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Broadcast & Post Production

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Sometimes the word 'producer' just doesn't describe what you do: Steve Albini gives an exclusive interview to **Studio Sound**

COMMENT

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THIS EDITION'S CONTRIBUTORS

BILL FOSTER co-founded Tape One Studios, one of the pioneers in the field of CD pre-mastering. He now specialises in digital audio for new CD media and telecomms applications. As a journalist Bill is also a long-standing regular contributor to **Studio Sound** and its sister titles.

LEO FINLAY is an acclaimed music journalist regularly pitching in his august Irish wisdom to such mighty organs as *Music Week*, *Vox* and *New Musical Express*. Often described as the Brendan Behan of pro-audio, Leo's least offensive habits include cadging a minimum of two drinks at a time.

MARTIN POLON has been writing of the ups and downs of studio and audio for 'many years'. He also observes the electronic entertainment, information and education industries, while at the same time believing the Boston Red Sox will win the World Series by the coming of the Millennium.

The truth drug habit

The truth, like any other 'standard', defies the quintessential quality which defines it. Seduced for years by its academic elegance, I sought the truth of words, of documents, of events, of philosophies, of characters... But slowly, and painfully, the paradoxical nature of truth dawned, and I was forced to accept the reality of 'multiple truths'.

After all, I reasoned, the science that once promised to make every aspect of our physical universe quantifiable is now using terms like uncertainty and duality, and and discussing parallel universes and nonlinear timescales. And given the Schrödinger's cat scenario (the oft quoted Uncertainty Principle parable), what the hell can you assume when an engineer talks about a 'truthful' microphone, monitor or mix?

Yet some form of 'truth' is essential if we hope to produce music with any kind of consistency–in tuning, in sound balance, in instrumentation, in saleability... It is a truism that truths–in recording as well as any other aspect of human activity–remain essential.

With such a rich palette of truths at our disposal, we can account for almost anything in any way we choose. We can defend everything from the reverb treatments on our last mix to our decision to endorse a piece of equipment in terms of truths that defy almost any argument.

Let's start again: leaving uncompromised truths in the realms of mathematics, the real world requires us to apply various truths to different situations. Scientific truth differs from artistic truth in as many ways as there are artists and observers. The essence of scientific truth is in consensus and repeatability; the essence of artistic truth lies in interpretation. What is common to both is not the nature of truth, but the existence of any kind of truth.

PERHAPS THE MOST SIGNIFICANT property of truth, however, is that is gives us non-truths. How, without truth, could the concepts of misinformation and disinformation arise? Without an agreed truth of action, how can a politician determine it damaging and conceal it? Without an agreed truth of intent, how can a military tactician misdirect his opponent? Without an agreed truth of sound and music, how can an engineer balance a set of samples to sound like a drum kit or spin in a chorus?

In the light of this argument, it is readily apparent that the pursuit of truthful (or accurate) sound recording and reproduction is only half of the story. Reference to real-world sound sources is an obvious and essential starting point for recordists and should remain at the top of the agenda for a variety of reasons–not least of which is the 'truth index' it can be used to provide. How else do you gauge the sound of a recorded voice, piano or sax?

It is equally apparent, however, that many of the 'tricks' employed in managing a recording rely on the listeners' relationship with real-world sounds and the resultant assumptions we can rely on their ears to make. A relatively poor synthesised violin can be made to sound more realistic by articulating it in a way appropriate to the 'real' instrument; the sample assuming its credibility through the listener's belief in a number of real-world truths–that the violin is a musical instrument; that it has a place in our piece of music; and that it can be made to sound similar to our recording. Similarly, real 'sounds' can be made to serve unfamiliar purposes by robbing them of their 'truth'.

Such is the audio engineer's power of disinformation–and the listeners' susceptibility to misinformation. And they are both founded in truth.

Arguably, the poet Keats came up with the most emotionally valid definition of the essence of truth; he believed that truth is beauty and that beauty is truth. And that is all we need to know.

editor

The OXF-R3 Digital Mixing Console.

The design is only the design.
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Sony Broadcast & Professional Europe, Jays Close, Viables, Basingstoke, Hampshire, RG22 4SB, United Kingdom. Sony is a registered trademark of the Sony Corporation, Japan.

SONY

soundin

PRO-BEL has launched its own World Wide Web site containing more than 100 pages of product and company information, as well as accommodating guest pages for the International Association of Broadcasting Manufacturers (IABM) and *Studio Sound* columnist John Watkinson. Other facilities include the company's illustrated short-form catalogue, news and a worldwide directory of agents that can be located using an area search facility.

Meanwhile, John Watkinson has announced the formation of a partnership with Richard Salter, creating one of the most powerful independent technical consultancies in the merging world of audio, television and information technology.

Explaining the move, Watkinson said: 'Quite by chance, Richard and I have a highly complementary set of skills which combine to put us in a position to handle virtually any technical problem in these fields.' Areas of consultancy include: acoustics, loudspeaker and listening room design, analogue and digital audio and video, optical and magnetic disc drives, tape transports, coding, error correction and encryption, compression and industrial design. **NICK SMITH**

Pro-Bel on the web:
http://www.pro-bel.com/
John Watkinson.
Tel: +44 1734 834285.

DANISH PRO AUDIO has given an unusual wedding present to the recently spliced Danish Royal couple, Prince Joachim and Alexandra Manley. The happy couple was seen live on TV saying 'I do' into a brace of Brüel & Kjaer mics specially made for the occasion by Hans Jorgensen of Danish Pro Audio, using 4011 equivalent capsules.

The gift helped to smoothly pave the way for simultaneous transmission of their nuptials into seven territories. And to make sure that the mics were as inobtrusive as possible the mic bodies were cunningly colour co-ordinated: white for the bride and black for the groom. Danish Broadcast, which commissioned and subsidised the development, employed one of their top sound engineers, Lars Palsig, for the occasion. Morten Stove of Danish Pro Audio was also on hand with a can of black spray paint in case the white microphone proved too much for the TV broadcast. The choir and other instruments in the church were also equipped with B&K's 4006s and 4021s. **NICK SMITH**

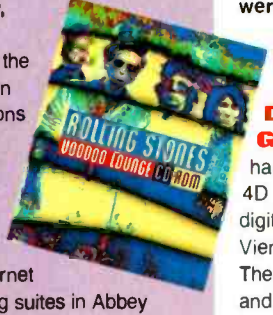
JBL star at the MTV Music Awards party

ABBEY ROAD GOES INTERACTIVE

As a result of a strategic alliance between EMI and Apple Computers, landmark studio Abbey Road has announced a major new addition to its North London complex. Abbey Road Interactive is claimed to be the world's first dedicated multimedia facility to be physically linked to a major recording studio and houses a Mac-based multimedia development studio designed to produce the multimedia-enhanced music CDs which are destined to give an extra dimension to the CD format.

Given that the multimedia market is set to grow by 1000% before the end of the century the move positions Abbey Road perfectly to take advantage of what Apple sees as 'new market opportunities created by interactive music.'

By integrating CD-quality music with video, graphics, animation, text and speech, enhanced CDs will allow recording artists to share information and creative vision with their fan-base in previously unexploited formats. CD-ROM and enhanced CD formats have already attracted the interest of many recording artists including Peter Gabriel, Bob Dylan, Prince and the Rolling Stones, who released their latest album—*Stripped*—on enhanced CD, following the success of their *Voodoo Lounge* CD-ROM.



The facility itself houses two media integration stations for the final assembly and programming of projects: a graphics station for producing and editing computer graphics images, animations and virtual reality scenes; a video station for digitalising and editing video footage and special effects; an audio station, for bringing audio material into computer formats; a server station to provide file sharing for all the other stations, and testing stations to enable testing of developing projects.

In addition, all of the computers are connected via an Ethernet network, and the studio itself is connected to the music editing suites in Abbey Road through a fibre-optic link. **NICK SMITH**

For a full report on Abbey Road Interactive see next month's *Studio Sound*

DEUTSCHE GRAMMOPHON has installed a permanent 4D audio recording digital network in Vienna's Musikverein. The digital transmission and communication network interfaces and synchronises the various elements of the 4D audio-recording system, including: stage boxes, incorporating the proprietary RC8MH remote control mic amps , DGAD III A–D convertors and authentic clock recovery circuit; customised Yamaha DMC1000 digital consoles, and 24-bit digital multitrack or stereo recorders.

Installed by DGG recording centre engineers, the network will provide locations for the connection of up to eight stage boxes—six on the main stage and two on the organ balcony—tie-lined to the green room location and a separate machine room.

The installation supports 4D audio recording systems of up to 32-track, 24-bit capability, providing the capacity to operate a full back up when operating with 16-track recording.

The hand-built, galvanically separated, digital communication system is manufactured by Deutsche Grammophon's audio engineering department and carries all the protocols standard to the 4D audio recording system.

THE MTV EUROPE Music Awards, held recently in Paris, proved not only to be a showcase for the cream of Europe's music industry, but also for US audio manufacturer JBL, who provided the sound systems for a glittering after-show party for over 6,000 VIPs and guests.

JBL's involvement with the party event was part of a major

gs News in brief

marketing coup designed to increase JBL brand awareness across Europe, joining, for this event, co-sponsors Burger King, Lee Jeans, Apple Macintosh and Jose Cuervo. The deal was put together by JBL staff in the US and Europe, and co-ordinated by English-based marketing consultants Mojo Working.

The event culminated with JBL unveiling a massive Sound Power Touring T-series sound system at the party, which was held in a specially built marquee across from Paris's Zenith, the home to the awards ceremony.

One of the JBL largest Sound Power T systems ever seen in Europe, over 60 boxes were placed in eight stacks around the room, with one stack in each corner and a further four arrayed around the central dance floor. Supplied by Copenhagen-based DPA Sound Co, the rig was designed specifically for high-quality reproduction of the techno dance music as supplied by the DJ's, and to ensure that the trademark JBL 'killer' bass was omnipresent, DPA's Michael Meisner and JBL Pro Europe's Guy Hawley designed a system which incorporated T Series T749 twin 18-inch subs in the central arrays with larger P798 Triple Chamber Bypass (TCB) sub boxes at the ends of the room. Amcron and JBL amp driven, the system was capable therefore of producing up to 110dB SPLs to give the quality 'club' sound as specified by MTV for the party.

JBL's latest EON systems were also present, with eight, powered, full-range systems relaying the main room programme to the VIP lounge and a further EON system at JBL's guest area behind the DJ riser, again being fed by a main mix feed.

Viewed as a resounding success from both a marketing and technological angle, Mark Spector JBL's Director of Marketing Worldwide commented: 'We're proud to continue our association with MTV Europe and view it as a leading-edge vehicle for the branding of our professional audio products to Europe's huge musician market. We hope to increasingly develop our market awareness using this type of high-profile promotion and will continue to do so on a global basis.' ANDY WOOD

Seated at the new Solid State Logic SL 9080j console at Record One in Sherman Oaks California, are Allen Sides, Engineer and owner of Ocean Way and Record One, Producer Phil Ramone and artist Brian Setzer. Setzer and Ramone were recently in session at Record One mixing tracks for Setzer's forthcoming release, *The Brian Setzer Orchestra* CD.

Anvil Engineer Ian Tapp with customised StudioFrame DAW

◆ London post facility, Anvil, has installed its fifth StudioFrame. Recent projects undertaken at Anvil include the remarkable film *Babe —The Gallant Pig.*
TimeLine Vista, US.
Tel: +1 619 727 3300.

◆ America's Stonecreek recording studios has recently installed Quested monitoring systems in its Studios A and B. An active HQ-410 system now graces the Philadelphian facility's' Studio A while a passive HQ-210 system lives in Studio B.
Stonecreek Studios, US.
Tel: +1 610 645 9626.
Quested Monitoring Systems, UK.
Tel: +44 181 566 8136.

◆ British studio complex, the Strongroom, has re-equipped its Studio Two with a Euphonix CS2000. The new 96-input console replaces an SSL G+ console.
Strongroom, UK.
Tel: +44 171 729 6165.
Euphonix, UK
Tel: +44 171 602 4575.

◆ London's Decca Recording Centre has purchased an AMS Neve Logic 2 console for use in Mixing Room One. Renowned for producing custom equipment, the Centre intends to use the Logic 2 and the Encore automation system on operatic, classical and sound-for-picture work to a custom, 24-bit, M-O recorder. Two Logic 2s with 24-output AudioFile Spectras have also been supplied to a new London Soho postpro facility being opened by ex-Magmasters and ex-Air engineers Bill Gaudier and Cliff Jones.
AMS Neve, UK.
Tel: +44 1282 457011.

◆ Future Disc Systems, the American mastering house, has recently come on-line with a 20-bit/24-bit facility claiming a control room 'flat to 20Hz'. The Hollywood outfit has also installed a Weiss console, Sonic Solutions system, and processing equipment which includes tc electronic's M5000, Manley and DB Technologies' convertors and Sontec equalisers.
Future Disc Systems, US.
Tel: +1 213 876 8733.

◆ Geiseng-Team, the German postpro facility, has purchased a further two Fairlight MFX3 audio mainframes. The recently expanded 5-studio facility now operates four MFX3 systems and specialises in advertising spots, and music for TV and radio. Further MFX3 placements include NTV Berlin and Filmixaarna in Stockholm.
Fairlight, Australia.
Tel: +61 2 575 1230.
Fairlight, UK. Tel: +44 171 267 3323.
Fairlight, US. Tel: +1 213 460 4884.

◆ Malaysian telecommunications supplier Pernec has opted to carry RE UK codecs to the Malaysian TV network. The move follows consistent sales of RE 660 and 661 Layer II codecs into Radio TV Malaysia.
RE UK, UK. Tel: +44 1734 731119.

◆ The Sahara India TV Network has installed an SSL 4048 G+ console in its Pyrla-Consultants-designed Studio B. SSL claim a move towards its consoles as a standard by the worlds largest film industry. Hollywood's Royaltone Studios has purchased an SL 4064 G+ console. Opened in July 1995, Royaltone's clients include Melissa and Don Henley.
Recent Omnimix installations include Milan's Mixal postpro operation Paris' Telfrance TV drama studio, Munich's Instant Records postpro and Dusseldorf's Voss TV postpro facilities.
Sahara India, Bombay.
Tel: -22 873 8825.
Royaltone Studios, US.
Tel: -1 818 769 2596.
SSL, UK. Tel: +441865 842300.

◆ Stockholm's TV4 has bought a pair of NVision NV 3512 AES-EBU Synchronous, Digital Audio, Routeing Systems for its new Master Control setup. The Swedish commercial television broadcaster claims to be the first such operation to implement a comprehensive disk-based video server which is based on the Tektronix Profile system.
NVision, US. Tel: +1 916 265 1000.
Tektronix, US. Tel: +1 503 627 3124.

◆ SZM, the German broadcasting operation, has ordered 12 Sony C-800G valve microphones, bringing its total to 16.
Sony, Europe.
Tel: +44 1256 55011.
Sony, America.
Tel: +1 201 930 1000.

◆ Venice, California, saw a Penny & Giles MM16 MIDI Management System installed in its Serafine Sound postpro studio. The MM16 has gone into the dubbing room where it controls 32 channels of MegaMix D–A convertors in concert with the facility's Otari 54P console, 24-channel digital multitrack/ 96-channel Tascam DA-88 recorders.
Serafine Sound, US.
Tel: +1 310 399 9279.
P&G, UK. Tel: +44 1495 228000.

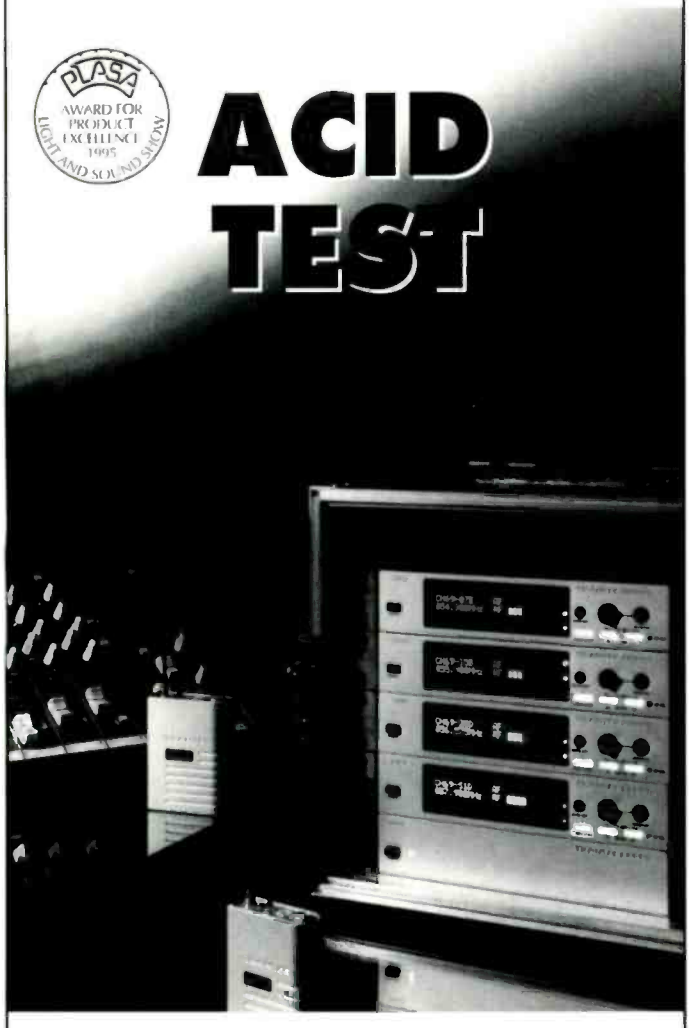
◆ A European-based compact, mobile recording system has been assembled by Sensible music around Alesis ADAT machines. The system is available for hire with live music, theatre and television performances in its sights. Further news from Alesis sees Phil Moon joining the company as Vice-President of Sales and Marketing in America.
Sensible Music, UK.
Tel: +44 171 700 6655.
Alesis, US. Tel: +1 310 841 2272.

The new S5000 UHF system from Trantec looks good and costs a good deal less than most of it's competitors too, but when it comes to the acid test, just *how good* is it?

The S5000 has also made a name for itself with a number of broadcast and professional theatre companies and has even made its West End début in the Fats Waller musical *Ain't Misbehavin'*. (A big thanks to Orbital)

PLASA AWARD FOR PRODUCT EXCELLENCE 1995 LIGHT AND SOUND SHOW

ACID TEST



If tests are anything to go by, the S5000 is right up there with the best (and in some cases quite a bit better)

In fact, it's so good that two of the UK's leading AV/Conference rental companies recently switched to the S5000 (Hello Delta, Hello Dimension)

In short, the S5000 out-looks, out-prices and most importantly, out-performs almost every UHF receiver around - and there are tests to prove it.

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Subjectivity or objectivity

The long-standing conflict between subjectivists and objectivists wages on with little prospect of reconciliation. Should there be a victor?

Without listeners, there would be no audio industry. It follows that human hearing has to be the final arbiter of sound quality at the end of the audio chain. It also follows that some form of subjective testing must be required in all real audio systems. However, it does not follow that there is no place for objective testing.

In fact, an intelligent combination of the two is used to develop most successful audio equipment. Subjective and objective testing are complementary and to ask which is better is to ask the wrong question. It is a matter of great regret that many who should know better have backed themselves into various corners by claiming that one or other of these approaches is wrong and the other is right. The observations of such dogmatists have to be treated as a source of entertainment rather than information.

Both types of testing have strengths and weaknesses. The strength of subjective testing is that it tests for all kinds of imperfections at once as the listener will be perturbed by any detectable problem. The weaknesses of subjective testing are manifold.

Firstly, the detection of a problem does not necessarily indicate its source. The subjective dogmatist has an unfortunate habit of arguing from the specific to the general. He hears an amplifier which sounds bad, is told that it uses negative feedback, and concludes that negative feedback is a bad thing. Used wisely, feedback and feedforward are both powerful tools to improve audio quality, but they are not necessarily used wisely. You can not make a racehorse by putting feedback around a donkey.

Secondly, subjective assessment is subject to tremendous variation between individuals and a knowledge of statistics is important to sift the conclusion from the variation. It is very difficult to remove bias from subjective tests and a number of rigorous methods have been evolved to reduce the effects. In comparison, the opinion of a single journalist who is being paid to test a product is statistically insignificant. All kinds of spurious products are available which are claimed to enhance some aspect of audio performance, having been 'tested' in this way. In fact, these products work by psychological justification. If you have just spent 50 quid on an oxygen-free, gold-plated mains plug for your hi-fi you have two courses of action: you admit that it makes no difference to the sound and that you have been stupid or you declare that it does make an improvement in order to justify the expenditure and hopefully avoid looking stupid. Furthermore, people like John Watkinson, who have the impertinence to suggest that there can be no improvement, must be arseholes. I understand that; it's all part of a normal day for an iconoclast.

THE STRENGTH of objective testing is that it can be very rapid, accurate and repeatable. Furthermore it is easy to locate the source of the problem by moving the test point to different places in the chain. The weakness of objective testing is that it only tests one thing at a time under very specific conditions. If you don't test for a specific characteristic, you don't know how good it is. If you don't realise an obscure problem exists, you won't detect it. Just because a device passes one type of objective test, it doesn't mean that it will pass all tests.

An example of this weakness was observed during the changeover from valve to transistor power amplifiers. Traditionally, tube amplifiers were highly linear at low levels but performance deteriorated as the level rose. Consequently, the objective test was to measure distortion at full power. Tradition being what it is, early transistor amplifiers were tested in the same way, and upon passing the test were deemed perfect. Unfortunately, in a Class-B amplifier crossover distortion gets worse at low levels, which the traditional test did not detect, whereas the subjective test would spot it straight away. The same problem occurred with early (predither) digital-audio systems where the quality got worse as the level came down.

While this example of folly eventually went away as objectivists learned to make new tests, one monumental folly remains. That is the testing of power amplifiers into a resistive dummy load. This tells precisely nothing about the ability to drive a real speaker which is highly reactive. No wonder amplifiers sound different. In my view all properly engineered amplifiers driven within their rating should sound the same. The output waveform should just be a larger version of the input irrespective of the quadrature currents delivered into a reactive load. Unfortunately, there is no law that amplifiers have to be properly engineered.

In a sense there is no such thing as a purely objective test. When we measure frequency response, we say that if it's flat from 20Hz–20kHz it's okay. But how did we arrive at those numbers? When we measure THD, we say if it's better than 0.1%, it's okay. Again who says so? The answer is that these criteria were obtained by subjective tests of human hearing. In fact, virtually all objective tests have come into being to measure some subjectively established criterion. From this it follows that for any phenomenon which can be heard it is in principle possible to design an objective test which will measure it. However, the amount of deficiency which is tolerable must be established from statistically significant subjective tests.

If we can put dogma aside, we can benefit tremendously from a combined subjective-objective approach. The subjectivist hears a defect, the objectivist designs a test which detects it. The subjectivist determines the allowable magnitude of the defect. The objectivist can then test every product to ensure that that defect will be inaudible.

As far as I can see, the only people to benefit from the artificial schism between subjectivist and objectivist are the hi-fi magazines who can create endless copy by fuelling the debate. The rest of us lose.

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Get the map out, honey

While other countries wage internal warfare over geographical boundaries and ethnic divides, the US is undergoing a quiet revolution in recording centres writes **DAN DALEY**

When the global music industry turns its thoughts to American music recording centres, it tends to think in terms of New York, Los Angeles–and, latterly, Nashville. Its a reasonable train of thought since these cities have been to the States what London is to the UK and Paris is to France. Despite the fact that none of America's recording capitals are also its governmental seat, the territory should be proud that it gets three cities of note; sure, it's a big place, but Russia's 11 time zones (at least on this week's map) have only Moscow and St Petersburg to offer as recording centres, and marginal ones at that.

The geographical balance of power in America is definitely shifting, and it's a trend that has been overlooked by the major studios in those established recording capitals. The loss of some of the 'traditional' market to the personal recording studio revolution has been widely recognised for some time, and the response of the old school was first to try to better it, then, finally, to join it. This has seen major facilities adding ADATs and DA-88s to their otherwise up-market shopping lists in an effort to interface with the new generation. But the smoke rising from this confrontation has obscured a larger pattern–one of almost plate-tectonic proportions–in which music is moving away from New York and Los Angeles not only into spare bedrooms and garages, but into other American cities.

MIAMI is now, without a doubt, the capital of the international Hispanic and Latino music markets. The major studios in the city are either owned by Latin music stars and producers–such as Gloria and Emilio Estefan with their Crescent Moon facility–or count Latin artists and producers heavily on their client lists. I recently made a circumstantial visit to veteran Miami music studio Criteria and found Julio Iglesias' name mounted in a semipermanent manner on a lounge door. In addition, Miami gets more and more of the Caribbean music base, such as Calypso and Soca, that used to find its way to New York for more sophisticated recording venues.

CHICAGO'S postproduction business–and there's a enough of it to make the post facilities in New York nervous –is now being buttressed by a renascent rock music movement that is spawning its own studios, such as War Zone built by the band Die Warsaw. And the city's historical music base of blues, jazz and R&B has pleasantly resisted Disneyfication by fast-food outlets like House of Blues and Hard Rock Cafe. When Buddy Guy opened a club, you knew from the minute you walked in that it was about music, not about French fries and overpriced T-shirts. This sort of attitude has put Chicago firmly back on the trail of peripatetic album makers like Collective Soul and the Neville Brothers. And acts like Ten City, which base themselves there, have helped put Chicago on the hip-hop map.

ATLANTA'S position as America's pop and soul capital, a position it held once before in time, rivals that of New York in dance music and is now secure with producers like Baby Face and Bobby Brown permanently there, as well as rock mixers like Brendan O'Brien whose credits include Nirvana and who returned there two years ago from Los Angeles. What the 1996 Olympics will do for the city in terms of music remains to be seen, but the boost to its post base is already visible. The network armies of the night will leave behind enough work along with their detritus to make Atlanta's broadcast audio base even more secure.

NEW ORLEANS may turn out to be the brightest star on the American recording map in the next few years. The city's sleepy and less-than-state-of-the-art image and reality is being transfused as new studios open and older ones undertake bold technological revamps. A city that worships ancient Neves and MCIs and that has never seen a permanently installed SSL on its somewhat soggy grounds is about to get three in the space of less than a year; Trent Rezner, the dark genius behind multi-platinum Nine Inch Nails brought in the first, a 72-input G-Plus, last year when he relocated to New Orleans, following by five years the relocation there of Daniel Lanois, the Canadian producer of acts such as Peter Gabriel and U2 and long-time Eno collaborator and now another draw for the town. Two studios–Egyptian Room and Side One–are both expanding and adding new SSL consoles later this year.

The smoke rising from this confrontation has obscured a larger pattern—one of almost plate-tectonic proportions—in which music is moving away from New York and Los Angeles not only into spare bedrooms and garages, but into other American cities

With all this muscle-flexing so removed from Broadway and Sunset Strip, it's no wonder that John Fry, incoming President of the American SPARS studio body and owner of Memphis' Ardent Recording (another city that is patiently awaiting its own recording renaissance) put a more geographically aggressive membership drive at the top of his administration's agenda.

But what does it mean for Stateside recording in general, this digital domestic diaspora? If one subscribes to the notion (as I do, cautiously) that a rising tide lifts all boats, then it simply makes America that much more attractive a place to come and record. Domestically, it continues the trend of decentralising the music industry and gives the creative side of the business more and closer technical options. It does not help the rates issue for studios in New York, Los Angeles and Nashville, as other cities offer new studios lower fixed overheads, but that's simply business, no different for studios than for widget manufacturers. And a more geographically diverse recording community simply reflects the diversity in music that's happened over the last few years. In short, it's both inevitable and ultimately beneficial, to most if not to all. America remains the land of opportunity. You may just have to keep on going a few hundred miles past the Statue of Liberty to find it these days.

Copyrights and wrongs

European copyright legislation is being used by a US publisher to protect a US composer. But there are complications writes **BARRY FOX**

A band of European musicians recently recorded an album of new arrangements of the American composer George Gershwin's tunes. The arrangers expected to earn royalties for their work because Gershwin died in 1937–so the UK and much of the European copyright expired in 1987.

Not so, says the Mechanical Copyright Protection Society, which controls the use of music on disc. Gershwin's publisher, Warner-Chappell, claims that George's melodies were 'co-composed' with his brother Ira. This is despite the fact that the original sheet music clearly separates the brothers' work with a 'Music by George, Lyrics by Ira' name check.

Ira died much later than George (1987) so his work is still in copyright. Warner-Chappell's curiously late discovery that the brothers were actually co-composing has the happy effect (for Warner-Chappell) of bringing George back into copyright because he never went out in 1987. And Warner-Chappell's interpretation of the new copyright laws in Europe has the even happier (for Warner-Chappell) effect of extending George's music copyrights until 70 years after Ira's death. That's AD 2053.

'Immediately contact Warner-Chappell Music in London,' the MCPS is telling arrangers, 'your query should be marked Gershwin Copyright Enquiries'.

This is the special legal department which Warner-Chappell has set up to handle the Gershwin gold mine. Enquirers get a standard letter 'to avoid any misunderstanding'. It seeks 'compliance' and warns that Warner-Chappell 'intend to enforce their rights vigorously with immediate effect'.

The new directive takes account of the fact the people now live longer, so it makes 70 years the norm

This is worth many millions of US dollars to Warner-Chappell, and will start a chain reaction of similar claims on other public domain music throughout Europe. Bewildered record producers may like a run-down of the situation. I'll keep it as simple as possible.

European governments must follow European Union Directives. One from October 1993 (93/98/EC, Harmonising the term of protection of copyright) obliges all European countries to pass laws which give 70-year copyright protection from 1 July 1995. The British Government missed the deadline but cannot duck the issue indefinitely.

The object of the Directive is to honour the original intention of the Berne Convention, and give three generations a chance to earn royalties. Most countries originally reckoned that life plus 50 years did this. Germany set the limit at 70 years. The new directive takes account of the fact the people now live longer, so it makes 70 years the norm.

Quite separately a European court case (involving Phil Collins) created a precedent. If something is in copyright in one European country, the new 70-year Directive puts it into copyright throughout Europe. This happens even if local copyright has already expired.

Non-European countries only get the same deal if they also extend their local copyright laws to 70 years. The US is still arguing about an extension. But Warner-Chappell claims that American George Gershwin is covered by the European law.

The British Government's DTI, which controls the Patent Office, which in turn is responsible for copyright law in the UK, obviously smells trouble. The DTI will say only that the new laws are intended to cover copyright material of 'European Union origin' and 'the DTI cannot offer its interpretation of what this means'.

Warner-Chappell has ducked the straight questions I have asked. Did Chappells ever change the Music by/Lyrics by tags during the lifetime of either George or Ira? Did Chappells ever make any attempt to discuss the matter with Ira Gershwin before he died and, perhaps, have Ira sign an affidavit? Why does Warner-Chappell think that the European directive covers works by an American citizen?

Contemporary music sheets clearly print the words 'Music by George Gershwin', quite separately from the words, 'Words by Ira Gershwin' (or others). Even if you do not have access to original print sheets, some of these are helpfully reproduced in the booklet which comes with Dave Grusin's CD, *The Gershwin Connection*.

Andrew Gummer, the lawyer with Warner-Chappell in London who is handling enquiries, says: 'I do not suppose they [George and Ira] considered the relevance of the original Music by/Words by tag'.

In support of the gold mine claim, Warner-Chappell offers a lengthy letter written in 1992 by a New York lawyer to the Australian Performing Rights Association. 'If one were able to ask George and Ira today whether they collaborated on their musical works there is no doubt they would answer "yes"', it argues.

Much of the Grusin CD booklet is written by Michael Feinstein, who for six years from 1977 worked as Ira's personal assistant and archivist. He leaves no doubt that even in the last years of his life Ira still had a keen mind. He could perfectly well have signed affidavits if anyone had asked him to do so when expiry of George's music copyright was imminent. But apparently no-one did.

Warner-Chappell also backs its case with a legal opinion written by a Professor James Lahore, but without any indication of who Lahore is or why his opinion should count. In any case it is hard to see why Warner-Chappell should offer this up.

'THE EVIDENCE does not indicate that George and Ira considered each other to be joint authors,' writes Lahore, going on to talk of a 'definite demarcation of roles' and cite court cases which 'appear to establish that where the composer and the lyric writer are different persons there will be two separate copyrights'.

Lahore concludes that 'While it is clear that George and Ira collaborated... this of itself is not sufficient to establish that the musical works are joint works for the purposes of the Copyright Act... the available evidence does not justify the conclusion that in all cases the musical works are works of joint ownership... [but] there is evidence in favour of joint authorship... for some of the works'.

Nevertheless Warner-Chappell still claims baldly that under the new European copyright laws, 'All works of George Gershwin are protected' and none is 'in the public domain'. Sooner or later this claim must be tested in court. The case could be as entertaining as George Michael versus Sony.

Those who cannot afford the legal challenge will probably just have to pay up. Arrangers will forfeit royalties. But there seems no reason why those who have to pay up should not do so under written protest. That way they may be able to claim compensation in the future.

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Yamaha PROMIX 02R

Nearly a year after introducing the ProMix 01, Yamaha has launched the sequel: the ProMix 02R. In the first of a three-part series ROGER NICHOLS puts the 02R through some practical as well as technical challenges, and addresses the question that seems to be on everyone's lips: Can you really have this much functionality at this price level?

THIS REVIEW HAD to be turned in so fast that as you read this, I am probably still typing the end. Quantum leaps in technology seem to be occurring at an ever-increasing pace. As a result, yesterday's $500,000 piece of technology can now sit on your desk at a cost of a few thousand dollars. This brings me to the subject at hand, the big brother to the Yamaha ProMix 01, the Yamaha 02R.

A year ago I was invited to Yamaha in Buena Park, California, to see the prototype of the 02R and, along with a few other engineers and producers, was asked to offer suggestions on its operational features. Three days ago I went into Emerald Studios in Nashville to actually mix a record on the first preproduction version of the Yamaha 02R. In a box that would fit in the back seat of your car was a console that runs rings around any other 8-bus board I have ever worked on.

The 02R is a digital console with digital inputs and digital outputs. Using my PC-based SIM program, I compared the signal going into the console with the signal that came out of the console. They were identical. I mean identical! If you digitally reversed the phase of the output and mixed it with the input, you'd end up with absolutely nothing. That means the input and output are exactly the same. You can't get any better than that.

Reviewer at work: Roger Nichols checks to see if all his ProMix 01 suggestions were placed on the 02R

The console I used was fitted for digital interface to four TASCAM DA-88 machines. I did not have the analogue I-O cards, so I could only test the analogue output to the stereo bus. My monitor speakers were the Meyer HD-1 self-powered monitors. The performance of the 20-bit D–A convertors on the stereo bus was more than just acceptable. The audio quality did improve slightly when I connected the digital output to my Apogee 20-bit D–A convertor. I would compare sound quality of the analogue output to most high-end DAT machines. The analogue output from the 02R did sound better than the analogue output from the DA-88 convertors.

> 'One of the tapes that I had brought to mix on the 02R was a Michael Franks tune that Walter Becker and I did about five years ago. We had mixed it at SoundWorks West in Hollywood'

Internally, the 02R processes information using a 32-bit word length, while all digital I-O employ a maximum word length of 24-bit. Each of the 40 inputs, reverb returns, and stereo bus, has a 4-band parametric EQ, limiter, compressor, expander, ducker, and gate. Each band of the EQ is full range, 20Hz to 20kHz. The EQ was very musical and reminded me of the EQ in the Harrison Series 12 analogue console. The 02R is more than $300,000 cheaper.

There are eight aux sends. The first six appear as analogue outputs and returns on the rear panel. There are two built-in effects units that are assigned to Aux buses 7 and 8. They are both mono in and stereo out. They sound pretty good, but are no replacement for the Yamaha SPX-990, Lexicon 480, tc electronic M-5000, or other high-end effects. I would compare them to the Yamaha REV-7. They are a good starting point and work well for rough mixes or song demo work. If you have additional external effects connected to aux buses 1–6, then the built-in effects can be welcome additions for the many occasions when 'you just need one more effect.'

Everything in the console, except the line trims, is controlled by the internal computer. Every EQ setting, dynamics setting, digital signal routeing, aux send level, effects return, pan, and channel mute is memorised by the computer just like 'Total Recall' on a Neve VR or SSL console. Every setting can be automatically reset to what is stored in memory like a Euphonix, SSL 9000, Tactile Technology, or Harrison Series 10 and 12 consoles. (There are a few other big digital consoles with 'Total Reset', but you get the point.)

As I have said in the past, if every aspect of the console can be recalled and reset, then you don't need as large a console. On a normal console, if you have two or more instruments on a single track of the tape, then you would usually make it appear on more than one module. Set one module for the trumpet, set another for the harmonica, and the third for the scat vocal in the fade. If every aspect of each input could be automated, then set the parameters for the trumpet, store them in memory, set everything for the harmonica, store it, set everything for the scat vocal, and store that, too. At the proper times during the mix, just recall the new settings. Everything changes instantly with no zipper noise or other unwanted artifacts.

The 02R has 64 memory locations for 'snapshots' of the entire console. You could set the board for the verse, store it in snapshot memory, set your mix for the chorus, store it in another snapshot memory location, and then just recall them at the proper moments.

You can 'pair' faders together. When you pair two faders together, whatever you do to one fader will also be done to its pair partner. This saves redundant setting of EQ and echo sends when you want the same thing to happen to both channels.

MEMORY LOCATION where the snapshots are stored is called the Scene Memory. The Scene Memory is one of the many Libraries where parameters are stored. When you recall effects for the on-board effects processors, they come

from preset memory locations in the Effects Library. You can modify effects parameters and store them in empty memory locations. There are also library pages for EQ and dynamics. If you are new to engineering, you can recall preset EQs to brighten the vocal or recall a preset for the proper kick-drum compression. After you have recalled a preset, you can modify it and store it in a user memory.

OK, we talked about the snapshot memory, but there are plenty of consoles with snapshot memory, so what is the big deal about the 02R? Well, real-time SMPTE-based automation with moving faders is the big deal. The 02R will let you ride vocals in real time, pan an instrument from side to side and back again, change reverb send levels during a solo, even change EQ for a vocal line that doesn't quite match the rest of the song.

The faders are not touch sensitive, so you must press the fader select button in order to disengage the motor that moves the fader. The fader can then be in either Absolute or Relative mode. In Absolute, any previous changes that were made to the fader will be replaced by the new fader position. If Relative mode is selected, then the fader becomes an offset trim to the moves previously written. This means that after you have ridden a vocal track, for instance, you can select Relative mode, select the fader, and trim the moves as they go by. If Auto Return mode is active, when the fader is deselected, the fader returns to its previous value. You can also set how fast or slow the fader returns.

During an automation pass you can also recall any snapshot memory and it will be included at that point in the automated mix. This means that you can set your snapshot levels for a chorus, and automatically recall them at the start of each chorus. Then you can recall the original snapshot at the end of each chorus to get back where you started. After that pass, you can use relative mode to touch up any ragged transitions.

'The second tape that I brought was one of the Steely Dan tunes from the live recordings... the drums were just as tight, the instruments were just as clear, the mix was just as clean'

You can select which console functions to include in the real-time automation passes. For instance, you can leave EQ automation off, which will allow you to change EQ during the automated mix without the changes being recorded as part of the mix. This EQ change can then be stored in the Scene Memory if you want to use the new EQ for your mix.

Off-line editing capability is limited in the initial release. You can remove events from the automation sequence so that all of the fader moves, mutes, or EQ changes are erased. You can set a start and end time code for this operation. You can also enter Scene Changes off line and define the time code where the scene will change. I spoke with Yamaha about additional features that they are now considering for a future software upgrade. One of the additions would be a feature similar to the Safety Net feature of Flying Faders that protects all areas of the tune except an area between two time-code spots. This will allow you to change levels and trim fader moves in one area of a song without affecting any other part.

AT THE PRESENT time you must play the mix to the end of the song if you have made any changes to the fader level that you want to keep to the end of the song. If you stop the tape, the fader levels will return to the previously stored setting. Yamaha is considering adding a trim feature that will let you trim a fader level up or down incrementally, affecting the entire song. This would work like the real time trim feature in Flying Faders. With this feature you can ride everything and then sit back and trim the overall level of a fader while the mix is running. When you keep the trim setting, it writes the trim to the entire song. This is my normal mix mode and the biggest reason I prefer Flying Faders. On the SSL, you can trim fader moves, but it is an off-line change, meaning that you must stop the mix, type in the change, and then start the mix playing again to determine whether or not you like the changes. I am not sure whether this feature will make it into the initial release or will be relegated to the next software upgrade.

I almost forgot about grouping faders. There are four groups. This means that you can have four separate sets of faders grouped together. If you move one of the faders, all others in the group will move. There is no group master for the group. And there are four mute groups to which any combination of inputs can be assigned.

The 02R comes with 512k of automation-system, real-time, memory. Separate dedicated memory is provided for snapshot storage. You can add an additional 2MB of memory if you desire, but I think that for all but the most demanding mixes the standard memory should be enough. You can also dump all internal settings via MIDI system exclusive dump to any MIDI storage device to make room for more mixes. ☞

What you can't see is the connection panel located at the rear, which allows for many connections, including both analogue and digital

02R REVIEW PART 2

Having Roger Nichols take time out from his engineering duties to file a hands-on report on the Yamaha 02R is the first part in an exclusive *Studio Sound* review programme for the console.

Recognising the potential significance of a fully automated 20-bit digital console that sets a new pricing precedent, it is important that some independent body takes responsibility for undertaking a comprehensive series of tests. If the desk is as good as it claimed to be, then we need to know; if it has shortcomings, we need to know what they are and how they affect its usefulness.

That challenge has been accepted by *Studio Sound*, and with Yamaha's full cooperation the console has already spent time in the hands of several reviewers and on the test bench of Sam Wise. The first results of this technical testing will appear shortly.

But the results of this programme are already being felt—as this issue goes to press, Sam has a significantly revised version of the 02R on his bench as a result of his earlier findings.

Tim Goodyer

I AM TOLD that there will be Macintosh software that will enable you to run many 02Rs from a single Mac. It is also possible to control many 02Rs from one screen through the 02R RS422 port or MIDI. Each console would store its own automation data, but starting a mix, updating mixes, playing back mixes, and whatever else you want to be commonly controlled is easy to do.

Many (no limit) 02Rs can be cascaded together digitally to build a larger system. In the cascade process, you can attenuate the level of the incoming console if you wish. You can also decide which aux buses you want to cascade or keep separate.

If you don't like toggling between screens to see what is going on, there is a View page on the display that will show you every parameter of a selected channel. You can see EQ, dynamics, aux send levels, and fader levels all at the same time.

There is a dedicated area of the console for EQ and pan so that you can adjust these values the way you are used to with an old-style manual console (Like how I am already moving my old console toward the obsolete pile?), by just reaching out and grabbing a knob. You don't have to cursor or mouse around to change EQ settings. The current settings for the EQ you are changing are displayed numerically on the LED display next to the EQ knobs and graphically on the screen display so you can actually see what the curve looks like that you are dialling in.

I find that I prefer the graphic display because it more closely represents the visualisation I have in my head of what should be done to the sound. Instead of thinking, 'Maybe 1.5dB at around 342 Hz with a Q of 3.2,' I can think, 'How about some of this kind of stuff, maybe a little of this, move it around to here, make this hole a little deeper here... ' The dynamics display also shows you the shape of the compressor-gate curve as you change parameters with live metering right on the display at the same time.

Remember, the 02R is an 8-bus board with eight direct outputs. That means that any of the input channels can be routed to any of the eight buses, as well as a direct out for inputs 9-16. You can record separate instruments to a maximum of 16 tracks at once. The eight buses are sent to all of the input interfaces in 8-track chunks, so if you assign something to track 1, it shows up on 1, 9, 17, and 25. The track that the signal goes to depends on which one you put into record.

There are so many features and menu pages that if I go much further this will take up the whole magazine. There are four I-O card slots: one I-O card will give you connections to eight tape machine tracks. You will also have two analogue inputs built into the back panel. There are three additional slots in the rear panel for other I-O interfaces. If all four are filled, then you can have 32 tape-machine tracks on line at once. The configuration I played with was 32 tracks of TASCAM DA-88. There are interface cards for analogue I-O, ADAT, TDIF-I, and AES. I successfully used the Otari DCF-24 format-convertor box to connect the TASCAM interface cards in the 02R to a Sony 48-track digital machine.

One of the tapes that I brought to mix on the 02R was a Michael Franks tune that Walter Becker and I did about five years ago. We had mixed it at SoundWorks West in Hollywood. The tape machine was a Sony 3348 48-track digital machine. The mixing console was a Neve 72-input VR-P, Total Recall, Flying Faders analogue console. I brought a DAT of the final album mix so I could try to match things up as closely as I could. It was very hard to do. The mix on the 02R sounded much cleaner and tighter than the mix from the analogue console, so I gave up. I had to settle for something better.

The second tape that I brought was one of the Steely Dan tunes from the live recordings. The recording was done on the Sony 3348, but this time the mixes were done on the AT&T digital processor. The final mix was printed onto the 48-track, so it was easy to compare my new mix to the master mix.

The drums were just as tight, the instruments were just as clear, the mix was just as clean. If the master mix sounds a little better, it's just because I spent two days on it riding every horn note and grabbing for each guitar lick.

The price of this machine under $10,000 US. I am definitely going to get one for my home demo studio. Walter is thinking about getting three of them for his 48-track studio in Hawaii. I think the very next thing on my agenda is to decide what kind of boat to buy and which airplane I want. That's what I'm going to do with all the money I'm saving.

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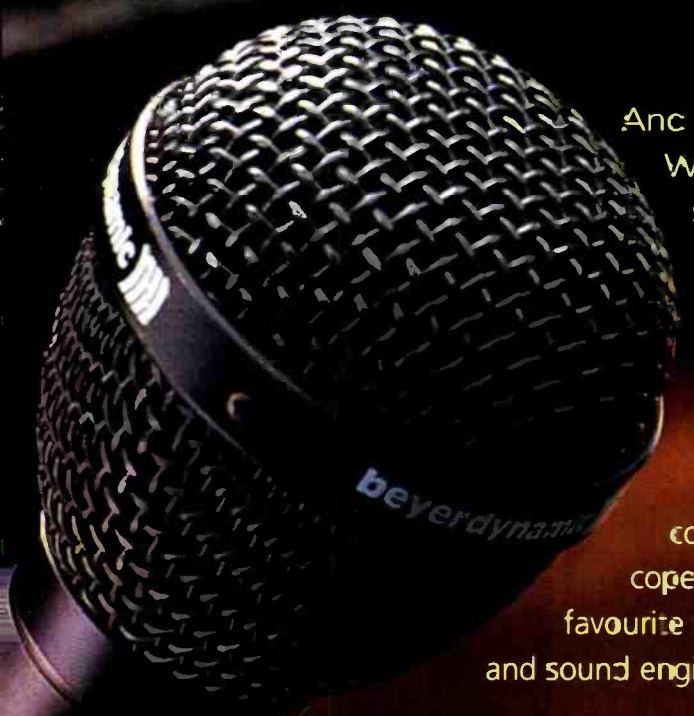

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REVIEW

Soundcraft B800

After extensive market research and an intensive period in R&D, Soundcraft's B800 broadcast console is set to have a major impact on the broadcast market. PATRICK STAPLEY finds out what makes the console so special.

ABOUT THREE YEARS ago, Soundcraft set up a broadcast division. This predominately concentrated on the lower end radio market, producing consoles such as the Series 5 and Series 10. Since then the company has steadily expanded its range in this sector, and last month, following an 18-month development period, released the first in a new generation of multipurpose broadcast consoles, the B800.

'As we became more involved with broadcasters it became clear that there was room for an affordably priced console that could be used for a variety of applications—TV production, large-scale radio production, and outside broadcast work,' says Soundcraft Broadcast Product Specialist, Ian Staddon.

In the past, Soundcraft had supplied consoles into these areas, but they were generally heavily customised and expensive 'specials'.

'It was a crazy situation,' states Philip Hart, President of the Harman Pro-Audio Group. 'We were constantly making modifications to our run of the mill consoles to suit broadcasters. So we thought rather than employ this level of customisation why don't we just design a dedicated console from the ground up.'

As a result, Soundcraft undertook a lengthy research programme, which involved visiting every major European broadcaster plus several in the Far East and the US, to find out what types of console people were using and the kind of facilities they considered most important.

From this collated information, Soundcraft produced a layout to suit the majority of tastes with as many facilities as possible built-in as standard—the target was to reduce customisation to an absolute minimum, and, hopefully, in the majority of cases, eradicate it altogether.

Some of the features that Soundcraft has designed into the console include extended headroom on the inputs (33dB) which is particularly relevant for OB use; dedicated clean-feed buses rather than relying on auxiliaries; two totally independent stereo outputs; comprehensive monitoring and communications allowing individual access; LED indication for all switches; limiters on groups and programme outputs; and an extensive system of internal jumper switching that further extends the configuration options.

'It looks as though we must have got it right,' comments Hart. 'Even before we got the thing past the line drawing stage we were getting advance orders. Europe and the Far East are the strongest markets at present but we're also hoping to break into the US market, which is currently looking very promising.'

THE B800 IS available in five compact frame sizes (16, 20, 28, 36 and 44 inputs) and can house seven different types of module: Mono Input, Stereo Input, Mono Group, Stereo Group, Master Stereo, Communications, and Monitor. Modules can be sited in any position in the console, although because bus connections are via motherboard construction, advance notification of layout will be required.

Given the console's potential use in OB trucks, the desk packs plenty of functionality into a relatively small space.

> 'It looks as though we must have got it right. Even before we got the thing past the line drawing stage we were getting advance orders'

The console offers eight mono groups or four stereo groups depending on the choice of group module, and four VCA groups. In addition there are two stereo programme buses (ST1 and ST2), and two Cleanfeed buses. Six mono and two stereo aux buses are provided.

The Mono Input Module provides individual routeing buttons for all outputs, thus it's possible to send a pre-pan output to the eight groups while simultaneously sending a post-pan output to the two stereo programme buses. By selecting PAN, the groups will source a post-pan output.

Once the CLEANFEED button is selected this will be replaced by one of the two Cleanfeed buses providing a mix minus source. By selecting CLEANFEED and Stereo 1 together, the direct output will carry a mono mix of all inputs routed to the ST1 bus minus the channel in question; with just the Cleanfeed button selected, the direct output will include all other channels with Cleanfeed only selected.

The system provides a neat method of going from an off-air configuration to on-air by the press of a button. An additional feature, which puts the icing on the cake, is the ability to independently control the level of the direct-cleanfeed output by locally switching Aux 1 into the direct output circuit, thus providing individual level control over each output.

Gain is controlled from a rotary switch (6dB increments) allowing for accurate matching between channels and a TRIM control providing ±6dB of continuous control—both operating for line or mic.

The equaliser is a 4-band semi-parametric design (32Hz–16kHz, ±15dB). High and low bands are shelving filters, while the two mid bands are peak response with selectable Q (1.2 or 2.5). An 18dB/Oct high-pass filter is also included operating at 80Hz. As with the rest of the console, the equaliser is a new design featuring high performance op-amps to reduce noise and give a more focused sound. Soundcraft's attitude appears to have been to introduce a more sophisticated equaliser which is, perhaps, closer to a recording studio console than a broadcast console.

The channel Insert point may be switched from the module and its position can be set to pre-EQ, post-EQ, or post fader depending on internal jumper selection.

The CUE switch provides a stereo PFL or AFL solo depending on master switching, and will operate either in latching mode (quick press) or momentary mode (prolonged press). There is also the option of a PFL overpress where a microswitch built into the end of the fader travel will activate the function.

Running alongside the 100mm fader is an 8-segment LED meter which via internal switching can be placed pre-EQ or pre-fade. A peak indicator is also included which comes into play at 6dB below clipping and measures the signal at three different points in the module. Also positioned next to the fader are the four VCA group selectors, and an ON button that activates the fader start-stop capability. This function only operates when line input is selected and will send a pulse or closed-contact relay signal (again jumper defined) to start and stop

external devices (CDs, DATs, Mic Live warning lights) as the fader is opened and closed.

The stereo input module differs from the mono version in that routeing buttons send to pairs of groups, so there are four rather than eight; MS decoding is provided; the Q switching is removed from the mid EQ bands and a low-pass filter added. The module also contains switching to allow the stereo legs to be summed to mono, or individual legs to be sent to both sides of the stereo channel bus.

GROUP MODULES are available in mono and stereo configurations and are virtually identical in operation, and are both fitted with group-master and stereo-return sections. The obvious benefit of fitting stereo groups is the additional space-saving it allows, but users should be certain that pairing groups in this manner will fit-in with their way of working.

Group Modules can individually route out to the stereo programme buses and other groups—desk logic, though, inhibits a group routeing back to itself. Access is provided to the auxiliary buses, but unlike the input module, dual-concentric controls are not used here. Instead, each of the four sends has a switch that selects between odd and even auxs, thus Send 1 will feed to either Aux 1 or Aux 2. In the case of the stereo auxs, the source will be summed mono in Pre, but will follow the Group Pan in Post.

A limiter is provided for each group output with four threshold settings, selectable release (200ms to 10s) or auto release (1s with 2-stage action), standard (10ms) or fast attack (0.5ms), a bypass switch, and 8-segment gain-reduction meters. A side-chain Link facility is also provided—for Mono Group Modules this links the module to the right..

As with the input module, groups include insert points, local and remote muting, fader machine start, cue, and peak signal indication (there is also a signal present indicator).

The two main output mix modules are identical apart from the inclusion of an ON-AIR switch and power rail indicators on the ST1 module. The modules contain stereo limiters which are the same as the stereo-group limiters. Insert and muting facilities are provided, plus there is a Mono Output section that provides a separately controlled summed output (independent of limiter and insert) that is selectable pre or post fader. The modules also house the auxiliary masters each of which includes mute and AFL switching.

The ON-AIR switch is opto-coupled allowing it to be operated both locally or externally, say from another console. When active it will switch on any On-Air warning lights as well as disable the oscillator and talkback facilities to the main stereo buses and studio monitors.

The monitor module contains two banks of source selectors—one for eight external stereo sources, the other for six internal sources. External sources are taken from a rear panel EDAC, while internal sources can be assigned via jumper selection in various combinations from the eight groups, the two main stereo mixes, the mono mixes from the stereo masters, and the auxiliaries. The standard factory setup assigns the stereo programme outputs and eight groups in pairs across the six selectors. An A-B source selector then switches between the two banks.

MONITORING IS VIA main or alternate loudspeaker circuits and headphones. Both loudspeaker circuits are affected by one VCA controlled gain pot with associated balance, right channel phase reverse, dim, mono, and left-right mute facilities. As with the channel mute functions, a number of the monitoring functions can be controlled remotely (including level) and special tally LEDs will light to show which of these are currently under remote operation.

A Cue speaker is also included in the meter bridge as standard with its own level control. Additionally, a pair of cue-speaker outputs are provided and the level for these is separately controlled from the module. The cue signal may also be disconnected from the cue speakers and routed to the monitor-speaker outputs.

Master switching for AFL-PFL is controlled from the Monitor Modules as is a global Clear Cue facility that deselects all cues on the console with a single press of a button.

At the base of the module are two of the VCA master faders, the other two are found in the Communications Module.

In terms of facilities and features an equivalent console could cost up to three times the price of the B800

The meter bridge is DIN standard size allowing for meter options such as RTW, NTP and Dorough to be easily slotted into place. Also any DIN-sized cartridges can be accommodated allowing for third-party clocks, timers, switchers, dynamics cards, additional communications panels and so on to be integrated within the desk.

Because of the wide range of metering standards adopted by broadcasters, the meter bridge is not supplied with a standard set of meters. Instead Soundcraft offer the choice of PPM meters (EBU, BBC, Din scale, stereo or dual reading) and high grade professional VUs.

Also fitted to the meter bridge is the talkback mic XLR, cue-reverse talkback loudspeaker, and meter select panel which is normally connected to a pair of meters and phase correlator, allowing various sources to be viewed separately.

THE B800 is an important console for Soundcraft's broadcast division. In typical Soundcraft style, it represents extremely good value for money, managing to pack in plenty of features and quality at a very attractive price.

The compact console offers solutions which would previously have involved customisation and it will be interesting to see how its simple yet highly flexible design satisfies the demands of different broadcasters. Of particular interest will be how the console is received in the historically impenetrable US broadcast market.

The B800 is the first of a new generation of broadcast consoles from Soundcraft. Next year should see the launch of a smaller, less featured desk, the B400, and there are also plans for a high end version. From the initial strong reaction shown by broadcasters worldwide, including orders already received in excess of 30 pieces, the B800 is certainly one to watch.

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Intertel CAMS

Into broadcasting came digital audio and the computer—and then came automated radio stations.

CHRIS DENNING takes a look at an auto-programme program from a Spanish innovator

YOU KNOW THE WAY things are in radio. You struggle away for years to get your licence for the Nobbed-on-Sea franchise and then, having finally succeeded, you go away on holiday for a year and leave the station to run itself —totally automatically.

Not a particularly likely scenario, I'll grant you, but it's interesting to know it can actually be done—and at modest cost. A case in point, Spanish-based software house Intertel, have a package called CAMS (Computer Aided Music System) which, whether you want a completely automatic method of running the overnight 'holding' service, or merely a way of making life much easier for both programmers and presenters, is both an effective and simple option.

Starting at an amazingly affordable $2,500 US (not much more than £1,300 UK), the basic kit—which Intertel sell only by direct mail—consists of a specially modified professional quality 16-bit computer sound-card, software on CD-ROM, a manual plus a piracy protection plug-in 'dongle'. On top of these items of course, you need a computer (any IBM-compatible from a modest 386 onwards will do) equipped with at least one suitably large hard drive and integral CD player.

The sound card uses the MPEG audio compression system to squeeze as many tracks as possible (commercials and station announcements as well as music) into the available hard-drive space but —and this is the unique heart of the system—the idea is for the majority of the music to be held on custom CDs. These look superficially like ordinary CDs but are, in fact, CD-ROMS on which the music is stored in compressed computer, as opposed to audio, format. The simple but convincing argument for doing so is that over 100 tracks can be put on each disc.

Since the compression used is virtually the same as that employed in Sony's MiniDisc format, in ISDN codecs and on DAB, there is no practical disadvantage in broadcast terms in quality loss. The clear advantages are vast cost savings over conventional hard-disk playout systems and the fact, for example, that well over 4,000 music tracks can be immediately accessible from a modest collection of just 40 CDs (not forgetting that, for very little extra outlay, such a library is constantly expandable).

The cost saving is significant. Six hours of music, for example, can be stored on one of the special CDs by Intertel (or various other computer service companies) for around £80 (little more than 20p-per-minute) which is far more economical than for any current hard-drive system. And CDs are —theoretically at least—a durable, enduring medium while hard drives are historically more prone to failure. Furthermore, if your CAMS setup includes a CD-ROM writer, your CD creation costs fall to almost the price of a blank disc —£15 or less for another 100-plus tracks.

Audio purists without budgetary constraint can specify the slightly more faithful (can anyone tell the difference?) Dolby AC2 compression system rather than MPEG, but at a cost—not only is the necessary Dolby card more expensive than its MPEG counterpart but also, under Dolby compression, the CDs hold noticeably fewer tracks per disc.

Although the discs obviously contain commercial material, there appears to be no particular copyright problem as it is accepted that there is clearly little difference between the storage of commercial recordings within a standard hard-disk playout system and their storage on a CD—the latter, after all, being itself merely a form of removable hard drive.

The ideal equipment setup would seem to comprise a computer system with three CD-ROM players, plus two or three large SCSI hard drives—the CD-ROMs being used for golden oldies and station jingles; with the hard drives reserved for the software, plus current hits and commercials. The system is currently DOS-based, although a Windows version (which has no particular extra benefit but looks prettier) is in the pipeline. One minor restriction conforms to that of nonlinear editing systems—if any form of music mixing is required, two of the sound cards need to be purchased. With the standard single-card package, tracks can only be played sequentially.

THE COMPANY BEHIND the system, Intertel, is an offshoot of a Belgian corporation that currently owns more than 60 Benelux radio stations—an important point, because it means that the software is designed very much with the professional radio user in mind. Accordingly, there are many other excellent features—there is a network version, for example, so that while an on-air studio and a recording studio use the system at the same time to play out material live, a third studio can be simultaneously feeding in commercials and hits for future use. In fact, up to five computers can be networked together on the one system.

The system allows up to five computers to be networked together

The CAMS screen displays lots of useful information, such as title, singer, year, and tempo (for both current and previous track) as well as the current song's total playing time and intro countdown (in both time and bar chart display modes), plus programmed commercials and the station's playlist. And there is a print facility to list, for example, all titles in the database, or actual titles played over a preceding period of up to 30 days or more.

So, who is CAMS aimed at? Obviously price considerations alone mean the system must be a prime contender in the deliberations of any company taking up one of the newer, smaller IR franchises. It is probably even a realistic possibility for 28-day RSLs or larger hospital radio services. But bigger companies should should not dismiss it either. Here, low price for once does not equate in any way with poor quality or lack of features.

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Soundscape v1.17

Building on a sound entrance, Soundscape's digital recording system aspires to secure a place in the modern studio. ANDREW NEVE offers an exclusive update on the rising nonlinear star

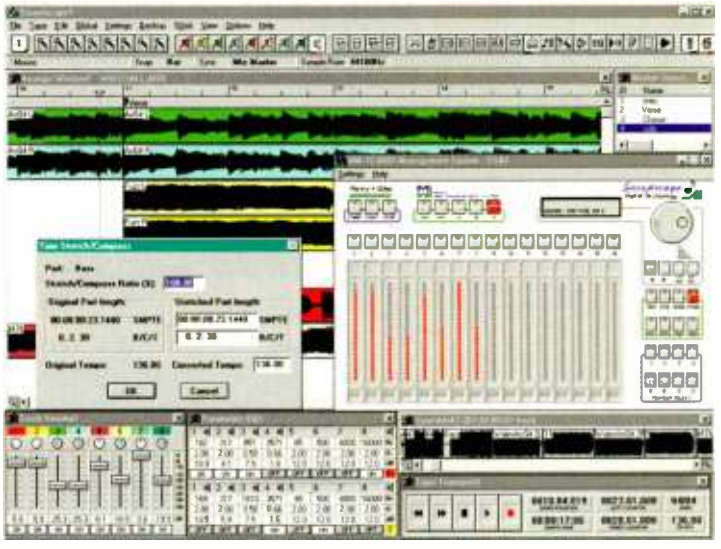
THE BRITISH Soundscape SSHDR1 hard-disk recorder was last reviewed in these pages about two years ago. In keeping with software-based equipment, it has received consistent upgrades in the intervening period.

To recap, Soundscape is an affordable (under £2,350 in the UK),high-quality, 8-track recording and editing system running on a standard PC. Processing is handled by the Soundscape unit externally using the computer as the user-interface only. It has two balanced analogue inputs and four balanced outputs with AES-EBU or SPDIF digital inputs and outputs. It is remarkably upgradable up to an impressive 128 tracks giving 32 physical inputs and 64 outputs. The sound quality is subjectively superb with 16-bit sigma-delta, 64-times oversampled A–D convertors and 18-bit sigma-delta, 64-times oversampled D–As giving quoted signal-to-noise figures of 96dB and 116dB respectively. The basic 8-track system offers 64 virtual tracks, a real-time audio mixer with volume and panning, eight real-time parametric EQs, a sophisticated digital noise gate, normalising, scrubbing and the 'usual' digital editing tools for cutting and pasting, copying, fading and mixing down non-destructively. The system has full chase-lock synchronisation and can generate MTC or midi clock for controlling sequencers. Up to 999 locator markers can be inserted and named and the system can import and export stereo PC.WAV files. Backing up to a standard DAT recorder is very quick and painless but if time is of the essence it is also available with removable hard drives.

VERSION 1.17 is not the first upgrade of Soundscape since its earlier review. It is, however, by far the most impressive. There is not space in this short review to list all the new features, however here are a few of the main ones.

Version 1.17 brings hardware control to Soundscape in the form of J L Cooper CS10 compatibility. Soundscape's designer has created dedicated software interfaces for both the J L Cooper CS10 and the Penny & Giles MM16 MIDI controller (software available free with v1.17). For this review I used a Penny & Giles MM16—this was originally manufactured as a MIDI controller for synthesisers, however the Soundscape MM16 interface software effectively turns the MM16 into a dedicated hardware controller. I have to say it works very well.

The MM16 has 16 faders allowing control of 16 volumes or 16 pans on Soundscape. And due to the nature of the endless belt MM16's faders, you effectively have a total recall system. Above each fader is a control for muting or soloing tracks and there are other controls allowing selection of tools and selection of multiple Soundscape units allowing one MM16 to control a large expanded Soundscape system. There is also a large scrub wheel. Available as a later upgrade will be the ability to record MM16 fader movements directly into the Soundscape software allowing real-time, synchronised, control of volumes, pans, EQ and effects without the need of a sequencer.



Version 1.17 is not the first Soundscape upgrade, but it is by far the most impressive

The v1.17 upgrade adds optional software modules jointly written by Soundscape and third-party developers: a similar idea to that of the Digidesign TDM plug-in concept as seen on the Mac.

At the time of writing this review I was only able to test one such module, The Time Module (£128). This features time stretching, pitch shifting and sample-rate conversion. The module is key-code protected with the code corresponding to the serial number of the soundscape unit to avoid piracy.

Time stretch can be set as a percentage, a SMPTE time value, a tempo or as bars, beats and so on. Soundscape's time stretch is by far the best I have heard yet, even coping with stereo files very well. Even a 20% stretch of a finished mix showed very little signal degradation. The process is also very quick; time stretching a 30-second stereo part by 20% takes about 1m 50ms.

The pitch shift allows parts to be tuned or even shifted in key without changing the length. You can specify the amount of pitch shift up or down as either a percentage or in semitones from seven semitones down to 0.01 of a semitone. This process is also very quick with a 30-second stereo part being pitch shifted by three semitones taking 2m 20s. Again the quality was superb with very little signal degradation even when pitch shifting by as much as six semitones.

Soundscape allows variable sample rate conversion between 22,050kHz and 88,200kHz. This can be set as a rate, a SMPTE time or in bars, beats and so on.

Other modules available soon include EDL and Autoconforming with RS422 support (available this month), real-time reverb and other effects and also a CD Mastering module that will allow compilation of audio on soundscape to Red Book standard ready for CD manufacture.

Ultimately, it's hard to argue with nearly 2,500 worldwide sales. Soundscape seems to be getting it right. With several hardware upgrades planned for the near future and more software upgrades on the way it seems that Soundscape are definitely looking after their existing customers as well as successfully enticing new ones.

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CEDAR AUTO DE-HISS

Noise and hiss removal are now an established part of the mastering process, with certain systems established as state-of-the-art. DAVE FOISTER reports on the latest in hiss removal for the CEDAR system

IT IS ONLY within the last year that CEDAR Audio realised what it had regarded as an impossible dream: simple, real-time removal of noise. CEDAR's name rose to prominence because of noise removal, but although the process operated in real time, it required a certain amount of operator input and a fingerprint of the noise in question before it could proceed.

Nothing at CEDAR stands still for long, and now there is a new module for the main system developed from the work that went into the DH-1. Auto De-Hiss is not a replacement for the main system's Hiss-2, but an alternative approach. Hiss-2 continues with its larger array of user-adjustable parameters, and will undoubtedly be the first choice for certain jobs, but for many tasks Auto De-Hiss offers a faster process which in the absence of major problems will perform just as well.

THE SOFTWARE occupies one screen, with all its adjustable parameters and metering immediately available. In terms of its overall appearance it integrates well with the rest of the CEDAR system, which seems consistent in its simple, logical layout. CEDAR equipment always values ease of use above the power to impress a client; it may be rocket science inside, but it never looks like it from the outside.

After the input level control, the main noise-removal process is handled by the central area of the screen, which has four pairs of sliders for stereo operation (ganged or otherwise) of the process's parameters. The concept is surprisingly simple; the process constructs a model, with the user's help, of the wanted part of the input signal, and then generates an output signal corresponding to that model without the noise present in the source. Three of the controls provide guidelines as to the construction of the model, while the fourth allows the user to decide how radically the identified noise is to be removed.

The first thing the process must be told is what part of the signal the user regards as noise, and this is adjusted with the NOISE LEVEL control. As this is advanced, the quietest parts of the signal are progressively removed, until the point where the noise disappears, although at this stage unwanted side-effects will be clearly audible. From here various approaches are possible; one is to adjust the attenuation of the identified noise first without worrying yet about the other parameters. The Attenuation control does nothing to the signal when at the top, but as it is pulled down removes the identified noise from the signal. Despite being calibrated from 0 to -100, no more than -5 or -10 on the scale is normally required for complete elimination of the noise.

The AMBIENCE control provided on the DH-1 is duplicated in the software, and its purpose is to help the process distinguish between genuine noise and long reverb tails, which have a tendency to resemble white noise as they decay. Thus for a source with lots of ambient information, the process needs to be told to err on the side of caution before assuming low-level mush is actually noise. In no way does the Ambience control attempt to restore lost ambience—the idea is to avoid losing it in the first place.

Complementing this, and new on Auto De-Hiss, is a BRIGHTNESS control, which helps the process avoid dulling steep leading edges by adjusting its look-ahead. Again, it is not a compensatory bodge after the main job, but part of the modelling process, and can, perhaps, be compared with the idea of driving a gate off the sync head to make sure it has opened before the wanted signal has reached it and therefore avoid the attack time eating into the signal. Adjustment of the Brightness can make a subtle difference as to how cleanly a close hi-hat comes through the noise removal, making sure the process doesn't damp the initial edge. Both this and the Ambience adjustment are subtle in their effects but worth getting right, as with them properly set it is easy to remove all the noise without detracting at all from the wanted signal.

The module will operate in three modes, referred to as Models. Model 2 is the new upgraded algorithm; Model 1 is effectively an emulation of the DH-1; and Model 0 is mathematically inferior to the DH-1, being less kind to HF material, but has its uses on bandwidth-limited sources.

We should be used by now to CEDAR getting it right, and Auto De-Hiss is no exception to the trend; it builds on an already excellent foundation and just gets better. It is simple to use, and it works faultlessly, once again achieving the apparently impossible.

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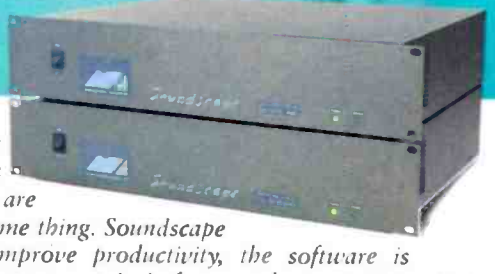
"While mixing a recent project I needed to get to the source tracks for some additional editing. Starting with only the back-up DAT's and having never used the Soundscape before, I rented the system and in only a few hours, with little instruction, was up and running, efficiently continuing my session with *no down time*. I was impressed with the Soundscape software and it's features, I could even edit whilst simultaneously chasing timecode. The sound quality was great and when I asked the price, well... Very Impressive!!!"

Alan Howarth, Sound Designer on such films as Haloween, Stargate, The Mask.



In this age of global communications good new travels fast... especially in this industry. Talk to any of our users (there are over 2000) and they'll all tell you the same thing. Soundscape SSHDR1 has the creative tools to improve productivity, the software is incredibly fast and reliable and saved them a great deal of time and money. This is why more and more of the worlds top professionals in sound design and motion picture editing are changing to Soundscape and the PC for their audio editing. From dialogue replacement and foley recording to that blockbuster movie soundtrack the SSHDR1 has some of the fastest and most powerful editing features available.

Is your existing Digital Audio editor expandable from 8 to 128 tracks, with real time editing while chasing time code and have fully parametric EQ? Does it give you 18 bit dynamic range and volume contours generated in real time, with professional I/O and audio quality uncompromised by noise from your computer. With glitchless audio scrubbing for accurate editing and perfect placement of sound effects. Soundscape offers all of this at a price much lower than you would expect.

If your serious about Video why not get serious about Audio and ring or fax Soundscape now....

Prices from only £2500 inc.VAT (8 track system)

With software specifically designed to run on the SSHDR1 it is possible to take a project from source reels to digital master. New software now available features optional **time stretch/compression, sample rate conversion** and **EDL file support** of all standard formats with full **auto conform via RS422, CDR mastering software** for audio CDR's, external control with the **Penny & Giles MM16** and **JL Cooper CS10** controllers.

Penny+Giles

JLCOOPER

Soundscape Digital Technology
Crichton House
Mount Stuart Square
Cardiff Bay
CARDIFF CF16DR
United Kingdom
Tel: +44 (0)1222 450120
Fax: +44 (0)1222 450130

SOUNDSCAPE DIGITAL TECHNOLOGY LTD

New technologies

Apart from the usual roundup of latest products, this month DAVE FOISTER goes in search of new equipment in the world of test and measurement

Tascam edit control system

Tascam has introduced a new edit control system aimed at both production and postproduction. The key component is the ES-61 Audio Edit Controller, which interfaces directly with a wide variety of both digital and analogue audio recording, storage and playback formats including DAT, CD, samplers, carts, multitracks, HD and M-O systems, sequencers and VCRs. The ES-61's role as central controller can be expanded with the use of the ES-60 synchroniser, which provides a full synchronising interface to machines equipped with parallel ports but no on-board synchronisation.

Simultaneous control of up to six machines is possible, with up to 128 machines connected to the network and can be brought on-line as required. Direct control of MMC compatible devices is provided, and the further IF-61 Addressable 422 to P-2 interface unit allows control of machines with on-board synchronisers.

◆ *Tascam America. Tel: +1 213 726 0303.*

◆ *Tascam UK. Tel: +44 1923 819630.*

Tascam ES-61: interfaces directly with a wide variety of analogue and digital equipment

Cantus digital console

German company Stage Tec is boldly building on the success of its Nexus digital-audio interconnection and routeing system with the Cantus all-digital console. This major system comprises one or more controlling consoles, linked via bidirectional fibre optics to signal processing racks. The main console is a large assignable surface, fitted with moving faders and a comprehensive graphical interface, and allows the setup of a wide variety of configurations and signal paths from a large pool of processing modules. Full static and dynamic automation of all console parameters is standard, and enhanced control is offered by a central access area with 12 additional motorised faders, trackball, PC keyboard and TFT colour display. Channel strips carry combined rotary encoders/push buttons controlling all channel functions, including dynamics on every channel. A range of input possibilities includes analogue inputs with 20-bit convertors and remote controlled mic amps, plus AES-EBU, IEC and Y2 digital formats, and routeing is 24-bit with 40-bit, floating-point processing.

◆ *Stage Tec, Germany. Tel: +49 30 63 99 02 0.*

ART Pro Gate, MDM-8L

ART has two new dynamics processors, both featuring eight full channels of control. The Pro Gate comprises eight fully-featured analogue gates under digital control, complete with MIDI facilities and preset memories. Each channel offers control over high-pass and low-pass key filters, attack, release and hold times, threshold and range, all adjusted by a row of rotary controls for the currently selected gate channel. Additional key inputs are provided, together with the facility to listen to the key source with the added bonus of a separate non-destructive key listen output. Settings can be stored in memory and recalled to individual channels from the front panel or via MIDI.

At the other end of the dynamics scale, the MDM-8L provides eight simple compressor-limiter channels designed for digital overload prevention and general-purpose compression. Each channel has controls for input and output level adjustment, with a fixed threshold and variable ratio beginning at 1.5:1 and rising with level to a maximum of 2.5:1. In MDM mode (which appears to stand for Module Digital Multitrack) the unit is intended to sit permanently between mixer and digital 8-track, and adds a limiter 6dB above the compressor threshold.

◆ *ART, US. Tel: +1 716 436 2720.*

BSS FCS 916 parametric graphic equaliser with high performance microphone preamplifier

BSS: new EQ, new control

BSS has a new equaliser-preamp in the form of the FCS-916, a 4-band parametric EQ with high performance microphone preamplifier. Each band is independently switchable and can provide a very narrow 30dB notch, and by using 10x multipliers and dividers can cover the whole 20Hz–20kHz band. Sweepable high and low-pass filters are also fitted, both with bell or shelving characteristics.

Meanwhile new control possibilities are now available for the Varicurve and Omnidrive products. The FPC-900 remote control, previously dedicated to Varicurve units, can now control delay times, band gains and mutes on any of the Omnidrive band outputs. Control of the Varicurve equalisers is now possible from a PC running BSS's Soundbench software under Windows, giving full graphical representation of the resulting curves and allowing direct dragging of the curve shapes on screen. BSS point out the advantage of having blank-panel Varicurve slaves programmed from a PC and then left secure against tampering when the computer is removed.

◆ *BSS Audio, UK. Tel: +44 1707 660667.*

Akai DR16

Akai's development work which has already produced the DD1500 and DR8 digital recording systems has now led to the DR16, which allows 16 tracks of linear 16-bit recording on a single SCSI hard disk. The proprietary LSI chips developed for the DD1500 are at the heart of the new machine, and data in the DR16 is fully compatible with both the DD1500 and the DR8.

Like the DR8, the DR16 is laid out to represent a familiar tape-machine-style interface, with transport keys belying the random access nature of the storage, multiple-take and editing facilities non-destructive. The machine includes a 16-channel programmable mixer, with on-board snapshot and fade automation and control of level, pan, two FX sends, bus on-off and fade. Up to six SCSI devices can be connected, giving 16x12 track-minutes at 44.1kHz per Gb. Up to seven DR16s can be ☞

slaved to a master unit, giving a possible 128-track capability, and the DR8 can also be integrated into the system.

- *Akai, UK. Tel +44 181 897 6388.*
- *Akai-AMC, US. Tel: +1 817 336 5114.*

Bel Tracksync

Developed in conjunction with the BBC and manufactured under licence from them, Bel's Tracksync is a system for maintaining correct synchronisation between audio and video signals as they pass through the various operations in recording and postproduction. A code indicating the mistiming between sound and picture is embedded within the video signal at each stage where such a mistiming is introduced. Where correct correlation must be restored, such as studio output, VTR or transmission, the embedded code can be read and used to set the BEL 7400 auto-tracking audio delay/synchroniser to re-establish correct sync.

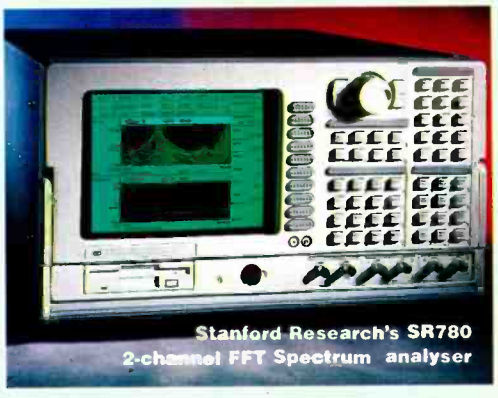
The system has undergone operational trials for almost two years within the BBC's News and Current Affairs facilities and is currently being installed widely in the BBC's London studios.

- *Michael Stevens & Partners, UK. Tel: +44 181 460 7299.*

Audiomation digital controller

Due for release from Audiomation Systems at NAMM is the Audio Station digital controller, a software-programmable control surface designed for use with a digital-audio workstation. Intended to replace on-screen mouse-driven functions on a variety of workstations, the controller has eight

TEST AND MEASUREMENT



Stanford Research's SR780 2-channel FFT Spectrum analyser

Stanford Research generator and analyser

Two new products from Stanford Research Systems address both ends of the measurement chain. The SR780 is a 2-channel FFT analyser with a frequency range of 102.4kHz and a dynamic range of 90dB. Its features include ANSI standard-octave analysis, swept sine measurements, transient capture, and optional computed-order tracking. A low-distortion source is built in, and storage and interfacing are provided by a 3½-inch DOS disk drive and RS-232 and GPIB ports.

As a more sophisticated source, Stanford has the DS360 Ultra Low Distortion Function Generator, providing waveforms from 1milliHertz to 200kHz with THD at less than -100dB from DC to 20kHz. Available waveforms include sine, square, two tone, and white and pink noise. Frequency sweeps can be log or linear, with 1mHz frequency resolution, 25ppm frequency stability and, again, RS-232 and GPIB computer interfaces.

- *Stanford Research Systems, US. Tel: +1 408 744 9040.*

Neutrik RapidTest RT-1M

Neutrik's new audio test system is designed for extremely fast turnaround of repeated measurements, with the ability to measure frequency response, distortion and noise of two channels simultaneously from a single multitone burst lasting less than a second. Test sequences are programmable, with four independent sets held in non-volatile memory. The test sequence begins with a trigger leader section, identifying the output as the correct signal and allowing automatic alignment to delays and phase shifts in the device under test.

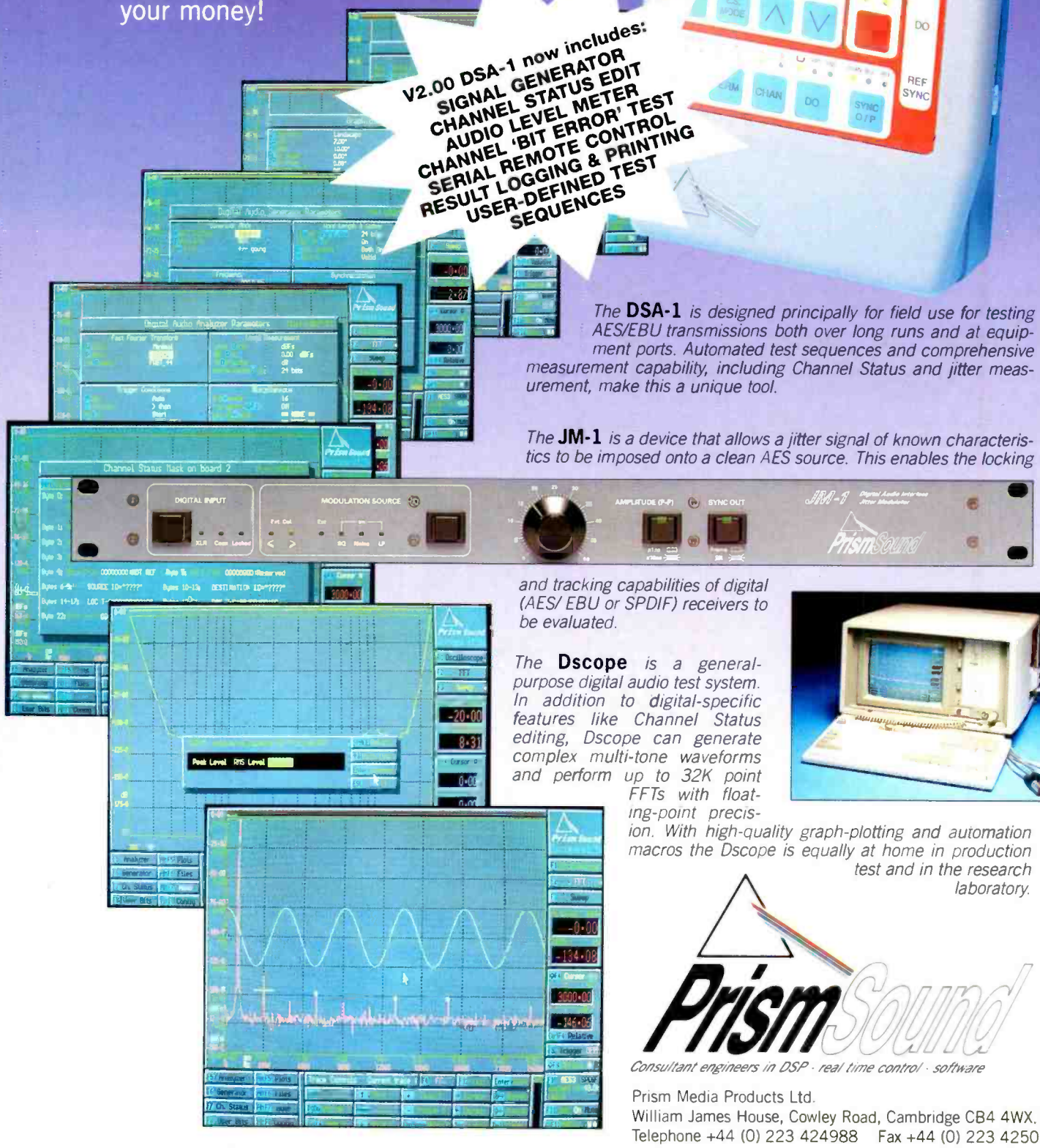
External interfaces comprise RS-232 and IEEE-488, and LabView drivers and BASIC programming examples are provided.

- *Neutrik, Liechtenstein. Tel: +41 75 237 24 24*

Digital Audio Test and Measurement made simple...

- Fast and accurate FFT measurements for distortion analysis
- A convenient, portable unit for interface and transmission tests
- Easy, intuitive controls and displays
- Test automation with macros and test sequences
- Great value – more FFTs for your money!

V2.00 DSA-1 now includes:
SIGNAL GENERATOR
CHANNEL STATUS EDIT
AUDIO LEVEL METER
CHANNEL 'BIT ERROR' TEST
SERIAL REMOTE CONTROL
RESULT LOGGING & PRINTING
USER-DEFINED TEST SEQUENCES



The **DSA-1** *is designed principally for field use for testing AES/EBU transmissions both over long runs and at equipment ports. Automated test sequences and comprehensive measurement capability, including Channel Status and jitter measurement, make this a unique tool.*

The **JM-1** *is a device that allows a jitter signal of known characteristics to be imposed onto a clean AES source. This enables the locking and tracking capabilities of digital (AES/ EBU or SPDIF) receivers to be evaluated.*

The **Dscope** *is a general-purpose digital audio test system. In addition to digital-specific features like Channel Status editing, Dscope can generate complex multi-tone waveforms and perform up to 32K point FFTs with floating-point precision. With high-quality graph-plotting and automation macros the Dscope is equally at home in production test and in the research laboratory.*

PrismSound

Consultant engineers in DSP · real time control · software

Prism Media Products Ltd.
William James House, Cowley Road, Cambridge CB4 4WX. UK
Telephone +44 (0) 223 424988 Fax +44 (0) 223 425023

motorised touch sensitive faders, 12 function keys and 6 rotary controls, all programmable to control various parameters of the workstation.

Alongside the Audio Station Audiomation will be showing the latest software for Audiomate, the Mac-based moving fader automation system. Enhancements include on-line trim, solo button and a selectable edit range.

◆ *Audiomation Systems, UK.*
Tel: +44 1207 529444.

Telecast fibre-optic snakes

Telecast Fibre Systems has added to its range of snakes with the Adder family, available in two sizes. The Adder 162 can carry 32 full-bandwidth 20-bit channels, while the larger 322 handles 64 channels. Both carry their 'studio quality' channels in addition to comms and data-control channels over a single optical fibre. The system is available as portable or rackmount enclosures, with variable-gain analogue preamps to accept microphone (with phantom power) or line-level inputs. A unique feature allows stage inputs to be split to multiple destinations—FOH, monitors and recording truck—all as optical feeds. Powering is via battery or AC, with internal uninterruptible power supplies.

◆ *Telecast Fibre Systems, US.*
Tel: +1 508 754 4858.

Denon CD jukeboxes

Denon's involvement in CD jukeboxes continues with several new releases. A new audio jukebox, the DN-1400F, replaces the DN-1200F and adds a dual transport, eliminating the dead time during

TEST AND MEASUREMENT

Brüel & Kjær 2236

B&K now has a complete range of measurement equipment for environmental noise, and in particular noise at work. The 2236 sound level meter has built-in standard national and international parameters for industrial noise-measurement tasks, and can be upgraded to include octave filters for frequency analysis. The 2260 Investigator is a hand-held analyser with integral PC for measuring a wide range of parameters, including statistical parameters, and simultaneously performs real-time 1-octave and 1/3-octave frequency analysis. Both devices can be supplied with Windows software for data analysis and report generation.

The 4436 Personal Noise Dosemeter provides a means of fulfilling statutory requirements for personal noise monitoring, combining a dosemeter and a Type 2 sound-level meter to give and overall picture of noise exposure including both continuous and impact noise hazards.

◆ *Danish Pro Audio, Denmark.*
Tel: +45 48 14 28 28.

Panda-J1 software

The familiar Panda-J1 hand-held digital-audio signal analyser provides many facilities for extracting information from a digital-audio data stream, including level metering to 0.1dB resolution, an indication of data-bit activity for the full 24 bits, and the reading of embedded ISRC code within CD data. It also includes a signal generator, producing sine, square and white-noise waveforms at any of the three standard sample rates.

New software for the unit readies it for the forthcoming PC-Panda Windows package, which will enable control of the unit from a PC and printing of analysis results.

◆ *Rayfield Electronics, UK.*
Tel: +44 181 361 2969.

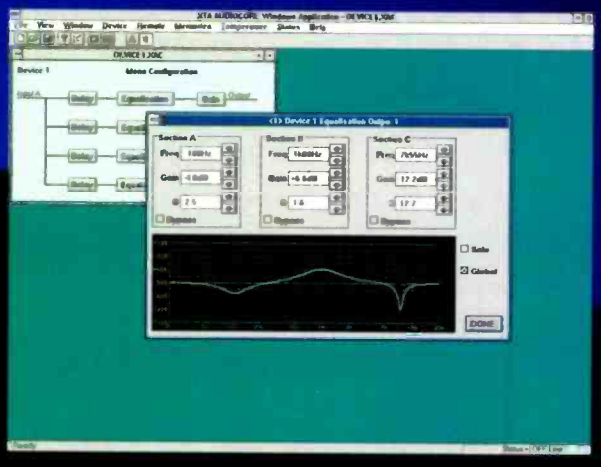
The next generation: Bruel & Kjaer's new range of measurement equipment

Not all delays are equal
– not all equalisers are delays

The DP100

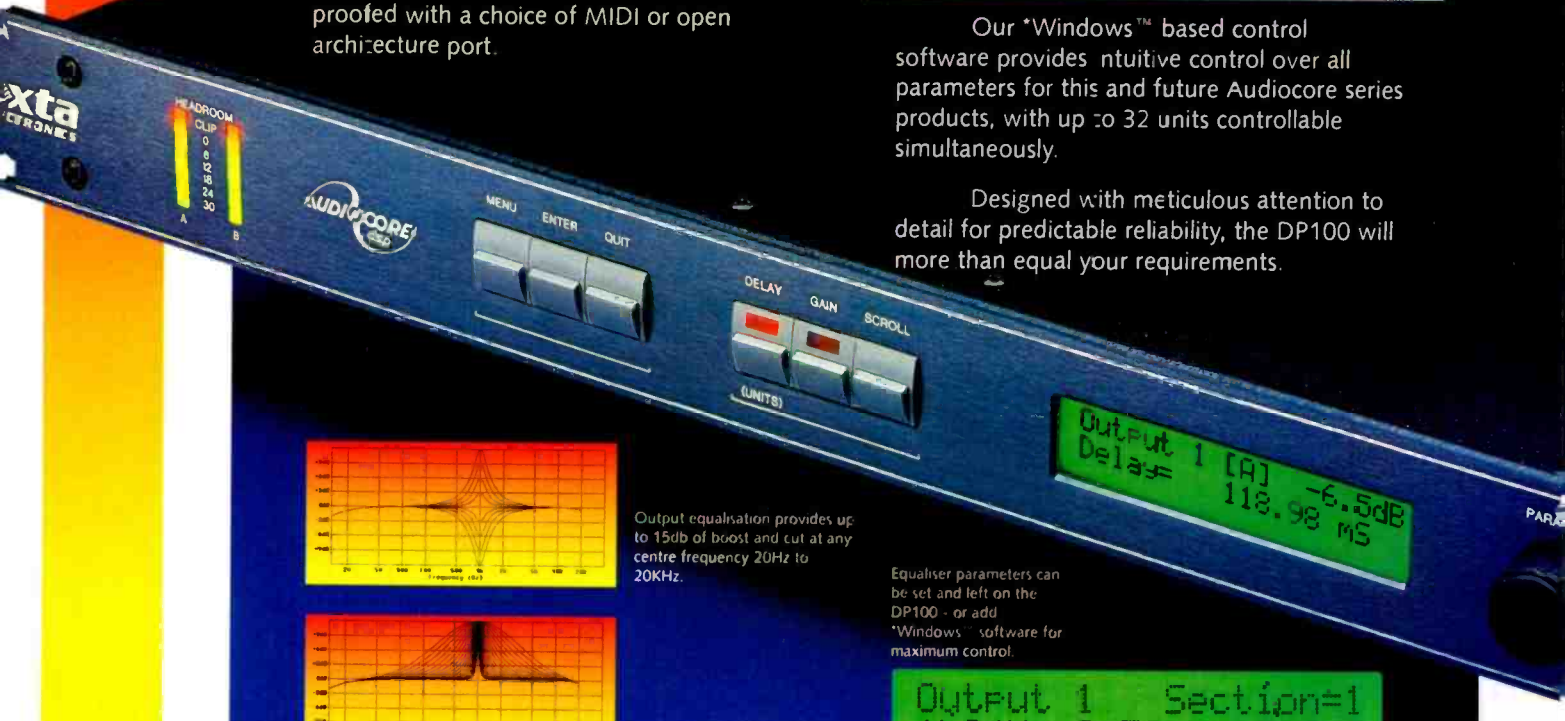
Developed around our proprietary Audiocore dsp technology, the DP100 offers excellent benefits and is incomparably trustworthy. This 2 input 4 output assignable delay features excellent dynamic range, compensation for ambient temperature change and a handy delay measurement function. We even included a flexible 3 band parametric equaliser for each output.

Available with AES/EBU inputs and outputs, plus optical I/O option, the DP100 will integrate into current and future systems - even the external control options are future-proofed with a choice of MIDI or open architecture port.

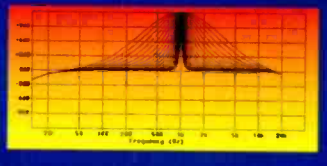


Our *Windows™ based control software provides intuitive control over all parameters for this and future Audiocore series products, with up to 32 units controllable simultaneously.

Designed with meticulous attention to detail for predictable reliability, the DP100 will more than equal your requirements.

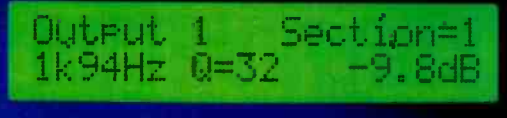


Output equalisation provides up to 15db of boost and cut at any centre frequency 20Hz to 20KHz.



A wide range of filter Q is provided for more flexibility.

Equaliser parameters can be set and left on the DP100 - or add *Windows™ software for maximum control.



*Windows is a registered trade mark of Microsoft Inc

USA: Group One Ltd, 80, Sea Lane, Farmingdale, N.Y. 11735
Tel: (516) 249-1399 Fax: (516) 753-1020

Head Office: XTA, Riverside Business Centre, Stourport, Worcs., DY13 9BZ, England.
Tel: +44 (0)1299 879977 Fax: +44 (0)1299 879969

DP100	Audio delay/equaliser
DS400	Mic/line distribution system
RT1	Spectrum analyser with computer control, RT_{60}, SLM and swept analysis function
GQ600	Dual channel equaliser with HF trim, sweepable high pass filters, long throw sliders and balanced inputs/outputs

XTA ELECTRONICS

Australia: Studio Connections, Tel: (61) 3 964 60544 **Austria:** Technik Design, Tel: (43) 72 426 6633 **Belgium:** Ampco, Tel: (32) 3 844 6797 **China:** Winbo Technology, Tel: (852) 260 49382 **Denmark:** Dansk PA Centre, Tel: (45) 32 96 1140 **Finland:** Sound Media, Tel: (358) 0 510 2355 **France:** beyerdynamic, Tel: (33) 1 4409 9393 **Germany:** Trius, Tel: (49) 5451 9408 0 **Greece:** KEM Electronics, Tel: (30) 1 64 78514 **Hong Kong:** Winbo Technology, Tel: (852) 260 49382 **Indonesia:** Multi Audio, Tel: (62) 21 6296309 **Israel:** Sikma Pro Audio, Tel: (972) 3 5101867 **Italy:** Ital C.I.D.A., Tel: (39) 521 690158 **Japan:** Otaritec Corporation, Tel: (81) 3 3332 3211 **Korea:** Pacific CS Electro, Tel: (82) 2 5788480 **Lebanon:** AMAC, Tel: (961) 6 430363 **Malaysia:** Swee Lee, Tel: (65) 3367886 **Netherlands:** Ampco, Tel: (31) 30 414500 **Portugal:** Access All Areas, Tel: (351) 1 478 3826 **Russia:** i.s.p.a., Tel: (7) 503 956 1826 **Singapore:** Swee Lee, Tel: (65) 3367886 **Spain:** Alberdi Pro, Tel: (34) 3 237 1600 **Sweden:** Interson LEAB, Tel: (46) 8 744 5850 **Switzerland:** Decibel, Tel: (41) 21 946 3337 **Taiwan:** Winbo Technology, Tel: (852) 260 49382 **Thailand:** Sound System Business, Tel: (66) 2 376 0115 **United Kingdom:** beyerdynamic, Tel: (44) 1273 479411 **USA:** Group One, Tel: (1) 516 249 1399

changeovers and allowing simultaneous playback from the two transports for monitoring and cueing. A companion machine, the DRD-1400, offers virtually all the same features for CD-ROM, both jukeboxes carrying up to 200 discs. The CD-ROM unit can handle any combination of 12cm CD-ROMs, CD-DAs and multisession CDs.

Three software development companies have joined Denon to produce a range of control packages for the new jukeboxes, bundled with the machines. Optical Technology Group's CDExtender CD-ROM library software allows control of the DRD-1400 under Windows NT, while Applied Media Technologies' TuneBasic provides Windows control for the DN-1400F, with a graphical interface showing CD name, artist, track name and cover art. Unlimited playlists can be assembled for playback, and a Random mode randomly plays CDs from selected music categories.

Mac control of the DN-1400F is provided by Gig O'Byte Music's Song Servant, which again allows simple creation of playlists and also has an optional package incorporating a large database of commercial CD titles. This can allow the computer to tell the user what CDs have been loaded into the changer.

◆ *Denon Electronics, US. Tel: +1 616 695 5948.*

XTA's RT1 Audio Spectrum Analyser

TEST AND MEASUREMENT

XTA extra

The British manufacturer of the RT1 Audio Spectrum Analyser, XTA Electronics, has recently added computer control software to the system. This PC-based program allows remote control of all RT1 functions and provides a high-resolution display in bar-graph form for third-octave resolution for sweep mode. This software is available free of charge with all new RT1 units and also to established users on request.

◆ *XTA Electronics, UK. Tel: +44 1299 879977.*

Crown TEF

Crown's TEF system continues to grow, with many software and hardware add-ons to facilitate a variety of measurement and alignment tasks. The platform comprises the hardware TEF analyser and a range of software packages for various applications, chief among which is the Sound Lab Time Delay Spectrometry (TDS) software, allowing in-depth analysis of a room and problem solving. Alongside this is the complementing MLS (Maximum-Length Sequence) software, providing an impulse response containing the entire audio frequency range over the measured time range, with off-site post-processing of data.

◆ *Crown International, US. Tel: +1 219 294 8295.*

AME CD Analyzer

Running on an 8Mb, 66MHz PC under Windows, AME's new CD Analyzer system will test CD-ROM, CD-R and CD-XA discs as well as audio CDs. The system supports ISO 9660 format analysis along with popular test functions such as Block Error Rate and jitter.

Since the Analyzer is intended to appeal to the expanding short-run disc market, AME has placed particular emphasis on ease of operation and has 'eliminated subjective judgement' by assigning all aspects of the test procedures to the system. It is, however, powerful enough to support detailed, in-depth testing.

◆ *AME Media Systems, Ireland. Tel: +353 1 295 4841.*

Iasys Speaker Performance Manager

Shown at the AES in New York and due for release early this year is the Iasys Speaker Performance Manager from Audio Control Industrial. This portable, self-contained measurement system analyses amplitude, phase and frequency to assist with loudspeaker setup, including crossover frequency selection, crossover level adjustment, delays and polarity verification. It is intended for use not only at the design and development stage, but on the road to help maintain consistency from venue to venue, and with this in mind it comes complete with on-line help.

◆ *Audio Control Industrial, US. Tel: +1 206 775 8461.*

AMEK

RNMP

The Mic Pre
The tradition
The pedigree

System 9098
Remote Controlled Mic Amplifier
by Rupert Neve the Designer

The need for excellent microphone signal quality in contemporary audio production has never been greater. Although the audio path may be fully digitized, the microphone remains the primary interface between the signal path and the real world.

A microphone cannot feed long lines without signal degradation; lengths in the order of 25 metres can degrade performance audibly and even in a normal recording studio, cable runs are often greater than this. Critical importance therefore attaches to the performance of the microphone amplifier, whether its output is in the original analogue form or converted to digital.

The AMEK / RUPERT NEVE RCMA Remote Controlled Microphone Amplifier is designed to provide microphone source audio of the highest possible calibre by raising the level of the microphone signal at source and then feeding the line from an amplifier which has been specifically designed to drive it. Thus the RCMA will be attractive to broadcasters, digital console owners requiring first-quality microphone signals, location recorders and sound reinforcement operators. Various options include simultaneous analogue and digital outputs, a distribution output mode, and remote operation of the software-driven control functions. These, combined with exceptional audio performance, make the RCMA a unique and original product.

Rupert

UK Head Office, Factory & Sales:
Telephone : 0161 834 6747
Fax: 0161 834 0593

AMEK US Operations:
Telephone: 818 508 9788
Fax: 818 508 8619

AMEK Germany/Mega Audio:
Telephone: 06721 2636
Fax: 06721 13537

AMEK Asia:.
Telephone: 65 251 1629
Fax: 65 251 1297

Travels in time

The Cybermen returned in 1968 in *Dr Who and the Invasion*: seen here marching southward towards Blackfriars Bridge—perilously close to Studio Sound's London offices

Dr Who has journeyed from a monophonic past into a Surround-sound present and is preparing for the jump to a cinematic future. **KEVIN HILTON** reports on this major sound restoration project

ALTHOUGH MOCKED for its shaky sets, cut-price locations and rubbery aliens, the cult, British TV, science-fiction series *Dr Who* was in many respects at the forefront of technology. From the very first programme (broadcast on 23rd November 1963) BBC viewers were accosted by electronic music and sounds that were revolutionary for the time.

The visual effects used then, and even into early-1980s, may appear a little rudimentary in comparison to such American fare as *Babylon 5* and the various *Star Treks*, but this has more to do with tight Corporation budgets than any lack of imagination.

But for the time being fans of the good Doctor, who are noted throughout the civilised world for their devotion and eccentricity, are starved of the Time Lord's adventures. Further, the BBC has said that it will not produce any more episodes as the demand does not exist. Yet such a statement is undermined both by the Corporation's success in releasing classic episodes on video, and Steven Spielberg's stated intention to make a new feature version, which will certainly bring state-of-the-art technology to bear. The only drawback here is that *Baywatch*'s David Hasselhoff has been mooted as the new pilot of the Tardis.

Meanwhile, Who-ites can feed their addiction with the re-release of the 20th anniversary celebration story, *The Five Doctors*, which adds contemporary audio and visual gloss to the more traditional technologies used first time around.

First broadcast in November 1983, this feature-length story saw five of the Time Lord's incarnations banding together to safeguard both the galaxy and their own existence(s). As an unseen evil plucks the Docs out of the space-time continuum using the Time Scoop, they find themselves in the middle of an isolated battlefield.

To add to their troubles, the Doctors, played by Patrick Troughton, Jon Pertwee, Peter Davison and Richard Hurndall (standing in for the late William Hartnell), with old footage of Hartnell and Tom Baker, have to contend with Daleks, Cybermen, the Yeti and arch-foe the Master.

Just like its hero, this new release moves around in time: it was originally recorded in mono with somewhat rudimentary visuals but in its restored form, it features extensions to some scenes, never-before-seen sequences, remade visual effects, and a Dolby Surround soundtrack.

TO ACHIEVE THIS goal, the production team—which included some who had originally worked on the project in the 1980s—returned to the basic elements, updating where necessary but also digging out the technology of the time to maintain continuity.

The restoration was produced by Paul Vanezis, who also acted as video-tape editor. The inspiration for this project had come when Vanezis was working in the BBC's video tapes department. While transferring programme material for other shows, Vanezis had come across the 2-inch Quad recording of *The Five Doctors*.

This recording format was introduced in 1957 and had been a broadcast standard, but it was big, bulky, offered no visual search facilities and, in Vanezis' words, 'was notorious for getting damaged'. This fate had befallen *The Five Doctors*, which now had a scratch on it.

The BBC has been heavily criticised for its treatment of archive programmes. Not only have some suffered damage due to sloppy handling or poor storage, but others have

been erased altogether in short-sighted economy drives to recycle video tape. *Dr Who* as a series seems to have suffered particularly: with a number of episodes having disappeared completely, while others only existed on black and white film stock (the colour masters having been wiped) and had to be painstakingly 'recoloured'.

The Five Doctors was unusual because just about everything had been kept. 'All the film sequences were in the library,' says Vanezis, 'plus all the gallery footage, the effects and the soundtrack—even the snoop tapes [audio recordings that are used as an administrative record of all activity during a production] had survived.'

This wealth of material made the repair easy, but there was so much of it that Vanezis put in a proposal to BBC Video to assemble a longer version. 'It's a fairly simple story,' he says, 'so it will appeal to an average audience, as well as the legion of *Dr Who* fans, who will be interested because it has lots of Doctors in it.'

THE FIRST TASK was to dig out a Quad machine from the technical archive and transfer the 2-inch recording onto D3 digital video. Working off-line, Vanezis prepared the first seven minutes of the programme to show 'the powers that be' how it would look. The suits duly gave approval, allocating a budget of £12,000 for the restoration.

'An extra ten minutes of material has been added to the original, Vanezis explains. 'It's mainly scene extensions to get a little bit more out of a scene and pace it better, because it was severely edited down the first time round. There were also complete scenes missing, mostly among the film sequences. I got the original scripts out of the vaults and I think that what you see now is easier to follow.'

The opening of the programme is completely new, constructed from the studio recordings. The pre-credits sequence, featuring the first Doctor, William Hartnell, has also been altered. This footage was originally broadcast in sepia, presumably to give some sense of time, but Vanezis came across a new print for this ten second clip, and used it in its original black and white.

Technology has moved on hugely in the 12 years since *The Five Doctors* was first broadcast. Audio techniques have changed considerably, but the most obvious difference is in the sophistication of visual effects. One sequence, featuring Cybermen crossing a chessboard, was originally prepared on a BBC Micro, which, even at the time, was hardly state-of-the-art.

Because he had access to a fair amount of clean material, Vanezis regenerated a number of sequences on modern equipment. The lightening that strikes the Cybermen as they make their way across the chessboard was redone on high-end Quantel Paintbox and Harriet graphics devices, while other scenes benefited from 3-D modelling and the use of a Charisma DVE and Silicon Graphics workstations.

New technology supplanted old on the visual side, but equipment now labelled antique was pulled out of retirement to recreate parts of the soundtrack. Digital equipment may have started to supplant analogue by 1983, and *The Five Doctors* heavily features the Fairlight CMI, but older keyboards still made significant contributions to the production.

'Some colleagues used to say that I overused the Yamaha CS80 at the time,' recalls Radiophonic Workshop composer Peter Howell, 'but I loved the pitch strip on the top. It was a bit like playing a violin and worked using ring modulation. But *The Five Doctors* was on the cusp between the two technologies and I used the CMI's 8-bit sampling and merging wave forms during that production, especially for the Daleks.'

Although parts of the music score were recorded in stereo for a BBC Entertainment Records release, other cues were mono, while the new scenes had to be scored from scratch. 'At the time it looked like it would be popular,' says Howell, 'so we put together a composite track for the record, which put some of the cues into stereo. I went back to those for this new version, but where there was mono material, I laid it down twice, introducing a split second difference between the two to get a good spread. This may not work for everything but it is very good for science fiction.'

One sequence, featuring Cybermen crossing a chessboard, was originally prepared on a BBC Micro, which, even at the time, was hardly state-of-the-art

Vanezis points out that several important segments were in mono, for instance the end 'flare' on the opening titles music, which was redone and then edited into the start of the episode. The first 30 seconds of the first scene were also reworked, as the only existing version was a second-generation copy. The split tracks that were used to create stereo were processed through a series of Yamaha digital mixers linked to sequencers.

In the case of completely new scenes, Howell combined several techniques: rewriting existing pieces, reconstructing others and adding totally new items. All these come together in a scene where the Cybermen (surely the scariest of all the Doctor's adversaries) catch up with the Peter Davison incarnation of the Time Lord, and he beams out to escape them.

Spot (sound) effects also had to be stereo-ised. One of the legendary names of the Radiophonic Workshop, Dick Mills, created stereo inserts from his mono originals by splitting the tracks and panning them around the soundfield to form an appropriate image.

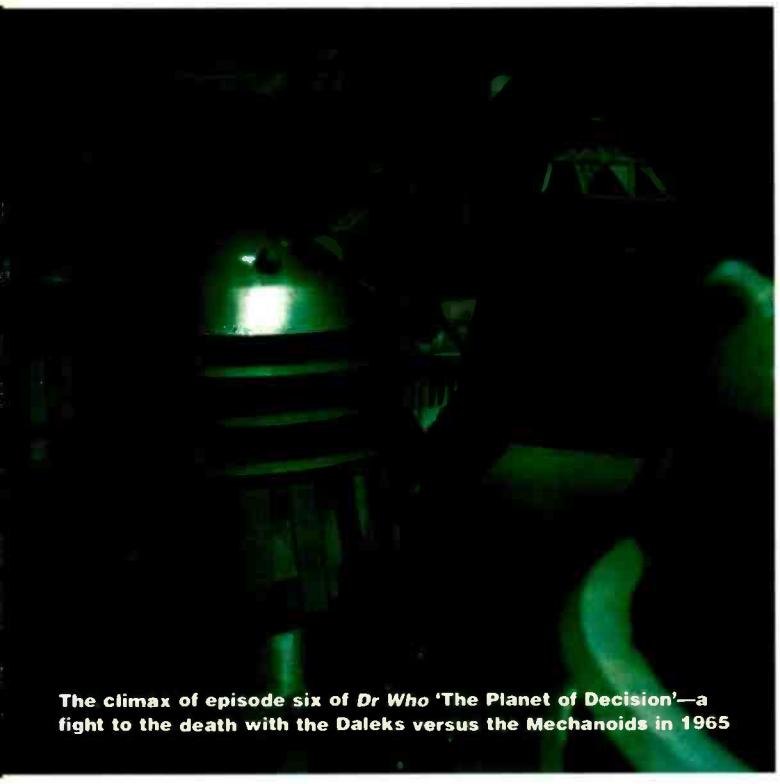
Doubling up and panning the effects and the music added to the illusion of space, something very important for a work of science fiction. This atmosphere was taken further by the use of Dolby Surround, marking a first for BBC Video.

The Corporation has been notoriously reticent about using the multichannel system, despite having the necessary encoding equipment at the Pebble Mill studios in Birmingham, where *The Five Doctors* was redubbed by Dubbing Mixers Andy Freech and Benedict Peisel.

AT PRESENT THE BBC does not produce its own programmes in Dolby Surround, although it has said that it will transmit bought-in programmes with such soundtracks, as long as they pass the various technical checks for mono and stereo compatibility. It will not publicise the fact, although a recent edition of the series *Sound Stories* was produced in the format and carried the Dolby logo in the opening titles.

Generally the thinking has been that if people with the relevant equipment can pick up the signals, that's their business, but the BBC maintains that it is not offering a multichannel audio service. 'The BBC doesn't want to confuse the public,' ☞

The exceptionally rare occurrence of all five Doctors in the same place at the same time



The climax of episode six of *Dr Who* 'The Planet of Decision'—a fight to the death with the Daleks versus the Mechanoids in 1965

explains Vanezis. 'They've even stopped on-air indication of programmes that are in conventional stereo because not everyone has the necessary equipment to receive it. But a video release is different —this one is stereo and Dolby Surround if people can get it.'

As a programme maker, Vanezis sees multichannel sound as a tool to enhance the viewing experience. 'Surround is an entertainment thing,' he says. 'It enhances the viewing experience. Doing this production in Surround has given our dubbing mixers experience of working with such multichannel sound systems.'

Benedict Peisel agrees that Surround adds a new element to a visual production. 'With any science fiction, you get an added dimension if you can do more with the sound. We did quite a lot of work on the original sound effects, reprocessing everything into stereo, mixing it all to create the atmosphere and then adding the surround.'

This work took three days to prepare and track-lay, with a further two-day session to mix. The familiar space atmosphere and background hums appear in the rear pair, but surround was also used for more obvious, creative purposes, particularly in the treatment of one character's voice.

Everyone agreed that the original recording of Rasillon, the chief Time Lord, was not as commanding as it should have been: 'He's a god-like figure and surround made him more awesome,' explains Peisel. 'We used the pitch-change capability of an Akai DD1000 digital audio editor to lower the voice, and then added reverse echo to give it a spatial effect.'

THE RESTORATION of *The Five Doctors* was a process of unpicking what had been originally laid down and starting again with the best possible source material, although in some instances this was not possible. The studio audio recording of the final confrontation was of such a poor quality that the gallery (control room) snoop tape, recorded at 15ips, was used to provide a higher quality source. The most problematic segments involved fourth incarnation Tom Baker, who did not personally contribute to the episode and was represented only by footage spliced in from the abandoned story *Shada* (later semicompleted and released on video). 'The original segments were missing,' says Vanezis, 'and what we had was already two or more generations old, so we didn't add surround or stereo to these sections because it would have detracted from the dialogue.'

The tight budget saw Vanezis working using a small team and doubled up himself as VT editor for the final reassembly. Some of those who worked on the original production also contributed to the restored version, among them Peter Howell and Video Effects Supervisor Dave Chapman.

'I negotiated internal discounts with the relevant BBC departments so that I could get the project completed within budget,' says Vanezis, 'and Dave was one of the people who worked on it. He redid the Daleks and supervised the laser box process. It was useful to get people who had worked on the original production because they could describe how it had been done in the old days. It also meant that I got to hear lots of anecdotes about what went on back then.'

However, Vanezis did not contact any of the original production team. 'I was quite keen not have too many people from the first time around because I wanted to have a crack at it myself,' he says. 'It's been a useful learning experience.'

It is not the intention of either Vanezis or the BBC to replace the original *The Five Doctors* with the restored version, as it is still available to buy on video. 'We may irritate the die-hards who buy everything,' Vanezis says, 'but it has the surround-sound-track and the extra material, which makes it different to some other rereleases.'

Such die-hards are notoriously difficult to please, but with no new BBC adventures planned for the good Doctor, and Spielberg's project still in the ideas mill, they will probably snap up any visitation from their time-travelling hero. Especially one that has been pieced together with such obvious care, and, fittingly, nods to both the past and the future.

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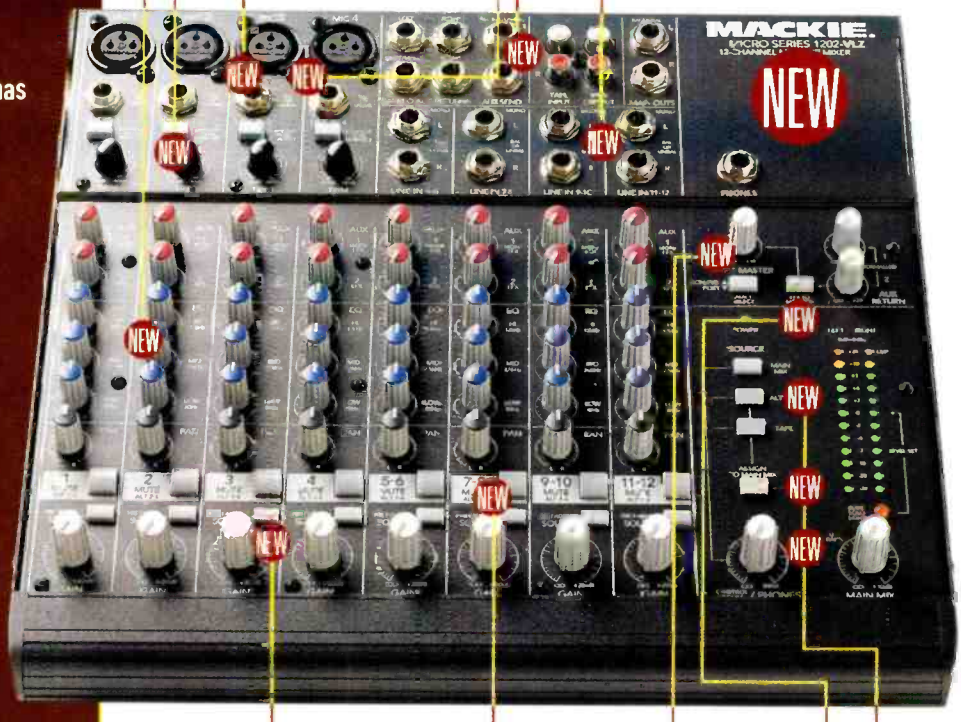

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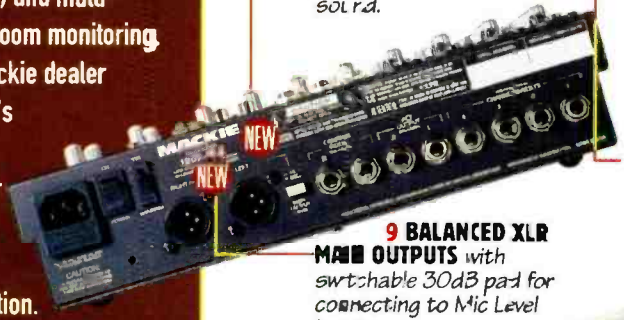

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The new geography

The next generation of broadcast engineers may find a working knowledge of geography essential to equipment navigation writes **KEVIN HILTON**

Perhaps it's the connection with creativity that causes broadcast technicians to employ vast numbers of metaphors in discussing their trade. Indeed, some are so convoluted that they would have left James Joyce with a look of befuddlement on his face.

One of the most common of these –and, mercifully, easiest to understand –pertains to the growing use of digital technology. Given how often it is trotted out today, whoever came up with the image of an 'analogue ocean' containing several small 'digital islands' should look into getting the phrase retro-copyrighted.

Like overly eager Fifth Form Eng. Lang. students, we all began adding to this clever but hardly substantial conceit. Hence, bridges became necessary to link the islands: digital-to-analogue and analogue-to-digital convertors, embedders, serialisers, clockers and other bits of equipment that miraculously connected the two worlds.

Where there is a need for bridges, there is a need for bridge builders (if this goes on, I may develop a board game called Talkbollox™). Specialist companies, the IK Brunels of their niche (a historical reference earns extra points), exploited the potential and turned interfacing into something of a mysterious art.

That image remains, but those who thought that the mystique would disappear as digital began to grow in usage have been proved wrong. Rather than completely usurping analogue and making interfaces redundant, digital is still coexisting with these older disciplines.

This situation is the norm in many working broadcast studios, and was obvious at last year's IBC Convention in Amsterdam. Digital was all around but interface products made a strong showing. As Mike Story of Data Conversion Systems says: 'It's not all digital, but more digital–there's still a need to get the stuff in from around the edges. Analogue is still out there.'

Another defender of the interface is Pro-Bel, whose Head of Digital Audio, Robin Caine, seizes the island mentality to emphasise his belief that there is always going to be a need for interfaces. 'The infrastructure is mainly analogue and you've got to maintain the highest feasible quality when you convert,' he says. 'Boxes like A–Ds and D–As will always exist because of a need for a different architecture for each function. There are no longer the digital islands, there are land masses of digital, but where they join, you need convertors.'

A company like Tekniche has got to retain its faith in interfacing–it accounts for nearly all its business. 'There is a real requirement, regardless of people moving towards digital–there are still huge analogue islands,' commented Product Manager Ian Puszet, taking yet another geographic turn but changing the emphasis. 'Look at Betacam SP, which is analogue. Broadcasters have large archives of material that they need to get to air. With transmission itself, most are still in analogue.'

SHREWD MANUFACTURERS are starting to safeguard themselves by identifying future markets. Tekniche is one. 'We're offering the same products, but now with fibre interfaces,' says Puszet. 'There has been de-regulation in the former Eastern Bloc and fibre is being laid. The operators need to work over greater distances, and it has to be secure. There is also a lot of scope with what you can do with fibre; it's a very flexible medium.'

MetaWave is another newcomer to the inbetweenie world, but is shrewed enough to leave the main body of interfacing work to Leitch and Tekniche. Mike Andrews comments: 'The key to the market is changing interfaces to keep up with what is happening out there.'

One such identified area is audio embedding, which is being exploited extensively by many of the new, upcoming TV channels. But, as ever, the youngsters do not have everything to themselves–the old guard have also seen the potential.

At Tekniche, Puszet says: 'We're pushing embedding at the moment. There are many advantages–systems design becomes so much easier, because you don't need AES-EBU.'

Audio embedding is not the only area that is sustaining the interface market, which, although changing, is certainly not dying off or contracting. While old faithfuls like video-to-video connection would probably lose a longevity competition with a Roundtree's Fruit Pastel, Steve Hathaway at Leitch points out that these will be replaced by new requirements.

'Video-to-computer links will be the next thing,' he affirms, 'and we're already working with DEC (Digital) to allow video signals to be recorded onto computers, which could be a replacement for tape machines, offering random access. We've also designed a PCI buss that is not specifically for Digital–we're looking at all formats.'

As new facilities designed specifically to work with digital technology are now being built from the ground up, design engineers are demanding one-stop boxes, which obviate the clutter of multiple add-ons and racks that mysteriously expand as yet another piece of gear becomes necessary.

The youngsters do not have everything to themselves –the old guard have also seen the potential

Robin Caine at Pro-Bel employs yet another metaphor, but mercifully dispenses with any talk of land-masses. 'The functions can be integrated, but people need to get to those functions. If you've got big bricks, you can only build one house, but if you've smaller, different bricks, you can do different things.'

Talk of bricks, bridges and islands, combined with bodge boxes, embedders and A–Ds and D–As, can be a tad confusing, even incomprehensible. Perhaps it's all to sustain the mystique that exists around the less mainstream areas of technology today.

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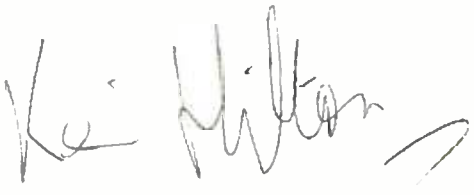

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Cyber City Blues

The increasing popularity of the Internet is making it a progressively larger target for hackers and other 'cyber vandals'. **MARTIN POLON** explores the vulnerability of the Net

THE WORLD OF audio in the mid-1990s has discovered the use of the computer and digital communications–the so-called cyber-highway of the future. This discovery includes, but is not limited to, the Internet and the public switched telephone network data transmission mediums of ISDN (Integrated Services Digital Network) and 'T' carrier. But whether it is the Net or the Infobahn or the Information Highway or just the digital use of POTS (Plain Old Telephone Service) that has caught the imagination of many in the audio and recording community, it is clear that this stuff is hot.

To date, recording studios have created 'pages' on the World Wide Web (WWW) with virtual representations of their mixing consoles, metering and fader movement for recording sessions with famous artists, while other studios allow session wannabes to monitor actual live audio via a 'mini-mixdown' to an Internet page where distributed audio can be monitored from the Web via 'soft' technologies such as Real Audio.

Other studio owners have implemented the ability to tap into every function in their facility so that they can monitor everything that goes on in the studio, either on the premises or via laptop computer while they travel. Still others conduct all their business on the Internet with record labels, musical groups, vendors, corporate customers, staff and so on. However, the interesting question about all of this is the same one asked some time ago by Lawrence Olivier as the peripatetic Nazi dentist in the Dustin Hoffman movie *The Marathon Man*–'Is it safe?'.

THE BEST WAY to view the problem of just what is and what isn't safe on the Internet, is to look at the beginnings of universal electronic communications along with the first computer mechanisms used in World War II. In many ways, the situation with radio communications then is similar to relatively open and anarchic Internet now. And the concomitant effort to destabilise telecommunications during WWII, is not dissimilar from the cyber vandals, freaks and hackers who hang out on the Net today. Yet while each side tries to monitor and hinder the communications of the other, history tells us that they often chose to ignore the reality of interception and sabotage of their own.

The most fascinating example of this during the War would be the Prime Minister of the United Kingdom, Winston Churchill, who would frequently dash into what appeared to be a private bathroom in the subterranean Cabinet War Rooms near No.10 Downing Street. In fact, this guarded chamber contained not a toilet but a transatlantic telephone and a supposedly secure transmission apparatus that was connected to a large voice inversion scrambling system designed by American Telephone and Telegraph's Bell Laboratories in New Jersey. Built in the US by AT&T's Western Electric division, the huge scrambler racks were carried by ship across the Atlantic and installed by crane in London in the basement of Selfridge's department store on Oxford Street (the only space near Churchill's headquarters large enough to accommodate it). From here, it connected to both Churchill's telephone and then on to two-way, high-powered, radio-telephone transmitters at a remote site in the south of England.

Security had to be provided for these radio-telephone links since the Allies could not use the cable sites that ran through Nazi-occupied France. Roosevelt and Churchill–and many of their aides–spent fruitful hours in conversation on the system, yet they could only talk in generalities and with innuendo since the Nazi intelligence arm, the Abwehr, possessed similar technology to allow the hearing of every word clearly at their Hamburg monitoring station.

> If a Web site displays the metering on an actual session, computer cyber vandals might use that link in reverse to hack at the studio computer that controls the recording console–via the computer

ROUGHLY 50 YEARS later, the Internet is largely accepted as a venue for communications, transfer of files and data and for graphic advertising sites. Yet, as with Churchill's radio-telephone link, a phrase from early science-fiction pictures is hauntingly relevant: 'We are not alone'.

The unseen presence in the world of cyber space is the world of the cyber-vandal or 'bad' hacker. 'Good' hackers are those whose hacks create or revise software and search out security problems for the benefit of the computer industry. The anonymous individuals who can attack the Net-connected studio do it in a variety of ways. If a Web site displays the metering on an actual session, computer cyber vandals might use that link in reverse to hack at the studio computer that controls the recording console–via the computer that acts as the interface to the site. If a studio allows session audio to be moved onto the Net, cyber-vandals might modify the audio software, thus affecting both the next recording session to use the link and the link itself. If important studio business data is available on or via the Net, that data might be accessed directly at the connected PC and erased or modified–for the hell of it. Ditto business messages sent on the Net.

Hackers also plant computer viruses, bombs, Trojan horses and 'spies' to await future detonation or activation. These self-contained software modules can respectively disable or erase hard drive data, actually initiate destructive operating sequences that can destroy a hard drive or a microprocessor CPU, gather business information, passwords or credit card numbers and pass them on to the person who planted the device or gather log-on IDs and passwords for further computer break-ins.

Nor are such depredations limited to ☞

Much of the hacking on the Net is done by those who resent the commercial usurpation of the Internet. Sometimes a technically adept competitor will do it, safe from any repercussions within the anonymity of the Internet

recording studios. In fact, recent occurrences on the World Wide Web show that Web sites created with HTML (hyper text markup language), are vulnerable due to the very ease-of-use of the technology. In one of the many cases of vandalism on the Web, vandals rewrote text contained within the Web site of an African-American religious organisation, contaminating it with racist slurs. In another case, the site advertising the MGM-United Artists motion picture Hackers was visited with electronic graffiti consisting of 'spray paint' markings on the images available at the site plus the 'painting' of offensive words.

In all of the above cases, the point of entry for the cyber-vandals is the computer on which the Web site is stored. This may be located on the premises of a company that provides pages and sites to customers or within the actual confines of a studio itself. In any case, the sophistication of the hacker may well exceed that of the Web page designer. Much of the hacking on the Net is done by those who resent the commercial usurpation of the Internet. Others do it for the 'challenge'. Sometimes a technically adept competitor will do it, safe from any repercussions within the anonymity of the Internet.

A recent study estimated that as high as 50% of all Web sites have been visited at one time or another by vandals with varying levels of interference and vandalism. That matches another recent report that identified one out of two business establishments (50%) as having had illicit entry into their computer systems when outside connectivity to the public switched telephone network was provided. But not all entry by vandals comes from the outside.

One recording studio owner who, as most victims of cyber-vandals, wishes to remain anonymous (as much to avoid looking foolish in front of future customers as to avoid revealing vulnerability) is not aware of any future 'fixes' to prevent a future incident.

'We keep all of our billing files in the several networked PCs around the studio complex,' he comments. 'Our supervisors work at a PC as they work the recording event. They keep a real-time tally on what is going on with the session. That way, the charges are available daily and we can bill the client in a rapid and timely manner–which, as you know, is the key to getting paid in this lifetime in this business.

'It seems that the drummer for this particular group has significant computer skills. He observed our supervisors log-on over his shoulder, and then after hours when the only help we keep on premises is a technician, he hacked his way into his band's billing file and removed a significant amount of charges. The bill went out in the normal way and we lost several thousands of dollars.

'It seems that this group has pulled this stunt elsewhere. They depend on the fact that in many studios, once the charges are entered, the review process frequently suffers from the push to get the bills out. We check to see if we might be overcharging but seldom work in the other direction.'

The kind of 'T' carrier and ISDN links that have become commonplace in studios doing much of their business in 'cyber transmission' of live or recorded artist performances between facilities are not perceived as vulnerable to many of the vandalism problems discussed above. This is due primarily to security of communications procedures and technical protocols imposed by the telecommunications authorities and since such links utilise dedicated lines that cannot be accessed directly. In fact, the hardware and software involved at the level of the telecommunications carrier providing the service is not absolutely safe from dial-in vandals who could access supervisory options to cause chaos during a recording session, but the security is 'good enough' to virtually guarantee a 'safe' session.

It is clear that the actual signal stream would be very difficult to modify since in effect we have two high-speed, high-volume modems that carry the audio stream as digital data. It is in effect thus already encrypted. Consequently, any break into the datastream could produce errors or computer data artefacts but it is less likely that the analogue audio volume, timbre, tone or equalisation could be easily modified since it is not addressable directly within the datastream.

It is, however, probably a good idea to never say never where bad hackers and other cyber-vandals are involved. The never-ending search for further savings through automation at telephone companies and other telecommunications carriers has placed an ever-increasing number of technical supervisory functions on computer platforms that can be reached via dial-up from legitimate in-house sources. Unless these technical management 'aids' are carefully protected, the dedicated vandal could still raise havoc with almost anything.

AT THIS POINT in time, the Internet is as fraught with danger as it is with future potential. This is one of the reasons that both AT&T and MCI are building their own international versions of the Internet without the threat of unbridled security problems.

It is easy to recognise the fact that data and systems security is currently one of the hottest topics in the computer and computer-user industries. And since the technology the audio and video businesses have adopted for many of its modern practices have been lifted from these industries, it follows that we should share their concerns. While many of the details are exclusive to audio and video, broader considerations are not. Your studio is attractive as a potential target just as any other business is–possibly more so because of the glamourous association of 'the biz'. Neglecting your security will make you increasingly attractive as other targets become harder to hack.

None of this should discourage the audio community from using the Internet, but it is quite clear that it makes good sense to take precautions in line with its increased use and computer practice.

REDUCING VULNERABILITY

Use an isolation or 'firewall' computer and keep all contact with the outside world to a minimum. Such systems store and forward all incoming and outgoing contact with the Internet and other outside services, isolating internal computers from direct contact.

Provide manual oversight of the firewall computer. Despite the presence of automated programs that 'operate' the firewall computer, daily observation of traffic flow can help to identify the existence of planted viruses and so on.

Pay top dollar for Internet Web sites and for 'bullet-proof' Web pages to avoid tampering. Budget sites are much less likely to have the supervision and quality of page construction necessary to resist tampering.

Avoid 'showboating' at the Web site. Such displays increase the vulnerability of an attack on displayed studio evolutions.

Monitor Web sites daily for tampering. At the least, constant vigilance will reduce the duration of public exposure to any examples of vandalism.

Control PCs in the studio with keyed locks on the computer that prevent boot-up by switching the power supply on and off. Many PCs come from the factory with such locking devices already installed. On other machines, it is a simple enough option to install. Passwords are no longer secure enough.

Change external access passwords on an weekly basis. This should help to prevent serious incursions from dial-up access.

Encrypt messages and data sent point-to-point on the Internet. There are excellent shareware and freeware software available for this in addition to commercial offerings

Use automated 'call back' equipment for those logging in from remote sites. This will 'call back' to a previously designated number to prevent unauthorised external access.

Avoid opening obvious icons within text messages initiated via Windows 95 and-or other Microsoft products. One of the features offered with Windows 95 and compatible Microsoft applications allows the sender of a text message to install an icon that reveals a further offering embedded within a message. Ostensibly a helpful and attractive innovation, the icons have proven to be a safe haven for hacker viruses and other undesirable modules. It also marks an unfortunate turning point, since prior to this, text messages were more or less immune from undesirable insertions.

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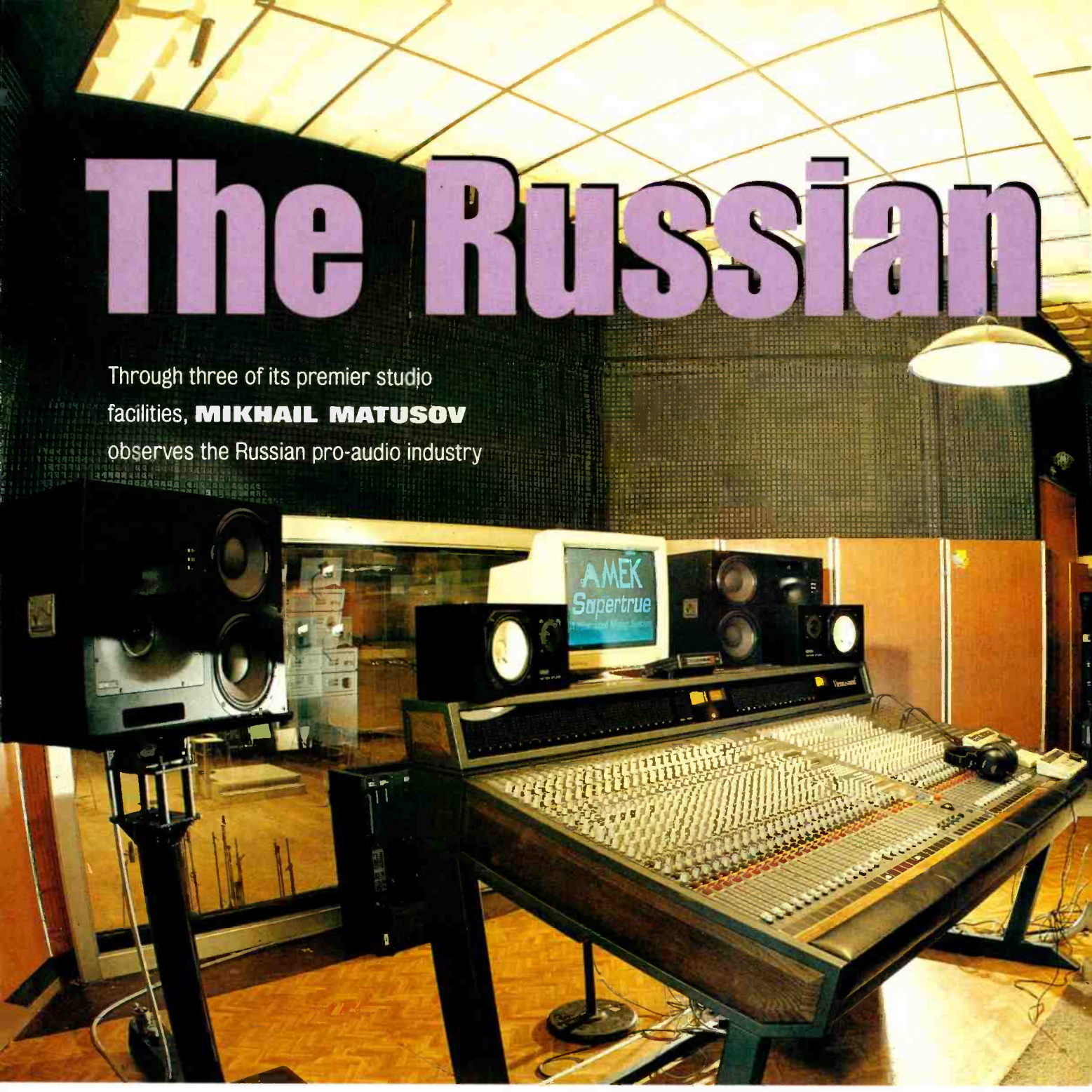
The Russian

Through three of its premier studio facilities, **MIKHAIL MATUSOV** observes the Russian pro-audio industry



IN ADDITION TO WHITE BEARS, vodka, spacecraft, warplanes, tanks, submarines and the Bolshoi Ballet; Russia has a healthy industry producing professional recording equipment. If it has come to the point where respected, Western magazines are publishing reviews of Russian musicals and recording equipment, then, perhaps, it is true that the wall between Russia and the West really is breaking down. Western readers have already read about Neva Audio amplifiers, Oktava, Byetone and Mikrophon microphones, as well as Sovtek combos. Now it is time to introduce a wider understanding of the industry in general.

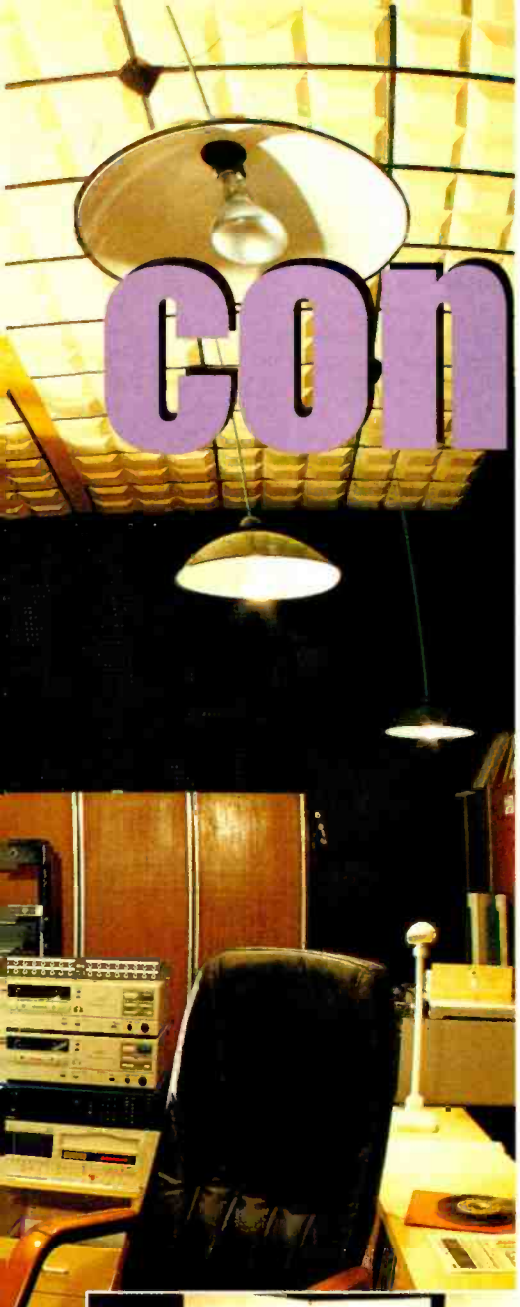
It is a pity that the West is awakening so slowly to all of this, as Russian industry in general–and particularly the studio equipment part of it–is in deepest crisis. If the West had turned to Russian manufacturers eight or ten years ago, the crisis might not be so deep. Perhaps this is a separate issue, as in this article I want to discuss two studios in St Petersburg, and through them to give some indication of the recording industry in Russia.

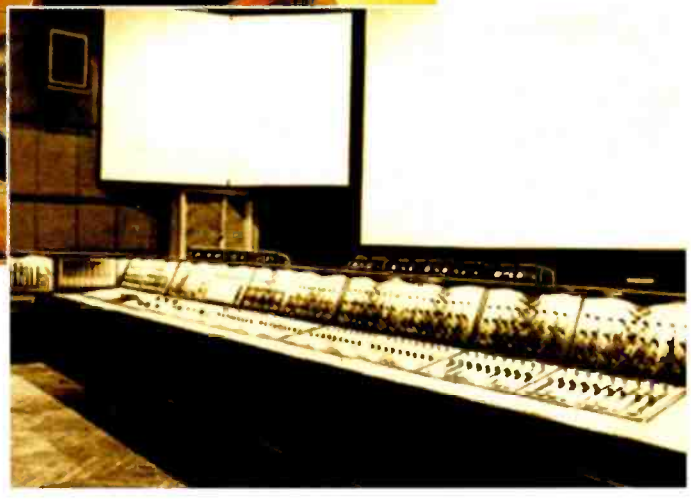
CALLED LENINGRAD from 1924 to 1991, St Petersburg is Russia's second largest city and is the former capital of the Russian Empire. Official propaganda of the time of Soviet power called Leningrad the cultural capital of the country, which was actually more or less true. Now, however, in the motherland of practical socialism, all is subordinated to a capitalism much stronger than in any capitalist country. Our centre of mass culture has moved to Moscow where, according to some sources, about 90% of Russian capital is now circulating. As in certain Western countries, our mass-culture stars have always gravitated towards the capital but now modern musicians and the attendant recording industry are moving there. It is a sign of the times.

Life in Moscow is boiling, heated by the wealth of the New Russians. Privately owned recording studios are said to number over 200. In St Petersburg, however, there are only the old studios, which have existed since the days before perestroika began to take effect. Personally, I know only one serious studio to have been built in St Petersburg recently. As this is hardly representative, I have chosen to look at two established studios–the Petersburg Recording Studio (PRS) and the Classical Music Studio (CMS). Both have interesting histories, are located in old buildings, and have proven be able to survive in extremely difficult circumstances, due largely to the efforts of their talented personnel.

PRS IS the new name of the Petersburg Recording Studio, which belonged

connection





Left: The control room at the Classical Music Studio. Below: The unique 6,000-valve console at the studio was regrettably destroyed

previously to the All-Union, State Melodija concern, the only producer of recordings in the USSR. State Melodija had several studios in different towns, and several (I think five) vinyl-pressing plants.

As a recording company, Petersburg Studio was founded in 1959, but until 1972 it did not have any facilities of its own. In conjunction with Melodija, the studio had been renting halls, and had equipped control rooms in both the St Petersburg (then Leningrad) Philharmony, and Academic Cappella, which possessed an organ. Cappella's concert hall had a unique acoustic, partly created by the old master acousticians filling the entire space under the stage with broken glass. In addition, for a period of time, the studio had a control room in the Mariinsky Opera and Ballet Theatre (known in the time of Soviet power as the Kirov Theatre).

This studio did not exist for very long, because the theatre was only interested in recording music for its performance and its orchestra. When the repertoire of the Theatre was exhausted, interest in the studio faded but the control room in Cappella remained and until recently was the best-equipped control room in St Petersburg. It was initially based around 8-track, and then 16-track Ampex machines, a 16-channel TAC Matchless console, and a Sony U-matic with an editing system. Apart from the stationery control rooms, the studio also had equipment for 'out of house' recordings. To fulfil state orders for recordings, studio personnel took equipment to Bashckiria, Tataria, Mordovia, Chuvashia, and into many other regions and republics of the former USSR. Big programmes were recorded, and in trips lasting between two and four weeks, anywhere from 10 to 30 albums would be produced. In 1972, our government rented to his studio the big St Catherine's Lutheran Church, which was built in the 18th Century. The building was in an extremely poor condition and needed quite serious repairs. This was, however, a consequence of neglect, rather than a consequence of the struggle between state suppression of religion.

In stark contrast, the Catholic church in Nevsky Prospect, in the very centre of St Petersburg, had a swimming pool built inside while an open swimming pool was built in place of Moscow's biggest Orthodox Cathedral, after it had been blown up. Both acts of vandalism were committed in the name of atheism.

The St Catherine's church building was restored over a period of 12 years through the efforts of the studio staff. The restoration was difficult and involved the restoration of the whole interior including gilding the heads of the columns and the balustrades. Work finished in 1988 and cost of two million rubles. Such a project would be quite impossible now, with the US dollar commanding 5,100 rubles but at that time, the ruble was officially rated at $1.66 US and on the black market it was, perhaps, ten times less.

At the time of the restoration work, responsibility for the acoustic design was given to GIPROKINO (the State Institute for the Design Cinema Theatres). Perhaps this is hard to believe, but in a country with so few studios there were at least three institutes for designing studio acoustics. In practice, the GIPROKINO design was never fully realised, in part because the building was declared an architectural monument. (The state committee for the protection of monuments forbade any alteration of the structure and allowed little to be done with the general layout.) Other problems included communication with the builders who, for example, refused to lay the zig-zag brick pattern called for in the design to help to produce a more diffusive soundfield in Control Room 1. The same problem meant that the ceiling surface was also simplified and that even when the diffusors were finally installed, they were not installed in places where they would produced the desired result.

Eventually, however, the studio finally got its two control rooms. Control Room 1 is 80m^2, and Control Room 2 is 25m^2. It also has five isolation booths (two of 20m^2, two of 5m^2, and one of 30m^2) for recording vocals and acoustic instruments. Most importantly, it gained full use of the giant (28m x 17m and 11 metres high) hall which had earlier seen the church's religious services.

The biggest of the isolation booths was originally planned to be another control room, but due to the poor sound isolation of Control Room 1, it was turned into a live room for the recording of vocals and acoustic instruments. In accordance with the generally accepted principles of that time, the control-room acoustics were aimed at a domestic average, and, consequently, were reasonably live. The other four booths were quite absorbent.

The large hall is mainly used for the recording of classical music, vocal jazz, chamber music, and sometimes orchestras, 'But not every combination of music and dynamics are suited to the characteristics of this hall,' says Recording Engineer Victor Dinov. 'Obviously, the isolated booths are usually used for modern pop and rock recordings but during classical sessions, ☞

PRS' live hall took 12 years to restore and cost 2m rubles

they help to solve some of the problems arising from the more difficult aspects of the hall acoustics. Measurements suggest a low-frequency reverberation time of around six seconds—in fact that seems to be so—but there are also, how shall I say it, subreverberations which build up at the gallery level, somewhat independent of the first process in the hall. On the measured plots, two tails could clearly be seen and we found some directions where the reverberant level even exceeds that of the incident wave. Because of this, during orchestral recordings, instruments such as contrabass or vibraphones are moved to the booths, so as not to "overload" the hall reverberation, and become disproportionate to the rest of the instruments'.

Two of the booths are connected to the hall by windows—the only windows in the whole studio. It must be said that during my first visit to the studio, I was quite surprised by this lack of windows but the reason becomes evident when you remember that the building is a monument, so nobody is allowed to knock holes in the walls.

Perhaps more surprising is how this lack of windows is viewed by Victor Dinov: 'Music is art for the blind, and nothing needs to be seen. It is for the ears alone'. He asserts. He maintains that windows are needed only in postproduction and overdubbing situations where the engineers can see the artist and the picture simultaneously. As an example, he has a story of how he had once been recording a jazz festival in parallel with a television crew. The television people asked him for an audio signal but he spent the whole 5-day festival without seeing a single band. Afterwards he found himself mixing his recordings to the video footage and arriving at balances unsuitable for audio-only release. On the other hand, perhaps he has just got used to working blind.

The unique hall of the main studio has defined the studio's major work for the past 35 years. For most of that time it was the only studio in St Petersburg producing classical recordings—initially for LP and for CD since 1988. Most of St Petersburg's best musicians have worked here, besides many of the old USSR's éminent artists. Among these have been the conductors Evgeny Mranvinsky and, Gennady Rozdestvensky, violinists Boris Gutnikov, Mikhail Vayman, Maxim Fedotov, and Sergey Stadler, organist Isaya Braude, the Academic Symphonic Orchestra of the Mariinsky Theatre (Kirov), singers Galina Kovaleva, Konstantin Pluznikov, Evgenya Gorokhovskaya, Nikolay Okhotnikov, and many others. Studio Manager, Igor Delgado says 'Some of these musicians are of the very highest level, but are almost unknown to Western listeners due to the closed nature of the former USSR. One of our main goals is to bring such musicians to a wider international audience'.

THE STUDIO COST around US$600,000 to equip. There is a Studer 905, with MasterMix MX644 automation for Control Room 1 and a Studer 962 console for Control Room 2. Control Room 1 also has a 24-track Studer A820 with Dolby SR and quarter-inch Studer A820 mastering machines, one of which is also Dolby SR equipped. The studio also has digital equipment for classical recordings

He maintains that windows are needed only in postproduction and overdubbing situations where the engineers can see the artist and the picture simultaneously

comprising Sony BVU800, Sony PCM1610, and Sony DAE1100 which was initially installed in Control Room 2, the room that was orientated from the very beginning for classical recordings. Both control rooms are equipped with Tannoy classic monitors.

Microphones include B&K 4003s, Schoeps CMC55s, and various AKGs, Neumanns, Sennheisers and Shures. More equipment has recently been bought, such as a WaveFrame digital audio workstation, which is successfully used for premastering, and even restoring old recordings, despite the fact that it was not primarily intended for such use.

Using his own restoration technology —based on signal splitting into several frequency bands with an internal WaveFrame equaliser and processing each band with Behringer denoising processors—Dinov has restored some important Russian recordings. Alexander Galich, a famous poet and singer, was inconsistent with the old Soviet regime and consequently spent many years in Stalin camps. Not surprisingly, he was never honoured with the opportunity to record in the State's professional studios but had to make his own recordings in less prestigious circumstances. Using the WaveFrame-Behringer techniques, Dinov has restored many of the 'semi-amateur' recordings of Galich and also of Peter Leschencko, a famous Russian singer during the early 20th Century. This work has only been possible due to that knowledge gained from daily use of the WaveFrame.

Other processing equipment has recently been installed—some commercial units from Lexicon and Valley and other specialist equipment, similar in purpose to exciters, developed by Victor Dinov himself. The latter consists of two independent filter sets with dynamic Q—which falls if there are insufficient harmonics near to the central frequencies and vice-versa. They enrich the timbre in a selected frequency band of a stereo signal or of two bands in mono.

THE HISTORY of the Classical Music Studio is very interesting indeed, though I only managed to document it with the cooperation of Evgeny Nikulsky, the studio's main sound engineer. With 50 years of experience behind him, Nikulsky has seen all the stages of sound recording technology development up to present day.

The story begins at the end of the last century, when on the embankment of one of the canals between the Mariinsky Opera and Ballet Theatre and the apartment house belonging to Fedor Shalyopin, the Emperor's Intimate Theatre was built. In fact, it was built for the sole purpose of allowing the Emperor and his closest family and friends to be able to attend the Mariinsky Theatre performances in more intimate surroundings. Later, just before the revolution, the Emperor's family moved to Moscow, and the theatre was bought by a Cavalry Guards Regiment, who turned it into an officers' club. As such, the theatre existed until the revolution, during which, 'only the devil knew what was happening there' says Nikulsky.

The theatre then became the The Nuilder Cultural House and stayed that way until World War II, during which time Leningrad was under siege for 900 days. One shell fell directly into the theatre building, which at the time was serving as a mobilising centre for the Peoples' Volunteer Corps, and resulted in severe damage.

After the war, it was decided to pass the devastated building to the Documentary Films Studio who produced two designs for its reconstruction. Neither one was realised due to lack of money. The structure began to change, however, in 1959, when the Soviet government issued a decree to improve its equipment and technology for film production.

In these years, the whole national economy was developed around the decrees of the government, and-or Communist Party (there were no big differences between the two) but which were obviously being written by interested parties and meant substantial funds becoming available. Significantly, the industry was expected to produce wide-frame and wide-screen films with stereo soundtracks. This required the

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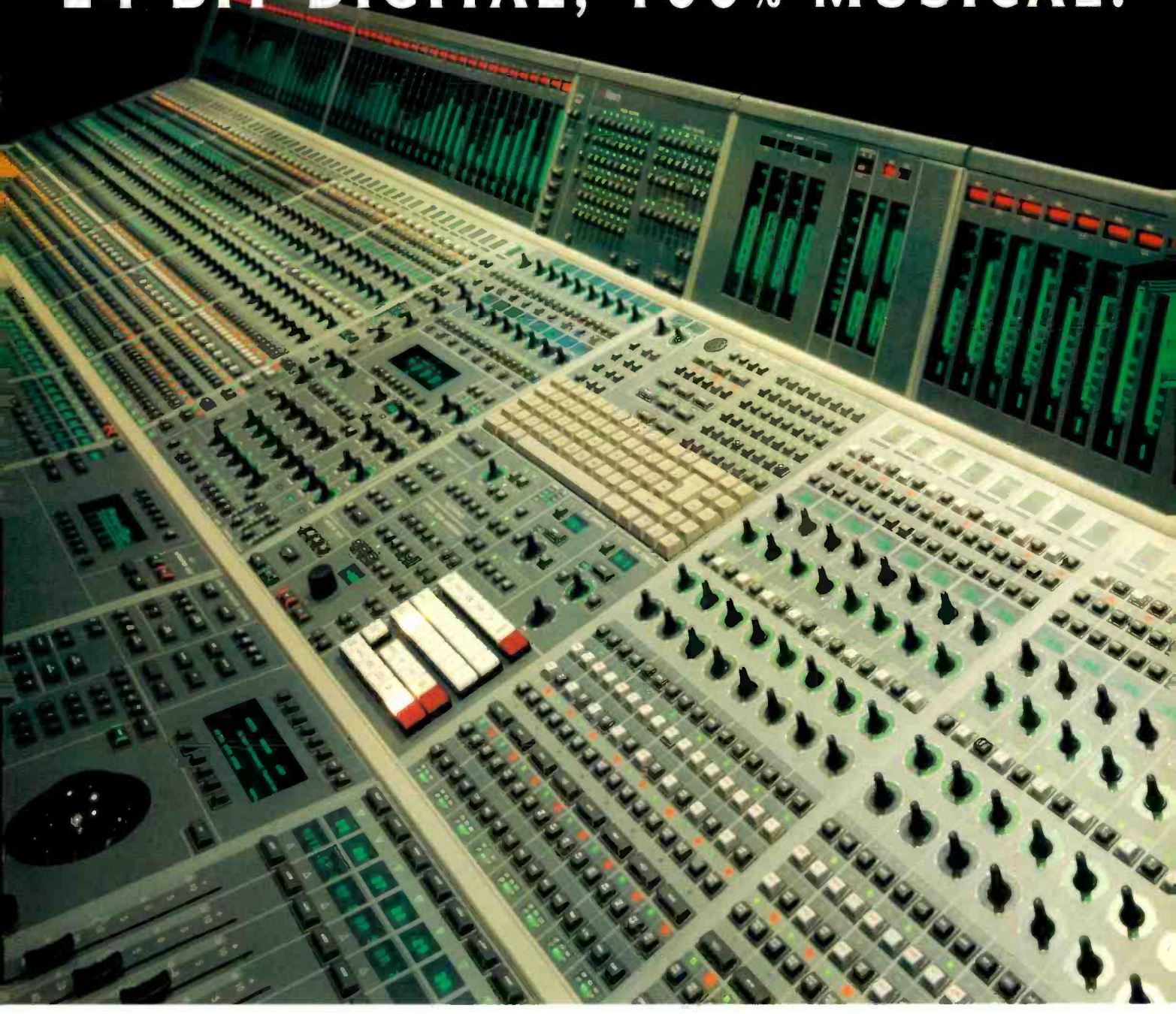

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development and manufacturing of new tape recorders and other sound equipment, along with new kinds of cameras and film processing equipment.

Many of the biggest institutes and factories were involved in this work but there was still a shortage of money, and for this reason it was decided to concentrate all the facilities for stereo magnetic recording and post-synchronisation of film production in one place—the Leningrad Studio. It was the first European complex of its kind and its uniqueness attracted the attention of many foreign clients wanting to record film soundtracks. The creation of the complex was led by Evgeny Nikulsky.

As a result of the above policy, the various soviet factories, but mainly the Leningrad plants, have produced the equipment needed for every stage of the stereo recording and film producing processes.

The postproduction console looks mighty and contains almost 6,000 valves. Evgeny Nikulsky says that since then, he has never heard such a subjectively true sound, neither on transistor-based equipment, nor from ICs. Unfortunately, nothing is left of this equipment, except for black-and-white photographs.

The old control room at PRS with Studer 905 console

At the time of the main construction work was carried out, one of the biggest Leningrad cinema theatres had been reconstructed to show 70mm films with 6-channel sound, so the process of putting into production 70mm films on an industrial scale in the Soviet Union is complete.

The complex is located in the former Emperor's Theatre building. The old auditorium having been turned into a huge control room of 2500m³ and treated to have typical cinema-theatre acoustics. This room, equipped with projectors and screen, was used both as a control room for final mixing, or as a stage for the primary recording of small musical ensembles and orchestras. The old theatre stage was transformed into a small control room (connected to the main control room via a window) and several auxiliary rooms, including one for recording speech. On the second level was a projection room.

The large theatre foyer (28m x 14m with a maximum height of 14m) proved to be a beautiful space for a live recording.

Originally, the foyer had its own little stage, but during reconstruction, this became the base of the new control room. After all of the re-building, two quite independent studios were complete; the one occupying the foyer being mainly for the recording of film music. Between 1963 and 1980, the music for around 100 films was recorded in this studio, including such musical films as *Katherine Izmaylova*, *Sleeping Beauty*, *Swan Lake*, and *Duke Igor*.

WITH PERESTROIKA, film production in Russia at first dropped dramatically and then dried up completely. The studios stood idle until Eldar Zeynalov turned it into a classical music studio, aimed at the recording of classical music for CD release.

Originally, the studio occupying the foyer had a wonderful acoustic with an almost totally diffuse reverberant field. Somehow, the old masters achieved what rarely turns out well even with the help of modern computers and measurement techniques. However, due to the need for more sound isolation from both the street and from the other studio, some of the original acoustics had to be modified. When CMS took over the operation of the studio, one of the first things that they did was to restore the original hall acoustics. They invited Yuri Indlin and other specialists from the Moscow Research Institute for Cinema and Photography to take measurements and make computer models. The implementation of the reconstruction work showed a very close correlation with the computer modelling work.

The reverberation time for the empty hall was almost uniform at 1.6 seconds in the range 50Hz–8kHz. When the hall is filled with performers (say, an orchestra and choir of 100–120 people in total), the RT drops to around 1.3 seconds, which occasionally requires a little artificial reverberation to be added to the recordings. But in the opinion of the majority of sound engineers, the CMS hall is probably the best studio hall for the recording of classical music in St Petersburg. In October 1994, it was visited by Philip Newell, the internationally renowned studio designer, in whose estimation the hall acoustics were very good indeed (see 'Raising the Curtain', *Studio Sound*, February 1995). This hall is a pleasure to record in, not only for studio personnel but also for the musicians who say that they feel very comfortable when playing. They point out its easy intelligibility and that they find every instrument in the orchestra clearly audible and natural sounding.

There was still a shortage of money, and for this reason it was decided to concentrate all the facilities for stereo magnetic recording and post-synchronisation of film production in one place

CMS' equipment list is not too long, but has been very carefully selected. The main mixing console is an Amek Hendrix, with Supertrue automation which is kept company by a Mackie 24:8:2. Main monitors are Genelec 1033As with Yamaha NS10s for domestic reference. There is a selection of excellent microphones including B&K 4006s, and 4001, Schoeps MKS, AKG C414s, C460s, C749s and Neumann U89is. The 'assistance' to the hall's natural acoustics, when 100 or more musicians damp it down, is usually provided by a Lexicon 300.

I mentioned earlier that the studio building contained two studios, so the story would not be complete without referring to the present usage of the old foyer studio. This studio, having cinema-theatre acoustics, is now occupied by Lendocvideo, who offer various audio-video services. They have an Amek Big-by-Langley mixing console, with Genelec's tri-amped 1024B monitors and, again, Yamaha NS10s. Tape recorders include a Fostex G16 , Sony BVW-75P Betacam SP, VO-9850 U-matic SP, Panasonic AG-7500 Super VHS plus a number of others, along with all necessary synchronisation equipment. There is a range of general effects processors, which includes an AKG ADR68K reverberation and effects processor.

Hopefully, this article will have given some idea of the development of at least one part of the Russian recording industry. Things at the moment are very difficult, but we hope that the future will bring us all more opportunities.

CONTACTS

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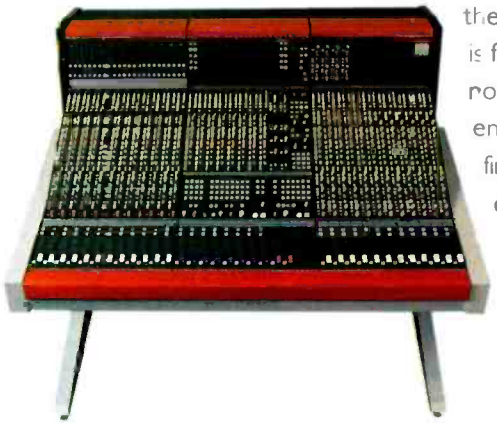

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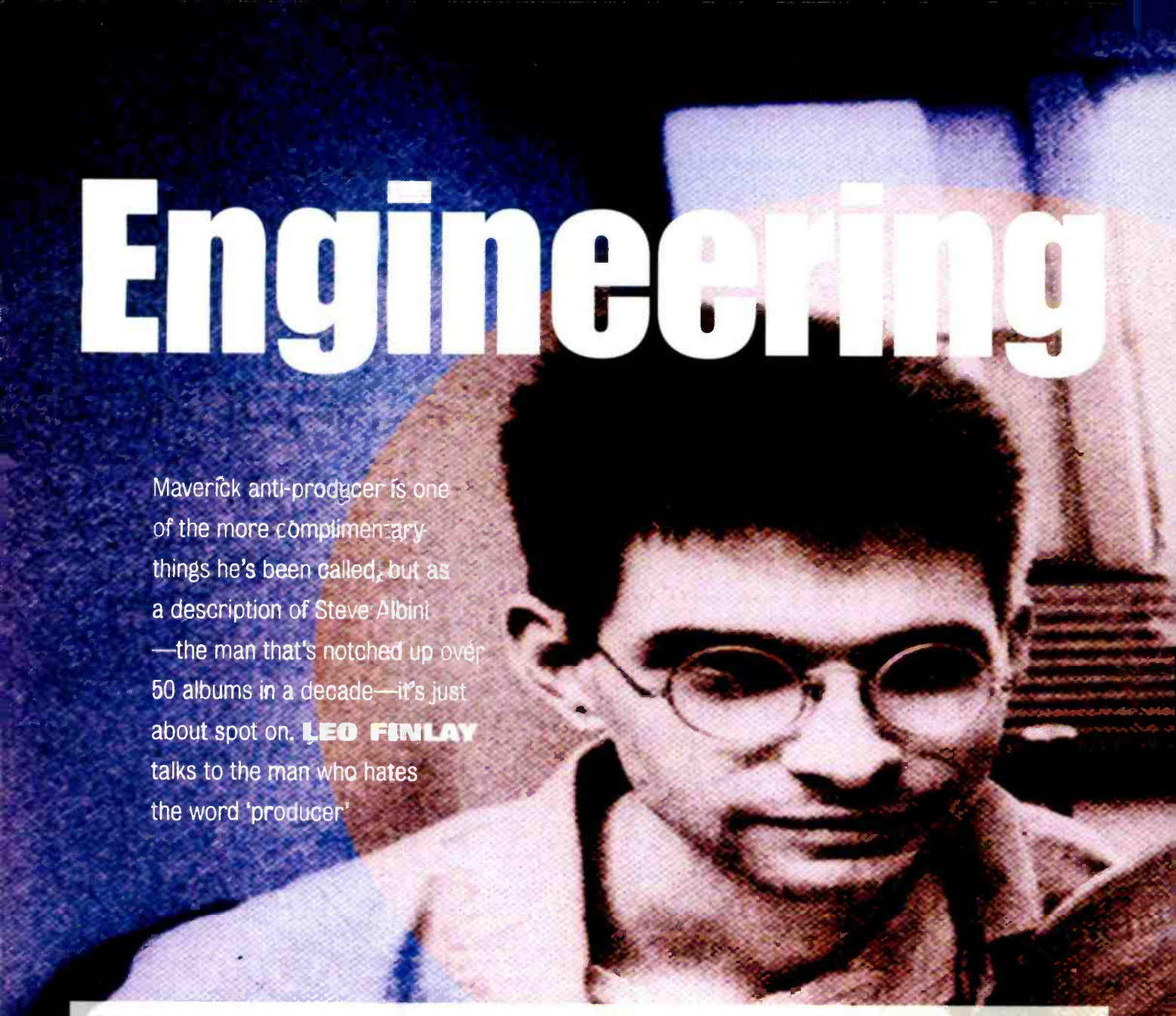


Maverick anti-producer is one of the more complimentary things he's been called, but as a description of Steve Albini —the man that's notched up over 50 albums in a decade—it's just about spot on. **LEO FINLAY** talks to the man who hates the word 'producer'

STEVE ALBINI is easily one of the busiest men in the recording industry. Apart from fronting the gigging band, Shellac, and working with dozens of bands each year in the studio, he estimates he's 'recorded' some 55 albums in the last decade. He's famous for his work with Nirvana, The Pixies and PJ Harvey, but spends almost all of his time recording obscure alternative bands around the world. These bands bask in critical acclaim, and some, notably the Breeders, achieve commercial success.

Albini's work on Nirvana's *Nevermind* follow-up, *In Utero*, broke him into big-time production, but the begrudging outside world remembers that project more for the slanging match that erupted between its recording and its release than for its extraordinary achievements. Yet Albini is undaunted and will continue with his self-appointed manifesto to record and engineer at break-neck speed, with whatever artists he considers valid, and in whatever environment he considers suitable.

Despite the fact that he's one of the most respected technocrats in the business, the words 'producer' and 'production' are no longer ones Albini wants to be associated with. As a successful musician —he fronted the influential Big Black and controversial Rapeman—he is very much an artist's man, and regards their input and performances as the key to making a great record. So why exactly does he view the term, production, as so distasteful, to the point where he is generally credited as engineer or recordist?

'I consider a "producer" to be an employee of a record label, who masterminds the sound and presentation of the music on a record. By that definition, on every record I've ever made, the artist would have to be considered the producer.

'My job is a technical one, but that doesn't mean it can't be executed with an ear for subtleties and an appreciation of style and grace. I make no secret of my distaste for producers. I have no respect for the way they interfere with bands who are complex, self-sufficient entities, and who have gotten to the point of making a beautiful statement without interference. I have no respect for their greed, which is an offshoot of the greater greed of the mainstream record industry, and I cannot fathom their egoism. The bands come first, period. I do not behave like a producer, and I do not consider myself one.'

It's a rare philosophy for such a high-profile industry figure, but being an outsider has given Albini the vision to work all the more closely with artists. Albini also has little time for the concept of the studio. With Swedish band, Souls, he took the bizarre step of recording the album in a barn next door to the studio.

'Before studios existed,' Albini explains, 'records were recorded in motel rooms and at clubs. Studios are not essential, they're merely convenient places with lots of equipment and microphones.

'I try to do a good job, which means recording everything as realistically as possible, with an eye out for any derailments that might occur along the way, good or bad. I have developed a pretty broad palette of techniques which enable me to record just about anything that might come up, and the execution of somebody's brilliant idea is always the high point of my day.

'MY PHILOSOPHY is along the lines of the Hippocratic Oath: At Least Do No Harm. I think it's best not to interfere. All too often a band will go into a studio with their art and personality pretty well in hand, and come out feeling like they're sub-par. The band shouldn't feel they're undergoing some strange experiment and, if I'm doing my job right, the band can forget they're making a record and enjoy

a revolution

'30 years into the "digital revolution", digital is dead as a carp when it comes to serious recording, except for location recording and jingles'

the whole process as an extension of their normal band interaction.'

Albini also believes that recording and mixing should never be regarded as two separate entities, but as integral, organic parts of a project. He feels that too many records feel like their sound originated at the mixing stage, with the producer regarding the performance as a slovenly mess that simply needs a lot of cleaning up.

'Those records always sound funny to me,' he opines, 'as though there was a veil of artifice between the listener and the band. I prefer records where there is an immediate and obvious connection between listener and artist, and that the performance being listened to is an actual event rather than a Speilbergian special effect.'

Scott Litt was famously brought in to remix 'Heart-shaped Box' and 'All Apologies' for *In Utero* and, while Albini deems it unprofessional to talk about fellow pros, he's unhappy about that situation: 'The remixes of recordings I've made have been so awful. Since the process is conceived as being a linear one, interrupting it and turning it over to an outside party can only be destructive.'

The Nirvana case was a different one for Albini, as it was the first time a globally massive band had entrusted him with the follow-up to a 10 million-selling album. He's more used to working with obscure acts at the beginning of their careers and bringing them to a higher level. But, with the notable exception of long-term associates Jesus Lizard, he tends to be employed to build bands up and then dropped in favour of a more 'commercial' figure when his efforts start paying off. PJ Harvey and The Wedding Present both used him for one album, The Auteurs project is also likely to be a one-off, and The Breeders and The Pixies also selected others after his initial input. No one can quibble about the value of his work, but the feeling must be that his name leads to a perception of 'alternative' parochialism.

Does Albini feel rejected?

'All these bands are individual cases,' he comments. 'I didn't feel let down by The Pixies at all, because I felt I'd done as much as I wanted with them. The Breeders situation was different in that Kim Deal felt she needed to produce the follow-up to *Pod*.

THE ANALOGUE connotations of the name Shellac suggest that Albini has 'analogue sympathies'. The suggestion is supported by a Big Black compilation album *The Rich Man's 8-track Tape* which bore the legend: 'This compact disc [is] compiled to exploit those of you gullible enough to own the bastardly first-generation, digital, home-music system... Don't worry about their longevity as Philips will pronounce them obsolete when the next phase of the market-squeezing technology bonanza begins'.

'It's safe to say,' he says by way of explanation, 'that 30 years into the "digital revolution", digital is dead as a carp when it comes to serious recording, except for location recording and jingles, where editing and compact storage media are the deciding factors. I record and mix to analogue, and I don't know of many serious engineers who do otherwise by choice.

'All the small-format digital decks I've worked with are a nightmare in a professional environment. DAT is useful as a higher-fidelity home cassette, but is totally unsuitable for permanent storage of masters. I strongly believe recording a master tape is writing the history of the artist for perpetuity. I would feel like a fraud if, after months of work, I gave an artist a DAT, knowing it wouldn't be playable in a few years' time.

'All other issues aside, once you compare the sound of a properly set up analogue machine—without noise reduction, which I never use—to any stand-alone digital machine, any quibbles will disappear. The best analogue machines are simply untouched in sound quality, and they have the added advantage that recordings made on them will still be here in 50 years.'

And for the editing medium? 'In principle, digital editing is nice (reversible, parameter-controllable and so on), but any time saved in getting the edit right is lost in fighting your way through the command lists, not to ☞

BACK TO THEIR ROOTS

NIRVANA WERE the band who made it cool—and profitable—to play guitars again. But, after the huge international success of the Butch Vig-produced *Nevermind*, they felt a need to get back to their punkier roots and hired Albini, who they admired for his work on Big Black, with Jesus Lizard and Killdozer.

Albini says: 'There had been lots of press linking me to Nirvana, but it took a long time for them to contact me. Because of the sphere I work in, I tend to ignore a lot of chart bands. As a result I really didn't know Nirvana from Adam. But when I met them I realised we were cut from the same cloth; we grew up the same way, in the same kind of place and had the same musical influences.

'I didn't have the emotional baggage most people had with Nirvana and, when going in to do the record, I didn't regard it as a life-changing experience. But after finishing I knew that's exactly what it was.

'I had no problems in the studio with them, we worked together really well. There were no disasters, no tantrums and certainly no pharmaceutical problems. Once recording was finished, it just seemed there would be no end of problems. They just developed overnight.'

Scott Litt came in and remixed two of the album's highlights, 'All Apologies' and hit single 'Heart-shaped Box'. The tracks were the highlights simply because they were the best songs on the album, does Albini feel slighted by this imposition?

'My versions were perfectly good recordings. I just felt that if they didn't want me to work my way with them, they should never have asked me to do the job in the first place.'

The band that told America how unhappy its children are

ADDITIONAL MATERIAL BY NICK SMITH

mention the time it takes to load and unload the audio onto the permanent analogue storage tape. If you're set up to work exclusively on the workstation, as is the case in jingle production, then the sound quality issues and fragility of the digital data are moot, but if you have all the analogue machines in place, the digital system is much more of a nuisance to bring into play for a lousy edit. And if the edit actually physically exists, then there's no way an edit file or menu can be corrupted, and there's never any question about where the edit takes place. I'll admit that crossfades are easier on a digital system, but it's a false economy to compromise the sound of the whole record for the sake of saving 15 minutes doing a crossfade.'

When listening Albini is happy to enjoy his established preferences over there perceived need for cutting-edge equipment: 'I don't have a philosophical objection to large far-field monitors, but in the 15 or so years that I've been making records I've only encountered one or two installations where they were worth listening to. Unless you get set up in a control room and stay there for weeks or months, it is very difficult to get comfortable with the peculiarities of a large monitor system, whereas little monitors can be easily repositioned, adjustments can be made to the tweeters and amps, and pretty quickly you can get a usably diagnostic sound out of them.

'At home, I prefer listening to music on a high-quality hi-fi speaker, but in the studio it's more important to have an even dispersion from the tweeter and an even response at different volumes than it is to have a flattering frequency response or deceptively-crisp reproduction. For close-fields, I quite like the Genelecs, although I find myself getting lazy with mix balances when I work on them exclusively, since they seem to handle complex material better than most small speakers. For general use, I'm happy with Yamaha NS10s or B&Ws. For big soffit-mounted installations, the good ones always turn out to be Tannoy or ATC, although I didn't much care for the ATC close-fields I've tried.'

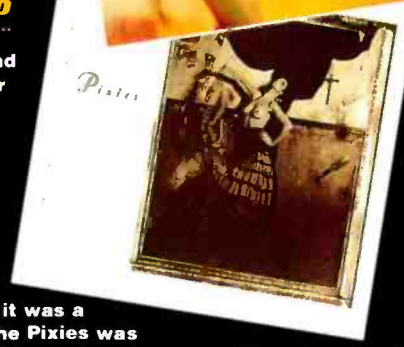
MICROPHONES ARE an Albini obsession. The sleeve notes for a Shellac single, (*The Rude Gesture*) listed more than 20 mics used in the recording. Like Stephen Street (*Studio Sound*, December 1995), Albini passionately believes that mics are crucial to a recording.

'I own about 350 mics,' he reveals, 'and I still feel like I have a few holes left to fill. One of the first things I did when I started making recordings was to experiment with different types of microphones as they were available, discovering as I went along what the general traits of each were and how they could best be used to capture a realistic sound.

'My experience has convinced me that the most important decision an engineer can make is what type of microphone to use, and in which position. I've found by experimentation that a lot of the accepted mic choices simply don't work for me.

'There is no instrument less suited to the characteristics of a dynamic mic than a drum kit. If you walk into a control room during one of these tracking sessions, you see every EQ turned on, all trebles full-whack, gates and compressors running wild, and a cheap little sound coming out of the speakers.

'I also think engineers do a disservice by treating each sound in the kit as a separate recording. I've always imagined a drum kit as a sort of bully's piano, and it needs to be heard as a single



FROM PIXIES TO *POD*

THE PIXIES WERE the first band to achieve significant chart action for Albini. His abrasive roots showed through, and worked well against the sci-fi Brian-Wilson-inspired pop of frontman, Black Francis. Albini says: 'I worked with The Pixies when they were very small, and they were just like any other small band; modest people with a bunch of songs they were desperately excited about recording. They were simply excited. it was a really big deal. My experience with The Pixies was different to everybody else. Then the big music industry machine started rolling and they became celebrities. The treadmill process changed them dramatically.

'I did a song with them a few years after *Surfer Rosa* when they were getting the star treatment, and they didn't seem to be enjoying it as much—if at all.'

This all changed with Kim Deal's spin-out, the Breeders. Free from the angst of The Pixies and reunited with Albini at the controls, Deal put together *Pod*, a truly magical album that caught the zeitgeist with startling acuracy. Wheras Francis was to founder, Deal was to excede, both with The Breeders, and The Amps.

Albini says: 'I don't know if she was being restricted in The PIxies as much as it seemed. It did appear strange, however, that the band split right after her first side project. I don't like to compare and contrast bands I've worked with, but I never went out of my way to buy a Pixies record, but I did with The Breeders.'

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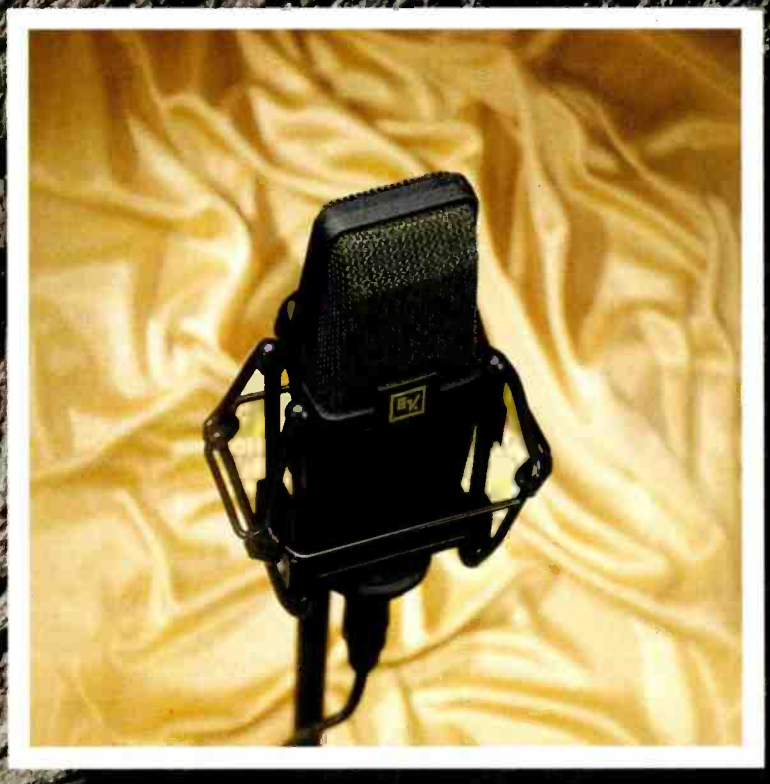

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instrument. In those terms, nobody would ever think of recording each hammer of a piano to a different track, with the idea that it could be rebalanced later. And just as a piano must be tuned properly, a drum kit must be tuned to sound its best.

Stephen Street, who rates Albini's work highly, told *Studio Sound* last month that he has always been blown away by the drum sound on The Breeders' debut album, *Pod*.

But the man is typically modest. 'The secret is Britt Walford, the drummer. He always sounds great, no matter where or what he's playing.'

ON INFLUENCES, Albini is characteristically controversial.

'Eno was a formative influence back when he made records,' he states unequivocally. 'Although his approach in the studio is pretty far from performance-based approach, he was aggressive in experimenting and I appreciate that. Experiments are extremely valuable if they result in decisions that can be built upon. If the experiment exists merely to provide another option to be mulled over later, it is probably a waste of time. The difference between Eno's approach in the 1970s and the studio-intensive approach of today, is that once an experiment was underway in Eno's world, it would lead to something which could be instantly used or formally integrated in some way. The experimenting most bands do today is a way of putting off the decision making process. 'What is important is that the standards not be lowered to make life easy on the equipment manufacturers and the studio facilities. Demand quality at every stage and eventually someone will provide it. Remember that the recording is the important thing, and the deals are trivial footnotes. Do a good job and you will be remembered for it. Even if you get paid a lot of money, you will still be remembered for the job you did. Take it seriously.'

In closing, Albini returns to his former paragon: 'Currently, Eno's an embarrassment to his legacy, but sitting on his wallet, I doubt he cares what the world thinks of him.'

THE AUTEURS

ALBINI HAS WORKED with artists as diverse as Nirvana and The Wedding Present, but it was still a surprise when his name popped up as engineer on foppish miserabilists, The Auteurs, forthcoming album. Albini admits that, initially, he too thought the band's interest was odd: 'I often get approached by people who seem to think working with me would be a wacky experience.' But after a few sessions with the band, Albini realised the band's sardonic outlook on life was right up his street. They recorded *After Murder Park* in London's famous Abbey Road over a 13-day period.

Auteurs frontman Luke Haines recalls: 'One of the reasons we went for Steve was to get it done quickly. Thirteen days was probably a long time for him, but it was really speedy for us and allowed us to get on with other projects.

'Steve is perceived as being difficult to get on with, but recording with him was great fun. His role as a vibe merchant was just as important as his recording skills.'

Albini outlines his thoughts on studios in the main piece here, and his thoughts on Abbey Road are no different, but he's delighted with the results of his work there.

'It won't appear until February, but we recorded it some time ago. I'm generally too busy to listen to stuff I've worked on, but that was definitely one of the cappers of my year. I listen to it now and can see that it will stand the test of time.

'Frankly,' he adds, 'they did a job on that record that no one has done for ages. They carved a sound for each song without resorting to fancy tricks.'

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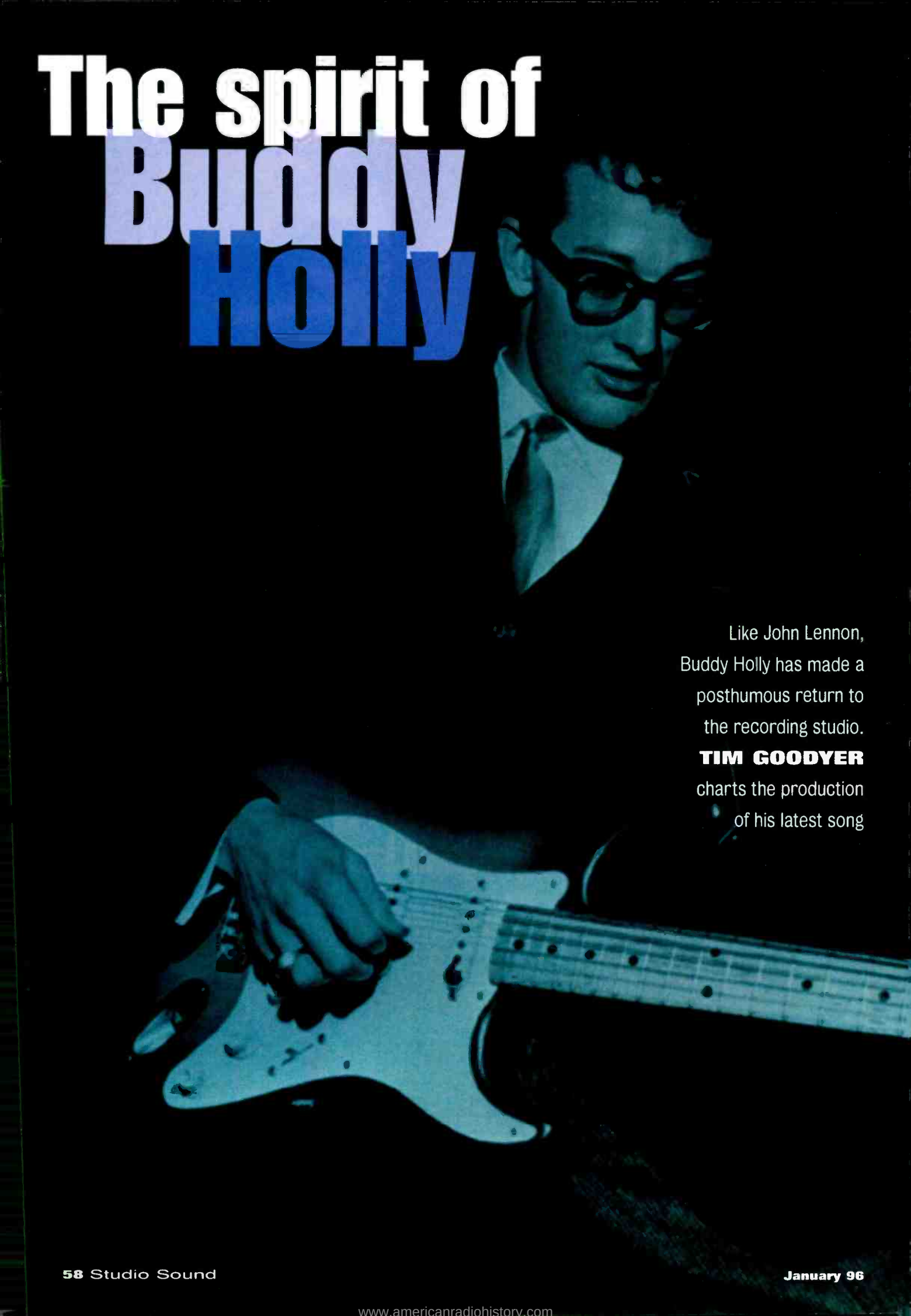
The spirit of Buddy Holly



Like John Lennon, Buddy Holly has made a posthumous return to the recording studio. **TIM GOODYER** charts the production of his latest song

PELICAN SOUND STUDIOS, in London's Covent Garden, has chiselled a milestone in audio postproduction, uniting an historic Buddy Holly recording with today's line-up of The Hollies, for a freshly released tribute album. Continuing the theme established by the 'reformation' of The Beatles last year, the Hollies bass guitarist Ray Stiles used a 1958 hotel-room recording of Buddy Holly singing 'Peggy Sue Got Married' to acoustic guitar, as the basis of an entirely new arrangement of the classic song. The process required much ingenuity and involved many hours intensive use of Pelican's DAR Delta Plus SoundStation to edit and piece the various elements together.

The song's new arrangement, written by Hollies keyboard player Ian Parker, necessitated adopting a tempo some 16% slower than the hotel recording—from 141bpm down to around 120bpm. Stiles (who is also the owner of Pelican Sound) used the studios Delta Plus' TimeWarp facility to stretch the song by an equivalent amount, in order to match the new tempo as closely as possible. A 'cleaned' version of the hotel recording on CD-R was utilised as the source material, with the TimeWarping being applied to the song globally, and also to individual phrases, to achieve the best possible fit.

Stiles comments: 'Naturally, the tempo of the original song was not computer-tight, but in order to build the new arrangement successfully around Buddy's vocal, the timing had to be click-track sharp. We chopped many sentences, as well as some individual words, into several parts. DAR's touchscreen is a godsend for this type of work—you simply pick up each little piece of "virtual tape" with your finger and place it where needed. It's a very fast and natural process—I dread to think how long this project would have taken using tape! This multitude of edits enabled us to get the start point of each phrase—or even each syllable—into the best position, then allowing us to TimeWarp the separate components bit by bit until the timing was exactly right.'

TIMING WAS NOT the only consideration in helping 1958 vintage Buddy Holly to sing along to The Hollies' 1995 arrangement. The team felt that an excellent fit had been achieved from a tempo point of view, but that the atmosphere and feel did not yet marry up. The next stage involved making it sound as if Holly was there in spirit as well as in voice on the new version.

This problem was addressed by utilising the WordFit facility on Pelican's Delta Plus. WordFit is an automatic dialogue-synchronisation package, normally used by the studio for its work on soundtracks for television commercials. WordFit enables replacement dialogue to be swiftly and automatically matched to the timing and rhythmic pattern of original speech. This facility gave the team the opportunity to WordFit Holly's voice into the vocal pattern of the new arrangement. Parker sang a new vocal line, with the feel and energy of the new arrangement, and Holly's voice was then automatically slotted into place.

Stiles is unreserved about the role of the workstation: 'Without the power and facilities of the Delta Plus, this whole project would have been totally impossible,' he states. 'We were pushing the system pretty much to its limits in our quest to rearrange a recording that was almost 40 years old. We are very pleased with the results—it was well worth the effort and, we believe, is wholly in keeping with the spirit of the tribute album.'

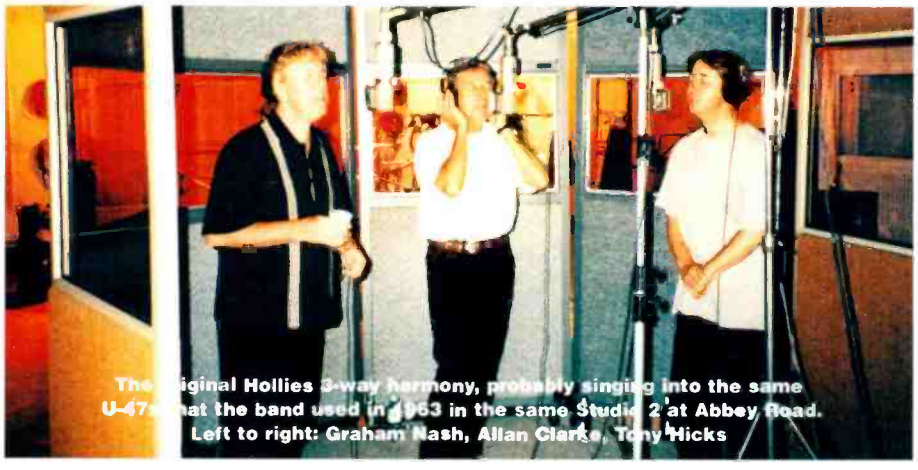
Despite having retempo'd, retimed, and created a different feel for the song, the work was not yet over. The original recording had to be heavily equalised in order to isolate Holly's vocal from his guitar as much as possible. Parker's arrangement had been written around a different chord structure, in addition to the completely new feel, and the original guitar had to be prevented from clashing. Although the degree of EQ required thinned out the voice somewhat, the team felt that once placed in the mix, the vocal quality was entirely satisfactory. The EQ section of Pelican's Yamaha DMP7 was used to perform this part of the process.

A final clean-up was necessary, as some original guitar could still be heard between the vocals when listening on headphones. Stiles performed some further severe editing, until he was satisfied that every last vestige of the guitar had been chopped—from between lines, phrases and syllables. At this stage, silence became an essential element in the mix.

Creative suggestions also played their part—just as everyone was happy with the results, up came the suggestion for a longer guitar solo. The answer involved going back into the Delta for a 'scene insert' to make room for the adjusted solo section.

THE FINISHED RECORDING took the form of a time-coded DAT, supplied to Abbey Road Studios for the rest of the song's production. Ian Parker took his computer and sound modules into the famous Studio 2 at Abbey Road, which had first hosted the Hollies in 1963. Here the 'Buddy Holly DAT' was copied across onto the studio's Sony 48-track digital machine, along with the computerised parts. Construction of the song continued with the addition of Bobby Elliott's live drums which replaced the click track, and the acoustic and electric guitars of Tony Hicks. Bass guitar and acoustic piano completed the tracklaying, forming a very interesting overall mix of traditional musicianship and state of the art music technology.

Graham Nash's arrival from the US (travelling straight from London's Heathrow airport to Abbey Road Studios), formed once again, with Allan Clarke and Tony Hicks, that unique vocal blend which is unmistakably that of The Hollies. The project symbolised a joyful reunion for the original members of the band—if only for the two days of the recording. It also achieved a seemingly impossible timewarp, enabling Buddy Holly to contribute to his own tribute album and sing in harmony with his close namesakes, nearly four decades after his death in a plane crash back in February 1959.



The original Hollies 3-way harmony, probably singing into the same U-47 that the band used in 1963 in the same Studio 2 at Abbey Road. Left to right: Graham Nash, Allan Clarke, Tony Hicks

THE ALBUM

Various artists tribute album *Not fade away: Remembering Buddy Holly* (MCA) is released on the 29th January 1996. The album—which includes 'Peggy Sue got married' by Buddy Holly and the Hollies— features megastars such as Mark Knopfler, Dave Edmunds, Steve Earle, The Band, The Crickets and Mary Chapin Carpenter

Pelican Sound Studios' owner and Hollies bass guitarist, Ray Stiles, at work on the DAR SoundStation Delta *Plus*

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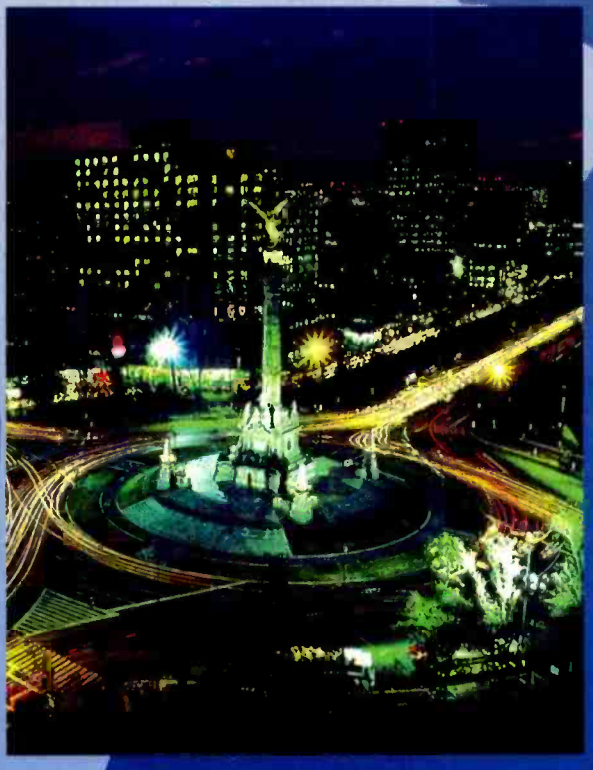

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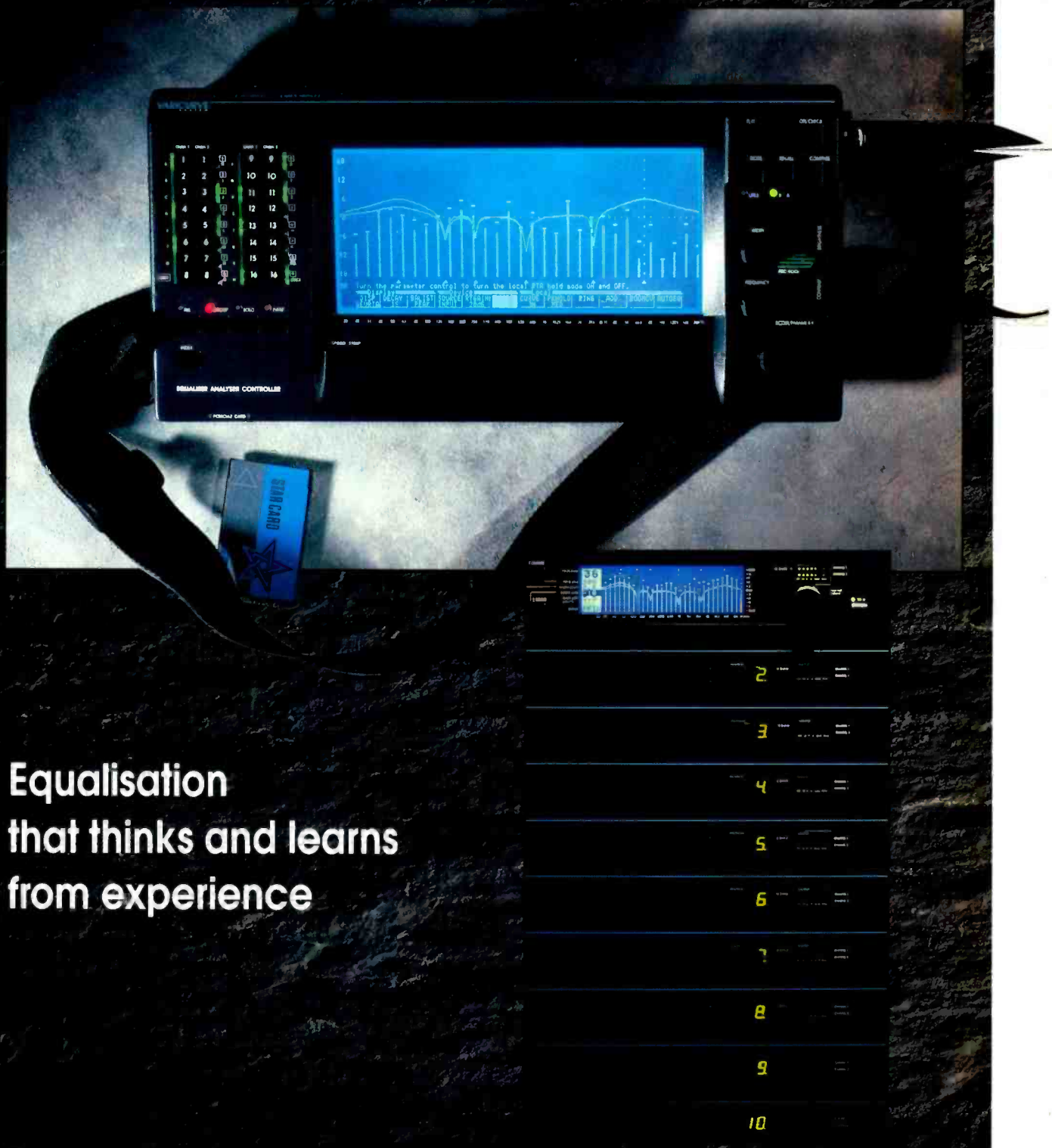

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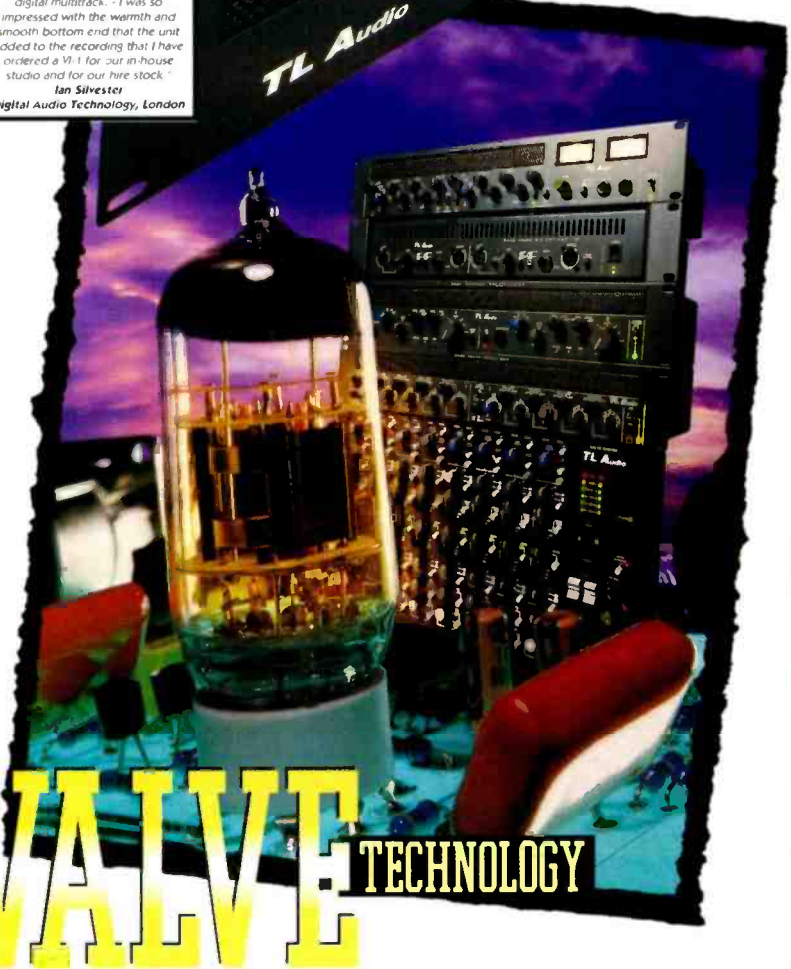

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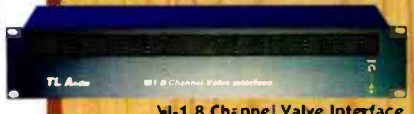

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Remotely relevant

With telecomms networks nearing the quality requirements of professional audio, is a new style of working imminent? **CHRIS EDWARDS** reports

Although some trendy music acts such as The Future Sound of London have toyed with ISDN as a means of performing at a venue without turning up, high-speed digital communication is much more than a technology for making statements about technology – and it's definitely going to make our lives easier.

To be able to provide production and postproduction work remotely from anywhere in the world is obviously as significant as it is convenient. In fact, long-distance work is likely to be concentrated more on the production process than recording or performance simply because of the practical problems involved in live tracking. The trick is knowing what sort of communication link to use for a particular type of job.

ISDN is little more than a narrow pipe for carrying data. Making it work for you is a lot more complicated, involving arguments about compression schemes and how to use a number of ISDN links together. A single ISDN connection cannot carry that much in terms of audio. It digitalises at a frequency of 8kHz, giving it a ceiling of just under 4kHz in terms of useful range. This is fine for the human voice as the speech range does not extend much above 4kHz. However, ISDN also degrades audio quality by taking 16-bit resolution samples and stripping them down to eight bits. Life is made more interesting by the US and Europe using different flavours of ISDN: the US version is about 8kbit/s slower than the one used in Europe and the way that the samples are converted to eight bits also differ. Any equipment attached to an ISDN line has to understand those differences or you will end up with a corrupted signal. Achieving higher bandwidth involves the use of compression systems and multiple ISDN lines.

For postproduction, where real-time feedback on what is happening to the audio is essential, using a number of ISDN channels concurrently is one answer. This, however, turns out to be more complex than it might at first seem. Although a number of ISDN calls can be set up in parallel, there is no guarantee that they will follow the same route. It is possible that one may use a satellite link and all the others an undersea cable to get to another part of the world. The multiplexers employed to use ISDN channels together are designed to work around this by waiting for the slowest link and then synchronising them so that they work together. This works well enough, but be prepared for delays: it is just like talking to someone on another continent over a satellite link. The multiplexer also has to deal with the differences between US and European ISDN. It is reasonably practicable to keep adding 64kbit/s channels up to around 2Mbit/s, enough for two channels of CD-quality or DAT-quality audio in real time.

CHANGES AFOOT may make it possible to work with multitrack audio remotely–perhaps stored on a hard-disk or digital-tape system. This would enable transfer of the audio data, processing and monitoring in real time. In the future, the high-speed links provided by sticking ISDN lines together will be replaced by another communications system which has another unmemorable abbreviation: ATM (see *Studio Sound*, September 1995). This has a data rate measured in megabits per second and there is a strong chance that it will be deployed more quickly than you might think. The UK cable TV companies have been busy putting down fibre-optic cabling to little kerbstone boxes ('fibre to the kerb') and then taking copper cable out to the subscribers. Over these short–no more than 500 metres–lengths of copper it is possible to get data rates of close to 50Mbit/s. The scheme that this system, known as VDSL, will use is ATM.

Unlike ISDN, ATM does not make calls as such. It is much more like the Internet: packets of data can be sent in all directions through the one connection. This makes it much easier to have a group of people work on one project, blasting audio tracks around without having to set up individual telephone calls, and all based in different countries. The VDSL links themselves are about three to four years off in the future, if only because it will take that long to get the cost of the electronics down to a reasonable level.

However, it does put a different spin on equipment rental: send the audio to it instead of hanging around for the delivery van to turn up.

You may also see more specialism if studios start to work together more often. Instead of having a full complement of processing equipment at each site, you can chose to have more advanced equipment in one area. If someone offers noise reduction, then you could use their system on a rental basis when you concentrate on another area, such as spatial sound processing.

Making it work for you is a lot more complicated, involving arguments about compression schemes and how to use a number of ISDN links together

The one problem for this kind of virtual studio is the front end: actual recording. Because there are delays involved, in the order of a few hundred milliseconds, it is not practical to have performers working at different sites and listening to eachother playing in true real time. The only workable system is to have each playing to a previously recorded backing track as then you don't need to have two-way feedback.

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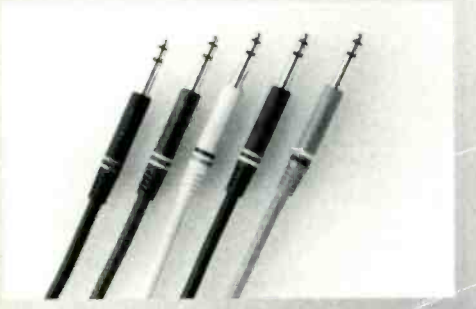

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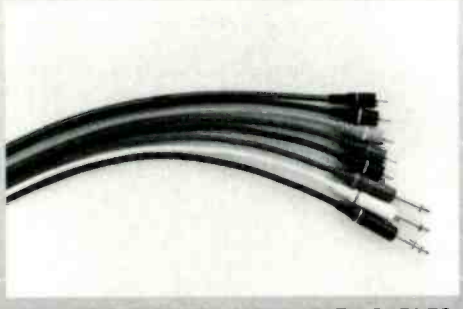

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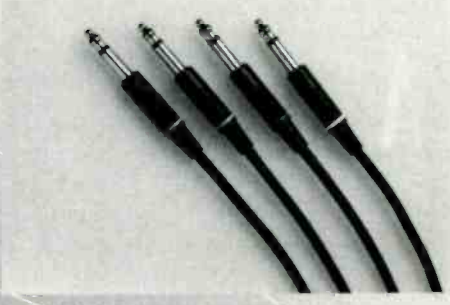

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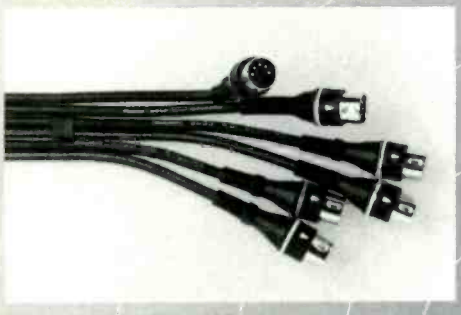

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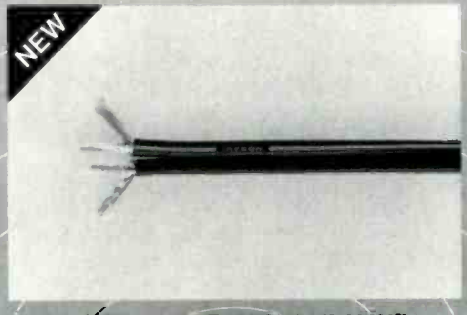

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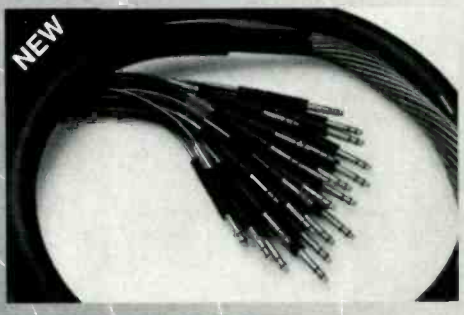

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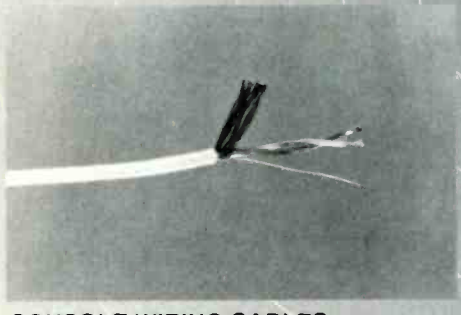

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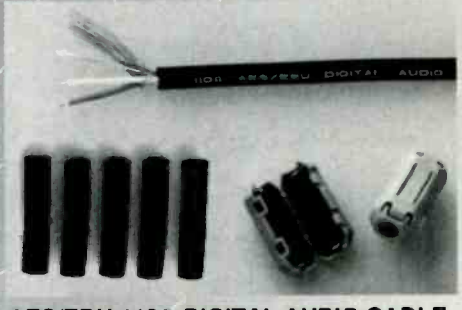

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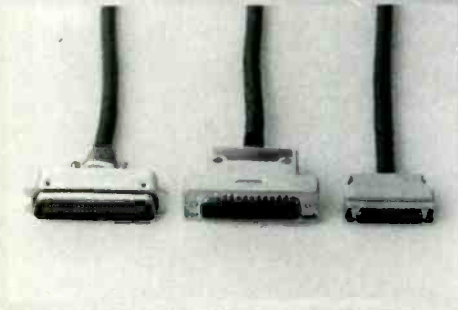

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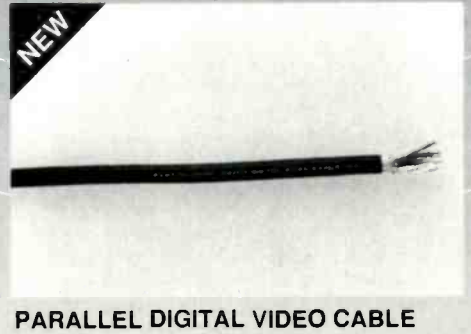

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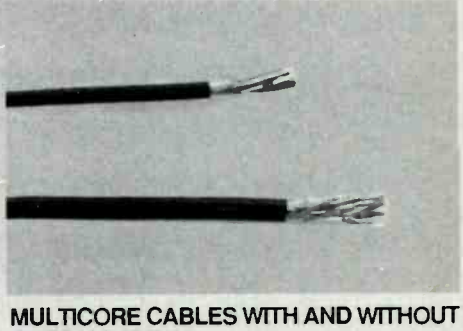

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A matter of scale

The ranks of the duplication system revealed: KABA is the company considered one of the experts in the field of duplication

Hidden away somewhere between one-off cassettes and full-scale duplication, there is a niche market in short-run cassette duplicators. **BILL FOSTER** surveys the available systems

NO MATTER WHAT sector of the industry a recording studio serves, there is one product that its clients will always require: audio-cassette copies. Sometimes it may be just one copy of a rough mix or finished take, but more often than not, multiple copies are needed. Most studios address this by having a handful of consumer cassette machines connected together in a back room; perfectly adequate when a small quantity is required—or when the job demands very high quality dupes —but what if the client owns a small record label and has a requirement for a hundred or more copies? The studio must then choose from a number of options: subcontract the work, buy more consumer machines or invest in a duplication system.

The first option is sensible if the job is a 'one-off' or several thousand copies are needed quickly; while buying more consumer machines would probably be the best solution if, say, 20 cassettes are ordered on a regular basis—for a sales force perhaps. If a studio receives regular orders for between 100 and 1,000 cassette copies a duplication system could present an extremely viable proposition, but it is unlikely that many facilities will have the space or the budget to set up a full-scale, high-speed, cassette-duplication facility. This feature therefore highlights the smaller systems available on the market —starting where real-time cassette copying leaves off, but stopping short of the high-speed/high-volume systems used by the major duplicators. Many of the products covered use a cassette as the source master and copy onto preloaded cassettes. Provided a good quality master cassette is produced, results can be very acceptable —although an upper frequency response of around 12kHz to 12.5kHz is the best that some of these systems can achieve. Slightly better quality can usually be obtained using a reel-to-cassette duplicator. Depending on the model chosen, this requires the preparation of a 2 or 4-track master—usually at 3.75ips (9.5cm/s) or 7.5ips (19cm/s), although in one instance 15ips (38cm/s) tapes can be used.

Most of the manufacturers covered produce a wide range of different machines, with many of them designed for specific purposes such as logging courtroom proceedings, talking books for the blind and so on. However, this article concentrates only on products which are targeted specifically at the broadcast and recording industries.

GRAFF'S GEM Diamond is based on a modular concept that allows slaves to be added according to demand. Additional slaves plug into the side of the master unit enabling the system to be expanded to any size required. The heart of the GEM Diamond system is a master-single slave unit which can copy one or both sides of a cassette simultaneously at a factory preset speed of 16x or 8x.

Graff's GEM Diamond audio-cassette copier

Sony CCP2310F stereo cassette duplicator

Gain controls and LED metering are provided to ensure correct copying levels. The playback equalisation of the master unit is factory set to either ferric or chrome, but each slave unit can be individually switched between the two. For those needing only smaller runs, GEM produce the Sapphire—a lower cost, nonexpandable version of the Diamond. All GEM copiers feature glass-lined ferrite heads and quartz crystal referenced direct drive motors. In common with many in-cassette copiers, Graff machines are not fitted with erase heads as standard, although they can be supplied as an option where bulk erased cassettes are not available. The Graff Duplicating Centre provides the choice of cassette or reel-to-reel as the master source, with performance from a cassette source being similar to the Diamond. When using the reel-to-reel option, masters are replayed on a 4-track deck at 60ips (152cm/s) to give a duplication ratio of 8x or 16x, depending on whether the master was recorded at 7.5ips (19cm/s) or 3.75ips (9.5cm/s).

KABA'S product range encompasses cassette-to-cassette, reel-to-cassette and CD-to-cassette copiers in a wide range of configurations. The company is considered to be one of the experts in the field of in-cassette audio duplication and it is therefore a pity that its products are only available on the American continent. The RTDS-4CD uses two write-once compact discs as a digital master source—one of which contains audio recorded 'backwards' from a digital workstation—and the system is capable of running at 1x or 2x. The outputs of the RTDS-4CD are fed into one or more of KABA's RTDS-4TS 4-track slaves. These 19-inch rackmountable units may be connected together to create very large scale duplication systems: each unit contains two cassette bays fitted with sendust heads and a three-motor, direct-drive transport.

For duplication from cassette, KABA produces the RTDS-TM, 4-track, master unit. In addition to housing a single cassette bay, the RTDS-TM incorporates all the command switching for the slaves. Real time or 2x duplication speed can be selected, with a choice of A-side only, B-side only, or both sides. 12-segment LED indicators and individual gain adjustments are provided for each channel as well as a master level control, and the system handles either ferric or chrome cassettes with a quoted frequency response of up to 20kHz ±3dB. Both the cassette transports and circuit boards are of a modular plug-in design allowing easy removal for servicing and alignment.

MAGNEFAX' 7800 (7-slave) and 3800 (3-slave) are unique 'desktop' duplicators that bridge the gap between the small and the large duplicating system. They copy onto industry-standard cassette pancakes at 24x from a 7.5ips 4-track ½-inch or ¼-inch 'loopbin' master, therefore offering better performance than most in-cassette machines, but requiring the purchase of a cassette loader. Although this makes the overall cost somewhat higher than an in-cassette system, it is still considerably cheaper than a full-blown duplicating line. The interim stage of producing a loopbin master may also incur the added cost of a suitable master recorder, but the benefit will be high-volume production in a limited space with audio response extending to 18kHz ±2dB (20kHz ±3dB)—equal to a full-sized duplication system. The loopbin is mounted

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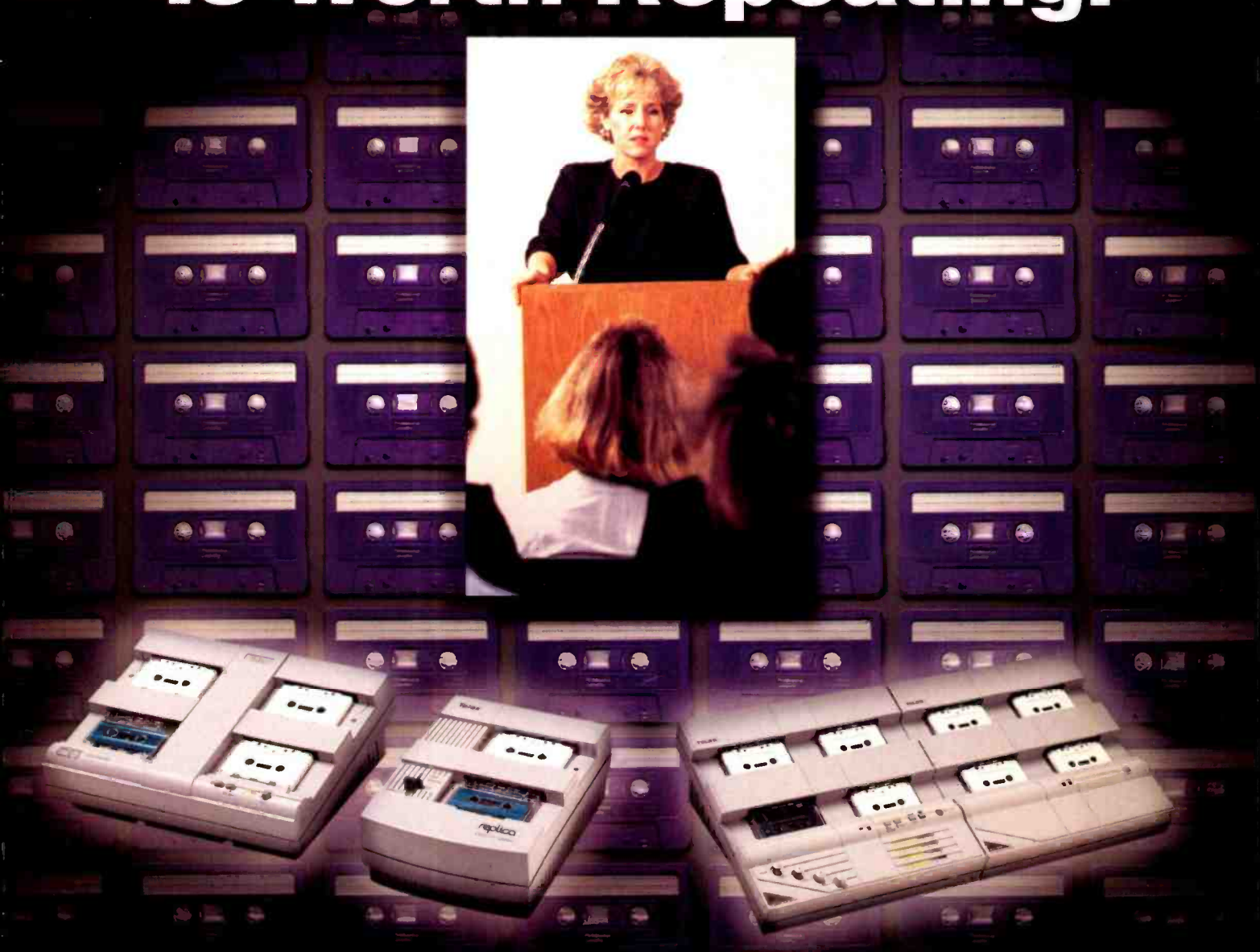

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Otari DP4050-OM open-reel master

at the side of the master unit, which also houses one slave and the control panel. Each track has its own individual adjustment for audio level, monitored by four 30-segment meters with peak hold, and bias can be accurately set using a long-scale analogue meter. A 50:1 version is also available for greater output, at about 25% higher cost.

MOTHERS SYSTEM is an unusual system from Japan which has been designed for portability. Each carry-case unit contains ten cassette bays (five on each side), with the controls and metering neatly recessed into the top of the unit. The M-2010 can be configured either as a master to nine-slave duplicator or a ten-bay slave unit, while the M-2020 acts as a slave only. Up to four M-2010s or 2020s can be connected to a master M-2010. Duplication is selectable between 1x or 2x, onto ferric or chrome cassettes—the latter achieving 15kHz. In the real-time mode the system can be connected to the output of a DAT machine, live mixing console or other line level source, as well as directly to a mic input. A built-in speaker is provided for monitoring audio during duplication. The M-2010-2020 combination is ideal for location work where cassettes are needed immediately for sale or reference.

OTARI'S DP-4050 range comprises three modules: the F-C2 with one master and two slave bays; the F-Z3 with three slaves, and the OM open reel master. The system can be configured in a number of ways in order to produce up to 65 simultaneous copies at either 16x or 8x. The DP-4050F-C2 features independent adjustment of record level, bias and equalisation for each channel, as well as LED azimuth indicators. Level monitoring is by way of four Vu meters and a switch selects between 8x and 16x. A unique feature is a variable ±5% pitch control on the master cassette player. Up to three slave units can be directly connected to the DP-4050-C2, and the system can be expanded further by the addition of up to three optional bias signal buffer units (DP-4050-EZ), each of which will feed six slaves. Each cassette bay is fitted with a DC brushless capstan motor, two direct DC drive reel motors and 4-channel, in-line, ferrite heads. Surprisingly though, for a product from a company with such a distinguished audio background, the upper frequency response quoted for all systems is 10kHz. Open reel masters on spools up to 10½-inch diameter can be copied to cassette from the DP-4050-OM, which runs at 60 or 30ips depending on whether the master is recorded at 7.5ips or 3.75ips. A front-panel switch allows copying of one side only or both sides simultaneously depending on the configuration of the master tape.

SONY'S CCP-2300 provides one master and three copy cassette bays, with the unit being able to copy one or both sides onto normal-bias ferric tapes at a fixed ratio of 16x. Gain controls and LED metering for each channel are provided, and an upper frequency response of 12.5kHz is achieved by the use of hexalloy heads. (A version fitted with long-life ferrite heads is also available, but according to Sony's published specification this reduces the upper response to 10kHz.) A companion slave unit, the CCP-2400, has four copy bays and up to ten of these units may be connected to the master CCP-2300 unit. The system's Auto-Copy function starts with a rewind command to ensure that all tapes are at the head before copying commences and tapes are rewound automatically once duplication is complete. Each copy bay has a 'short tape' indicator which illuminates if a cassette is under length. Both models feature built-in erase heads as standard, together with a two-reel, direct-drive motor system and brushless

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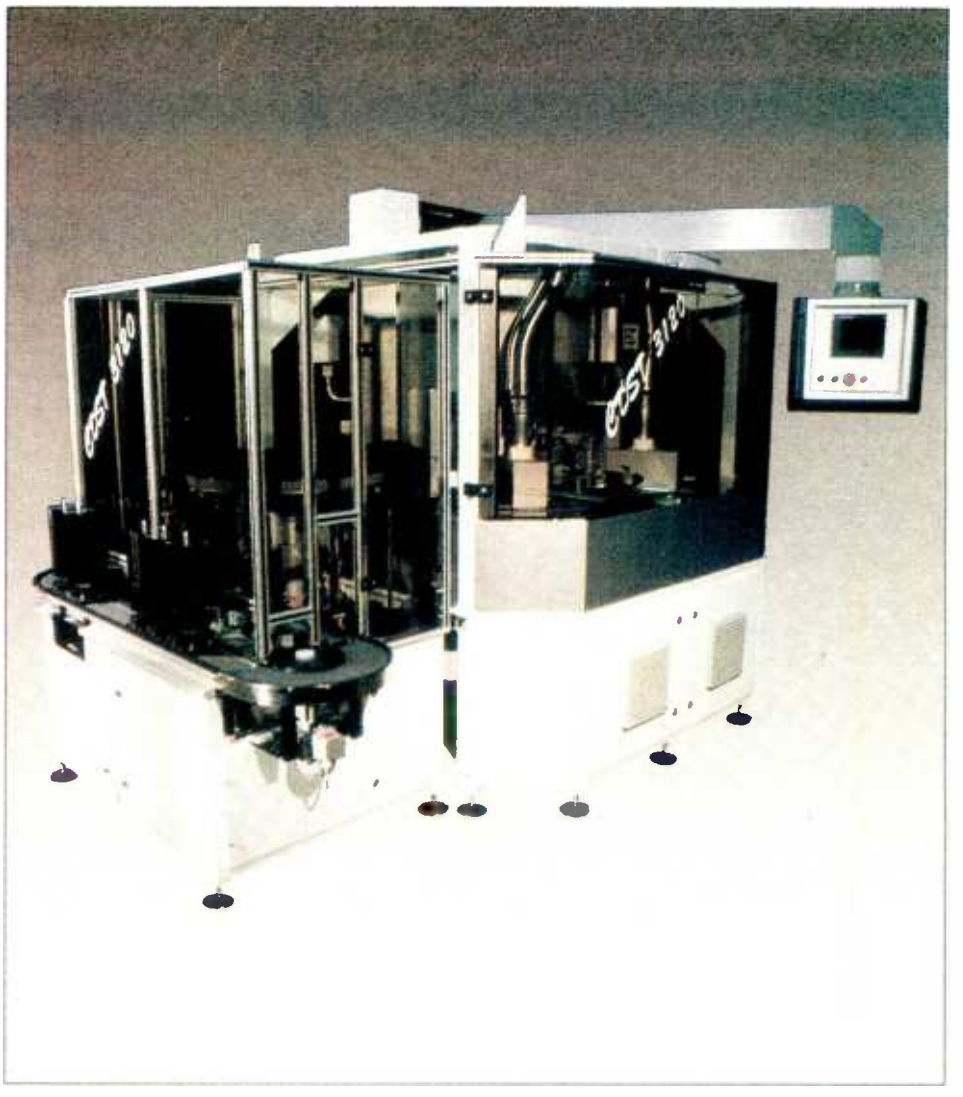

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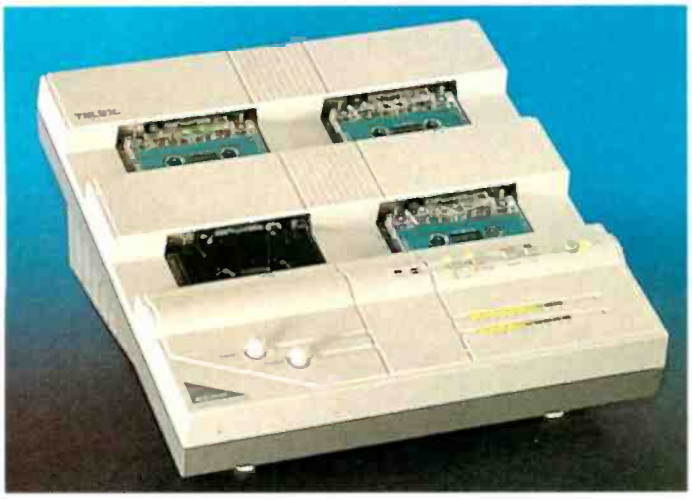

Telex ACC2000 Master Module

capstan motor. A 'cleaning mode' allows easy cleaning of the head block assembly.

TELEX' XL series of duplication machines comprises the ACC4000 XL Stereo Master Module with one master and three slave bays, and the Slave Module with four slave bays. The system is expandable up to 27 copy positions. Heads are made of a patented ceramic-like material, which Telex claims will not only give up to ten times the life of standard heads but also allow for relapping to further extend the life. Individual controls and LED record-level metering are provided for each of the four tracks: other features include selection of one side or both sides copying and the option to automatically rewind the cassette after recording. The XL series can copy onto either chrome or ferric cassettes, but has no erase facilities. (A ferric-only version of the system with erase heads is available as an option.) For those wishing to duplicate from 7-inch or NAB reel-to-reel 1/4-inch tapes, Telex manufacture the 6120XLP 8x duplicator. By using a master tape recorded at either 15ips or 7.5ips an upper frequency response of 15kHz can be achieved, depending on the quality of the cassette tape selected. This feature allows cassette copies to be produced directly from 15ips master tapes. The 6120XLP—which is available in 2-track or 4-track head configurations—will also duplicate from cassette. Three copies can be made from either source in the basic version and this is expandable in increments of four.

CONTACTS

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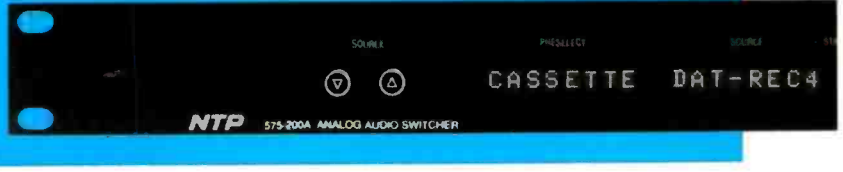

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Master class

With Sony PCM-1610 being laid gently to rest, **BILL FOSTER** investigates the new formats for premaster exchange

DESPITE THE INTRODUCTION of other 2-channel digital recording formats such as DAT, PD and DASH, the PCM-1610 (and its successor, the PCM-1630) has reigned supreme for almost 14 years as the principal premastering format for the audio CD. But now developments in the CD manufacturing sector look set to end the U-matic-based system's extraordinarily long run in what is, in most other respects, a rapidly evolving market.

When the audio CD was launched in 1982, there were just a handful of manufacturing plants, and almost all of these specified that premaster tapes should be supplied to them on PCM-1610 format U-matic tape. Any tapes received on other formats–analogue or digital–were normally transferred onto U-matic before mastering.

This demand for CD masters on U-matic prompted a number of vinyl-disc cutting facilities to invest in PCM-1610 systems; partly out of concern that an important stage of the creative process was frequently being carried out in a 'non-creative' environment, but also, one suspects, because they saw a significant revenue stream suddenly going elsewhere. To be fair, most CD manufacturers were happy to let the disc-mastering facilities handle the CD premastering (as it quickly became known) because few plants were equipped with acoustically treated rooms, let alone facilities to cope with visiting producers or artists. As a result, both the premastering studios and plants bought copious quantities of PCM-1610 and-or PCM-1630 systems throughout the 1980s, and the U-matic became the *de facto* interchange standard worldwide.

However, while studios learned to live with a less than perfect format (which is based around an industrial video recorder originally developed in the 1960s), advances in laser-beam recorder technology such as faster than real-time mastering prompted the plants to look around for a system better suited to their needs. One solution was found in the shape of an 8mm tape-based computer backup medium known as Exabyte.

IN THE LATE 1980s, Doug Carson & Associates (DCA)–a company based in Cushing, Oklahoma, in America–developed a system for CD-ROM mastering in which the content of the CD is 'streamed' onto the Exabyte tape in a manner that allows glass mastering to be carried out directly from it at double the standard writing speed. This method of encoding was named the Disc Description Protocol, or DDP.

While DDP was initially developed for CD-ROM, it works equally well for audio, VideoCD or any other CD-based format, and it was not long before DCA introduced a peripheral for audio mastering known as the Audio Transfer System. This provides an SDIF-2 digital input and allows PCM-1610/PCM-1630 tapes to be transferred directly to Exabyte. Assuming that the output of the PCM-1630 is checked for errors using a DTA-2000, the copy produced is, theoretically anyway, identical to the U-matic master. It would be incorrect to say that the CD manufacturers concealed this process from the outside world, but none went out of their way to publicise the fact that a transfer was being made.

Partly because of a few unfortunate mistakes which occurred on CDs (such as reversed channels) studios and producers gradually became aware of what was going on and some began demanding a return to real-time mastering; citing changes in the 'sound', increased jitter, and so on as their reasons. Somewhat naturally the plants were not particularly willing to do this, unless, of course, the client was prepared to pay a premium for the extra time involved. The alternative is to generate the DDP format tape at the premastering facility—although this can introduce a whole new set of problems—while there are certainly some technical limitations inherent in the PCM-1630 system, from an operational standpoint it is an ideal tool for premastering. The DMR-4000 and DMR-2000 were designed as studio recorders (albeit for video) and have all the controls and other features one would expect to find on a professional machine; whereas an Exabyte drive has no controls at all (other than a tape-eject button), having been designed to be operated in conjunction with a computer. Unless the premastering facility is using a computer-based workstation, Exabyte in its present form is useless.

Some studios and producers began demanding a return to real-time mastering; citing changes in the 'sound', increased jitter and so on as reasons

Almost all premastering facilities nowadays have a workstation in their editing suite(s), but they do not necessarily have them in every copy room or transfer bay. The lack of a 'stand-alone' Exabyte player therefore presents a logistical problem when a client requests, for example, a single cassette copy and sends an Exabyte CD master from which to do it. In most cases the studio's only choice is to load the whole master into the workstation before making the transfer—a cost that many clients are unwilling to pay. One system, SADiE, now offers real-time playback from the Exabyte—and Sonic Solutions promises to incorporate this feature soon—but this still ties up a workstation which could be generating

Townhouse Studios, London: the cutting and mastering room

master pieces

In an era of mixed analogue and digital audio technology, the requirements of mastering engineers have never been more precise. It is in response to growing demand that Focusrite has developed two new products, designed to address the key processing functions of equalisation and dynamic control.

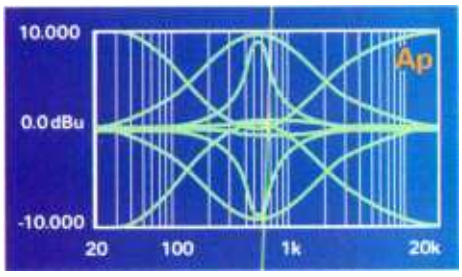
The Blue 315 Mastering EQ and the Blue 330 Mastering Compression Limiter both make use of the highest quality switches for all rotary functions. These provide precise and repeatable settings in units of unequalled build quality, ensuring long-term reliability and performance.

Blue 315

It was the widespread desire to see the legendary ISA 110 Equaliser available for mastering which led to the creation of the Blue 315. The simple request was for rotary switches on all functions, but of course there is a great deal more to mastering than recall-ability of rotary switches alone.

Mastering is the process by which a mixed product is refined – the fine-tuning and assembly for particular medi. Private discussions with individual mastering engineers, coupled with careful research, revealed many small differences between a programme equaliser and a product designed for top-quality mastering. These differences were the starting point in the design of the impressive 315.

The frequency ranges have been gently expanded to allow for finer resolution and the Q controls boast higher resolution and wider low-end range. In addition, the boost and cuts are designed with small increments close to the null point and larger steps at the extremities. The filters have minimum ripple roll-off and the extra-fine



variables of the input gain controls allow for absolute precision.

Mastering will always be a very personal skill, and it is with this in mind that the 315 has been constructed to allow simple adjustments according to individual preference.

This technological 'masterpiece' has been achieved without any sacrifice of Focusrite's traditional standards. You are assured of the best performance parameters (often superior to digital), the highest quality components and construction, along with both transparency of sound and ease of use.

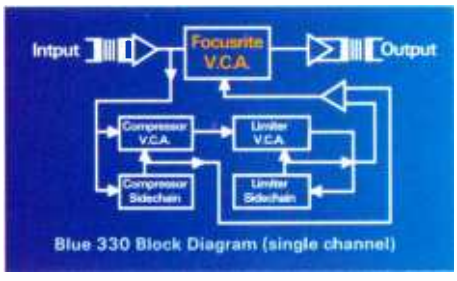
"The Blue EQ is a superb sound sculpting tool. It allows me to develope textures no other equaliser enables you to achieve"
– George Marino, Sterling Sound. New York.

"In almost a year I've used my three old EQ's three times. Any other questions?"
– John Matousek, Masterworks. Los Angeles.

Blue 330

Also the product of customer demand and extensive research, the Blue 330 represents the transformation of the Focusrite Red 3 Compressor and Limiter into a Mastering format. Unique and unrivalled in all its attributes, we feel it genuinely deserves masterpiece status alongside the 315.

The structure of the circuits is very different to that of other compressors/limiters. The 330 separates the compressing and limiting processes, which are then implemented by one signal path VCA through combined controls signals. You are able to compress and limit in turn, meaning that the limiter only compresses the peaks that remain after the completion of the compression process. The overall result is cleaner and less intrusive than that which can be achieved with a compressor that rolls over into limiting.



Blue 330 Block Diagram (single channel)

Our diagram shows that the main signal path has only the Focusrite proprietary VCA between input and output. Its feed is from two separate sidechain circuits – compressor and limiter – each with their own VCA.

Just like the 315, the 330's control ranges and sensitivities have been suitably adjusted to meet the needs of fine-resolution mastering. The input gain and make-up gain controls are of the same sensitivity, allowing tandem contra operation, so that all other settings can therefore be raised or lowered without re-adjusting each control.

Both the Blue 315 and the Blue 330 are now available for evaluation, either direct through Focusrite in the UK, or via our appointed distributors elsewhere in the world. To find out more, please contact us today.

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PHOTOGRAPH: ELIZABETH ANNAS

Bernie Grundman Mastering studios

far higher revenues if it were being used for editing or compilation work.

Another problem arises when copies are required for production or export. So far no system exists that will allow a clone to be made of an Exabyte and monitored at the same time. Theoretically, if a computer system were installed which could produce Exabyte clones, these could be made without human intervention. But there are probably few studios brave enough to send out a tape destined for production without checking the audio content. An Exabyte-to-Exabyte copier with only data verification would, after all, be perfectly capable of producing a data-perfect, but completely 'blank' clone. The ideal solution is a studio-style Exabyte tape recorder-player with conventional transport controls. StageTech in Sweden is one company considering this possibility, but so far no one has actually committed himself to producing such a device. This in turn has meant that many of the major premastering facilities are opting to retain the PCM-1630 format until either an Exabyte player becomes available or another interchange format is adopted. This situation has prompted the APRS—the UK's studio trade association—to set up a working group to examine the needs of both the premastering and manufacturing facilities, and to try and come up with a way of satisfying all concerned.

Because the DDP format was originally designed for CD-ROM applications, a few key issues peculiar to the audio industry were not addressed in the early software versions

The working group's brief is not only to address the question of formats but also other relevant issues such as interchange compatibility and verification, right through to the labelling of boxes. An important point when transferring from Exabyte is the minimum data transfer rate that the tape must deliver in order to achieve double-speed mastering. Because of its origins in the computer world, the Exabyte format does not guarantee a sustained data transfer rate: in the event of a media fault, the system will rewrite or reread the same block until the data is 100% error free. This could cause the data rate to fall below the 350kbyte/s required for double-speed mastering. To avoid sending a tape with a high-error count for manufacture, the premastering workstation should ideally provide some means of monitoring the average data transfer rate going to, and coming from, the Exabyte—in similar fashion to the way that the DTA-2000 operates in a PCM-1630 system.

Last June the APRS convened a meeting of the leading manufacturers of premastering workstations—as well as the two main suppliers of LBR input systems, DCA and Media Morphics—to examine this issue. As a direct result of these

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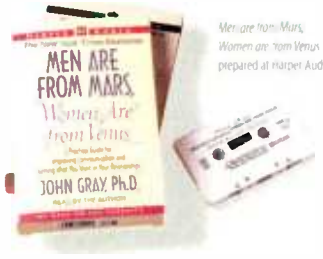

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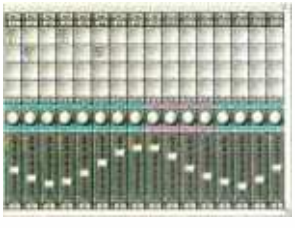

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discussions SADiE's latest software revision includes the facility to monitor the data transfer rate to and from an Exabyte. But, while SADiE users now have a 'speedometer', there are as yet no clearly defined speed limits. This is because the actual data-transfer rate from the tape during mastering is dependant on a number of other factors. To cover any short-term data loss, the replay systems used by the manufacturing plants are fitted with a buffer memory which ensures that a constant bitstream is fed to the LBR even if the input medium momentarily fails. The data rate coming from an Exabyte, for example, could therefore drop to zero for a second or two provided that it then outputs maximum data for the next few seconds. This minimum-maximum transfer-rate equation is entirely dependant on the size of the buffer—which can be any size but is generally between 20 and 40 seconds. Working in collaboration with a group of European CD manufacturers, the APRS is attempting to reach a consensus on a 'safe' minimum figure for double speed mastering. A proposal of 400kbyte/s averaged over any given 10-second period has been put forward and is currently being evaluated. This specification actually allows a 100% margin over the tolerance provided by the smallest buffer, and may in fact be too tough. Because the DDP format was originally designed for CD-ROM applications, a few key issues peculiar to the audio industry were not addressed in the early software versions. One of these was the provision to easily modify the PQ information—something that is all too frequently required when catalogue and ISRC numbers arrive after the CD premaster has been prepared. In the case of U-matic it is simply a matter of loading the PQ code back into the editor, modifying the relevant information and rewriting the file onto audio track 1. A DDP file, however, cannot be overwritten in the same way. Currently the plants get around the problem by storing the modified DDP file on a diskette which is then loaded into their input system in place of the file on the Exabyte. This process is simple enough to operate within a closed environment, but any student of Murphy's Law will know that a diskette attached to a master by a premastering facility is unlikely to be in place when the tape arrives at its final destination.

From the studios' point of view, the overriding concern with all these new formats is still the lack of proper facilities for verification of the programme content

The latest version of the DDP format (v2.0) allows the file containing the PQ code to be placed at the end of the programme, when it can be modified at will. But spooling through the tape to find it takes time and the plants, quite naturally, are not happy about the thought of their $2m machines lying idle while cassettes wind to and fro. This is an issue which has yet to be resolved.

The Exabyte tape's small physical size (the shell is the same as a Video-8 cassette) also raises the question of labelling. As with DAT, there is barely enough space to accommodate the title, artist and catalogue number, let alone a full track listing. An ideal label design should include some technical information about the tape as well as catalogue number, title and artist details, and a tick box indicating the presence of a revised PQ file on diskette would also be useful: at least the plant would know it once existed.

SO FAR WE have only discussed the issues surrounding the Exabyte-DDP format as the replacement medium for U-matic, but despite its popularity in Europe (and to a lesser degree in the US) the adoption of Exabyte-DDP as the preferred premastering medium has not been universal. A sizeable proportion of the manufacturing facilities in the US, led by Sony and Warner, have instead opted to use write-once, single-session CDs of the type that can now be generated by most digital workstations. The CD is, in theory, an ideal medium for CD premastering because it can exactly mirror the data required on the finished disc. Its detractors, however, cite the risk of surface contamination causing errors, while the 'golden ears' are having a field day pointing out all the bad things that can happen in the CD writer's EFM encoder—which must inevitably cost far less than the unit attached to an LBR. [Note: In both DCA's and Media Morphics' input systems the EFM signal from the CD premaster is ☞

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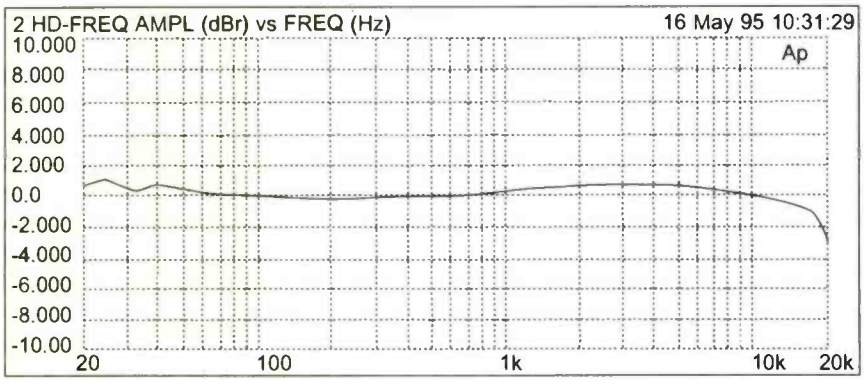

Lyrec proudly announces duplication at a ratio of 128:1 with full frequency response and the sonic quality, which has always characterised the Lyrec recording equipment. While the 128:1 ratio has been around for a while for "voice quality" duplication with less than adequate frequency response, Lyrec has refused to fall into the trap of releasing a duplicating slave that fails to meet the Lyrec standard of excellent frequency response and audio cassette quality regardless of program material.

"We have the greatest respect for spoken word as one of the more difficult program materials to record and duplicate. Spoken word is very revealing and poor quality is easily detected even by untrained ears."

In order to meet the goal of 128:1 speed ratio without compromising audio quality, Lyrec has pioneered numerous innovations in several key technical areas.

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A bias frequency of 12 MHz was chosen to avoid beat frequencies between bias and audio, which gives an optimum ratio of 5:1 between the bias and audio high frequency.

Formula: (Speed ratio (128:1) x Highest Frequency (20 kHz) x 5)

The record amplifier and bias driver were optimised to cope with the higher audio frequencies associated with the 128:1 speed ratio.

A new generation of technically superior material, ferrite recording heads were employed by Lyrec engineers to solve their greatest challenge: transferring the signal from the head to the tape without pole tip saturation.

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The result of this uncompromising design is a Twin/Slave with the efficiency of duplicating speeds up to 128:1 and a frequency response of 18 kHz +/- 1 dB and 20 kHz +/- 3 dB for duplicating both ferric and chromium tape.

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always decoded, reclocked and re-encoded during mastering, so, in theory at least, the EFM encoder of the CD writer should make no difference.

There is also the question of running time as write-once CDs are normally limited to about 74 minutes. Discs capable of storing 80 minutes are available but they are currently outside the Orange-Book specification and so the question of who is responsible when a disc fails during mastering becomes a very debatable point. Write-once CDs intended for CD mastering are normally created using a SCSI-linked CD writer. The format of these discs differs from those created on the stand-alone CD-R units in that they conform to the Orange-Book/single-session standard, which is the same as the Red-Book standard as far as the subcode information is concerned.

A benefit of the CD option is the facility to cascade a number of writers via the SCSI link. (The Exabyte system is unable to work in this manner because of the way that the system writes to tape; each block of data being written and then checked before the next block is sent. In the event of an error the block is rewritten, so in a multiple drive setup each Exabyte drive would very

Mastering at speeds of 4x and up will necessitate a complete re-engineering of the media-input system –something that has, in fact, already started to happen at a few of the more progressive CD manufacturing facilities

probably require a different transfer rate –something that would be virtually impossible to achieve without some very sophisticated additional hardware.) During glass mastering CDs are normally replayed at 2x, although they are capable of being read at higher speeds as LBR writing speeds increase. In this respect CD has a major advantage over Exabyte, which is currently unable to support speeds in excess of about 2.6x. If Exabyte is to be used to feed the next generation of LBRs a different solution will have to be found.

One option is the latest addition to the Exabyte range; the Mammoth. This is capable of delivering data at a faster rate, while also being backwards compatible with the current 8500 Series, but it appears that the Mammoth is unlikely to be adopted as the 8500's successor because it does not meet all the criteria for mastering the new high-density CDs (hdCDs). In video applications the hdCD (or DVD as it is known) uses variable rate MPEG-2 compression, which can require data rates in excess of 1Mbyte/s against a standard-density CD's rate of around 170kbyte/s. This has led DCA to

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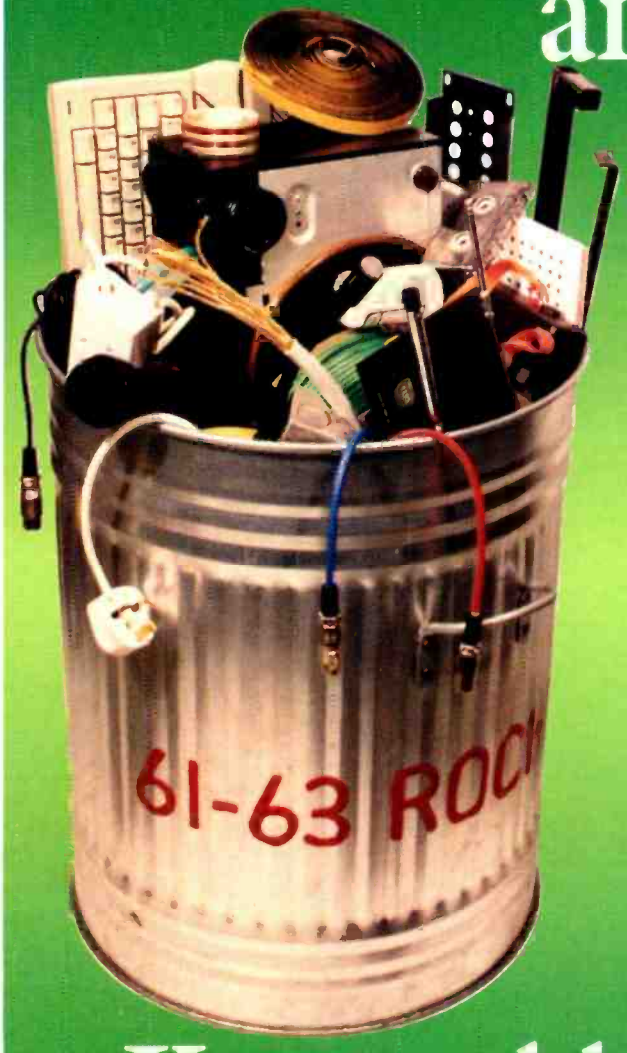

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From the studios' point of view, the overriding concern with all these new formats is still the lack of proper facilities for verification of the programme content. Without an accurate plot showing the condition of the disc or tape when it is shipped to a plant, the studio is highly vulnerable should the product turn out to be defective further down the line.

In the US, Sony Music's New York studio checks all premaster CDs destined for the company's own manufacturing plants on a PC-based error-checking system installed in the room where the PQ coding is done. WEA, though, relies mainly on outside premastering facilities, so in order to ensure that the CDs supplied are error-free, it has installed factory-type, CD-testing systems at the studios of their main suppliers. A comprehensive check of the finished premaster CD is carried out at the studio and a print-out sent with the disc to the plant. This log is then compared at the plant with one from a finished pressing in order to verify that error rates have remained within acceptable tolerances throughout the entire process. While it is relatively easy to check a CD in this way, the cost of a comprehensive analyser system has until now been high. And, unless the disc is subsequently sealed in a box, there is always the risk of damage being caused to the disc's surface by careless handling if someone decides to play the disc before sending it to the pressing plant. In this respect, even though Exabytes are more difficult to verify, they are less likely to suffer from outside interference.

Like the U-matic, few outside of a studio or factory have any facilities to play them. It will be obvious from the above that the whole issue is presently in a state of flux, with the majority of premastering studios continuing to use the PCM-1630—a system which not only offers comprehensive data verification facilities through its companion DTA-2000, but also provides the facility to replay audio in real time. Interestingly, the situation may actually be resolved with the introduction of new, higher speed LBRs. Mastering at speeds of 4x and up will necessitate a complete re-engineering of the media-input system—something that has, in fact, already started to happen at a few of the more progressive CD manufacturing facilities. To deliver data to an LBR at speeds of 700Mbyte/s or more will require the use of hard-disk drives, which in turn will be fed from multiterrabyte mass storage devices holding several thousand CD masters. Because these storage units are 'off-line' they can be loaded at any speed, meaning that masters produced on a single-speed, 16-bit audio device such as a U-matic, or even DAT, will no longer present a problem. At least, not until the proposed 24-bit multichannel discs based on the new hdCD format make an appearance.

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◆ **January 9th**
UK AES Conference: Putting the Acoustics Back in Loudspeaker Design
Imperial College, London, UK. Tel: +44 1628 663725.

◆ **January 9th–12th**
MacWorld Expo
Las Vegas, US.

◆ **January 9th–12th and February 20th–23rd**
Internet and System Security: Attacks and Countermeasures
Learning Tree Education Centre, London, UK. Tel: +44 800 282353.

◆ **January 15th–16th**
The Live! Show
London, UK. Tel: +44 1322 660070.

◆ **January 17th–18th**
Computer Virus Workshops
Abingdon, Oxford, UK. Tel: +44 1235 559933.

◆ **January 18th–21st**
NAMM Convention
Anahelm, USA.

◆ **January 21st–25th**
Midem
Cannes, France. Tel: +33 1 44 3444 93.

◆ **January 30th to February 1st**
SortExpo 96
Santa Clara Convention Centre, Santa Clara, US. Fax: +1 303 745 5712.

February 1996

◆ **February 6th–8th**
The ISDN & Broadband User Show
Olympia 2, London, UK. Tel: +44 1733 394304.

◆ **February 9th–12th**
Milia, Cannes, France.

◆ **February 11th–14th**
SIEL 96, Paris, France. Tel: +33 1 45 22 35 40.

◆ **February 13th–14th**
Live Virus Workshop
Latimer House, Bucks, UK. Tel: +44 1296 318700.

◆ **February 13th–15th**
Video Forum 96
Wembley Conference and Exhibition Centre, London, UK. Tel: +44 1273 857800.

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

◆ **February 15th–18th**
World Audio Visual Entertainment Fair
Bangkok Convention Centre, Bangkok, Thailand. Tel: +662 95066014.

◆ **February 20th–13rd**
Internet and System Security: Attacks and Countermeasures (Part 2)
Learning Tree Education Centre, London, UK. Tel: +44 800 282353.

March 1996

◆ **March 11th–14th**
DSPx 96
San Jose Convention Centre, San Jose, US. Tel: +1 203 840 5652.

◆ **March 12th–15th**
Aseanplas 96
Jakarta, Indonesia.

◆ **March 13th–15th**
The Television Show
Business Design Centre, London, UK. Tel: +44 171 344 3861.

◆ **March 13th–17th**
Musikmesse and Pro Light & Sound
Messe, Frankfurt, Germany. Tel: +49 69 7575 6662.

◆ **March 26th–30th**
The Pro Audio Show
The Holiday Inn Crown Plaza, Karachi, Pakistan. Tel: +9921 498 4012.

April 1996

◆ **April 4th–7th**
Broadcast Thailand
Queen Sirikit National Convention Centre, Bangkok, Thailand. Tel: +66 2 503 2199.

◆ **April 14th–18th**
NAB Radio 96
Los Angeles, California, US. Tel: +1 202 429 5350.

◆ **April 16th–18th**
REPLITech Europe 96
Jaarbeurs Congress and Convention Centre, Utrecht, The Netherlands. Tel: +1 914 328 9157.

◆ **April 21st–23rd,**
Midcab & Midsat 96
Abu Dhabi Exhibition Centre, UAE. Tel: +971 4 310551.

◆ **April 23rd–25th**
Entech 1996,
Sydney Exhibition Centre, Sydney City, Australia. Tel: +61 2 876 3530.

◆ **April 23rd–27th**
Information SuperHighway China 96
Beijing Exhibition Centre, China. Tel: +86 841 5250.

May 1996

◆ **May 11th–14th**
100th AES Convention
Bella Centre, Copenhagen, Denmark. Tel: +45 9785 1122.

◆ **May 12th–14th**
NSCA, St Louis, USA.

◆ **May 14th–16th**
Midem Asia, Hong Kong. Tel: +33 1 44 34 454 44.

◆ **May 17th–20th**
BTV China, China Foreign Trade Centre, Guangzhou, China. Tel: +852 2862 3460.

◆ **May 25th–28th**
Pro Audio, Light & Music China 96, Beijing Exhibition Centre, Beijing, China. Tel: +852 2861 3331.

◆ **May 28th–30th**
7th onference and Exhibition on Television and Audio Technologies Thermal Hotel Helia, Budapest, Hungary. Tel: +36 1 153 0127.

◆ **May 29th–June 1st**
Expo Show 96
St Petersburg, Russia. Tel: +7 812 119 6245.

June 1996

◆ **June 1st–4th**
Nightwave 96, Exhibition Centre, Rimini, Italy. Tel: +39 541 711249.

◆ **June 4th–6th**
REPLITech, San Jose, US. Tel: +1 914 328 9157.

◆ **June 4th–7th**
Broadcast Asia, World Trade Centre, Singapore. Tel: +65 338 4747.

◆ **June 5th–8th**
Third Annual Latin American Pro Audio & Music Expo,
World Trade Centre, Mexico. Tel: +541 864 4036.

◆ **June 6th–9th**
Montreux International Radio Symposium and Technical Exhibition including 1st Interactive Media Symposium and Exhibition, Montreux, Switzerland. Tel: +41 21 963 52 08.

◆ **June 10th–15th**
Americas TELECOM 96, Rio de Janiero, Brazil. Tel: +41 22 730 6161.

◆ **June 19th–21st**
Audio 96: Technology & New Media (APRS)
Olympia, London, UK. Tel: +44 1734 756218.

◆ **June 20th–22nd**
World Lighting Fair 96
Pacifico Yokohama Exhibition Hall, Yokohama, Japan. Tel: +81 3 3706 5687.

July 1996

◆ **July 10th–12th**
Pro Audio & Light Asia 96
World Trade Centre, Singapore. Tel: +65 227 0688.

◆ **July 12th–14th**
Summer NAMM
Nashville, US.

August 1996

◆ **August 7th–10th**
MacWorld Expo
Boston, USA.

◆ **August 15th–18th**
Popkomm, Cologne, Germany. Tel: +49 221 8210.

◆ **August 26th–29th**
Windows Solutions Expo & Conference
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September 1996

◆ **September 4th–8th**
CEDIA, Dallas, Texas, US.

◆ **September 7th–10th**
British Music Fair, Earls Court, London, UK. Tel: +44 1442 215435.

◆ **September 12th–16th**
IBC 96, RAI, Amsterdam, The Netherlands. Tel: +44 171 240 3839.

◆ **September 17th–19th**
Interactive Multimedia Association Expo
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◆ **September 18th–23rd**
photokina, KölnMesse, Cologne, Germany. Tel: +49 221 821-0.

◆ **September 21st–23rd**
cinec, MOC Events Centre, Munich, Germany. Tel: +49 89 51070.

◆ **September 24th–29th**
Live 96, Earls Court, London, UK. Tel:+44 181 233 9306.

October 1996

◆ **October 24th–26th**
Broadcast India 96 Exhibition & Symposium
World Trade Centre, Bombay, India. Tel:+91 22 215 1396.

November 1996

◆ **November 5th–9th**
PT/Expo Comm China
China International Exhibition Centre, Beijing, Peoples Republic of China. Tel: +52 525 592 3257, US. Tel: +1 301 986 7800.

Studio sound

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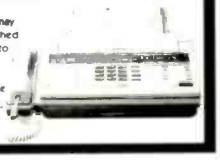

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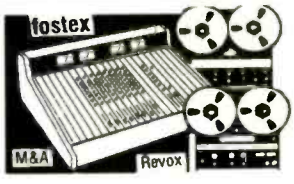

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Security: a cold war?

We live in an age when we can take for granted that the Berlin Wall is a thing of the past... or do we? JOHN WATKINSON relives everyone's private nightmare: getting past the exhibition security man

DON'T GET ME WRONG, I appreciate the need for security and by the nature of my work I tend to be in certain places when the general public shouldn't be. As a result I have met zillions of security people and I have no quibble at all with the vast majority who have helped me. My missive today is not about them, it is about the minority who embarrass them and irritate us.

The goal of the jobsworth is to insert himself in series with as many processes as possible in order to justify an existence which would otherwise be questionable. Sometimes, several jobsworths insert themselves in series in a single process. Because creativity precludes the development of the jobsworth mind-set, only obstruction can be contemplated. Consequently a whole vocabulary of obstructive phrases has passed into the language. 'You can't go in there', 'You can't park here', 'You can't bring that in here' and so on. Of course, these phrases are only used when they are not true. The true jobsworth is sworn never to check the identity or purpose of his victim before issuing the obstruction. He doesn't care who you are or whether you actually may have a perfect right to do; be; open; carry; remove; enter the; person; room; door; box; or activity he is disallowing.

Sometimes it seems that the skilled jobsworth subconsciously selects the person with a deadline from those with all the time in the world.

My personal, all-time record was surpassed at a recent trade show when I attempted to give a lecture and a demonstration of some loudspeakers.

Naturally I showed up before opening time to get the equipment in before the punters. Jobsworth No.1 said I couldn't go in until the show started. A polite explanation of my exact position brought no respite, so I asked him how badly he wanted his day spoiled. 'What do you mean?,' he enquired. 'How many members of the organising committee of this show should I arrange to complain to your boss that you stopped the keynote speaker getting in?,' I replied. That did the trick, although had I not actually been the keynote speaker another ploy would have been necessary. Jobsworth No.2 refused to tell me where the lecture room was because I wasn't wearing the right badge. I found the room on my own, and the papers chairman called Security to arrange to get my equipment in. Jobsworth No.3 then said that equipment could no longer be brought in because the show had opened!

This caused a small explosion, and the equipment finally came in through a fire exit. Jobsworth No.4 said I could only take one guest at a time to buy a sandwich.

After my presentation it was agreed with Security that I would bring my car to the same fire exit to get the gear out. Jobsworth No.5 speculated that I couldn't 'drive up here'. So I demonstrated his error by driving right past him.

As I have stressed, most security people are helpful and fair. Therefore you should start any meeting politely as jobsworths are rare and you don't want to offend someone who isn't one. Once identified, however, you should bare your teeth, act as though you own the place and walk past them.

This is particularly effective if you are with a colleague and you can pretend to be showing him round. Ignore their protests and challenge their knowledge; undermine their confidence. Dare them to arrest you without finding out who you are. List all the people who will complain if you are obstructed. It always works.

Sometimes they have to be told by their boss that you should be allowed. They will then glower at you for the rest of the show because they lost their little game. I never do anything but smile graciously—after all it's more than my job's worth

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