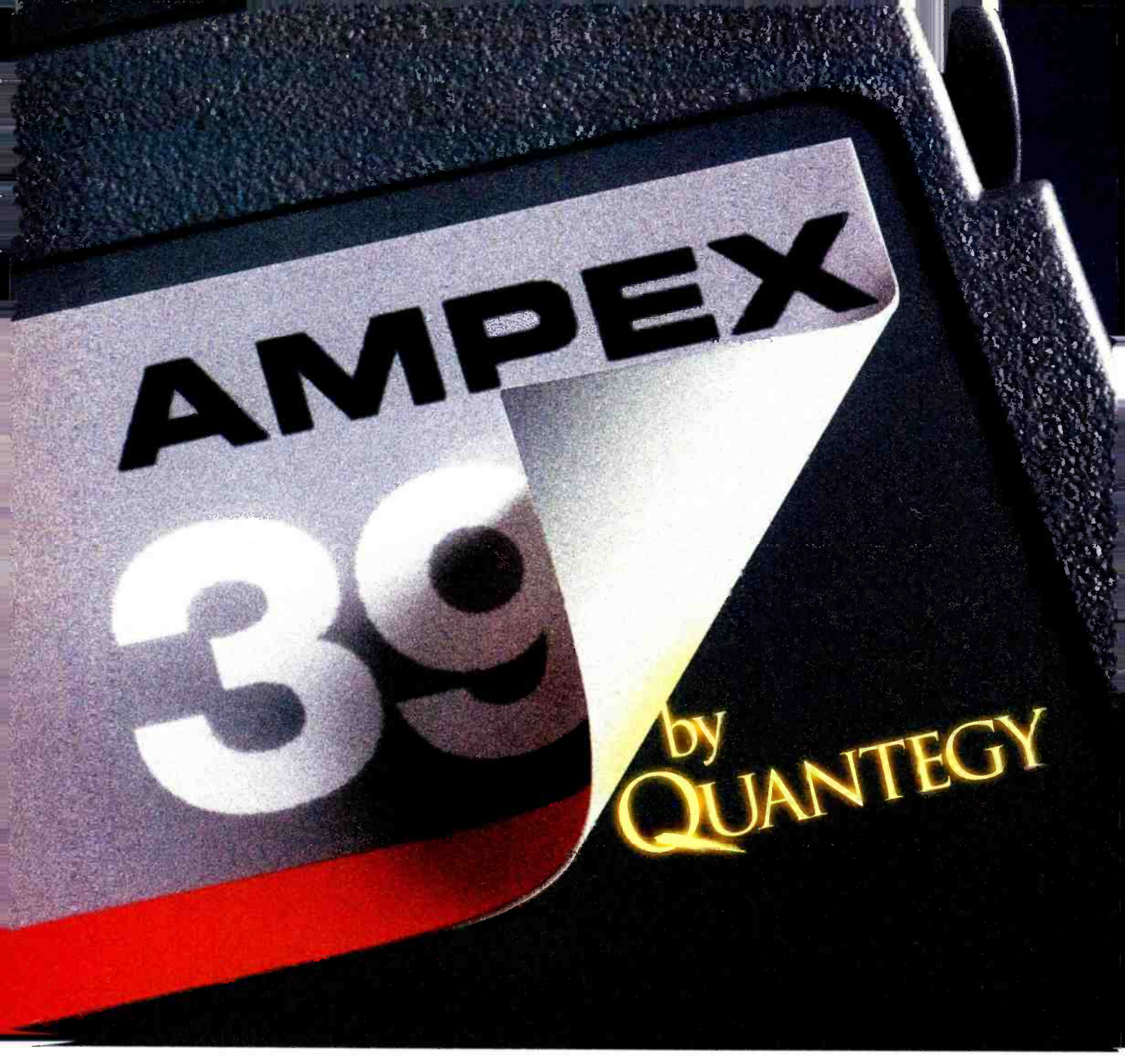

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MTA INTERMIX

Trading flexibility for modularity, Console Designer Malcolm Toft has sought to defeat the compromises imposed by real-world console budgets. **TERRY NELSON** investigates the modular alternative

FLEXIBILITY, IN PRINCIPLE, is great. After all, why choose to limit the potential applications of your next major purchase? Flexibility—in practice—can present problems. How certain are you that you'll end up with something that does what you want, rather than everything but?

Surprisingly enough, consoles tend to fall into the 'flexible' category and this is easily explained by the fact that many are hybrids intended to address a variety of applications but fail to squarely cover any one. This also explains why studios are still prepared to hand over large sums of money for equipment that meets their applications head-on rather than skirting around them.

The tide may be turning, however, as one of Britain's pioneer console designers, Malcolm Toft, has just launched the Intermix modular, rackmount, mixing system.

Looked at in a simplistic way, the Intermix system consists of the main building bricks of a 16-track, 8-auxiliary, console in rack modules, thus allowing any configuration to be built up as required. where the system goes a step further is that it provides add-on facilities for virtually any console in order to provide painless (to the wallet) upgrades for increased flexibility.

Toft hardly needs any introduction to the pro-audio world, having founded Trident Audio in 1972 and having produced world-selling consoles such as the highly successful Series 80. Since selling the company in 1988, Toft has pursued various avenues until he was literally pulled back into console manufacturing by repeated requests from the States for a console that existed only in sketches. MTA was up and running.

'I think my philosophy has always included a large dose of giving the customer what he needs,' explains Toft. 'That is, a product to meet specific applications and if anything further is required, to customise—the advantage of a small company. However, there are a lot of people out there with good equipment that tends to fall short in certain areas. There are also people who have high requirements but small budgets and who are forced into buying economical gear that again, falls short.

'In fact, the idea for Intermix came from my hi-fi. For some reason I was looking at it and the thought passed through my mind as to why people buy modular, or component, systems rather than integrated ones? For me the answer was obvious—in order to get what they want rather than a compromise. This led me to thinking about consoles and whether there was anything on the market similar to a component hi-fi that would allow "custom" systems to be built up and existing ones upgraded—all at an economical price. My conclusion was "no, there is not" and I started working on Intermix.

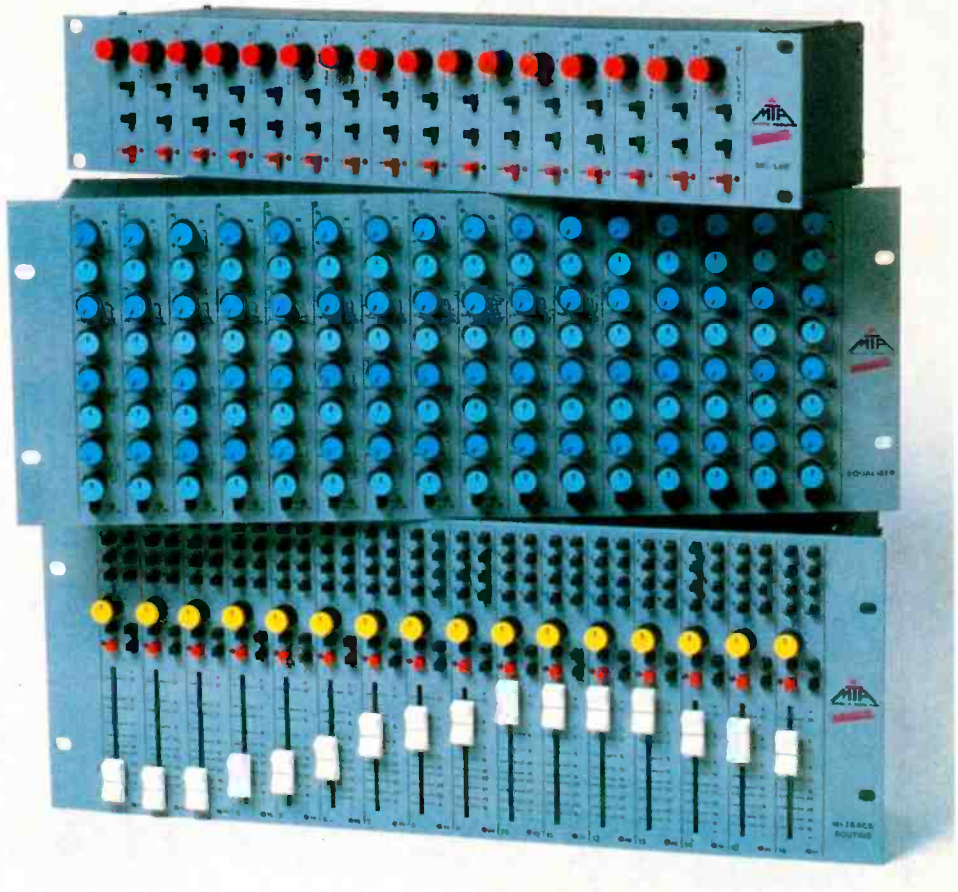
'The system is based around 16-channel rack modules, which allows for a simple system at the start and room for later expansion as required. You could start, for example, with 16 mic-line inputs going to 16 groups and end up with a 64-channel console with 32-track monitoring and EQ on all channels and monitors.

'However, I was very concerned that while the price structure was to be very reasonable, that the equipment be of the same quality as our MTA consoles. For this reason, virtually all circuitry comes from the large consoles and the same components are used.'

AT PRESENT, the Intermix range consists of six rack modules plus rackmount power supply. The 16-channel mic-line rack (2U-high) features a rotary gain control, plus -20dB, phase reverse and 48V phantom switches for each channel. The rear connections include a Neutrik combined XLR-balanced jack for each channel in order to provide separate mic and line inputs, and balanced ¼-inch output jacks. There are also multipin Interlink connectors which we will come back to later.

The EQ rack (4U-high) features 16 channels of the MTA, 4-band, swept equalisation and includes an EQ IN-OUT switch. Input and output connections are balanced ¼-inch jacks and Interlink connectors.

The 16-channel routeing and panning rack (4U-high) features 16-track routeing ☞



Intermix elements (top to bottom): mic-line, equaliser and route-pan modules

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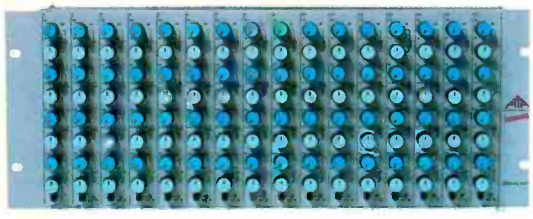
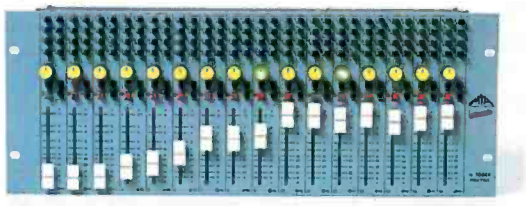


The EQ module: 16 channels of 4-band swept EQ



The routeing and panning module could be used as an auxiliary to another console

via eight switches (1-2, 3-4 ...), a pan control, four switches for Mix, PFL, AFL and Mute and linear output fader. Rear connections include balanced inputs and separate, balanced, post fade and group outputs on ¼-inch jacks plus Interlink connectors.

The Aux send rack (3U-high) provides eight aux sends from 16 channels. In the interests of packing as much as possible into a small space, the layout provides enough flexibility to cover most situations. The eight aux buses are treated as two mono sends and three stereo sends, and accessed as follows: Auxes 1 and 2 feature separate level controls and Pre and Mute switches; Aux 3-4 features level and pan controls and Pre and Mute switches with Aux 5-6 being identical but with the addition of another switch to route into Aux 7-8. Connections are again via ¼-inch jacks (unbalanced) for the inputs designated Pre-Fade and Post-Fade, with balanced jacks for the eight bus outputs plus Interlink connectors.

The Monitor and Tape Return rack (4U-high) provides full monitor and group send facilities for 16-track recording. Each channel includes monitor level and pan controls, Tape switch for group or tape monitor, AFL and Mute switches and linear-group fader. Another useful feature is a FADER REVERSE switch for applications such as live mixing with multitrack recording. Apart from the ubiquitous Interlink connectors, connections are via balanced ¼-inch jacks with separate inputs designated Group Insert Returns (Input) and Tape Returns plus Group outputs.

The Master Control Unit (3U-high) is where everything comes together in a tidy package and this also provides some dedicated facilities.

Looking at the front panel from left to right, there are eight level controls for the Aux Masters complete with SOLO switches, six auxiliary returns with level and pan controls plus MUTE Switches, a talkback section with in-built microphone and level control and routeing switches to send talkback into Aux 7/8, groups or studios. This is followed by a Studio Playback level control with an ON switch and routeing switches to send the signal into Auxes 5/6 and 7/8, Solo Master level control with Solo Enabled LED and Monitor Master level control with 4 source select switches, viz: 2 Track 1, 2, 3 and Mix plus Mono and Mute switches. The right of the panel is completed with two 12-segment LED meters for the Master Outputs and Solo and a linear stereo Master Fader. All connections are via balanced ¼-inch jacks with the exception of XLR-3M connections for the monitor, mix, studio-play outputs—and, of course, Interlink connectors.

THE MODULAR APPROACH applied to Intermix is self-evident. However, a little delving into the system brings out its versatility—at the centre of which is the Interlink feature. Whereas connection of the different racks is simple enough, the key to the system is the Interlink balanced, ribbon-cable, interconnection facility. Interlink offers the flexibility of easy patching for comprehensive system: for example the Monitor-Tape Return module features Interlink connectors for meter feeds, EQ in-out (in order to place EQ on monitors), aux pre-post sends and Interlink buses (including solo, PLF and AFL buses). In fact, a whole system could be built up using only ribbon cables—the only exceptions being the preamp rack inputs and the tape return inputs on

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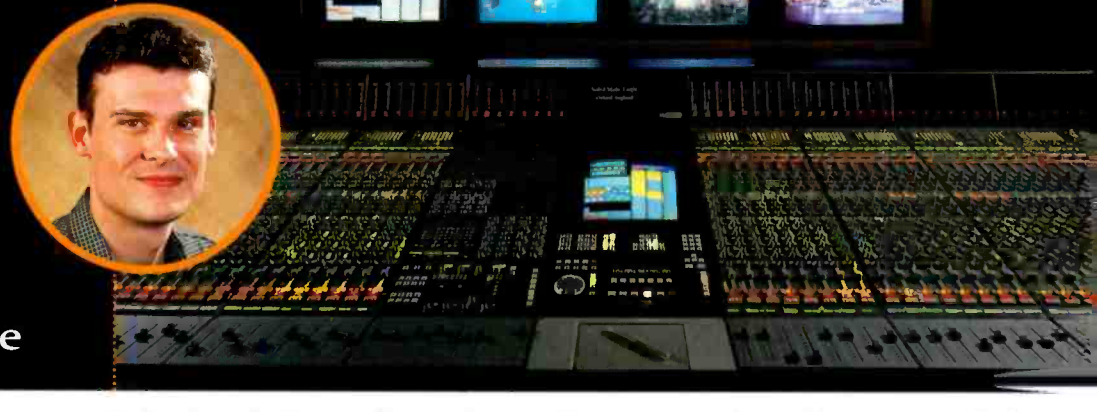

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The mic-line module features phase reverse and individual 48V phantom power

the monitor rack, these being signal sources external to the system.

As a general rule, it is easier to consider the inputs and outputs as duplicates of the Interlink connectors in order to allow connections to the outside world. Again, the possible exceptions are the Group Outputs and Group Insert Returns when connecting the routeing and monitor racks. These effectively provide a patch point for compressors and the like on the group send.

Apart from providing the means to custom-configure your own system, Intermix also provides the opportunity to have the console laid out the way you want it. A fairly typical example of this is the placement of EQ and aux sends—some of us like them at the bottom of the channel strip, other at the top. With the Intermix racks, you can decide for yourself. You can also build a console frame to suit your environment: theatres may like to save space by putting most of the rack vertically whereas other applications could use a flat or arced layout. Incidentally, MTA will supply the system in flightcases according to your specification.

As well as building your own custom console, you can incorporate elements of Intermix into your existing system in order to expand operational facilities for a moderate cost—you could patch in an aux-send rack into the insert points of your console (pre and post fade) and immediately gain another eight aux sends.

The mic-line rack and EQ rack are fairly obvious choices but a host of other possibilities are lurking. You could, for example, take the direct outs of your console into the routeing rack and give yourself 16-track routeing facilities.

The monitor-tape return provides 2 x 16 (or A-B) line inputs mixing down to stereo via the Master rack—as well as 16 group outs. The TAPE switch simply becomes an A-B source selector for a total of 32 line inputs. As with all systems of this kind, the more you get into it, the more uses you can find —it just depends on how flexible you want to be.

AFTER A RUN-THROUGH with the system in the MTA workshop, I must admit that I was convinced of the validity of Toft's design approach—with terms such as 'OB vans', 'small permanent installations (in terms of physical space)', 'system expansion' lighting up in front of me like so many neon signs. Where I feel MTA has scored heavily is by providing high-class console circuitry and features in equipment that is economically priced (prices range approximately between UK£600–£900 per unit). There is a lot of 'budget gear' out there in the audio marketplace which offers a stop-gap solutions but MTA seems to have found a niche with a system that will be equally at home in a broadcast or A-V studio as well as sound reinforcement installations and home studios.

Malcolm Toft: 'The aim with Intermix was to provide the same quality in terms of sound and construction as that found in our studio consoles but at a price that would allow people on limited budgets to either purchase basic systems for future expansion or upgrade existing equipment.'

Personally, I think Toft aim has more than been achieved. And the game is not over as a 16-channel compressor-limiter rack and gate-expander rack are soon to emerge from the Intermix stable.

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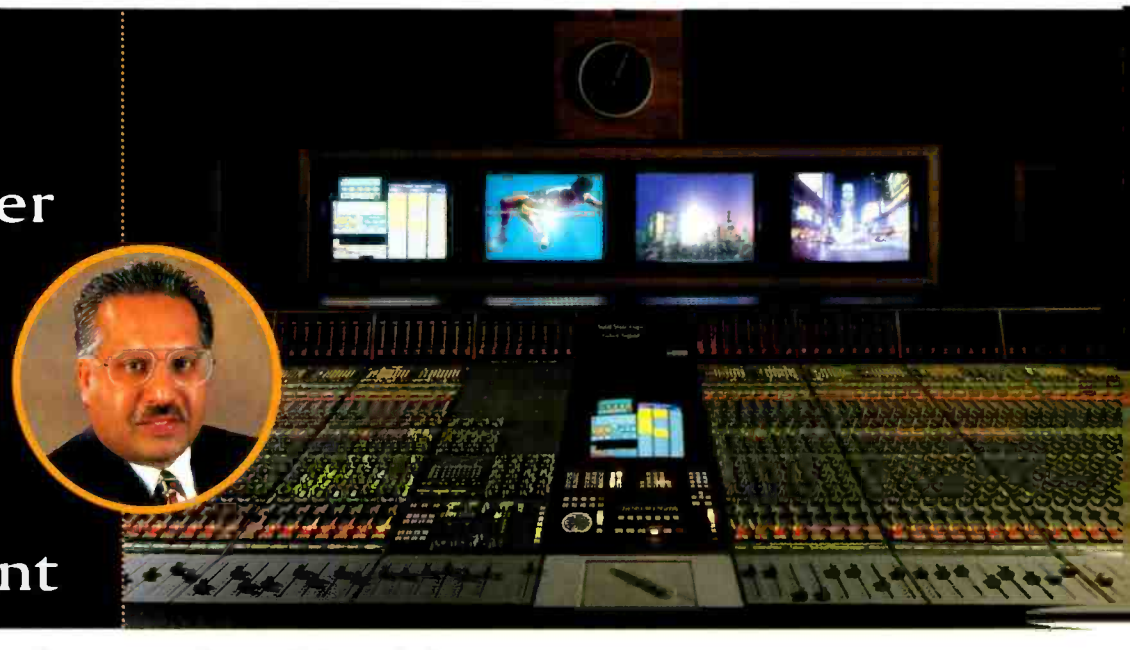

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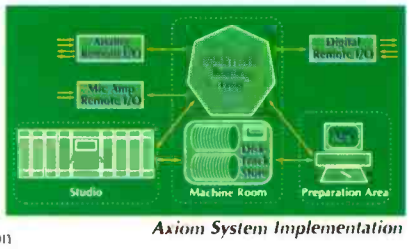

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Aphex MODEL 109

Given the current proliferation of EQ units, old attitudes to multiple reverbs may soon be extended to include equalisers. WADE McGREGOR test drives a cost-effective addition to the catalogue–the 109

APHEX HAS DEVELOPED a reputation for building high-quality audio units for dynamic control and enhancement of audio signals—including the Aural Exciter and anthropomorphic-sounding Big Bottom. The original processors were priced to suit the serious studio, broadcast and live-sound professional. A few years ago Aphex introduced the Model 100 series of processors suited to the budget of the project studio and local sound-reinforcement rigs. This new series sports a simplified front panel to allow even the casual user to quickly get results. The most recent additions to the series also include Aphex's patented Tubessence valve circuitry.

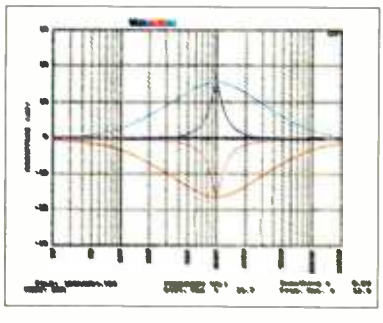

Fig.1: Aphex Model 109 filters at 1kHz and ±15dB with bandwidth at maximum and minimum

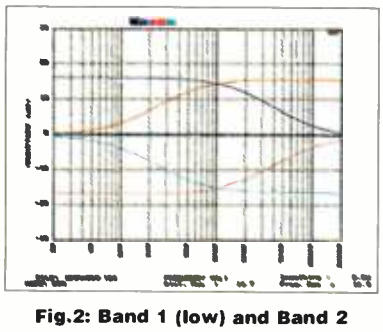

Fig.2: Band 1 (low) and Band 2 (high) set to shelf at ±15dB at 1kHz

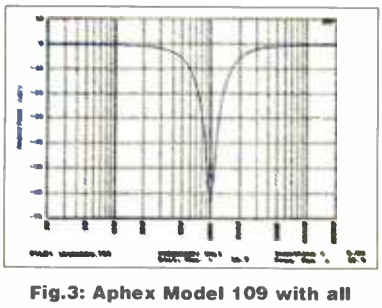

Fig.3: Aphex Model 109 with all four filters set to -15dB at 1kHz and minimum bandwidth

The Aphex Model 109 is the first equaliser in the 100 series (Aphex also builds the 9901A in their modular 9000 series) and offers four bands of fully parametric control that can be switched to operate as a 2-band, 2-channel unit. Each pair of filters cover the audio band with Band 1 ranging between 20Hz–2kHz while Band 2 covers the 200Hz–20kHz range. This provides plenty of overlap through the voice range and does away with the usual RANGE switch. The Bandwidth for each band is adjustable from two octaves (Q=0.66) to two-tenths of an octave (Q=7.2) with the third-octave setting at roughly the 3-o'clock position. All of the bands can be switched between peak (see **Fig.1**) and shelf filters (see **Fig.2**) and all bands share a single BYPASS switch. The Bandwidth control is disabled when the filters are switched to shelf and provide a fixed slope. In 2-channel mode there are two front-panel controls for varying the input level by ±10dB and in single-channel mode the level and input for channel two are disabled.

The unit includes the same Tubessence circuitry as many other Aphex units (including the Model 661 reviewed in *Studio Sound*, March 1996) and can simply be used for this subtle enhancement by setting the EQ level controls to the zero detent. Tubessence is a Reflected Plate Amplifier valve implementation that promises low noise, wide bandwidth and extended life from the single 12AT7 while still offering second-harmonic distortion products (calibrated to 0.12% at +10dB) and compression effects. This is handy for driving a DAT machine during mixdown or as an insert into specific channels. It may be almost irresistible to add just a little equalisation while your at it, though.

THE MODEL 109 is a versatile tool that suits both the musician shaping the tone of an instrument or overall mix and audio surgeon who must remove blemishes in the sound. The high-Q settings provide a sharp knife where you need to cut annoying whistles, whines or buzzes without chopping out to many notes in the affected area. It is possible to achieve over 60dB notches by stacking the filters (see **Fig.3**).

All of the front-panel controls have numeric labels at the centre and extremes of the control range, the remainder of the range has simple tick marks. You must use your ears or measurement gear to tune the unit in to a particular setting. The user manual includes diagrams of the controls with a few more numeric legends and a listing of settings for many typical instrument sounds as a starting point for those unfamiliar with this format of EQ.

The Model 109 uses an external wall-wart-style power supply that decreases the cost of the unit and simplifies meeting the requirements of the various electrical standards around the world. These ubiquitous devices are a little problematic to install in portable racks but most of us have already found a way to make them stay firmly connected, such as providing a short extension and tying the unit to the base of the rack.

The rear panel sports 6.3mm minijacks for input and output connection of each channel with the inputs fully servo-balanced and the outputs ground-referenced (Aphex terms this single-ended impedance balanced) to provide some common-mode rejection improvements over typical single-ended connections. However, unlike balanced outputs, ground-referenced outputs will not pass audio if the polarity reversed while connecting to a single-ended input. A pair of rear-panel switches select between operating levels of -10dBV or +4dBu for each channel.

Each frequency control covers a 1:100 range but I didn't find it too difficult to tune the filters accurately when setting precise loudspeaker equalisation using a TEF analyser. You might want a few more filter bands and higher Q values to equalise sound reinforcement systems but four bands were enough to tweak in the critical mid-band for one channel on a good set of studio monitors. Accurate parametric equalisation can also improve the phase response of the system if you stick to equalising the equalisable. In production situations the Model 109 can nail down a few hot notes and smoothly roll-off rough edges on instruments. The 109 can also provide a handy tool for touching up stereo programmes or fixing a troubled track and can add some subtle valve qualities in the process at a price that allows it to be dedicated to any of these tasks.

CONTACTS

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Tel.: +1 818 767 2929
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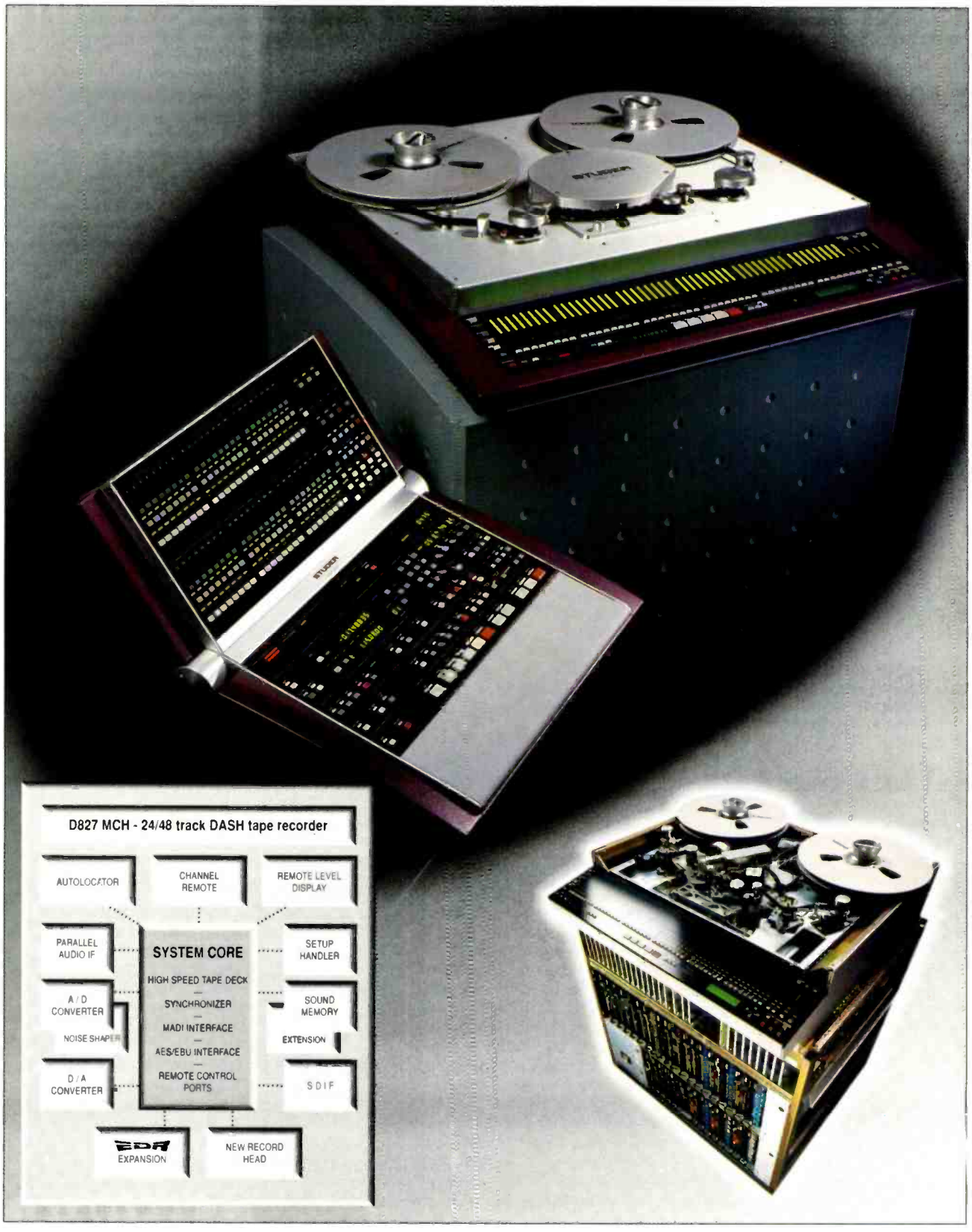

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Fostex PD4 PORTABLE DAT RECORDER

DAT is now widely accepted as a professional, portable, recording format and has seen a variety of approaches to location-recorder design. DAVE FOISTER examines Fostex's latest response to the challenge

WHILE OTHERS make things smaller, Fostex makes them bigger. When others' DAT machines began to look more and more like domestic cassette decks Fostex DATs just got chunkier, with the kind of controls and displays that leave no doubt you are looking at a professional machine. A Fostex master recorder looks like a master recorder, which is more than can be said for some.

And the same applies to portable machines, the subject of even more diverse approaches. The balance between portability and operational access—big buttons on a small machine—is a challenge which has inspired a variety of responses, all of which Fostex appears to have ignored. It must have crossed the designers' minds that the advantages of DAT over open reel are running times; quality; convenience and flexible synchronisation, not necessarily physical size; as long as the machine is no larger or heavier than its analogue counterpart it has enough benefits to win the contest without being squeezed into a matchbox.

Hence the PD-4, successor to the PD-2. The machine is easily twice the size of some of the competition, but still smaller than a Nagra IV and substantially lighter. It has a well balanced, comprehensive set of facilities, none of which needs tweezers to adjust it; a commendable clarity in its layout; and some useful and distinctive features which set it apart on its own.

THE IMMEDIATELY OBVIOUS one is the number of inputs: the PD-4 incorporates a fairly elaborate 3-channel stereo mixer, removing the need for a separate mixer slung over the shoulder in many situations. Each channel has independently switchable mic-line, phantom and pads, and a fully variable high-pass filter. This is all on the top, and the front panel then carries a 3-position pan switch (LCR) and a rotary fader for each channel, followed by a rotary master control with a switchable limiter. This makes up most of what you'd find on a small location mixer, and the inclusion of a monitor speaker as well as headphones makes the machine pretty self-contained, although I would have appreciated a louder headphone output. All these facilities may sound like a drain on precious battery life, but switching any input to Line turns the mic amp circuitry off completely.

Time code is now a standard requirement for most location work, and yet there are still few portable DATs capable of handling it. Fostex, of course, pioneered time-coded DAT, so the PD-4 has got everything necessary for the job, including automatic time-and-date stamping both in the subcode pack and the time-code user-bits, with user override of the user-bits if required. Fostex make a feature of the onboard generator's ability to jam to a squirt of external code and then run with crystal accuracy, maintaining sync with other equipment without having to be physically connected to it (which assumes, of course, that the main time code source is similarly precise). The generator can also be set manually, and is independent of a battery-backed 24-hour clock which can be used to produce time-of-day code. Several operating modes are provided, with many software-settable functions such as whether or not code is output in pause, whether the playback frame-rate stays as recorded or follows the switch settings and so on. The large display allows all these functions and time formats to be viewed along with transport and I-O status and errors, but surprisingly omits a margin or headroom field, a shortcoming made worse by the fact that the large level meters will only hold peaks for half a second. On the other hand, the machine can be made to sound an audible alarm in the headphones to warn of amplifier clipping (but not digital overs), high errors or low-battery voltage. Coupled with the fact that the PD-4 is a 4-head machine with switchable confidence monitoring, this means most problems should become apparent without the need to look at the display.

Sometimes bigger is better—an increase in size and facilities characterise the PD4

The control layout follows location tradition by providing fast access to the most important routine functions on huge buttons under the fingers. It is interesting to note that the Pause and Record controls are joined here by a similarly large button for adding Start IDs, acknowledging the value of these and the need to be able to stick one on in a hurry without fiddling about. The rest of the transport controls are on the top panel, with ridges to aid touch identification, and the whole lot can be locked out for safety.

Power is provided by an NP-1B NiCd battery giving about 2½ hours or an external 12V supply, which is on the standard 4-pin XLR allowing connection to any video power supply. All other connectors (apart from headphones) are on XLRs, covering ins and outs for analogue, digital (AES-EBU or IEC switchable) and time code.

The PD-4 is, clearly, serious stuff for serious users. Margin indication and more headphone volume would complete the job for me, but even without them this is just about the most comprehensive, reassuringly solid portable DAT machine you will find.

CONTACTS

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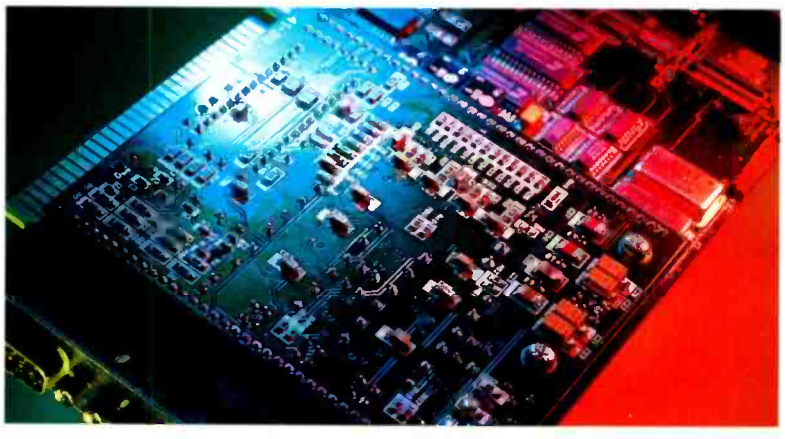
New Technologies

The American National Association of Broadcasters' convention is the continent's largest broadcast-related event. DAVE FOISTER documents the latest developments in audio equipment for broadcast and postproduction



Apt's new ADK200 card offers various coding systems

Fostex CX-8

Fostex' commitment to the ADAT MDM format is underlined by a new recorder, the CX-8, joining the existing RD-8. It too has balanced +4dB outputs on a 25-pin D-connector, and features a new transport with faster wind times. A large multimode display and front-panel access to 44 function buttons make operation more flexible, and as ever the machine will integrate into any ADAT-type system with full compatibility as master or slave, complete with optical 8-channel interface. The absence of onboard time-code facilities means the machine is substantially cheaper than the RD-8. At the same time comes the Fostex D-80, 8-track, hard-disk recorder designed as a direct replacement for a tape-based recorder in an existing project studio.

◆ *Fostex, US. Tel: +1 310 921 1112.*

apt codec & PC card

apt has released a new multiformat codec incorporating both apt-X compression and the new apt-Q developed with AT&T. The SCF 384 allows the more appropriate system to be selected for the job in hand, with apt-X suitable for studio-to-studio links at 384/336 kbit/s and apt-Q for lower bandwidths or situations such as one-shot audio delivery in broadcast applications. Also new from apt is an audio expansion card for PCs aimed at audio workstation and radio automation developers. The ADK200 supports simultaneous multichannel playback and record on a single card, with a choice of coding systems including apt-X.

◆ *apt, UK. Tel: +44 1232 371110.*

Otari Elite

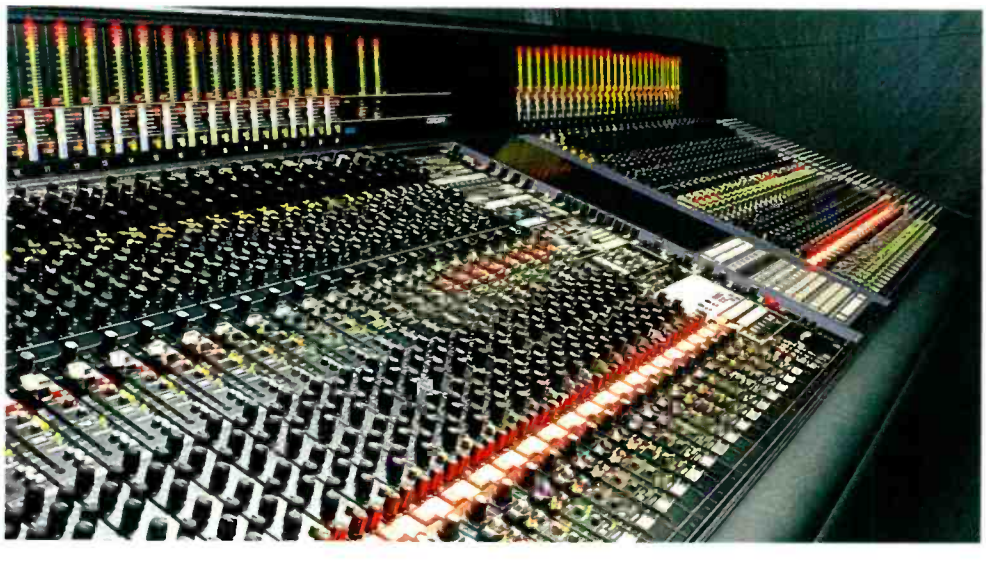
Otari's digitally-controlled Concept 1 console has been further developed into the Concept Elite, maintaining the same features of digital master section, symmetrical dual-input modules, snapshots and VCA automation, and adding new facilities. The EQ has been enhanced, image recall is now supported, and the processing power has been expanded to support the other additional features such as the multiformat panning section with automated joystick panners. The Concept Elite and the existing Status console will further benefit from the forthcoming Eagle automation system, which features full-colour graphical representation of faders and switches interactive with the console control surface. Finally, from Otari is Lightwinder system, providing an optical link between stage and console for reinforcement applications. The system comprises multichannel Stage Master and Console Master units connected by fibre-optic cable, and can handle up to 64 channels as 48 in/16 out. The Stage Master end incorporates phantom-powered mic amps and active parallel outputs for monitor splits, while the console end has a digital throughput allowing signals to be connected to FOH and recording consoles at the same time.

◆ *Otari, US. Tel: +415 341 5900.*

Intelligent Devices IQ

An intriguing new TDM plug-in from Intelligent devices claims to be able to match the spectrum of one signal to that of another. An existing track which needs to have its characteristics duplicated, or a mix which wants to be tonally matched to another, can be played into the process to be learnt; the material that is to be matched to it is also presented to the process; and IQ designs a mono or stereo FIR curve fit algorithm which ☞

One of NAB's star consoles was the Otari Elite, surround-sound-capable, digitally controlled desk



360 Systems Shortcut

Designed specifically for broadcast editing, the Shortcut is a portable hard-disk recorder-editor with dedicated controls for fast operation. Recording is 16-bit linear stereo, with internal drives available with up to three hours of storage. Familiar transport controls, a jog wheel, dedicated editing keys and a built-in waveform display make the unit completely self-contained—it even has a built-in microphone preamp and speakers. Digital inputs are also provided, and editing markers can be dropped on the fly during recording ready for the full range of nondestructive editing possibilities complete with an Undo function.

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

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IN BRIEF

Portadat film sync option

The new MS1000 Master Sync option for the Portadat time-code DAT recorder allows integration with existing film systems, giving accurate synching with time-code film cameras with a claimed drift of not more than a frame in ten hours. Also important to film users is the ability to pull up the 29.97 frame rate (drop or non-drop) to 30fps, and the unit has full compatibility with Aaton cameras via standard Lemo sockets.

◆ *HHB, UK. Tel: +44 181 962 5000.*

Quantegy media

Quantegy, the company that has taken over the Ampex recording media lines, has launched its first new products, the first of which appropriately enough is the DV Series of digital video cassettes for use with the Ampex DCT postproduction system. Also in the video line is the Ampex DBC Series of digital Betacam cassettes, while on the audio front there are new tapes for 8mm digital storage and DTRS format recorders and enhancements to the CD-R range. Analogue sees developments too, as the archiving stability of Grand Master 456 is improved, giving a claimed life of 40 years.

◆ *Quantegy, US. Tel: +1 415 903 1100.*

Waves TrueVerb

Waves' latest TDM plug-in is a combination of room simulation and reverb which allows the user to define the size of a simulated room, the frequency response, and the distance from the sound source. Operating on individual or multiple tracks, the process uses 'psychoacoustic rules' and is claimed to give a persuasive perception of distance beyond the speakers.

◆ *Waves, Israel. Tel: +972 3 5107667.*

QSound QX/TDM

QSound has responded to a demand for a TDM version of its soundfield expander process with QX/TDM. The plug-in applies QSound's patented QXpander algorithm to Pro Tools material to move widely-panned elements outside the bounds of normal stereo speakers, and can be used to position mono sources or expand stereo elements or even complete mixes.

◆ *QSound, Canada. Tel: +1 403 291 2492.*

Synchro Arts ToolBelt

Offering a selection of non-real-time processes for Pro Tools users is ToolBelt from Synchro Arts, using a simple user-interface to produce combinations of the available processes. These include TimeMod time compression and expansion, Power Looping, reverse and invert, and an audio-generation process which produces fills and atmospheres from short source signals using chaos theory.

◆ *Synchro Arts, UK. Tel: +44 1372 811934.*

Frame Master II

The American Frame Master II time-code calculator attains revision 'II' status at NAB and now offers conversion between all time-code formats along with addition, subtraction, multiplication and division operations. The pocket-calculator style unit also has sync an offset functions, count up-down timing and 14 on-the-fly edlt points.

◆ *Calculated Industries, US. Tel: +1 702 885 4975.*

runs in real time to apply the spectrum of the first to the second. It can also be used manually to draw complex curves, and has full library functions for saving and recalling reference templates.

◆ *Intelligent Devices, US. Tel: +1 410 744 3044.*

Studer MADI router

Studer used NAB to unveil a new MADI routeing and processing system that enables multichannel digital signals to be connected between remote locations using simple cable runs. The network has a star topology, with a hub capable of handling a throughput of 1 Gbit/second, allowing systems of 1,344 by 1,792 or more crosspoints. The various peripheral components can handle analogue or digital signals, and simple mixing tasks such as crossfades and mono summing can be handled by the basic system. Further options allow more complex DSP functions such as EQ and compression-limiting. Control is from any of the CS range of control systems from simple keyboards to PC workstations.

◆ *Studer, US. Tel: +1 615 848 5321.*

D&R Cinemix

D&R will shortly be launching a new dedicated video, film and post console, the Cinemix. The desk features true LCRS panning and complete recall of all digitally controlled routeing-and-switching functions, including the 6-channel automated output section and automated joysticks. Channel specifications include dual signal paths with VCAs or motorised faders on both as well as two full EQs and automated mutes, and 12 additional automated functions, giving effectively 64 automated input channels on a 32-frame desk. A powerful routeing matrix allows access to up to 34 aux sends during mixing and access to the 24 buses from both signal paths, and an optional film module allows the use of stems during mixing. Monitoring is LCRS and the CRM option is a 6-channel digital attenuator with switching for up to three sets of control-room monitor systems and LCRS outputs.

◆ *D&R, Netherlands. Tel: +31 294 418 014.*

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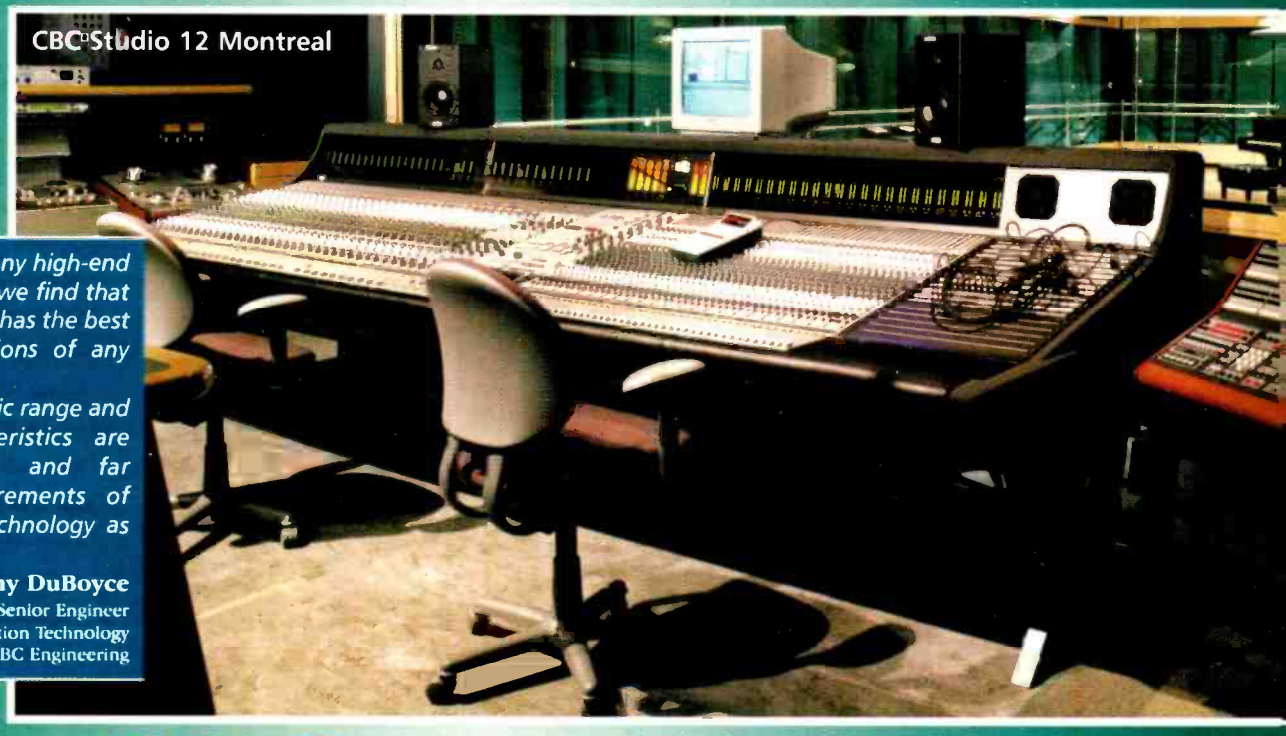

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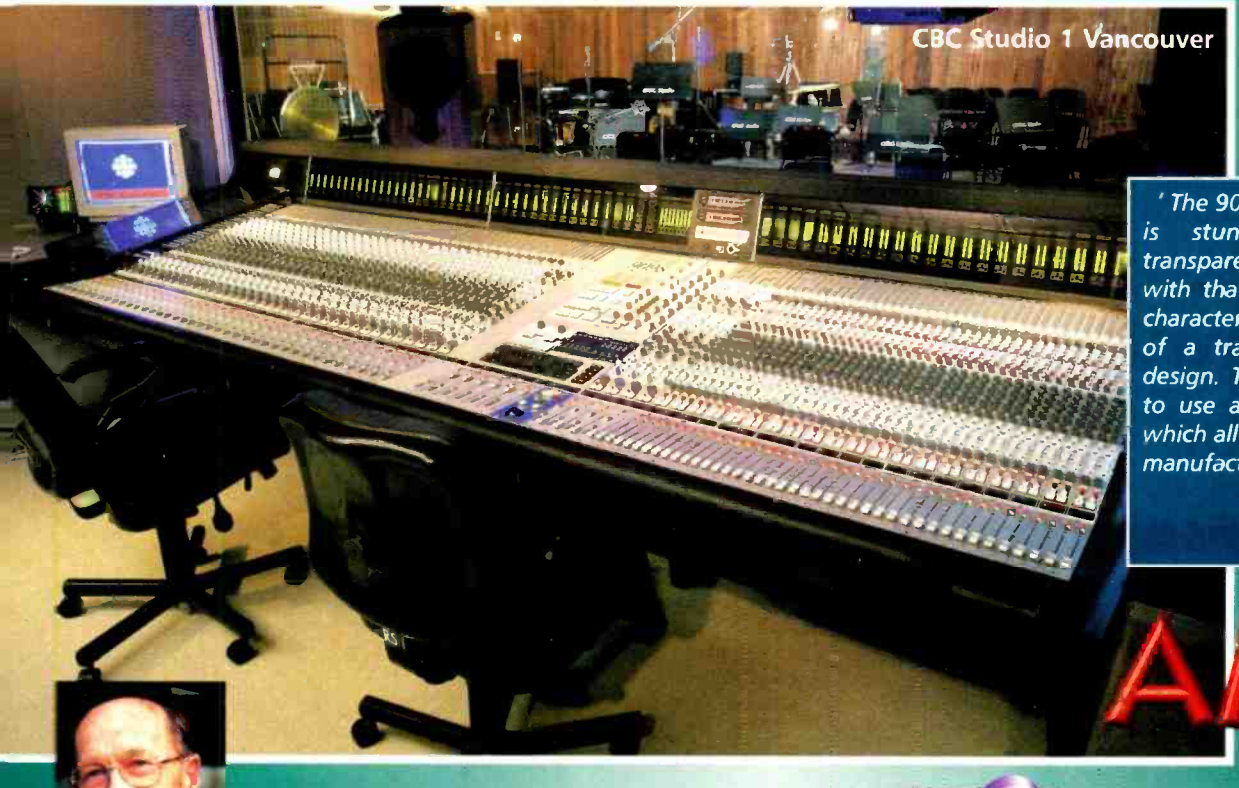

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IN BRIEF

Nagra-D 24-bit 96kHz

Special versions of the dCS 902D ADC and 952 DAC have been used to allow the Nagra-D digital 4-track to record and play back at 24 bits and 96kHz. The convertors claim a linearity down to -130dB without the use of gain-ranging techniques, and the new combination takes the capabilities of the already 24-bit-ready Nagra-D even further than before.

◆ *Nagra, US. Tel: +1 615 726 5191.*

D-Vision Transcoder

Building on its PostSuite Windows NT-based nonlinear A-V editing system, D-Vision used NAB to introduce its new MPEG Transcoder. This allows creation of MPEG1 and-or MPEG2-coded video and audio material direct from PostSuite for use on, for example, www authoring.

◆ *D-Vision Systems, UK. Tel: +44 181 540 0515.*

Sonic Solutions SonicStudio High Density

In preparation for the new audio formats likely to spring from DVD, Sonic Solutions has announced the first audio workstation capable of supporting both 24 bits and 96kHz sampling rates. SonicStudio High Density provides all the familiar features of the SonicStudio family, including editing, filtering and processing features such as TimeTwist and NoNoise, all operating at the higher-resolution format.

◆ *Sonic Solutions, US. Tel: +1 415 893 8023.*

Whirlwind Brick and splitter

Whirlwind's The Brick is a compact mic-to-line driver with built-in headphone monitoring, 18V phantom power, and line input. The unit falls into the 'unglamorous but essential' category with applications in troubleshooting as well as being a general problem solver. The Active Concert Series 56 is an active 1x4 splitter box featuring 48 sends and eight returns with individual channel LED monitoring, ground lift switch and optional transformer isolation.

◆ *Whirlwind, US. Tel: +1 716 663 8820.*

New software from TimeLine

Three TimeLine systems had new software on show at NAB. A complete upgrade for the Studioframe, v6.20, includes fast waveform display, multiformat file transfer, new data-sort functions and an enhanced user-configurable editing interface. The Micro Lynx synchroniser gets v1.34, enabling additional machines to be controlled including the Fostex RD-8, Studer D-827 and Tascam DA-60. The same additions are also made to the capabilities of the Lynx-2 system, augmenting more than 120 different transports already supported.

◆ *TimeLine, US. Tel: +1 619 727 3300.*

◆ *Burnie Productions, The Netherlands. Tel: +31 40 2571651.*

Orban DSE 7000 and Optimod 2200

Orban's Optimod range of broadcast signal processors has a new low-price member, the FM 2200, designed to bring Optimod processing to smaller radio stations. Its features include eight programmable presets, 2-band processing with HF enhancement, protection processing, remote control and an alignment tone generator. The DSE 7000 workstation receives a major upgrade package, including a replacement DSP board with 24-bit internal processing and new v6.0 software, giving the system on-board digital effects. Many of the effects are specifically tailored to the broadcast market, and include Optimod compression, Orban parametric EQ, digital delay, and Lexicon reverb. All new DSE 7000s will be shipped with the upgrade at no extra cost, and it can be retrofitted to existing units, recent purchasers being supplied with it free.

◆ *Orban, US. Tel: + 1 510 351 3500.*

Digidesign AudioVision

Digidesign has simultaneously announced two developments to the AudioVision postproduction system. AudioVision 3.6 is an upgrade to the existing system, centring on the addition of MediaShare, a networking solution providing multiple users with simultaneous access to any sound located on a central server. 3.6 also adds a new Varispeed Tool, emulating tape varispeed by varying pitch and duration simultaneously in order to simplify the process of pull-up/pull-down adjustments necessitated by the film-video transfer process. Looking further ahead, Digidesign has previewed AudioVision IV, completely redesigned to take advantage of RISC-based processing and PCI bus hardware. The system now supports 32-track playback with unlimited virtual tracks, and through its use of Digidesign TDM hardware it will also run any Digidesign software application including Post Conform, MasterList CD and Pro Tools III v4, which will include Sound Designer II functionality.

◆ *Digidesign, US. Tel: +1 415 842 7741.*

Macromedia Deck II -SoundEdit 16

Designed to catch the attention of audio folk spread from radio to multimedia, Macromedia has paired up its Deck II and SoundEdit 16 as an integrated system. The package also comes with Director Multimedia Studio 2 and offers a single solution to digital audio recording and editing, and as a platform for third-party DSP processing.

◆ *Macromedia, US. Tel: +1 415 252 2000.*

Spectral Express and Producer

New for NAB were Spectral's Express and Producer, both running on its Prisma digital-audio workstation. Both are user-interfaces targeting specific operators—Express is typically aimed at radio production where the need is for speed of operation or accessibility to relatively untrained operators, while Producer should appeal to the more rigorous demands of the audio production engineer. Spectral claims a 'radically different graphical paradigm' to be behind the look and feel of both interfaces.

◆ *Spectral, US. Tel: +1 206 487 2931.*

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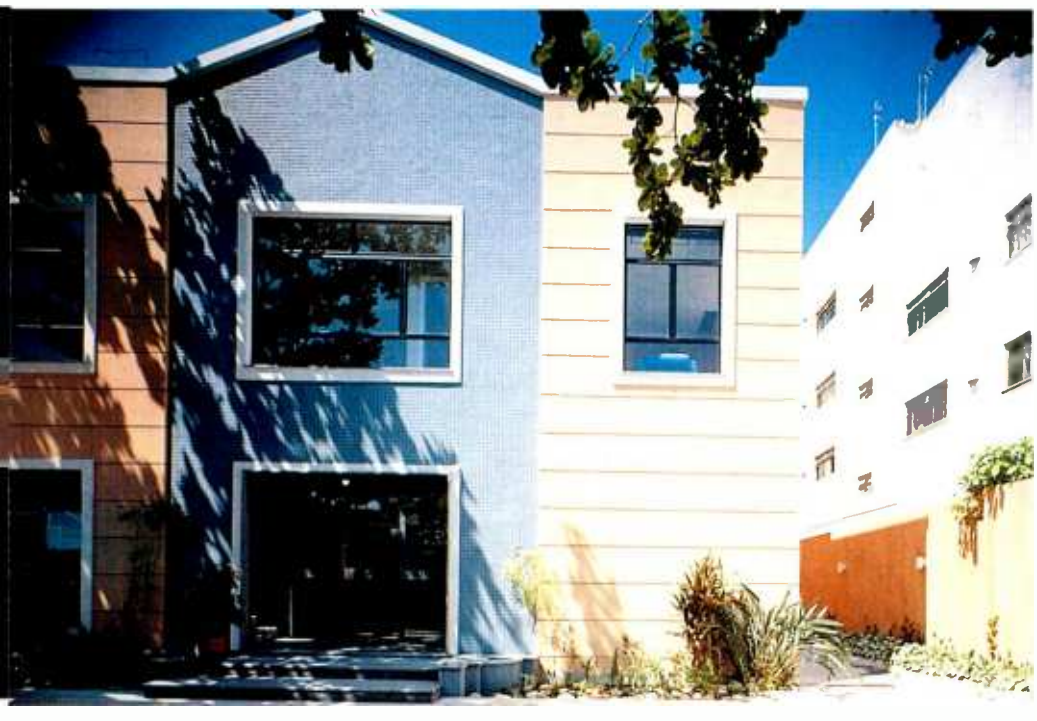
The Road to

As we now enjoy a 'global recording community', the existence of the top-flight AR Studio complex in Rio comes as no surprise. But the details of equipment availability, regional legislation and local musical fashions contain many contradictions as **DAN DALEY** reports



FROM THE AIR, Rio de Janiero looks like a jewel—the statue of Christ The Redeemer, with arms outstretched atop Corcovado peak, overlooks a city of six million people hemmed on one side by towering, verdant mountains and sparkling beaches on the other.

Close up, Rio becomes a sequence of neighbourhoods decidedly Third World in their density and as precipitous as the faces of the surrounding mountains in their ability to change from slum to high-rise luxury. It is some of these neighbourhoods that have contributed their names to the culture of the century: Copacabana, a synonym for nightclub in the lexicon of the northern hemisphere, is a section of hotels and shops that derives its name from the coffee shops that used to characterise it ('copa' for cup and 'cabana' for small cottage) coffee house. Ipanema, a bit further down the road, has been immortalised in song, and as one drives past the beach, slowly in the dense traffic that seems to plague the resort sections all summer long, getting a chance to linger over the inhabitants of the local bikinis, one realises that the composer knew very well whence he spoke.

But Rio—and Brazil—have contributed far more than cultural and romantic icons to contemporary culture. Bossa nova and samba, which continue to be staples of the regional music, have periodically infused western pop rhythms over the last 40 years while Gilberto Gil and Milton Nascimento continue to grace Latin and jazz charts in both hemispheres. An estimated national recorded music economy of $500m (US) indicates that music continues to be on a par with Brazilian coffee as a component of the country's economic and cultural life, domestically and for export. In *Billboard* (2nd December 1995), Brazil is credited as the region's largest music market, with a value of $700m in 1995, up 25% from the previous year's sales. Brazilian artists now have a 65% share of their own market against international acts, up from 60% the year before.

CD retail prices in the country range from $15 to $25, depending upon the type of outlet; cassettes sell for about half this. Brazil still has a significant record piracy issue to face, but labels say that it's being addressed. And while the romantic samba is still the country's primary genre, one record company executive was quoted as predicting a significant shift to rock and pop. According to Paulo Junqueiro, Director of A&R at WEA-Brazil in Rio, since the passing of the economic crises of 1990, the country has seen strong sales for both major record labels—all of which have Brazilian operations headquarters in Rio—and fast-growing independent labels.

'But,' says Junqueiro, 'Brazilian recording studios have left a lot to be desired.' He refers to the fact that historically Gil Nascimento and other Brazilian artists, producers and engineers have left the country to record once they achieved a certain level of success, in search of better technology and studios. AR Studios, which was completed in Rio in February, was designed to change that.

'What AR represents is a large step up for the entire Brazilian recording industry,' says André Rafael, the studio's majority share-holder who owns AR with partner Tom Capone. 'There have been studios in Brazil with good equipment, but never one that has high-level technology and world-class design combined into one place. This studio raises the ability and the image of Brazil as a place to make and record music.'

Both Rafael and Capone are members of what is equally a band and an extended family. Their youth—Rafael is 23, Capone 29—is reflected in the fact that their entrance into the studio business started on a Tascam 688 8-track cassette deck a few years ago. A guitarist who is as at home on a nylon-stringed flamenco as on an electrified Parker Fly, Capone's rhythmic chops are on a level with his obvious enthusiasm and spiritual connection with the music.

'This,' he says, gesturing around the studio, guitar in hand, 'is simply what we do.'

THE MAIN STUDIO, Studio A and its lounge, is located on the upper floor of the front building of the walled studio compound (offices are on the first floor), and is centred around a 60-input Neve V3 desk, equipped with Flying Fader automation. The console was bought secondhand and completely refurbished by Neve, which sent roving installer Steven Laisi to Rio to implement it. Main monitors are Genelec 1034A speakers, which are complemented by an array of close-fields such as the ubiquitous Yamaha NS-10s. The analogue-based facility has a pair of Otari MTR-90 Mk.III 24-track decks linked via a TimeLine MicroLynx synchroniser and 24 channels of Dolby SR. Mixdowns are to an Otari MTR-15 quarter-inch 2-track. Although half-inch heads are available, quarter-inch remains the stereo storage format of choice in Brazil. (A Panasonic SV-3700 is also on hand.) True to Rafael's and Capone's project studio origins, an

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Rio

The 60-input Neve V3 desk and Genelec 1034A main monitors featured in Studio A

Alesis ADAT is available to interface with Brazil's growing population of home recordists.

Studio B is located in a second building, separated from the first—both are marked by terracotta plaster work and blue-steel-coloured tiling; interior design consulting was done by Designer John Storyk's partner and wife, Beth Walters—by a pleasant, sunlit courtyard. It occupies the first floor of the structure, which also houses its own café, and has a customised Mackie 32:8 desk with Ultramix automation and 26 additional channels of Neve, API and Aphex outboard inputs. DynaudioAcoustics PPM-3s are the main monitors; another Otari MTR-90 Mk.III is the main storage unit. Upstairs, Rio's first dedicated mastering facility is having the final touches put to it.

The mastering-editing suite will offer a 16-channel Digidesign Pro Tools system with 32-channel capability and 888 and 882 I-O modules, extensive TDM processing including a Waves bundle, Digidesign DPP-1, DINR, Mezzo backup, and a Masterlist CD system on a Mac Quadra 950 with 40Mb of RAM and two 4.2Gb drives. Mastering monitors are Snell System D speakers powered by Sunnfire amplification. The mastering format rapidly becoming the standard in Brazil is PMCD; a Pinnacle CD recorder is in place, as are a pair of Sony MiniDisc recorders and Apogee AD1000 and DA1000E convertors. AR Studios outboard is a mix of new and vintage; Neve, API, Pultec, Tube Tech, Focusrite, Urei and Lang are all represented in the racks behind each console. Signal processing includes a Lexicon 480L, Eventide DSP 4000 and H3000S, and an AMS DMX 1580S. The microphone cabinet is well-stocked, including Neumann valve mics, Sennheisers, Sony, AKG, Shure, Cole, EV and Crown. The studio's complement of guitar amps is equally notable, including some vintage Fender, Marshall and Mesa units. The overall size of the facility is 8,600ft .

The outboard island in the control room of Studio A

WHAT SETS AR apart from the Rio pack is the fact that it has a contemporary equipment complement combined with accurate acoustical engineering, a combination that the city has previously lacked—according to Storyk. He was contacted by AR's management team in 1994 about the possibility of bringing a contemporary studio design to Brazil, a region that had been fascinating him for some time.

'Between its language and it's size, it's like a world unto itself,' he says of Brazil, which has nearly the same land mass as the continental US and which is distinct from the rest of Latin America by way of its adherence to the language of its Portuguese colonisers. What Storyk found was the original front building being used as what he called 'an official rehearsal studio' by Rafael and Capone's band. The major design elements called for the complete reconstruction of the building, done by the local firm Ribiero Guimaraes Engenharia, with only two of the four outer walls remaining from the original structure. It also originally called for placing the studio on the ground floor, although ultimately moving to the building's upper level allowed more natural daylight in to the studio rooms.

'It's a classic 5–8 man rhythm recording studio.' Storyk says of the recording-room design, which includes two interior isolation booths as well as a large sound lock which serves as a third isolated microphone area. The L-shaped room is designed in such a way as to permit, via angles and glass in iso booths, excellent sight lines between all the spaces, which Storyk, who came to studio design via careers as an architect and a musician, describes as a characteristic of his rooms. The bright sounding (RT60 of approximately 0.4s at 1kHz) recording room has active tapping in the upper portions of the high, angled ceiling, which itself has a cloud suspended from it and which allows for varied live room microphone placement.' We integrated diffusion extensively throughout the design, particularly in the control room,' he explains. The 500-plus ft , geometrically complex room faces out on the larger portion of the studio. Its rear wall is dominated by a large custom diffractal, manufactured by RPG out of wood and aluminium. Like most of the acoustic treatments used, this was imported from the US. The RPG unit is a full-frequency diffuser and increases the spread of the room's listening area to about six feet across the console position as well as lowers in frequency the diffuse field in this area. The room also reflects Storyk's dislike of dead-sounding control rooms; AR's room measures at approximately 0.3s (RT60 at 1kHz with less than 10% deviation per octave through the entire frequency spectrum).

'There seems to be two camps when it comes to this particular specification in control-room design', he says. 'One camp suggests very dead control room environments, the other, which I belong to, suggests more room ambiance and naturalness. What makes that possible is creating a uniform frequency and time-domain monitor system response at as wide a listening position as possible while not giving up room reflections. Geometry is the single key design tool for this, not absorption'

Storyk adds that the decision to put the studio on the upper floor of the building also gave him more ceiling height—5m in this case—to work with, which allowed him more play with the surface treatment selections as well as amount of glass between studio and control room. The main studio monitor system (Genelec 1034A) was tuned by Storyk and associate Sam Berkow using Berkow-developed transfer-function analysis software currently being brought to the marketplace by JBL. Once in the studio, there's nothing to indicate that you're in Rio de Janiero, a comment to which Storyk, who has done rooms in Malaysia, Argentina, India in addition to North America, responds that, 'The world is now CompuServe-close. For a while much of my design work was being done via fax, and I thought that was great. But once I started working over the Net, then that made the fax look slow and outdated. The thing about what a world-class studio should be is, you can fly 11 hours from New York, walk through floods [Rio suffered lethal rain-induced flooding the week the studio was christened] and once you enter the studio, not know which city you're in—it could be New York, it could be London. It just happens to be Rio.'

From another perspective, Latin America in general and Rio in particular seem to be heading towards upswing cycles. The dance- ☞

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music subgenres that dominate charts in Europe and Asia lend themselves to the rhythmic, contrapuntal basis of Brazilian music. The local economies, governments and social structures are stabilising—Brazil had an annual inflation rate of as much as 200% as recently as five years ago; all major western labels are represented in South America's leading countries, and, as Storyk points out, Argentina once had a thriving domestic and export record industry in the 1950s, before the excesses of the Peron years. (Which, ironically, were being recreated by Madonna and film-maker Alan Parker in Buenos Aires that very week during the shooting of the movie version of the Broadway musical *Evita*.

FOR WHAT IT'S WORTH, Latin America is wary about how its culture is being portrayed in North American media; the choice of Madonna as Eva Peron incited protests in Argentina, as did the request by Director Spike Lee to use Rio's slums as one of the backdrops for his shooting of Michael Jackson's newest video literally the same week.) In light of these developments, some in Brazil—including Rafael and Capone—would like to see more of the country's artists, such as Gil, Nascimento, Brazil's leading rock act Paralamoas Do Sucesso, as well as producer-engineers like Antonio (Moogie) Canazio, who now works in LA, remain here to record more of their records, and that is the larger challenge that the studio addresses. Just the notion of such a facility in Brazil may have already started the ball rolling; local reggae-pop band Skank, whose first two recordings sold in excess of 1 million units regionally, has changed plans to do its next record in the US in favour of using AR. And at approximately $132 (US) per hour, the studio has already booked itself six months in advance, starting with quadruple-platinum (250,000 units constitutes platinum sales in Brazil) Brazilian rock band Legiao Urbana in February, whose guitarist, Dado Villa-Lobos, says the establishment of a studio like AR in Brazil will definitely raise the capabilities of the country's artists and will keep more of their projects there.

The Courtyard

'So many Brazilian artists go to LA to record now,' he says. 'We would rather stay here where we have the structure and culture we're familiar with. It was hard to to that without a studio like we could get in the US.' John Storyk notes that, while India has its own pro-audio magazine, South America has yet to have a significant locally produced version. This underscores the fact that, while AR is a big step in the direction of retaining the work of its leading recording artists, building a world-class facility in a place like Rio is no small feat. A significant part of the estimated $3m that it took to build AR went into the purchase of basic building components like power outlets and gypsum sheet rock, which was actually less expensive to import rather than buy locally, according to Alvaro Alencar, AR's technology consultant and assistant studio manager. (Woodwork, like the mahogany used extensively throughout the facility, was made locally.) Alencar, a Brazilian citizen who also works as an engineer at New York's Room With A View studio, gets an interesting, bi-hemispheric perspective on the studio industry.

Right to left, owner Andre Rafael, Eddie Kramer, John Storyk, and co-owner Tom Capone

'There's no spare parts to be had here, no rental services, and major import duty issues to deal with when you're bringing equipment in,' he says, duties of as much as 30% which contributed significantly to the studio's final cost. On top of that, most of the technical talent to even get the studio to an opening stage had to be imported, from Storyk to Laisi for installation. 'There's not been much of a technical tradition to rely upon in Brazil,' he observes, adding that he as an assist-ant engineering candidate training at Full Sail's school in Florida as we speak. While some major equipment manu-facturers have representation in South America (SSL, for one, which has three installations in Brazil), most of the equipment was ordered on trips by Alencar to the States.

'I get as many schematics as I can for future maintenance,' he explains. 'And based on knowing what usually goes wrong with a piece of equipment, I keep a supply of spare parts on hand. Also, we ordered more than one of a number of pieces, so that if, for instance, a Urei 1776 goes down, I have a dozen of them to shift around and that gives me more time to fix the down one. You can't count on 24-hour delivery here.' (Alencar also notes that he was able to buy a significant amount of the studio's vintage outboard locally. Brazil, like the former Eastern Bloc nations, had squirrelled away many pieces over the years. The problem with them tends to be corrosion due to the climate.) As one could imagine in a city that runs on a rotary telephone system, mains power can be sometimes unreliable. The studio's power is conditioned and a 40-minute no-break reserve is installed between the studio and the power company substation, which, thanks to Rio's arcane utility regulations, the studio actually had to buy for itself, even though it does not own it. The overriding awareness of maintenance in a place like Brazil is self-reliance. For instance, Alencar and Neve installer Steven Laisi had to adapt the TimeLine synchroniser to work with the Neve's Flying Faders automation, which is defaulted to the AS2600 synchroniser. Laisi, who worked for Neve for seven years before becoming a freelance installer for its consoles worldwide, notes that the V3's power supplies had to be modified to accommodate the local 127V current. He also had to rearrange the studio's star-ground system to match the local utility's 2-phase wiring approach. Laisi, who has been doing increasing numbers of installations in such offbeat locations, observes.

'As the amount of installations go up globally in places like this, you wind up having to become an expert in every area of audio, not just the console itself. Everything that console connects with, even peripherally, you have to know what that interaction is going to cause.' But as trying as the entire process of setting up a world-class studio in a city like Rio can be, the shakedown cruise of the facility's main room was worth it for Rafael, Capone and Alencar, as well as the rest of the studio's staff. Eddie Kramer, a long-time friend of Storyk but perhaps better known as the guy who engineered records for Jimi Hendrix, Led Zeppelin and Traffic, to name a few, came down for the room tuning in mid-February. He did a 3-day test session with Rafael's band, moving microphones around, looking for the sweet spots in the room. By the third day, Kramer, whose fastidiousness about every aspect of a session being spot-on is reflected even in the precise handwriting he uses to label the console inputs, was being referred to by Capone as 'our guru'. Kramer was clearly taken with the intimacy that resonates throughout the place. He not only placed every mic himself and patiently explained the placements to the staff, but was seen at one point helping Capone lug a hefty SWR bass cabinet into the iso booth, in the middle of which process he turned and smiled dryly through his neatly trimmed, grey-flecked beard, 'I'm a roadie, too'.

While Storyk and Berkow worked on tuning the monitors, Kramer and the band worked long hours all three days, and he took only a few pink-noise-induced time-outs, during one of which he revealed his keyboard chops by expertly morphing from a Bach invention into a free-form jazz piece. He had good things to say about the studio, from comments on its acoustical isolation (NC20 or better throughout, according to Storyk), and the sound of the control room ('Fucking awesome'). But he reserved his highest praise, typically understated but punctuated with a raised eyebrow, for the crew at AR, saying, 'I'll definitely be back.'

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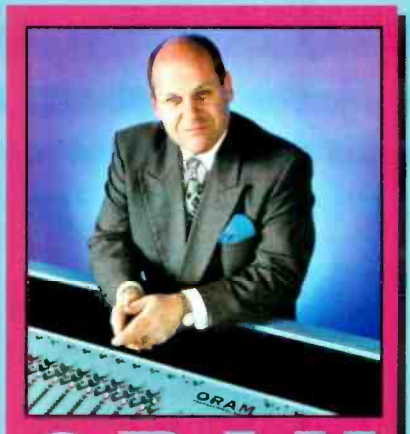

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King of the

In twenty years he has progressed from tea boy at Morgan Studios to being one of the most critically acclaimed pop music producers. His rise to prominence has been a mixture of judgement, good luck, and some vintage equipment. **SUE SILLITOE** talks to Mike Hedges at his Normandy chateau facility

THE RECORDING INDUSTRY is full of large characters, but if we're talking literally then there are few who come much larger than super-hip record producer Mike Hedges. When Everything But The Girl worked with Hedges on their orchestral-based album *Baby, The Stars Shine Bright* they joked that he was the obvious choice: they were looking for a big sound so they thought they'd better get a big guy to produce it!

With Hedges standing at well over six feet tall and built like a brick outhouse, you can see what they meant. Yet despite his formidable appearance he is actually a gentle giant renowned for his kindness, charm and exceptional good humour. He is also one of the most talented producers around, so it's no surprise that he is in constant demand. Many bands come back to record second, third, fourth and even fifth albums with him.

Mike Hedges has been making critically acclaimed records for nearly 20 years, yet he remains one of those rare producers who is very hard to categorise because the projects he handles are so diverse. A quick look at his CV reveals a zany mixture that takes in classic left-field pop from the likes of The Cure, The Associates, Wah!, Bauhaus, Siouxsie & The Banshees and The Creatures through to seriously radio-friendly, internationally marketable material from artists like The Beautiful South, Alison Moyet, Texas, Marc Almond and McAlmont & Butler.

Many of these projects have resulted in massive hits—the most recent of which is the Manic Street Preachers single *Design For Life* which sold over 250,000 copies in the UK alone and entered the charts at No. 2. He has also just produced their biggest selling album to date, *Everything Must Go*.

Stark ethereal landscapes characterise Hedge's early Cure productions

REMEDIAL ACTION: HEDGES ON THE CURE

WITH MANY OF the albums he has produced—in particular those recorded with The Cure and Siouxsie & The Banshees—Hedges is credited as coproducer. This is because he feels most production is in fact a coproduction that demands equal input from the band and the producer. 'With The Cure and The Banshees it really was a coproduction and I was happy to have my work credited as such.'

Even now, it is clear that the sessions Mike Hedges did with The Cure remain among his favourite. His initial involvement with the band came about when producer Chris Parry booked into Morgan to do the first album and asked for an engineer to be provided as part of the deal.

'I was the cheapest engineer Morgan had, so I got the gig,' he laughs. 'Also, I'd heard of the band and I thought they were brilliant. I'd seen them play at a pub in West Hampstead when they were supporting Adam And The Ants, so I was really pleased to get a chance to work them.'

Parry produced the first album, but for the second and third albums Robert Smith decided to go it alone and asked Hedges to act as coproducer.

These session were very intense. *Seventeen Seconds* was recorded and mixed at Morgan Studios in a matter of weeks, while the third album, *Faith*, was recorded at Morgan and Abbey Road and mixed at Morgan and Red Bus because by that stage Hedges was starting to establish himself as an independent producer.

HEDGES BEGAN his recording career in the mid 1970s after leaving school and landing a job as a tea boy at the now defunct Morgan Studios. He says: 'When I went for an interview the studio manager, Martin Levan, asked me three questions: Have you ever been in a studio; do you know anything about multitrack recording and are you in a band? I answered "no" to all of them and thought I'd blown it, but instead he said: "When can you start?" It turned out that he was looking for a complete novice because he preferred to train his staff from scratch.'

Thanks to some lucky breaks, Hedges progressed from tea boy to tape op, engineer and finally producer within the space of just two years. 'The major advantage of being the lowest of the low is that you get grounded in the psychology of the session' he says. 'You learn that there are certain things that should be said at certain times by certain people. Other people, apart from the musicians, involved in the session shouldn't say anything unless their decision is asked for. If a musician is nervous and is taking a while to get something right the last thing you need is the tape op saying: "Oh, that bit was out of tune wasn't it?", or laughing about something else and not realising that the situation is really tense.'

Although some musicians can be a bit nervous, Hedges believes that most bands are incredibly strong and sure about what they want. His role, he feels, is to interpret their views in order to get the sound they are after.

He says: 'Artists use many different ways to explain the sound they want. Some are technical but others say things like: "I want the guitar to sound like a pair of scissors cutting through paper and then opening up again". It's not very specific but you just have to use your imagination.'

By 1982 he was able to set up his first commercial one-room recording studio, Playground, which quickly became one of the busiest studios in London. Hedges was involved with Playground for a few years but eventually gave it up to become truly independent, working at any studio that took his fancy, although his natural inclination was to use Abbey Road because he felt—and still feels—that it is one of the best facilities in the world.

These days, however, Mike Hedges is usually to be found at his studio in France, working with long-time associate and ☞

ADDITIONAL MATERIAL BY NICK SMITH. EXCLUSIVE PHOTOS BY SYLVAIN ROHEE

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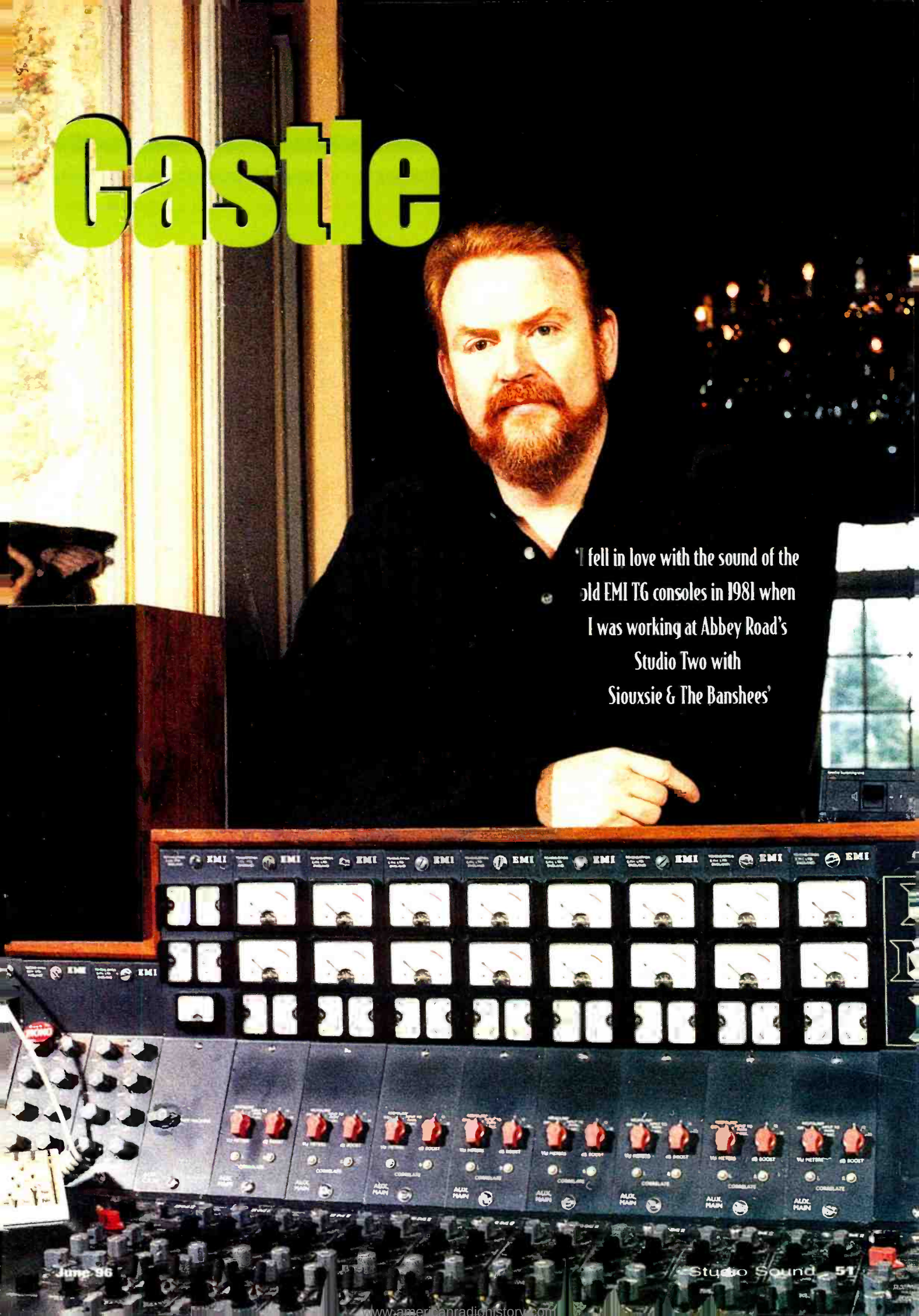
Castle



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freelance engineer Ian Grimble who has engineered many of the hits. He set the studio up six years ago because he wanted a permanent home for his two vintage EMI consoles.

THE CONSOLES are clearly an important part of the Mike Hedges sound as virtually everything he has recorded in the last four years has been done at his studio. He says: 'I fell in love with the sound of the old EMI TG consoles in 1981 when I was working at Abbey Road's Studio Two with The Banshees. We did two songs there and miked everything up with about 25 old valve mikes just to see what would happen. It was amazing –we certainly didn't need much compression! We were experimenting, really, and we thought we'd try as many valve mikes as possible simply because Abbey Road had so many.'

Soon after that Abbey Road took the console out of studio two and stored it away, but Hedges never forgot how good it had sounded. A few years later, when he was back at the studio with another project, he saw a mobile version of the TG console in a cupboard and asked if he could buy it.

He says: 'I got it home and started using it, but the first thing that became apparent was that I really needed spare parts. I asked Abbey Road if they could help and they said they had a garage full of spares which turned out to be the old studio two console which was in bits.'

Hedges bought the console and with his wife, Jane, he reassembled it, cleaning all the knobs and connections and putting it back together like a marathon jigsaw.

'Phil Hancock–one of the technicians at EMI–helped us during the final stages because the main 50 and 80-way plugs were quite finicky. When we had got it all back together he said: "Shall we switch it on and see if it smokes?". But it didn't–it just lit up. It was marvellous.'

Mike Hedges never intended to own another studio but when the artists he was working with started taking over the living room and dining room of his flat in Willesden just so that they could use the console, he felt the time had come to move.

'Everyone who used the desk loved it,' he explains. 'It has built-in compressors and EQs and sounds so individual that it seems a crime not to use it.'

The Twang dynasty: Mike Hedges' collection of classic guitars

After months of house-hunting Mike Hedges finally found the ideal location–a chateau in Normandy which was quickly turned into a residential studio with a large control room on the ground floor and various ground floor and basement recording areas. All of the ground floor rooms have natural daylight and on sunny days the control room windows are thrown open because the house is isolated enough to be removed from extraneous noise.

> 'I'm certainly not a vintage equipment nut, but I have got some pretty weird things–four Vocoders, for example, and some unusual mics that I've picked up secondhand.'

Mike Hedges designed the facility himself–with some telephone input from Andy Munro who was on call to sort out any acoustic problems. 'It was initially going to be for my own projects because I didn't want to keep travelling,' says Hedges, 'but it is now fully commercial, although I tend to book it quite a lot of the time because I love working here.'

Over the years Hedges has amassed a collection of equipment that is now permanently installed in the facility. 'I've pored over the back issues of *Studio Sound* for years because I love seeing what's for sale. I don't just buy old valve stuff and I'm certainly not a vintage equipment nut, but I have got some pretty weird things–four Vocoders, for example, and some unusual mics that I've picked up secondhand.'

HIS MICROPHONE COLLECTION includes a hybrid Neumann U47 that has a U47 serial number but a Telefunken badge. He says: 'It's a mixture of everything–God knows what's in it–but it sounds fantastic and I use it all the time.'

Another favourite is the Sony C800G valve mike which gets used for everything, particularly acoustic guitars. Hedges is also an advocate of the Sennheiser MKH series, especially the MKH 40 and 32 hand-held vocal mikes. He says: 'They are the workhorses and we use them a great deal because they give very high gain with very low noise.'

For monitoring, Hedges only uses close-fields and his preference is for the DynaudioAcoustics M1 system and B&W 1200s. He says: ' I don't think big speaker systems are relevant anymore because we are all making music that will be played on relatively small home hi-fis.

'I tend to use B&W 1200s and Dynaudios for the actual mix. We put it through the DynaudioAcoustics system because it is incredibly accurate and doesn't jazz up the sound. With the B&Ws and Dynaudios you have to work quite hard to get the mix

MANIA FROM HEAVEN: HEDGES ON THE MANIC STREET PREACHERS

'I'M NOT SURE why I got this project –I think it was because they had heard the recordings I'd done with The Beautiful South and liked the fact that they were so radio friendly.

Getting the chance to work with them was fantastic. I knew their work very well and I was delighted because I think they are such a good band with so much energy. I wanted to get that energy across through the speakers.

It was difficult for the band because it was the first album they had recorded since Richie Edwards disappeared. They had all known each other since childhood and I think they were very brave to carry on without him. They felt a bit strange going back into the studio, but luckily the first track we recorded was for the *Help* album for Bosnia which was done in five hours. That broke the ice and after it was finished they were OK.'

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Mike Hedges' vintage EMI TG console at home in the control room

sounding good but when you eventually play it through a pair of NS10s you feel as though you've got sheet metal coming out of the speakers.'

FOR RECORDING, Hedges uses a mixture of traditional analogue and digital hard disk, proving beyond doubt that he is not a Luddite.

He explains: 'My favourite is a Studer 16-track 2-inch that was originally two ex-Abbey Road 1968 1-inch, 8-track machines which have been converted into a single machine.'

Hedges bought and adapted the machine by taking the electronics from the eight tracks and adding a 2-inch headblock. It runs at 15 IPS with Dolby A.

'We also have a 16-track 2-inch and a modern Studer A80 24-track 2-inch that runs at 15 and 30 which we use at 30 IPS with no noise reduction, so there's plenty of variety. On top of that we have a 32-track Pro Tools so we are not completely retro! In fact I think we are very un-retro.'

Mike Hedges feels that the digital Pro Tools system is a great addition to his studio. He says: 'I prefer not to record digitally because I don't like the sound of it. Analogue does sound better and there are some things you can do on analogue that you can't do on digital—recording at half speed, for example, or at double speed or backwards. It's a very tolerant medium

CHOOSY SIOUXSIE: HEDGES ON THE BANSHEES

'EVER SINCE I HEARD their first album, *The Scream*, I was desperate to work with Siouxsie & The Banshees because I just thought they were so brilliant.

I eventually got to meet Siouxsie when she came to visit Robert Smith of the Cure at Abbey Road while we were doing their third album, *Faith*. Soon after that I opened Playground studios and in order to get to work with The Creatures I said they could come in for free. I was that desperate!

We did a three-day session—the first Creature EP *Mad-Eyed Screamer*. They got on well with the studio and with me and soon after Siouxsie & The Banshees came back to came back to record *Kiss In The Dreamhouse*.

Siouxsie and [drummer-husband] Budgie have gone back to being The Creatures again and they asked me if I would record their next project, but unfortunately I just don't have time. They came and spent a few days with us recently to talk about it and if it had been at all possible I would have leapt at the chance. But it wasn't—not this time anyway.' (doh!—Ed.)

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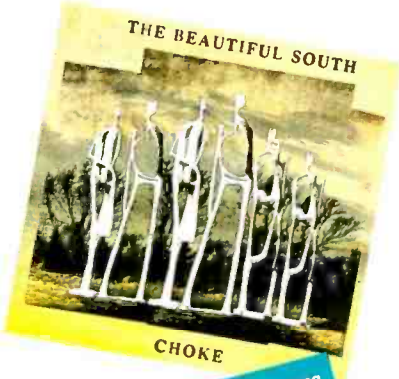
Worlds apart: Hedges has achieved major commercial success with mega-selling Beautiful South, and critical acclaim with the not-so-mega-selling Creatures



and if you do overload the tape you tend to get tape compression rather than distortion, whereas with digital if you overload the tape it doesn't sound good at all.'

He adds that although he wouldn't want a tape-based, digital, recording system, he is happy with his hard-disk system because it offers some amazing facilities. 'Obviously you can do things with a hard-disk recorder that you can't possibly do on analogue and that's what we use it for. I like being able to chop up all the parts of a song and then quantise it which sounds totally bizarre and unnatural. But sometimes that's what you want.'

Hedges says Pro Tools really comes into its own when he has a difficult backing track to sort out. He explains: 'The important thing about backing tracks is to go for the take—the best take. Sometimes it will happen immediately and other times it will take a while. But it's not a great idea to keep the band going and going because eventually they start to flag.

'In that situation what we tend to do is go for the best take possible on the 16-track and use the Pro Tools to edit any part we are unhappy with either by time correcting it or by taking relevant bits from other takes.

'You have to be careful, though, because it's easy to get so tied up in the system

The beautiful recording area at the chateau is bathed in sunlight and commands wonderful views of Normandy countryside

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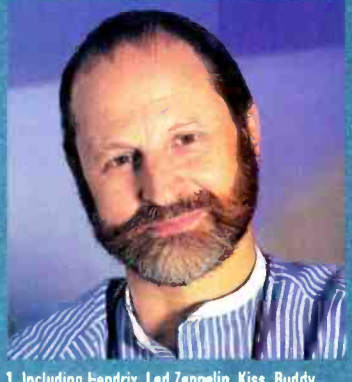
INSTEAD OF BRAGGING ABOUT OUR 8•BUS CONSOLE AGAIN, WE THOUGHT WE'D BRAG ABOUT EDDIE KRAMER BRAGGING ABOUT OUR 8•BUS.

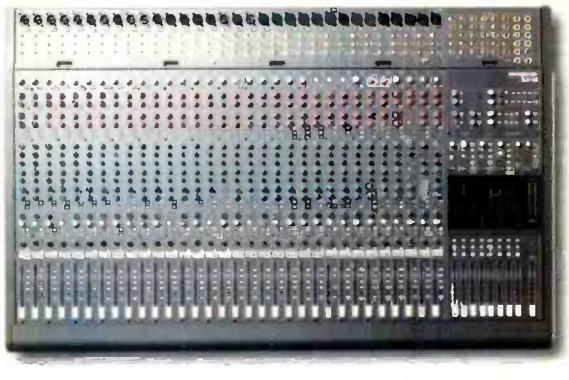
Okay, bragging is too strong a word. But we are very proud when one of the most important, rule-breaking, producers in recording history has become a Mackie 8•Bus fan.

After all. Eddie Kramer's role in the making of popular music has changed its sound forever[1]. His recipe? *"Make a record unlike anything that's ever been heard."* So, while other engineers in London were churning out England's formula Pop of the Day, Eddie Kramer was across the console from a strangely-dressed young man from Seattle named Jimi Hendrix. Together, they broke practically every sonic and musical rule in sight. The result was an aural legacy of such originality that it still sounds amazing — even revolutionary — a quarter century later.

Sample Eddie's latest work on *"In From The Storm,"* RCA VICTOR a brilliant orchestral homage to Hendrix with an astonishing array of some of the best players in the world. Leave it to Eddie to break more rules. (Net surfers should check out the RCA VICTOR Web Page @ http://rcavictor.com.) For a great read, pick up the *Jimi Hendrix Sessions* book by John McDermott with Billy Cox and Eddie Kramer (Little Brown), and on video, *Adventures In Modern Recording* (available from Mix Bookshelf, 510-653-3307).

Eddie hasn't gotten any more conservative over the years. So it's not surprising that a man with Kramer's receptiveness to change would add a 32•8 to his creative arsenal. A mixing console that costs hundreds of thousands less than those he's worked on for most of his awe-inspiring career. A console he says he likes for its *"...sweet EQ, dynamic range, and cleanness."*





Eddie wanted to do more than just take advantage of the creative and lifestyle options afforded by the project studio revolution. He also wanted to help DRIVE it. So a year ago, we agreed to lend Eddie a 32•8 in return for his feedback. Since then, we've learned Eddie is not shy about expressing his opinions. Luckily they're mostly good[2].

And Eddie Kramer recommends Mackie consoles to his associates, too[3]. In these cynical times (when pop stars accept millions to "endorse" products they admit later to having never tried), we at Mackie Designs think that's the only kind of "endorsement" worth having.

If you're in the market for a serious but affordable mixer, we hope you'll take a close look at the only 8-bus console Eddie Kramer says is worth having.

1. Including Hendrix, Led Zeppelin, Kiss, Buddy Guy, and more recently, his work with other Mackie mixer owners: Sting, David Abbruzzese, Vinnie Colaiuta, Stanley Clarke, Tony Williams, Steve Vai, and Carlos Santana.
2. He hates the location of the 8•Bus' talkback button.
3. According to Eddie, Eric Shenkman (Spin Doctors), Little Red Wagon Mobile Recording Studio, Bootsy Collins and John McEnroe have purchased 8•Bus consoles at his urging.

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that it quickly becomes Slow Tools instead of Pro Tools. That's the trouble with computers—they can slow things down just as much as they can speed things up.'

A RECENT ADDITION to the Hedges equipment collection is the Focusrite Red range of EQs and compressors. Hedges bought Red 1, 2 and 3 after trying various outboard EQs and finding that they were the only ones that sounded good with the EMI console.

He explains: 'The console has a very specific EQ sound and for some reason all the other EQs we tried didn't balance in well with what was coming through the console. They sounded fine on their own but just sounded odd with the desk.

'The Focusrite racks are great, though. Maybe it's the warmth of them that makes the difference. Whatever it is we felt they were ideal because they are very usable and modern and have a very high top end. They match well with the other equipment we use and everyone loves them.'

Hedges is amused that so many bands like Focusrite for its looks as much as for its sound. 'You would be surprised at how many people buy things because they look lovely,' he laughs. 'The clients come in and say "My God, those are fantastic—don't they look lovely" and we reply "yes, they are extremely good—and they also sound nice!"

> 'The console has a very specific EQ sound and for some reason all the other EQs we tried didn't balance in well with what was coming through the console. They sounded fine on their own but just sounded odd with the desk'

The Focusrite equipment was a fairly substantial investment for Hedges who doesn't usually buy new gear because it depreciates so quickly. But as they are used all the time he feels they were well worth the money. 'I just had to rip my wallet open for them,' he says, 'and I'm really glad I did.'

WITH SO MANY projects under his belt—and plenty more in the pipeline—Hedges is convinced that diversity is the key to remaining busy as a producer. He says: 'I don't specialise in any one musical genre which is probably why I'm so busy. Last year I only managed to take ten days off in total and that was really too intensive. It was all getting a bit much, so this year I've decided to cut back a little. It has meant turning down one or two projects I would have killed for, but you have to stop eventually or you end up killing yourself!' S

STUDIO SOUND'S MIKE HEDGES VIRTUAL TOP TEN

The following ten Mike Hedges produced chart singles is a personal chart compiled by the editorial staff at *Studio Sound*—we had great fun listening to those classics again and compiling a few trainspotting context notes. Wouldn't make a bad compilation album, this lot!

MANIC STREET PREACHERS
'A design for life'
McALMONT & BUTLER
'Yes'
MARC ALMOND
'Stories of Johnny'
THE BEAUTIFUL SOUTH
'I need a little time'
THE CURE
'A forest'
SIOUXSIE & THE BANSHEES
'Dear Prudence'
THE ASSOCIATES
'Party fears two'
THE CREATURES
'Miss the girl'
EVERYTHING BUT THE GIRL
'Come on home'
WAH!
'Story of the blues'

MANIC STREET PREACHERS entered the UK singles chart at No.2 earlier this year, while for many McALMONT & BUTLER'S sumptuous 'Yes' was the single of 1995. 'Stories of Johnny' provided MARC ALMOND with his biggest solo chart hit to date in 1985, while THE BEAUTIFUL SOUTH made the No.1 slot with 'I need a little time'. THE CURE'S 'A forest' was by no means a their greatest chart success, but signalled a significant turn in direction under Hedges' production, while SIOUXSIE & THE BANSHEES' cover of The Beatles' 'Dear Prudence' was their biggest chart success peaking at No.3 and spending a total of eight weeks in the charts. 'Party fears two' made the top ten for THE ASSOCIATES in 1982, and in the following year Siouxsie's CREATURES hung around in the early twenties for seven weeks with 'Miss the girl'—a deeply uncommercial marimba-based offering drawn from their stunning *Feast*. EVERYTHING BUT THE GIRL'S 'Come on home' spent seven weeks in the charts without making a great deal of impact. The last single on our list, Wah!'s wonderful 'Story of the blues', gave Mike Hedges the Christmas 1982 No.59 before peaking at No.3. NS

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Back in The Ring

Kept in the can since its recording in 1991, a 4-channel, high definition, surround version of the acclaimed Barenboim-Kupfer recording of Wagner's *Ring* cycle has recently been released.

JONATHAN KETTLE discusses the problems facing this, and future, mixed media releases

WAGNER CHANGED the face of opera. His tetralogy, *The Ring*, remains one of the most controversial pieces of music theatre ever conceived. The epic qualities of *Das Rheingold*, *Die Walküre*, *Siegfried* and *Götterdämmerung* were memorably captured on John Culshaw's audio landmark recording for Decca. Conducted by George Solti, the performances are matched by Culshaw's imaginative, vividly 3-dimensional production. More than any other classical music recording of its day, it revealed the extraordinary potential of 2-channel stereo.

Thirty years on, Unitel's HDTV recording of the acclaimed Barenboim-Kupfer production of *The Ring*—made at Bayreuth, the opera house Wagner built to stage his own works—has also helped extend technical and artistic boundaries. With remarkable prescience Unitel made a 4-channel audio mixdown for this 1991-92 recording. Surprisingly Teldec, which has licensed the recording, has not yet issued the surround-sound recording on any of the current carriers. For the moment only 2-channel stereo is available on the Laserdisc, VHS video and CD audio releases.

Unitel and Teldec finally unveiled the HDTV 4-channel audio recording to the British public this Easter. The venue for this UK screen debut was London's Queen Elizabeth Hall, and the organisers went to town commissioning a team of specialists to provide an appropriate quality of audio and video reproduction. ATC Loudspeaker Technology installed an array of its monitor speakers to match the HDTV video image projected onto the 40-foot x 20-foot video screen at the QEH. All of which begs several questions:

What form of HDTV master did Unitel issue for use at the QEH? How did this master differ from those used to make Teldec's VHS, Laserdisc and CD releases? What were Unitel's original priorities when making the recording? And can we expect Unitel and Teldec, in due course, to capitalise on their production foresight by releasing *The Ring* to spearhead the launch of surround sound DVD?

Wagner stories are usually tortuous and this one's no exception. So before getting embroiled in the release format mastering details, let's concentrate on the Easter presentation at the Queen Elizabeth Hall.

The audio and video signal source turned out to be the 300Mb/s D1 large format helical scan system. (D1 is the preferred

REPLAY SOUND

ATC WAS APPROACHED by promotions company, The Park Lane Group, to provide the monitor quality loudspeaker installation for the Queen Elizabeth Hall presentation. The sound had to fill the 900-seat auditorium (net 850 with the addition of the video projector located in the rear five rows), and do justice to the 4-track HDTV master.

Since ATC was unable to access the D1 master until the first day of the Easter QEH screening, some prior monitoring was undertaken using the Teldec Laserdisc release. The programme dynamic range was measured at a little greater than 60dB with a noise floor 85dB below peak. These figures corresponded closely to the 4-channel D1 audio feed actually provided for the HDTV presentation.

ATC designed its system installation to achieve 110dB from the front channels, allowing significant headroom. Concert peaks during performance were maintained at 100dB maximum, though levels in excess of 115dB were achievable in practice. Ambient noise in the centre seats was in the order of 60dB, requiring a small amount of gain riding to mask noise from the Hughes-JVC video projector during the quietest passages.

For the performance, ATC generated one extra audio channel—centre front—in order to hold a central image for the stage soloists. Gremlins struck shortly before the curtain rose. The three phase mains of the QEH, which turned out to have a +10V variation, was bound to be a problem and, sure enough, hum breakthrough surfaced in the centre front channel. As ATC's Alan Ainslie pointed out, 'You can imagine that -80dB from 10V is perfectly audible'.

Some rapid adjustments established a phantom centre channel for the duration of *Das Rheingold*, the first opera of Wagner's tetralogy. This was achieved mainly by reducing front stereo channel separation. Rear channel information was set at a discreet level in order not to distract attention from the stage.

During the long interval between *Das Rheingold* and *Die Walküre*, ATC engineers managed to break the earth loop reducing hum level to inaudibility by removing the mains earth to the offending channel. This enabled a return to the originally planned speaker configuration. For the left-right front channels, there were four pairs of ATC SCM 200 speakers, each pair providing 1700W of amplification plus 2dB headroom. The dual bass drivers were aligned vertically as were the mid-treble units. Two SCM 100 speakers, also aligned vertically, reproduced the centre channel. For the rear channel, a single SCM 50 was positioned each side of the auditorium facing the audience. The entire loudspeaker array was operated actively, with signal fed to each channel from ATC's new SCA2 control preamplifier. Two of these preamps were used to provide four balanced feeds. One fed the rear channels, the other the front channels. A purpose built ATC summer and level control was used to derive the centre front channel.

The SCA2 preamps drove 100m of balanced audio cable to the front monitors, and no measurable intrusion of video or supply related noise or interference was detected during the presentation.

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ATC SCM200 speakers flank the screen for *The Ring*

format of downtown editing suites seeking the highest broadcast quality.) Unitel supplied real-time copy masters taken from first generation D1 masters. The 4:1 ratio data reduction of D1 is achieved by removing adjacent static frame data, making it an efficient storage format for the enormously high density HDTV signal. A 4-track digital-audio signal was interleaved with the video information on the D1 tapes, several of which were required to store the entire three days' of *The Ring*.

D1 tape is Unitel's final mastering format for the finished HDTV programme. As such it clearly determined the company's mastering strategy for Teldec's release of *The Ring* in today's three main consumer formats, VHS, Laserdisc and CD. The best way to appreciate the significance of D1 in Unitel's mastering programme is to trace our way through the recording and processing chain.

UNITEL'S TONMEISTER, Gernot Westhäuser, was at the cutting edge. He outlines how the recordings were made:

'We used a 48-track Sony 3348 DASH recorder with a 6-desk combination of Yamaha DMC1000s. I placed microphones all over the stage, either concealing them from the three HDTV cameras focused on the stage for each scene, or deliberately placing them out of shot. There were a lot of difficulties, but I have been recording at Bayreuth for 18 years. We had a general rehearsal with piano accompaniment and two run throughs for the recording. The director organised the singers' positions during rehearsals, marking them on the stage, so the microphones could then be positioned appropriately.

'It was difficult to change the microphones after the rehearsals. And, of course, no postproduction dubbing was possible—everything you hear and see was recorded on the Bayreuth stage to get the most faithful sound and picture possible. The rehearsals were inevitably full of interruptions—it was important to ensure that corrections were included in the final recorded performance. If a microphone was in the wrong place you would be lost. Then it would be very difficult. If singers moved from the place marked on the stage they would be in the wrong position for the microphones.

'I could talk for three hours about how I recorded and mixed *The Ring*. We used a wide range of mics including PZMs on the floor, under tables and so on. Some mic feeds required equalisation or reverb to obtain the best balance between stage and orchestra. Essentially we directed our efforts to producing one final audio mix, and my top priority was to make sure the CD sounded as good as possible. The same mix was used for mastering the CD, Laserdisc and VHS video.'

As Peter Schröder, Studio Supervisor at Unitel, explained, for the CD, Laserdisc and VHS releases only the final, mixed down, edited front stereo 2-track master was used. This derived from a mixture of stage and orchestral microphone feeds.

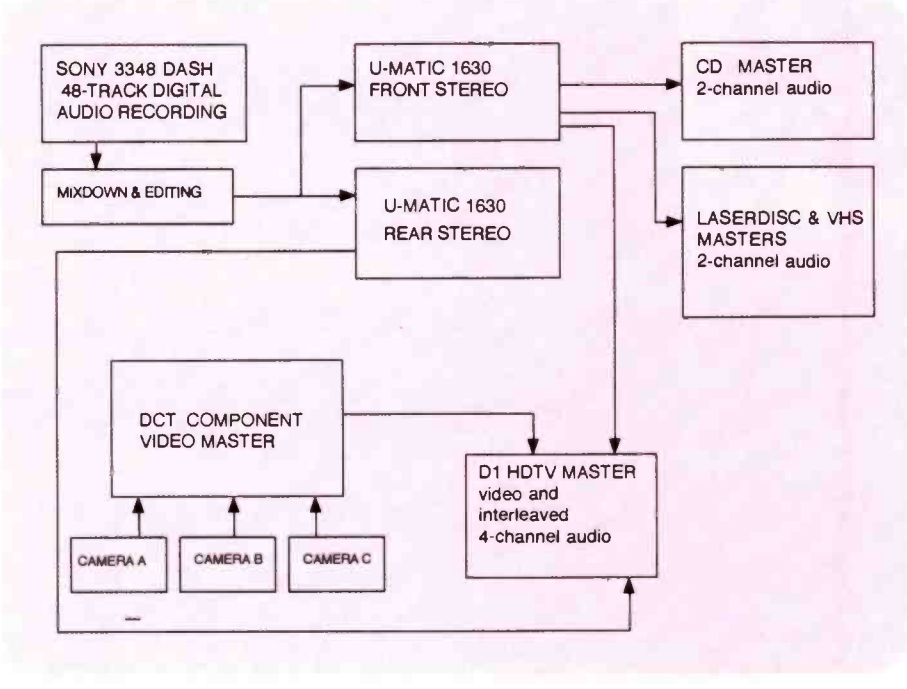
However, an additional 2-track stereo master taken from hall mics recorded the Bayreuth ambience. Both the 2-track front stereo master and the 2-track rear stereo (ambience) masters were transferred from DASH to U-matic 1630 format. It's these four audio tracks that are interleaved with the HDTV video signal on Unitel's D1 master.

Herr Engelbrecht, Head of Audio Production for Teldec, was present for some of the mixdown and editing because he wanted to confirm that the individual singers' voices would sound right on all the release formats as well as for the HDTV production. He is amazed at Herr Westhäuser's achievement, considering the restrictions imposed by the video recording:

'The microphones out in the hall were there to record ambience in case HDTV or any other new format required surround sound. In 1991–92 we had to make an educated guess. It is always important to allow for arrival of future release formats. So then it is not a problem to release to the highest quality.'

'From the outset we were always trying to focus on the best way to get the sound acceptable for both CD and VHS. For video voices need to be recorded close, but for CD such a balance would place voices too close. In the end we found that by recording the orchestra and stage action 'live' (minus only the audience) it was actually impossible to make voices sound too close. It wasn't possible because the microphones were placed far from the singers.

'In fact the mics had to be positioned ☞



Schematic of *The Ring*'s recording setup

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where they were because of the terribly difficult conditions for audio recording. It was nothing like a normal opera recording for CD. Herr Westhäuser couldn't put the mics where he would have ideally wanted. They would have been visible to the video cameras. He got such good results because he worked so long and hard on the audio mix. He tried and tried again to get the best result. Each opera took half a year to produce.

'During mixdown and editing, the main thing we did was to make comparisons between the various options without looking at the video. We wanted to see what happened just listening to the audio. Since the recording was multitrack, during the first phase of editing, even just one track could be isolated. If one singer sounded wrong, that track could be taken separately and track-by-track editing done. When this was complete, the 2-track mixdown could be done with the help of a rough mixdown made on DAT shortly after the recording of each act. Rough mixes were produced for video and audio using the automatic mixing console.

After the first edits, Westhäuser made special corrections for Barenboim—so first there was the basic edit and then the final, special, 2-track edits.

'I got the result I wanted—I am happy with the sound for compact disc. Perhaps for video the voices could seem too far away. If I'd been responsible for the video maybe I'd have said to Herr Westhäuser, "We want a second mix" but I'm sure he would have said: "No, it's not allowed, because the mics are where they have to be for the best sound on CD".

Although the U-matic master used for CD, Laserdisc and VHS was identical, some loss of dynamic range was bound to occur in the high-speed duplication of VHS tapes. However Unitel decided not to try to compensate for this compression by taking artistic risks and making tweaks to the VHS audio signal during postproduction.

For the Laserdisc release in different territories subtitles were produced in four languages. But instead of embedding the subtitles in the picture, they were placed in the Videotext band. You call up the appropriate page on a Videotext television, and the subtitles appear. This is true of both the PAL or NTSC releases. (One unfortunate side effect of this Videotext subtitling was that for the QEH presentation they could

COPYING

SCANNERS, the prestige facilities house, was called upon to handle Unitel's copy master D1 tapes for the QEH screening. Its main OB van with banks of D1 tape machines onboard fed signal to a Bit Rate Reducer and D–A convertors, outputting a separate component video signal to the Hughes-JVC 435 projector and analogue audio to the ATC audio preamp located inside the hall.

One hiccup five minutes before the First Act of *Das Rheingold* resulted in an unavoidable break in audio and video continuity halfway through this first opera. A power supply failure put one of the D1 machines out of action, requiring manual transfer from Tape 1 to Tape 2. Apart from this technical hitch and one or two signs of tape drop out in the form of pixellation, there were no indications of serious difficulty during the presentation, though I did detect a momentary light intensity problem at one point during *Die Walküre*.

Mark Holdaway of Anna Valley pointed out that the 35-metre throw asked of the high-definition Hughes-JVC projector left little room for manoeuvre when setting up for contrast. Too much adjustment one way and the picture would look crushed—too dark, with inadequate tonal gradation. Too far the other way and everything would seem bleached. The sequence in *Die Walküre* must have contained an extremely high intensity image which stretched these limits.

Contrast was one of a number of setup parameters for Holdaway to grapple with. His main task initially was to conduct a survey to calculate the most appropriate use of the screen for the scale of the auditorium. The switchable 16:9, 4:3 aspect ratio and 3:1, 5:1 lens options on the projector gave him plenty of flexibility. But, he agreed, the final choices amounted as they often are, to a case of chicken and egg.

Was there any tape to tape variability? Holdaway wouldn't be drawn, simply explaining that normally on a show he wouldn't resort to contrast adjustments on the hoof... The fact is that in situations like this QEH presentation the projector operator is entirely at the mercy of the supplier.

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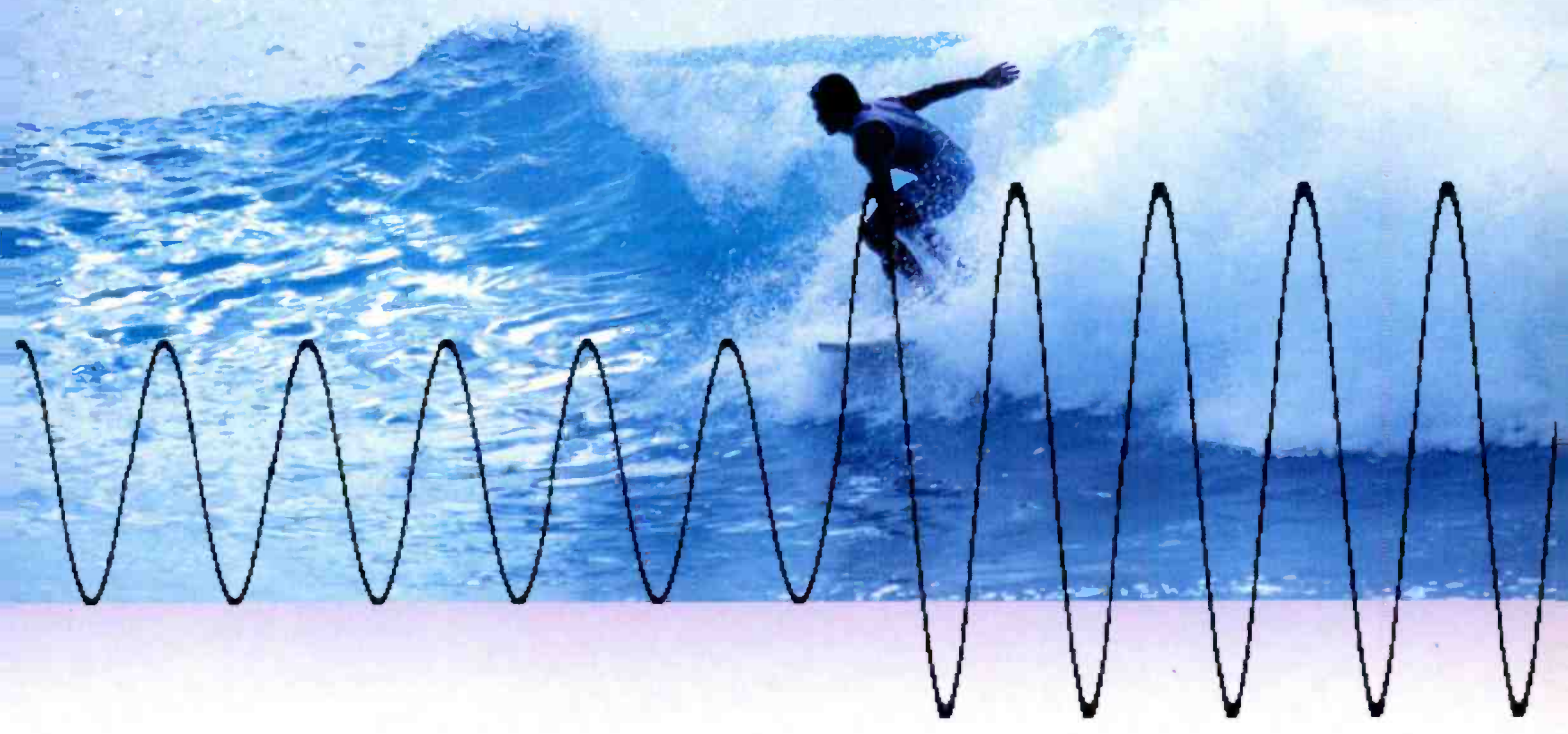

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ATC SCA2 control preamps at *The Ring* premier

not be accessed by the available equipment).

Unitel and Teldec have not yet made a firm commitment to release *The Ring* on DVD. They believe the decision is premature since the technical standards for DVD have not been finalised. Clearly DVD should be the logical format to make the most of the surround-sound audio and high-definition video recording. Horant Hohlfeld, Executive Producer of the recording , certainly anticipates release of the Unitel Teldec recording of *The Ring* on DVD: 'We have to be covered for any system that comes up, as we were with our 35mm recordings of Karajan, Bernstein and Kleiber.'

Schröder goes even further: 'We have been preparing and discussing. We've made a few tests with Dolby Surround. And we have the four audio tracks of the HDTV master. So if a 5.1 channel sound track is required we would need to remix. To date, though, we have not experimented with Musicam.'

THE EXECUTIVE in charge of Teldec's video releases, Marcos Klorman, admits to being frustrated by the current lost leader status of *The Ring* recording. Subtitling for the LD release alone cost between £10,000 and £12,000 (UK), enough to make any accountant blanche given the latest CD, VHS and LD sales figures. Even so, Klorman is eyeing DVD with cautious enthusiasm.

'The fact that the recording is in component video certainly helps,' he says. But he's well aware of what he calls 'the marketing botch-up' that has plagued PAL Laserdisc. And he doesn't underestimate the three hurdles DVD still has to clear—regional codes, copyright and sound coding. Once these issues have been settled, Teldec is more likely to commit to a DVD release for *The Ring*.

DVD could provide the ideal platform to promote Unitel-Teldec's *The Ring*. Whether it will is in the lap of the gods. Enter Loge, Wotan and Brünnhilde!

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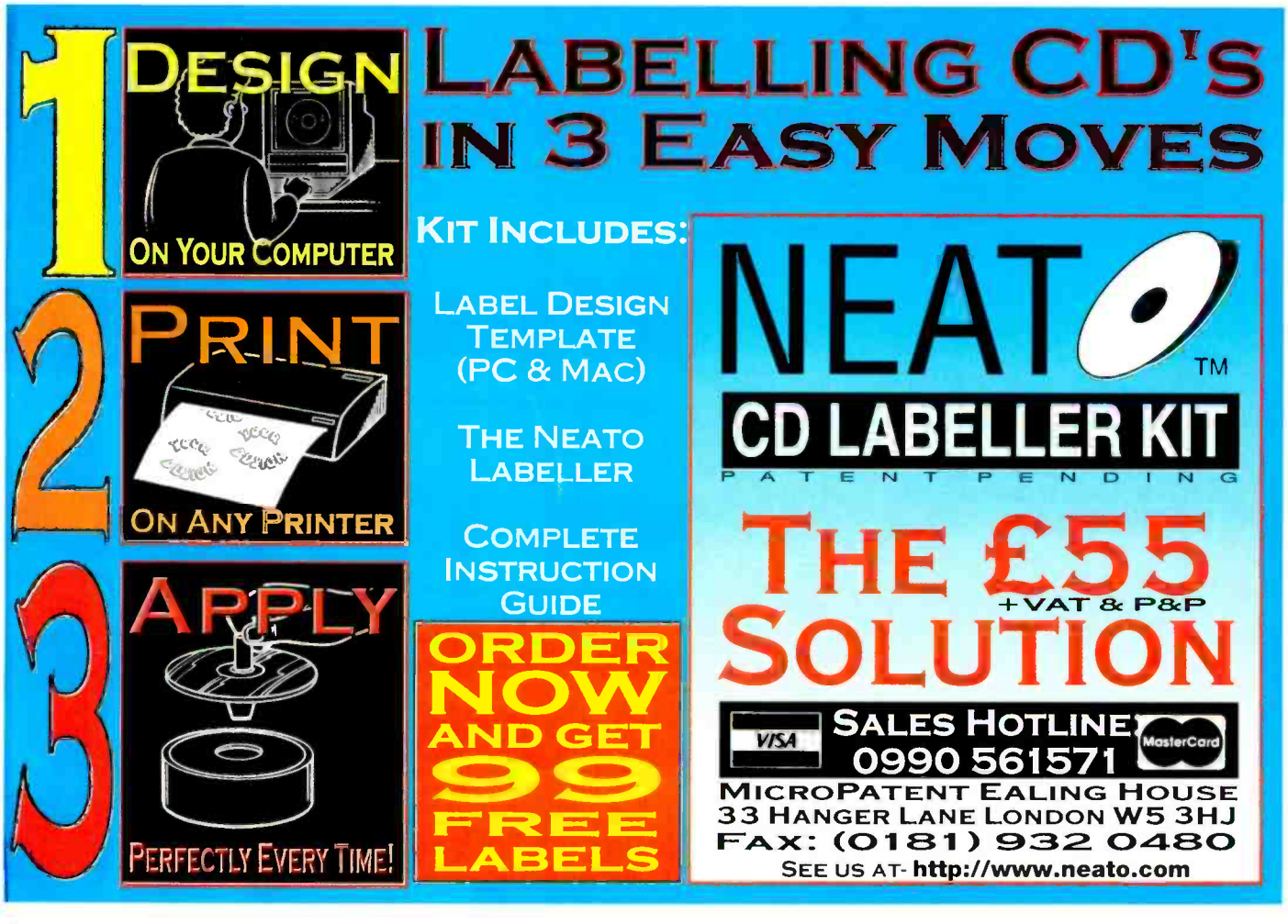

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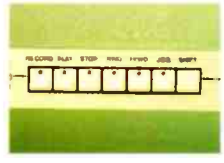

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Taming the

As it is with visual effects, so it is with sound: each landmark motion-picture production raises the stakes for all that follow it. **MEL LAMBERT** reports on the challenge faced by Steven Spielberg's sound crew when designing the sound for *Twister*

THEY DON'T COME any more action-packed than *Twister*. Directed by Dutch-born Jan De Bont–fresh from his action hit, *Speed*–the new movie features a screenplay by best-selling novelist Michael Crichton and is set amid the tornado-plagued plains of Oklahoma during a destructive series of storms. *Twister* follows two rival teams of scientists as they chase the largest storm to hit the state in more that 50 years–each wants to be the first to launch its own equipment pack into the heart of a twister to obtain valuable scientific data.

'I wanted to make this movie look as realistic as possible, and to film in the countryside where tornadoes take place,' says Director De Bont, who also served as Director of Photography on *Die Hard* and *The Hunt for Red October*. 'My goal was for the audience to get the feeling that they are one of those storm chasers out searching for a tornado.' Using a combination of live action, models and computer-generated sequences from Industrial Light & Magic, De Bont was able to produce several different types of twisters. 'But then we needed to create a 'colour' for each of them; some were scary, others magical, and so on.

'Sound is very important to any movie,' the director explains. 'But, given the nature of what we are trying to achieve–including retaining a high sense of anticipation from the largely unseen threat that these phenomena can create–we needed to create "voices" for each of the different types of tornadoes featured in the film. Yet a tornado –which is our star–has no voice; I turned to Stephen Flick to create those impressionistic voices, and make them attention grabbing for the audience. At the same time, I wanted the audience to be aware that tornadoes have a "soul" rather than being inanimate objects.

'While working on location in Oklahoma,' De Bont continues, 'I began to develop a series of ideas for how each of these might sound; when would you hear it, and when would you not hear it? How would it sound from a distance, and how would it sound close up? What would it sound like to be surrounded by a twister?

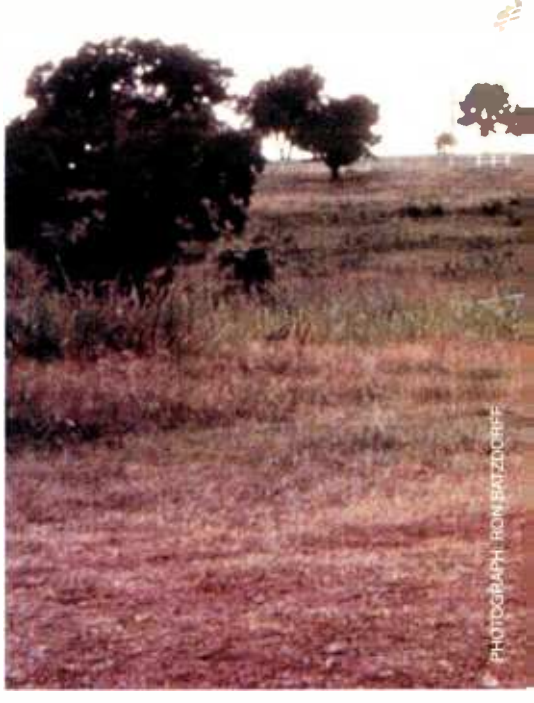
'We spoke to people that had real-world experience of tornadoes, about the sights and sound they had become a part of, and also viewed documentary and news footage. We wanted to create a life for each twister that would let the audience know what it was like to be involved in the power and beauty of such energy. People told us that a tornado sounded like 21 freight trains coming at them; we knew that we had to reproduce a lot of low-frequency rumble in the theatre, as well as the power of the wind–which was described as more like a jet-engine blast. I knew that coming up with a realistic and convincing sound-track was going to a major challenge to Stephen's creativity.

'Sound is becoming more and more important in movies; I even edited the film with sound in mind, by extending scenes to take into account what might need to follow. But Steve is one of the best sound-effects editors that I know; our experience on *Speed* convinced me of that, as well as his work with Paul Verhoeven on *Robocop* and *Total Recall*.

'We used the film's trailer [produced during the Fall of 1995 in, unusually, 6-track DTS-SR-D formats plus 8-track SDDS] to introduce the character of the tornado to audiences. Stephen was very involved in preparing those trailers, and making sure that we had great sound effects.

'We convinced Rob Freeman, Head of Distribution at Warner Bros., that we needed a powerful, discrete mix for the trailers. We needed to sell the movie ahead of time –there are a number of important films being released in May, and we wanted to make sure that movie audiences, through a series of sound-heavy trailers, were fully informed about *Twister*!'

Field Recordist Ken Johnson with 'The Professor Marvel Incredible Wind Machine'



PHOTOGRAPH: RON BATZDORFF

Flick–who served as Supervising Sound Editor on *Twister*–recently set up a new base for his sound-design, editing and related talents in Glendale, California. Known as Creative Café, the new editorial shop features a wide range of workstations, including 25 Digidesign Pro Tools systems. Some of the Pro Tools workstations feature QuickTime digital picture, and are used with a variety of sound-processing software and hardware. 'The majority of our Pro Tools [v3.2] provide a total of 16 voices, mixed out to eight channels,' Flick says. 'A few systems offer fewer voices, which makes them perfect for use by assistant editors, and as inloading stations.

'We also have four [Avid] AudioVision workstations, all with digital picture. We

PHOTOGRAPH LEFT: MEL LAMBERT

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Twister

recently acquired and are currently installing an Avid Media Share network system, which will allow us to simultaneously use over 200Gb of sound files between several systems.' One advantages of using Avid and Digidesign systems, Flick stresses, is that they can share a common file format, which means that material can be transferred easily from one platform to another.

All of the audio materials used in the film, aside from original production recordings, were recorded and edited digitally. 'All the sound effects were edited on our Pro Tools systems, while Foley materials were cut on [Avid] AudioVision. We recorded 50% of the Foley to DA-88, and the remainder with a Fairlight MFX3. Mark Mancina's score was edited by Zig Gron at Media Ventures on Pro Tools.' Mancina also wrote the score for *Speed*.

'For the predubs we took three transportable *Pro Tools* onto the stage [Universal 3, Universal City] for playback of edited dialogue, effects and music tracks, plus a spare Pro Tools system. We premixed everything to six tracks, with and without booms. The advantage of working with digital workstations is that you can perform multiple edits on the material with complete freedom to undo any edits that you might need to change or modify—that's something you cannot do so easily with mag dubbers. Also, we can lay up multichannel source material, and pick what we need during the predubs.

'In fact, we tried to work all the way through this project in terms of 6-track elements; that only became possible because of the time we had available to us—I began work back in March, 1995—and a generous sound-effects budget.'

TO CAPTURE a variety of wind sounds, Flick contracted Field Recordist Ken Johnson to design and build a special device —christened 'The Professor Marvel Incredible Wind Machine'—that could be mounted in the bed of a pickup truck. Comprising a sturdy frame lined with foam and carpet padding to deaden the truck vibrations, various sound-making slats, wires and other devices could be added to produce different noises as they were pulled through the air. Johnson used a pair of crossed X-Y Schoeps CMC4 microphones with windsocks.

Then, while driving the pickup around various locations throughout the Mojave Desert, the field recordist could capture different sounds as the breeze made a variety of fishing lines, wires and other filaments create exotic wind 'whirs'. Jars, bottles and similar open containers mounted at various heights above the box frame were also used to create resonant sounds, plus slats and arms that could be extended to either side of the pickup body to produce whirring ☞

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The twister swallows up and destroys a lone farmhouse as Jo and Bill try to drive around it

sounds. (Just in case you missed the arcane reference, 'Professor Marvel' was the kindly travelling wizard who became *The Wizard of Oz*; recall also that Dorothy and Toto were transported from Kansas aboard a tornado in the classic movie. So it goes.)

Using these effects as a base, Flick and his team began to build the sound of various tornadoes featured in the film. 'There are several stages prior to the arrival of a twister,' Flick elaborates. 'First, the air grows unnaturally still; nothing moves. Then, the deafening roar of a freight train fills the silence. And, finally, a swirling, spiralling wall of wind descends from the skies, tearing through everything in its path.' A tornado, after all is one of nature's most deadly phenomena—its has the power to drive an unbroken straw through the width of an oak tree, or lay waste an entire town in seconds; they remain mysterious and capricious killers. 'I wanted to re-create the sound of a tornado as it passes you—yet without risking capturing it on a DAT and some high-quality mics. I worked out that the sound of a tornado is made up of several elements. First, we have the natural, low-frequency rumble. Just like a pulsing freight train, we experience a lot of LF information, followed by high-end steam pulses, followed by a fast passby and then silence after the thing moves off. One of our editors had actually been in a tornado, which he describes as being first quiet and then incredibly loud.

Another of Ken Johnson's wind devices

'So we began looking for effects that would contribute to the sound of our tornadoes —there are several different twisters in the film, all of which have a different characteristic and sound signature, building to the film's climax. Martin Lopez and his crew of field recordists, including Charles Maynes, made a number of audiophile recordings for me of freight trains, passby effects and other effects I would need for the movie. Last summer, Ken Johnson and Eric Potter spent several weeks recording wind effects here in LA and in Texas, as well as gathering more train effects.

'Many of these sounds, including a series of ambiance recordings, were made using multi-mic arrays, so that we could prepare 3-D images for the soundtrack. From our discrete recording [made to ADAT and DA-88] and sound design, we were able to produce edited 6-track masters for the soundtrack; I wanted to provide left-to-right information, as well as back-to-front, so that the sound could be placed anywhere in the auditorium. We were also able to re-create a sense of height—that the wind was above the audience —by using matrixed effects and digital reverb.

'I kept returning to the question: 'What does a tornado really sound like?' Or, more to then point, how should I make it sound to convince the audience that this is major threat; to provide a sense of power within the movie theatre? I concluded that the sound of a tornado is made up of three primary elements: We combined the sound of wind moving very fast, with objects being moved rapidly, and a voice panning across the surface of the wind—the combination is almost human in its characterisation, and can be varied by altering the speed and force of the wind velocity. We also added sounds we created on the Foley Stage, and totally synthetic sounds. These, in combination with surround-sound information, produced what I consider to be a very realistic effect on the dubbing stage, and one that will totally convince the audience that they are experiencing the real thing.'

FOR THE DUBBING of *Twister*, the sound crew moved to Universal 3, which features an 120-input Otari Premier board with DiskMix VCA/moving-fader automation. Because of the large number of sound elements involved during the predubs and rerecording session, a sidecar Otari Concept 1 board was added to the right-hand side of the main 3-man Premier console, and used to handle additional effects elements. Lead mixer-dialogue for the dub was Steve Maslow, with Gregg Landaker handling effects, and Kevin O'Connell supervising music tracks, as well as a small overflow of effects elements.

Maslow and Landaker have worked together at Universal for many years, on such landmark films as *Waterworld*, *Speed*, and *JFK*. (During their previous experience at Skywalker Sound and Warner-Hollywood, the duo worked together on *Top Gun*, *Empire Strikes Back*, *Raiders of the Lost Ark* among others.) O'Connell normally works at Sony Pictures Studios, Culver City, but has seen action with the duo on such films as *Unlawful Entry* and *Beetlejuice*.

According to Steve Maslow, 'This is an effects-driven movie that opens with a big tornado. It's actually a flash-back for a little girl that experiences the most horrific thing she's ever seen; then you dissolve into the future and the girl has become a storm chaser. But you don't really see [the tornado] because it's a night shot; instead, it's the presence, the sound, the destruction going on all around them.

'They came to the predub with hundreds and hundreds of raw elements—winds, debris... We worked mostly with stereo tracks that we placed and swirled around the room for the 6-track discrete mix that we then poured into DTS, SR-D and SDDS, as well as the Dolby Stereo mix.'

The final dub was to 6-track 35mm mag. 'We like the 'feel' of the sprockets,' Maslow confides. 'We didn't prepare extra tracks for the left-inner and right-inner channels on the SDDS mix; we just bleed some information into the inner pair.'

Maslow recalls that the predubbing process was particularly complex because of the large number of sound elements. 'Steve Flick provided us with maybe 300-400 tracks for a tornado reel [on DA-88 and Pro Tools], and gave us his general idea of what he would like us to do with them. Then all three of us went to work with the material.' Music was supplied on a 16-channel Pro Tools system, predubbed to 35mm mag.

'We didn't want to have every-thing playing at once, so we were diving in and out of different tracks', Maslow continues. 'As the twister got closer we would get the

The dubbing session for *Twister* at Universal Stage 3, with (left to right) Dialogue Mixer Steve Maslow, Music Mixer Kevin O'Connell and Effects Mixer Greg Landaker. Also to be seen working at the 120-input Otari Premiere console, with sidecar Concept 1 board for additional effects elements.

PHOTOGRAPHS: MEL LAMBERT

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wind in the high-end, then get the low-end going and try to drive the tornado close to us. We would try to put specifics into the swirling effects and raspiness, because if you have 400-odd tracks playing all at one time it would sound like a big mess; we tried to give some definition to the sound. For me, predubbing is like editing; you only want to retain the sounds you know you're going to need for the dub.'

For some of the premixes, the film was still lacking opticals from ILM. 'Jan would stand close to the screen with a flashlight,' O'Connell remembers, 'and tell us where the tornado was and how it might move. We made mental notes of his movements so we could have those elements ready. Ninety percent of the time we hit them on the button; once in a while we didn't, and just fixed it on the final.'

During the final-dubbing sequence, Maslow and his team had as many as 200 sound elements running through the main and sidecar consoles. 'Greg had about 110 on the main and outboard effects boards. Kevin had about 30 [music tracks], and I had about 30 or so [dialogue]. We probably started with close to 800 elements during the predubs.'

In terms of using sound to create a mood to reinforce what's happening on the screen, Maslow says that he considered a variety of techniques. 'There are a couple of scenes in the movie where a tornado is coming and we're just getting licks of wind wisps, and maybe a little growl here and there. All of sudden all the people are looking around the screen because they know something's coming, and then we hit them with it.'

In terms of discrete vs matrix mixes, Maslow suggests that six separate tracks enable him to more accurately define the direction of each sound. Also separate left and right surrounds enable the sound to move more freely within the auditorium. 'This movie definitely lends itself to a discrete format. A lot of times the surrounds become a little intrusive. But when you're into this massive tornado the SPL is up there; you feel like you're in the middle of this incredible monster. Surrounds can be overused. Hopefully, we used them to the right degree in this movie, because when you're in the vortex of this tornado you've got to have every speaker in the place going.

'We treat everything with reverb and ambience when we predub it; sometimes if it's not treated enough we might hit it again.' The mixing crew had access to three Lexicon 480 XL digital effects systems, which were 'very flexible, quick and easy to work with.'

'But Steve Flick is a genius for bringing to the stage pretreated tracks with 90% of the effects done for us; he brings us what he feels will work,' O'Connell says. 'He may have a dry version and a wet version so that we can mix between the two—when you're dealing with 400 tracks, for us to treat every single track would be very time consuming.'

'There's something a little different about *Twister*,' Maslow confides. 'Jan designed this movie around the score and the effects, so that they will not fight each other. By leaving spaces in the frequency spectrum, we have room to add sounds without swamping the level. An example: We're coming up on a tornado, and as soon as it is upon us, the music dies down and goes away completely. As soon as we get into the crux of this tornado, it's all effects.

'Because Mark Mancina and Steve collaborated on editing the score with the sound effects, it all bends together seemlessly. Mark wrote the score without diving into this mid-frequency range where the effects were going to be—that's one of the best designs about *Twister*. For practically every chase I've seen—from *Raiders of the Lost Ark* to *Top Gun* to *Crimson Tide* to *Waterworld*—music is always fighting the effects; in this movie they compliment one other.'

In terms of dialogue balance versus music and effects, Maslow says: 'Basically, we just set the dialogue at a comfortable level and worked everything else around it. Obviously, as the action ebbs and flows, some pieces of dialogue are lost and we'll go up and retweak them.'

'Steve picked the level of dialogue,' O'Connell recalls, 'and so Greg and I mixed the effects and all music around it, so that the overall sound level of the movie doesn't become offensive.'

According to Maslow, 'The effects elements came in on DA-88, which is a choice that Steve Flick made because it's very flexible. But, for us, it's very time consuming, because we like to mix as we are backing up as much as we mix forward. We have maybe 20 DA-88 machines in the machine room and other areas. But when you've got so many tracks going at once, all of the DA-88s don't lock up to time code at the same time. So you're waiting for those missing eight or 16 tracks. We drive the whole system from a TimeLine Lynx generator.

'We predubbed the film down to probably

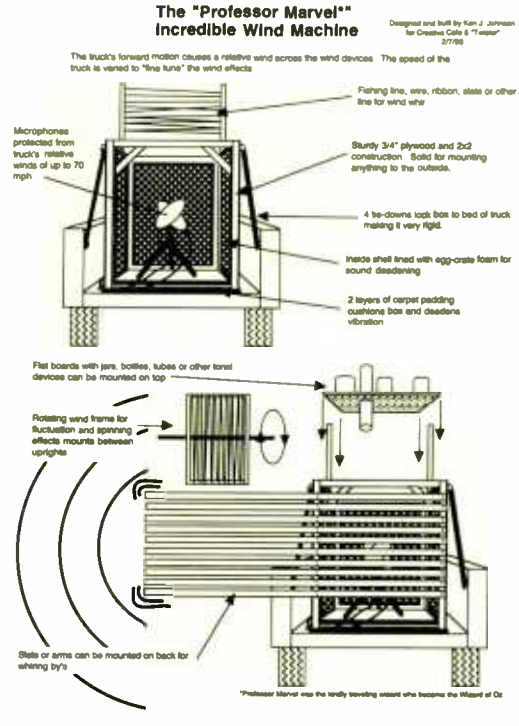

Fig.1: Design notes for the 'Professor Marvel' device used in *Twister*

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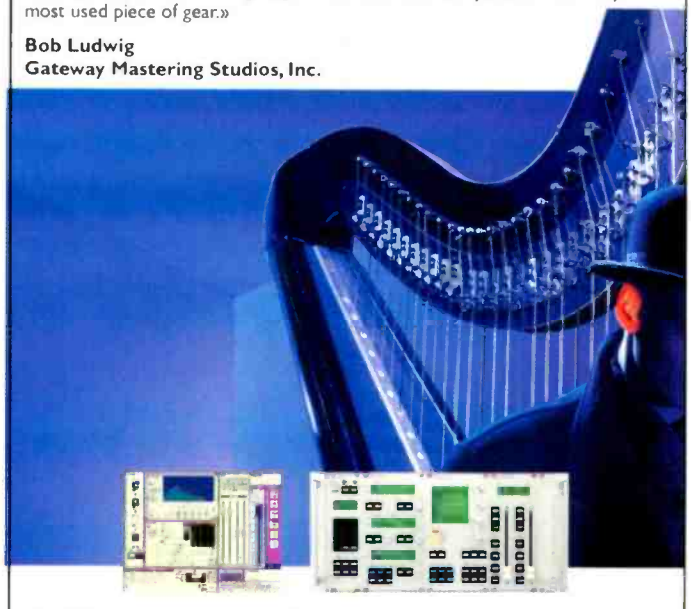

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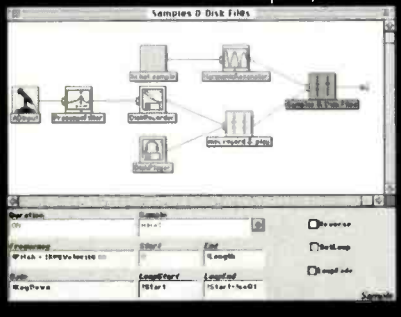

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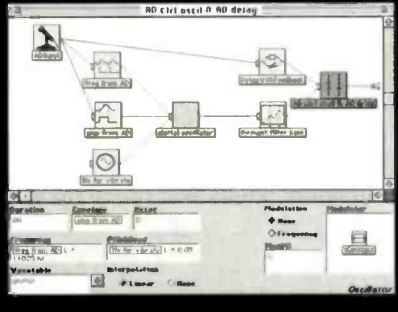

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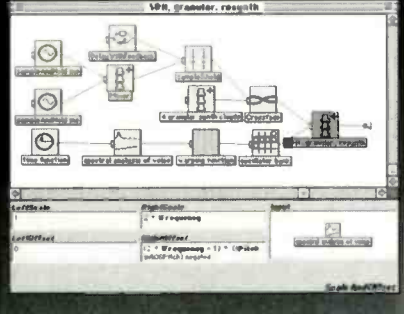

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120, 6-track 35mm mag reels of effects so that we could have individual control during the mix. We didn't want to tie ourselves into just this big huge tornado sound, for example, but wanted the flexibility of being able to add some high-end and mid range; some low- end and screams and growls; some tearing sounds, whatever. By keeping them all separate we were able to bend and fold it around the dialogue.'

To maintain consistency of sound throughout the movie, Maslow says that they spent a week doing a temp dub with De Bont. 'Jan gave us input on exactly how he wanted everything to sound, which we used going into the predubbing stages and finals.

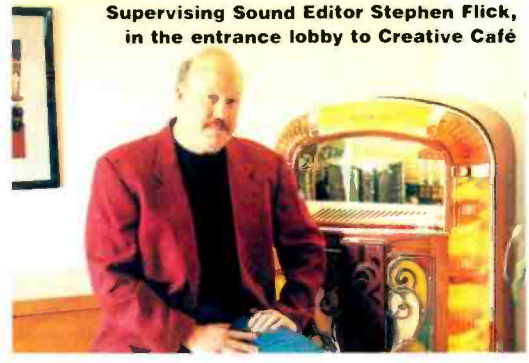
'There are several different tornadoes in this movie. Our goal is to give the audience a different experience with each tornado– we don't want them to sound all the same. Some of them are going to start with rumble and shaking the room; some of them are going to start with howling wind; some of them are just going to start with screaming, tearing sounds.

'Jan and Steve collaborated on those details before they would come to us. Since the final mix was all going to be in our hands, they shared with us what they wanted to do. Then we'd interpret what they said and try to deliver it on the screen.

'I think that the best part about this movie is that we're trying to provide the feeling that a tornado has come upon the audience, and they are now experiencing what it is like to have tractors and semi's and houses and everything dropping in on them. And animals blowing around about their head. From interviews we saw on TV of people that had been in real tornadoes, the movie is a pretty good representation of how a real tornado sounds and the effect it can have on you.'

Gregg Landaker: 'Each tornado is different in having its own character; there's are two that you don't see, and three that you do see. The last portion of the movie deals with at F5 tornado [on the F-Scale or Fujita-Pearson Tornado Intensity Scale, with 300mph-plus winds]–The Finger of God; it takes out anything in its path.

'To capture the energy force of that coming out of a speaker system was one of our more difficult tasks. We have the



Supervising Sound Editor Stephen Flick, in the entrance lobby to Creative Café

PHOTOGRAPHS: MEL LAMBERT

sound of hundreds of freight trains going by at the same time, but we need to hear dialogue! To pick out detail is a very tough process. The art is to choose the right moments where you can take this mass of energy down a little bit for the other layers to come through. It's a difficult task because, unlike other movies, this energy force goes on for a long period of time, unlike a gun shot, car crash or a train wreck that happens and then it's over.

'And we needed to take the sound of a tractor hitting the ground, and flying past us in the speaker system. Even though the audience is seeing a two-dimensional image in the screen, we're trying to create a three-dimensional sound coming through the room.

'On one scene, we had a high shot of a truck going through a ditch. You don't see the tornado but you hear it coming. The actors are saying: "We've got to get out of here". We put this very animalistic growl in the surround speakers that gives you a chill. So, when the tornado does reveal itself, there's another growl and it explodes a barn as they're trying to get away from it.

'Yet the audience has no idea of what's coming. I can either scare them, or shy them away from the screen; you are manipulating your audience as much as the director manipulates the story. That's the art of a film mix; knowing when to make the audience feel like they're part of this event, and when to back off and let them listen to the story and get into the characters.

'There's a comedy part and a love story in *Twister*. And, like *Speed*, there's a happy ending to it all. So the audience will walk away going: "Unbelievable, that was great!" with a heartfelt story at the end of it.'

Interior of one of several hundred sound-design and editorial suits at Creative Café, equipped with Digidesign Protools and Avid audio workstations

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Digital wonderland

Of the technological ages, digital is making its mark. But it extends back into the past as well as forward to the future writes **KEVIN HILTON**

The digits! The digits! They made me mad, you know. Digital technology is permeating our lives: it's there in the form of our CD collections (unless you happen to be a vinyl rebel), our telephone networks (although I happen to live in an area with one of the last analogue exchanges in the UK), computers and watches (sorry, they're an anachronism from the late 1970s). In becoming this pervasive, it has expanded the language.

At the end of the 1980s, some friends and I used to play a game that was called What Did We Do Before...?, which involved coming up with things now a firm part of modern life that hadn't been around when we were younger—the favourites were fax machines and night buses. This mind-expanding game, which is only relatively less trivial than the one where players have to think of cartoon cats, dogs or rabbits, can be modified to consider how we regarded things before the word digital became a prefix to so many things. Poor old analogue never got the same exposure, at least not before the mighty digit came along. In the days before digital people didn't talk about 'analogue records', they were just 'records'. We do talk about analogue recordings now but only to differentiate them from the digital variety, which is a preservation action by the old guard. (A colleague asked recently whether there are really differences between the two. Before the letters pour in rest assured I snorted in a derisive way to answer this.) This makes me wonder whether, eventually, we will only identify something that is still in the analogue domain and not bother labelling a digital device or source because it will then be the norm.

In many ways, we can do that now. Do we really have to say 'digital audio workstation' given that there was never really an analogue audio workstation (unless you count tape machines hooked up to a mixer)?

When the EU Action Plan for wide-screen television came into being, broadcasters and manufacturers agreed that there was little point in talking about PALplus because it wouldn't mean all that much, which wasn't a superior attitude, merely a pragmatic one that concentrated on the practical benefits of different aspect ratios, rather than talking about the tweaky bits behind them. Digital television and radio services will mean an upheaval for the consumer, not just the providers. To justify this the prefix digital is very important because it implies a new age, one where every viewer and listener is guaranteed what BBC Director-General John Birt has called 'a digital dividend'. When the BBC announced full details of its DTT services on 9th May, Birt, whom the late, lamented TV dramatist Dennis Potter accurately described as a grey man with a voice like a Dalek, gushed: 'In an increasingly commercial world, public service broadcasting will become even more important in maintaining a balanced broadcasting system. We forecast that every household will be a major consumer of BBC services in the Digital Age; the BBC will still be watched and heard more than any other single broadcaster in the UK.'

THE DIGITAL AGE? Good grief! This conjures up a picture of archeologists of the future going around digging up sections of Greater London looking for remains of Analogue Man (and Woman), primitive creatures with legs who had to wiggle strange objects called aerials to get decent reception on the few meagre channels available to them. Analysing Birt's statement makes me feel that he and his senior executives see the word digital merely as a marketing device, one that they hope will sustain the Corporation in its contest with the new generation of commercial broadcasters, both terrestrial and satellite.

Although the Beeb has a long list of the extra benefits that digital technology will bring to the viewer and listener, it appears that it is still using the 'D' word merely as a marketing jingle rather than focusing primarily on the extra services themselves.

For radio, the BBC has now confirmed the extra services that it hinted at during its less than impressive launch last September. These are: BBC Now, ten minute updates of news, business, sport, weather and travel; 5 Live News Plus, which will broadcast extra live news when the network is concentrating on sport; 5 Live Sports Plus, giving more coverage of more events; BBC Parliament; BBC Music Plus, offering genre specific services (jazz, country and so on); and Classic Comedy and Drama.

On the TV side, BBCs 1 and 2 will have wide-screen visuals and CD-quality audio; a number of so-called side channels, which will give wider choice and access to archive material or complementary programming (for example, a documentary on Irish novelist Roddy Doyle being 'shadowed' by a screening of the film version of his *The Snapper*); a 24-hour news channel; The Learning Zone educational service; regional broadcasting; a number of pay services covering documentaries, drama, music, education and sport; and overseas services, including the BBC World Services. This will be accompanied by a multimedia division, offering a range of CD-ROMs and an Internet service.

We do talk about analogue recordings now, but only to differentiate them from digital —a preservation action by the old guard

Through these examples it can be seen that digital is offering the consumer wide choices and access to things that could only be dreamed of in the analogue-only days. But these benefits are the main point, not the digits, which are only the means to an end. People criticise those heavily into computers and the Internet for being technology-obsessed geeks but those who feel that a sentence is incomplete without at least two mentions of the word digital are just as bad. Mind you, what else can you expect from a Dalek?

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Express™ is a creative tool for broadcast and commercial production with a no-frills interface so simple to use that even a program director could learn it. It uses Producer's hot-key shortcuts to reduce the learning curve if you upgrade.

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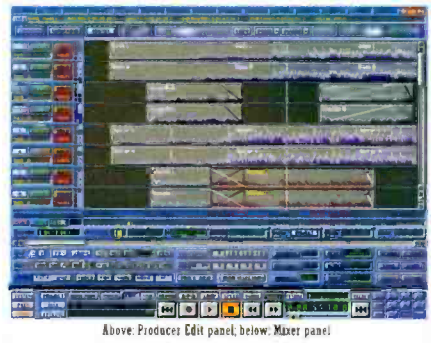

Above: Producer Edit panel; below: Mixer panel

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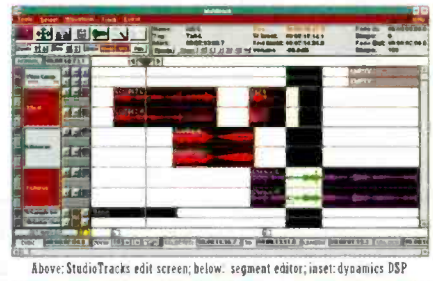
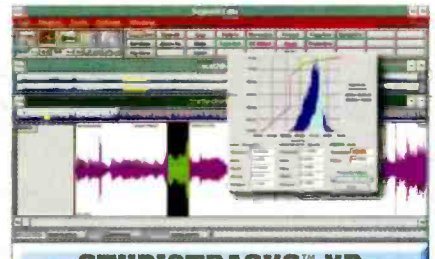
‡The software program Formerly Known As Prisma Music. Our *previous* Marketing Department did it.



Above: StudioTracks edit screen; below: segment editor; inset: dynamics DSP



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Opening DAWs

Digital audio workstations have seen more than their share of success and failure over the last decade. **YASMIN HASHMI** offers an overview of current nonlinear systems and their standing in the market

WITH TAPELESS PRODUCTS having been around for over a decade now, and with tens of thousands of systems already in place worldwide, the technology could be said to have come of age. For many, the primary benefits are nondestructive editing and digital-audio quality, but the overall move towards digital is driven by commercial considerations as much as subjective preferences in audio quality.

In an increasingly competitive and global market, there is pressure to get things done faster, improve the quality of the final product, or save money where possible, and digital technology is allowing this to happen for a broad range of applications. Manufacturers are also under the same commercial pressures, and whether providing recording, editing or replay devices, the pro-audio world is being irresistibly drawn into the digital age, and random access is now becoming the norm.

Even those companies not traditionally associated with recording-editing products directly are also involving themselves in the technology by means of takeovers and strategic alliances. Mixing-console manufacturer Euphonix, for example, has bought Spectral; and Fairlight is collaborating with console manufacturer Amek. In addition, Mark Crabtree has bought AMS Neve back from Siemens; and OSC has been bought by Macromedia, makers of SoundEdit 16 Mac-based software.

A growing number of audio-editing-system manufacturers are joining with suppliers of video-editing systems—a trend highlighted by the acquisition of Digidesign by Avid Technology a couple of years ago. Now Sonic Solutions is cooperating with the digital video-effects specialist Discreet Logic; Studio Audio & Video is collaborating with both the nonlinear-video-system makers Adcom and the radio broadcast specialist Broadcast Electronics; and Merging Technologies—the company behind the Pyramix system—has formed an alliance with Softimage, makers of the video-based Digital Studio. Furthermore, some traditional manufacturers of audio products such as Publison, Doremi and FED, have expanded their respective portfolios to include video products, each having developed a digital disk recorder for picture.

The areas in which the technology has had the greatest impact so far are audio postproduction for video, CD mastering and live-assist and automation for radio, but the past 12 months have seen the introduction of more systems aimed at the music-recording market. For the low-budget studio in particular, there are now computer platforms on a consumer level, such as the Mac AVs, which have digital-audio capabilities thrown in. These platforms only require an appropriate software package in order to turn them into professional audio editing systems. Such packages include the new Digidesign Pro Tools DAE Powermix and v2.5 of Macromedia's Deck II, both of which only require a 16-bit audio capable PowerMac, the number of channels supported depending on the clock speed, amount of RAM and disk throughput. For professional I-O, both systems can use Digidesign Audiomedia or Pro Tools cards, and Deck II also supports the new Korg 1212 I-O card, which includes an ADAT interface and supports up to 32 channels.

Perhaps one of the most remarkable developments over the past year is the introduction of a new breed of low-cost recorder-mixers, complete with built-in disk drive, mixer surface and transport-edit controls, but also boasting professional audio quality. Such products include Fostex' DMT-8 and Roland's VS-880, both of which support 8-track operation and use hard disk as the recording medium. Using MiniDisc as an alternative are Tascam's 564 Digital Portastudio and Yamaha's MD4. Both support 4 tracks with punch in-out and include an integrated analogue mixer. The MD4 also supports the ability to submix all 4 tracks into one, while the 564 Digital Portastudio features a jog-data wheel and MIDI functionality.

For IBM-compatible-system users, a number of software-only packages are available which can use any Windows ☞

Fairlight's FAME is poised to make serious inroads into the international postpro market

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Timeline' MMR-8 has features aimed at postpro requirements

compatible sound card. Such products include the SEK'D Samplitude Studio and IQS' SAW Plus, both of which require a minimum 486 platform and support 16-channel operation, and the new Sonic Foundry Sound Forge 3.0. This requires a minimum 386 PC and supports a wide range of DSP functions including plug-ins for noise reduction, spectrum analysis and QSound 3-D effects. It also has a batch-convertor plug-in for automatic conversion of files for a wide range of formats.

Adding to its range of PCX cards, Digigram has introduced the PCX20 playback-only and PCXi9 for PCI bus cards. Although Digigram is well established in the radio-broadcast market, third-party developers of .WAV-based software may be interested in the new APT ADK200 4-channel card for a minimum 486DX-50 platform. As well as linear recording, the card can use apt-X, MPEG2 or G722 compression, and up to four cards can be used to support 16-channel operation via AES-EBU, SPDIF and SDIF2 I-O, with various optional analogue I-O formats. The new V8 card from Digital Audio Labs supports 16 channels and requires a minimum 486DX-66 platform. Optional hardware includes add-on dual DSP modules, an analogue breakout box, a stereo analogue and digital I-O card and ADAT, DA-88 and timing interfaces.

FOR 2-TRACK REPLACEMENT, Studer Professional Audio has launched the M-O-based D424 which can be used for a range of applications including CD premastering and integration with the Studer D741 CD-R machine. It supports linear recording as well as LRC, AC-2 and MPEG2 compression and up to 24-bit recording. The M-O-based GX2000 from Genex Research is primarily aimed at location recording and also supports up to 24-bit recording. In addition to linear recording, it supports what the company calls lossless data packing, the compression ratio varying with audio content. Tascam's new MiniDisc-based MD-801R recorder-editor and MD-801P player-editor, support programmable, random-access, locate-and-repeat functions including an insert feature and a jog-data wheel that provides single-frame accuracy. The units support analogue and digital I-O and can be remotely controlled using a standard PC keyboard.

Along with the Direct Research Direct 115, Otari's RADAR was one of the first systems designed specifically for multitrack replacement. And until recently, virtually had a monopoly of the market with its cascadable 24-track unit. The past 12 months, however, have seen a marked increase in such systems, particularly modular 8 tracks, including the Fostex the D-80, the DAR OMR8 and the E-mu Systems Darwin. This supports an ADAT network such that Darwins and ADAT-compatible tape machines can be mixed in any combination up to 16 units. Optional hardware includes ADAT I-O, and ADAT sync card for full ADAT compatibility and SCSI host card for control by an external PC.

A more established system which uses 8-channel modules is the Soundscape SSHDR1. This supports up to 16 units for 128-channel operation, and while the system can be used for simple multitrack replacement, it offers a comprehensive range of editing and mixing features for both music and postproduction for video. These include the ability to run simultaneously with any MIDI sequencer, a new DSP plug-in card for increased processing power, a number of new DSP software plug-ins, and the recently introduced EDL conform feature supporting CMX, GVG and Sony format EDLs. SAV's Octavia supports up to ten 24-channel modules and also includes comprehensive editing and mixing features, controlled using dedicated hardware surfaces.

Over the past few years, a number of attempts have been made by various manufacturers to integrate disk-based systems with custom-designed mixing consoles, but this has often resulted in a preview showing of the product with eventual withdrawal for further development. However, successful launches of optional mixer surfaces include the Fostex DFM dynamically automated module for its Foundation 2000, the MT8 for the Akai DR8, DR16 and DD1500, the ADX automated mixer for Doremi's Dawn II, a new hardware controller for the SADiE and Octavia systems, and the SCS-1000 controller for Sonic Solutions' Sonic System. In addition, manufacturers which include mixers as an integral part of their systems include DAR with SoundStation Gold; Studer Editech with Post:Trio; SSL with Scenaria; Korg with SoundLink; Orban with the DSE7000; and Fairlight with its new FAME. This system includes all the functions of the MFX3 along with a

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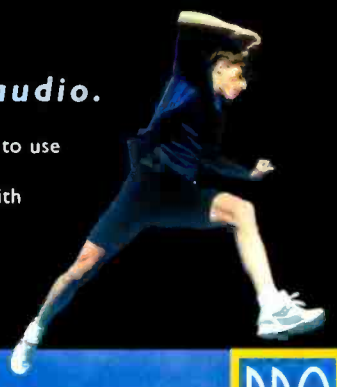

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moving-fader console with track-based dynamic automation of level, pan and aux send, and snapshot automation of EQ.

An increasingly popular alternative is to support control and automation via external MIDI mixers from companies such as JL Cooper, Penny & Giles and the new Audio Station from Audiomation. However, for those who prefer fully-featured consoles, one of the first manufacturers to success-fully launch such a console integrated with disk-based recording and editing was AMS Neve with the Logic series of digital consoles. This has been followed by SSL, whose DiskTrack supports up to 96 channels and is controlled by either the analogue SL9000j console or the digital Axiom console, with the optional APS audio-preparation system available for control of any 24 tracks for editing.

Many disk-based systems are available for cart replacement, live-assist and full automation, but there are very few specifically aimed at radio production. The Orban DSE7000 is one such system, and supports specifically developed factory preset DSP processes and effects. It now also supports file export to broadcast-delivery systems such as the Enco DAD486x and the Broadcast Electronics AudioVAULT, and can append the delivery system's database appropriately. The new Sonic Solutions SonicStudio OnAir is also designed for broadcast production applications and features scalable architecture and a range of options. Its networking capabilities include transfer at 4x faster than real time and the ability of up to 30 journalists or editors to edit on the same incoming feed while it is being recorded.

THE FILM INDUSTRY is another market which until recently has not been well served by disk-based systems. Of course, there are a few systems with features specifically aimed at film applications, such SA&V's SADiE (which has a special rush syncing feature), AMS Neve's Logic-AudioFile combination and SSL's OmniMix (both of which offer comprehensive surround-sound mixing), TimeLine's DAW-80 StudioFrame (which has special ADR features) and the Studer Editech Dyaxis II and Post:Trio systems (which will soon support subtitling and dubbing tools). But the main drawback of disk-based systems for film has been the cost of storage and the number of channels supported. However, with the cost of storage dropping all the time, the past year has seen the emergence of a new breed of low-cost digital-audio dubber. Such systems are aimed at replacing multitrack and mag machines for recording and playback, but have the advantage of using removable media for transfer to proprietary editing systems.

The TimeLine MMR-8 modular 8-track recorder for example, uses plug and play M-O or hard disk and supports sync to time code or biphase in forward or reverse, with jog-shuttle control and track slip. Fairlight's DaD dubber is designed as a playback-only device for material originally recorded using the MFX3. Available in 24-track modules and supporting real-time crossfades and EQ, up to 24 units can be controlled from one DaD control console. Akai's new DD8 modular 8-track should be ready by the end of the year and is designed as an M-O-based plug-and-play replacement for the Tascam DA-88. It can play in sync, forward or reverse, at any speed, has dedicated track slip and event-region nudge buttons and supports a range of sync and digital I-O options including an ADAT interface.

While the tapeless audio market for video and TV postproduction can now be said to be mature, manufacturers are facing new technological issues raised not so much by the first-time buyer as by existing customers, who are looking to integrate of multiple systems, reduce bottlenecks and improve efficiency in terms of material management. One way of speeding up the postproduction process is by using random-access video recorders, since they require no waiting time for rewinding. Among the proprietary solutions is SSL's VisionTrack, the new Doremi V1 which can be used by Dawn as well as any other 9-pin compatible system, Akai's DV1500, the

Orban's updated DSE 7000 with effects, was launched at the Las Vegas NAB show

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Digital Audio Labs V8 card

DAR VMR-1, the NLV option for the dsP Postation, and the Videomix option for the Dyaxis II and Post:Trio systems which displays the video track as an integral part of the EDL. In addition, an increasing number of systems are supporting control of third-party random-access video recorders such as the ASC VR and the FED VMOD-100. Examples include the new Windows version of Digigram's X-track (which can control any RS422-compatible digital disk recorder while displaying the video on the same monitor, with both audio and video being controlled using the same tools) and the Augan OMX series (which supports M-O-based audio as well as M-O-based VMOD-100 video).

One of the most basic needs in audio post is for direct transfer of sound effects prepared on a low-cost workstation to a higher-end post system, thus eliminating the need to tie-up costly equipment or rooms for what should essentially be an off-line task. Although using removable media solves this problem between compatible systems, what large facilities in particular are looking towards are solutions which eliminate the need for physical transfer. SSL addressed this need with its SoundNet network for ScreenSound, Scenaria and OmniMix systems. This uses a centralised structure, and allows quick project swapovers as well as access to centralised resources such as sound libraries and archiving devices. Sonic Solutions' MediaNet network supports simultaneous multi-user access to distributed storage, Avid Technology's Avid Mediashare network allows groups of users to share the same media, and DAR's systems also supports distributed networking whereby a user can edit material on their own machine live from another machine—although only two channels of playback can be guaranteed at a time. Nonetheless the company is working towards high-speed communication between large multimachine systems, with acquisition directly to, and live working directly from, disk irrespective of physical location.

The ideal would be a transparent transfer of material irrespective of the platform used, and while initiatives such as Open Media Framework Interchange (OMFI) are slowly being taken up by manufacturers, very few, if any, are using OMF as a native format. Companies such as DAR and AMS Neve have had success in reading Lightworks audio files directly but an increasing number of manufacturers is turning to file conversion software in order to import and export a range of different file formats—Spectral's systems for example, will do this over a network.

WITH STORAGE CAPACITIES ever-increasing and costs decreasing, the range of tapeless applications is bound to expand. Increased processing power will mean more real time functions, and the increased performance and availability of removable media will lead to more plug-and-play solutions. In addition, the convergence of technologies and applications will require even more integration of differing material types—audio with text for news, audio with picture for video and film, audio with text, graphics and video for multimedia and the Internet. All of this will lead to the inevitable —more collaboration, alliances and takeovers, and more compatibility as a result.

Digigram's PCXi9 card

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Future tense

The 'new age' of nonlinear technology is still denied by a handful of analogue die-hards. But their defence of yesterday's technology is a diversion from a model that offers to define the future writes **CHRIS EDWARDS**

Nobody is about to dispute the elegance of analogue circuitry or its performance. Nobody is going to insist that that the secrets of analogue recording media are still so obscure that digital technology is nothing but a blind alley and that the future is analogue. Yet there remains a hard core of analogue devotees who promote analogue over digital at every turn.

If we ease off a little and consider music's recent history, we can identify a model which may help us accommodate our move into digital technology. It's not so long ago that audio professionals openly derided the Musical Instrument Digital Interface, regarding it at best as a substandard medium for handling functions that were loosely analogous to those of professional musicians and pro-audio, and at worst as a travesty of all those skills they held dear.

Yet MIDI provided a generation of aspiring musicians and engineers with an insight into the power of nonlinear recording and editing that was unparalleled in pro-audio. While we were slowly coming to terms with the distinction between moving faders and Casio, MIDI musicians were learning the potential of nondestructive editing, edit decision lists, automated EQ and an alternative relationship between time and pitch.

CERTAINLY, the demands of MIDI-literate musicians have helped define the functionality of today's professional consoles and their automation systems, and many of the operational principles employed in digital-audio workstations are identical to those pioneered in early MIDI sequencing software. Certainly, it is inescapable that, given the right sort of software tools, hard-disk recording can be used to achieve results in a fraction of the time that it takes with analogue tape, especially when you combine it with the new generation of 'soft' mixing desks now appearing on the market.

One problem not directly encountered by MIDI, however, is that hard-disk recorders work on the basis of 'audio tracks' that is not fully supported by audio replay technology. The 'track' is a metaphor that pro-audio engineers and producers (and even record company A&R people booking studio time) are used to. It also helps make the task of using a nonlinear system much less daunting. Sadly, many hard-disk recorders cannot guarantee to replay all tracks at once. Generally, there is not a problem with a dedicated 8-track system but once this modest track limit is exceeded, at least with current hard-disk technology, you run the risk of encountering track 'drop outs'—typically this is the case if the machine cannot access a particular segment of audio in the available time because it is on the other side of the disk.

This is something that will be progressively eliminated as computer memory becomes cheaper—in effect, at this point nonlinear recorders will come to behave more like samplers and use a lot of caching to reduce the probability of experiencing an audio drop-out. At the same time, the track metaphor is probably also going to die out in this context because it does not reflect what the hard-disk recorder is able to do so much as reflecting our (in)ability to operate it. The hard-disk recorder is, even now, a bulk sampler and playback engine. As a result, over time, the sequencing software used to control the machine will make you think more in terms of sample polyphony and less in simultaneous tracks. When you get a drop-out on a hard-disk recorder today, you can think of it as the equivalent of MIDI note stealing.

ONCE WE ARE FREE of the dependency on track analogies, the 'soft' mixing desk, with its ability to direct one input a limitless number of ways, is going to prove extremely useful. With it you can feed any number of signal processes, give musicians any kind of monitor mix they want—from the mics on a particular type of amp and speaker to heavily treaded DI feeds—and still manage to record any number of takes ranging from straightforward repeated performances through a variety of DI boxes to arrays of mics in front of speakers. Certainly, there are more recording and mixing options just around the corner than there are in any real-world studio—and certainly enough to give the producer the flexibility he may crave.

But perhaps the most important observation to make about the rise of the workstation is that of relating its history to the future. If many of today's workstation pilots are drawn from yesterday's MIDI enthusiasts, then it follows that tomorrow's audio operators are going to demand the kind of user interface that are now being devised for video games, Net working and the emergent generation of interactive media. Forget the elitism of touch-screens for a moment, and consider the prospect of virtual reality mixing. Yes, it's as indefinable as it is unavailable but this will change. And those of us who derided MIDI in the 1980s may well be best placed to say 'I told you so' to the top-gun operators of today's state-of-the-art workstations when the crunch comes.

Forget the elitism of touch-screens for a moment and consider the prospect of virtual-reality mixing

The fact is that so much of tomorrow's day-to-day technology is already being defined by ideas too radical to be entertained by 'serious' manufacturers' R&D departments. Instead, it is being explored by the forerunners to William Gibson's cyberpunks. And why should it not be so—wasn't the music culture that imparted so much impetus (and cash) to advanced audio was borne of youth expression?

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BEN DUNCAN updates his 1990 survey of IC op-amps—the heart of most analogue signal chains—with new devices, ultra-high-resolution tests, and challenging conclusions

IC op-amp testing

SINCE IC OP-AMPS were last considered in these pages[1], there have been more new, low-cost, and highly specified op-amp models released than the entirety of what existed before. Fortunately for designer and reviewer alike, the majority of these are very high speed, wideband parts, principally for video, which don't display their benefits at audio frequencies, and at the generally low gains, below 20dB, required in most audio IC positions. At the same time, there has been a small but increasing stockpile of parts made expressly for audio. In this context, the biggest change has not been the so-called 'current feedback', but the complementary process, which has allowed IC designers to put decent pnp transistors in their chips. Listening today to mid-1970s recordings with some of the better modern op-amps reviewed here, the use of substandard ICs in 1970s recording consoles and tape machines is plainly audible. This has left the world with a legacy of bad sonics that may never be correctable.

Table 1 details the parts that have been chosen for primary examination. The majority have FET inputs, making them noisier than the classic NE5534, which would just make the VLN grade. A couple of AD types are principally designed for single-rail application, which is usually a major retrograde step for quality audio. A mic head-amp is one obvious exception. These types were tested in the same, dual-supply jig as all the other parts, proving that they are 'upwards compatible'. A few are not conventional op-amps. One employs current feedback and is an up-to-date, if otherwise random example, of many such parts principally made for wideband analogue signal processing. Other devices under test (DUTs) are higher level integrations, namely two balanced-line receivers (DTSEC), a transmitter, and a buffer (unity gain only), all having the 8-pin package in common.

PRIMARY TESTING was for linearity. With the modern parts tested here (the models marked >< are older types believed to be 'noncomplementary'), %THD would be well below 0.1% under all reasonable conditions. On this basis, the decision was taken to abandon the universal but potentially meaningless or highly misleading %THD testing, as a means of categorising sonic quality. Instead, high-resolution harmonic spectral testing was performed. This was pioneered by the author in 1993[2].

The test takes place with a low distortion 1kHz stimulus, at 1V rms (+2.2dBu). This is the lowest distortion test condition for the AP test set used. Sixteen samples are averaged, to cancel out true, random (stochastic) noise, and give a high (better than ±1dB or 12%) certainty to results that are as low as 1ppm. **Fig.1** shows the test setup, which is a

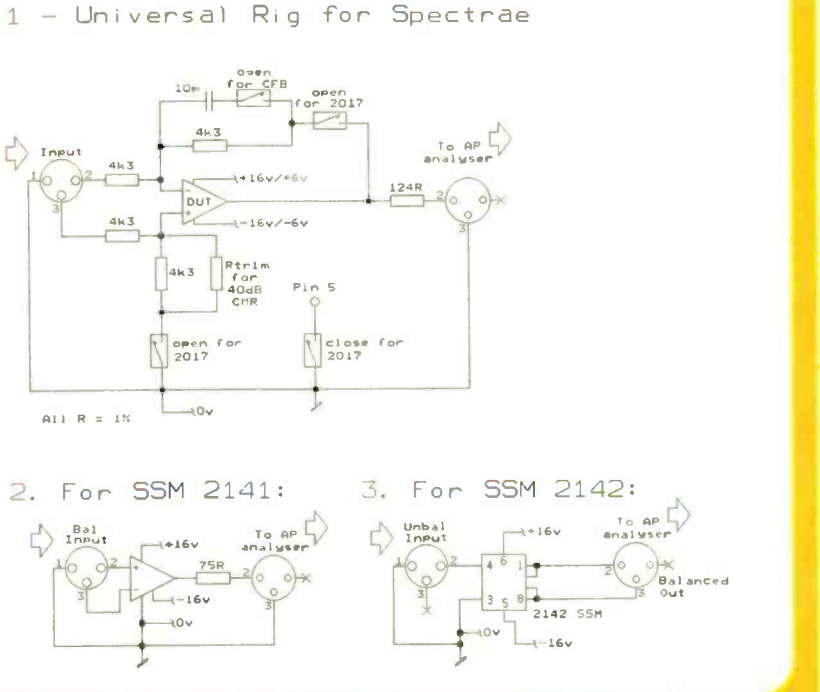

Fig.1: The test circuit for harmonic spectra. Most ICs operated were rated at or above ±18V and were tested with ±16V supplies. Those marked } [in Table 1 were limited to just ±6V, inadequate for most professional applications. The feedback network values mean that the real load on the DUT is just over 4kΩ, although the analyser load is 100k. In the analyser's 600Ω condition, the 124Ω output resistor helps to make the total load close to 600Ω. CMR was set at -40dB by a small but purposeful resistive imbalance, to deliver a small but well defined amount of common-mode voltage. For the two parts employing CFB, the HF comp cap is disconnected. The SSM 2017 true DTSEC can be plugged into the same bed by opening the feedback arm, and grounding pin 5, as shown. The BUFO-4 buffer has no -ve input. It and the 2142 balanced-line driver version were tested by being driven unbalanced.

TABLE 1

Part	Maker	No.	Type
AD 817	AD	S	VHS
AD 823	"	Dual	SSR
AD 847	"	S	
AD 8047	"	S	} [
BUF 04	"	S	Buffer, VLN, VHS
EL 2044	Elantec	S	VHS
EL 2244	"	Dual of 2044	"
EL 2166	"	S	CFB
HA2548	Harris	S	
HA5102	"	S	><, VLN
LM 833	"	D	><, VLN
LT 1360	LT	S	VHS
OP 178	AD	S	
OP 275	"	Dual	
OP 279	"	Dual	SSR } [
OP 604	Burr Brown	S	
OPA 2604	"	Dual of 604	
OPA 627	"	S	VLN
OPA 2132	"	Dual	
SSM 2017	AD	S	>< true DTSEC, CFB
SSM 2141	"	S	>< simple DTSEC
SSM 2142	"	S	>< balanced driver
TLE 2071	"	S	updates TL701
TLE 2141	Texas	S	
TLE 2142	"	Dual of 2141	

All ICs are UGS. CFB = 'Current Feedback'.
Cload = Auto Capacitative load compensation.
DTSEC = Diff-to-single-ended convertor.
S = Single. SSR = Single Supple Rail.
VLN = Very Low Noise ≤4nV√Hz.
VHS = Very High Slew limit, .100V/uS.
>< = older noncomplementary parts, not prior tested.
} [= ±6V max. Others all ±18V or greater. Makers' abbreviations:
AD = Analog Devices. LT = Linear Technology

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THE TINY CAN BE BIG ON THE EARS

WHAT CAN BE the significance of these figures? Knowledge of masking derived with sterile steady-state tones would suggest that differences in harmonic patterns with individual harmonics that are as small as -120dB (one ppm) are utterly insignificant. Nothing could be further from the truth. Differences in harmonics at the sub -100dB level are quite readily discerned by skilled listeners on ordinary but good recordings, in conditions of real use, for example mixing, balancing. But if the wrong thing is being measured, the results are bound to be oblique. Nowadays, with the very macro and micro-most parts of the cosmos neatly co-explainable with everyday reality by physicists with the Superstring theory, with its 13 dimensions of space, some of the stuff that people can hear that seems out of proportion may be legitimately explained by considering that electronic circuitry (unlike transducers) exhibits errors in higher dimensions that 3-dimensional tests sets are having a struggle to resolve. The late Richard Heyser anticipated this, and wrote some essays about it (thank you, Neil) and the late David Bohm's 'theory of everything'—implicate order, sister of the Superstring—explains neatly why it is possible for human senses to perceive' effects that are almost too slight to measure in the available dimensions of measurement. Particularly audio, since Bohm wrote, 'in listening to music, one is... directly perceiving an implicate order'. A light analogy of trying to measure a higher dimension when the measuring equipment is limited to a lower dimension, occurs with some aliens who are investigating the contents of houses in London, but cannot read. One alien has a weighing machine that will detect differences of 0.0000000001%. So they patiently weigh endless books (and *Studio Sounds*!) to try to learn about them, but find this usually gives a poor—if any—corroboration with the value within them, as expressed by the humans. But the alien has also noticed very precise weight measurements will sometimes give an almost linear measure of worth. This happens when the two books are in some way comparable—later and earlier editions. Those of us able to read know that later editions can be disproportionately improved by corrections and additions, having value in excess of the weight of ink they add, and the aliens might deduce this by noting an increase in weight of (say) 13 parts per billion.

The general significance of harmonics may now be briefly explained; see ref. 4 for a deeper treatment. The 2nd, 4th and 8th are innocuous in one sense, as they are 100% consonant. But their introduction (with random phase) nonetheless retains the capacity to changes the sound's timbre and pitch in ways that may be unpredicted, relative to behaviour at higher sound levels. The 3rd, 5th and 6th may be relatively innocuous in some combinations, but dissonant in others. The remaining harmonics (7th, 9th–15th) are almost always highly dissonant, even in tiny quantities—unless you are attuned to Japanese music. The capacity of harmonics to compound into a morass of intermodulation products, yet there cannot be much of this in circuits with %THD well below 0.01%, just as few people would be living off compounding if interest rates dropped below 0.01%. Yet at levels that may be taken to be less than tiny quantities (below -90dB), I have witnessed experiments in which solely the effects of sprays of harmonics can be perceived more as dulling, loss of detail and loss of air, rather than as dissonant in the usual sense of 'antimelodic' or 'gritty'.

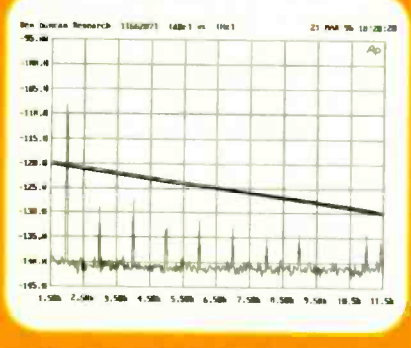

Fig.2: The TL 2071, update of the famous but comparatively crude TL071 demonstrates fine behaviour typical of the modern genre of op-amps built with complementary transistors. The sloping line is the demarcation below which the AP's own residue may interfere with the results, depending on relative phase. Here, even with a 600Ω load, the TL02071's second harmonic clearly dominates.

simple one op-amp balanced input stage, DTSEC or 'debalancer', with an 0dB in-out gain. Note the DUT experiences the higher, internal 'noise gain' of +6dB. This configuration—balanced in and 0dB through gain—was expressly chosen for best resolution, as the AP generator's output transformer is able to be used in balanced mode, for the lowest residual. The AP test set's own residue (APR) was logged before, during and after testing, and was at least 5dB below the -120dB demarcation, and generally 10dB–15dB lower with the higher harmonics.

The spectral tests were carried out with two nominal load conditions, 100kΩ and 600Ω. The latter 'low load' condition may not be met by many op-amps is practice but simulates the consequence of a higher gain setting, which would increase the residual baseline. Testing the 25 ICs together with APR checks produced 56 detailed graphs, which are being made available separately, to avoid overstaying their welcome in these pages (see references). **Fig.2** offers an example, while the behaviour of all the parts (which all had spectra below -100dB) is reported here in summary.

In each of the reports, the IC's name is first suffixed by '600' indicating the low-load condition, followed by 4k on the next line, indicating the approximate, effective load in the relatively unloaded condition –including the feedback resistor. Next, the harmonics are listed in size order, largest first. The following code is then used for brevity: 2nd, 3rd and so on are harmonics of the 1kHz tone. dom = dominant, that is >10dB larger than all other harmonics. Low = all (unlisted) harmonics are below 120dB (1ppm).

Spray = a prominent family of harmonics. A few parts, marked #, change dramatically from 'low' to a spray of harmonics when loaded with 600Ω. These types are evidently unsuited to high gain and-or heavily loaded conditions (line drivers, mic or mix amps).

On the basis that the cleanest sounding devices will have residue that is either 'all low' (') or else any harmonics above -120dB will be limited to the 2nd, the cleanest parts are: Category A, all harmonics below -120dB under both load conditions: AD 817, LM 833, OP176, OPA 627, SSM 2142, TLE 2142. Category B, only 2nd harmonic above -120dB under both load conditions: HA 2548, LT 1360, OP 275, OPA 604 & 2604, SSM 2141 & SSM 2017; TLE 2071 & 2141.

THE CROSSTALK of a variety of dual and quad op-amps–as opposed to the circuitry they are in–was tested by conventional means, as shown for the first time in **Fig.3**. The single IC test position

SPECTRAL REPORT

Note: -100dB = 0.001%
-120dB = 0.0001%

AD 817	600 & 4k All low.*
AD 823	600: Low 4k: 2nd @ -115dB
AD 847	600: 3rd & 2nd about -109dB 4k: 2nd & 3rd about -112dB
AD 8047	600: 2nd @ -110dB; 3rd @ -112dB 4k: 2nd @ -110dB; 3rd @ -109dB
BUF 04	600: 2nd @ -116dB 4k: 2nd @ -111dB
EL 2166	600: 2nd @ -114dB 4k: 2nd @ -97dB, 3rd -119dB
EL 2244	600: Dom 2nd @ 109dB 4k: Dom 2nd @ -110dB
EL 2440	600: Dom 2nd @ -110dB 4k: Dom 2nd @ -111dB
HA2548	600: Low 4k: 2nd @ -120dB
HA5102	600: Spray, odd, -101 to <-120dB. # 4k: Low
LM 833	600 & 4k: All low.
LT 1360	600 & 4k: Both 2nd about -116dB
MC 33079	600: 2nd @ -98dB, 3rd @ -111dB. #
OP 176	600 & 4k: All low. #
OP 275	600: 2nd @ -113dB 4k: Low.
OP 279	600: Spray, all -112dB to -121dB. # 4k: Low.
OPA 604	600: 2nd @ -117dB. 4k: All Low.
OPA 2604	600: 2nd @ -115dB 4k: All low.
OPA 627	600 & 4k: All low.*
OPA 2132	600: 2nd, 3rd @ -117dB. 4k: Low.
SSM 2017	600: Dom 2nd @ -110dB. 4k: 2nd @ -119dB.
SSM 2141	600: Dom 2nd -107dB. 4k: Low.
SSM 2142	600 & 4k: All low.*
TLO 2071	600: Dom 2nd @ -108dB. 4k: Low.
TLE 2141	600: Dom 2nd @ -107dB 4k: Low.
TLE 2142	600 & 4k: All low. *

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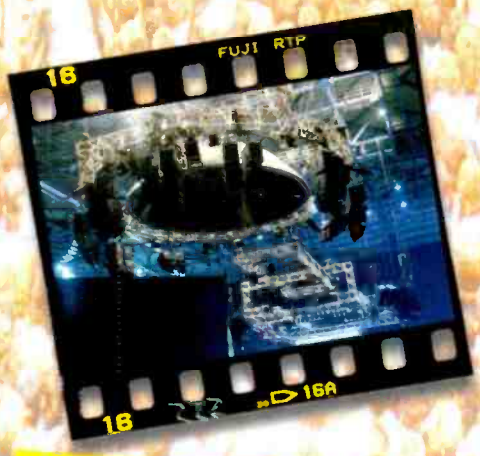

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was converted into a dual or quad socket on 1-inch vertical extender leads. Looking at **Fig.4**, Channel 1 was driven with the **Fig.1** test bed circuit, into the intrinsic 4k1 load, switchable to 600Ω. Channel 2 was strapped to itself for unity gain, with its input grounded cleanly. The AP analyser was then connected to Channel 2 output, with wiring heading diametrically away from Channel 1, and set to plot third-octave noise spectra. This showed that the TL0 72 & 052 had a capacitative leakage problem, with interchannel isolation degrading to as little -96dB at 20kHz. The significance of this is greatest in equipment with large numbers of dual op-amps with otherwise good interstage or interchannel isolation, or else where one channel of the two is (or may be) handling signals at a much higher or lower level than its twin. The other ICs had considerably smaller degrees of leakage. Harris's HA5222 had the lowest leakage of the group, but the ranking of those at the lower levels had as much to do with having low noise as with real crosstalk.

Harmonic spectra were then looked for, this time with a 50Hz tone, so the second harmonic is at 100Hz, 3rd at 150Hz and so on. The test setup is identical, but to help see what is really going on, the DSP averaging lowers the noise floor. Surprisingly (or not) the harmonics had no relation to either those at Channel 1 output, or the AP's generator residue. In this configuration, it permits resolution of harmonics down to -150dB, or one part per 30th of a millionth. Allowing a 5dB minimum margin above the AP residue, figures above -145dB are cited.

With the quad ICs, Channel 3 was sensed—which is the one diametrically opposed to Channel 1. This delivered one surprise: the continuing occurrence of a strong second harmonic, and another surprise: In the aging TL074, while noise is high, there are no discernible spectra, leading to the conclusion that there are (at least) two separate chips inside. This evidently removes the X-contamination between the 'upper' and 'lower' halves, but as a quad IC with quad dice costs less to produce, even modern-day TL074s probably aren't made like that any longer.

The IC manufacturers have not been able to immediately answer the questions that these graphs pose. Other than thermal modulation, causes include leakage through shared bias circuitry. The effect of the spectral breakthrough becomes more significant than simple noise breakthrough when the channel being contaminated is passing a signal that is the same signal later or earlier in the process. It may also be taken as

AD 823	600: 2nd @ -134dB 4k: All low.
EL 2244	600: 2nd @ 109dB 4k: Dom 2nd @ -110dB
HA5102	600: 2nd @ -126dB. @ 4k: 2nd @ -145dB.
HA5104	600: 2nd @ -135dB 4k: low.
HA5222	600 & 4k: Low.
LM 833	600: 2nd @ -124dB, 4th @ -143dB. 4k: All low.
LM 837	600: 2nd @ -108, 3rd to 11th spray, -114dB to -143dB. 4k: 2nd @ -128dB
MC 33079	600: 2nd @ -117dB, 3rd @ -133dB. 4k: Low.
NE 5532	600: 2nd @ -134dB; 5th @ -145dB. 4k: 5th @ -145dB
OP 275	600: Dom 2nd, low. 4k: Low.
OP 279	600: Spray, -112dB to -120dB. 4k: 2nd.
OPA 2604	600: 2nd @ -115dB 4k: All low.
OPA 2132	600: 2nd @ -142dB. 4k: Low.
TLE 2142	600: 2nd @ -115dB, 3rd @ -130dB. 4k: Low.
TL 072	600: 2nd @ -111dB, 3rd @ -140dB, 6th @ 143dB 4k: Low.
TL 074	600& 4k: All,noise @ -130dB to -135dB. 2nd @ about -132dB.

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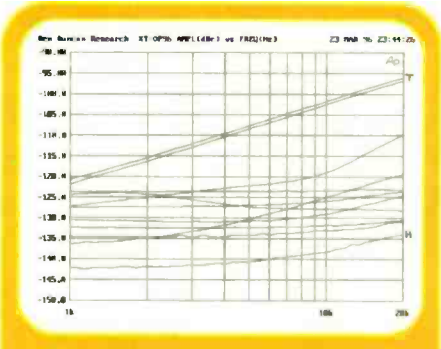

Fig.3: The crosstalk of ten of the dual ICs. If the residue is assumed to be purely random noise below -120dB (at 1kHz; and correspondingly below 107dB by 20kHz) in this 3rd octave analysis, then only the top two parts' behaviour (marked T) is of much concern. These are TL072 and 052.

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SONIC IMPROVEMENT IN THE PAST DECADE

I HAVE ASSISTED a number of audio professionals in upgrading the ICs in their equipment. In 1993, I upgraded the main recording mixer belonging to Underworld. The industry standard, yet primitive NE5534, 5532 and TL072 op-amps in two input channels, two subgroups, and the stereo masters, were changed for enhanced singles and duals made by Harris Semiconductor. Underworld's Rick Hyde reports, 'Since the chip changes, the DAT's recording quality has gained in resolution. You can hear much more. There is far more air and space, and you can hear reverb tails go right down'. Their FOH DJ mixer for live work has since been upgraded with OP275, and SSM 2017 and 2142.

Experimental Soundfield evaluated a lot of ICs before 're-chipping' their FOH console to create what is described in Brixton, London as 'the best dance sound system in the world'. Their experience is a warning that not all dimensions are being covered by any set of measurements. Specifically, one model which measures well (at 1kHz, as here) turns out to sound strangely wooden in the bass, and its otherwise fine sound hardened when driven hard. They liked the OP275, yet chose a model from Harris that measures less well. The interaction of op-amp sonics with the ancillary parts may explain some of the irregularities.

significant that the author and other audio designers have not employed dual op-amps in their best-sounding designs.

THIS GENERATION of ICs are, for the most part, reasonably priced. In real terms, their prices, typically between £1 and £2 (UK) in manufacturing quantities, will be deemed too expensive by purely profit-line-driven manufacturing, even though in real terms, the price-performance ratio is extra-ordinarily good. Today, the amounts have almost flipped. The variety of op-amps is a healthy sign, but how exactly they can improve or change the sonic quality of a given unit or system is something that even the sophisticated measurements here cannot yet do more than hint at. As Germans say when gazing at an array of rye breads, 'Probieren...' or 'It is better to try it, than study it!'

References and Further Reading

1. B.Duncan, 'Evaluating audio op-amps', part 3, *Studio Sound*, September 1990.
2. B.Duncan, 'How Clean is Your Audio Op-amp?', *Electronics World*, January 1993. Reprinted in *The Audio Amateur* (US), 1995.
3. D.Bohm, *Wholeness and the Implicate Order*, Ark, 1995. ISBN 0-415-11966-9.
4. B.Duncan, *High Performance Audio Power Amplifiers*, chapter 7, Butterworth-Heinemann, 1996. (forthcoming publication)

A bound copy of all the measurements can be purchased from the author.

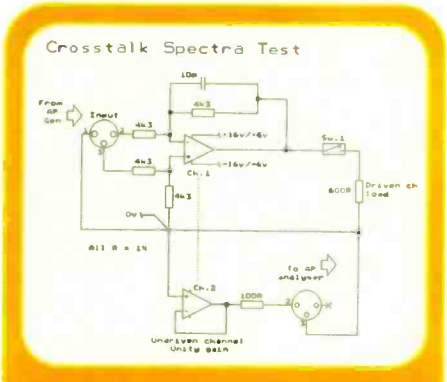

Fig.4: The test setup, as modified to test crosstalk in duals and quads. The tested ICs were mounted in a flying header with ch.2 cabling taken directly off the IC pinouts.

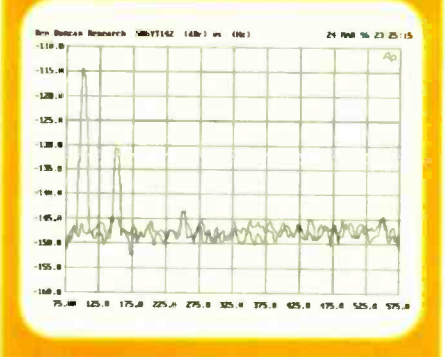

Fig.5: X-talk harmonic spectra of the Texas TLE 2142 differs from most in having a large 3rd alongside the 2nd harmonic, under the 600Ω condition. The test frequency is 50Hz, so the 2nd harmonic is the first and largest spike at 100Hz. Note also the distinct 5th, even in the lightly loaded condition.

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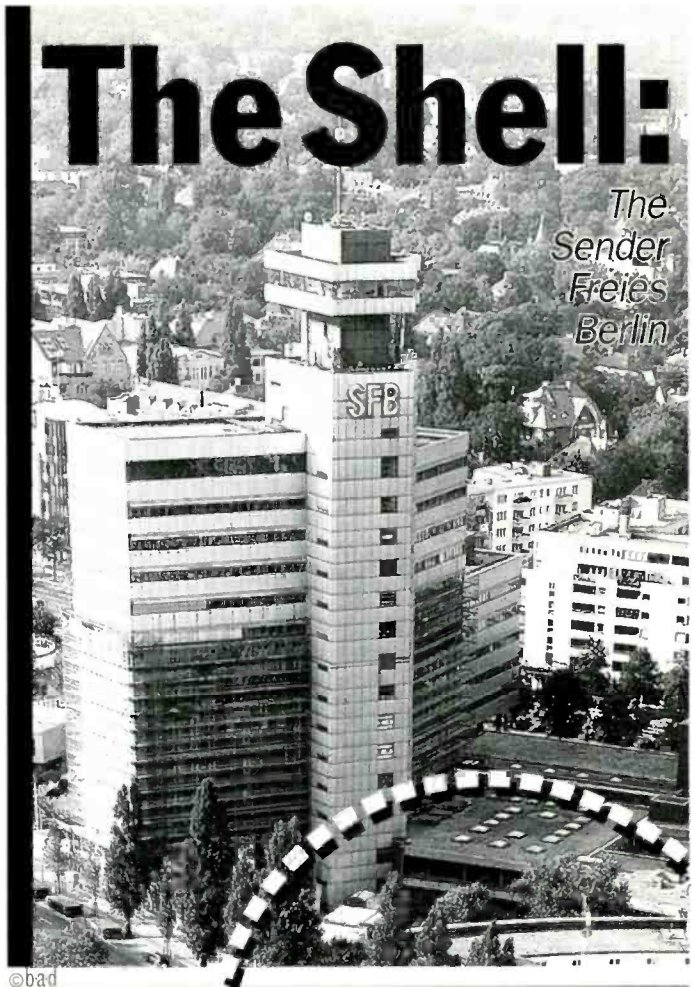

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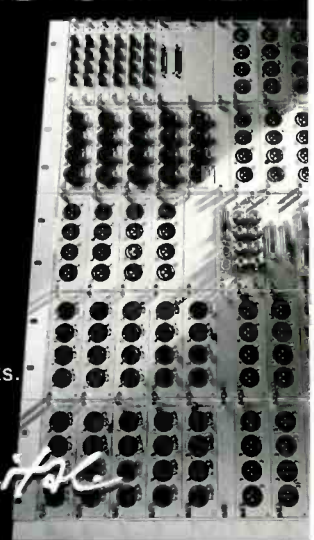

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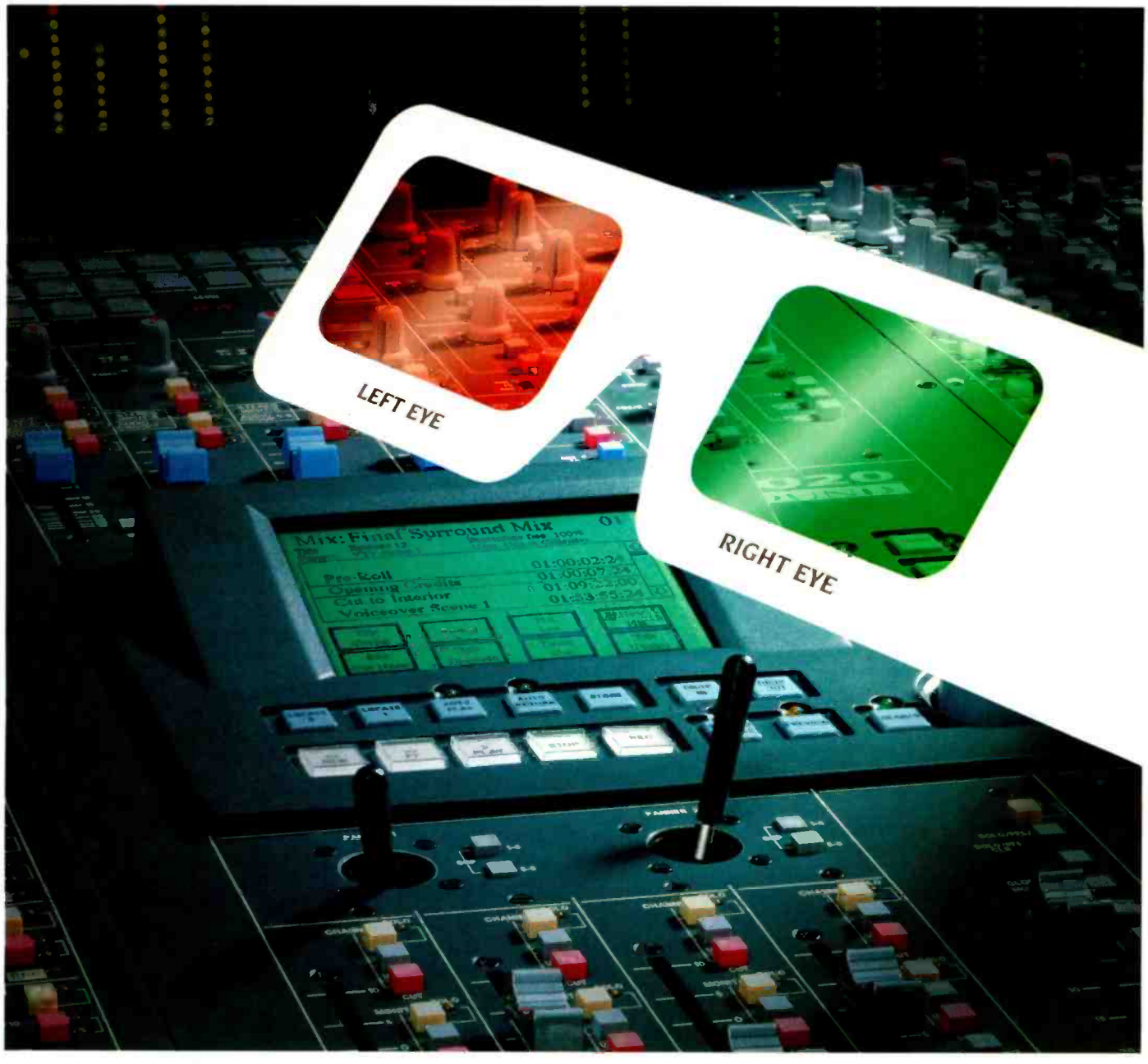

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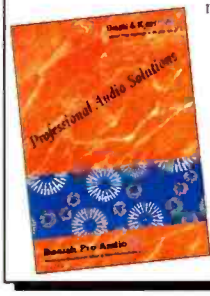

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Down, down...

Many producers are becoming concerned about frequencies that escape their monitoring systems. **BEN DUNCAN** argues the case for checking the subsonic content in audio recordings

SOMEWHERE, at the top and bottom of the frequency domain, useful audio ends. That's the easy bit, because beyond this simple observation, we can be sure that there will never be complete agreement on where these ends occur. Realistically, the definitions have to remain adaptive for a variety of reasons.

Firstly, humans differ physiologically. Straightforward subsonic sound below the usual threshold would seem—like ultrasonic sound once did, before EEG traces proved otherwise—to be, at best, only subliminally audible. Yet people can 'hear' below 20Hz, where the 'average' person's perception is bodily. The sleep-deprived sufferings of a Yugoslav woman who could hear down to 4Hz was reported recently by a respected audio engineer; elsewhere, a water pump was found to be preventing people from sleeping, even though they were some miles away and were not conscious of its sound or any vibration.

Secondly, humans have an immense adaptive range. Once you learn the knack of being receptive to 'subsonic' sound, the threshold of perception may be extended. In analogue electronics, of course, there are no clear limits to the audio spectrum because there are no brick wall high-pass filters in analogue electronics. There is even an argument that any high-pass filtering is unnatural, unlike its opposite number. There is general consensus that a gentle (or at least gently accelerating) low-end roll off is better than going low, then having to slope off abruptly at a high rate. But beyond this, best damping or settling, and the least frequency-dependent delay may have conflicting requirements.

It is useful to be receptive to, and have tools to resolve, subsonic sound when recording, since a great deal of it is either nonmusical or troublesome. And you cannot predict what reproduction equipment is being used by the keener domestic listener, let alone what will become available in the future. Occasionally, almost random, large cone movements that persist for fractions of a second or more, before they abruptly disappear have been noticed in recordings being played back on high-end domestic, transmission line speakers.

In theory, all good cutting and mastering rooms should be watching a spectrum analyser like a hawk, to monitor for activity below 40Hz, and will excise any excess levels. In practice, it doesn't always happen. Subsonic sound in final mixes should be monitored before it reaches the cutting or mastering stage. LF EQ'ing may have brought up subsonics that were well below audibility at an earlier stage. Then surprisingly small increases in their level are needed to noticeably increase the intensity.

1977: The aftermath of a rogue white-label pressing demonstrates the undesirability of excess low frequencies in a mix

MY SUGGESTION requires a suitable, no-hassle switching or quick patching arrangement that moves the connections of a given pitch-shifting gizmo from where it usually is, to be on the output of any channel insert, directly after every mic amp, and thus before any steep high-pass filtering; and likewise on the output of any keyboards, samplers and 'down to 0Hz' digital sources. A scanner switch would allow periodic checking to sweep automatically through the sources. Set the gizmo to a high or maximum pitch multiplication. With sub-20Hz frequencies shifted up to the low midrange (say) they will be much more audible, while most of the audio will be taken off into supersonic realms, where is should be brick-wall filtered out of existence. Else some after-EQ may still be needed in the hf and high mid, so just sub-20Hz stuff is able to be listened to in isolation.

The subsonic realms may be badly polluted—but not all environmental noise is antimusical or inapposite. Not by any means. Subsonics is ambience. The throb of a stage being rocked over would seem anathema, like miking up the side walls of a bad speaker cabinet, yet with a decent sound system, some subsonic 'rubbish' adds to or even makes, the sheer palpability of the replay. But as mentioned, too much reality may prove troublesome. Quite high SPLs are needed to make any subsonic sound explicitly audible to a crowd. In a competitively tendered PA system, or any system when being driven hard, opening out the response to subsonics so it can be felt 'above the crowd' would eat up valuable headroom, or else require a much more powerful system. Fortunately, live subsonics are not in need of much (if any) amplification. But if omitted from recording by excess enthusiasm for upfront 'cleanliness', something palpable has been lost for ever. The 120pm buzz from a dance floor is a 2Hz beat. More than a few speaker systems can give a sense of this, given swing and headroom enough. To capture the irrecoverable one could have a dedicated a separate subsonic channel, with an old D12 buried in the dusty lumber pile under the average stage; or dug into the soil at a festival. Such a sub-sonic track could be added to audiophile release mixes, but omitted from versions seeking radio play. There could even be a subsonic track activating digital code included on future digital media...

The message is to listen to the baby and the bathwater before you throw them both out. Careful with that 50Hz HPF switch, Eugene...

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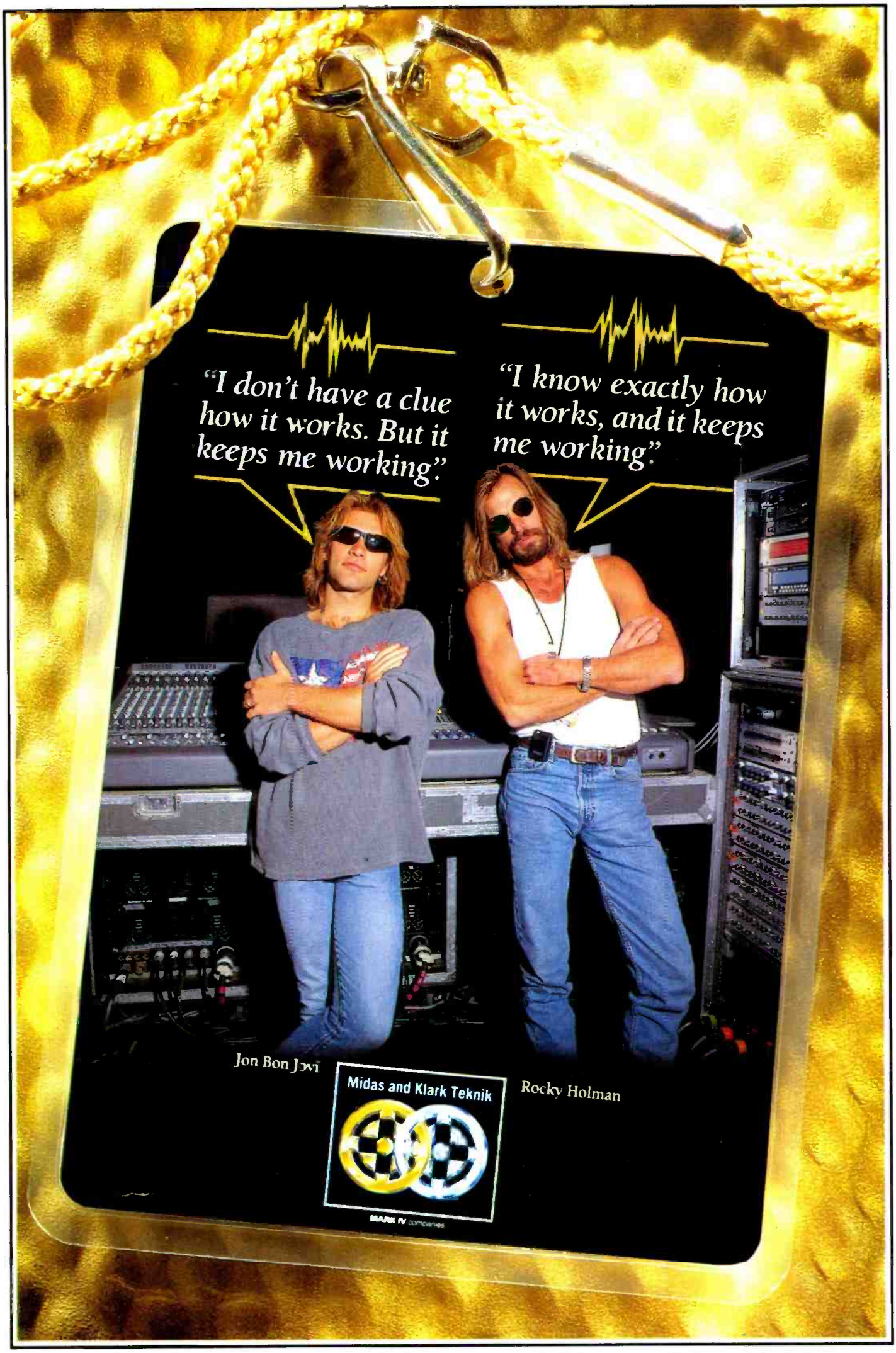

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