

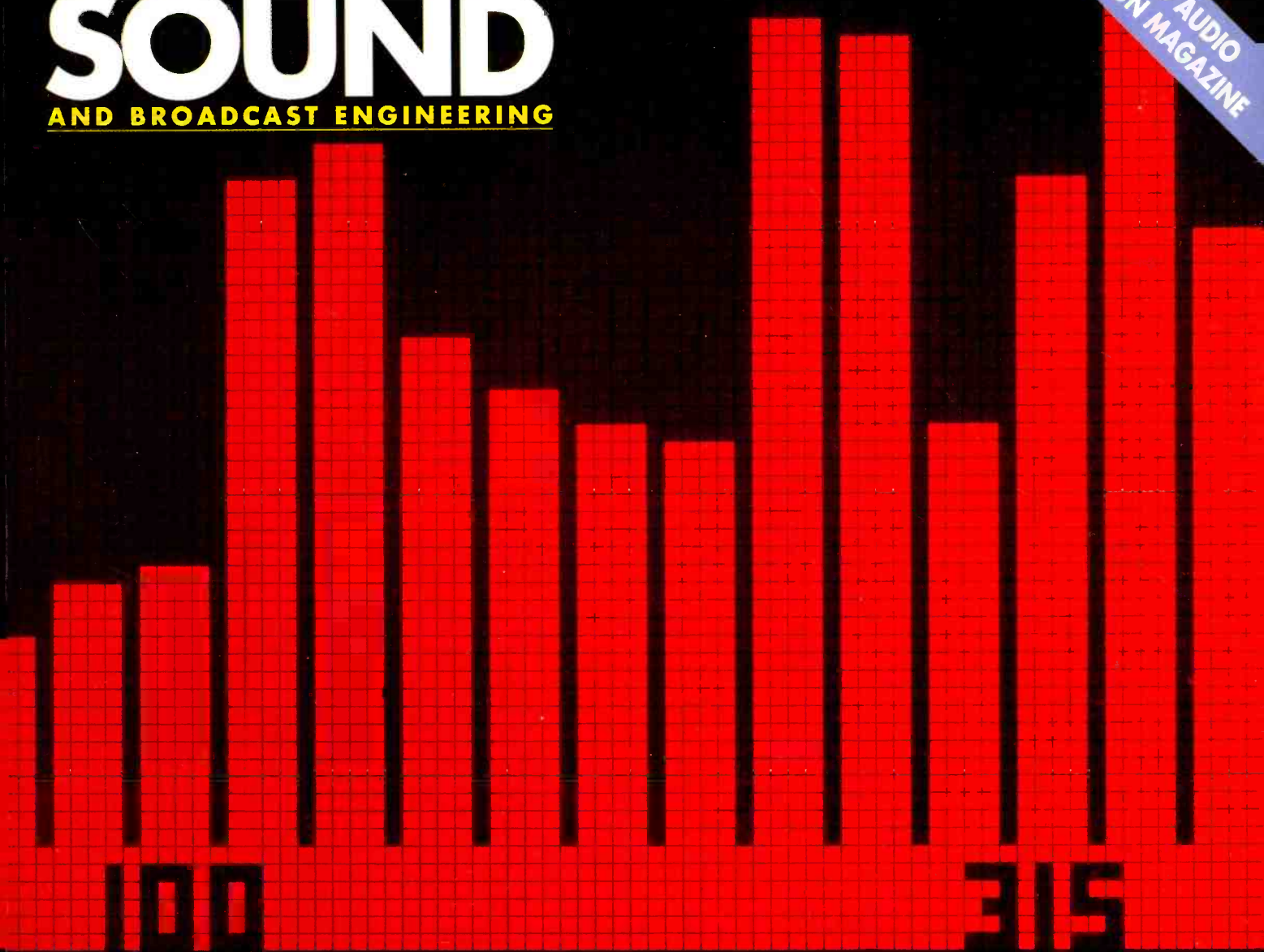
JULY 1995

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STUDIO SOUND

AND BROADCAST ENGINEERING

INTERNATIONAL PRO AUDIO
AND POSTPRODUCTION MAGAZINE

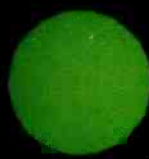


MIXING MATTERS

Yamaha O2 review; Euphonix CS2000 review;
SSL Axiom Film Dubber review; Martech-ADM console restoration;
The Record Plant's Rick Stevens on console purchasing

Understanding ISDN

Making sense of remote audio and video operation



Axiom

F I L M M I X I N G S Y S T E M

Film
mixing direct
from hard disk



SSL DIGITAL

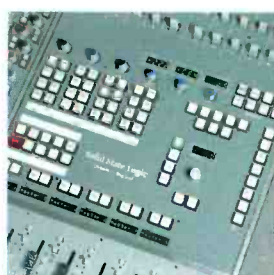
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- ONE, TWO AND THREE OPERATOR CONFIGURATIONS
- MIXING DIRECT FROM HARD DISK
- OPEN MEDIA INTERCHANGE
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- Simultaneous output of master programme mix and mix stems. Configuration capabilities include a range of surround stems and stereo or mono subgroups
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- Accurate film dubber control, plus 4 serial control ports
- Optional Axiom Preparation Station (APS) provides shared access to Axiom's hard disk and I/O resources. Up to 24 tracks may be used to record, edit, pre-lay and mix material, with fully networked interchange between APS and console
- **Open Media Interchange**
Axiom Preparation Station (APS) provides import of most major file formats



Bus/Tape Panel



Joystick Panning Control



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Los Angeles (213) 463 4444

STUDIO SOUND

AND BROADCAST ENGINEERING



Star of the recent UK
Audio Technology 95 show
—Yamaha's O2R console.
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We Know Who's Listening

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Studio Sound is the only truly international pro-audio magazine covering recording, postproduction and broadcast. It has a 100% requested circulation of over 20,000 and a readership of over 100,000 (a recent survey established 5.5 people read each issue).

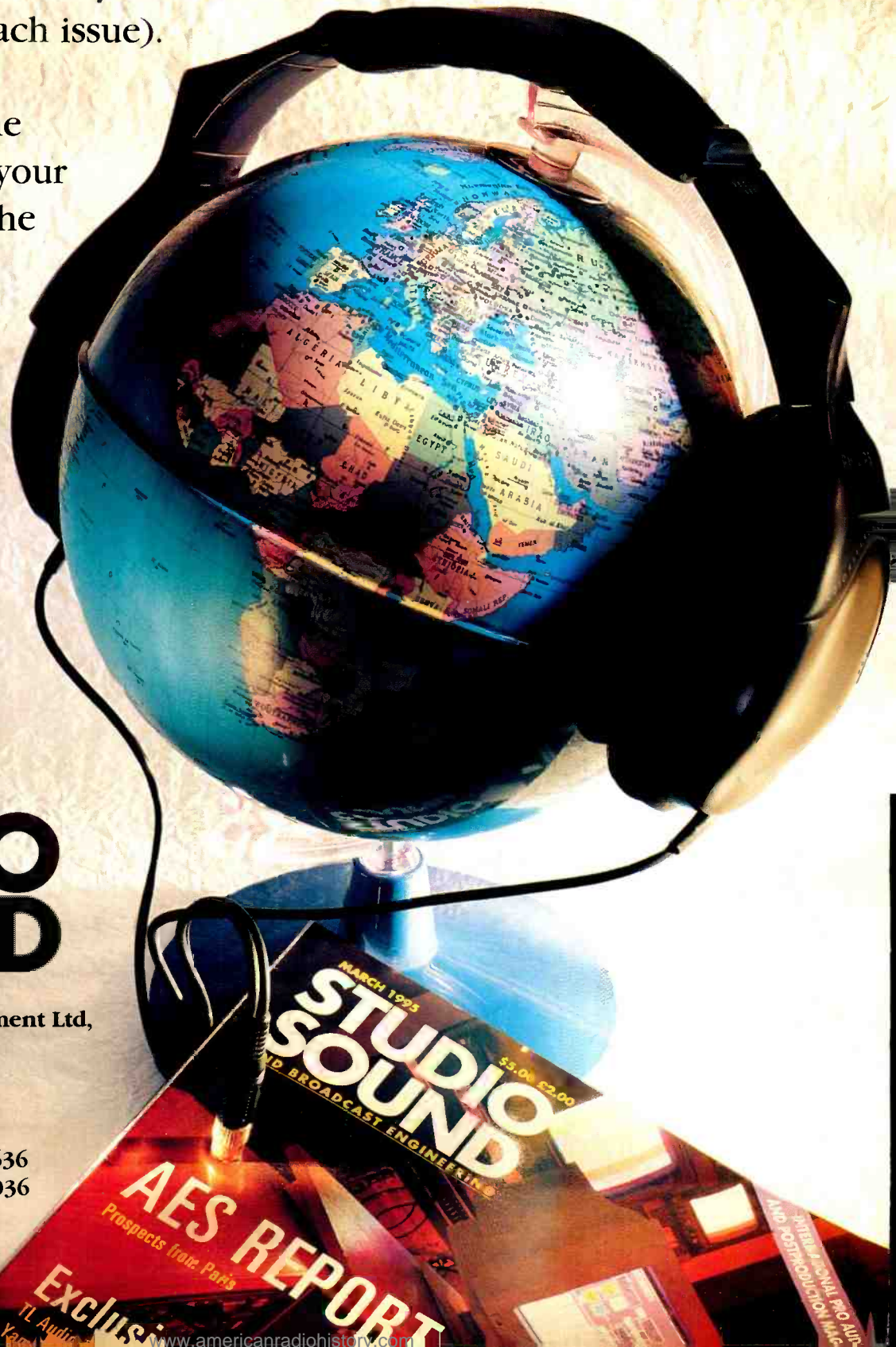
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Personal perspectives

Conventional wisdom tells me that I am unique, but the increasing dehumanisation of mankind by technology frequently has me wondering. Yet the individual is, I understand, the locus of its experience. And, therefore, unique.

Trading intellectualism for empiricism, my experience at the hands of many trade shows tells me there is no question: I am unique. Who else can offer you stories as incredible—yet consistent—as my experiences of pleurisy, Dutch casualty departments and eyes full of Superglue. There's more, but you don't really need to know. . .

Much has been written about trade shows—most by those with some vested interest or other. You regularly read about forthcoming events from the point of view of a sponsor, a publication on the receiving end of a series of advertisements. But attendance at any trade show frequently offers a whole new perspective on its *raison d'être*. More objectively, trade shows have been the target of a number of *Studio Sound* columnists before now. Martin Polon, for example, laid down a 'show strategy' a couple of months back—the emphasis here was how to 'work' a trade event to the best of your advantage rather than to that of the organisers.

The ideal trade show offers exhibitors the opportunity not only to show their wares and extend their sphere of business, but to join in championing their area of an industry to converts and speculators alike. The reality of a trade show is that it is a commercial exercise—not just on the part of the exhibitors, but also on the part of the show organisers. And there are increasing numbers of organisers queuing up to convince you and I that they have a show worthy of our attention and support. The justification for any trade show becomes an important issue for potential exhibitors and visitors alike. Being 'sold into' a show is, therefore, to be avoided. After all, cash spent unnecessarily on a show is cash that cannot be spent elsewhere.

How, then, to assess the worth of any show?

One obvious gauge is the level of business conducted on previous occasions. Then there is the list of exhibitors already signed up at the time you have to make your decision and the expected level and quality of visitor. You can even use other companies' product launches as a measure of their faith in an event. For me, with three days recently spent at London's Audio Technology show and three more lined up for the Singapore Pro Audio and Light Asia next week, it seems like an opportune moment to reflect on some of these points.

At Audio Technology 95, it was difficult to avoid comments that would have the show smaller or less well attended than in previous years. Yet a change of venue improved access to the stands but made objective comparison to past shows difficult and there were a number of exhibitors eager to spread word of sales arising from their attendance. Impressions of visitor attendance too conflicted; some had it as poor while others seemed satisfied that all was well. In terms of new products, world firsts included the Yamaha 02R (reviewed elsewhere in this issue), Uptown's *System One* moving-fader automation system, Focusrite's *Blue 245* 20-bit A-D convertor (and the company's agreement with Digidesign to develop TDM units), Studio Audio and Video's *Octavia* modular digital recorder-editor and CEDAR's first integral processing unit for the *SADiE* system. Quite a busy time—yet Audio Technology is struggling to retain its position as the UK's only pro-audio exhibition.

The logical indicators of the show's worth would appear to have failed us all. Yet AT 95 was good for me.

Quite how Pro Audio and Light Asia will fare remains to be seen. But if it proves as difficult to accurately assess as Audio Technology, I fear we are going to have increasing difficulty in making the best decisions about this vital aspect of our business. Perhaps we will all be reduced to making personal—unique—assessments of our opportunities rather than more general ones. ■

Tim Goodyer

Cover: Klark Teknik *DN6000* audio analyser

Photography: Nik Milner

550



At the first IBC
just 550 came to see us

10,000's



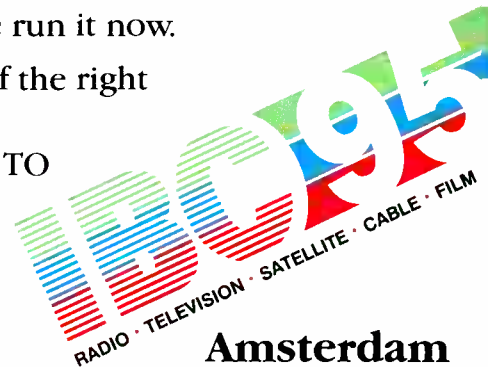
Now we're counting in
tens of thousands

We're not inclined to talk about numbers – quality is more important than quantity. The fact is the right people come to IBC. They always have, from that modest start in 1967. Serious people – Directors – Producers – Editors – Engineers – Financial Controllers. In other words – decision makers.



Of course there is a reason for this – the right people started IBC in 1967 and the right people run it now.

If you are one of the right people –
YOU HAVE TO BE AT IBC95! RIGHT?



Amsterdam
14-18 September 1995

For information contact the IBC Office, details below.

Contact: International Broadcasting Convention, Savoy Place, London. WC2R OBL United Kingdom.
Telephone: +44 (0)171 240 3839 FAX: +44 (0)171 497 3633

The world's electronic media event

World Events

July 1995

- July 6th-7th, **IBC Conference: Digital Audio Broadcasting**, Marriott Hotel, London, UK. Tel: +44 171 637 4383.
- July 12th-14th, **Pro Audio and Light Asia 95**, World Trade Centre, Singapore. Tel: +852 865 2633.
- July 13th, **UK AES Conference: Sensaura—Three Dimensions from Two Speakers**, Imperial College, London, UK. Tel: +44 1628 663725.
- July 17th-19th, **WCA 95. Wireless Cable Association Show**, Washington Convention Centre, Washington, US. Tel: +1 202 452 7823.
- July 23rd-25th, **British Music Fair**, Olympia, London, UK. Tel: +44 181 907 8314.

August 1995

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

September 1995

- September 6th-9th, **NAB Radio Show (1995 World Media Expo)**, New Orleans Convention Centre, New Orleans, US. Tel: +1 202 429 5350.
- September 10th-12th, **ECTS**, Olympia Grand Hall, London, UK. Tel: +44 181 742 2828.
- September 10th-13th, **PLASA**, Earls Court 2, London, UK. Tel: +44 171 370 8179.
- September 14th-18th, **IBC 95**, RAI Centre, Amsterdam, Holland.
- September 19th-24th, **Live 95**, Earls Court, London, UK. Tel: +44 181 742 2828.
- September 21st-24th, **Nordic Sound Symposium XVII**, Bolkesjø Mountain Hotel, Norway. Tel: +47 2 79 7730.
- September 22nd-24th, **ShowBiz Europe**, MOC Exhibition Centre, Munich, Germany. Tel: +49 89 47 02 399.

October 1995

- October 3rd-11th, **ITU**

Telecom 95—the 7th World Telecommunication Exhibition and Forum, PALEXPO, Geneva, Switzerland. Tel: +41 22 730 5111.

- October 6th-9th, **99th AES Convention**, Jacob K Javits Centre, New York, US.
- October 17th-19th, **Vision 95**, Olympia, London, UK. Tel: +44 181 948 5522.
- October 18th-19th, **SoftExpo**, RAI International Exhibition and Congress Centre, Amsterdam, The Netherlands. Tel: +1 303 745 5711.
- October 19th-23rd, **9th International Audio, Video, Broadcasting and Telecommunications Show**,

Complex, St Petersburg, Russia. Tel: +7 812 119 6245.

- November 2nd-4th, **Broadcast India 95**, World Trade Centre, Bombay, India. Tel: +91 22 215 1396.
- November 7th-9th, **Wireless World Expo 95**, Moscone Centre, San Francisco, US. Tel: +1 301 986 7800.
- November 9th, **20th Sound Broadcasting Equipment Show**, SBES, Metropole Hotel, NEC, Birmingham, UK. Tel: +44 1491 838575.
- November 21st-23rd, **Visual Communications 95**, London, UK.
- November 28th-30th, **Computer Graphics Expo 95**, Wembley

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

February 1996

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

March 1996

- March 11th-14th, **DSPx 96**, San Jose Convention Centre, San Jose, US. Tel: +1 203 840 5652.
- March 13th-17th, **Musikmesse and Pro Light and Sound**, Messe, Frankfurt, Germany. Tel: +49 69 7575 6662.

April 1996

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

June 1996

- June 10th-15th, **Americas TELECOM 96**, Rio de Janeiro, Brazil. Tel: +41 22 730 6161.
- June 20th-22nd, **World Lighting Fair 96**, Pacifico Yokohama Exhibition Hall, Yokohama, Japan. Tel: +81 3 3706 5687.

September 1996

- September 18th-23rd, **photokina**, KölnMesse, Cologne, Germany. Tel: +49 221 821-0.

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.

February 1997

- February 22nd-25th 1997, **Middle East Broadcast 97**, Bahrain International Exhibition Centre. Tel: +44 171 486 1951.

POPKOMM, KÖLN MESSE, GERMANY

Cologne, Germany. Now in its seventh year, the Popkomm exhibition has seen considerable development during its tenure over popular music and related entertainment. This year, there will be a considerable emphasis placed on the rising star of multimedia entertainment and the nature of both exhibitors and attendees are expected to reflect this trend. Relocated to Cologne's KölnMesse in 1992, Popkomm is claimed by its organisers to be the 'world's most well-attended fair of its kind'. This claim is substantiated by some 10,871 accredited attendees last year—one third of which were visiting from overseas.

This year's show will see an increase in floor space to 16,000m² to accommodate the anticipated 550 exhibitors. The exhibitors themselves will include representation from record companies, publishers, media bodies and a variety of types of studio—including audio and video. In past years, Popkomm has been recognised as a valid communication forum for these and other areas in the European region.

Popkomm will also be accompanied by 'a congress on topical themes in the music and media sector'. Additionally, there will be a concert programme involving almost all of Cologne's important venues. ■

Popkomm, August 17th-20th 1995. Tel: +49 221 8210.

IBTS, South Pavilion, Milan Fair, Milano-Lacchiarella, Italy. Tel: +39 2 481 5541.

- October 23rd-25th, **European Cable Communications 95**, Olympia, London, UK. Tel: +44 171 222 2900.
- October 24th-26th, **REPLitec Asia**, Singapore International Exhibition Centre, Singapore. Tel: +1 212 643 0620.
- October 25th-28th, **Broadcast Cable and Satellite India 95**, Pragati Maidan, New Delhi, India. Tel: +91 11 462 2710.

November 1995

- November 1st-5th, **Audiovideo-95**, Lenexpo Exhibition

Conference and Exhibition Centre, London, UK. Tel: +44 181 995 3632.

December 1995

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

January 1996

- January 5th-7th, **Showbiz Expo East**, New York Hilton and Towers, New York, US. Tel: +1 513 8400.

For your World Event to be included, or updated, contact the Editor during your nearest appropriate time window. Fax: +44 171 401 8036. E-mail: ez73@cityscape.co.uk.

International News

In brief

● Oram distribution

An exclusive distribution deal has been agreed between John Oram and TGI (North America) Inc, making TGI representatives for all Oram products in Canada, the US and Mexico. After helping with sales of two Oram BEQ consoles, Chris Pelonis of Pelonis Sound and Acoustics Inc is to control the sale of the consoles with TGI. Meanwhile in the UK Oram rack equipment is now available from HHB.

Oram Consulting, UK.
Tel: +44 1474 535888.

● tc electronic go East

tc electronic of Denmark have launched a marketing initiative aimed at expanding the company's operations in Asia and the Far East. Carsten Lebeck, formerly International Marketing Manager, Professional Audio Electronics Division, has relocated to Japan and will be working in partnership with the company's Japanese distributor, Otartec. Carsten has embarked on an 18-month intensive Executive Training Programme which includes 12 months of Japanese language training. Upon completion of the course, Carsten will head tc electronic's activities in the Asia-Pacific region.

tc electronic, Denmark.
Tel: +45 86262800.

● Steve Reich's *City Life* on Yamaha

Steve Reich recently premiered his new piece *City Life* at London's Queen Elizabeth Hall, with a live broadcast on BBC Radio 3. Like several contemporary composers, Reich prefers the mixing console to the conductor's rostrum, and mixed *City Life* on the new Yamaha PM3500 8-bus concert console.

UK: Yamaha-Kemble Music Ltd.
Tel: +44 1908 366700.
US: Yamaha Corporation.
Tel: +1 714 522 9011.

● Radio Talks via SystemBase

The UK's latest national radio station, Talk Radio UK, have installed a total of 48 C100xr digital-audio codecs with SystemBase. The units, purchased earlier this year by BT Broadcast Services, provide the entire national studio to transmitter distribution network over 64kb/s digital-data circuits (DPCN). The Talk Radio UK network is pioneering the use of this technology with proprietary X21 compatible 7.5kHz audio codecs supplied by SystemBase. The C100xr is a 19-inch, 1U-high, rackmount codec, based on the fast apt X-100 compression-decompression system.

SystemBase, UK.
Tel: +44 1256 882797. ■

Austrian Surround

The Austrian television company Österreichischer Rundfunk (ORF) will shortly start announcing broadcasts of Dolby Surround feature films on screen at the beginning of each transmission. ORF will use a Dolby Surround animated logo in the opening credits of every film which has been produced in the Dolby multichannel format. These include over 5,000 films originally made for the cinema since the late 1970s.

ORF are aware that there are an increasing number of homes which use Dolby Surround systems. 'Having noticed the Dolby logo in the end credits of many films, customers are asking us to announce Dolby Surround broadcasts before the broadcast, so that they can activate their equipment,' says Peter Ganner, Head of the Audio Department at ORF. We will also try to get TV magazines to identify the format of the films shown in Dolby Surround.'

With over 120 facilities around Europe now equipped to mix in Dolby Surround, there is a growing list of national and independent European broadcasters now regularly transmitting programmes in Dolby Surround, and ORF are also considering the possibility of producing their own programmes in Dolby Surround, including major sports events and live shows.

Dolby Laboratories, US.

Tel: +1 415 558 0200.

Dolby Laboratories, UK.

Tel: +44 1793 842100.

Fibre optics for Rod Stewart tour

The forthcoming Rod Stewart tour will be the first major European tour to use a fibre-optic cable system for the FOH gear. The equipment for this has been supplied by BEC Technologies, and connects everything

on stage to the *Midas*-equipped mixing position. The fibre system consists of 76 feeds from the stage to FOH being converted by five BEC AD16 16-channel A-D convertors. Fifty feeds enter the BEC system at mic level and are handled by two BEC MP16 16-channel mic preamps. In addition there are 26 return feeds from FOH to the stage. Two Bec FB2 64-channel fibre-optic transceivers at both ends interface the AD and DA16s to the fibre-optic cable. Rehearsals are being run using a 160m cable, but this may be modified for one or two of the very big concerts such as Wembley where a separate production area may be utilised.

BEC Technologies, US.

Tel: +1 407 855 8181.

BBC World cabled to Denmark

Denmark's largest cable operator, TeleDanmark, will begin distributing BBC World to nearly half a million homes on its two main networks, as a direct response to viewer demand. After a recent trial period, customers of KTAS Kabel-TV in Zealand and JTAS Hybrid TV in Jutland voted for the 24-hour international news channel to have a permanent place on the network.

The channel will join its sister channel BBC Prime in reaching 310,000 homes on KTAS and 160,000 on JTAS BBC Prime, the BBC's 24-hour subscription-funded entertainment channel, has been carried on all TeleDanmark's networks since it replaced BBC World Service Television's general programming channel in January.

European Channel Management, UK. Tel: +44 181 576 3061.

Nordic Representative.

Denmark. Tel: +45 33 33 82 84.

UK. Tel: +44 1734 811000.

Sound Advance to Sound Dept

Sound Dept are now distributing Sound Advance Systems range of planar loudspeakers designed specifically for high-quality ceiling and in-wall installations. All Sound Advance speakers claim at least a 140° dispersion, and the company provide both a PC compatible *Quick Layout* software package for project



Rwanda: This month's candidate for 'The Worst Job I Ever Had': Jon Raper of Raper & Wayman recently had to rush to war-torn Rwanda to install a new sound system in the National Assembly building in capital Kigali, and get it up and running in a very short time. After wasting a week obtaining unnecessary visas in Brussels, Raper and two engineers from RCF arrived in Kigali on the 8th April, gained access to the building on the 10th April and had to be ready to roll by the 12th April. The building by this time was so badly shelled that it had no doors, no windows and no lighting (there were apparently no light bulbs available in the whole country), and shell craters within the main hall under the newly-laid carpet, one of which led to Raper spraining his ankle. Armed with an RCF SC4000 microprocessor-controlled Conference System the team succeeded in getting 70 of the 100 units, plus the chairman's console, going in time to brief the President on its use on the Wednesday morning and listen to his opening speech on the radio that afternoon. The final installation work was completed on the Thursday ready to catch the return flight on Friday morning. Raper & Wayman, UK. Tel: +44 181 800 8288.



UK: AMS Neve meet *Judge Dredd*. The soundtrack for the forthcoming movie *Judge Dredd* has been recorded at two UK AMS-Neve-equipped facilities. The majority of the soundtrack was recorded at CTS in Studio One on the *VRP* console, with Dennis Sands engineering the orchestral recordings. At Whitfield Street Studios contributions to the soundtrack included tracks by The Cure and Matt Johnson, lead singer of The The, both on the 72-channel *VR* console. Due for UK release on 21st July, *Judge Dredd* stars Sylvester Stallone in the title role as a futuristic lawman. Set in the 22nd Century, this action adventure was directed by 27-year-old Briton Danny Cannon. AMS Neve, UK. Tel: +44 1282 457011. Fax: +44 1282 39542. Siemens Audio Inc, US. Tel: +1 212 949 2324. Fax: +1 212 450 7339. Siemens Audiostudiotechnik (SAST), Germany. Tel: +49 6131 9460. General Traders, Japan. Tel: +81 3 3291 2761. Fax: +81 3 3293 5391. Audio Consultants Company Ltd (ACCL), Hong Kong. Tel: +852 351 3628.

design and a Guaranteed Layout service, offering a detailed system specification in response to a customer-completed job form and guaranteeing the performance, to the extent that if the system fails to meet the specification Sound Advance will provide extra loudspeakers free of charge to meet the coverage.
Sound Dept, UK.
Tel: +44 1865 516800.

DAVE on call

Trials are under way on a *DAVE* 'audio-on-demand' service from Independent Radio News, systems engineered by ASC.

The operation is on trial with Classic FM, and allows their newsroom to dial up a *DAVE* filesaver at IRN's headquarters for browsing and downloading prepared audio cuts, slugged and ready to air. ASC are also conducting similar trials

at other sites, unconnected with IRN, in North America, Australia and Continental Europe.

The system permits bandwidth-on-demand linking between a remote PC (or network of PCs) and the host filesaver using ISDN Smart Bridges configured at ASC. In practice, the remote PC(s) can be anywhere ISDN is available yet appear to be logged-in as if physically present at the filesaver location. The system fools both remote PC and filesaver into thinking they are still connected when there is no actual network traffic, and then connects, usually within a quarter of a second, as required. It knows whether one or two B channels are needed and can dial up the second as appropriate. When activity ceases the ISDN lines are automatically dropped. As well as collecting audio, the system also permits delivery, so foreign correspondents and overseas bureaux can file at will—no operator

intervention is required at the filesaver end, which will be available round the clock. The systems connect directly to the ISDN socket and do not require a terminal adaptor or audio codec.

Audio Systems Components, UK.
Tel: +44 1734 811 000.

World Wide Web goes Multimedia

Macromedia, the multimedia and digital arts software specialists, and Netscape Communications Corporation, providers of open software for the Internet, have announced a technology integration that changes the character of the World Wide Web from static pages to dynamic, interactive multimedia. The companies have agreed to integrate Macromedia's *Director* multimedia ►

Contracts

● Euphonix in Norway

Norlyd Studio 1 in Oslo have recently installed a 64-channel Euphonix *CS2000* digitally-controlled analogue console with Snapshot Recall, Total Automation and onboard dynamics. The facility features a massive recording area with marble flooring and a Bosendorfer grand, with recording on either 32-track digital or 24-track analogue. Studio Manager and Chief Engineer Truis Birkeland is already halfway through completing some additional album tracks for Morten Harket of A-Ha on the Euphonix.

Euphonix, US. Tel: +1 415 855 0400.

Europe: Euphonix.

Tel: +44 171 602 4575.

● Sony go through the motionworkers

Sony Music in New York have installed their sixth *motionworker* in Studio E, known as their hip-hop room. Sony Music are fully equipped for television and reckon to have every combination of every facet of equipment in the music industry, necessitating a multifacility controller for integration.

motionworks, UK.

Tel: +44 1865 865355.

● Sony box clever

Also at Sony Music, Coastal Acoustics have announced the installation of a fourth Boxer *T Series* reference monitor system at the studio. The system comprises a stereo pair of *T5* cabinets featuring 2, 15-inch, LF drivers and the soft-dome mid and high drivers unique to Coastal and the Boxer range. The monitors are supplied with two Boxer *X3MB* crossovers, a trio of the new generation of Boxer power amplifiers, and low and high-level cabling and are installed and fully commissioned by Coastal Acoustics using TEF analysis. Over a 12-month period, Boxer *T5* systems have replaced, one by one, the original main monitors from a selection of manufacturers in all four of Sony's music production studios.

Coastal Acoustics, UK.

Tel: +44 1753 631022. ►



New Boxer *T Series* reference monitor system at Sony Music's US studio HQ

Contracts● **More Fairlights to NFL**

NFL Films of Mount Laurel, New Jersey, are constructing two editorial rooms to enable them to keep up with additional projects, and both are to be fitted with

Fairlight *MFX3* digital-audio workstations. NFL have used Fairlight DAWs in 'almost every conceivable application', including the live broadcast of *Superbowl XXIX* earlier this year.

NFL were recently awarded two Emmys, one for 'Outstanding Performance in Music for a project recorded, mixed and edited on an *MFX3*', and one for 'Outstanding Performance in Audio' for Fox's children's show *Grunt and Punt*, using an *MFX3* for music and sound editing.

Elsewhere a total of four *MFX3*s and a *Mainframe* system have been sold to three Australian postproduction companies: Tracks Australia; Good Audio Sense; and Take 2 Creative Audio; while 24-track *Mainframe* systems have gone to Japanese post facilities TVC Yamamoto and Media 21 with further *Mainframes* delivered to Tokyo facilities Imagica and Tokyo Sound Production.

Fairlight, Australia. Tel: +61 2 975 2100.
Fairlight ESP, UK. Tel: +44 71 267 3323.
Fairlight, US. Tel: +1 213 460 4884.

● **API supply EMI**

API have announced a major re-entry into the European market with a custom order for EMI's Manor Mobiles operation. The order of 72 *Stage Microphone Amplifiers* and a 24-channel custom recording sidecar based on the

API *Legacy* console series design is due for delivery in September, to be installed in the recording truck.

API Console Sales, US.

Tel: +1 708 653 4544.

● **Sega go for Soundcraft**

Computer games manufacturers Sega have purchased a Soundcraft *DC2000* digitally-controlled console for use in the production of the company's new generation of advanced games packages. Installed at Sega Europe's Product Development Studios in West

London, the 24-channel *DC2000* is employed in the mixdown of voice-overs, music and effects which are subsequently dubbed to computer-generated graphics. Following this acquisition, Sega US have bought a 32-channel *DC2000* for the same purposes.

Soundcraft Electronics, UK.

Tel: +44 1707 665000. ■

playback software with the Netscape *Navigator* browser software.

World Wide Web pages are currently limited to text and static graphics, and small sound and video files must be downloaded and played with shareware. With the Macromedia-Netscape agreement, millions of Netscape *Navigator* users will now be able to experience multimedia in a Web page and the dynamic effect of multimedia documents.

In addition to offering new experiences to the Internet end user, Macromedia and Netscape see this agreement as creating opportunities for innovative marketing to organisations promoting themselves over the World Wide Web and an additional channel for creative expression and sales to multimedia developers.

Macromedia, UK.
Tel: +44 1344 761111.



US: The latest application of the *Spatializer 3-D* stereo technology is cable radio, with the licensing of the system to Taisei Electric Company of Japan for immediate use in cable radio receivers. Taisei Electric is one of the main suppliers of cable receivers to Osaka Yusen Broadcasting Corporation, Japan's top cable radio company. The company's unique 'Usen' system broadcasts 24 hours a day and provides 440 channels of radio programming including music on request. The *Spatializer* stereo enhancement system, which provides 3-D surround sound through two ordinary stereo speakers, will be fitted to the Taisei receivers in a bid to gain an edge in a highly competitive market. The deal follows licensing agreements with Panasonic, Hitachi, Sharp and others, and news that the *Pro Spatializer*, recently used for the Grammy Show, is featured on Michael Jackson's *HIStory* album engineered, as usual, by Bruce Swedien (above). *Spatializer* Audio Laboratories Inc, US. Tel: +1 818 227 3370.

Glasgow school opens

The School of Audio Engineering's 18th site is now open in Glasgow. It offers a full range of SAE courses, using a primary 24-track studio equipped with a Mackie 32-channel console and digital multitrack machines, a secondary Tascam-Fostex 8-track studio, a fully specified MIDI programming suite and a number of *Macintosh* computer workstations running Steinberg and Digidesign software.

Meanwhile the London school has upgraded its main recording and mixdown facility by retrofitting full *Flying Fader* automation to its 32-channel Neve VR console.

SAE Glasgow, UK.
Tel: +44 141 221 3441. ■

MACKIE INTERNATIONAL DISTRIBUTORS

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256 VICTORIA RD
GLADESVILLE, N.S.W. 2111
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Fax: 61 2 817 1049
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Indonesia: GOLDEN AUDIO PRO

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Fax: 62 21 629 8453
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Fax: 81 33 323 5945
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Korea: CHUNGBO SOUND, INC

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SUNGDOONG-KU, SEOUL, KOREA
Phone: 82 2 455 2231/4
Fax: 82 2 455 2235
Contact: ARN-KOO LEE

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Fax: 64 9 815 0452
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Fax: 63 2 811 4482
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Singapore: SWEE LEE COMPANY

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Phone: 65 336 7886
Fax: 65 339 7035
Contact: PETER SONG

Thailand: LUCKY MUSIC INST. CO.

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BANGKOK 10400, THAILAND
Phone: 66 2 251 3319
Fax: 66 1 225 2597
Contact: PREECHA
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Phone: 84 4 243 058
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WUKU INDUSTRIAL ZONE
TAIPEI COUNTY, TAIWAN, ROC
Phone: 886 2 298 2688
Fax: 886 2 298 2396
Contact: DOUGLAS CHANG

MACKIE RE-DEFINES THE 8-BUS CONSOLE. MORE FEATURES. MORE HEADROOM. LESS NOISE.

Because 8•Bus consoles have 20dB of gain above Unity (and mix amp architecture that resists overload), Trim is a "set-and-forget" control.

Flip works with the MIX-B section to double inputs during mixdown.

6 mono Aux Sends from 4 controls. All are Pre/Post Fader-Mute switchable. Aux 3&4/5&6 can tap their signal from the MIX-B/Monitor section.

4-band equalisation. True parametric Hi-Mid with 1/2 to ultra-wide 3-octave bandwidth (previously found only on far more expensive desks), comprehensive 500Hz to 18kHz sweep (15dB boost/cut). Sweepable 45Hz-3kHz Lo Mid, shelving Hi EQ at 12kHz, shelving Lo EQ at 80Hz & 18dB/oct. Lo Cut filter @75Hz.

20dB activity LED's "stacatto" effect is so distinct that you can tell vocals from instruments.

+20dB OLLED. Triple bussing! All 8•Bus consoles have 24 Tape Outputs (3 sets per bus) so you can "send" an output to your choice of tape tracks without re-patching. For example, Sub 1's output appears at Outputs #1, #9 and #17. All outputs are switchable between "pro" +4dBu & "semi-pro" -10dBV in banks of 8.

If you've been searching for affordable recording consoles that truly do

justice to the new generation of digital recording media, your search is over. A complete mixing system,

Mackie's 24•8 and 32•8 are expandable in groups of 24 channels. And all 8•Bus models are level and mute MIDI automation ready.

Sealed rotary controls resist contamination.

Optional MB•32 meter bridge.

Mackie's famous discrete mic preamps with -129.5dBm E.I.N. & awesome headroom.

Elaborate monitoring including two separate headphone sections with multiple sourcing & solo, individual

Studio & Ctl Rm level controls, Talk back with built-in mic, MIX-B & Solo sections.

Mackie exclusive, accurate-taper 100mm faders with extra resistive elements closely approximate the logarithmic taper of mega-expensive consoles. Our faders let you do precise fade-outs all the way down to silence (versus conventional D-taper faders that give up at about -20dB). Compare with your own ears to appreciate our custom design.

Exceptional specifications including 0.0014% THD (1kHz @+4dBu, main outputs), -95dBu output noise (master fader up), 10Hz-120kHz (+0dB/-3dB) frequency response, -129.5dBm mic E.I.N. (20Hz-20kHz, 150Ω), -83dBu mic C.M.R.R. and 91dBu crosstalk (line in to adjacent ch.).



Optional stands available for all models & 24•E Expander.

Constant loudness pan controls' active buffered circuitry & special pot design provide up to 74% more attenuation than comparably-priced consoles.

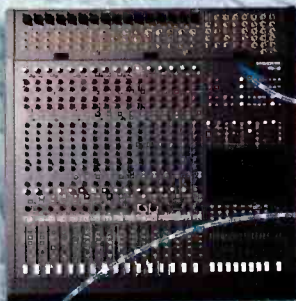
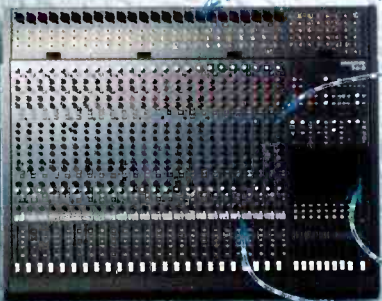
MIX-B bus is a "channel strip" within a channel strip, with its own Level, Pan, Source and EQ options. During mixdown, Mix-B doubles your inputs (for example, 64 on our 32x8x2 32•8 shown above).

All channel inputs include mic preamp with +48VDC phantom power, bal./unbal. line input, mic/line switch, direct out & channel insert.

Mackie 24•8 (24x8x2) is expandable in groups of 24 channels (complete with tape returns) via our 24•E Expander.

In-place stereo solo on all three console models lets you solo any channel(s) to the main L/R LED meters at the touch of a button. All solo assignments in true stereo perspective even if you have a source panned hard right & an effect panned hard left.

Mackie 16•8 (16x8x2) is perfect for video post and scoring applications. Tape returns are switchable between "pro" +4dBu & "semi-pro" -10dBV operating levels.



MACKIE

Mackie Designs Inc. • Woodinville • WA • USA • Represented internationally by MMS, INC. P.O. Box 1071 • Neptune • NJ • 07754 • USA • (908) 988-7800 • FAX (908) 988-9357

In brief

● **Midas XL200**

Midas recently introduced the *XL200*, a mid-priced mixing console with 40 mono input modules, four stereo input modules with mic preamps, eight aux sends, eight VCA subgroups, six mono and two stereo subgroups and eight mute groups. There is room for an additional four input modules, and the console is also available in 40, 32, and 24-channel versions, with 24 and 16-channel extenders available. There is an optional MIDI automation system which allows up to ten groups of channels to be setup for simultaneous muting and 128 console mute settings to be stored as MIDI patches.

Mark IV Pro Audio Group, US.
Tel: +1 616 695 4750.



Re an's *Class 1* patchbay

● **Re an patchbay system**

Re an Products have reintroduced their 96-way, *Class 1* Patchbay. Aimed at the broadcast market in particular, the *Class 1* features die-cast jacks, mounted in groups of 24, on an extruded aluminium chassis for increased structural rigidity. Normalling switches feature high-grade Palladium contacts welded to solid nickel-silver spring leaves for maximum contact pressure. The nose of each jack, nickel-plated to eliminate poor earth contact through tarnishing, forms an integral part of the chassis and cannot come loose.

Re an, UK. Tel: +44 474 328807.
Re an, US. Tel: +1 210 808 0063. ▶

S/B 201

HIGHLIGHTS OF AUDIO TECHNOLOGY 95

Symetrix 620 A-D convertor

New in Symetrix' *600 Series* of products is the *620* 20-bit A-D convertor. The unit features selectable dither and noise shaping and output word size, real-time, sample-rate conversion from 44.1kHz to 22.05kHz, AES-EBU plus SPDIF in and out, and 20-bit quantisation, priced at under £1,000. The new convertor, along with the rest of the Symetrix range, is now handled in the UK and Ireland by Fuzion.

Symetrix, US. Tel: +1 206 787 3222.

Soundcraft DC2020

The latest in Soundcraft's console range is the *DC2020*. Aimed squarely at the postpro market, the *DC2020* comes in 24, 32 and 40-channel formats with semiparametric EQ, six

aux buses and the floating bus system. Automation is Soundcraft's *C3* offering (moving) faders and mutes, machine control, on-line mix editing and project management.

Soundcraft, UK.
Tel: +44 1707 665000.

SA&V developments

Various news from the manufacturers of the *SADiE* hard-disk system include the *Octavia* modular hard-disk-based recorder-editor, a real-time stereo *De-Noise* module developed by British DSP specialists CEDAR for the *SADiE* system and a miniature (read location) hard-disk recorder which shares the proprietary *SADiE* file format.

Octavia is hosted by a *486DX266* PC and employs four AT&T 32-bit floating-point processors to support eight independent channels of 16 to 24-bit audio. Audio I-O is via eight balanced analogue ports and four stereo AES-EBU ports with 20-bit sigma-delta conversion both ways. Sample rates can be set anywhere between 28.8kHz and 51kHz with

synchronisation to VITC, SMPTE EBU at all standard rates. Up to 10 units may be chained to provide 80 channels of digital audio.

The *Rolec SADiE Mobile* offers 4 hours and 20 minutes of stereo 44.1kHz field recording in a portable unit which readily interfaces with the *SADiE* system. The unit features balanced XLR audio connections, optional AES-EBU and SPDIF connections, simple cut-and-splice editing and a removable hard disk. File transfer to *SADiE* is via SCSI, and enables easy access to all of the larger system's facilities.

Studio Audio and Video, UK.
Tel: +44 1353 648888.
Studio Audio Digital Equipment Inc, US. Tel: +1 615 327 1140.

AM-4 Meter

The Chromatec *AM-4* in-picture audio-level meter will display up to four channels, all analogue, all digital or two of each, together with phase which can be displayed as a bar and in X-Y format. Pairs of channel may be switched to display M&S. All these scales may be displayed on a dedicated video monitor using the internal colour raster-sync generator or combined with an external composite video signal in order to display the meter superimposed on a television picture.

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

AudioVision v3.1

Avid's popular *AudioVision-AudioStation* systems are now up



Symetrix 620 A-D convertor—new at Audio Technology 95

DAT. You'd have to go

TCD-DIOPROII

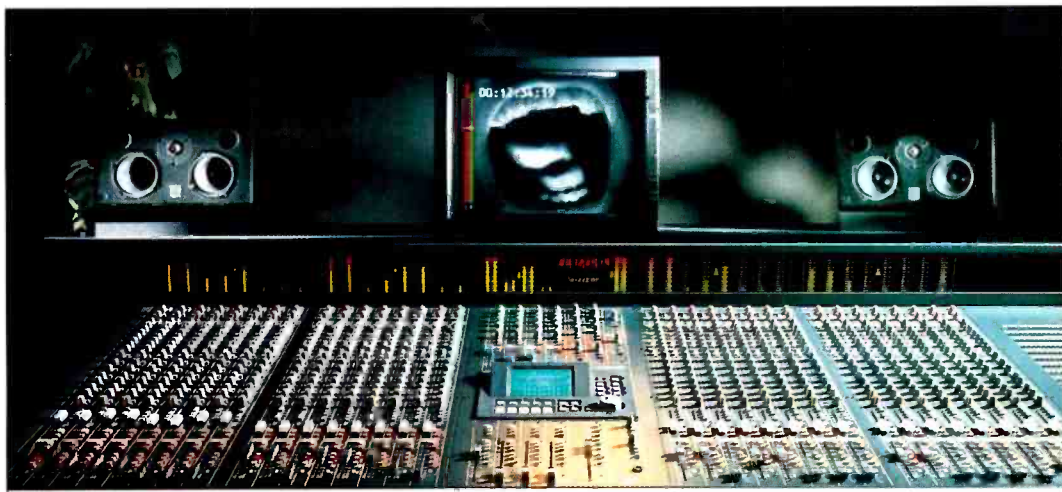


DTC-A8



PCM-2600





Soundcraft DC2020 digitally-controlled, moving-fader, postproduction console

to v3.1 which brings enhanced compatibility with the company's *Media Composer* and *Film Composer* nonlinear audio-video systems. Among the significant facilities on v3.1 are DDI to the Yamaha *DMC1000* console and playback of AVR 26 and 27 by conversion to AVR 5.

Avid Technology, US.
Tel: +1 508 640 3158.
Avid Technology, Europe.
Tel: +44 1753 655999.
Avid, Japan.
Tel: +81 33 505 7937.

Smartpatch

Isotrack were showing the new *Smartpatch* from Signex which allows audio signals to be routed automatically in real time under MIDI control. Designed to work with conventional patch panels, the

Smartpatch uses a familiar panel layout with no complex menu structures to navigate. It can manipulate interconnections between 16 inputs and 16 outputs using an electronic switching matrix, and patch information can be stored in 128 patch memories which are selected and edited directly from the front panel or remotely via MIDI. The *Smartpatch* is available in 2 and 3-pole versions.

Isotrack, UK. Tel: +44 1202 747191.

The Russians are coming

A S McKay, importers of the increasingly-familiar *Oktava* range of Russian microphones, added to the Russian content on their Audio

Technology 95 stand by exhibiting a number of new Russian audio products. Among the newcomers were the first radio microphones to have been exported from the former Soviet Union, which the company expected to surprise visitors with their high standard of build quality and sophisticated engineering.

A S McKay, UK.
Tel: +44 181 541 1177.

beyerdynamic

A new cardioid studio condenser microphone, the MCE 83, along with the *U600* UHF wireless system, new versions of the *MPC65* boundary microphone, the all new *DT200 Series* of headsets, the *XS* range of cost-effective dynamic microphones, and two new gooseneck microphones, the *SHM22H* and *SHM22F* all ▶

In brief

● KNX ISDNPod 2000

Yorkshire-based ISDN specialists KNX used last month's Networks 95 show to launch their next generation of connectivity solutions, the *ISDNPod 2000* range. Aimed at a diverse market including SoHo applications, design studios, retail outlets, petrol forecourts, pubs and restaurants, the range combines the ability to provide access to remote LANs, the Internet and X.25 as well as the integration of existing analogue telephony devices from a single contained unit via ISDN.

KNX describe it as the first product to really capitalise on the flexibility of ISDN, building on their success in combining remote LAN access with POTS (Plain Old Telephone System) on a PC card.

KNX, UK. Tel: +44 1943 467007.

● Shure M367 portable mixer

Shure Brothers have introduced the *M367* 6-input portable microphone mixer designed for professional applications in electronic news gathering, electronic field production and general audio mixing. Its low-noise circuit is over 25dB quieter than the *M267* and allows it to be used for DAT, CD-R and other digital formats. It adds indicator LEDs, XLR outputs and peak lights as well as 12V and 48V phantom power to handle a wide variety of microphones. Mains powering is switchable voltage and ▶



Shure M367 portable mixer

a long, long way to find



PCM-2700A



PCM-7010



PCM-7030



PCM-7050

In brief

two 9V batteries can provide up to eight hours of continuous operation under typical conditions.

HW International, UK.

Tel: +44 181 808 2222.

● **Mackie SR24.4**

New from Mackie, and trumpeted with considerable pride as shipping on time, only six months after its first announcement at NAMM, is the SR24.4 console, a 24-channel, 4-bus board derived from the 8-bus and compact series. The desk is a 24:4:2:1 console featuring high-headroom, low-noise, mic preamps, 3-band EQ with swept mid, six balanced aux sends and double bussing to feed eight tracks at once, all for less than \$1600.

Mackie Designs, US.

Tel: +1 206 487 4333.

Key Audio Systems, UK.

Tel: +44 1245 344001.

● **MetaWave MW25**

digital-audio embedder

MetaWave have complemented their recently launched MW21 digital-audio extractor with the MW25 digital-audio embedder for serial digital (SDI) video applications. The unit is designed to simplify digital broadcasting and related applications by embedding 20-bit AES-EBU digital audio signals within the SDI video data stream. This simplifies complex broadcasting systems by eliminating many audio-only components such as audio routing switches and distribution amplifiers.

The MW21 extractor reverses the process by separating the embedded audio signals from the SDI path.

MetaWave, UK.

Tel: +44 1635 299000. ■



ALPS Motorised Shuttle Fader

appeared at Audio Technology 95.

Also on beyerdynamic's stand were two new microphone preamps from SPL, the single channel *ProMike* and the dual-channel *MikeMan*, and a new Audio Delay Processor from XTA, the *DP100*.

beyerdynamic, UK.

Tel: +44 1273 479411.

beyerdynamic, US.

Tel: +1 516 293 3200.

ALPS Motorised Shuttle Fader

The *Motorised Shuttle Fader* from ALPS is designed for high-end audio and broadcast recording mixer applications. It has a slim 15mm body, standard 100mm travel (60mm and 104mm types can be supplied) and high-speed motor operation of

100mm/0.1s with standard touch sensor track. Its sealed casing and cranked lever ensure a rugged dustproof construction, and dual-unit audio tracks are available, as are special audio tapers for custom requirements.

Roxburgh Electronics, UK.

Tel: +44 1724 281770.

Amek-Neve mic amps

Ameks new *RCMA* (Remote Controlled Microphone Amplifiers) combine four TLA channels of mic amplification each with phantom power, mute, earth-lift, phase-reverse functions along with remote control via the Remote Control Unit or Amek's *VFX* software. Derived from the *9098* circuitry, the *RCMA* boasts

a frequency bandwidth in excess of 100kHz and can take advantage of a digital subboard offering 20-bit A-D conversion for each channel via two AES-EBU interfaces.

Remote control functions are extensive allowing up to 16 *RCMAs* to be used together and mimicking the controls of each unit.

Amek Systems and Controls, UK.

Tel: +44 161 834 6747.

Amek, US: Tel: +1 818 508 9788.

Fax: +1 818 508 8619.

Drawmer 1962 Valve Preamp

Centre stage on the Drawmer stand belonged to the latest addition to Drawmer's valve range, a microphone preamplifier with switchable valve circuitry and full 24-bit resolution A-D convertors. It provides three inputs for microphone (with switchable phantom) line and front-panel aux, with variable HP and LP filters and 3-band EQ. These features, the enhancer and the valve stage with its variable Tube Drive can all be bypassed to give a minimal signal path, as can a zero overshoot limiter. The preamp outputs feed the A-D either directly or via a simple 2-channel mixer section with pan pots, level controls and metering. Digital resolution is selectable 24, 20, 18 and 16 bit, with sample rates of 48kHz, 44.1kHz or external clock.

Drawmer Distribution, UK.

Tel: +44 1924 290460. ■

a broader range.



PCM-E7700



SIX TAPE LENGTHS



In fact, however far you go, you'll never find a bigger choice of DAT products.

Sony makes everything from top-end recorders to the lowest-cost four-head DAT machine on the market.

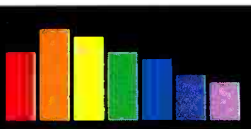
Including a revolutionary twin-deck portable editor.

That's why Sony makes a model that suits you.

And each one is built for professional use and professional sound reproduction.

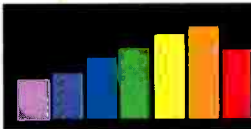
Sony DAT. It's the way to go.

SONY



DN6000

REAL TIME AUDIO
SPECTRUM ANALYSER



Sensitive audio analysis.



The new DN6000 Spectrum Analyser from Klark Teknik is sensitive enough to measure one of nature's quietest creations.

By incorporating the latest DSP technology, the DN6000 provides superb, high resolution spectrum/time analysis, plus all the flexibility, quality and reliability you expect from the world's leader in signal processing.

It performs real time 1/3 and 1/6 Octave spectrum, LET, LEQ and RT60

analysis to a resolution of 0.2dB - and incorporates microphone or line level inputs, with a 20dB trim control to allow optimum visual display.

In fact, the DN6000 is designed to conform to Type 1 specifications of IEC 804 and IEC 651 - the standards for integrating averaging sound level meters.

Thirty two memory positions are available to store spectrum analysis data and a further sixteen for LET/LEQ/RT60. Also,

accumulation of measurements can be achieved to build up a composite average. It can automatically analyse a whole evening's or even a whole week's data.

Other features include an internal signal generator, output parallel printer port and a data output port to link with the DN3600 programmable graphic equaliser, allowing auto equalisation.

For further information please contact Klark Teknik or your nearest agent.



KLARK TEKNIK
a MARK IV company

The first name with sound system designers

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

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40 INPUT CHANNELS including 24 ANALOGUE INPUTS,
each with 20-BIT 64-TIMES OVERSAMPLING A/D
CONVERTORS... 32-BIT PROCESSING with over 190dB
of internal dynamic range... TOTAL ON-BOARD

AUTOMATION of all digital mixing parameters
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Yamaha-Kemble Music (UK) Ltd. Pro Music Division

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digital EFFECTS PROCESSING... £5,999 RRP ex. VAT

SSL Axiom

During a series of standing-room-only demos at Todd-AO/Glen Glenn's world famous Hollywood facility, Solid State Logic recently profiled the new *Axiom* Film Dubbing System. The applications specific *Axiom* configuration offers panning and output assignments for all surround-sound formats—including DTS, Dolby Surround, Dolby Stereo, Dolby SR-D, HDTV and SDDS, and provides up to 96 tracks of *DiskTrack* functionality per operator position.

Based on *Axiom*'s existing configurations, SSL have developed several new dedicated controls for film rerecording. All systems feature integral *VisionTrack* video record-playback.

In practice, this means that each customer will have a unique front-panel layout by specifying the location within the frame of the interface tiles. A new Bus-Tape panel allows *Axiom*-for-film to be offered in a variety of two or three-man configurations through individual control of motion, PEC-Direct switching, joystick panning and unlimited group masters at a dedicated M&E and-or dialogue section. A bank of 12 assignable pairs of bidirectional paddle switches enables bus-tape monitoring and record in-out control. Every software-controlled switch can be used to command up to 48 tracks on single or multiple recorders or *DiskTrack*. Programmable bus-stem reassignment also appears on each panel. Each operator has control of 64 premix

return tracks.

The Surround-Sound/Monitor-Select panel provides selection of the monitoring format, speaker muting, monitoring of individual channel sources and stems and other functions. External premixes can be monitored alone or added to a soundtrack in context.

Other innovations include dynamic automation of surround panning on all channels with automation gathered from pan pots, assignable joysticks or the pen interface (by drawing a profile on the bit pad): flexible routing across four, 8-track stem mixes; 96 *DiskTrack* channels per operator, with concurrent access to record-edit tracks; integral machine control via four serial ports for direct control of VTRs, ATRs, Tascam DA-88, plus film recorders. Each operator has access to an unlimited number of assignable joysticks, which enable the automation of dynamic surround-sound panning. In addition, a Relay Box provides eight GRI I-Os, plus an assignable machine-control port.

According to Colin Pringle, SSL's Group Marketing Director, 'The Film Dubbing System was designed to provide large-scale integration of hard-disk storage, and the type of configurability in the digital domain that (SSL) has been so successful at providing in the analogue domain. Our presentation at Todd-AO introduced the film-dubbing version of *Axiom* to the West Coast community. We were demonstrating a significantly different *Axiom* to that designed for broadcasters, although both make use of the same technology.'

Unlike other digitally-controlled

analogue or all-digital designs that offer a high degree of assignability, SSL have adopted the philosophy of 'one control per function; one function per control'. The result is a panel layout that is extremely easy to follow—no 'layers' or EQ assignment panels to call up to change system parameters—and one that very closely mimics an analogue console. All user controls are totally resettable, and feature circular LED displays to show current settings of each knob.

Each channel strip provides dedicated controls for a 4-band parametric digital EQ section; eight auxiliary sends; a digital dynamics section offering gating, expansion, compression and limiting; digital effects processing, including reverb, delay and ambiance generation; plus full panning between eight programmable outputs. All signal processing applied during recording or overdubbing can be saved as snapshots or dynamically automated without affecting the recorded signal.

Axiom's computer-controlled Resource Management System provides access to input-output options and *DiskTrack* hard-disk audio storage-editing. All input sources to, and output designations from, *Axiom* can be cross-assigned to any physical channel strip. The *Axiom* mainframe can accept channel strips in blocks of eight, to provide virtually limitless one, two or three-man configurations. Upon system startup, the available disk-storage capacity—a disk drive per eight channels of user control—is pooled and assigned as one-track-per-channel strip. In this way, each mixer channel can replay a hard-disk track, and sources are available for multichannel hard-disk recording. Being disk based, the recording capacity is available concurrently, which means that users can be simultaneously recording and playing back from the same track.

'The system has a different busing structure,' Pringle continues, 'plus a range of custom panels that provide both the type of interface and facilities demanded by film mixers. While film dubbing facilities might finally specify a variant on the 'standard film-dubbing console we showed at Todd-AO/Glen Glenn, the *Axiom* Film Dubbing System already provides a range of controls and capabilities.'

'SSL is already fortunate enough to number Todd-AO, Warner Bros, Universal Studios, Buena Vista, Disney-MGM, Lucasfilm and

Pinewood among its clients. We therefore have not only experience of designing and building custom consoles for film dubbing, but also the regular dialogue that has helped us devise a digital solution to the goals these facilities have set themselves.

'Also worthy of note is the *Axiom* Preparation Station, a stand-alone system that adds the ability to import a wide range of file types used in the film industry, such as Lightworks, *Pro Tools* (Sound Designer), AIFF, WAV, and other formats. In this way, edited tracks can be brought into the dubbing environment, and be accessible from the *Axiom* control surface.'

The *Axiom* Preparation Station (APS) is a desktop unit that provides shared access to *Axiom*'s *DiskTrack* for recording, editing and prelaying audio elements, and also records videos. APS can select up to 24 audio tracks from *DiskTrack*. In a similar way, APS shares *Axiom*'s I-O resources, removing the need for expensive duplication of system inputs and outputs. The addition of an APS unit as an extension to *DiskTrack* frees *Axiom* for large-scale mixing projects, while allowing programme preparation to be performed more cost-effectively through the use of shared resources.

As many *Studio Sound* readers will be aware, although multifunction recording and mixing is central to the *Axiom*'s operation, for a number of applications—such as video and film postproduction—there exists a need to record, edit and prelay audio independently of the mix process. Because the *Axiom* Preparation Station also provides audio conforming and reconfirming to standard EDLs, plus Open Media Interchange via import-export of audio in both a variety of formats, some audio functions can now be performed off-line, and be instantly accessible from *Axiom*.

All in all, SSL's *Axiom* Film Dubbing System represents a dramatic breakthrough. Combining the user familiarity of a pretty conventional-looking user-interface, *Axiom* incorporates some astonishing functionality and automation concepts. I expect a sales announcement from a major facility any day now. ■

James Douglas

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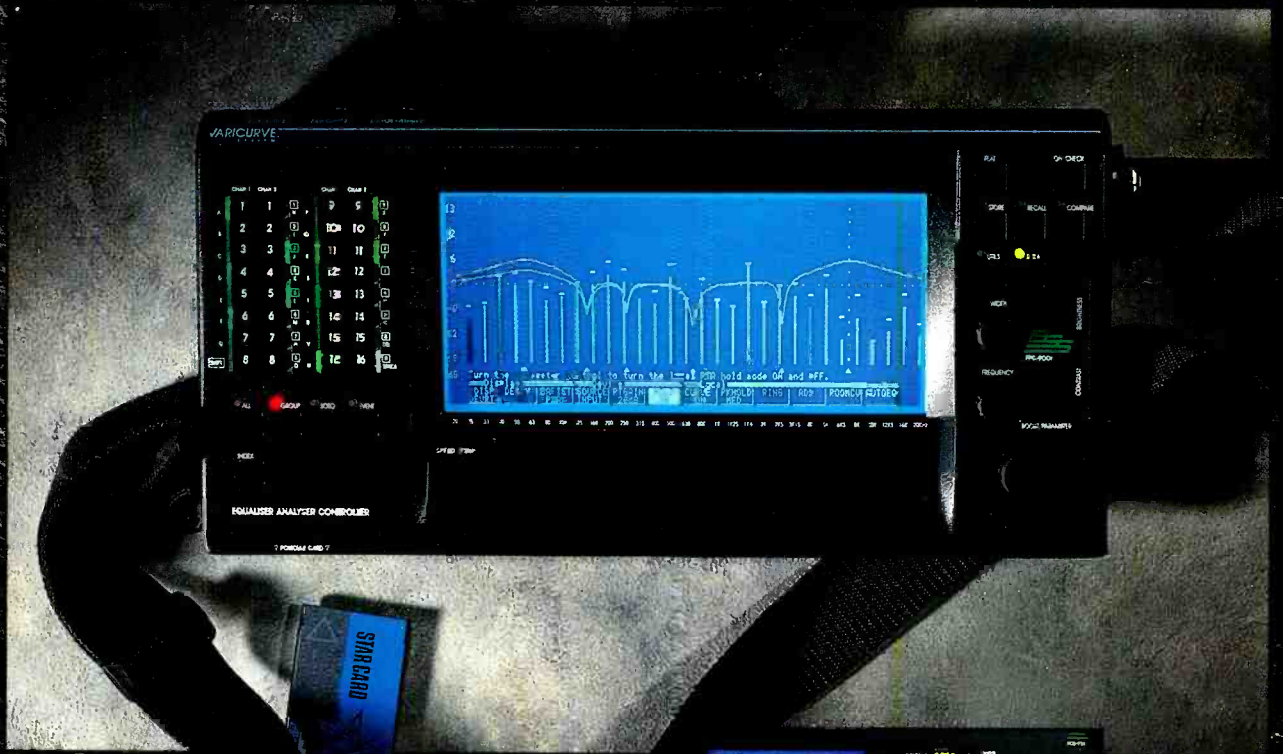
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Axiom for film—one control per function philosophy

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Rode NT2

So which came first, the model number or the company name? Did the hitherto-anonymous designers come up with the *NT2* and seize on Rode as an amusing brand name, or did Rode already exist and the model number follow? Either way, I smell a rat, or more likely some obscure Australian marsupial.

The resurgence in interest in microphones has already been noted, in *Studio Sound* and elsewhere; surrounded as we are by ever more shiny new computers we have rediscovered the pivotal role of the microphone and the fun and variety on offer from the plethora of models available. This trend has been helped on by the appearance of several previously-unknown microphones, many from Eastern Europe, and a renewed interest in vintage microphones from both users and the original manufacturers. In fact there have been so many new and revived microphones introduced to us over the last couple of years that it must be getting more difficult for yet another model to get itself noticed. Yet that is precisely what the Rode *NT2* has done.

Some new microphones attract initial attention by virtue of their appearance—new materials, a new sleek shape, an unusual colour—but no-one could accuse the *NT2* of using such a ploy. It follows a remarkable number of recent introductions in shamelessly modelling itself on the basic *U87* shape, complete with something approaching the original Neumann colour. It has a similar side-fire grille assembly concealing a 1-inch diaphragm, mounted on a fat, tapering, body with an XLR fitted at the base. Just to catch you out, the XLR plugs in facing neither the front nor the back, but the side, an orientation I have never seen before and which must have been specified out of sheer bloody-mindedness.

The *NT2* carries fewer switches than the 'original' for reasons which are, on the face of it, hard to fathom. The one switch on the back selects a 10dB pad in one direction and a bass roll-off of unspecified frequency in the other—the two cannot be used together (an odd compromise), although a centre position disables both. The polar-pattern selector switch is mounted in the expected place on the front of the body, but curiously offers only cardioid and

omni patterns. One or the other alone would be understandable, but given that both are present a figure-of-eight characteristic must be knocking around somewhere, so why is it not available to the user? This seems a curious omission which, if put right, would make the *NT2* even more of a contender.

A big plus is that it comes as standard with an elastic suspension, which is just as well as there is no other way of mounting it on a stand. The suspension is sturdy and well-balanced, firm enough to allow easy aiming while light enough to provide effective shock absorption, and the swivel includes a locking knob, which is small but adequate for the not inconsiderable weight of the microphone. A very unexpected bonus is a spare set of elastic bands for the mount. Unusually, the suspension's stand-mounting thread is $\frac{3}{8}$ -inch, and an adaptor for $\frac{1}{2}$ -inch stands is supplied as standard.

The packaging is designed more for safe long-term storage than for cosmetic presentation; the whole kit comes in a big anonymous white cardboard box, with the microphone and suspension separately packed in pretty basic, black, plastic cases. The microphone itself is in a soft pouch within its case, complete with a bag of silica gel which Rode take the trouble to suggest should be kept with it, at the diaphragm end, to reduce the risk of moisture-related problems arising.

The build quality of the whole kit is reassuringly solid and careful, if not as sleek as the icons it seeks to emulate. The fit of the body parts and the engraving quality are good, the suspension is well-designed and nicely finished, and removing the body sleeve reveals a carefully-assembled PCB with high-quality components and wiring and moisture protection applied where appropriate.

The performance of the *NT2* sits well with the visual impression and the specs, and confirms the rumours one has heard about it. This is a microphone with a definite character, although not so pronounced as to make it only suitable for certain applications. It is honest enough to find uses in most situations where a large-diaphragm condenser is appropriate, but distinctive enough to fit snugly into various specific areas where its undeniable high-mid lift is a pronounced advantage. Pulling solo instruments, particularly up-front ones such as saxophone, out to the front of a mix is an effortless job for the *NT2*, and it shines on vocals,

bringing a singer a step or two forward of the backing with no EQ whatever. This is by no means to suggest that its sound is bright or hard—in fact the depth and body of the large diaphragm is always in evidence and nothing ever sounds thin. What we have is a full, rich sound with a subtle but exploitable presence—for many people the ideal way to get a result. The noise floor is as low as one has a right to demand of a modern condenser design, and the off-axis coloration is minimal. All in all, the performance of the Rode is

quite extraordinary for the price; it joins the growing ranks of newcomers who together are redefining what we can expect of inexpensive microphones, and is likely to find its way into an awful lot of studios from the most cost-conscious to the most exalted. ■

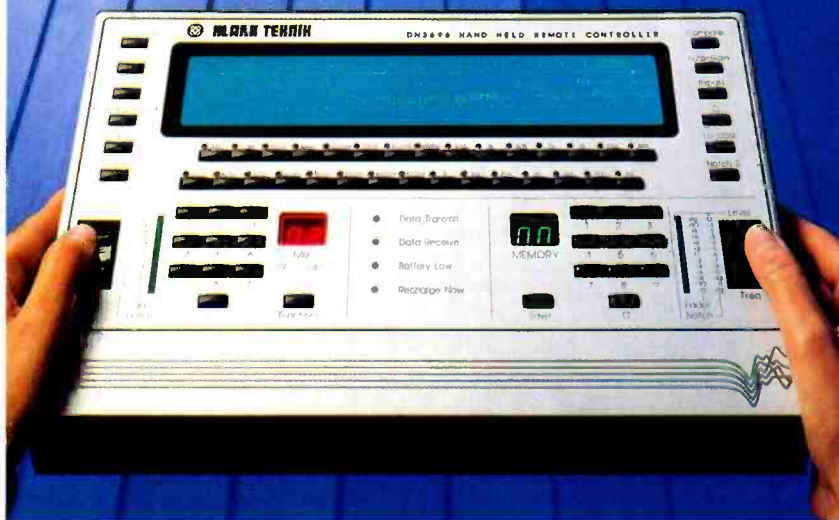
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Aphex Tubessence

The two biggest growth areas in pro-audio, it seems to me, have nothing to do with digits, ISDN or hard disks; they are surely microphone preamplifiers and valves. Every other manufacturer is queuing up to sell us a better alternative to the mic amps in our consoles, and every other piece of outboard has a valve in it somewhere. The state of the audio art, apparently, is the combination of the two, and there are plenty of valve mic amps to prove it. One manufacturer less likely than some, one would have thought, to have joined in with all this is Aphex, yet their contribution to the field, with its typically unorthodox approach, is doing very well indeed.

The *Model 107 Tubessence* microphone preamplifier is a hybrid design, choosing like certain others to use a low-noise, solid-state initial gain stage with a valve to follow, giving the sound without the downside. It is a simple yet comprehensive box, immediately remarkable for its size and weight. Valve equipment is traditionally big, solid and heavy, yet the *Tubessence* is quite the opposite. Its 1U-high 19-inch case is only a few inches deep, and the outboard mains transformer leaves the main unit feeling like a plastic mock-up.

The combination of valves and external power supplies is unusual in itself, making one wonder what sort of voltages are running up and down the bit of lightweight wire joining the two. In fact the valves are operated at very low voltages—the PSU delivers only 24 volts—which according to Aphex not only prolongs the life of the valves themselves but makes replacement far less critical. They go so far as to say that if a valve should fail, any equivalent can be put in its place without any selection or matching being necessary.

The XLRs for the microphone inputs appear on the front panel, presumably for added convenience if several units are racked together. The output from each preamp (this is a 2-channel unit) is, however, on the back, presented on a 3-pole A-type jack which Aphex claim will run unbalanced quite happily. The only other connector is a jack for footswitch muting, a feature Aphex like to fit since discovering that the Grateful Dead used just such a switch on Aphex gates to control vocal microphones on stage.

As to facilities and controls, one looks in vain for anything that might suggest any kind of Aphex processing. This really is a surprisingly straightforward preamp, without even any EQ, never mind dynamic treatment or enhancement—the enhancement, one might say, is all in the valve. The front-panel controls, therefore, simply provide the switching and gain control one needs to get a microphone signal into a multitrack or a console line input, and no more. Phantom power is individually switchable for each channel, as is phase inversion. High-pass filters (at 80Hz) are

provided, and gain is controlled by pots with a 40dB range and 20dB pad switches. Nominal output levels are switched on the back between -10 and +4, and signal levels within each channel are indicated by a pair of LEDs, green for OK and red for Overload. Crude though this system sounds, it is sufficiently well set up to give remarkably reliable results when viewed on an external meter. There is in fact a fair sprinkling of LEDs on the front, as every switched function has an On indicator—you always know where you are with an Aphex.

As ever, there would be little point to all this unless the unit did something special, or at least a little bit different. Since there are no onboard treatments to add anything extra, the point must be the sound produced by the valve, and there is indeed something usefully distinctive about the *Tubessence* sound. I used it, as I imagine most would, between a selection of microphones and my multitrack inputs, and in almost every case felt I had gained something in the process. The preamp is extremely clean and quiet—no reservations about the objective quality—with a fullness which usually enriches the sound and often helps mask shortcomings. There is a lot of depth and body, and a useful reluctance to overemphasise harshness in the source. This can sometimes come across as a softness and lack of sparkle on a sound which has little to start with, but never enough to call it a lack of top or to make it irretrievable with EQ.

Aphex describe the *Model 107* as the ideal front end for a DAW or other digital recording medium, and that seems to sum it up pretty accurately. The 'valve sound' is not obtrusively evident but still undeniably there in all its positive aspects, producing what might be seen as the best of both worlds. The *Tubessence* sound is clean and relatively neutral, unlikely to detract from the intrinsic sound of any microphone and capable of lending a subtle smoothness to a microphone which does not inherently possess it. Using it in preference to a state-of-the-art reference preamp would have to be a conscious decision made in the light of the contribution it makes, but at the same time it is a very cost-effective entry to the always interesting world of alternative microphone amplifiers. Apart from anything else, there will undoubtedly be many for whom a budget-driven trade-off between console facilities and console signal quality will make the Aphex *107* a very attractive purchase indeed. ■

Dave Foister

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Dinemec Sound

What makes the Geneva-based Dinemec Sound production facility of particular note is the fact that it may be the forerunner of a new type of facility. In fact, it could be a pointer to the kind of facility we can expect to see emerging at the end of the century.

Rather than being a recording studio *per se*, Dinemec offer studio recording, mobile recording, mastering and editing, musical services and in-house record production—and the list is still growing. The facility was founded by Dr Paul Sutin (who holds a PhD in Science, an MBA, and is also an accomplished musician with chart successes in the US and appearances at such events as the Montreux Jazz Festival). And as it is built on the lower ground floor of his house in the Genevan suburb of Chene-Bourg, it qualifies as a 'home studio'.

'It may sound a cliché, but we have the idea of an artist walking in with a song or piece of music in his head and going out at the end of the production with all the masters necessary for distribution of the final product,' explains Sutin. 'The major advantage of this is that allows all stages of the production to be followed through under the same roof, and same atmosphere, and thus keep the continuity of ideas. You can keep the basic concept alive without it being

altered by outside influences.'

One of the immediate dangers facing a studio that offers a general range of facilities is the potential lack of expertise in specific areas. Dinemec are well aware of this and have assembled a strong production team to ensure a high level of in-house expertise. This team includes Production Manager Sutin, Technical Manager and Recording Engineer Michelangelo Defoe, Mix Engineer Jose Serano, and Recording-Mixing Engineer Toby Alington. The studio also has a roster of freelance people who can be brought in as appropriate to the project in progress.

The control room is the largest in the facility at 35m², and has the feel of a large drawing room.

The room is divided into three, with an AMS Neve *Logic 2* console and *AudioFile* pairing taking pride of place in the centre of the room. These are flanked by a pair of ATC 100 monitors. The left-hand side of the room houses an automated Soundcraft *TSR* console, which is sometimes pressed into service for supplementary mixing operations when not being used as a submixer for the MIDI system. Main effects racks, a Studer *D827-48* digital multitrack and Otari analogue 24-track with Dolby SR are also to be found here.

The right-hand side of the room could be called the 'composer's suite'. Tucked into the curve of the bay windows, this boasts a comprehensive MIDI centre and allows the musician abundant space in which to prepare or execute a production.

Adjoining the Control Room is the studio proper. This contains a



Logic 2-Audiofile centre stage at Dinemec

comprehensive selection of new and vintage instruments, an extensive collection of 'classic' guitars and an equally impressive collection of microphones. The size of the control room makes it ideal for overdubs in situations where the musician(s) prefer to play directly against the control-room monitors.

The mobile was designed to do a summer season of recording and then to be reinstalled in the studio for mixing. However, the demand for the *Logic 2* became so great that it was obvious that it would be staying put. The truck has stage racks with remote mic preamps and A-D converters (specially built by AMS Neve) so signals arrive in the van in digital form. The arrival of the Studer meant that the recorded signals could go straight to tape and all that was needed then was a cost-effective analogue console (a Soundcraft) for monitoring.

Sutin had entertained the idea of forming his own record label for some time, with particular emphasis on classical, jazz and New Age music, and this became fact with the foundation of Dinemec Records in 1994. This move also brought the mastering suite in its wake and this is in the form of a Sonic Solutions system complete with *NoNoise*.

'With the interest in rereleasing old recordings on CD, getting the *NoNoise* system made a lot of sense as it allows the original recordings to be restored as opposed to running the risk of altering them through excessive EQ and filtering. It has certainly proved to be very popular from day one.' He comments.

The latest area of activity for

Dinemec is audio-for-video. Recent productions include voice-overs with Roger Moore for documentary films and the KLM in-flight programme, Michael Caine doing the narration for the BBC film *Out of the Blue* (which also included musical composition and production) and the postproduction for Peter Greenaway's documentary on Geneva, *Geneva Stairs*.

'Postproduction is a field that we very much want to expand into,' explains Sutin, 'and we have installed film-orientated equipment such as a Dolby Surround 4:2:4 matrix encoder and *Optiview* metering system plus a Betacam for the video.'

'Each new area is approached very carefully and we only offer new services when we are firmly convinced that we can do them well. It is no good trying to do everything and finding out that you cannot handle it—that is the best way to gain a bad reputation in very short order!'

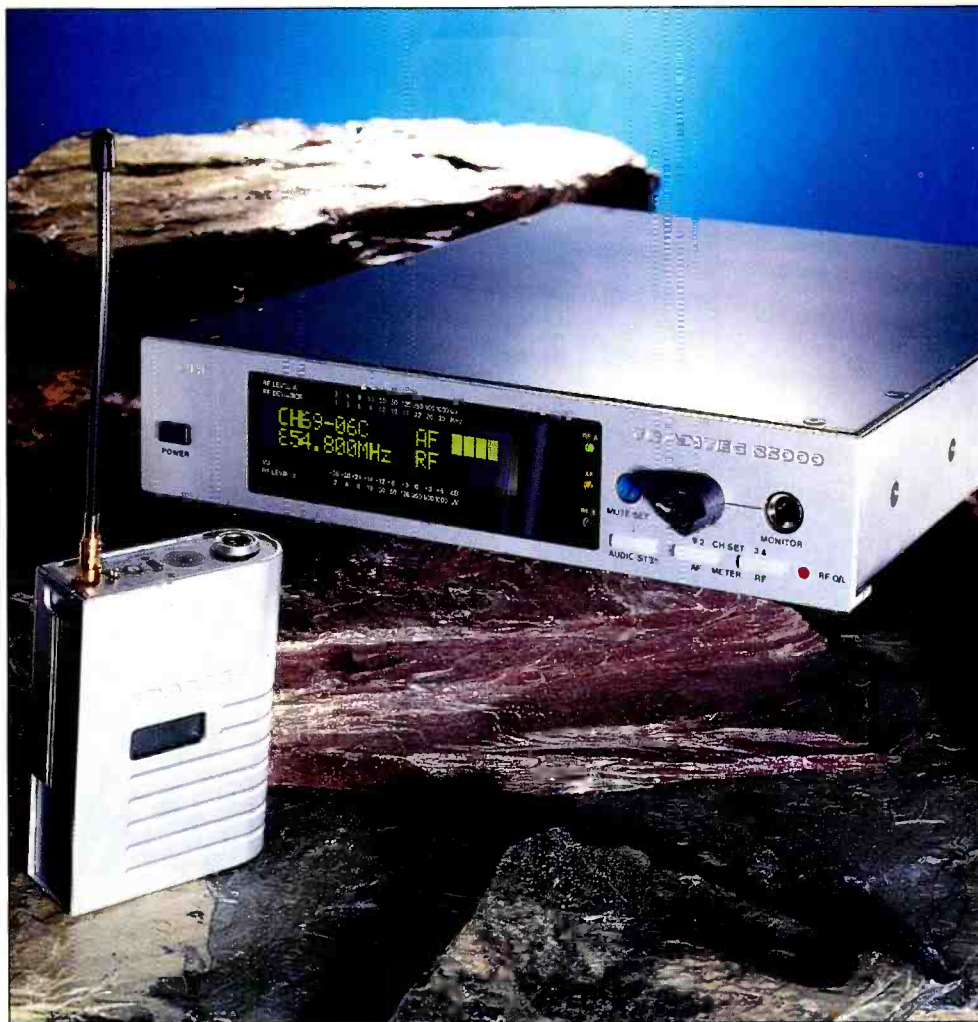
The other advantage of diversification is that the company is well covered through fluctuations of business. There may be periods when the studio is less in demand but the mastering facilities are sought after—it is very doubtful that there will be times when all of the facility's services will be on a downturn and Sutin can concentrate on where the demand is and back off temporarily on the other areas.' ■

Terry Nelson

**Dinemec Sound, 17 Boulevard Helvétique, PO Box 3704, 1211 Geneva 3, Switzerland.
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Composer and keyboard player Matt Clifford surrounded by the Dinemec MIDI bay



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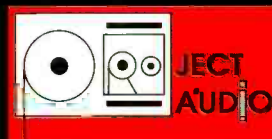
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Producer Frank Fillipetti (seated) and Simon Andrews, owner of Right Track, before the SSL SL9000j console in Studio A

BRIGHT LIGHTS, BIG CITY

New York City's Right Track recently completed the latest of its ongoing upgrades to stay ahead of the game on a very fast track. Dan Daley reports

As Wall Street became the locus of the world financial community, and as Fleet Street became synonymous with newspapers and media, West 48th Street in midtown Manhattan has been for nearly six decades the hub of much of the world's music community. A single block between Seventh Avenue and the Avenue of the Americas (Sixth Avenue to native New Yorkers) houses two of the oldest retail music and recording-technology establishments in the western hemisphere, Manny's Music and Sam Ash Music.

Both began their existences as instrument, string and reed suppliers for the musicians who worked the now-defunct jazz artery of West 52nd Street in its 1940s heyday, as well as for the musicians who still populate the pits in the nearby Broadway show theatres. Over time, as the technology changed, so did Manny's and Sam Ash; both stores now have expansive

recording and mail-order catalogue sales departments.

Nestled in between Manny's main store and a Sam Ash satellite storefront on the south side of the street is an almost anonymous doorway with a brass-plated intercom. Inside, a long, white corridor leads to a private elevator that transports you from the bustle of the street into the tasteful, gracious reception area of Right Track Recording. Like the street it's on and like the business that it's in, Right Track has changed over the years. What has kept it successful, claims owner Simon Andrews, is that he's tried to keep the changes as far ahead of the pack as is prudent in the volatile studio business environment that the intensity of a place like New York City engenders.

'The thing about New York is, for all intents and purposes as far as recording studios are concerned, it's really just the island of Manhattan and just the midtown part of the island, and what that means is that you're dealing with the most intensely, vertically driven, real-estate market in the world,' the wiry Andrews observes from behind his orderly desktop on a grey-skied weekday morning, in his own London accent that's resisted 25 years of exposure to New York patois. 'LA is a horizontal place with lots of space; in London, you can be anywhere from Knightsbridge to Mayfair to Chelsea. But in New York, the business is almost completely confined to a few square blocks.'

While many studios do populate other areas of Manhattan

and New York's outer boroughs, Andrews is referring to the cluster of nominally regarded world-class studios of New York: Right Track, Power Station, Quad Recording, Sony Recording and The Hit Factory a few blocks north and west. And midtown has traditionally housed their forebears, such as the late Media Sound, Automated Recording, A&R, Columbia Recording Studios and RCA Recording Studios, which loom as both ghosts and mementos of New York's once and possibly future position as the centre of the music recording world.

That has changed over the years, Andrews acknowledges. However, he considers the changes cyclical in nature, and he has made a recent and very serious investment in the future of both Right Track and New York, betting that New York's number is up again. The studio, which has operated two rooms since it moved to its present location in 1979, added a third room this year, Studio C, with an expanded version of the SSL G that once occupied its Studio B. Studio A now houses a new SSL 9000j desk, and Studio B had a new Neve Capricorn digital desk installed earlier this year. All this was surrounded by an extensive refurbishment of the facility's interior design and wiring. Once the dust had settled, Andrews immediately began planning for the next round of upgrades, and reflective of the competitive atmosphere of New York's mean and lean studio environment, he prefers to remain secretive about what that will ultimately entail.

'All you'll get are "no comments" from me on that,' he says, with a thin, purposeful Cheshire cat smile.

Despite Andrews' reticence regarding the future, Right Track's past and present offer plenty of insight into what it takes to be successful in a place like Manhattan. The short answer is, as one might suspect, money and a willingness to part with it; the deeper answer reveals the need for an intuitive ability to perceive market permutations before anyone else does and the testicular fortitude required to act on them.

Andrews, a guitarist and keyboard player *manqué* in his native London, came to New York in 1969 as marketing director of new line of cosmetics from 1960s British fashion designer Mary Quant, innovator of the miniskirt and one of the moving pop-cultural forces of an era, spearheaded by the Beatles, in which the term 'gear' was not used to represent technology but taste. Unfortunately, while Carnaby Street

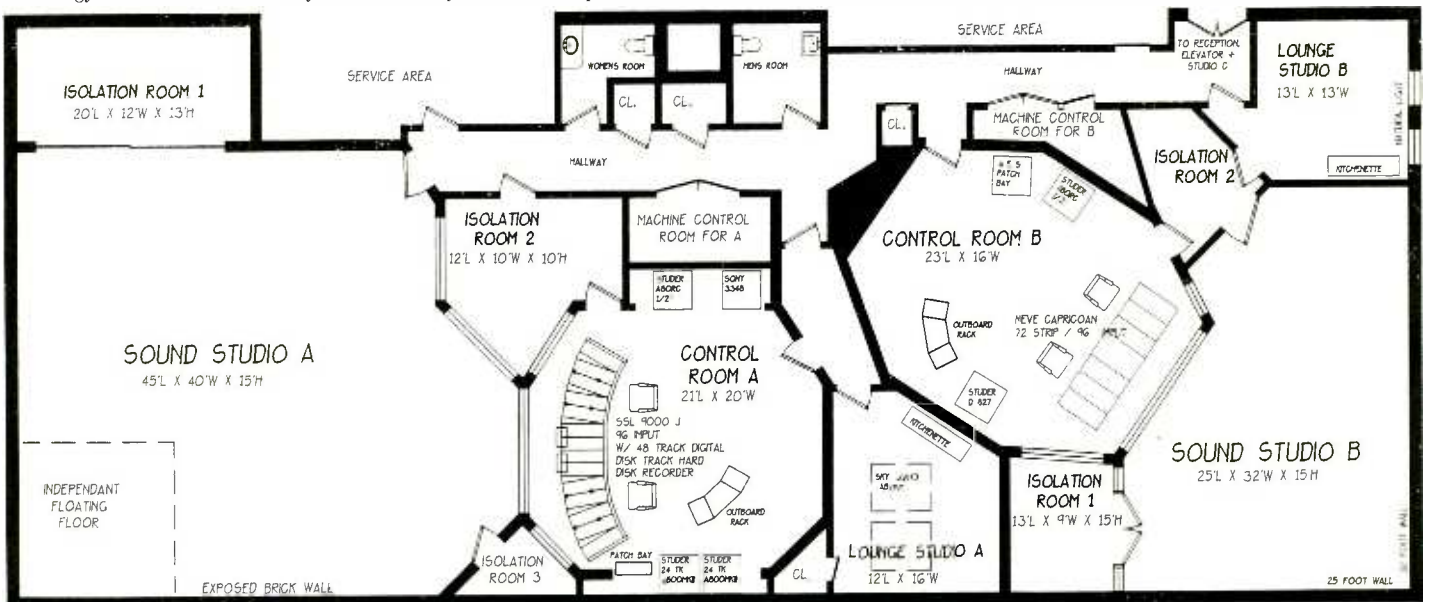


Control room B showing the Capricorn console

took over US fashion like the Beatles dominated American radio and record sales, Quant's cosmetics line went quickly and quietly to the charnel house of couture, despite Andrews' efforts. What he ultimately got out of the deal was a one-way ticket, an American wife, a lifelong fascination with Manhattan and an opportunity to revitalise his musical aspirations. His attempts with a local band proved slow-going, but in the process he perceived a gaping hole in New York's studio base.

'The big studios sort of owned the town and treated acts with small budgets rather arrogantly,' he recalls of the period. 'I saw a niche opportunity for a small studio that would cater to that kind of act.'

So was born Right Track Recording, in 1976, with an 8-track Ampex tape deck and an MCI console in a cramped space on the corner of West 24th Street and Sixth Avenue. ▶



Floor plan showing the main-level sound studios A and B

EAST COAST RECORDING FACILITY



The lounge in the Studio C complex

Andrews quickly upgraded to 16 tracks, then to 24, becoming a one-room, all-MCI studio with a steady client base of band demos. The niche approach worked well until the late 1970s and the first appearances of personal recording equipment, such as the Tascam 8808 open-reel 8-track deck, the initial beachhead of what would soon come to swamp the industry under the rubric of the project studio.

In 1979, Andrews made a critical decision to join the ranks of the studios he once found so imperious, and armed with a credit card and abetted by a heavy dose of sweat equity, he leased a floor in the building that now houses Right Track on 48th Street and, with design and

engineering assistance from long-time and current associate, Engineer-Producer Frank Fillipetti, for three years operated two locations, serving his original clientele downtown with the older equipment and building a more upscale client base on 48th Street, using a 56-input MCI 500 Series console and Westlake monitoring. In 1982, Andrews closed the downtown studio and consolidated both rooms on 48th Street.

The critical curve

What was not consolidated was the split market; the two different locations were serving different clientele bases —downtown continued to cater to low-budget demo projects while the uptown studio aimed for major label projects. The new 2-room Right Track was designed to focus on and pursue the latter. And Andrews maintains that his choice of console for the new main room was critical and as much a function of serendipity as anything else.

'When we were building the new room we really had no idea what console was going in there,' he recalls. 'Frank [Fillipetti] had been in London for six months working on a project there and that's when he first ran into the SSL board, which was rather new at the time. He told me about it and we would up buying the second SSL in New York [Power Station had bought the first one a year earlier]. What was fortuitous was that SSL had gotten their software together in the six months between when Frank encountered the board and when we took delivery of it.'

What Andrews is referring to is, in retrospect, a turning point in console development. From the late 1970s through the early 1980s console automation was a relatively new concept and the learning curves for the initial versions were steep and complex. Andrews believes that Right Track's acquisition of the SSL at a time when its automation interface had just evolved to the point where it was far more transparent to itinerant engineers that had become the norm in New York (staffers were being phased out throughout the industry during this time) was a linchpin for the success of both the studio and SSL in New York. (New York's position as an advertising jingle centre also drove the SSL juggernaut locally; the desk actually acquired a cachet of sorts among agency types who otherwise would be stalking the control room muttering comments like 'Could I hear that an octave faster?')

'As a result, we were ahead of the curve in which SSL boards sort of swept New York studios at a time when

they were easier to interface with,' Andrews says. 'At first it seemed like a bit of risk; it was a new console for the US where Neve had always been the frontrunner. But it's acceptance in the UK was a big factor since at the time British studios were still perceived as leaders, and once it was installed, the phones began ringing.'

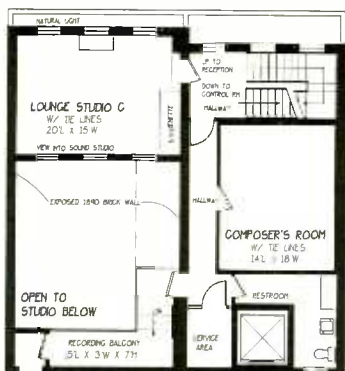
Producer Ed Stasium was the first to use the SSL at Right Track on J Geils' lead singer Peter Wolf's first solo effort, followed by a record for glam-rockers Kiss. Within months, Right Track installed a second SSL in its B room, replacing the ageing MCI desk.

'It was a matter of a trend,' he observes. 'Up till then, New York was a Neve-Studer A800 town. We caught the trend as it was shifting to SSL and digital machines.'

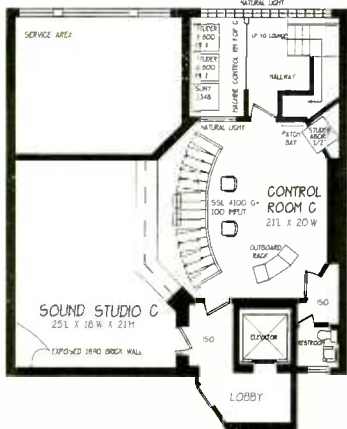
By 1985, Right Track was riding the crest of a wave that saw New York City become the apparent centre of the recording universe once again, before New York and the other major music centres began to feel the undertow of the project studio phenomenon. That year, the studio found itself consistently near the top of the *Billboard* charts; Andrews has one week's chart from that watershed year framed in his office that shows the studio with four of the week's top ten singles and 10% of the Top 100 Album chart, including all or parts of records from Simple Minds, Whitney Houston (her first No 1 record), Robert Palmer, Journey, Aretha Franklin, Freddie Jackson, Charlie Sexton and the Rolling Stones' *Dirty Work* LP.

While this was in retrospect the high-water mark of New York's music stock, the period secured Right Track's position as one of the leading rooms in the city, even as New York watched as the cracks caused by project studios and the globalisation of music genres and production widened into the beginnings of the fractured, fragmented, multiple-chart music industry of today.

Andrews is philosophical about what has happened to New York: 'You can't look at a location and say this or ▶



Floor plan of the upper level

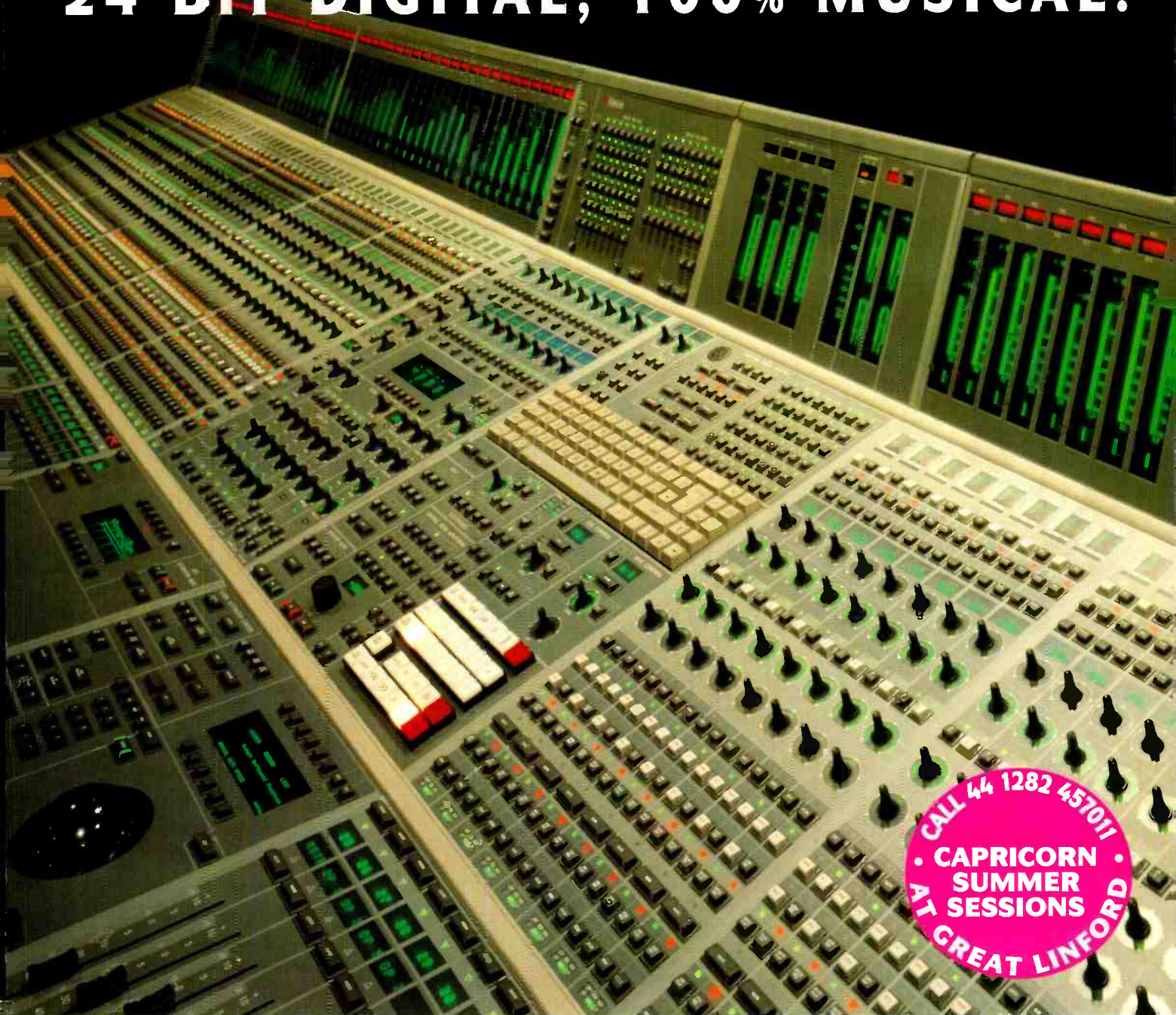


Floor plan: Studio C complex: the lower level



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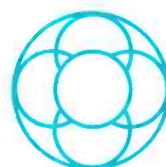


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Control room C with SSL SL4000 G Plus console, AT&T DISQ and Genelec 1035 monitoring

that about it based upon where things are at at the moment,' he says reflectively. 'If you look back from the early fifties onward the music has gone 'round between London, New York, Los Angeles and Nashville on a cyclical basis. In the 1950s it was in New York with Bell Sound, which had all the hits and was an amazing facility. Then it moved to London in the 1960s with the Beatles, to LA in the 1970s with the Eagles and Linda Ronstadt, came back to New York in the 1980s and now seems to be moving to Nashville, although it's also spreading out to places like Seattle and San Francisco.

'But New York is already seeing a resurgence of music recording and what's going on with the studios here reflects that: Hit Factory's new facility spent untold sums as is very successful—Michael Jackson booked three rooms for a year there; the large Sony facility opened up; other studios are expanding; and we added our third room, as well as an SSL 9000j and a Neve Capricorn. It's not like it was in the 1980s, with lots of sex, drugs and rock 'n' roll, but it's definitely a resurgence.'

Studio C

Right Track's expansion was delayed by that quintessentially New York obstacle of vertical real estate. Andrews waited over a year for the adjacent floor space to become available. Planned since late 1993, the new Studio C opened in April of this year with the SSL 4000 G Plus Series console—now expanded to 100 inputs—from Studio B. The console also had an AT&T DISQ digital mixing core added to it in May of this year, further expanding its capability. Aesthetically, Studio C also retains a New York flavour, with original brick and inlaid timber beams from the 1890s structure serving as much as a visual motif as an acoustical purpose. Designed by Fillipetti to be a sharply reverberant overdub and vocal room, it has a number of angles and nooks that allow for almost infinite room mic placement combinations. Fillipetti and Andrews laid out the basic design of both the recording and control rooms, and Studio Chief Technician John Herman did the wiring. Studio Manager Nancy West added the interior decor and

colour schemes, which were then applied to the rest of the studio as part of an overall refurbishment of the facility, technologically and aesthetical.

The introduction of the Neve Capricorn in Studio B was based on Andrews feeling that a digital console would become a necessity in the near future, if not immediately. 'The [all-digital] technology isn't ready to sweep the market just yet,' he says. 'But eventually everyone is going to want to be able to record on 24 bits. The Capricorn has been around a while now and it's gone through its phases of development just as the early SSLs did a decade or so ago. But it's going to be an ongoing process to make the interface more and more user-friendly. The point is, we got into it at a point that's ahead of the curve as far as what the

mainstream wants, and I think it'll still be years before the curve straightens itself out.'

In the meantime, Andrews says, there are plenty of artists who want the all-digital desk that aren't mega-budget acts but of which there are enough to make it worthwhile, from jazz acts that can pay the approximately \$2,000 daily rate to get an entire record done totally digitally in a day or two to spot work on album projects, such as the vocal work Carly Simon did there with Fillipetti or the string dates Ray Bardani has recorded for Luther Vandross

'In the meantime, our technical knowledge in the area of digital desks is increasing by leaps and bounds,' he adds. 'I think the console is ready for mainstream use; it's that the user base, the engineers, isn't completely ready for it. But it will be.'

Right Track's experience with at least two generations of SSL desks and now the Capricorn underscores how what was once an intuitive philosophy has now become an operational imperative as large, leading edge music-recording facilities now find themselves in something of a niche in the age of personal recording environments and proliferating global recording studios. While not faced with the bewildering array of noncompatible digital-audio-workstation decisions that post houses have to deal with, music studios like Right Track have to make critical and expensive technology decisions nonetheless that will keep them several degrees of latitude ahead of the pack on a technology curve that gets pricier and more profligate each year.

'What you also need to add to the equation is that music is still a very intuitive process,' observes Andrews. 'I don't see any real change in the hardware for some time to come; it's the software that will really be driving things. But I still see lots of tactile surfaces, which I think are necessary because as logical as all this technology seems to want to make music, you need things to have serendipitous accidents on, because in music, accidents can be beautiful.' ■

Right Track, 168 West 48th Street, New York, NY 10036, USA. Tel: +1 212 944 5770. Fax: +1 212 944 7258.

RIGHT TRACK

STUDIO A
35ft x 35ft x 15ft
main recording room with three iso booths; 96-input SSL 9000j with 48 tracks of DiskTrack integrated hard-disk recording and switchable E and G Series EQ on each channel; Sony 3348 v2.1 digital and Studer A800 analogue multitracks; Genelec 1035 main monitoring.

STUDIO B
25ft x 32ft x 15ft
main recording room with two iso booths; 72-input Neve Capricorn; Studer D-827 and A800 MIII digital and analogue multitracks; Genelec 1034A main monitoring.

STUDIO C
25ft x 18ft x 21ft
main recording room with 15ft x 3ft x 7ft balcony; 100-input SSL 4000 G Plus with E and G EQ, Ultimatum and AT&T DISQ Digital Mixing Core; Sony 3348 and Studer A800 digital and analogue multitracks; Genelec 1035 main monitoring.

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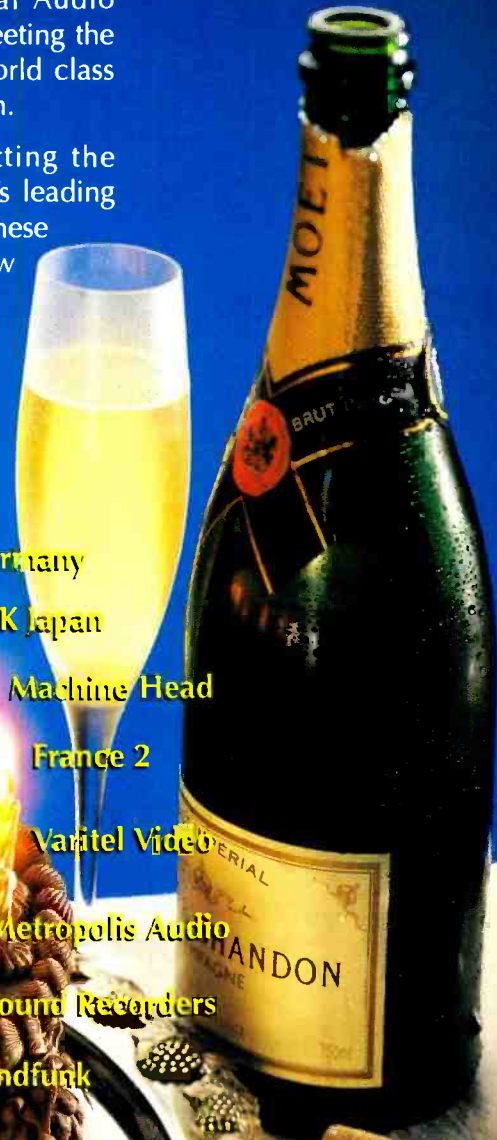
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SADiE PORTABLE

‘Because it’s such a blindingly obvious idea, I think it’s going to appeal to a lot of people,’ says Joe Bull, Managing Director of the British Studio Audio and Video operation. In fact, SA&V’s latest *SADiE* development is such a good idea that attracted plenty of admiring, if not envious, attention at its recent Audio Technology 95 show launch.

The unit in question is the *SADiE Portable*, a ‘luggable’, fully-specified version of the desktop *SADiE* packaged in a Pentium PC the size of a large briefcase and weighing around 25lbs.

‘We’ve been waiting for the technology to catch up with the idea,’ claims Bull. ‘With recent improvements to portable computers, and in particular the advances in colour LCD screens, the quality and cost have now made it a realistic proposition.’

Although the *SADiE Portable* is not a battery-powered laptop, that technology is still some way off yet, it provides a solution to some of the more persistent requests that SA&V have received over the last couple of years.

‘One of the reasons for putting the *Portable* together was in response to some of our BBC radio customers. Producers in particular wanted a system they could work with at home. Traditionally, before the advent of hard-disk editors, producers would stick a Revox and a stack of tapes in the back of their car, and carry on editing a programme at home. Providing them with that facility again is very appealing, and we can imagine a situation where a number of producers would have access to one *SADiE Portable* as a shared resource.’

Also with radio in mind, Studio Audio are currently investigating an ISDN option for the system. ‘We feel there is likely to be demand for ISDN on the system in the future and we know of various ISDN solutions that would potentially work well,’ says Bull. ‘As the public service networks start expanding, I think there will be easier ways for people to get access to ISDN on an *ad hoc* basis as opposed to a permanent installation, and this obviously fits in well with the portable concept.’

Apart from SA&V’s radio customers, other users had also suggested a portable system, including a number from the classical music sector which Bull feels will be a strong market for the system. ‘I think initially the system will



Taking the DAW into the field—SA&V’s *SADiE Portable*

appeal most to the classical market working in 20-bit and over. Recording directly to a portable system that offers full editing capabilities without any upload time has very real advantages, and people are excited about that.

‘It also has applications for location film and TV work, where the ability to do some pre-editing could be invaluable. It allows decisions to be made there and then about whether an edit is going to work, rather than hoping the studio will be able to sort it out later—which, as we all know, can sometimes prove a very expensive gamble. Its acceptance, though, is totally dependent on people’s working practices, and I certainly don’t see it taking over from Nagra-D and DAT overnight. Where I do think it will start to be used is for fast turnaround TV work, where recording direct to a removable hard disk will significantly speed up the production process. With 25% of *SADiE* sales now going to

postproduction there is a good argument for working this way.’

Another area where Bull sees potential for the system is with hire companies. Apart from its obvious portable advantages, the self-contained, ready-to-go nature of the system make it very attractive as a hire-in item to edit, compile and even PQ (standard now on all *SADiE* editors) finished mixes.

Although the *Portable* uses the same cards and software as the desktop, it ►

Taking digital nonlinear recording on location is the sole aim of SA&V’s new *SADiE* system. Patrick Stapley reports

differs in one respect by being fitted with a 4Gb removable drive rather than the standard 2.1Gb removable. But can the system accommodate even larger drives if necessary?

'It will be able to,' claims Bull. 'The only trouble at the moment is that with a box this size you are very space limited, and at the moment anything bigger than a 4Gb drive is in a 5 1/4-inch format rather than a 3 1/2-inch format. Once the technology allows we will be able to supply larger drives, but what we're talking about here is continuous recording time and the 4Gb drive gives you 6 1/2 hours of stereo which is pretty good. Also you have to remember these are removable drives, so if you get low on recording space you simply load in a new drive, log it on, which takes approximately 10 seconds, and off you go for another 6 1/2 hours.'

The system is currently restricted to mains power and although Joe Bull can see the advantages of a battery-powered system, the technology as it stands does not really cater for it. 'It would be wonderful, but the trouble is that with any current disk editor, it's the disk drives that are the killer because they need an awful lot of power to spin them up, also the cards are designed to work from mains. Having said that, you could in theory power the system using a car battery and 12 volt DC to 240 volt AC adaptor, but the problem then is that you're going to have to lug around heavy batteries which would rather defeat the object.'

There is a half-way solution currently being developed independently by UK company Rolec. Called the *SADiE Mobile*, this is a battery-powered, 16-bit hard-disk recorder (1Gb) which uses the *SADiE* file format and is primarily aimed at news-gathering applications. The system operates rather like a DAT recorder, and is said to have a battery life sufficient for 100 minutes of recording time. Being in *SADiE*'s native format, there need be no disk transfers or lengthy upload times.

In use

SADiE Portable's first customer is classical producer and engineer Trygg Tryggvasson who has bought the system for his company Modus Music. Icelandic born Tryggvasson formerly worked at Decca between 1960 and 1973, followed by a 15-year stint at the University of East Anglia where he ran a music recording course. When funding ceased, Tryggvasson along with student Marianne Freeman formed Modus Music which has since gone from strength to strength and now offers full recording and postproduction services. Modus became one of the first companies in the classical world to purchase a *SADiE* editor and with the imminent delivery of the *Portable*, the company will soon own three *SADiE* systems.

'For some time we've been looking hard at other media to record on,' says Tryggvasson. 'Everything we do is 20-bit and is currently recorded to either Mitsubishi X86 or Nagra-D. We looked at the Sony PCM-9000 but the media costs on that were so astronomical that our clients simply would not have accepted it.'

'It occurred to me that since most of the work we do involves the full production process, if we could record straight onto the editing system where it has

to end up anyway, there could be an efficiency that would translate into lower costs for our clients and a more convenient way of working for us as well.'

Taking into account *SADiE*'s ability to archive to Exabyte at five times real time, its support for M-O discs, and its virtual multitracking capability, Tryggvasson realised that the system offered the basis for a recording system that could move in many different directions.

'It struck me that a portable system could be put together quite easily. Knowing of a couple of portable PCs with suitable card slots, the Toshiba 6600 and another by a company called Colossus, I came to the conclusion that the Colossus system was the way to go because it was a more standard system and cheaper. I worked out all the figures and was about to put an order in for the computer and get the *SADiE* cards, when I discovered Studio Audio were working along exactly the same lines.'

Rather than pursue his DIY route any further, Tryggvasson decided to let SA&V do the work and put an immediate order in for a *SADiE Portable*.

'We expect to take delivery of the system any day now, but at this stage it's too early to say which project we'll use it on first. However, we will definitely be using it to record the Royal Opera House records which we're doing for Conifer where it should help simplify things hugely.'

The potential for having the recorded audio within the editor on location is enormous. It gives us the option of performing edits at the time which is ideal. Funnily enough we got to that position just before I left Decca in the 1970s, by sending an editor to every location recording. However, digital through everything sideways and the practice inevitably changed. Now with this system we're able to return to that again, and this kind of integration is going to open up some very interesting ways of working.'

Apart from the ability to check on location how an edit will work, and play edited passages to the conductor and artists, Tryggvasson believes it will also be possible with certain recordings to assemble a great deal of the material during the sessions themselves.

'In instances where there are longish takes, it's perfectly feasible to start putting things together during the recording sessions. I know, for example, that Marianne Freeman could easily edit together two takes ready for playback in the time it takes people to walk from the studio to the control room. Instead of ending a session with a mass of editing notes and scribbled scores, we will have the beginnings of a physical edit which is a wonderful thought because that's when it's really fresh and you're deeply involved in it all. The other thing, of course, is that if you're stuck in a hotel room between sessions, you may just feel like piecing takes together, and here again the system makes really efficient use of time.'

All the drives used by Modus are removable 2Gb IBM devices, and five of these have been set aside for use with the *SADiE Portable* rather than using the 4Gb drive that was originally specified.

'The only awkward thing I can see at the moment is the freeing-up of hard drives. Unless you have dozens of them, which gets rather expensive, you are bound to be in a situation where

THE SADiE PORTABLE

- Portable PC by Colossus
customised by Studio Audio
- Intel Pentium 75 processor
- YESA graphics card
- SADiE cards: 2-in: 4-out digital card,
analogue and time-code card
- SADiE software
- 8Mb RAM expandable to 128Mb
- One 1.44Mb diskette drive
- One 540Mb high speed IDE hard drive
- One 4Gb removable hard drive
- Active TFT Colour LCD VGA Screen
(An external monitor may also be connected)
- 102-key detachable keyboard with 12 function keys
- Mouse or trackball
- 200W, 110/220V switchable power supply
- Carrying case
- System dimensions: 18.1
inches x 9.1 inches x 7.5 inches (WHD)
- Weight: approximately 20lb

they have to be freed-up. With Exabyte we can archive in a 20-bit format which is then 'oven ready' for our *SADiE* editors back at base. I imagine after a session is finished we will backup the day's work in this way if we need to reuse the disks—of course during the recording we will also record in parallel to two Nagra-Ds.

'I will also be keen to try recording direct to magneto-optical, which I would think will be something we'll do more and more in the future. Very soon it will also be possible to record directly to Exabyte in real time and we will certainly be trying that too. The great thing about the *SADiE* system is its versatility and the choices open to you.'

'Over the last few years we've been in an environment where there has been no *de facto* standard for high-bit recording. The *SADiE* route seems altogether more sensible and logical. By recording straight to the editing medium you avoid upload time, you can do the editing on location if you wish, and you create a truly integrated system where the engineer and editor talk the same language. The whole thing makes perfect sense.'

The price of the *SADiE Portable* works out to be approximately 50% more than the desktop version—this is mainly due to the increased cost of the portable against the standard PC, and takes into account the Pentium processor and larger disk drive. RRP in the UK is just under £9,500. ■

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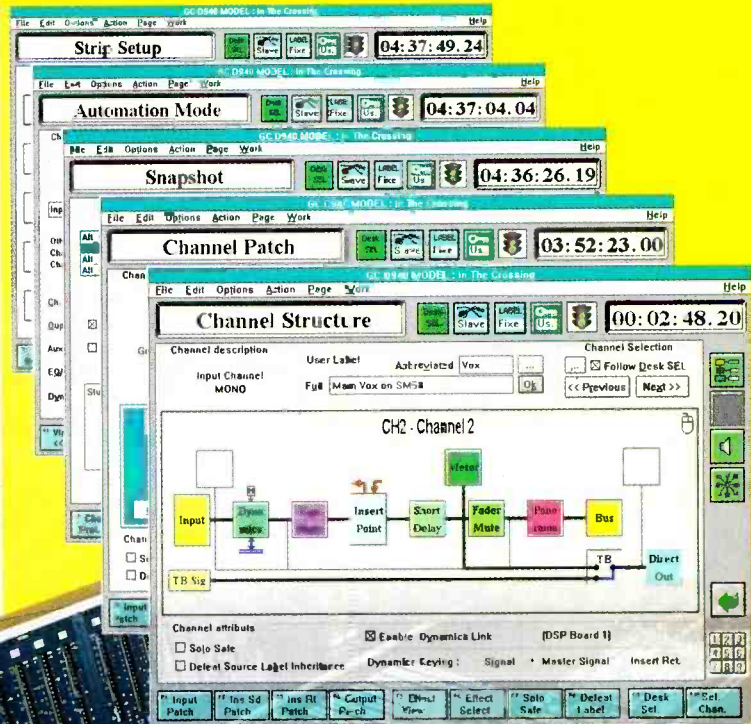
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THE RESURRECTION SHUFFLE

The lengths that sound engineers have to go to in order to produce convincing results for the cinema shows yet again how closely related sound and picture are. Be it intergalactic cruisers or T Rex footsteps, the sound is there to convince the audience that a 2-D picture on a screen has an additional dimension of reality.

However, these audio engineering efforts are not devoted solely to SF or special action features, and the recent film by Belgian Film Director, Gerard Corbiau, on the life of the celebrated castrato, Carlo Broschi (aka Farinelli; 1705–1782), required the use of purist stereo recording techniques allied with the latest computer software for treating the human voice.

The major technical problem in creating the soundtrack for the film resided in the fact that most of the arias that were written for castrati are unsingable today, due in part to their extended ranged and technical virtuosity. As the film—entitled *Farinelle, il castrat*—is virtually the biography of a ‘voice’. Since the voice is central, it presented the greatest single hurdle that had to be cleared in order to make the production credible. But who were the castrati and what made them so special?

For reasons best known to itself, the Catholic Church of the 16th Century decided that women were unsuited to sing in church choirs. This posed the

immediate problem of how best to substitute for the missing voices. The solution was a cruel and radical one: castrate the best boy singers before puberty so that they would retain their ‘angel voices’ and thus be able to maintain the female vocal role within the major church choirs.

However, other, vocal, advantages appeared to accompany castration. The range of the castrati was often as wide as three-and-a-half octaves, covering virtually the alto and coloratura soprano registers. Added to this was the fact that the larynx stayed small and very supple and the vocal cords remained short, allowing vocal virtuosity such as cascades and sweeps of notes. Upon reaching maturity, the castrati developed chest size, lung power, physical endurance and strength which often exceeded that of a normal adult male. The consequence of all this was that they were able to sing very powerfully, sustain long notes (Farinelli was known to be able to hold a single note for over a minute) and sing long phrases of over 200 notes without appearing to take a breath.

Furthermore, they could perform vocal gymnastics such as rapid large intervals, cascades of notes and trills.

To composers such as Monteverdi, Purcell, Handel and later, Mozart, the voice of a castrato was as great a boon as the latest synthesis techniques are today and it did not take very long for the castrati to be integrated into the

burgeoning development of opera outside the church.

The darker side was that most of the boys selected were from the poor classes of Southern Italy (the parents seeing an opportunity for financial security) and of the 90% of the boys that survived the act of castration, barely 10% were able to make a singing career.

The most successful, however, were highly trained singers who were feted as superstars in a manner that was easily the equal of the extravaganza of today.

Coming back to the present, the question still remained—how to ‘create’ the voice of a castrato and based on what information?

The practice of castration was finally forbidden at the beginning of this century but several recordings of poor quality on wax cylinders do still exist. However, the bulk of the information had to come from written reports and from the evidence of the musical scores that had been written. The research in the latter area even turned up pieces that had been hitherto thought to be lost.

To coordinate the musical side of the film, Director Gérard Corbiau turned to noted Musicologist and Voice Specialist, Marc David, who was to work with Conductor, Christophe Rousset. This in turn led to a telephone call the classical recording engineer Jean-Claude Gaberel in Switzerland.

‘I have a slightly crazy project which may interest you,’ the call went. ‘It concerns the recording of an orchestra together with two separate voices in order to create via editing the voice of a castrato. I warn you, this will mean lots of work and lots of patience. Do you think it is possible and are you interested?’

Being a man for a challenge, Gaberel was instantly interested. The proposition was to record a Baroque orchestra with two separate voices, counter-tenor and coloratura soprano, which would then be edited to form the playback recording for the shooting of the film. The voice recordings would subsequently be treated at IRCAM in Paris in order to create a single voice out of the two. The result would then be remixed and laid back for the final soundtrack.

The recording

The original idea was to record the orchestra separately and then dub the vocal tracks one by one in order to achieve maximum separation.



Farinelle, il castrat was recorded on Nagra-D and edited on a Sonic Solutions system. Vocal processing took place at IRCAM

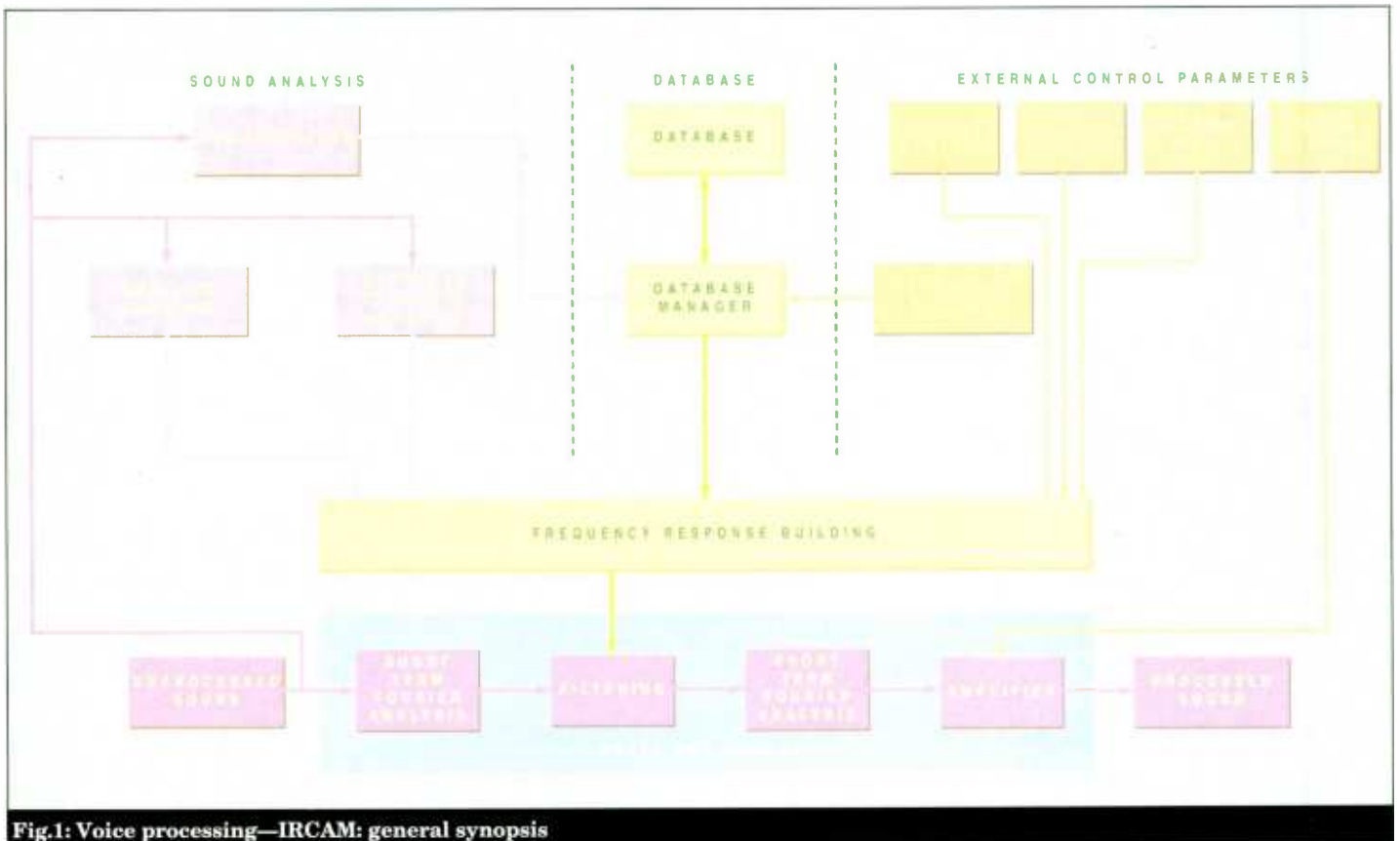


Fig. 1: Voice processing—IRCAM: general synopsis

However, it was soon evident that the interplay between singer and orchestra was vital to the final result and that the strain of 'multitracking' due to the inherent vocal technical difficulties would produce results unacceptable from an artistic standpoint.

In order to obtain the vocal range of Farinelli, Soprano Ewz Mallas Godlewski and Counter-Tenor Derek Lee Ragin were chosen to sing the arias. Both singers were well-versed in Baroque vocal techniques and would sing the parts that fell within their respective vocal ranges—each part being recorded individually.

The sessions started in August 1993 and were held in the hall of the Metz Arsenal in France. The hall features an excellent acoustic due to virtually all-wood surfaces and a reverberation time of between 2s and 2.5s. Dimensions of the room are 51.5m x 26m x 15m and an important characteristic of the reverberation is that it is linear over the whole frequency range, thus providing a rich sound uncoloured by resonances and with high definition on the instruments.

The recording was made on a Nagra-D digital 4-track recorder, with two separate vocal tracks and a stereo orchestra track. The first decision to make concerned the orchestra microphone technique.

An artificial head would leave poor

separation between voice and orchestra and an M-S pair was considered unsuitable for music. The solution adopted was a pair of Sanken CU-44X cardioids in an X-Y configuration together with a specially modified (by Jean-Claude Gaberel) AKG C414 hypercardioid for the voice—all three microphones grouped together on a single 'tree'. Mono-compatibility was also a very important requirement for screenings in mono cinemas.

This method would cover the artistic requirements (it was found early on during rehearsals that it was extremely important for the singers, conductors and musicians to have visual contact during the performance) while providing 20dB–30dB of separation between voice and orchestra.

To say that Jean-Claude Gaberel is a perfectionist is an understatement—however, his results more than justify what may be considered by some as an excessive attention detail. In order to achieve the highest possible sound quality, analogue microphone preamplifiers of his own design were combined with 20-bit A–D converters and placed next to the musicians. The signal was then sent via AES-EBU to a Nagra-D with the microphone cables being Van den Hul (Gaberel: 'There has been a lot of mumbo-jumbo concerning

cabling but there are also a lot of audible differences'). Monitoring was via a pair of Perspective Studio 5 speakers (yet another in-house design) and Metaxas audio electronics with all cabling by Audioquest. Headphones were Sony MDR10R and Grado Signature.

The final result are a marriage between the two vocal interpretations that were considered to be closest to the idea of what Farinelli's voice would have sounded like—and it is a tribute to the musical skills of Conductor Christophe Rousset and the orchestra, *Les Talens Lyriques*, that the tempi varied extremely little between the different takes with the two singers. ►

Music documentaries are nothing new—and substituting a modern performer for a dead virtuoso is equally commonplace. But a recent film of famous castrati Farinelli brought unusual audio implications



Jean-Claude Gaberel Recording Engineer for *Farinelle, il castrat*

Editing at IRCAM

Once the recording was finished, it was sent back to the Sonic Solutions *Quatro* 4-track digital editing system at Gaberel's studio in Switzerland in order to create the basis of the film music soundtrack.

I chose Sonic Solutions as it appeared to me to be one of the very few systems on the market to have a conception that is really professional as well as a total transparency for the signal. Notwithstanding, there were some quite intense telephone calls between Fontaines and California in order to improve the system even further.'

Some 3,000 edit points later, the playback work copy for the start of the film shoot was ready and from this point onwards the length of the music tracks could not be altered. Gérard Corbiau started shooting and the voice recordings went to IRCAM in Paris.

The task facing the team at IRCAM (*Institut de Recherche et de Coordination Acoustique / Musique*) under the direction of Philippe Depalle was to take the two voices and combine them into one. The synthesis of two voices rather than voice synthesis, an important difference. Subsequently the two voice tracks were transferred in 24-bit format to the IRCAM *alpha 600* computer and the work could start.

The separation between voice and orchestra (sometimes being as low as 20dB) imposed certain restraints on the processing that would be used at IRCAM, and this added to the challenge. The other primary consideration arose from the use of two singers: the perceived dynamic was often different between the two and when this occurred in the middle of a phrase, sounded like phrase attacks. (Fig.1 shows the main elements used in

the voice processing.)

It was decided that the final voice would approach that of a counter-tenor and the first step was to modify the timbre of the soprano parts by a process called 'voice morphing' (similar to video morphing).

The second step was to make the voice sound more 'boyish' by global modifications such as selected attenuation in the high frequency bands to reduce breathiness and modifications to the spectral envelope in order to give a brighter response.

This heavy processing started with the building up of a reference voice database; due to the predominance of vowels over consonants, only the former were processed. However, this still required the establishment of a data base containing the three vowel-timbre components, namely: phoneme, or pitch, intensity, for each vowel note. As the songs are all in Italian, only the *a / e / i / o / u /* phonemes were used over chromatic intervals from 185Hz–987Hz, together with three levels of intensity: *piano*, *mezzoforte* and *forte*. For practical reasons, this data base was not extended to cover the whole intensity range, and intensity rules (Rodet *et al.*, 1989) were used to compute the missing fields.

Once the database for the reference voice had been established, the various musical phrases had to be segmented in order to create elementary portions in terms of singer, phoneme, pitch, power and begin-end time. Precise pitch estimation was made via new frequential method.

The first pass for a segment was made automatically on the fundamental frequency evolution with a second pass being made manually in order to adjust the begin-end times on the vowels and provide the singer and phoneme labels.

The reference voice file allowed segment in the voice to be associated with a target phoneme in the

data base. For example, every *a /* phoneme sung *mezzoforte* by the soprano at a pitch of 415Hz–520Hz could be associated with the database phoneme *a /* sung *mezzoforte* by the counter-tenor in the same range. In practice, the information is not hard-coded and can be given in a parameter file. This makes the transformation process much more flexible by allowing the selection of multiple versions with differing characteristics to be selected from the database and thus the production of more dramatic changes such as changing phonemes.

The morphing technique used to create a single voice out of the two consisted basically of modifying the spectral envelope of the soprano voice to match that of the counter-tenor. This was achieved through the use of a phrase-vocoder with filtering in the frequency domain. The technique was further refined by improving the estimation of the spectral envelope in the low frequencies through the use of time evolution for the frequency and amplitude of the partials (poor estimation can result in incorrect reference timbres and emphasis of some of the partials of the orchestra).

In practice, the spectral envelope is not necessarily stable during a vowel note. A colouratura-soprano changes the shape of her vocal tract, for instance, when singing a cascade of notes over the same vowel. Additionally, tremolo correlated to a vibrato effect will induce a variation upon the amplitude for each partial which will be superimposed on the scanning of the spectral envelope.

The estimation of the spectral envelope for the mid (2.5kHz–5kHz) and upper (above than 5kHz) frequency bands remains valid due to the wider shape of the formants. However, if the spectral envelope is constant for a given vowel note, the global amplitude will be modulated and fluctuate according to the degree of tremolo. It is also important to note that in the upper frequency range, the average level is perceptually more important than the actual shape of the spectrum.

After seven months of intensive work at IRCAM, the 'voice' of Farinelli was ready for the world and for the final mix with the orchestral tracks.

However, Jean-Claude Gaberel's nerves were put to the test—believing that nothing could be more simple than to mix tracks of exactly the same length, he found that the treatment of the voice had changed the wavefronts and envelopes of the vowels, with the result that the voice no longer 'sat' within the mix. There was nothing for it but to adjust all the edit points and 1000 edits later the resurrected 'Farinelli' turned in a musically convincing performance with the orchestra.

The edited version was copied at 24-bit resolution to the Nagra-D for the final mix in 16-bit Turbo Bit Mapping for the CD release and transfer for the film version.

As a personal comment, it is on seeing the film that one starts to understand the impact that the virtuoso castrati had on the public of their day. Listening to the CD (on Auvidis Travelling, matrix number K1005) is an enjoyable experience but the combination of the visual with the aural seems to take everything that much further. Strongly recommended for all those interested in the history of music. ■

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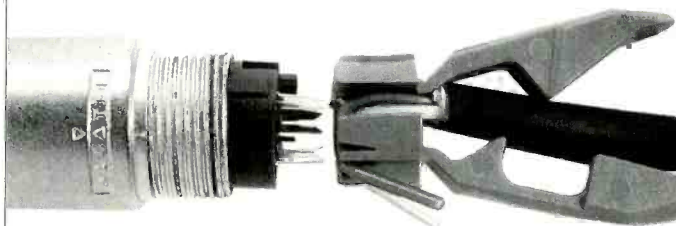
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PICK 'N' MIX



Record Plant owner Rick Stevens seated at the facility's new SSL 9000 j console

When I took over the Record Plant there were only two studios—the classic Tom Hidley rooms. One was SSL and one was Neve equipped. At first, we seemed to grow rooms in twos, split off into Neve and SSL. We brought in design architects studio bau:ton who added the Atrium and the two new suites and who did the general renovation. At the time, having those Neve VR consoles was a positive thing—we had some key Neve clients: Ed Cherney, Mick Gzauski and Dave Reitas (who likes both Neve and SSL but who very much liked our Neve board). We had built the largest Neve console ever—and that console served us very well.

In terms of rooms, we had the SSL 1 suite, with a 96-input SSL 8000G, and 48 channels of *E* and *G-Series* EQ and *Ultimation*, and SSL 2, with the 72-input SSL 4000G and 32 channels of *E-Series* and 40 of *G-Series* EQ. In an interesting aside, that board is our oldest SSL, but it is still very popular for mixing. Van Halen mixed their recent *Balance* CD in there, and Producer Mike Fraser works in there a lot—he is in there now, mixing AC/DC. But after our expansion, we had two SSL suites and two Neve VR suites, Neve 1 and Neve 2.

Because I'm neither an engineer nor a producer, my console choice is largely dictated by my clients. Probably 85% of the decision-making process is based on input from my customers, while the other 15% has to be a consensus from

me and the key technical engineering people on my staff that we are heading in the right direction.

The market for a console is somewhat fluid, so there are changes in what a client base wants from time to time. It is a dynamic situation; what your clients are going to feel is the best thing for them and I think any studio owner has to be able to listen to his customers and to where technology stands at any given point in time. And, if you are in a position to do so, to change your console to reflect the best that is out there. We keep records as to requests that we have had—I think we are quite good at tracking major categories of information that can help us to do our job better. We ask clients what they would do to improve things. We ask them their opinions as to individual pieces of technology that are in the marketplace. For example, when SSL were about to announce the 9000-Series console, we were invited, along with some other studio owners, to fly people to the factory to experience it. They asked us for two or three people from our team and I said I'd rather send my Chief Engineer and some clients. So we sent Jim Rice, my Chief Engineer at the time, and Jon Gass, the Engineer from the LA and Babyface team. They flew to England on my behalf to give me input. Throughout the process we were talking to our clients on a day-to-day basis, listening to their input, and when it came to decision time, involving them.

Mixing it

At the moment, mixing is a very important part of Record Plant's business, and in the mixing domain, SSL have more or less captured the lion's share of the market. When you have four major studios, every one of them is significant to your business well-being. You want to see each one of them with the equipment that will give maximum customer response. The decision, for us, was made because so many people are able to do high-level recording at home now, so it was a conscious decision: the Record Plant feels that is in its interest to specialise in the category of mixing.

If you are focusing on mixing, there clearly is a predominant position for SSL at this time. We believe it is ►

Currently celebrating his fourth year as owner of the legendary Record Plant complex, Rick Stevens discusses some of the reasoning behind the console purchasing decisions he has made



The Record Plant clientele. Introducing standing left to right: Carmen Rizzo (Seal); John Jones (Duran Duran); Grammy Award winning Engineer Ed Cherney (Bonnie Raitt, Jackson Brown). Back row: SSL's Chief Engineer John Mansey; Media Holdings Group Chairman Richard d'Abo; SSL West Coast Vice President Phil Wagner; (behind him is SSL's Russel Keys); Mixer Tavi Mote; SSL's Trainer Karen Down; Producer Bill Drescher and Mrs 'D'; Mr Bonzai. Front row: Mixer Guzauski (Mariah Carey); behind Mick is Record Plant/EFX/ Vice Prêsidant/Engineering John Hurst; Record Plant/EFX Chairman Rick Stevens; Producer John 'Tokes' Potoker; and Mixers Tim Bomba and Jeff Lord-Alge

more lucrative for us to respond with all SSL product so we are, in terms of our major studios, an all-SSL house at the moment. We are also one of the first people in the world to take the new *SL9000j* console with *DiskTrack*. We think it is one of the best sounding SSL consoles that has ever been manufactured, and at the same time it is familiar to all SSL users. That is a good combination for us.

Over the last two months we've added the *9000* where the 96-input Neve was and renamed that room SSL 3. And we took what was known as Neve 2, our biggest, live, tracking room, put in an *SSL 4080G Plus* with *Ultimation*, and renamed it SSL 4. So, even in rooms that have tracking space, we have SSL consoles.

Of course, Record Plant is famous for its large supply of tube mics and vintage gear, that has always been part of what we offer. So if people want anything like that to complement an SSL console it is available. With the *9000* we don't think we need vintage equipment because SSL not only came up with better functionality than they have ever had for mixing, but they came up with something that may be one of the best sounding consoles ever.

I find it interesting that Alan Sides, owner of LA's Ocean Way/Record One, is putting in a *9000* too. Sides had resisted SSL for a long time as he is very fond of old Neve and API technology. But my friends at SSL tell me that he, too, now says the *9000* may be the best sounding analogue console he has heard.

The first client in on our *9000* was Mick Gzauski who took the console on its shakedown cruise. Rose Mann, Record Plant's Studio Manager, got him in to try it. He was a big fan of our 96-input Neve that was in that room prior; he liked the room, and he responded to our request that this was something that he should check out—and it

was a good thing. Gzauski, the long-time Neve fan, commented to me, 'SSL finally got it right—it's comparable to any analogue console ever built in terms of its sound quality'.

The first client behind Gzauski was Babyface. He has his own studio in town here now, but for certain vocals and what-not he wanted to try out the *9000* board. I think any artist in his position, even if you have your own studio, is going to wander to the mothership kind of studio to try new technology, or for them to supply a recording environment that the artist may not have in their own place. And that's what Record Plant is all about. We know that the capability to record at home has dramatically increased, and the quality of what you can do in a home environment has increase, and we know that many major professionals have certain level studios of their own to work in. We want to be a step beyond that. We want to be the place you come to finish your record or where, if you're a star, you come to do the special project. And we are succeeding at that.

We have a very electric mix of music going on at Record Plant—Nine Inch Nails may be working in one room while Barbra Streisand is mixing in another. The only common denominator is that they are the best in their fields. They include different musical categories but they all seek the same kind of good stuff.

New technologies

It also helps in our decision making that we have a fifth room that we call the Mini-Plant. It is not really a part of the commercial mainstream of the Record Plant but a room that allows us, without a lot of risk, to expose new technologies to our clients and for them to get a chance to have hands-on experience, so that when it is time to make

equipment decisions we are up to speed. Not just from having seen it on the AES showroom floor, but with having lived with it for periods of two to three months at a time. That has been very valuable for us.

Recently, we had the Euphonix *CS2000* console in there. Subsequent to that, the people at Siemens audio allowed us to use one of their Neve *Capricorn*s for a period of time. When somebody's new exotic gear is not there, we will typically have a project studio console. That is what is happening now, with the Sony *MXP3000*. That room is continually going to change in terms of boards. It will take the nature of high level project or preproduction studio with a project board when we are not using it to expose and play with new technology.

We are also working with AT&T to install a *DISQ* system. We are very interested in welcoming the top people in Nashville when they come to Los Angeles. And the AT&T system has had great response at Masterphonics in Nashville. They have an SSL console with the AT&T *DISQ* Digital Mixing Core, which allows all the controls on the console to become like a work surface for a digital environment. It is at studio now, and we are simply waiting for four open days to install it in SSL 2. It will probably be in service by mid July.

Again, it is a really dynamic situation for us. It is an ever changing marketplace, and the job of any studio owner is to keep in touch with those changes. Right now we're an all-SSL house. Two years from now, who knows? If something comes out that our clients feel the need for, you can bet that we will have one of those in there as part of our equipment inventory. ■

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The Ultimate Analogue Console

9098

by Rupert Neve the designer



Photo courtesy Lisa Stansfield's Gracieland Studio, Rochdale, UK.

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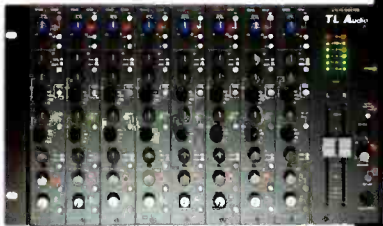
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GOLDEN AGE OF HOLLYWOOD



Old faithful—the analogue ADM console that refuses to give way to a more modern system

Producing today's movie soundtracks is becoming an increasing complex process. No longer can a small-format console handle the myriad assignment and signal-processing tasks that are required during the rerecording of a multichannel film mix. When you consider that the music, effects and dialogue engineers will be producing a variety for submixes that also need to be recorded onto separate tracks as the various elements are simultaneously blended together to produce the master Dolby Stereo, SR-D, DTS, SDDS and the other release formats, it is small wonder that today's dubbing consoles require more input, output and monitoring flexibility than ever before.

For many decades now, Todd-AO /Glen Glenn have offered editorial and mixing services for the international film and video community. With facilities in Hollywood, Santa Monica and New York, Todd-AO/Glen Glenn's operation is considered by many film

directors and video producers to be second to none. When it comes to providing state-of-the-art sound editing and rerecording facilities, the organisation places particular emphasis on leading-edge technologies. When, in early 1994, engineering staff at Todd-AO's Hollywood facility were reviewing the current complement of mixing consoles, they came to the undeniable conclusion that the ADM console in Stage 2 was in need of some technical care and attention.

According to Bill Ritter, Todd-AO's Supervising Engineer, 'We had owned the ADM board for around 10 years and during that time had added *Flying Faders* automation. During 1994, however, we began serious deliberations about what features the ADM console lacked, and how we might bring it into line with today's requirements.

'At the top of our "wish list" were more output groups, accessible from the music, effects and dialogue sections, and assignable transport controls. Often

during a complex rerecording session, the crew will need to record multiple stems and submixes, in addition to the multichannel master. As the mix progresses, there will be many occasions when the mixers will do a pickup recording, by dropping in and out of record during an update pass of a mix.

'The ADM also needed some ►

Against a rising tide of digital systems, Hollywood's Todd-AO have recently reinvested in their faithful old ADM analogue dubbing console. James Douglas investigates the analogue alternative



Supervising engineers from left to right: Dale Manquen, Toby Foster and Joe Martinson from Martech; Bill Ritter and Dave Tourkow from Todd-AO

enhancements to its logic systems, to provide flexible control of record-safe and punch-in for tape machines and mag transports. Having worked with Martech on several previous occasions—the firm had installed the *Flying Faders* automation to six of our dubbing consoles, and custom equalisers for a *Quad-Eight* console—we called them in to look at the console in Stage 2.

Enhancements added to Stage 2's 65-channel, 3-man ADM console included new input modules and microprocessor-controlled routing, monitor formatting and machine control systems. The project started in late July 1994, when engineering staff from Todd-AO and Martech first met to discuss the console upgrades, through September, when the fabrication and rewiring stages were started, until late December, when the console was commissioned. In total, the entire project took just four months. The installation involved the design and fabrication of 20 custom-developed I-O, routing, interface and related PCBs.

Martech

'The basic strategy behind the upgrading of Todd-AO's ADM console was relatively simple,' explains Martech's Project Manager, Toby Foster. 'Working closely with the engineering staff, we identified two main areas that needed to be addressed. Firstly, we elected to improve productivity by providing more I-O assignment controls. The custom ADM board was originally designed for TV dubbing, with 65 inputs, laid out as 20 dialogue, 20 music and 25 effects channels, routing to four main buses.

To dramatically improve productivity during film dubbing, we decided to increase the number of buses from 4 to 32, laid out as four groups of eight, with stereo panning added to every input. A series of microprocessor-based Bus Routing Control modules, accessible from three areas on the console surface, can route 72 channels to 16 odd/16 even buses, with companion Bus Routing Displays.

Now, an engineer is able to route an input source to any combination of buses. We also increased the number of auxiliary outputs from three to five per channel. We added monitoring functions for all film-release formats, plus improved machine control and monitoring control for each section. And, while we were redesigning the console I-O topology, we included provisions for adding more channels, up to a total of 72 from the current 65, at a later date.

'Secondly, to allow Todd-AO/Glen Glenn to maintain and enhance its competitive position, we added the ability to switch quickly between various film and tape formats. A total of 100 system setup memories provide snapshot storage and recall of all bus routing, monitoring, and machine control assignments.

'In essence, we felt that by adding more capabilities to the existing ADM console, Todd-AO could avoid buying a digital console prematurely; they could wait for the functionality and ergonomics of emergent designs to surpass current analogue consoles. And, while waiting for the price-performance ratio of digital consoles to improve, the facility could monitor the speed with which the production and postproduction infrastructures was converting to all-digital dubbing.'

System components

For many years, Martech have been developing a series of products aimed specifically for use in film dubbing theatres. During the refurbishment or upgrading of a scoring stage, Martech's custom-designed bus routers, monitor formatters and machine controllers are intended to quickly fill a customer's requirements. To simplify maintenance, each of the custom-designed products share a common architecture, and utilise similar components.

The master microprocessor controller for Todd-AO's revitalised ADM board comprises an

off-the-shelf 486-based PC, which connects via an RS-485 interface to the modules and system electronics located within the mixing console. All computer-controlled switching is achieved via custom-designed FET arrays. As Toby Foster recalls: 'We performed extensive listening tests with relays, and decided that we could make a far better sounding switch with our proprietary design. Although we'd be the first to concede that a physical on-off switch might provide the 'ultimate' switching element, we need to reset these crosspoints; our proprietary computer-controlled FET element sounds virtually identical to a hard switch.'

The Martech Bus Assignment module will assign and recall routing setups for as many as 128 inputs assigned to 32 outputs, and can be configured to support 2-channel and 4-channel panning. The 32 outputs are available in four groups (A–D) of eight buses each. Each section of the console can be provided with independent control of input-channel routing for that specific section; recalling a stored I-O setup will only affect those input channels that are accessible from the relevant console section. Up to 100 presets in each section can be stored to the system controller's hard drive, and recalled at a later date.

The 64-input Monitor Format module supports selection of both direct and playback sources for each input. The engineer can define how each of the eight channels of five Monitor Input Groups (A–D plus External) are routed to the eight monitor outputs that feed the playback system on the rerecording stage. Each channel can be routed to one, several, or none of the eight monitor groups which, in turn, feed the various loudspeakers channels to develop discrete or matrix-encoded film and video release formats, including Dolby Stereo, Dolby SR-D, Digital Theatre System, Sony SDDS and others. The metering outputs can be reassigned for various metering formats. Presets can be set up that define to which output(s) each of the eight channels is routed. Again, up to 100 presets can be stored and recalled at a later date.

The Monitor Output module allows selection of any of three monitor loudspeaker output sets, with monitor-level control and mute. The module also displays the Monitor SPL (adjustable 75dB–105dB), with controls for inserting external signal processing or an Academy Filter. The three separate monitor outputs are labelled main, small and mono. The Main setting assigns the eight outputs from the Monitor Format module to the associated replay assignments, which are defined by their relative position and orientation to the mixing console. (For example, an SDDS-compatible monitor replay system would have loudspeaker channels labelled as Left, Left-Inner, Centre, Right-Inner, Right, Left-Surround, Right-Surround and Subwoofer, to reflect their physical location behind the projection screen and in the rear of the dubbing stage.) The small setting assigns the Left and Right Monitor Formatter outputs to the console-mounted L-R speaker pair, while mono sends a monaural mix of all eight Formatter outputs to the designated mono loudspeaker output.

The Record Control module provides selection of the Record Buses (A–D) as well as the Record Control and Direct-Playback monitoring of the tracks to be ►

GET REAL!



The final mix breathes life into the body of the visual medium. From the subtlest foley effect to the roar of jet engines, the audio must create a convincing experience for the audience. Each actor's voice must be treated like that of a skilled vocalist. The orchestral score must be combined with dialog and effects without losing detail and dynamic range. This final stage is the culmination of all the time, talent and investment that has gone into the production.

The Euphonix CS2000P provides the ultimate sound quality and digital manipulation capabilities for the final mix. Its EQ and dynamics perform well beyond other analog designs. The audio isn't digitized so it retains maximum resolution, dynamic range, frequency response, and timing accuracy. Version 2.5 software takes the complexity out of multi-format mixing. Instant reconfiguration of every control is done with the press of a button or triggered to code. Sophisticated signal processing, film panning and stemming is provided for every input.

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controlled from each mix section. Also provided is a comprehensive Monitor Solo function, as well as complete Transport Motion Control with muting. The 64-track machine controller can be configured with parallel outputs for driving either film and/or tape transports. Unlike music recording consoles, film dubbing requires extended flexibility for record safe-ready switching, as the final soundtrack mix is produced. Normally, the stereo/surround-sound mix is prepared in sections, by dropping or punching in across both the master multichannel outputs, as well as any M&E stems and other submixes that might be made simultaneously. For example, during the preparation of a Dolby Surround film soundtrack, the dubbing crew might simultaneously record a master four-track LCRS (Left, Centre, Right, Surround) mix, a 4-track Music-only LCRS, a 6-track dialogue-only LCRS + C1 + C2, a 6-track Effects-only LCRS + L + R, plus the matrix-encoded Left-Right.

Martech also manufacture a series of microphone preamps and equalisers. The mic preamplifier features a custom-designed, mic-input, transformer and discrete amplifiers, while the parametric equaliser utilises a new circuit topology.

'The mic preamplifier and equaliser are key components in painting the 'sonic portrait' of a rerecording session,' considers Shawn Micheal, Martech's Product Manager for modular products. 'Rather than simply combining an off-the-shelf transformer with an IC, we recreating our own version of a popular classic transformer design. After six months and dozens of transformer

redesigns, we had a transformer that could beat every top competitor in a listening shoot-out.'

'We had already developed a very musical equaliser to use in a Todd-AO/Glen Glenn console upgrade for Stage A. The only noise increase upon inserting this new equaliser into the signal path is due to boosting a frequency band; the flat EQ setting contributes no excess noise. We love the warmth of tubes [valves], but recognise the practicality of solid-state designs. Our "compromise" was to design both tube and solid-state front ends for the mic preamplifier. The mic transformer and amplifier following the transformer are where the "colour" of the sound is captured. Our customers can choose the product that best fits their tastes.'

The bottom line

'We are very happy with the refurbished console,' confirms Todd-AO's Bill Ritter. 'We have worked with Martech on several other technical projects and have been impressed with the firm's attention to technical details. During the upgrade of our console we also took the opportunity to refurbish the machine room and upgrade the monitoring system with active crossovers. The project proceeded very smoothly.' ■

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A BRIEF HISTORY OF MARTINSOUND AND MARTECH

Briefly, Martinsound is a developer and designer of custom equipment for the audio recording and production industry. Previous projects have included custom equalisers; enhanced system electronics; computer-controlled routing and control systems; upgrade electronics for EMT-140 echo plates; and the *Flying Faders* moving-fader automation system, marketed by AMS Neve.

The company was founded in the early 1970s by Joe Martinson as a freelance recording service. In 1975, Martinsound moved into its present 22,000ft² facility in Alhambra, which also features a studio designed primarily for large orchestral sessions, including TV and film scoring.

In 1985 Martinsound began the development of a Virtual Console that featured an all-digital control surface and a remote rack containing the audio circuitry. Technology for this system included fast scanning interfaces, motorised faders, high-resolution CRT displays and excellent ergonomics. Although a prototype 32-channel system was constructed, Martinsound chose to concentrate on the development of the console's moving-fader automation system. Subsequently, the Martinsound *Flying Faders* automation system was unveiled in 1988.

Flying Faders' high performance and ease of use soon attracted the attention of Neve Electronics, original developers of the NECAM moving-fader automation. Neve elected to exclusively license the *Flying Faders* design, and included it in *V-Series* consoles. As a result,

Martinsound produced all *Neve Flying Faders* systems for the first year, achieving a rate of one automation system per day by the end of 1989. The following year, Neve began deliveries of *Flying Faders* systems from its Scotland factory. Martinsound, now known as Martech (for the Martinsound Technology Division), continues limited production of custom *Flying Faders* systems for the US market.

'Martinsound has always had a passion for superb audio quality,' concedes company President Joe Martinson. 'These efforts have included investigations of gain-control elements using VCA, MDAC and various forms of rotary and linear faders; 'warm sounding' equaliser circuits that introduce a minimum of excess noise; and switching elements that are less audible than the common variety of relays and FET switches. This technology base has been applied to custom products manufactured for the film postproduction market, and to a new family of modular outboard components.'

Martech's facilities include multiple CAD stations for schematic capture, PCB design and packaging design, special software development stations for automation programming, a large assembly area and a machine shop.

'Most important,' Joe Martinson concludes, 'is the crew of dedicated designers and manufacturing personnel who can quickly turn new ideas into working product.' ■

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EUPHONIX CS2000

Euphonix' digitally-controlled analogue console now incorporates Snapshot automation and MIDI Machine Control. Dave Foister offers an update

Euphonix are by no means the only company to have taken a fresh look at the way a mixing console could or should be put together, but their combination of what they regard as the best that analogue and digital technologies have to offer has attracted plenty of attention and found homes in a wide and ever-growing range of applications.

The Euphonix CS2000 system draws the eye at a trade show because of its unusual wafer-thin profile—the console itself is no more than a few inches thick, with a raised section at the back for the various displays. The reason for its slender cross-section is the fact that it contains none of the audio electronics, being a true remote-control surface. The entire audio path (with the obvious exceptions of talkback and monitor headphones) is mounted in a separate tower which, with the control computer

and power supplies, can be sited in a separate machine room. The audio path is completely analogue, with channels built on horizontal trays in the tower, giving full modularity and easy access for service. The control of all the desk's functions, on the other hand, is digital, which not only allows the console surface to be compact and remote but allows every function in the system to be automated and recalled. Euphonix' proud boast is that the entire system can have all its parameters totally reconfigured within one video frame.

Various approaches have been adopted to the business of digital control of a mixing system, very often with the emphasis on compactness and assignability. Many of these ideas have alienated engineers used to traditional desks as they lack the immediacy; in many cases calling up a function and tweaking it with nudge buttons simply will not do, and there are controls whose physical presence on the board cannot realistically be dispensed with, no matter how fast and intuitive the replacement system is. Euphonix have addressed this problem by laying the CS2000 out like a conventional in-line desk, with all the controls they feel an engineer is likely to want within grabbing distance retained on the channel strips. This means that it looks far more like a conventional desk than some digitally-controlled systems, and this has several consequences. It makes

learning to use the CS2000 far easier and quicker than becoming familiar with some such systems; it makes using it faster and more comfortable; and it makes it less apparent to the casual observer that the Euphonix is genuinely different from the traditional console it physically emulates, which has, perhaps, given rise to some confusion as to what it actually does.

Each channel strip is impressively comprehensive, with no less than six inputs, three direct outputs, and a full complement of routing buses and aux sends. There are two complete equalisers, each with variable frequency high and low-shelving sections and two overlapping fully parametric sections, and a total of four signal paths, as both upper and lower faders can handle stereo signals. If they are working in mono, the channel therefore gives full EQ on both paths, with none of the usual necessity to split out bands to the monitor path. If either fader is working in stereo, the two EQs can be ganged together to give true stereo EQ. The standard system (see sidebar) comes with 24 group buses and two stereo mix buses, and four aux sends. The auxes can be augmented in multiples of four up to a maximum of 48.

The input-output possibilities are particularly flexible, making use of the programmability to exploit the various direct outputs. The channel has two fully-featured inputs, accepting mic or line level with phantom, phase reverse and gain trim, and four non-adjustable line-level inputs. Each block of the signal path—the two EQs, the two stereo faders—can be fed from any one of these, and each block in turn can be routed to any of the three direct outputs. This makes it simple to configure the line level ins and outs as insert points anywhere in either path, or to have a stereo pair of microphones on one fader and the stereo tape return from those mics on the other—the setup offers tremendous possibilities. Assigning all this routing is done very simply from the central control area, of which more anon.

The standard four aux sends can be configured as two stereo pairs or two mono sends and one stereo, and can be placed pre or post either of the channel faders. The four sends can be individually assigned to eight auxiliary buses, giving once again a remarkable degree of flexibility. While additional sends are controlled from the central





CS2000 installed at SARM East

area, the stock four have real knobs on the channels, and in stereo use one acts as Gain while the other controls Balance.

Besides the controls already mentioned, each channel has mute and solo switches for each fader, and a pair of meters on the back-bridge section. A new addition is a pair of 8-character electronic scribble strips for identifying the two fader signals, situated above the meters. For the functions not covered by the channel strip's dedicated controls, each fader has an associated ATTENTION key. This places the chosen channel's other parameters, such as EQ and routing, on the central panel for further adjustment.

The central panel now carries the feature which has done more than anything else to bring the whole Euphonix concept together, the Digital Studio Controller (DSC). This handles many of the desk's master functions, as well as individual channel adjustments, for which it makes imaginative use of

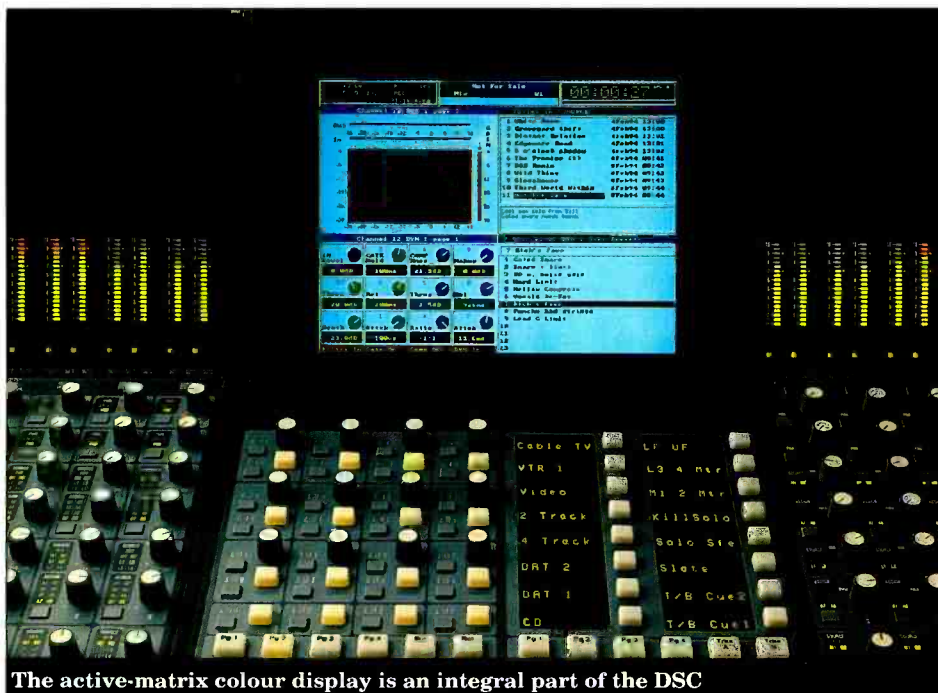
the prominent colour screen, not a CRT but an active-matrix colour display. This very bright, low flicker, high resolution display effectively bridges the gap between real controls and virtual ones—the actual knobs associated with it are continuous rotary encoders but the screen representations make it easy to treat them as real pots. The main basic function handled by the display is EQ.

Not only does the DSC show the positions of the chosen channel's EQ controls, but it also carries a plot of the resulting curve, moving in real time to reflect changes. The graph shows coloured bars indicating the ranges of the bands, and its horizontal axis can show musical note values as an alternative to Hertz. Immediately below the screen are 12 continuous rotary encoders which correspond to the knobs shown on the current screen, with associated switches and a set of four function keys whose purpose is clearly displayed—in the case of EQ they

perform functions like switching EQ in and out, and altering the scale of the display.

Another display deals with auxiliary sends, showing master-send controls complete with user-labels as to what they are feeding and individual output-level bar meters beside the controls. If more than the standard four auxes are installed, the extra sends for each channel are also controlled from here, twelve at a time.

One of several options on the CS2000 system is dynamics processing, available in outboard sets of eight processors. Each processor offers the whole range of dynamic treatments including compression, limiting, gating, expansion, de-essing, ducking and combinations of these, and has two digital filters in the side chain for frequency-conscious effects. Since the processors are outboard, they have to be physically patched into the console, but are controlled from the DSC using the ►



The active-matrix colour display is an integral part of the DSC

most impressive of its displays.

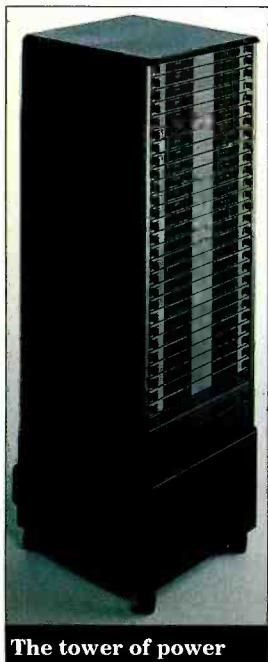
The lower part of the screen shows all the controls, with numeric values for the settings as well as all the knobs' positions. Three meters are displayed, two across the top for input and output levels and one vertically at the side showing gain reduction. This ties in with the central display, an output versus input graph showing the gain function set by the controls. As if this were not enough, a little red ball darts about the screen showing the actual result of the processing, giving the clearest indication possible of how the chosen time constants are affecting the deviation from the set curve. This visual representation of what the processor is doing is unique in my experience, and is not only useful for setting up processes but an unparalleled aid to educating trainees as to what a dynamic processor is doing. Indeed it is hard to think of any aspect of the processor's behaviour that is not clearly presented on the screen.

Given the amount of digital control flying about the CS2000, it stands to reason that the automation facilities are going to be pretty comprehensive, and in fact there are in effect three

separate and complementary control systems fitted. The first and most obvious is dynamic fader and mute automation, which automates every control on the channel strip—both faders, mutes, pans, and all the aux sends. Note that there are no moving controls on the channels, but the usual set of null indicators together with the familiar options as to how to make a control 'live' do the job. There are, however, two moving faders on the DSC, which assume the positions and the roles of the currently selected channel faders allowing instant touch writing. Mix management is handled on the DSC's screen, showing the history of all the mixing so far, the pass tree, and allowing up to 99 levels of undo. All of the selected channel's control moves are also shown graphically against time.

Alongside the dynamic automation is Snapshot Recall, which resets the entire desk to a stored setting within 1/30 second. Because of the nature of the Euphonix system, this is a true reset, with the electronics instantly configured to the stored settings with no laborious nulling involved. The dedicated controls on the channel strips may, of course, be in the wrong physical positions, but the aforementioned null LEDs allow settings to be matched if changes are required. The power of the system is that the desk is restored to exactly the way it was when the snapshot was stored, complete with all the internal channel routings to the various ins and outs, all EQ settings and the position of the EQs in the signal paths, all dynamics settings and all DCA grouping configurations. The DSC also allows MIDI control of outboard device settings, and these too are stored in a snapshot.

The next step, and a feature recently added to the system, is Snapshot Automation, where snapshots can be selected on the fly and then fired to time code. This ability to reset the entire desk (and the outboards) automatically at a chosen point, say as the verse goes to the chorus, with ▶



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the dynamic automation still running alongside it, gives awesome power for detailed automated mixing. Further subtleties include the facility to lock out parts of the console from the snapshots so that they stay put whatever else happens.

The CS2000 now incorporates MIDI machine control, complete with locators and looping, via dedicated keys on the DSC. This is in addition to the flexible RS422 or parallel control possibilities already fitted. Here also are the keypads for overall control of the automation, all the monitor controls, labelled function keys for running macro commands (a set of macros is included with the system) and 48 keys for selecting channels as an alternative to the local ATTENTION keys.

The CS2000 genuinely appears to put everything you could ever wish for on a mixing console right under your fingers. Despite its power, within minutes of being shown how it was laid out I felt I

could comfortably have run a session on it, so intuitive is the control surface. Of course, none of this would have any point if the sound was anything other than first rate, and I was pleased to find that every sonic aspect was just as impressive as the control facilities. The EQ is detailed, precise and above all musical, and the whole signal path seems transparent and clean, delivering, as Euphonix suggest, everything that analogue audio has to offer.

If the Euphonix looked more outlandish and less like an ordinary mixer, it might have attracted even more attention than it has, although its very familiarity is one of its strongest points. As it is, the various configurations of the CS2000 system seem to be finding their way into all kinds of applications, and I think it is fair to say that whatever you want from a mixing console you would be foolish not to give the Euphonix a very close look indeed. ■

CS2000 VARIANTS

The main review covers the basic Euphonix system, known as the CS2000D. One of the appeals of the concept is that there are several hardware options, allowing the configuration to be optimised for specialised applications. Recently introduced is the CS2000B broadcast console, differing primarily from the standard setup in the routing facilities on the channel strips. This gives a choice of either six stereo subgroups or 12 mono mix-minus feeds on each fader, expandable up to 48 mix-minus feeds with optional racks. The B version comes as standard with the new MX464 Master Expander, optional on other versions, which is a matrix and patchbay providing 64 monitor inputs, multiple stem 4-channel monitoring, programmable record bus, fader starts and reverse talkback. Standard on the B variant and available on all the others are redundant power supplies.

The CS2000P Audio Post System has different routing facilities again, with six stereo buses on every fader where the standard strip has 24 buses on the upper fader only. This allows all the faders to feed the multitrack and to access a total of eight stereo mix buses during mixdown. The P also comes with the MX464.

The film dubbing version, the CS2000F, has similar routing options to the P, together with

16 multi-surround mix buses. These can be configured to any combination of film pan formats, and multiple formats can operate simultaneously with the correct pan laws in place for each. Again, the MX464 is standard, and later this year Euphonix plan to introduce a larger monitor matrix to provide eight channel or larger capabilities.

The CS2000M is not a variant of the system like the broadcast, post and film consoles, but a minimum specification of the standard music system, with the idea that a project begun on a CS2000M in one studio can be taken to another M-equipped room in the knowledge that certain of the options will be in place. Chief among the specifications is the provision of at least one dynamics processor per channel, together with dynamics on the main stereo buses. Each channel must have at least 12 aux sends from the lower fader, and the desk must have a DSC, although with the level of control the DSC provides it is hard to imagine having a CS2000 without one. It is, however, optional, and it is important to note that any size or version of CS2000 can be upgraded in the field to any other configuration and that it is part of Euphonix' policy to be able to provide software upgrades to any user of any version. ■



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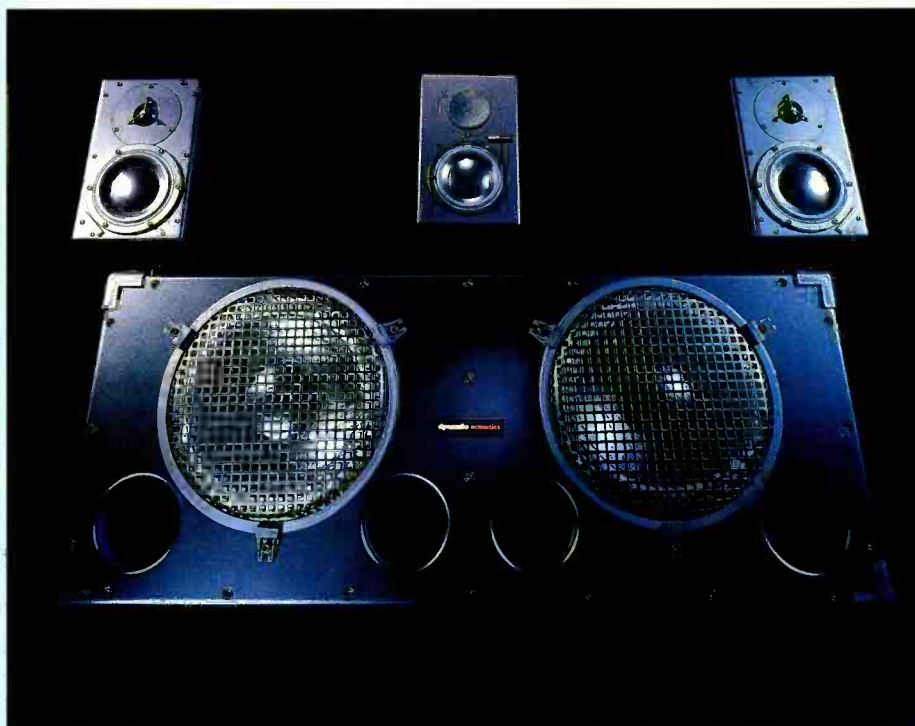
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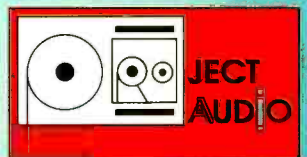


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YAMAHA 02R

Zenon Schoepe gets an exclusive preview of the ground-breaking Yamaha digital desk launched at the UK Audio Technology Show

Ever since the *DMP7* digital mixer, Yamaha have been entertaining themselves by shocking the audio world. While the original mixer suffered from a bad attack of the 'ahead of its times', the faders moved and it still sold by the barrow-load. The affordable digital mixer concept was pursued through the *DMP9* and *DMP11* but it took the *DMC1000* to show what Yamaha could do when they got serious.

Consequently, the launch of the *ProMix 01* a year ago was a disappointment for some—although it was ridiculously cheap and highly assignable, it made no concessions to recording work through such things as the lack of busing. And where were the digital I-Os for modular multitracks?

The *01* name suggested that there was more to follow; that it should take the form of the *02R* surprised everyone.

The *02R* desk will start shipping in the fourth quarter of this year. It has 8-buses with 20-bit, 8-times oversampled, D-A, analogue conversion, or AES-EBU, or SPDIF, stereo-digital outputs. It is basically an in-line desk although facilities are not shared in the traditional in-line fashion and each input has fully parametric 4-band EQ, eight auxes, dynamics processing and access to the two internal effects units.

The physical appearance and presence of the board is compact but by no means insignificant although it seems strangely narrow width-ways and deep front to back. The controls sweep away towards the top of the desk and surround a large LCD mounted almost centrally in the surface.

There are 20 moving faders corresponding to 16 mono channels and four stereo channels plus an automated main stereo fader. A word or two about the configurability of the board would not go amiss and centres around four slots on the back panel which can be filled with a variety of I-O boards. As it stands in its basic form, the *02R* is a 24:2 desk but fill the card slots with a combination of

ADAT, Tascam TDIF or analogue I-O cards and you gain 16-channels of tape return to bring the input quota up to 40. As already mentioned each of these signal paths is fully featured. If you need a bigger system, then *02Rs* can be cascaded digitally.

Analogue inputs are processed on 20-bit A-Ds using a newer chip to that employed in the *ProMix 01*. The first 16 channels have mic preamps with gain pots and while the analogue front end to the desk is the only section excluded from the automation system, the fact that these pots are click detented makes pot settings reproducible.

The first eight channels also have switchable phantom power with A and B inputs for XLR or quarter-inch jack allowing two inputs to be connected and switched between. These inputs also have analogue inserts fitted after the mic preamp.

Each channel strip has peak and signal activity LEDs and continuing with the in-line analogies there are 16 continuous pots dedicated to the tape return or monitor path levels—their positions being continuously displayed at the bottom of the LCD regardless of which page is selected.

Global Flip between these pots and the moving faders is achieved on a single switch and the digital nature of the beast means that if you flip to monitors on the faders for a rough mix setup and flip back the levels are transferred immediately. Aux send levels can also be set using the faders in the same way. Priceless.

Major signal-path functions are accessed by assigning the chosen path via its SELECT button to a selected Channel module where physical controls are presented for the most commonly needed channel parameters. It is here that you set the routing to the eight buses, the main stereo, direct out, and process stereo or mono channels. Adjacent channels can be stereo pair linked for all parameters and dynamics.

The eight auxes are accessed individually with pre-post switching and

a send-level pot referenced to an associated bargraph display. There is also a pan pot with stereo position bargraph. An EQ in-out switch activates the EQ and each of the four bands is accessed individually on a button which appoints knobs for bandwidth, gain and frequency with numerical readouts. A digital attenuator is built in to make the most of the internal headroom that the 32-bit DSP provides.

Signal-path parameters that do not need to be accessed quite so often are found in LCD pages and are adjusted using cursor keys and a dial. These cover such things as channel delay and phase reverse but the LCD also shows other parameter values graphically such as EQ curves and dynamics curves in a clear manner. A number of viewing options exist including a whole page display of all parameters in a channel and global displays of selected parameters such as all pans and all routing.

Page recalls are refreshingly direct and mostly a single button-press away and Yamaha have managed to avoid the need for lots of menu depths by placing most facilities on a single layer. Matters are assisted still further by the provision of programmable 'hot' keys which can jump to user-defined page spots.

An optional meter bridge will be available but is not essential as there is 12-segment metering on the LCD with adjustable fall time.

Auxes 7 and 8 are hard wired to the two internal, digital, effects units, which are claimed to be improved versions of the *SPX1000*, and aside from management functions to handle these there is also a library function on the EQ similar to that on the *ProMix* which has 30 factory presets and 98-user-definable locations. The idea here is that stored EQ settings can be triggered from within the automation for instances where, for example, different sounds share the same track on tape.

A full dynamics module is available on every input channel plus the eight bus outputs and the stereo output. This is new technology that offers finer control of things like knee characteristics with metering of output and gain reduction. Again dynamics can be fired as presets from within the automation and can be keyed from itself, the channel to the left of it or Aux Sends 1 or 2 and can be pre or post EQ. What constitutes the master section of the *02R* takes in the ability to monitor three digital and two analogue ►

2-tracks in addition to Auxes 5 and 6 which are intended as cues. There is also a studio-output section and talkback facilities.

Automation

The 02R is totally, dynamically, automated but can also employ scene snapshots in addition to the aforementioned cues for EQ, effects and dynamics. Fader positions can be filtered out from a scene recall for instances, such as live sound, where manual control of these is preferred. The moving faders are Alps units and, interestingly, are not touch-sensitive which has operational implications

for the fader-automation system.

The system will run to time code as any analogue automation package with the difference that the 02R offers more than 3,000 automatable parameters.

Mixes are recorded into static RAM which always holds the current and the previous pass for undo and comparison purposes. Additionally, there are 16 memory locations for storing mixes in, while longer term storage is via RS422 to computer or MIDI bulk dump. The computer add-on adjunct to the desk is still being developed but is expected to take in library and management roles for desk functions as well as added functions

for the automation. Indeed it is the automation that is currently most 'open' and still being refined but the basis of what there is already is good. Individual parameters can be selected for automation with CHANNEL SELECT buttons acting as EDIT buttons for activating drop in and out of record and faders already feature a glide back to previous data function.

Round up

The absence of any form of machine control is perhaps the biggest omission on the 02R. The fact that the moving faders are not touch-sensitive removes some of the benefits of using motorised faders in the first place, but as is the case with any criticisms of the desk, it is important to remember its price.

Upgradability and support looks set to form a strong thread in the desk's future-proofing and it is understood that it has been physically built to facilitate chip changes.

The 02R is a very important product. If we forget for a moment that the desk is digital and just focus on the £6,000 (UK, excluding VAT) price tag and look at the competition, on a pure features per signal path equation there is little that gets close to what the 02R offers in terms of traditional desk facilities. You then need to increase the price many-fold before you encounter a desk that offers the same degree of automation.

To my mind the fact that the 02R is digital, which is how Yamaha have managed to do this for the money, only rears its head when you come to the matter of interfacing to anything else and it is quite remarkable that Yamaha should be the first desk manufacturer to have surfaced with interfaces dedicated to ADAT and Tascam TDIF gear. Given that the installed user-base for these machines is enormous, this area of the recording market is ideal for the 02R and those who want to keep their audio digital.

When digital technology first started arriving one of its real buzz points was not just that it would enable things to stay in the digital domain and thus retain quality, but that digital would ultimately enable things to be achieved more cheaply compared to analogue equivalents. This point has largely been overshadowed and digital has become synonymous with expensive. The main reason for this is that it has been the expensive digital gear that has added value and functionality and made life easier for its users. Affordable digital attempts have continuously failed to deliver due to operational shortcomings, intended market immaturity and the fact that they have not always made a great difference to lives of the people who would buy it.

To my mind the 02R changes all this and will, quite simply, revolutionise the project studio sector. It's very able, very clever, it's very easy to use, and it's priced right. You cannot ignore it. ■

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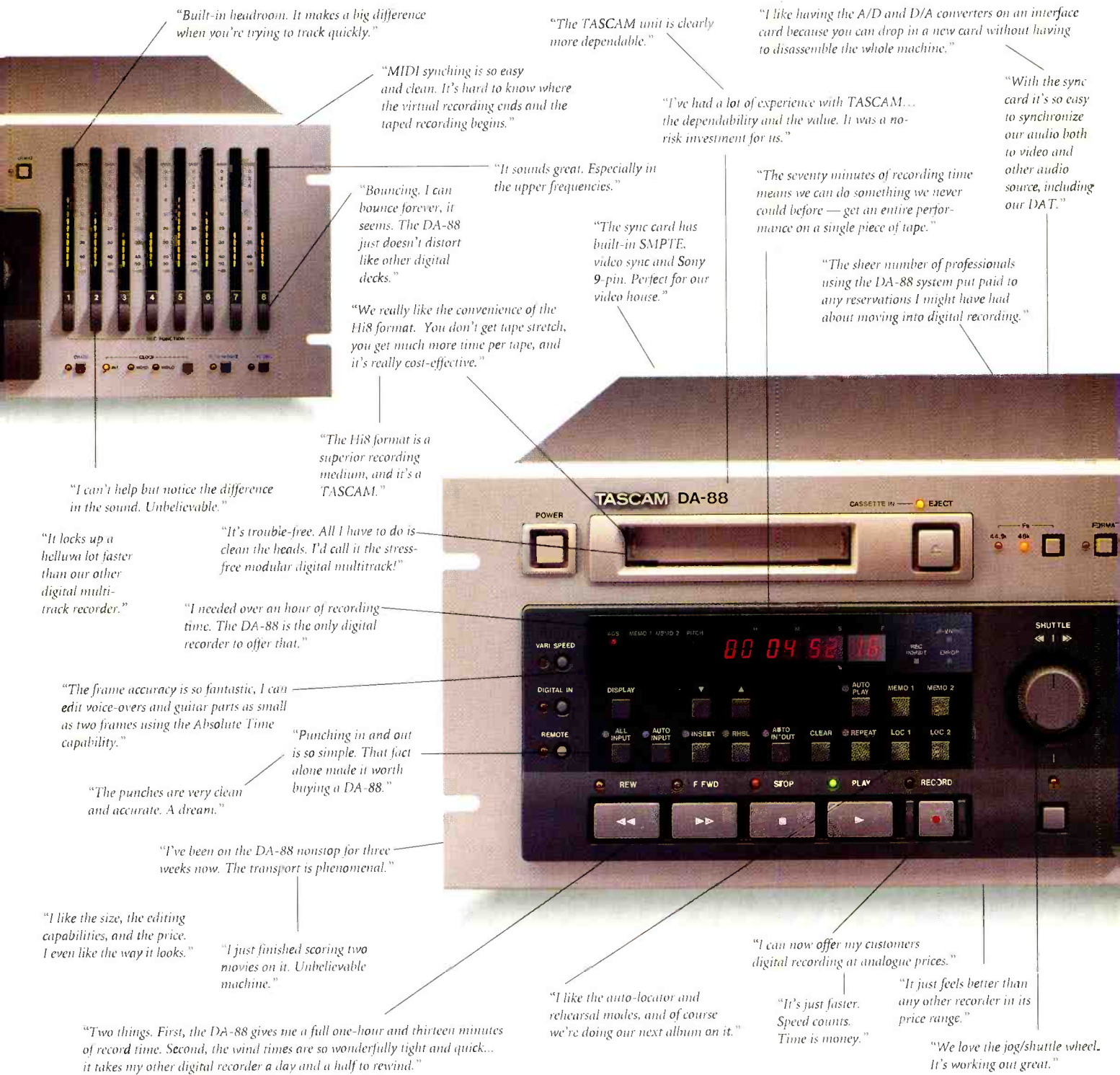
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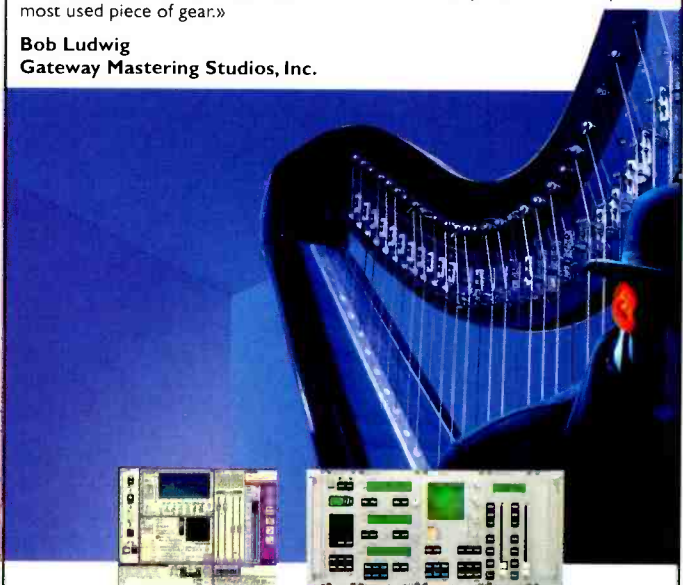
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Audio Design CDR63 (63mins)
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Tel: +44 734 844545.
Fax: +44 734 842604.

BASF

CD-R Master 63 (63mins)
CD-R Master 74 (74mins)
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Fax: +1 617 275 2708.
● **UK:** BASF, 151 Wembley Park Drive, Wembley, Middlesex HA9 8HQ.
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Tel: +1 201 692 7700.
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Audiomaster 63 (63mins)
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● **Germany:** Estemac Electronic, Alter Teichweg 67, D-22049 Hamburg 70.
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Tel: +1 207 773 2424.
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● **US:** KAO Corporation, 40 Grisson Road, Plymouth, MA 02380.

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Writable CD (63mins; 580Mb)
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Fax: +1 716 722 0838.
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Fax: +1 201 342 3342.
● **Europe:** Maxell Ltd, 3a High Street, Rickmansworth, Herts WD3 1HR.
Tel: +44 1923 777171.
Fax: +44 1923 777110.

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Fax: +81 3 3552 8791.
● **UK:** Stanley Productions, 147 Wardour Street, London W1V 3TB.
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Fax: +44 171 437 2126.

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Tel: +81 3 3592 4774.
Fax: +81 3 3592 4255.
● **US:** Mitsui Toatsu Chemicals, 140 E. 45th Street, 34th Floor, New York, NY 10019.
Tel: +1 212 867 6330.
(800 MTC CORS toll free).
Fax: +1 212 867 6315.
● **Germany:** Mitsui Toatsu Chemicals (Deutschland) GmbH, Kö-Galerie (4th Floor), Königsallee 60A, 40212 Düsseldorf.
Tel: +49 211 133729.
Fax: +49 211 320458.
● **UK:** Audio and Design,

Unit 3, Horseshoe Park, Pangbourne RG8 7JW.
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Fax: +44 1734 842604.

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CD-R 63 (63mins; 600Mb)
CD-R 74 (74mins; 700Mb)
● **Netherlands:** Philips PDO, Building SK-7, Glaslaan 2, 5616 LD Eindhoven.
Tel: +31 40 736455.
● **UK:** Philips PDO, Queen Anne House, 11 The Green, Richmond-upon-Thames, Surrey TW9 1PX.
Tel: +44 181 948 7368.
Fax: +44 181 940 7137.
● **US:** PDO, Philips Key Modules Group, 2001 Gateway Place, Suite 650W, San Jose, CA 95110.
Tel: +1 408 453 7373.
Fax: +1 408 453 6444.
● **Japan:** PDO, Philips Key Modules Group, Philips Building, 7th Floor, 13-37 Kohnan 2-Chome, Minsato-ku, Tokyo 108.
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Fax: +81 3 5460 8592.

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CDQ-63 (63mins; 553Mb)
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Fax: 201 930 4752.
● **Europe:** Sony Broadcast and Professional Europe, Jays Close, Viabes, Basingstoke, Hampshire RG22 4SB.
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Fax: +1 408 956 9444.
● **UK:** Plasmon Data Ltd, Saxon Way, Melbourn, Herts SG8 6DN.
Tel: +44 1763 262963.
Fax: +44 1763 262980.
● **Germany:** Plasmon Data Ltd, Frankfurter Ring 193 A, 80807 Munich.
Tel: +49 89 3246 390.
Fax: +49 89 3246 3911.

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CD-R63 (63mins)
CD-R74 (74mins)
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Thats CDR74/670T (74mins)
CDR63/570Z (63mins)
CDR74/670Z (74mins)
CDR63/570P (63mins)
CDR74/670P (74mins)
● **Japan:** Taiyo Yuden, Matsumura Building, 16-20 Ueno 6-chome, Taito-ku, Tokyo 110.
Tel: +81 3 3837 6536.
Fax: +81 3 3837 6555.
● **Europe:** TTS Tal & Ton Studioteknik AB, Gelbgjutarevägen 4, 171 48 Solna, Sweden.
Tel: +46 8 734 07 50.
Fax: +46 8 82 44 76.

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CD-R63B (63mins; 550Mb)
CD-R74B (74mins; 650Mb)
CD-R63P (63mins; 550Mb);
CD-R74P (74mins; 650Mb)
CD-RXG 60 (60mins)
Life expectancy: >10 years
● **US:** TDK Electronics Corp, 12 Harbour Park Drive, Port Washington, New York 11050.
Tel: +1 516 625 0100.
Fax: +1 516 625 0171.
● **UK:** TDK House, 5-7 Queensway, Redhill, Surrey RH1 1YB.
Tel: +44 737 773773.
Fax: +44 737 773809.
● **Europe:** TDK Recording Media Europe SA, Z I

Bommelscheuer, PO Box 120, L-4902 Bascharage, Grand Duchy of Luxembourg.
Tel: +352 50 50 1364.
Fax: +352 50 50 1455.

TRANSCO

CDR74 (74mins; 650Mb)
Manufactured by Taiyo Yuden.
● **UK:** Transco Mastering Services plc, 2 Dean Street, London W1V 5RN.
Tel: +44 171 287 3563.
Fax: +44 171 494 3583.

VERBATIM

VCW-12A (63mins; 540Mb);
VCW-12B (74mins; 640Mb)
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Tel: +44 784 473736.
Fax: +44 784 470760.
● **Central-East Europe:** Verbatim GmbH.
Tel: +49 6196 482666.
Fax: +49 6196 900162.
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YOD 063 (63mins)
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● **US:** Yamaha Corporation, 6600 Orangethorpe Avenue, Buena Park, CA 90620.
Tel: +1 714 522 9011.
Fax: +1 714 739 2680.
● **UK:** Yamaha Kemble Music Ltd, Sherbourne Drive, Tilbrook, Milton Keynes MK7 8BL.
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CDR 63Z (63mins; 660Mb)
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● **Canada:** Zonal Canada Ltd, Unit 42, 4500 Sheppard Avenue East, Scarborough, Ontario M4S 3R6.
Tel: +1 416 609 9011.
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● **UK:** Canford Audio plc, Washington, Tyne & Wear, NE38 0BW.
Tel: +44 191 417 0057.
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● **UK:** CD Revolution Limited, CDR House, Gogmore Lane, Chertsey KT16 9AP.
Tel: +44 1932 562000.
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● **US:** CEI Industries US Inc, 833 Towne Center Drive, Pomona, CA 91767.
Tel: +1 909 626-7819.
Fax: +1 909 626-6756.
● **US:** Creative Data Products, 3751 East Charter Park Court, San Jose, CA 95136.
Tel: +1 408 448 3773.
Fax: +1 408 448-3777.
● **Singapore:** Globe Precision Products PTE Limited, 514 Chai Chee Lane, 06-16 Bedok Industrial Estate, 1646.
Tel: +65 449 7700.
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● **Taiwan:** Linfair Engineering and Trading Limited, 7th Floor, 7 Jen Ai Road, Sec 2, Taipei.
Tel: +886 2 321 4454.
Fax: +886 2 393 2914.
● **France:** Malfroy, BP124, F-40103, Dax, Cedex.
Tel: +33 5874 3171.
Fax: +33 5874 1647.
● **UK:** Stanley Productions, 147 Wardour Street, London, W1V 3TB.
Tel: +44 171 439 0311.
Fax: +44 171 437 2126.
● **Sweden:** Studioteknik AB, Gelbgjutarevagen 4, S-171 48 Solna.
Tel: +46 8 734 0750.
Fax: +46 8 824476.
● **US:** Videomatic US Inc, 2470 Redwood Road, Salt Lake City, UT 84119.
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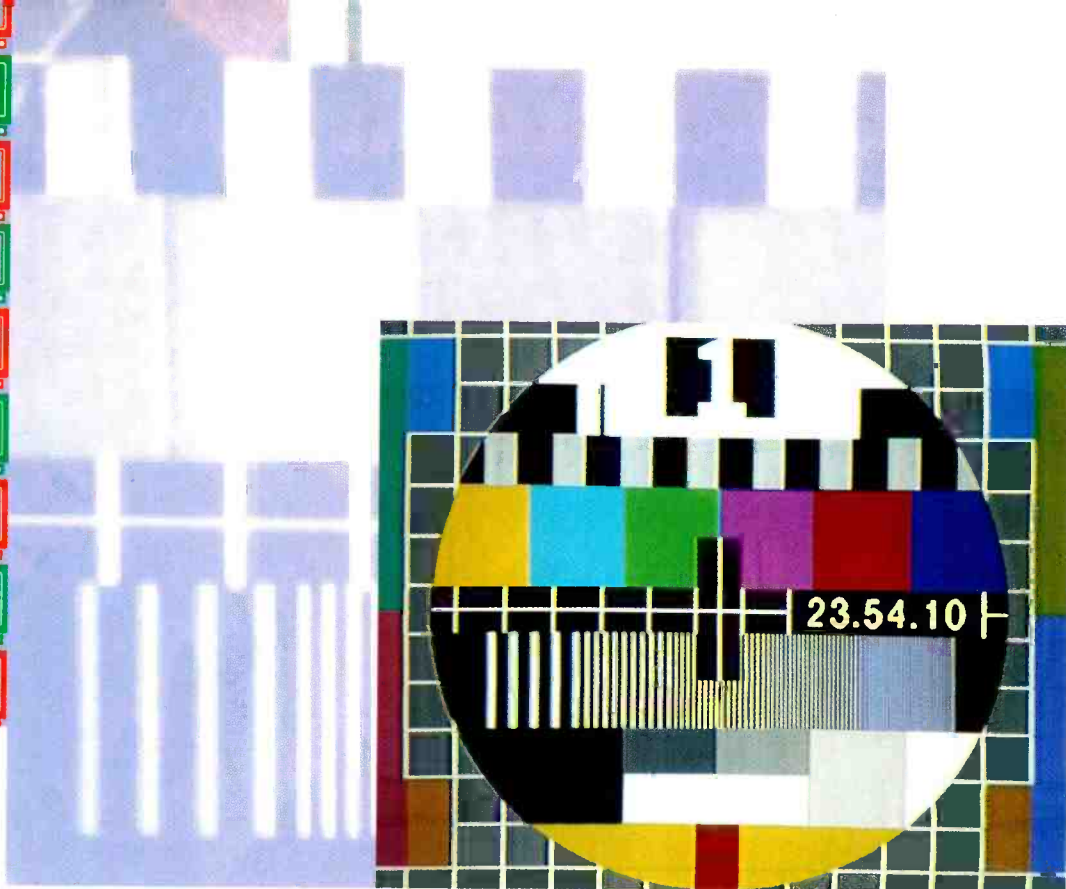
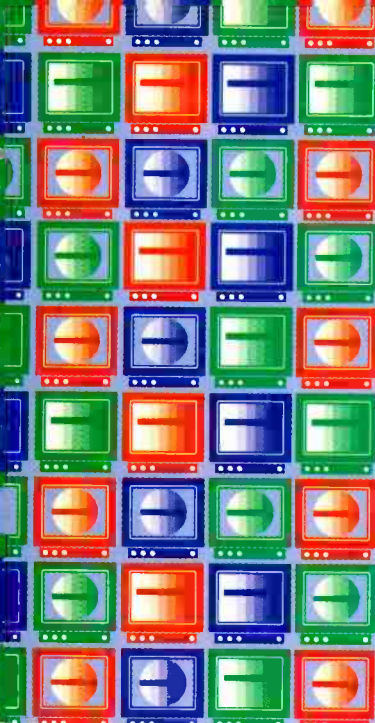
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UNDERSTANDING ISDN

By now there cannot be many people working in the music recording industry who have not heard of the ISDN (Integrated Services Digital Network). But it seems that, rather like Siberia, even though almost everyone has heard of it remarkably few have so far been motivated to go there.

This is in stark contrast to the radio and film industries where, throughout North America and Western Europe at least, the ISDN is being used on a daily basis. And, as the digital telecommunications network expands across the globe, a growing number of other regions are also beginning to take advantage of the ISDN's ability to link remote sites at the push of a button, avoiding the need to use costly and rigidly scheduled satellite links.

ISDN is the high-capacity digital network that forms the backbone of all modern dial-up telecoms systems. High capacity, mainly fibre-optic, cables are made up of multiple 'channels', each one providing the capacity to carry not only voice, but also computer data traffic at 64kbit/s (64 thousand bits per second), more than double the speed of the fastest currently available analogue modems.

Coding systems

By using a codec, a device that data reduces the audio and converts it into a telecoms-compatible data stream, perfectly acceptable mono speech quality can be sent across the ISDN using just one 64kbit/s circuit, and this technique is now being regularly employed by broadcasters for occasional contribution circuits, football commentaries and other applications where a permanent line would be uneconomic to maintain, but where phone link quality is undesirable.

However, 64kbit/s is not sufficient to achieve the audio bandwidth demanded by a music circuit, and so more than one ISDN channel and a more sophisticated coding system is required in order to reduce the 1.4Mbit/s data stream of a 'CD quality' stereo signal to a manageable figure. This is where not only the cost, but also the complexity of the equipment starts to increase, and is probably one of the key reasons why, to date, the recording industry has been slow to embrace this new medium.

The technology required to combine the data streams of more than one ISDN channel has been around for some time and is known as inverse multiplexing. This

involves breaking down the input data stream and splitting it across the required number of channels with the addition of embedded control signals to ensure that the data is reconstructed in the correct sequence at the receiving end.

The need for intelligent multiplexing stems from the way the telecoms companies handle calls. Even if two circuits are dialled, one immediately after the other, there is no guarantee that they will go via the same route. In the case of two calls made to Tokyo from London, for example, one might be routed over a fibre link via the US while the other could be uplinked to a satellite. This could result in two calls, which are components of the same data stream, arriving out of sync.

Unfortunately, until very recently there was no inverse multiplexing standard, with the result that each manufacturer of these devices has developed their own proprietary method. Some attempts have been made by a group of manufacturers to create a form of quasi-standard known as Bonding, but this has, as yet, had little impact.

Almost all of the codecs used by the audio industry employ proprietary coding algorithms which do not work with other systems, and so the problem of multiplexing is rarely an issue—provided always that all the users of a particular system use the multiplexer recommended by the manufacturer.

However, problems have sometimes occurred when using codecs which are billed as conforming to the international ISO/MPEG Layer II 'standard'—more commonly known as MUSICAM

In the family of MPEG audio codecs, Layer III is the most powerful member. It has been merged from former MUSICAM and ASPEC schemes, providing the best audio quality for any given data rate. Layer III is especially useful to achieve a high sound-quality at low data-rates—around, or even below, 64kbit/s per audio channel. Layer III approaches 'CD quality' when using 2 x 64kbit/s, Joint Stereo.

The various makers of these codecs make a great deal of the fact that their systems comply with a coding standards laid down by the hallowed ISO, but the truth is that because they have not until now conformed to any multiplexing standard, they will not interoperate with any other manufacturer's system at data rates higher than 64kbit/s, even when the audio coding algorithms are the same. This has masked the fact that some 'ISO standard' codecs have proprietary aspects to their audio coding too.

The audio industry's use of the ISDN is currently minimal compared with the amount of data being moved around by the multinational corporations, but fortunately they too are now beginning to find that a single 64kbit/s channel is frequently insufficient for their needs. This growing demand for greater bandwidth has resulted in some action by the International Telecommunications Union (ITU), which set up a working group to look at multiplexing and recently published a draft standard, J52.

At the time of writing this 'standard' is still only a draft, but as it is unlikely to change significantly at this late stage a number of codec manufacturers, such as Dialog4 with their popular *MusicTaxi VP*, have gone ahead and launched 'J52 compatible' codecs onto the market.

Another way for a manufacturer to solve the problem of interoperability is to emulate the protocol of another unit's multiplexer, and this is what the designers of a recently launched MUSICAM codec appear to have done. The *L⁴ Blue*, which is the first product of a joint venture between Philips and Canadian company MPR, is claimed to offer full interoperability with the CCS *CDQ2000* series of codecs—probably the most widely used system by broadcasters worldwide. Other protocols are apparently in the pipeline.

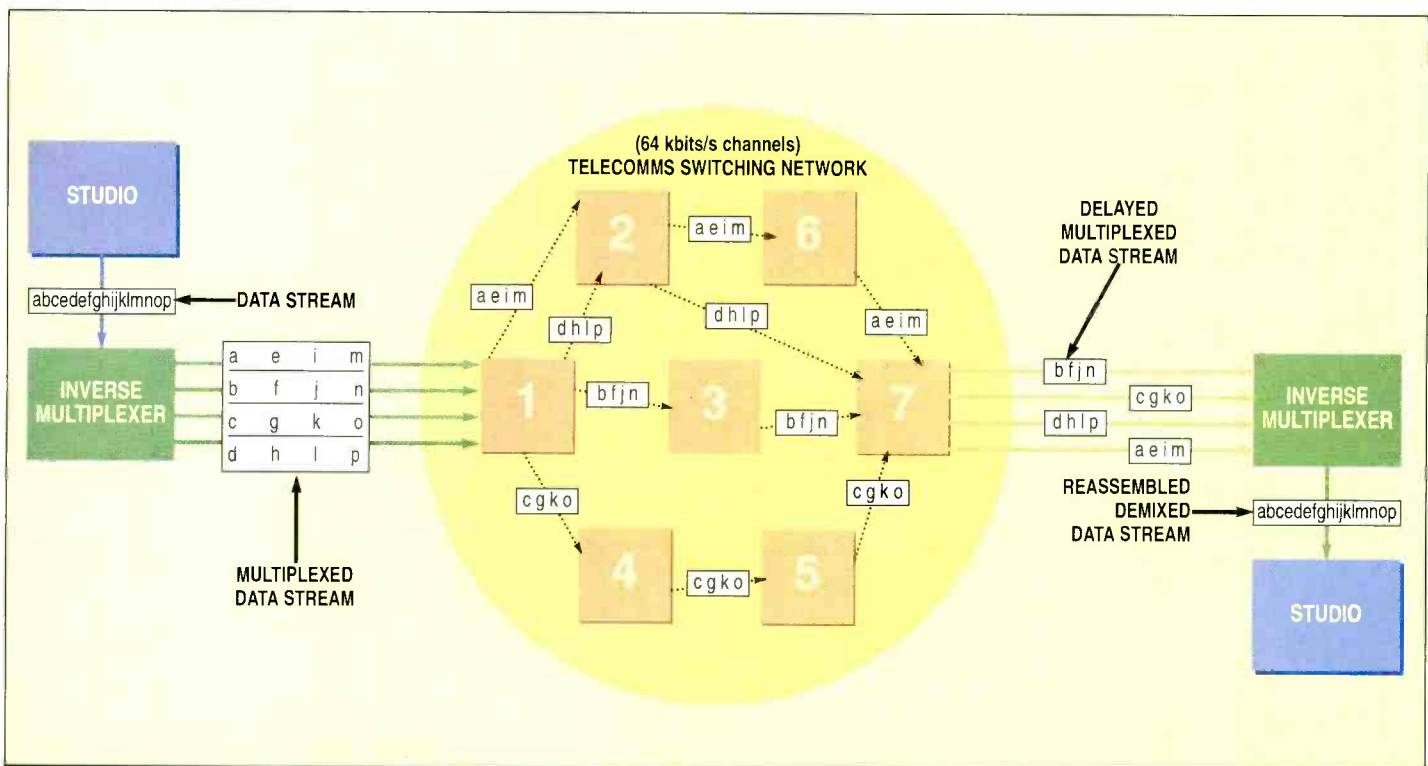
Audio quality

Now we must address the burning issue of audio quality.

The first thing to say on this subject is that however good the coding scheme, data compressed audio is never going to be as good as the linearly-encoded equivalent. It may be close, but it will not be the same.

Although there are now a fair number of different data compression algorithms ►

Currently changing the face of the film and music industries, ISDN suggests the shape of things to come. Bill Foster explains the ins and outs of the Integrated Services Digital Network



The Inverse Multiplexer Function. Separate 64k bit/s channels take diverse routes through the network, introducing delay and order differences at the end of the process. Inverse multiplexing reorders data and adjusts for the delay

around, only three commonly available formats offer the equivalent audio bandwidth to a CD and are therefore suitable for any form of music recording application. The first two use proprietary coding schemes, while the third is an ISO standard which has been incorporated into codecs manufactured by a number of companies.

AC-2 was developed by Dolby Laboratories and is available as a pair of encoder-decoder boxes which handle two analogue or digital input/output signals and convert them to and from an RS-449 format 256 kbit/s data stream. This data is divided into four 64kbit/s or five 56kbit/s channels (see next section) by an Ascend Multiband Plus terminal adaptor. The coding algorithm compresses the audio at a ratio of about 6:1.

The apt-X100 employs Adaptive Differential Pulse Code Modulation (ADPCM) which offers the shortest coding delay of any system, under 3ms, making it ideal for any application requiring two-way communication. The trade-off, however, is data bandwidth: to achieve 22.5kHz requires six ISDN channels. The compression ratio is fixed at 4:1 and so the frequency response varies proportional to the data bandwidth employed.

The ISO-MPEG Layer II (MUSICAM) standard also provides for multiple data rates, ranging from a single channel, giving a mono signal with maximum frequency response of around 7kHz, up to 384kbit/s, which provides full stereo and a compression ratio of 4:1.

MUSICAM is probably the most maligned of the coding systems, which is largely due to the fact that its most common application is in broadcast where a data rate of 128kbit/s is the norm. At such a rate, MUSICAM can only provide a 'joint stereo'

signal and the frequency response is very often limited to 15kHz in order to improve the resolution of the mid-frequency coding. This has resulted in unfair comparisons being made by supporters of other codecs, because they are based on the two coding systems running at different data rates.

At 384kbit/s, or even 256kbit/s, MUSICAM can produce some excellent results. In fact, DCC's PASC coding algorithm is very similar to MUSICAM and this has received praise from some very demanding classical recording engineers.

North America

When connecting with most parts of North America a further complication comes into the equation; the ageing telecoms circuits belonging to the various 'Baby Bells' who operate local telephone services in the US.

As in so many areas of technology, America had a digital telephone system several years before anyone else. And, as is the case with their TV system, that benefit has now turned into somewhat of a liability.

While the data rate of the US telephone system is also based on multiples of 64kbit/s, 8kbit/s are used for signalling and other housekeeping chores. The result is that only 56kbit/s are available per channel, requiring rate adaptation to be carried out when interfacing with 64kbit/s circuits in other parts of the world.

Computer-to-computer links between the two systems are comparatively straightforward: the computers simply exchange data at 56kbit/s and the remaining 8kbit/s are packed with zeros when travelling over the 64kbit/s part of the link. But,

depending on the coding system being used, the loss of 8kbit/s can cause a problem when transmitting audio.

Each of the three aforementioned audio coding systems handle the loss of data bandwidth in different ways. MUSICAM coding loses some resolution due to the 12% reduction in data available, while apt's *DSM100* narrows the audio bandwidth so that the 15kHz stereo signal obtained from a 256kbit/s link becomes 13.5kHz at 224kbit/s.

Depending on your viewpoint, Dolby have the best, or the worst solution. In order to avoid any compromise to the audio quality the rate of 256kbit/s required by the AC-2 coding scheme for a 20kHz bandwidth stereo signal is not variable, so when connecting with 56kbit/s circuits it is necessary to dial up an extra channel.

The telecom companies make no distinction between 56kbit/s and 64kbit/s when charging for a call, and so transmitting from an area served by the ISDN to a SW56 destination will increase the cost of the connection by 25%. Not only that, in order to access five SW56 channels it is necessary to install an additional ISDN line—something which many European studios do not realise until they first try to make a link with the US.

Cost factors

Despite the enthusiasm for ISDN within the broadcast and film industries, music recording studios have been notably slow to embrace this technology. Even in the US, where producers like Phil Ramone have used telecom-based links for a number of high-profile projects, overall take-up has been slow. So why is this? ►

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The most logical answer is money. Although lines are reasonably priced in some European countries, in the UK and the US the cost of installing circuits is still a major deterrent. Codec prices are coming down, but systems which are good enough to handle audio that may be destined for CD release are still not cheap, with prices starting at around UK £6,500-US \$10,000.

Even then, use of today's systems should really be limited to component parts of a recording, such as a vocal or guitar overdub because of the risk of artefacts appearing down the line if a full mix were to be data compressed and then subsequently released or transmitted in a format that involved a different coding system—MiniDisc or DAB being good current examples.

Although it is not yet economically viable to transfer real-time, linear, digital audio over the ISDN, except perhaps point-to-point over short distances, by using technology borrowed from the publishing industry it is feasible and fairly cost-effective to transfer short audio files between workstations, and to date a number of successful transfers of *Sound Designer II* files have been made using an ISDN board plugged into a Mac's NuBus slot.

While not all workstations store their audio in a format that is ISDN-compatible (without complex and time consuming file conversion which negates the point of doing it), many have begun adapting their file formats to make them easier to transmit over ATM, and as this is effectively just a high-bandwidth version of ISDN a by-product of this is likely to be ISDN compatibility.

Solid State Logic have taken this a stage further with *WorldNet*. By using a combination of codecs from their sister company apt, and direct ISDN interfaces, they can link two *ScreenSound* or *Scenaria*-equipped studios to exchange either data compressed audio in real time or uncompressed programme files (complete with EDLs) in non-real time.

Installing lines

In whatever country the studio is located, tariffs are an issue. In most countries the charge for international data circuits is higher than those for voice—often by a factor of two or three.

One of the most expensive of these used to be the UK. In 1993 the cost of calling the US was £1.40 per channel, per minute. Today the same call costs just £0.65 via BT, a dramatic reduction that has largely been brought about by competition from the UK's second telephone network, Mercury, who last year started to offer an indirect (via BT local lines) Basic Rate ISDN service.

Other countries, while not yet enjoying the UK's duopoly, are also finding that their rates are coming down. This is because much of the traffic over the ISDN is generated by multinational companies and if they find that another country is significantly cheaper they will simply originate the call at the other end.

This increasingly competitive environment will benefit studios too. In fact, as an industry we are starting to become a worthwhile source of income for the telecom companies. One account manager I

spoke to recently was startled to learn that an ADR session for a feature film between London and Hollywood had involved seven hours of connect time using five ISDN channels—35 hours in total. When compared with many computer-to-computer file transfers, which often last only a few seconds, this was serious usage.

Despite the sizeable telephone bill, it still represented a massive saving for the production company over the cost of flying two big-name film stars from London to Hollywood and putting them up in a 5-star hotel for a couple of nights.

One area where data compressed audio over the ISDN can offer a real benefit is for mix approval. On a first pass none of the full-bandwidth coding systems cause any significant degradation to the audio signal, and this means that the comparative ease with which links can be established between cities, or even continents, provides a huge advantage in this respect.

Anyone who has used an ISDN-based system to obtain instant approval of a mix or performance will tell you how much easier it is than sending a DAT by courier and then having to reset a mixing desk several hours, or days, later when the A&R person does not like what they hear. It is for this very reason that a growing number of record company A&R departments are installing codecs in their offices, with these frequently being linked to a DAT machine so that any overnight transmissions from other time zones can be stored for replay the following day.

Getting on board

If the above has whetted the appetite to join a growing band of studios who are throwing caution to the wind and installing ISDN service, how does one go about it?

Procedures vary from country to country, but here are a few tips which may help smooth the path.

Outside of the US, ISDN lines are provided by the national telephone company as two distinct

types of service. The first of these is Primary Rate (PRI), which consists of a fibre optic or co-axial cable laid directly to the customer's premises from the exchange. PRI has the capacity for up to 30 lines (or multiples thereof) and so it is more frequently found in the headquarters of large corporations rather than in studios—unless they have a digital PABX and use some of the circuits for regular voice and fax traffic.

Basic Rate Interface (BRI) is a much more cost-effective system which is also very simple to install. For this reason it is by far the most common means of delivery to publishing houses and studios. Each circuit provides two 64kbit/s channels—known as 'B' channels—plus a 'D' channel which is used by the telephone company for signalling (dialling in layman's terms). The service is usually delivered on standard copper pairs which terminate in a special line box.

In the US there are now some areas, notably Manhattan, that are served by the same ISDN standard found elsewhere in the world, but in most parts of the US and Canada Switched 56 and its primary rate equivalent, T1, are still the normal method of delivery.

SW56 is always provided by the local 'Baby Bell', whereas T1s are sometimes linked directly to the long distance carriers. Although the initial cost of installation is normally higher than SW56, these T1s provide 64kbit/s channels which can be interfaced directly with ISDN services.

In addition, a small number of companies in the US provide private T1 circuits. These offer the additional advantage of contiguous bandwidth up to 1.5Mbit/s and so do not need inverse multiplexers, unless connection is required to the public network. It was on one of these private T1s that EDnet built their original DMS network, although in recent months they have begun to switch over to SW56 or ISDN as the demand for interconnectivity with non-EDnet and international studios increases.

Because ISDN lines are to all intents and ►

SYNCING ANALOGUE TAPE DECKS

So much for synchronising digital audio recorders; how do good old-fashioned analogue decks sync up? And do any of the same issues apply when synchronising to video?

The equivalent of a sample rate clock in an analogue tape deck is a tachometer control pulse sent to the capstan motor. This pulse usually happens at a frequency of 9600Hz (in countries with a 60Hz AC mains frequency) or 8000Hz (in those with 50Hz mains). Changing the frequency of this pulse changes the speed of the tape deck. That's why varispeed was often referred to as VSO (variable speed oscillator): what actually changed was the capstan oscillator's tach pulse frequency.

A tape deck synchroniser takes over control of the capstan's frequency by remotely feeding it this pulse. It receives SMPTE time code from a track on the tape, and compares the speed of that code to a reference such as the master deck's time code. If it finds the slave's time code drifting

a bit ahead, it will slow down the capstan frequency to compensate (and vice versa). This has the same end effect as changing a digital audio device's sample rate.

Whenever we mention changing the sample rate to follow some timing kink in the road when slaved to video, in essence the same thing must be done to the capstan tach pulse in analogue deck as well. For example, if an analogue Nagra tape deck was resolved to a film camera's pilot tone on location, and then the film was slowed down by 0.1% to transfer it to NTSC video or sped up by 4.2% to transfer it to PAL or SECAM, the Nagra must also be slowed down or sped up by the same amount to keep everything in time.

This is the goal of synchronisation: keeping everyone at the same relative pace. The real difference when dealing with digital audio is that, not only may you drift out of sync, you might shut down altogether. ■

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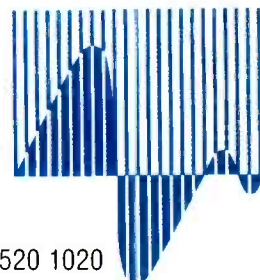
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purposes telephone lines, temporary circuits are easy to install anywhere where telephone service is available. But, depending on the telephone company, the cost can be high.

For example, in the UK a temporary ISDN line costs the same to install as a permanent line—£400 at the time of writing. In addition there is a minimum charge of two month's rental and so two lines—which would provide the four 'B' channels required to operate, say, a Dolby system—will cost more than £1,000, plus call costs and any rental charges for the equipment; quite a lot if it was just needed for a short vocal overdub.

One solution to the problem of linking with a location that has no ISDN lines, an outside venue for example, is to use a two-way wireless modem. One unit is connected to the codec, while the other is positioned at a nearby site where ISDN service is available. This method has been used with some success in the US, but although I was able to obtain a temporary licence in order to give a demonstration at the *Studio Sound*-sponsored 'ISDN Briefing' during 1994's APRS show, the EU have not yet allocated a permanent frequency on which these units can operate.

Video

A frequently-asked question is when it will become economical to transmit acceptable quality video over the ISDN in real time. Using existing 64kbit/s circuits. The answer is probably never.

An uncompressed digital video signal with accompanying AES-EBU audio requires the equivalent bandwidth of more than 4,000 ISDN 'B' channels, making it a totally impractical proposition. In fact, whatever coding scheme were to be used, I do not believe that simple compression by redundancy would never reduce the rate sufficiently to make transmission over the ISDN an economical proposition.

Video-conferencing systems combine various methods of coding including frame rate and pixel reduction in order to get moving pictures over a manageable number of channels, but even at 384kbit/s the quality is acceptable only for fairly static objects and would be virtually useless for applications such as remote ADR or sync-to-picture.

A couple of systems are being marketed which use a 'store and forward' technique where video is J-PEG encoded onto a computer's hard disk (the same process used by most nonlinear video editors) and then transmitted as a file to a similar receiving system. A 30-second commercial takes between five and 30 minutes to transfer over a pair of ISDN channels, depending on the final quality required and the size of the picture window.

The drawback of this technique is that anything longer than an advertising spot takes a very long time to send. ADR sessions often involve full 10 or 20 minute film reels and in this case a non-real-time transfer would be impractical. The solution adopted by the film industry has therefore been to provide a video copy to the remote site and lock this to the master using time code transmitted over the link.

However, transmitting time code over the ISDN along with audio can be a problem because it usually involves taking one of the two audio channels for the

code. Fortunately, some recent developments are greatly simplifying the process.

apt are offering a solution by adapting their codec's RS232 data channel so that it can carry time code; effectively providing a third channel. At the remote end a standard machine synchroniser is connected to the extra (time-code) output and this drives the multitrack or video recorder.

A refinement to this technique is offered by British synchroniser specialists CB Electronics. The *IS-1* ISDN Synchroniser is an adapted version of their SS-2 video synchroniser and was originally developed for London-based ISDN network, The Audio Exchange. The unit takes time code or 9-pin RS422 command signals in and converts these into an RS232 format data stream which can be transmitted by any audio codec fitted with an RS232 data port. At the remote site another *IS-1* decodes the data and drives a 9-pin controllable machine in sync with the master.

Although a more expensive solution than apt's, the *IS-1* is ideal in situations where there is no skilled operator at the remote end.

One current application links a production studio in London's West End with a video recorder and stereo audio system in the creative department of an out of town advertising agency. This allows the producers at the agency to view a video copy of a TV spot with 'live' audio coming from the studio, thereby saving a cab ride through London's traffic each time they want to approve a voice-over or mix. The agency people can also talk back to either the engineer or voice-over artist at the studio.

The future

A number of studios who are as yet reluctant to commit themselves to a full system have been going half way by installing permanent ISDN lines and renting codecs when they need them. In some ways this is a sensible measure: with at least three incompatible formats the limited number of music studios that can presently be accessed by ISDN is reduced further where only one coding system is available.

When a system is used frequently it naturally becomes more economic to buy. and some studios will undoubtedly find that they are using one system more than the others; especially if they concentrate on one particular type of work.

Also, as with all studio equipment, prices will inevitably fall, and equally inevitably by the end of the decade ISDN is likely to be as commonplace as the once-expensive fax machine is now.

The network is also becoming cheaper to access and to use, while the number of countries going on-line increases almost daily. Broadcasters' demand for links during the recent Rugby World Cup was the impetus required for the South African telephone company to open up international ISDN circuits, while the new digital switching systems being installed throughout the former Eastern Bloc should bring ISDN to most of that region within five years.

A future article will look at the ways in which the ISDN is being used in both recording and postproduction in various parts of the world. ■

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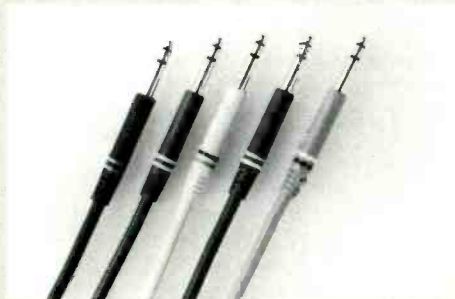
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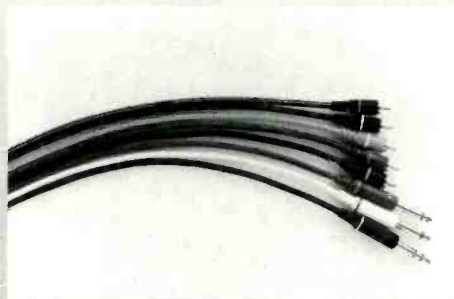
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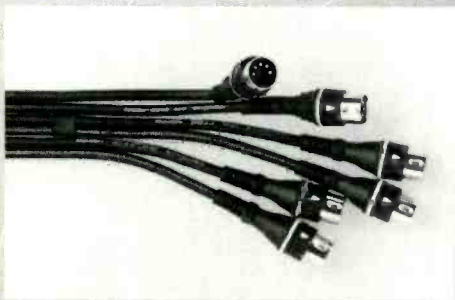
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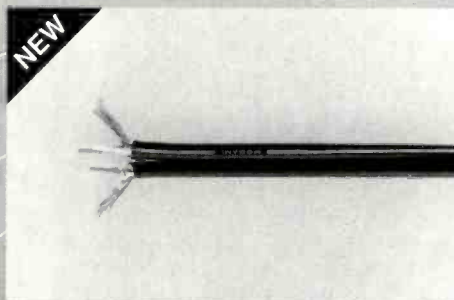
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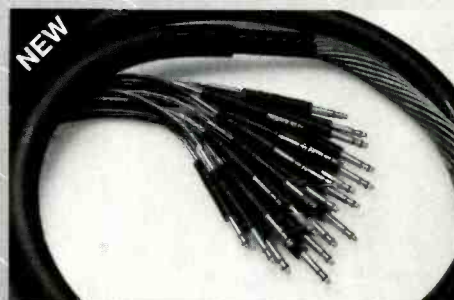
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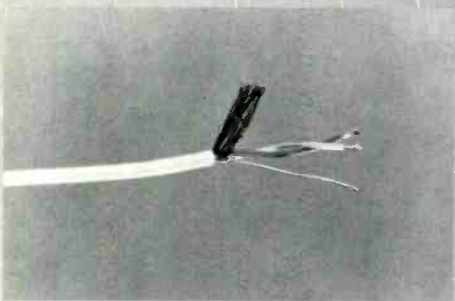
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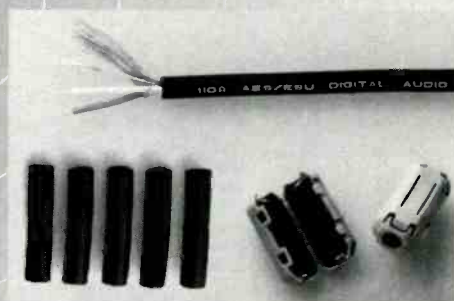
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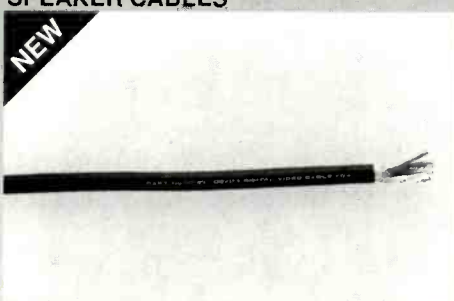
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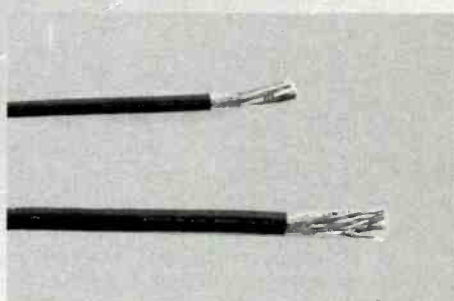
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The recent conversation on audio education versus the needs of studio owner-operators that appeared in this magazine ('The Great Debate', April 1995, *Studio Sound*) focused attention on a topic that has vexed studio management, educational-programme administrators and students since the inception of audio education 15 to 20 years ago. It is curious that the expressions of the UK studio community virtually echo those of studio operators across the pond, where these issues receive an almost continuous airing. There are strong feelings expressed in the several quarters that, firstly, students should be 'customised' for the recording studio business to really be of value as potential employees; secondly, that studio owner-operators should understand and respect the quality and diversity of the education possessed by the students they interview for employment; thirdly, that the students are angry about not being able to find enough employment, both suitable and adequate, in their chosen field. Each side: studio operators, academic programme heads and students are convinced of the righteousness of their arguments.

If we go back to the late 1930s and early 1940s, we would find electrical engineering programmes worldwide where audio and radio-frequency engineering would be part of the 4-year curriculum and that a specific professor might have a strong interest in the area that led to a specific subprogramme. In addition, that interest could lead to 'grants' from such audio giants of the day as RCA, EMI, General Electric, Tannoy, Telefunken, ATT... The science of physics saw similar individual emphasis on studios and their acoustics, with university experts such as Vern Knudsen of UCLA servicing the Hollywood studios and audio industry experts such as RCA's Harry Olsen, guiding any number of budding acousticians, virtually one-on-one.

World War II shifted the emphasis from film sound, AM radio and auditorium-arena sound reinforcement to military applications to such things as the Beachmaster sound systems used at the 1944 Normandy invasions and the acoustic proximity fuse used in anti-aircraft shells. The emphasis remained on audio engineering programmes with such revered engineering institutions as MIT (Massachusetts Institute of Technology) and Cal Tech (California Institute of Technology) jumping on the audio technology bandwagon.

The conclusion of World War II saw the advent of consumer audio—hi-fi. Academic engineering programmes continued to focus on audio as military, consumer, FM broadcast, entertainment. TV-film usage grew. This continued into the 1950s and early 1960s until it became obvious to every Dean of every engineering programme worth its weight (except in Japan), that the computer was the engineering programme cash cow of the future.

Make no mistake, all of these programmes were at the engineering level, with very little educational activity for audio practitioners. One of the highest profile audio practitioner programmes during the period was run in the 1950s by the legendary Howard Tremaine, author of the long-lived first and second editions of the *Audio Cyclopaedia*. Not so long-lived was Tremaine's

Martin Polon

Education or profit? The Great Education Debate continues

University of Hollywood audio course, but it did prepare individuals for employment in Hollywood's elite film sound and other related 'craft' unions during the mid-1950s—the one period when these unions were fearful of member shortages.

During the 1960s and 1970s, most were trained on-the-job or by hobby avocation as with radio hams, or as teenagers by friendly radio or studio engineers who would let the young men hang out in the control room. High schools had small radio stations that sparked the interest of many in audio as a career. Although hindsight is always accurate, the University engineering schools had made the right call about de-emphasising audio engineering curriculums in the 1950s and 1960s since over 75% of all audio equipment manufacturing in the Western World had gone offshore (read Japan) by 1985.

Two-year public and private vocational 'hands-on' audio schools had been running since the 1950s and 60s, in most cases struggling to expand—while students at 4-year institutions had to depend on programmes in radio and television broadcasting plus service with the campus audio-visual department and/or sound crew to provide usable audio skills.

Twenty years later, with little or no organised 4-year instruction in audio going on in the interim, we began to see the rise of musician-practitioner education—strongly aligned with music and musical schools.

What was so exciting initially about audio learning that was educationally linked to the making of music, was that it promised to deliver virtual Tonmeisters with popular skills as well as the classical. The European tradition of Tonmeister training, combining in the classical genre, the best of musical recording techniques with the best of audio engineering, had been slowly producing superbly trained individuals during the 1960s and 1970s. Almost a one-on-one programme, Tonmeister

At the other end of
the spectrum, we
have seen the
creation of hundreds
of thousands of
sustainable personal
and project studios

training was the paradigm that everybody in the audio industry 'ooohed' and 'aaahed' at.

By the 1980s, the demand for trained audio practitioners had jumped to in excess of 15,000 job openings a year—in North America alone. That assumed a total number of jobs at the 150,000 level, with an annual turnover of 10% or better. The 4-year music departments with dedicated programs in studio audio continued to grow, trying to match demand with their graduates.

Since 1980, we have watched curricula expand to number over 200 in the US and over 200 in the rest of the world. These schools turn out well in excess of 4,000 graduates each year. Unfortunately, the audio (and related) job pool has shrunk by 66.6% worldwide in the last 15 years. In the US for example, by 1995, there are less than 50,000 jobs available for audio program graduates (with a turnover rate as low as 1%). Even the 50,000 job figure holds only if you include high paying positions in high-end hi-fi salons. US government statistics credit only about 37,500 such studio-audio or related jobs, without the hi-fi job component.

Where did all the jobs go? The answer is that changing technology did away with most of the positions which were used to feed individuals into studios. For example, film-sound work used to involve two operators—one to run the sound recorder and one to mix. Now, one person does it all. Similarly, TV news used to require a separate sound engineer. Now, in many instances, the videographer does it all. In many of these and similar cases, the lost jobs were 'givebacks' from unions that could not justify the obsoleted positions in the face of advancing technology.

Consider the case of motion-picture theatre complexes where 14–20 screens will be under the control of one or two equipment operators (read: projectionists), with automated equipment. Similarly, corporate and educational institution audio-visual support departments have replaced slide and film projectors, open-reel tape recorders and associated audio equipment run by operators, with multimedia personal computers running presentation programmes, VCRs and audio cassette recorders that the end-user can self-operate.

And nowhere has this contraction in job availability been more apparent than in recording studios. In the US, between 1980 and 1995, we have gone from the several thousand mainstream major-league music, advertising and postproduction recording studios to under one thousand large, 'conventional' recording studios. These are the facilities that deliver the jobs. At the same time, but at the other end of the spectrum, we have seen the creation of hundreds of thousands of sustainable personal and project studios. Unfortunately, these new trend studios employ far fewer individuals because, in addition to being much smaller than the mainstream studios, they are owner operated.

What we find in 1995 is the flip side of 1975. There are more and significantly better educational programmes turning out more graduates to compete for fewer jobs available to the graduates and therein lies the rub.

We shall pursue the education conundrum in a future column. [Amen to that!] ■

In an ideal world, legislation would respond to changing circumstances and work in the common good. Someone once observed that we get the laws we deserve but what was intended as irony probably reflects something closer to the truth. Broadcasting has become a pet subject for legislators, and Europe is set to see far more activity from the civil servants and their political masters in this field—despite the past ten years having already seen much investigation into the media *per se*, with the introduction of both voluntary and statutory controls in some territories.

All European countries have had to adapt to the rapidly changing nature of newspapers, radio and television, particularly cross-media ownership, the emergence of all-powerful proprietors (some of whom, like Silvio Berlusconi, have had a go at making the laws themselves), and the introduction of new technologies. Broadcasting is most affected by emerging techniques, which enable services to stretch around the world, not only in their search for an audience but also in reach—the drive to be seen to bring the world into the viewer's front room.

Things have moved on considerably from the broadcasts of the 1950s, when newscasters would say things like, 'Story now, pictures at eleven', because the film was still on its way back to the studio. 'Now' live means live; even if the anchor only interviews a reporter in the field about something that may or may not happen, the station is still seen to be doing something. Technology—ENG crews, satellite fly-aways, micro-wave links—have made this possible, and, as journalist Alison Pearson pointed out, the fact that there is nothing going on does not seem to matter.

I live not far from the South London law courts where rogue footballer Eric Cantona appeared on assault charges; the front steps of the building were taken over by press photographers, while the adjoining street was full of OB vans, many with satellite dishes or microwave aerials on top, all for a brief snippet of the taciturn star pushing through crowds. (My biggest surprise was at the presence of a French broadcast truck, as I thought that Cantona's homeland had given up on him completely.)

All this has made the world smaller (although I still wouldn't want to paint it), and this troubles some politicians. With cable and satellite technology, it is easier to move beyond the bounds of a broadcaster's country of origin, giving them a whole new audience. This, of course, makes regulation a problem and it is this situation that is causing governments to consider a new legislative structure to take their countries into the next century. In many respects, the UK acted too quickly, and, as can be seen with NTL's call for changes to the law to allow digital terrestrial transmissions, there will have either have to be additions to the existing legislation, or a total rethink.

But the 1990 Broadcasting Act was not intended to prepare the UK for the coming of new technology and the 21st Century—it was purely designed to break down what the then Prime Minister, Margaret Thatcher, saw as 'the last bastion of restrictive practices', namely independent television. In his 1992 collection of essays, *Distant Voices*, liberal journalist John Pilger neatly catalogued the late 1980s, when Thatcher's policies of deregulation

Kevin Hilton

A shrinking world is facing growing legislation—and nowhere is it growing more quickly than in broadcast

reached their peak, supported by backed media mogul Rupert Murdoch, who had defeated the print trade unions and used his newspapers to support the Government. Pilger wrote: 'These efforts. . . produced a farcical "auction" that cost the industry heavily in resources, while leaving most of the network in place.'

The auction process continues with the advertising of the licence for Channel 5 ('On Air', June 1995, *Studio Sound*). Murdoch's consortium have bid the almost laughable sum of £2m, knowing that the highest bidders generally win, and although he has said that he is not that interested in C5, he may be hoping to emulate Central TV, which retained its ITV franchise for the bargain price of £1,000. (To allay fears, I am not criticising Central or comparing it to Sky, merely pointing out the inconsistencies of the present system.) If he wins, however, it will for the first time bring him under some kind of regulatory system; at the moment he can pretend that BSkyB is not a British broadcaster by virtue of the fact that it is uplinked from Luxembourg—despite being headquartered just outside London.

The Green Paper discussion document on broadcasting of the late 1980s, and the subsequent legislation, took very little notice of emerging technologies, or of the fact that, like it or not, the UK is part of Europe. Perhaps the Department of National Heritage should take a look at the Green Paper recently published by the Irish Government, titled *Active or Passive?—Broadcasting in the Future Tense*. This weighty tome, which nearly crushed the cat when the postperson catapulted it through my letterbox, opens with an extensive examination of the Republic's broadcasting needs, putting them into a wider perspective by considering the country's position in Europe and the rest of the world.

Like most countries, Irish broadcasting is split between a public broadcaster and independents. The public service is provided by Raidió Teilifís Éireann (RTÉ), which broadcasts two national TV channels, four national radio stations (with FM3 Music and Irish-language service Raidió na Gaeltachta sharing a VHF network) and Cork Local Radio. At the moment, the commercial sector is solely national, local and community radio. The Government plan to introduce an independent

national TV service, and are actively establishing a separate national Irish-language station, Teilifís na Gaeilge, which will draw on the facilities and experience of RTÉ but which will be regarded as an independent entity. The four UK TV channels can also be received in Ireland.

One of the main issues raised in the Green Paper is that of emerging technologies, particularly how telecommunications, broadcasting and IT can be developed and integrated. As in many other European countries, the maintenance of a public service broadcasting remit is a priority, and the Government appears keen to pay special attention to this during the coming explosion of services, many of which will come from outside Ireland, aided by the growth of satellite, cable, and, most especially, MMDS (multipoint microwave distribution system, aka wireless cable). Also taken into consideration are high definition-widescreen TV, digital compression-transmission, and DAB, with a nod towards the future and Integrated Broadband Communications Networks.

Other sections of the document look at privatising activities that are presently in the public sector, notably RTÉ Network 2 and the transmission chain. There are also suggestions that RTÉ should expand satellite activities and attempt to reach an international audience. At the moment the public service broadcaster provides a 24-hour radio service to Europe over Astra, and three and a half hours of programming a day to North America, which could expand into a full 24-hour commitment. The future of Atlantic 252, the long-wave music radio station broadcast to the UK from just outside Dublin and in which RTÉ has a minority shareholding, has been questioned. The document wonders whether its frequency could be better used in the national interest.

Like the UK, the Republic of Ireland is an island state, but successive governments, and the people, have accepted the concept of a single Europe more readily than their close neighbours. The constant cry of the so-called Euro-sceptics in the UK has been that the breaking down of border controls and greater integration will erode national identity. The Irish Green Paper is cognisant of the need to maintain Irish culture, probably one of the reasons why the document is presented in both Gaelic and English languages. (When I called up the Department of Arts, Culture and the Gaeltacht to get a copy, the phone in the press office was answered in Gaelic, which threw me as I only know two phrases in the language: one is a greeting, the other is scatological.)

The Government is welcoming comments and ideas from viewers, listeners and other interested parties, and is looking to receive replies no later than 30th September 1995. There is a very real chance that by the time a White Paper is produced, all the good intentions of its Green predecessor will have been forgotten in favour of political expediency, but for the time being, it does show that some politicians and civil servants have been seriously thinking about what broadcasting is for and how it fits into the worldwide scheme of things. My only problem with the document is that, after a cursory browse, it fell apart and shed pages all over my flat. ■

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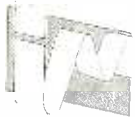
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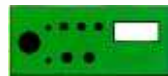
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Perhaps there is some hope for DCC after all. Philips' subsidiary Marantz tell me that their *PMD-601* portable DCC recorder is generating 'enormous interest'. This is a ruggedised deck, with balanced XLR microphone inputs and Ni-Cads that will run for ten hours. Sales being in July. More models are in the pipeline.

Matsushita were Philips' main partner in the DCC venture. At a recent seminar held by Matsushita's hi-fi division Technics, there was one old and lonely-looking *RS-DC8* tabletop DCC deck buried in the display of new product. Technics confirmed that they will start making and selling MiniDisc players in Japan this autumn.

'But we are not planning to introduce MiniDisc to the world market' said Ken Kuno, International Operations Manager. 'In Japan the market requires MiniDisc so we will introduce it. But not in Europe or the US. DCC is a continuing product.'

'We are not introducing our next model yet. But we are working on it. We still believe the sound of DCC is superior to MiniDisc. But the price of DCC components has not fallen as quickly as expected.'

Here things start to get interesting. This autumn Technics will launch a new range of high-quality analogue cassette desks which use a thin film (magneto-resistive) playback head of the type developed as the key component for DCC decks. response is from DC to 25kHz, with S-N ratio better by 3dB, and up to 15dB better channel separation.

In a DCC deck, magneto-inductive thin-film heads are used for recording. But they cannot carry enough current to record wide-band analogue signals, or erase analogue recordings. This is what killed Philips' original plan to sell DCC decks that recorded on either analogue or digital tape. So the Technics analogue decks combine MR playback heads with conventional analogue recording heads.

But Technics engineers think they can make thin-film MI heads work for recording analogue signals, too. Although they do not say so, this would allow them to build a cassette deck that records and plays back either analogue or digital tapes.

As revealed by an advert in *Studio Sound's* sister publication *One to One*, Sonopress are selling their entire DCC production line, at a massive loss. No-one is interested in buying prerecorded DCC's. No-one is



Barry Fox

The rerecordable media melee takes another turn while in-flight entertainment takes a nose dive

interested in buying prerecorded MiniDiscs, either.

The unpalatable truth for the record companies is that the public are so happy with CD and analogue cassette as release formats that there is no market for a new one. If a new hardware format catches on it will be driven by dubbing.

A full dual-function DCC-analogue cassette deck is one answer. Recordable CD is the other. But CD-R is reaching homes through the back door, as a PC peripheral. In other words, people will buy a CD-ROM writer to store computer data, and then use it to dub music. If the disc is *Red Book* compatible. It will play back on a domestic CD player.

So far, the only *Red Book* CD-R discs are write-once. But all the manufacturers are working on *Red Book* CD-Rs that have reversible chemical reactions, and can thus be erased (CD-E). Five years ago Tandy tried with Thor, a dye disc. It was never launched. The disc recorded once, and erased, but all subsequent recordings had a far inferior signal-to-noise ratio. TDK engineers hint that they now have a *Red Book* compatible disc which will record, erase and play back a few dozen times. After that the recording refuses to budge. So the manufacturers dare not sell it to people who are used to reusing tape

an indefinite number of times.

But in reality who needs a million erase cycles, as promised for the non-*Red Book* systems like MiniDisc? Millions of erase cycles are only needed for computer use, where the disc's index of contents must be continually updated. How often do you erase and re-use an audio tape?

No-one expects printer ribbons, ink jet or toner cartridges to last for ever. Cars need regular supplied of petrol and oil. Food perishes. Show leather wears out. Batteries go flat. Buildings need repainting.

Once the public get a low-cost write-once CD-R system, users will quickly become a ready-made target for blanks that cost a bit more because they can be erased a dozen times.

The record industry has lobbied long and hard against home taping, and is now proud to have won a tax or levy on blanks in several European countries. This has created a chaotic situation with different countries charging different rates, and entrepreneurs importing tax-free tapes from neighbouring states.

The tape manufacturers have switched tactic and are no longer opposing the idea of a levy. Instead they are lobbying for a fixed and equitable rate across the whole of Europe and coordinated distribution of the collected tax to stop fraud.

'The record companies have shot

themselves in the foot,' confided one of the leading lobbyists. 'By establishing the precedent of a tax on blank tape and media line MiniDisc, they have made it impossible now to object to the sale of blank CDs.'

A quick tip for travellers. There is not a lot now to choose between the 'name' airlines. They all offer much the same leg room, food and drink for the same basic ticket prices. so they compete on entertainment.

First it was one movie, and you had to pay to hire a low-fi stethoscope headset. Now you get real electronic headphones, and they are usually free. It can only be a question of time before someone takes advantage of this norm to deliver binaurally processed Dolby surround.

Long flights now play two movies, with TV news and comedy sitcoms in between. There is a wide range of music and comedy audio-only channels, too. Virgin are offering Nintendo video games from a very clever computer system, so clever, in fact, that on one flight I was on, the computer crashed and left everyone *sans-entertainment* for a while.

But some airlines still try to skimp, and some cabin seats may have no view of a screen. Others are installing seat back screens with credit card swipers that will allow them to charge for entertainment.

If you have to make a choice of airline for a long-haul flight, ask before you book about the entertainment on offer and whether you will have to pay extra for it.

Talking of airlines, I have a quick fix for the current crazy situation over DVD. There are two rival systems, SD from Toshiba, Time-Warner, Panasonic, Pioneer and Thomson, versus the almost-but-not-quite-the-same-system from Philips and Sony.

Both sides say they believe it is important to have a standard. So important in fact that they each have their own standard and will fight on the open market to keep it. Sales starting next June. Both side keep challenging each other to talk. But they cannot agree on how to talk, or where, or when.

The solution is as simple as was when the same giants were failing to agree on DCC and MiniDisc. Just take the top man in each company and lock them all together in any airport departure lounge at the height of the holiday season. Only let them out when they have agreed a single standard. ■

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